TEAMCENTER

Simulation Process and Data Management on Active Workspace — Usage

Teamcenter 2412

SIEMENS

About Siemens Digital Industries Software

Siemens Digital Industries Software is a global leader in the growing field of product lifecycle management (PLM), manufacturing operations management (MOM), and electronic design automation (EDA) software, hardware, and services. Siemens works with more than 100,000 customers, leading the digitalization of their planning and manufacturing processes. At Siemens Digital Industries Software, we blur the boundaries between industry domains by integrating the virtual and physical, hardware and software, design and manufacturing worlds. With the rapid pace of innovation, digitalization is no longer tomorrow’s idea. We take what the future promises tomorrow and make it real for our customers today. Where today meets tomorrow. Our culture encourages creativity, welcomes fresh thinking and focuses on growth, so our people, our business, and our customers can achieve their full potential.

Support Center: **support.sw.siemens.com**

Send Feedback on Documentation: **support.sw.siemens.com/doc_feedback_form**

Contents

Create the simulation model and define a mesh

1. About Simulation Process and Data Management

Design is an iterative process and often designs need to be modified due to manufacturing constraints or conflicting requirements. It is possible to reduce costs and minimize the time spent on verification and testing by arriving at a good design in the initial stages of product development and by continuously validating the design throughout the product lifecycle. Simulation Process and Data Management is a solution used for validating or improving a design in the early stages of the product lifecycle.

Where do I go from here?

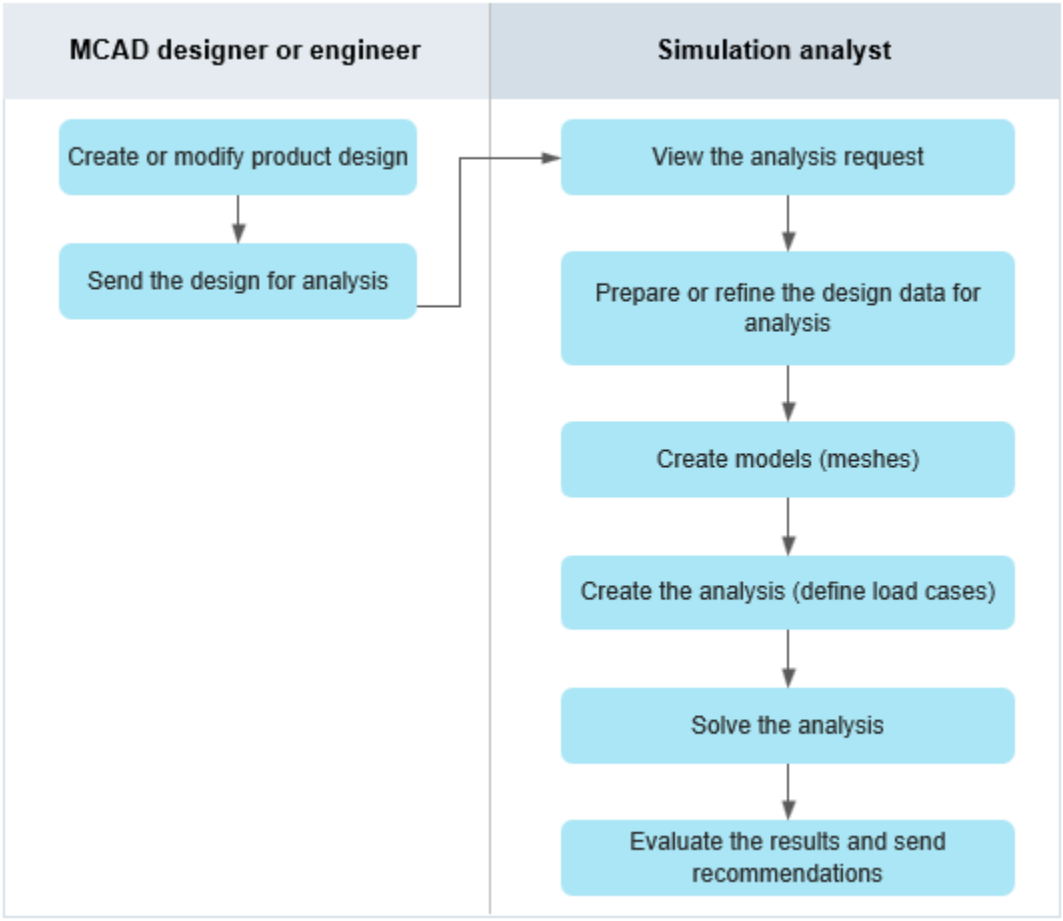
Simulation administrator	See *Simulation Process and Data Management — Deployment and Administration*.
Simulation analyst	
I want to perform simulation analysis in rich client	See *Simulation Process and Data Management on Rich Client — Usage*.
Which workspace to use?	The **Analyst** workspace is the recommended workspace for the simulation analyst role. See *Using the Analyst workspace*.
Prepare the data for analysis	You prepare the data for analysis by simplifying the CAD geometry. After simplifying the CAD geometry by using the appropriate software, you can launch a preconfigured simulation tool to export the simplified CAD geometry. See *Preparing the data for analysis*.
Create geometry revisions for the components you want to analyze	You can create geometry revisions for the components for which you want to simplify the CAD geometry. The geometry revision is often different from the product geometry. It may be a simplified or an abstracted version, or an approximation when the product geometry is not available. See *Create geometry revisions for the components you want to analyze*.
Create the simulation model and define a mesh	While analyzing a large product structure with thousands of components, you can create simulation models or model structures using one of the following options: • **CAE Structure Map**: Generate a model structure for a specific type of analysis using predefined structure map rules. The lead analyst or the designated analyst creates structure map rules. • **Data Map**: Some organizations prefer not to use structure map rules. They prefer to create a model structure that is an exact replica of the product structure using this

	option. After creating this replica model structure, they use predefined derivative rules and variant configuration rules to quickly derive one or more structures relevant to their analysis from the model structure. The simulation administrator defines the data map rules. See *Different ways to generate simulation models*.
Create the analysis model and define load cases	The analysis model represents the specific analysis such as thermal, structural, or fluid you want to perform. It includes load cases, solver parameters, and boundary conditions. After creating the analysis model or revision, you can select the specific revision and launch a preconfigured simulation to upload the load cases, solver parameters, and perform the solve. See *Create analysis revisions and solve the analysis*.
Launch simulation tools	Simulation Process and Data Management provides a framework for launching simulation tools that include preprocessors, solvers, postprocessors, and other tools. You can launch simulation tools as a local launch, local detached launch, remote launch, or server launch, depending on how the administrator configures the launch parameters at your site. See *Launch simulation tools*.
Solve the analysis	You can solve the analysis by launching preconfigured simulation tools. After capturing results from different solvers and verifying results, the analysis data can be released to production. The data is released by signing off from a workflow. You can make recommendations while signing off the workflow. See *Capture results from different solvers and verify results*.
Use the simulation dashboard	The simulation dashboard provides a clear view of the status of all the models and analyses carried out by simulation analysts at the program, milestone, group, or individual user level. It allows decision makers to access the latest information and make correct decisions. See *Why use the simulation dashboard?*

2. Introduction to Simulation Process and Data Management

Simulation Process and Data Management workflow

The workflow for managing the simulation process is as follows:



Understanding Simulation Process and Data Management using an example

1. *View the analysis request*

   Let us assume that you (as a simulation analyst) are an expert in simulated automobile crash testing. The analysis request is to perform a simulated side-impact test for a design change made to the driver-side door.

2. *Prepare or refine the design data for analysis*

Your first task is to import the product geometry and simplify it to make it *relevant* for the analysis. The driver-side door has a speaker; switches for the door lock; power window; and electric mirror; an intrusion beam; steel frames; door panels; and other parts. The speaker and switches are not relevant for the simulated side-impact analysis. You import the complete product geometry and use a simplification tool to remove the speaker and switches. Then, you create geometry revisions for the *intrusion beam*, *steel frame*, and *door panel*, and save the simplified geometry for each component.

3. *Create models*

   The model you want to analyze includes the mesh definition, connections, and material and physical properties. In this step, you create model revisions—in the context of the geometry revisions—for the *intrusion beam*, *steel frame*, and *door panel*. Then, you select the appropriate batch meshing tool to generate meshes for each component.

4. *Create the analysis and solve the analysis*

   The analysis you want to perform includes load cases, solver parameters, and boundary conditions. In this step, you create analysis revisions—in the context of the model revisions—for the *intrusion beam*, *steel frame*, and *door panel*. Then, you select the appropriate solver tool to specify load cases and solver parameters.

   In this example, you create different analyses to vary the load cases, for example, a **3000** pound SUV-like barrier hits the driver side door at **30** mph. You also create another analysis model to change the barrier weight to **3200** pounds and the speed to **35** mph.

5. *Evaluate the results and send recommendations*

   The intrusion beam acts as an energy-absorbing material during a side impact. The results show that the intrusion beam cannot withstand forces of **3200** pounds at **35** mph. After evaluating results from various scenarios, you sign off the workflow by suggesting a design change for the intrusion beam.

Objects you work with

- *Geometry revisions*

  The CAD model is used to define the geometry of a part or an assembly. During the final stages of the design process, the geometry contains numerous details, such as sharp edges, bolt holes, or fillets, which are not required for the analysis. The geometry used for simulation analysis is often different from the product geometry. It may be a simplified or an abstracted version or an approximation when the product geometry is not available. **CAE 3D Geometry** revisions are workspace objects for storing the simplified geometry. Geometry revisions are created in the context of the item revisions in the product structure.

- *Model revisions*

A mesh represents a geometric object as a set of finite elements. Finite element analysis (FEA) is a computerized method for simulating how a part reacts to conditions such as force, heat, vibration, and other physical effects in the real world. **CAE 3D Model** revisions are workspace objects for storing the mesh definition, connections, and material and physical properties. Model revisions are created in the context of geometry revisions.

- *Analysis revisions*

  An *analysis revision* represents the specific simulation you want to perform. **CAE 3D Analysis** revisions are workspace objects for including load cases, solver parameters, and boundary conditions. Analysis revisions are created in the context of model revisions.

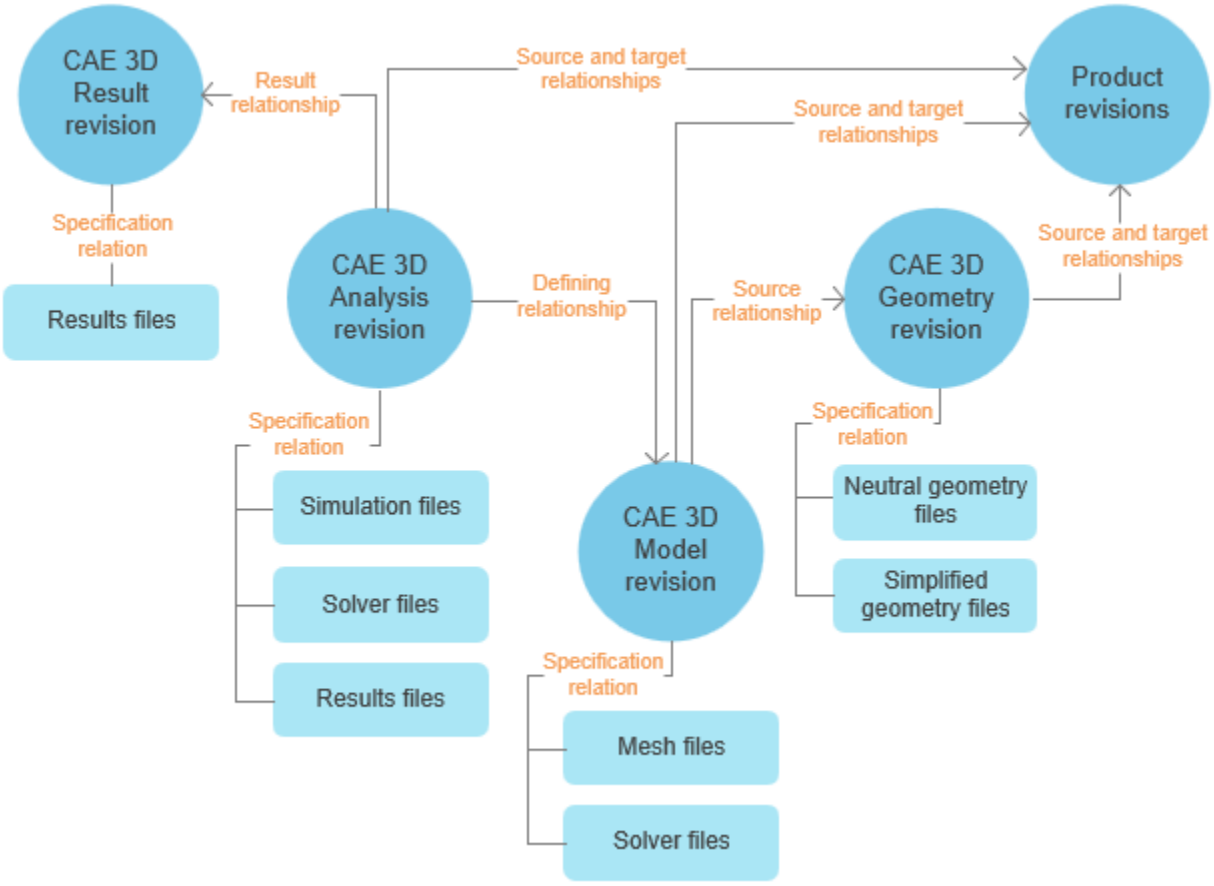
- *Result revisions*

  A *result revision* represents the results of a simulation analysis. **CAE 3D Result** revisions are workspace objects for storing the results of a solve. They may contain JT files or other visualization files that are the results of a solve. Result revisions are associated with analysis revisions.

You can create the following CAE revisions in the context of other revisions along with relationships:

Context revision	CAE revisions you can create for the context revision	Default relationships
Product structure	**CAE 3D Geometry**	**TC_CAE_SOURCE** and **TC_CAE_TARGET**
	CAE 3D Model	
	CAE 3D Analysis	
CAE 3D Geometry	**CAE 3D Model**	**TC_CAE_SOURCE**
	CAE 3D Analysis	
CAE 3D Model	**CAE 3D Analysis**	**TC_CAE_DEFINING**
CAE 3D Analysis	**CAE 3D Analysis**	**TC_CAE_INCLUDE**
	CAE 3D Result	**TC_CAE_RESULTS**

The following is an example of the default simulation data model.



Using the Analyst workspace

As a simulation analyst, you can access all the commands in the **Default** workspace, and some of these commands are not relevant to mainstream CAE workflows. Instead, you can use the **Analyst** workspace. It provides a simplified **Home** page with fewer tabs and commands. These are the ones that you typically use. It contains simplified tabs, pages, and table columns. You can use this workspace to:

- Access the **Subscription** tile to view all the past and current alerts and logs generated during simulation workflows.
- Launch simulation tools to complete tasks.
- View all the relevant CAE objects that you work with from the **Gallery** viewer.

The **Analyst** workspace is the recommended workspace for the simulation analyst role.

To access this workspace, set your **Group** to **Engineering**, **Role** to **Analyst**, and **Workspace** to **Analyst**.

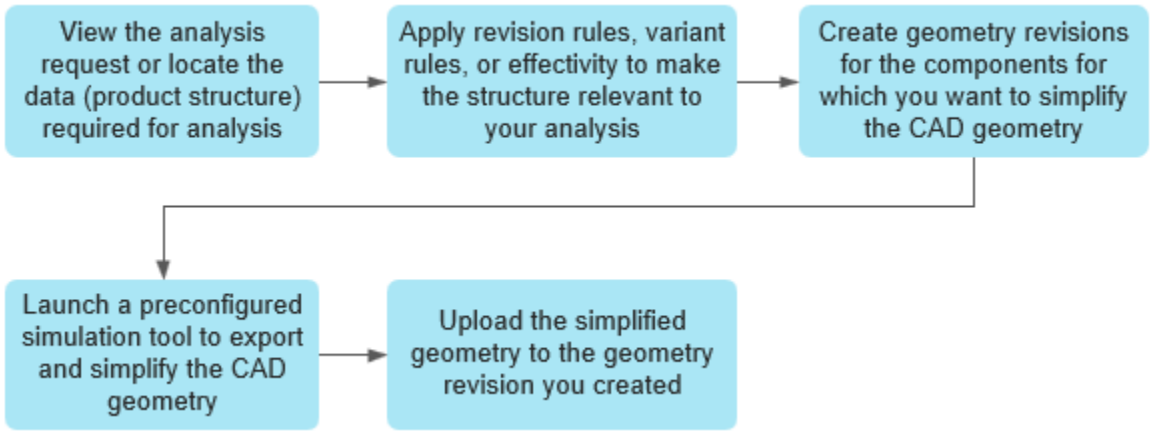
Setting preferences to control the behavior and appearance of Teamcenter

You can work with all Teamcenter preferences by using the **Preferences** page.

For information about retrieving a list of preferences, see Where can I get a list of preferences? in *Teamcenter Administration*.

3. Prepare the data for analysis

Preparing the data for analysis



1. **View the analysis request**

   An engineering manager reviews design requirements and assigns design changes for validation to a simulation analyst using a workflow. The workflow contains the design requirements, configuration information, subassembly, and components required for analysis.

   If your organization does not follow a workflow process, search for a target structure and select the data for the analysis.

2. **(Optional) Apply revision rules, variant rules, or effectivity**

   If you work in a product environment with a lot of variability, such as the automobile industry, you can apply revision rules, effectivity, or variant rules to make the product structure relevant to your analysis.

3. **Create geometry revisions for components for which you want to simplify the CAD geometry**

   You create geometry revisions for the components for which you want to simplify the CAD geometry. The geometry revision is often different from the product geometry. It may be a simplified or an abstracted version, or an approximation when the product geometry is not available.

   In the **simulated side-impact example**, the driver-side door has a speaker; switches for the door lock; power window; and electric mirror; an intrusion beam; steel frames; door panels; and other parts. The speaker and the switches for door lock, power window, and electric mirror are not relevant for the simulated side-impact analysis. You export the complete product geometry (next step) and use a simplification tool to remove the speaker, switches, and the electric mirror.

4. **Launch a preconfigured simulation tool to export and simplify the CAD geometry**

   The CAD model is used to define the geometry of a part or an assembly. During the final stages of the design process, the geometry contains numerous details, such as sharp edges, bolt holes, or fillets, which are not required for the analysis. You can launch a preconfigured simulation tool to automatically export the CAD geometry. Then, you simplify the product geometry using a simplification tool.

5. **Upload the simplified geometry to the geometry revision you created**

   You can upload the simplified geometry to the geometry revision you created.

View the analysis request or select the data for analysis

You can view the analysis request or select the data for analysis.

1. View the analysis request.

   If your organization follows a workflow process, open the analysis request containing the design requirements and the subassembly and components required for the analysis.

   a. On the **HOME** page, click **INBOX**.

   b. In **My Tasks**, select the task you want to perform.

   c. Review any task instructions and the process description. If necessary, type additional information into the box.

   d. Complete the task instructions and click **Complete**.

2. Select the data for analysis.

   If your organization does not follow a workflow process, search for a target structure and select the data for the analysis.

   You can obtain the data by opening the target structure as follows.

   a. In the search box, type all or several characters of a word or value related to the objects you want to search for.

   b. (Optional) Restrict your search to those objects with a certain owner or of a particular type category by clicking **Any Owner** or **Any Category** and choosing a value.

   c. Click **Search** or press Enter.

   d. From **Filters**, select the **Item Revision** type.

e. Select the item revision from **Search Filters**, and click the **Overview** tab to find the related CAE objects.

You can also perform a **Perform a quick search to locate the data** or **Perform an advanced search to locate the data**.

Perform a quick search to locate the data

You can perform a quick search to locate the data required for simulation tasks.

Procedure

1. To search for data required for simulation tasks, start by typing the required search criteria into the search box located in the top right corner.

2. Refine your search criteria by selecting **Simulation** from **Filters**.

3. Refine your search further by selecting other criteria from **Filters**.

Examples

- Search for **CFD** in the search box and refine your search further by selecting **Simulation** and **Discipline** from **Filters**.

- Search for **Thermal** in the search box and refine your search further by selecting **Simulation** and **Solver Name** from **Filters**.

- Search for the product structure. The results display the product structure along with the model structures and the analysis revisions related to the product structure.

Perform an advanced search to locate the data

You can import and create data for your simulation analysis, or you can search for data in Teamcenter to find an existing CAD model to perform analysis on, find a previous CAE 3D Analysis to reuse or modify, or find other data that can be used as input for a CAE 3D Analysis.

Procedure

1. On the **HOME** page, click **Advanced Search**.

2. Click the **Advanced** tab, and type *cae*, and select a query.

   Some query examples are as follows.

- Use **CAE 3D Analysis Revision**, **CAE 3D Model Revision**, or **CAE 3D Result Revision** to find analysis revisions, model revisions, or result revisions, respectively.

- Use **CAE – Find Single-Level Related Model** or **CAE – Find Single-Level Related Analysis** to find all associated models or analyses of a specific product item revision. In the CAD Item Revision ID query field, you can type a question mark (?) to query for all the CAE models or analyses generated on the latest revision rather than all revisions.

- Use **CAE – Find Multi-Level Related Models** or **CAE – Find Multi-Level Related Analysis** to find all associated models or analyses for the selected CAD at the components, subassemblies, and variant levels. You can use this query to identify all models or analyses impacted by the design change of a product item revision.

3. To perform an advanced search, click **Search**.

Apply configuration rules to make the structure relevant for your analysis

You can trim the product structure and make it relevant for your analysis. To do this, you can apply revision rules and configure the product structure for a particular situation. Each revision rule selects the appropriate revision of all the components in the structure for a particular situation. For example, a design engineer may want to see the components specified by the **Latest Working** revision rule, whereas a manufacturing engineer may require the components specified by the **Latest Released** revision rule.

You can also apply effectivity and variant rules to further trim your product structure.

> Note:
>
> Do not apply revision rules, effectivity, or variant rules to a product structure or subassembly in a saved working context.

Reorganize the product structure to make it suitable for simulation analysis

As a simulation analyst, the product structure you receive may not have all the data or it may not be organized in a manner that is suitable for simulation analysis. Before you start reorganizing the structure, you require a collector item or a placeholder to store the new structure.

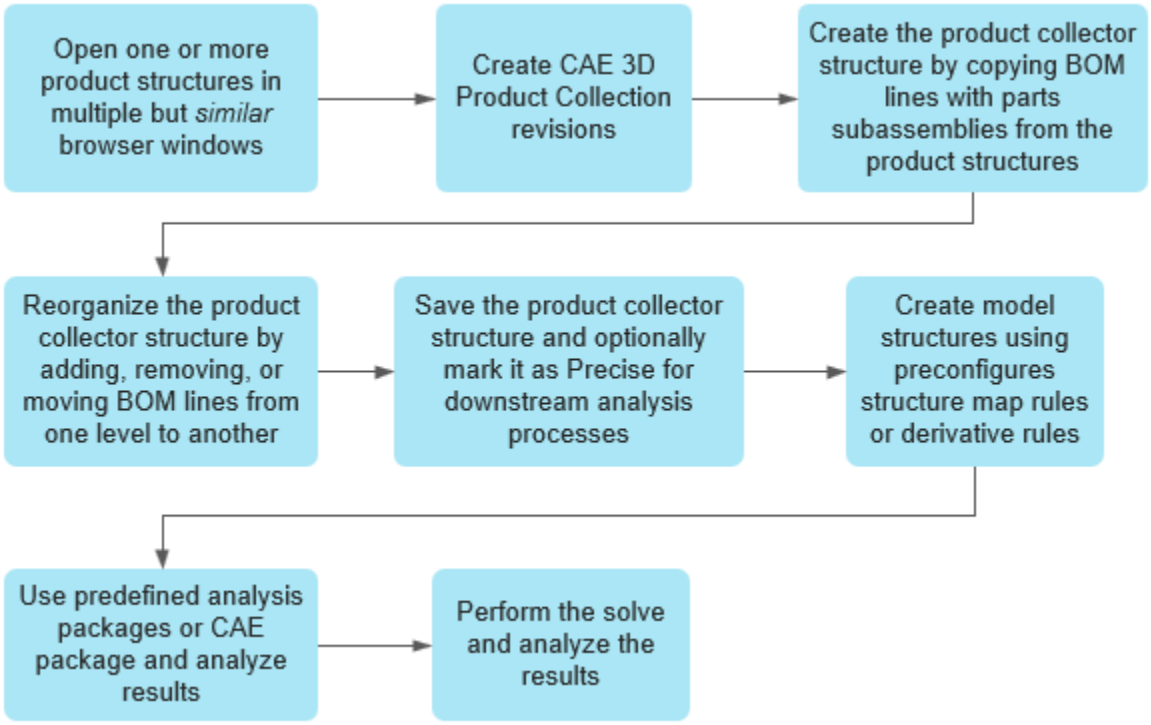
You can create **CAE 3D Product Collector** revisions to store the new structure. The new structure you create using this revision object is called a product collector structure. It is similar to the product structure.

The **CAE 3D Product Collector** workspace object is used to manage a collection of objects which are used for 3D type CAE work. For example, if there are several CAD items (item revisions) or CAE 3D

geometries that are distributed through Teamcenter and are necessary to perform a CAE 3D analysis, then analysts can utilize the CAE 3D product collector to group all these objects together. You can run data map and structure map rules on the CAE 3D product collector object. Product collectors can also be placed under other product collector objects similar to a parent-child relationship. A CAE 3D product collector can collect the following objects: CAE 3D geometry, CAE 3D model, CAE 3D analysis, as well as item revisions.

You can create collector structures in different ways. For example, you can:

- Create a flat structure by copying only the leaf nodes and by ignoring all the intermediate subassembly levels created by the designers.
- Organize the components differently under different subcollectors in a manner that is more efficient for simulation analysis.
- Choose desired parts or subassemblies from more than one product structure.



Create CAE 3D Product Collector revisions

1. On the **HOME** page, click the **CREATE SIMULATION** tile. From the **TYPE** menu, select **CAE 3D Product Collector**.

   Alternatively, click **Folders**, select a folder, and choose **More Commands** > **New** > **Add**. In the **OTHER** filter, type *cae product collector* and select **CAE 3D Product Collector**.

2. (Mandatory) Specify a name for the **CAE 3D Product Collector** revision.

3. (Optional) Select a discipline such as **Durability**, **NVH**, or **Safety**.

4. (Optional) To specify a project, click **Add Project** ⊕, search for a product item revision, select the item revision, and add it.

5. To create the **CAE 3D Product Collector** revision, click **Create**.

Add a geometry, model, and analysis revisions to the product collector structure

The following procedure describes how to add a geometry revision with a product collector revision. You can use similar procedures to add model and analysis revisions to the **CAE 3D Product Collector** revision.

1. Open the **CAE 3D Product Collector** revision and click the **Overview** tab.

2. (Optional) To add a geometry revision, choose **More Commands** > **New** ✳ > **Create Simulation**.

3. From the **TYPE** menu, select **CAE 3D Geometry**.

4. (Mandatory) Specify a name.

5. (Optional) Select an analysis type, preprocessor type, and discipline.

6. To create the revision, click **Create**.

   The system automatically creates the source and target relationship with the product collector revision.

Associate the product collector revision object with geometry, model, and analysis revisions

The following procedure describes how to associate a product collector revision object with a geometry revision. You can use similar procedures to associate model and analysis revisions.

1. Open a **CAE 3D Geometry** revision and click the **Overview** tab.

2. In the **RELATED OBJECTS** table, click **Add Simulation** ⊕.

3. In the **TYPE** filter of the **Add Simulation** panel, type **CAE 3D Product Collector** and select it.

4. Select the **CAE 3D Product Collector** from the **Palette** tab or type the search criteria in the **Search** tab and click **Add**.

   The system displays the object you added in the **RELATED OBJECTS** table.

5. (Optional) Click the **Overview** tab.

   The system displays the object you added in the **PRODUCT** table.

Organize the product collector structure and create model structures

1. Open the **CAE 3D Product Collector** revision.
2. Organize the structure.
3. Generate a model structure.
   a. Click the **Content** tab and choose **More Commands** > **New** > **Generate CAE Structure**.

      In the **Generate CAE Structure** panel, select one of the following options:

      - **Data Map to create a model structure that is an exact replica of the product structure using data map rules**.

        After creating the model structure, you can use predefined derivative rules in CAE Manager (rich client) to derive one more structures relevant to your analysis from an existing structure.

      - **CAE Structure Map to create a model structure that is an exact replica of the product structure using data map rules**

   b. Select a domain.

      The default domain is **CAE**.

      The simulation administrator creates domains. Your company might have different CAE disciplines for safety, durability, and so on. The company wants data mapping to be different for each discipline, but there is only one data map XML file for the whole site. Domains are created to handle data mapping differently in such situations.

   c. To generate a model structure, click **Execute**.

Create predefined analysis packages or CAE packages and analyze results

Analysts can use the **package definitions created by the simulation administrator or the group administrator** to create their own CAE item revisions.

1. Open the **CAE 3D Product Collector** revision and click the **Overview** tab.
2. Choose **More Commands** > **New** > **CAE Package**.

3. From the **Results** panel, open a site package.

4. **Specify input, output, and other parameters as appropriate** and click **Execute**.

5. **Capture the results and verify the results**.

View the product collector with the CAE Based On relationship

1. Create the **CAE 3D Product Collector revision**.

2. Attach a **product revision to the product collector revision**.

3. Create a model structure using **data map rules**.

4. Open the model structure you created and create a **CAE 3D Analysis** revision from the **Overview** tab.

5. Click the **Overview** tab and open the product collector revision from the **Product** table.

6. Click the **Relations** tab and click **Show All Incoming Relations**.

7. Click the **Relations Legend** to view the simulation objects and relations.

View traceability information

1. Create the **CAE 3D Product Collector revision**.

2. Open the **CAE 3D Product Collector** revision and click the **Overview** tab.

3. Select the model revision in the **MODEL** table.

   The system displays the **TRACEABILITY INFORMATION** as **CAE 3D Model Revision** > **CAE 3D Product Collector**.

4. Select the analysis revision in the **ANALYSIS** table.

   The system displays the **TRACEABILITY INFORMATION** as **CAE 3D Analysis Revision** > **CAE 3D Product Collector**.

5. Select the result revision in the **RESULT** table.

   The system displays the **TRACEABILITY INFORMATION** as **CAE 3D Result Revision** < **CAE 3D Analysis Revision** > **CAE 3D Product Collector**.

4. Create 1D model and 1D analysis objects for simulations

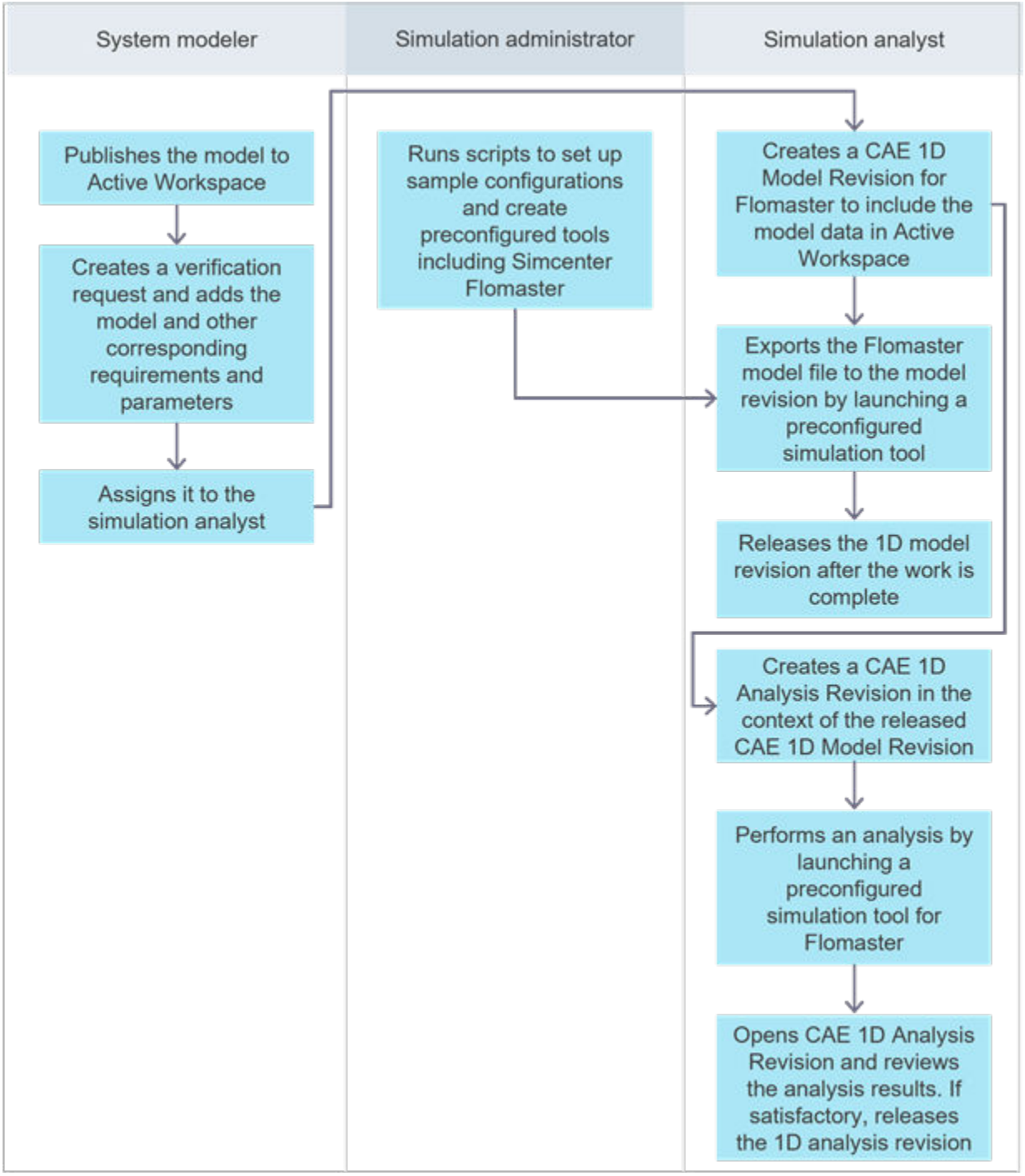
Workflow for Simcenter Flomaster

Workflow for managing 1D data in Simcenter Flomaster

System simulation modeling is used to explore different concepts at the early stages of the design. This is usually done even before any CAD geometry is available. The parameters for these models can be refined, and the details can be added later when they are available. 1D models are precursors to the detailed 3D CAE models in the entire design cycle.

You can create **CAE 1D Model** and **CAE 1D Analysis** revisions to capture model and analysis data for Simcenter Flomaster integration. The **CAE 1D Analysis** revision must always be created in the context of the **CAE 1D Model** revision.

The workflow for managing 1D data in Simcenter Flomaster is as follows:



Create CAE 1D model revisions to capture 1D model data for Flomaster

You can create **CAE 1D Model** revisions to capture 1D model data for integrations such as Simcenter Flomaster.

You can use the 1D model revision to manage templates for system simulation analysis activities, for example, Amesim and Flomaster. When simulation analysts use templates to perform the system

simulation work, they prefer to store them in Teamcenter. These 1D system simulation templates can thereafter be used to create 1D system simulations. You can directly relate the CAE 1D model object to a CAE 1D analysis as well as a physical test result. When connecting to these objects, all CAE 1D analyses which were created based on the CAE 1D model object as a template can be quickly retrieved.

Prerequisites

The following procedures assume that the **Simulation Process Management with Parameter Management** feature is installed at your site and the simulation administrator has run the quick setup script (**tcsim_quick_setup.pl**) to create sample configurations that includes the required Simcenter Flomaster tool.

Procedure

1. On the **HOME** page, click **Create Simulation**.

2. Select **CAE 1D Model**, specify a name for the 1D model revision, and click **Create**.

3. Create the input and output parameters for the 1D model by launching a preconfigured simulation tool.

    a. Select the 1D model revision, click **Open**>**Open in Simulation Tool**, and select **Simcenter Flomaster**.

    For more information about launching tools, see **Launch simulation tools**.

    b. In the **Launch Inputs** tab, specify the launch method and other parameters as appropriate.

    c. To create the input and output parameters for the 1D model, select the **Create Model** launch type.

    d. To launch the tool, click **Open**.

    e. After the tool launch is complete, click the **Parameters** tab to verify the parameter values in the **Input Parameters** and **Output Parameters** sections.

4. Update the input and output parameters for the 1D model by launching a preconfigured simulation tool.

    a. Select the 1D model revision, click **Open**>**Open in Simulation Tool**, and select **Simcenter Flomaster**.

    For more information about launching tools, see **Launch simulation tools**.

    b. In the **Launch Inputs** tab, specify the launch method and other parameters as appropriate.

c. To update input and output parameters for the 1D model, select the **Update Model** launch type.

d. To launch the tool, click **Open**.

e. After the tool launch is complete, click the **Parameters** tab to verify the updated parameter values in the **Input Parameters** and **Output Parameters** sections.

5. Release the model revision.

   After all the work related to model revision is complete, you can release the model revision using a workflow.

   a. Select the model revision you want to release and choose **More Commands** > **Manage** > **Submit to Workflow**.

   b. Select the **TCM Release Process** template and click **Submit**.

6. (Optional) To view related revisions, select the 1D model revision, and click the **Overview** tab.

7. Edit the properties of the 1D model revision.

   a. Select the revision and click the **Overview** tab.

   b. Choose **More Commands** > **Edit** > **Start Edit**.

   c. Update the properties as appropriate.

   d. To save the properties, choose **More Commands** > **Edit**>**Save Edits**.

8. (Optional) Create external links or folders for the 1D model revision.

   a. Select the revision and click the **Overview** tab.

   b. Click **Add to** ⊕ in **EXTERNAL LINKS**.

   c. Select **PROPERTIES**, specify a name and the URL or a shared location, and then click **Add**.

   d. To delete a web link, select the web link, click **Edit**, and select **Delete External Links**.

9. (Optional) Upload data using predefined rules.

   You can upload data for integrations such as Simcenter Flomaster.

   a. Select the revision and click the **Files** tab.

b. Click **Upload File**, select a predefined file upload rule, and choose the file you want to upload.

c. **Upload or download files using predefined rules (without Data Share Manager)**.

OR

Upload or download files using predefined rules (with Data Share Manager).

10. (Optional) To view relations between different objects, select the 1D model revision and click the **Relations** tab.

It allows you to view and navigate the relations between different objects in a graph view.

11. (Optional) Make a copy of the 1D model revision.

a. Select the 1D model revision.

b. Choose **More Commands** > **New** > **Save As**.

c. (Optional) Specify a new name if you want to create a copy and description.

d. (Optional) Select a new destination folder.

The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

A. Remove the **Newstuff** folder and click the **Add** button to select another folder.

B. Select the folder and click **Add**.

e. To create a copy, click **Save**.

12. (Optional) Revise the 1D model revision.

a. Select the 1D model revision.

b. Choose **More Commands** > **New** > **Revise**.

c. (Optional) Specify required information as appropriate.

d. (Optional) Select a new destination folder.

The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

A. Remove the **Newstuff** folder and click the **Add** button to select another folder.

B. Select the folder and click **Add**.

e. To revise, click **Save**.

Create CAE 1D analysis revisions to capture 1D analysis data for Flomaster

You can create **CAE 1D Analysis** revisions to capture 1D analysis data for integrations such as Simcenter Flomaster.

You can use the 1D analysis revision to manage system simulation analysis activities, for example, Amesim and Flomaster, and the associated data from those tasks. When simulation analysts perform system simulation work, they prefer to store the data in Teamcenter. These 1D system simulation templates can thereafter be used to create 1D system simulations. The CAE 1D analysis object can be directly related to a CAE 1D model as well as the physical test result. When connecting to these other objects, all CAE 1D analyses, which were created based on the CAE 1D model object template, can be quickly retrieved.

A **CAE 1D Analysis** revision must always be created in the context of a **CAE 1D Model** revision. When you create a **CAE 1D Analysis** in context, the system links the **CAE 1D Analysis** revision to the **CAE 1D Model** revision and creates the **CAE Defining Relationship**. It also copies the input and output parameters from the 1D model revision to the 1D analysis revision, and they are available in the **Parameters** tab. The columns in the **Parameters** table for the 1D model revision are not editable, whereas some columns are editable for the 1D analysis revision.

Prerequisites

The following procedures assume that the **Simulation Process Management with Parameter Management** feature is installed at your site and the simulation administrator has run the quick setup script (**tcsim_quick_setup.pl**) to create sample configurations that includes the required Simcenter Flomaster tool.

Procedure

1. Log on by using the default workspace or the **analyst workspace**.

   > Note:
   >
   > The **Analyst** workspace is the recommended workspace for the simulation analyst role.

2. Select the previously created **CAE 1D Model** revision and choose **More Commands** > **New** > **Create Simulation**.

3. Specify a name for the 1D analysis revision and click **Create**.

4. Create the input and output parameters for the analysis by launching a preconfigured simulation tool.

   For more information about launching tools, see **Launch simulation tools**.

   You launch a preconfigured simulation tool to perform the analysis. The analysis tool updates the parameter information from the results to the JSON file format. The system rewrites the PLM XML file with the updated parameter information. The results are then imported to Teamcenter from the PLM XML file.

   > Note:
   >
   > When you create a 1D analysis revision within the context of a 1D model revision, the system automatically copies the input and output parameters from the 1D model revision to the 1D analysis revision.

   a. Select the 1D analysis revision, click **Open**>**Open in Simulation Tool**, and select **Simcenter Flomaster**.

      For more information about launching tools, see **Launch simulation tools**.

   b. In the **Launch Inputs** tab, specify the launch method and other parameters.

   c. Select the **Create Analysis** launch type.

   d. To launch the tool, click **Open**.

5. After the tool launch is complete, to view the input and output parameters, click the **Parameters** tab.

6. Execute the analysis in Simcenter Flomaster on the desktop by launching a preconfigured simulation tool.

   a. Select the previously created 1D analysis revision, click **Open**>**Open in Simulation Tool**, and select **Simcenter Flomaster**.

      For more information about launching tools, see **Launch simulation tools**.

   b. In the **Launch Inputs** tab, specify the launch method and other parameters.

   c. To perform an analysis, select the **Update Analysis** launch type since have the previously created 1D analysis revision containing the input parameters.

   d. To launch the tool, click **Open**.

e. To verify the changed parameter values, click the **Parameters** tab after the tool launch is complete.

7. Release the analysis revision.

   After all the work related to analysis revision is complete, you can release the analysis revision using a workflow.

   a. Select the analysis revision you want to release and choose **More Commands** > **Manage** > **Submit to Workflow**.

   b. Select the **TCM Release Process** template and click **Submit**.

8. (Optional) To view ID related models, select the 1D analysis revision, and click the **Overview** tab.

9. (Optional) Create external links or folders for the 1D analysis revision.

   a. Select the revision and click the **Overview** tab.

   b. Click **Add to** ⊕ in **EXTERNAL LINKS**.

   c. Select **PROPERTIES**, specify a name and the URL or a shared location, and then click **Add**.

   d. To delete a web link, select the web link, click **Edit**, and select **Delete External Links**.

10. (Optional) **View traceability of simulation data** using the **Relations** tab.

    It allows you to view and navigate the relations between different objects in a graphical view.

11. Make a copy of the 1D analysis revision.

    a. Select the 1D analysis revision.

    b. Choose **More Commands** > **New** ✳ > **Save As** 🖫.

    c. (Optional) Specify a new name if you want to create a copy and description.

    d. (Optional) Select a new destination folder.

       The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

       A. Remove the **Newstuff** folder and click the **Add** button to select another folder.

       B. Select the folder and click **Add**.

e. To create a copy, click **Save**.

12. Revise the 1D analysis revision.

    a. Select the 1D analysis revision.

    b. Choose **More Commands** > **New** > **Revise**.

    c. (Optional) Specify required information as appropriate.

    d. (Optional) Select a new destination folder.

       The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

       A. Remove the **Newstuff** folder and click the **Add** button to select another folder.

       B. Select the folder and click **Add**.

    e. To revise, click **Save**.

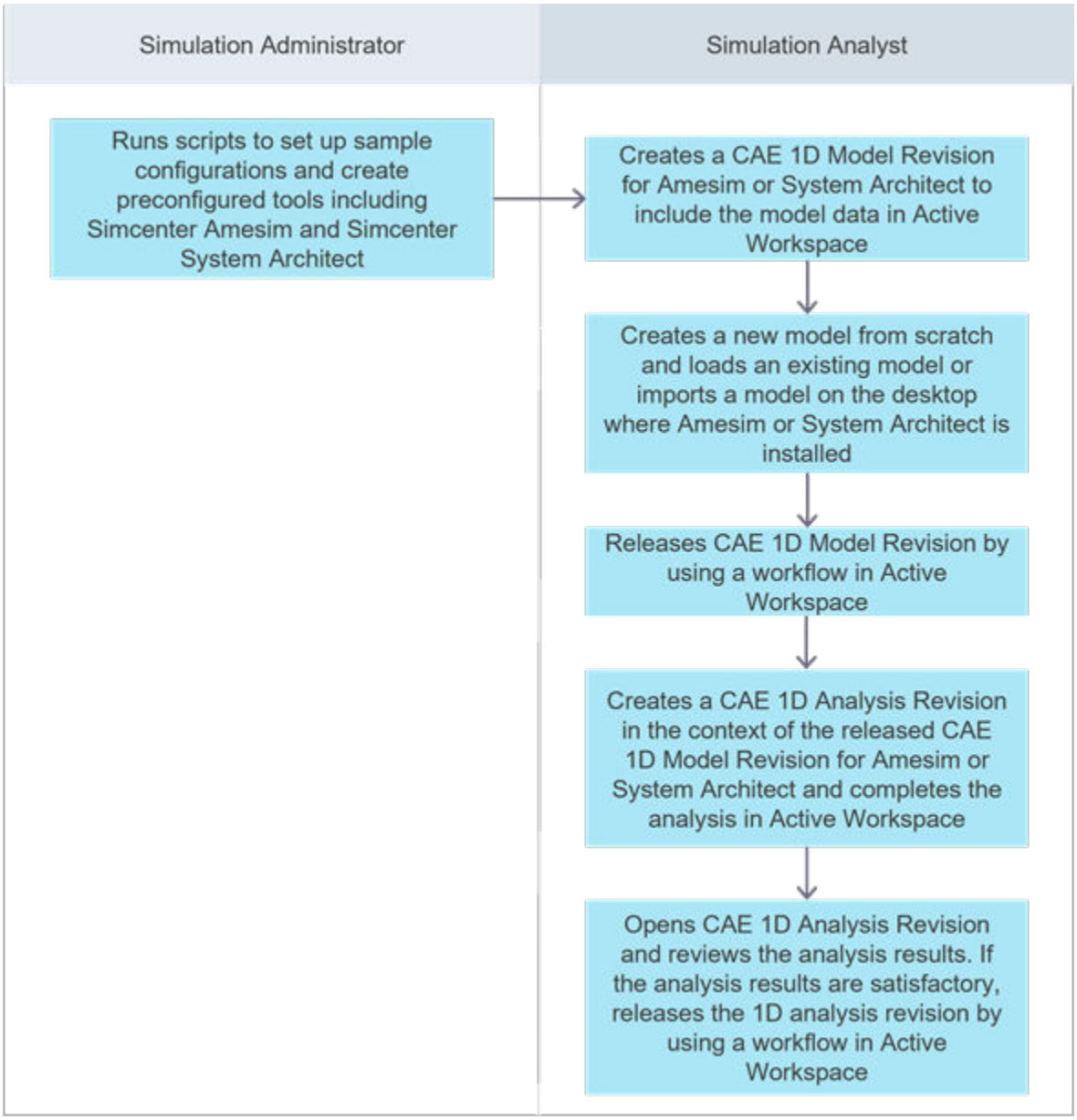
Workflow for Amesim and System Architect

Workflow for managing 1D data in Simcenter Amesim or Simcenter System Architect

One-dimensional computer-aided engineering (1D CAE) modeling is used to explore different concepts at the early stages of the design. This is usually done even before any CAD geometry is available. The parameters for these models can be refined, and the details can be added later when they are available. 1D models are precursors to the detailed 3D CAE models in the entire design cycle.

You can create **CAE 1D Model** and **CAE 1D Analysis** revisions to capture model and analysis data for integrations such as Simcenter Amesim or Simcenter System Architect. The **CAE 1D Analysis** revision must always be created in the context of the **CAE 1D Model** revision.

The workflow for managing 1D data in Simcenter Amesim or Simcenter is as follows:



Create CAE 1D model revisions to capture 1D model data for Amesim or System Architect

You can create **CAE 1D Model** revisions to **capture 1D model data** for integrations such as Simcenter Amesim or Simcenter System Architect.

Create the CAE 1D model revision

1. In the default workspace or the **analyst workspace**, create a model revision in the context of a design or item revision, project model revision, or NX P&ID Designer revision.

- (Amesim or System Architect) Search for a design revision or item revision, open it, click the **Overview** tab, and choose **More Commands** > **New** > **Create Simulation** > **CAE 1D Model**.

  OR

- (System Architect) Search for a project model revision, open it, and choose **More Commands** > **New** > **Create Simulation** > **CAE 1D Model**.

2. Specify a name for the 1D model revision and click **Create**.

3. (Optional) To view related objects, click the **Overview** tab.

   The **Related Objects** section displays the source and target relationship between the object based on which this model revision was created.

4. Export the Amesim or System Architect model file to the model revision by launching a preconfigured simulation tool.

   a. (**Analyst** workspace) Select the 1D model revision and choose **Open in Simulation Tool**.

      (Default workspace) Select the 1D model revision and choose **Open** > **Open in Simulation Tool**.

   b. **Select a preconfigured simulation tool** for Amesim or System Architect.

   c. In the **Launch Inputs** tab, specify the launch method and other parameters.

   d. In the **Help** tab, access the documentation for simulation tool configuration.

5. To view parameters after the tool launch is complete, click the **Parameters** tab.

   The **Input Parameters** and **Output Parameters** sections display the various parameters of the imported model.

   The system copies the parameters to the 1D analysis revision when you create it in the context of the 1D model revision.

6. (Optional) To view additional columns in the **Input Parameters** table, click **Table Settings** > **Arrange** and add columns such as **Formula**, **Max**, **Max Operator**, **Min**, **Min Operator**, and **Units**.

   Similarly, you can add additional columns to the **Output Parameters** table such as **Goal**, **Goal File**, **Max**, **Max Operator**, **Min**, **Min Operator**, and **Units**.

7. To view all related test objects, click the **Physical Test** tab.

8. (Optional) Create external links or folders for the 1D model revision.

a. Select the revision and click the **Overview** tab.

b. Click **Add to** ⊕ in **EXTERNAL LINKS**.

c. Select **PROPERTIES**, specify a name and the URL or a shared location, and then click **Add**.

d. To delete a web link, select the web link, click **Edit**, and select **Delete External Links**.

9. Upload data using predefined rules.

   You can upload data for integrations such as Amesim or System Architect.

   a. Select the revision and click the **Files** tab.

   b. Click **Upload File**, select a predefined file upload rule, and choose the file you want to upload.

   c. **Upload or download files using predefined rules (without Data Share Manager)**.

      OR

      Upload or download files using predefined rules (with Data Share Manager).

10. (Optional) To view relations between different objects, select the 1D model revision and click the **Relations** tab.

    It allows you to view and navigate the relations between different objects in a graph view.

11. Verify if objects are out-of-date.

    a. Click the **Overview** tab.

       The **Out-of-Date Information and Objects** section displays objects that are out-of-date.

    b. To mark objects as up-to-date, select them and choose **More Commands** > **Edit** > **Mark Up-To-Date**.

       After the analysis is complete and the files are added, the status for these objects is displayed as **Added**. You can mark them as up-to-date.

12. **Release the 1D model revision after the work is complete.**.

13. **Create CAE 1D analysis revisions to capture 1D analysis data for Amesim or System Architect**.

Create a copy of the 1D model revision

You can optionally create a copy of the 1D model revision.

1. Select the 1D model revision.

2. Choose **More Commands** > **New** > **Save As**.

   The **Save As** dialog opens.

3. (Optional) Specify a new name if you want to create a copy and description.

4. (Optional) Select a new destination folder.

   The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

   a. Remove the **Newstuff** folder and click the **Add** button to select another folder.

   b. Select the folder and click **Add**.

5. To create a copy, click **Save**.

Revise the 1D model revision

You can revise the 1D model revision.

The model revision is created in the context of a design revision or item revision, project model revision, or NX P&ID Designer. When the original object based on which the model revision is created undergoes changes, you can revise the model revision.

1. In the default workspace or the **analyst workspace**, select the 1D model revision.

2. Choose **More Commands** > **New** > **Revise**.

3. (Optional) Specify required information as appropriate.

4. (Optional) Select a new destination folder.

   The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

   a. Remove the **Newstuff** folder and click the **Add** button to select another folder.

   b. Select the folder and click **Add**.

5. To revise, click **Save**.

6. (Optional) Select the model revision and click the **Overview** tab and remove or add files as per the revision changes of the object on which this model revision is created.

7. Verify the **CAE Status** header. The model revision is displayed as out-of-date.

8. To update the status of the model revision, choose **More Commands** > **Edit** > **Mark Up-To-Date**.

Release the 1D model revision after the work is complete

You must release the **CAE 1D Model** revision after completing your work.

1. In the default workspace or the **analyst workspace**, open the **CAE 1D Model** revision you want to release.

2. Choose **More Commands** > **Manage** > **Submit to Workflow**

3. Select the **TCM Release Process** template and click **Submit**.

Search for the input and output parameters for 1D model revisions

You can search for the input and output parameters for 1D model revisions.

1. In the default workspace or the **analyst workspace**, click **Advanced Search** and select the **Advanced Search** tab.

2. Select **CAE 1D Model Revision** and specify the search criteria in the input parameter or output parameter boxes and click **Search**.

Export the input and output parameters of the 1D model revision

You can optionally export the input and output parameters of the 1D model revision as PLM XML data.

For more information, see *Exporting data as PLM XML*.

1. In the default workspace or the **analyst workspace**, open the 1D model revision and choose **More Commands** > **Share** > **PLM XML Export**.

2. Select the **CAEConfiguredDataFilesExportDefault** transfer mode.

3. Specify the configuration rules to use when exporting the objects.

4. (Optional) Specify export languages to export as appropriate.

5. Click **Export** to create the exported PLM XML file. The export begins and you receive an alert when the export is complete.

Create CAE 1D analysis revisions to capture 1D analysis data for Amesim or System Architect

You can create **CAE 1D Analysis** revisions to capture 1D analysis data for integrations such as Simcenter Amesim or Simcenter System Architect.

A **CAE 1D Analysis** revision must always be created in the context of a **CAE 1D Model** revision. When you create a **CAE 1D Analysis** in context, the system links the **CAE 1D Analysis** revision to the **CAE 1D Model** revision and creates the **CAE Defining** relationship. It also copies the input and output parameters from the 1D model revision to the 1D analysis revision, and they are available in the **Parameters** tab. The columns in the **Parameters** table for the 1D model revision are not editable, whereas some columns are editable for the 1D analysis revision.

Create the CAE 1D analysis revision

1. In the default workspace or the analyst workspace, select the previously created **CAE 1D Model** revision and choose **More Commands** > **New** > **Create Simulation**.

2. Specify a name for the 1D analysis revision and click **Create**.

3. (Optional) To view ID related models, select the 1D analysis revision, and click the **Overview** tab.

4. (Optional) To view the input parameters, click the **Parameters** tab.

   The **Input Parameters** section displays the parameters that have been carried forward from the 1D model revision to the 1D analysis revision.

5. (Optional) To view additional columns in the **Input Parameters** table, click **Table Settings** > **Arrange** and add columns such as **Formula**, **Max**, **Max Operator**, **Min**, **Min Operator**, and **Units**.

1. To view all related test objects, click the **Physical Test** tab.

2. Perform an analysis by launching a preconfigured simulation tool for Amesim or System Architect.

   a. (Analyst workspace) Select the revision and choose **Open in Simulation Tool**.

      (Default workspace) Select the revision and choose **Open** > **Open in Simulation Tool**.

   b. Select a preconfigured simulation tool.

   c. In the **Launch Inputs** tab, specify the launch method and other parameters.

   d. In the **Help** tab, access the documentation for simulation tool configuration.

3. To view the output parameters, click the **Parameters** tab.

The **Output Parameters** tab displays the parameters from the analysis.

4. (Optional) To view additional columns in the **Output Parameters** table, click **Table Settings** > **Arrange** and add columns such as **Goal**, **Goal File**, **Max**, **Max Operator**, **Min**, **Min Operator**, and **Units**.

5. To view the analysis related files and images, click the **Overview** tab.

   The **Files** section displays the analysis related files and images.

6. Verify if the objects are out-of-date.

   a. Click the **Overview** tab.

      The **Out-of-Date Information and Objects** section displays objects that are out-of-date.

   b. To mark objects as up-to-date, select them, and choose **More Commands** > **Edit** > **Mark Up-To-Date**.

      After the analysis is complete and the files are added, the status for these objects is displayed as **Added**. You can mark them as up-to-date.

7. (Optional) Create external links or folders for the 1D analysis revision.

   a. Select the revision and click the **Overview** tab.

   b. Click **Add to** ⊕ in **EXTERNAL LINKS**.

   c. Select **PROPERTIES**, specify a name and the URL or a shared location, and then click **Add**.

   d. To delete a web link, select the web link, click **Edit**, and select **Delete External Links**.

8. (Optional) **View traceability of simulation data** using the **Relations** tab.

   It allows you to view and navigate the relations between different objects in a graphical view.

9. **Release the 1D analysis revision after the work is complete.**.

Make a copy of the 1D analysis revision

You can optionally make a copy of the 1D analysis revision

1. Select the 1D analysis revision.

2. Choose **More Commands** > **New** ✳ > **Save As** 🖫.

The **Save As** dialog opens.

3. (Optional) Specify a new name if you want to create a copy and description.

4. (Optional) Select a new destination folder.

   The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

   a. Remove the **Newstuff** folder and click the **Add** button to select another folder.

   b. Select the folder and click **Add**.

5. To create a copy, click **Save**.

Revise the 1D analysis revision

You can revise the 1D analysis revision.

The analysis revision is created in the context of the model revision. When the model revision undergoes changes, you can revise the analysis revision.

1. In the default workspace or the **analyst workspace**, select the 1D analysis revision.

2. Choose **More Commands** > **New** > **Revise**.

   The **Revise** dialog opens.

3. (Optional) Specify required information as appropriate.

4. (Optional) Select a new destination folder.

   The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

   a. Remove the **Newstuff** folder and click the **Add** button to select another folder.

   b. Select the folder and click **Add**.

5. To revise, click **Save**.

6. (Optional) Select the 1D analysis revision, click the **Overview** tab, and remove or add files as per the revision changes of the object on which this model revision is created.

7. Verify the **CAE Status** header. The model revision is displayed as out-of-date.

8. To update the status of the model revision, choose **More Commands** > **Edit** > **Mark Up-To-Date**.

Release the 1D analysis revision after the work is complete

You must release the **CAE 1D Analysis** revision after completing your work.

1. In the default workspace or the **analyst workspace**, open the **CAE 1D Analysis** revision you want to release.

2. Choose **More Commands** > **Manage** > **Submit to Workflow**

3. Select the **TCM Release Process** template and click **Submit**.

Search for the input and output parameters for 1D analysis revisions

You can search for the input and output parameters for 1D analysis revisions.

1. In the default workspace or the **analyst workspace**, click **Advanced Search** and select the **Advanced Search** tab.

2. Select **CAE 1D Analysis Revision** and specify the search criteria in the input parameter or output parameter boxes and click **Search**.

Export the input and output parameters of the 1D analysis revision

You can optionally export the input and output parameters of the 1D analysis revision as PLM XML data.

For more information, see *Exporting data as PLM XML*.

1. In the default workspace or the **analyst workspace**, open the 1D analysis revision and choose **More Commands** > **Share** > **PLM XML Export**.

2. Select the **CAEConfiguredDataFilesExportDefault** transfer mode.

3. Specify the configuration rules to use when exporting the objects.

4. (Optional) Specify export languages to export as appropriate.

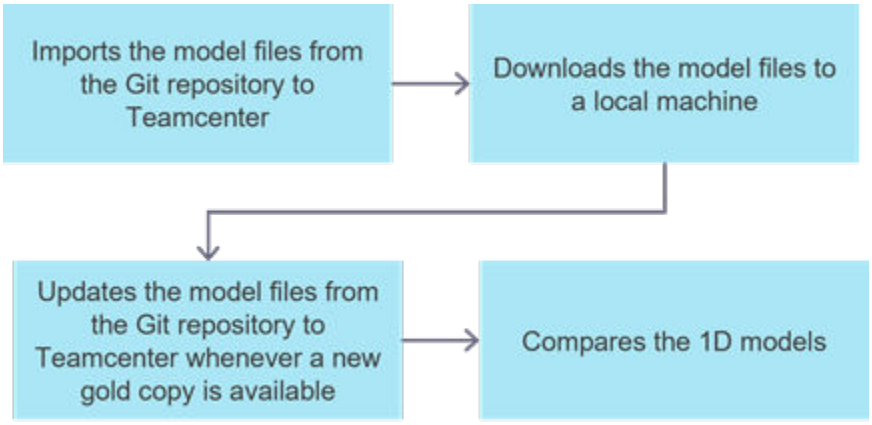
5. Click **Export** to create the exported PLM XML file. The export begins and you receive an alert when the export is complete.

Workflow for managing MBSE data mapping for Git integrations

Workflow for managing MBSE data through the GIT integration

After modeling engineers complete their work and the system simulation models are ready to be released, simulation analysts can import the MBSE data from the Git repository to Teamcenter. The data that is imported is the released data or the *gold copy* of the data. The gold copy in the Git repository contains all the folders and the project files. The supported model files in the Git repository are converted to CAE 1D models.

The workflow is as follows:



As a prerequisite, the **Simulation Process Management with Git integration** feature must be installed using Teamcenter Environment Manager (TEM) or Deployment Center at your site. In addition, the Teamcenter MBSE Integration Gateway desktop client must be installed and the post-installation configuration tasks for the desktop client should be complete.

For more information about installing and configuring the desktop client, see Install the Teamcenter MBSE Integration Gateway desktop client using TEM or Install the Teamcenter MBSE Integration Gateway desktop client using Deployment Center.

Import the Git repository containing the model files

As a simulation analyst, you can import a gold copy of the model files from the Git repository to Teamcenter, update the model files whenever a new gold copy is available, download the 1D models to a local machine, and compare the 1D models.

The gold copy in the Git repository contains all the folders and the project files. The supported model files in the Git repository are converted to CAE 1D models.

Examples of model files that are converted to CAE 1D models:

- Matlab (***.mdl**, ***.slx**) are generated in the **CAE Matlab** dataset attached to the **CAE 1D Model** revision.
- Amesim (***.ame**, ***.bame**) are generated in the **CAE Amesim** dataset attached to the **CAE 1D Model** revision.
- GTPower (***.gtm**, ***.bgtm**) are generated in the **CAE GTPower** dataset attached to the **CAE 1D Model** revision.

Prerequisites

The following procedures assume that the **Simulation Process Management with Git integration** feature and the Teamcenter MBSE Integration Gateway desktop client are installed. In addition, the post-installation configuration tasks for the desktop client should be complete.

For more information, see **Workflow for managing MBSE data through the GIT integration**.

Procedure

1. In the default workspace or the **analyst workspace**, import a gold copy of the CAE 1D models from the Git repository to Teamcenter.

   a. Select or open a folder and choose **More Commands** > **New** > **Import Model Collection**.

      The system starts downloading an **.opr** file.

   b. After the download is complete, click to open the file.

      The system displays the **Import Model Collection** dialog.

   c. Specify the source link to the Git branch URL and the authentication information to log on to Git.

      The information about the model collection and revision are automatically populated.

      The Git branch objects are uploaded to Teamcenter through the MBSE gateway.

   d. Click **Import**.

      After the import is successful, a link is displayed in the **Import Model Collection** dialog.

   e. Click the link to open the objects in a new browser tab.

      The structure is displayed in the **Content** tab. It is identical to the Git folder structure.

The model files such as Amesim, Matlab, and GTPower are imported as CAE 1D models, the Branch Folder as Model Collection Folder, and the Branch Revision as Model Collection.

f. To view the generated CAE 1D model files, click the **Overview** tab.

The **Files** section displays the CAE dataset containing the CAE 1D model files.

2. Update the 1D models from the Git repository to Teamcenter whenever a new gold copy is available.

a. Select and open an existing model collection in the **Content** tab. A tree structure is displayed and you can select the top level object.

b. Choose **More Commands** > **Manage** > **Update Model Collection**.

The system starts downloading an **.opr** file.

c. After the download is complete, click to open the file.

The system displays the **Update Model Collection** dialog.

d. Specify the source link to the Git branch URL and the authentication information to log on to Git.

The information about the model revision is automatically populated.

The Git branch objects are updated to Teamcenter through the MBSE gateway.

e. Click **Update**.

After the update is successful, a link is displayed in the **Update Model Collection** dialog.

f. Click the link to open the objects in a new browser tab.

The structure is displayed in the **Content** tab. It is identical to the Git folder structure.

The model files such as Amesim, Matlab, and GTPower are updated as CAE 1D models, the Branch Folder as Model Collection Folder, and the Branch Revision as Model Collection.

g. To view the generated CAE 1D model files, click the **Overview** tab.

The **Files** section displays the CAE dataset containing the CAE 1D model files.

3. Download the 1D models from Teamcenter to a local machine.

a. Select and open an existing model collection.

b. Choose **More Commands** > **Share** > **Download Model Collection**.

The system starts downloading an **.opr** file.

c. After the download is complete, click to open the file.

The system displays the **Download Model Collection** dialog. This dialog contains the link to a local folder where the structure was downloaded.

d. Click the link to navigate to the folder where the structure was downloaded on the local machine.

The system creates the appropriate folder structure corresponding to the structure locally in the configured folder, for example, **C:\bhm\staging**. It is identical to the Git folder structure.

4. Extract the SSV parameters by using a preconfigured simulation tool.

SSV is a format for saving tabular data. It contains the attributes that can be extracted to the 1D model revision.

Currently, the SSV files from Git are not automatically mapped to CAE 1D models. You must map it manually.

a. Select and open an existing model collection.

b. (Optional) Select the **CAE 1D Model** revision from the **Content** tab.

c. Choose **Open** > **Open in Simulation Tool**.

d. Select the **Extract Parameters (SSV)** tool and launch the tool.

For more information about launching tools, see **Launch simulation tools**.

5. Compare 1D models that you have downloaded from Teamcenter to the local machine.

For more information, see **Compare structures using the guided update to view the differences by generating a report**.

Mark 1D model revisions as up-to-date for changes to attachments and related revisions

As a simulation analyst, you can mark 1D model revisions as up-to-date for changes to attachments and related revisions.

In a complex product development environment, different analysts perform different tasks of the overall analysis. For example, abstractions are delivered by one group, models built by another group, and load cases defined by another group. In such scenarios, it becomes critical to know when the analysis data, possibly with multiple dependencies, is out-of-date. The analyst can then act on it and ensure that the analysis is built with the correct set of data to deliver accurate results.

If the related revisions of a 1D model revision undergo a revision change or updates to parameters or materials, the CAE status of the 1D model revision shows as out-of-date. In such cases, you can use the **Mark Up-To-Date** command to update to the latest revisions and mark the 1D model revision as up-to-date.

You can also view the CAE status of released 1D model revisions if the **CAE_allow_cae_status_on_released_objects** site preference is set to **true** at your site.

Procedure

1. Open a **CAE 1D Model Revision** from the appropriate folder in **Explorer**.

   Alternatively, search for a 1D model revision and open it.

   The header section displays the CAE status as **Up-to-date** or **Out-of-date**.

2. If the status is out-of-date, hover your mouse over the status. The system displays a tooltip.

   The tooltip provides the reason for the revision being out-of-date.

   > Note:
   >
   > Baselined revisions are not considered as newer revisions.

3. Click the **Out-of-date** hyperlink.

   The system opens the **Overview** tab. The **Out-of-Date Information and Objects** section displays the status and the reason why the related revision is out-of-date.

4. Click **Edit** and select **Mark Up-To-Date**.

Mark 1D analysis revisions as up-to-date for changes to attachments and related revisions

As a simulation analyst, you can mark 1D analysis revisions as up-to-date for changes to attachments and related revisions.

In a complex product development environment, different analysts perform different tasks of the overall analysis. For example, abstractions are delivered by one group, models built by another group, and load cases defined by another group. In such scenarios, it becomes critical to know when the analysis data,

possibly with multiple dependencies, is out-of-date. The analyst can then act on it and ensure that the analysis is built with the correct set of data to deliver accurate results.

If the related revisions of a 1D analysis revision undergo a revision change or updates to parameters or materials, the CAE status of the 1D analysis revision shows as out-of-date. In such cases, you can use the **Mark Up-To-Date** command to update to the latest revisions and mark the 1D analysis revision as up-to-date.

You can also view the CAE status of released 1D analysis revisions if the **CAE_allow_cae_status_on_released_objects** site preference is set to **true** at your site.

Procedure

1. Open a **CAE 1D Analysis Revision** from the appropriate folder in **Explorer**.

   Alternatively, search for a 1D analysis revision and open it.

   The header section displays the CAE status as **Up-to-date** or **Out-of-date**.

2. If the status is out-of-date, hover your mouse over the status. The system displays a tooltip.

   The tooltip provides the reason for the revision being out-of-date.

   > Note:
   >
   > Baselined revisions are not considered as newer revisions.

3. Click the **Out-of-date** hyperlink.

   The system opens the **Overview** tab. The **Out-of-Date Information and Objects** section displays the status and the reason why the related revision is out-of-date.

4. Click **Edit** and select **Mark Up-To-Date**.

5. Create geometry revisions for the components you want to analyze

Create geometry revisions for the components you want to analyze

1. (Default workspace) Open the product item revision for which you want to create a corresponding geometry revision, and click the **Simulation** tab.

   (Analyst workspace) Open the product item revision for which you want to create a corresponding geometry revision, and click the **Overview** or **Simulation** tab.

2. Choose **More Commands** > **New** > **Create Simulation**.

3. Select **CAE 3D Geometry** and then type a name for the geometry revision.

4. (Optional) Select a preconfigured analysis type, for example, **Structural** or **Thermal**.

5. (Optional) Select a preprocessor, for example, **NX** or **Catia**.

6. (Optional) Specify a project ID or click **Add Project** and select a project.

7. To create the geometry revision, click **Create**.

8. Create a geometry structure manually.

   You can do this by creating a geometry structure manually by creating child geometry revisions as appropriate.

   Alternatively, you can automatically generate a geometry structure using data mapping rules.

   a. Open the geometry revision and click the **Content** tab.

   b. Choose **More Commands** > **New** > **Child**.

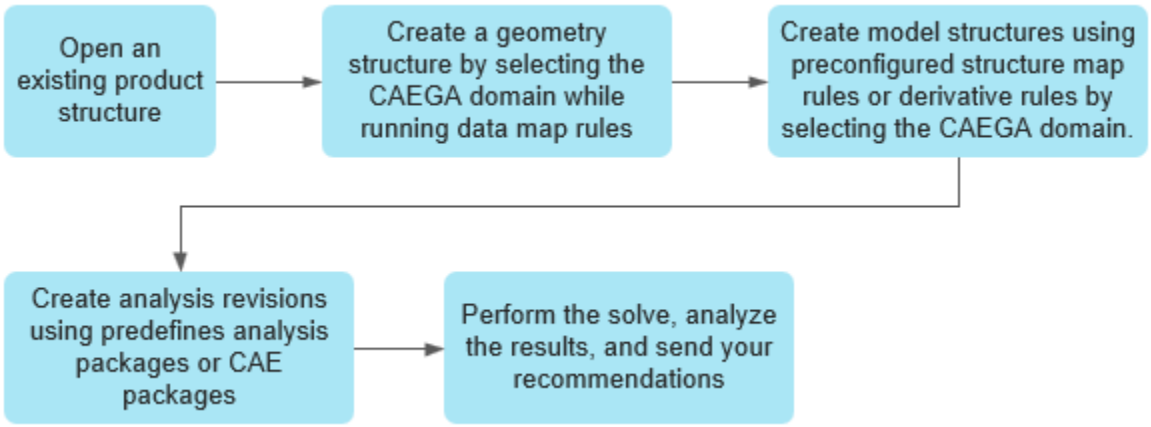
   c. (Mandatory) Specify a name for the child geometry revision.

   d. (Optional) Select or specify other options as appropriate.

   e. To create the child geometry revision, click the **Add** button.

Generate a geometry structure using data mapping rules

You can generate a geometry structure from an existing product structure or a product collector that contains CAD assemblies. You can do this by selecting the **CAEGA** domain while running data map rules. The system creates a **CAEGA-***source_product_structure_name* structure. This structure contains corresponding **CAEGA-***BOM_Line_Name* geometry items for each generic item in the product structure.



1. Generate a geometry structure from the product structure.

   a. Search for and open the product structure (item revision).

   b. (Optional) Apply configuration rules as appropriate to the product structure.

   c. Choose **More Commands** > **New** > **Generate CAE Structure**.

   d. To generate a geometry structure, select the **Data Map** option, select the **CAEGA** domain, and click **Execute**.

      The default domain is **CAE**.

2. Generate a model structure from the geometry structure.

   a. Open the geometry structure (item revision) in the **Overview** tab.

   b. Choose **More Commands** > **New** > **Generate CAE Structure**.

      In the **Generate CAE Structure** panel, select one of the following options:

      - **Data Map to create a model structure that is an exact replica of the product structure by using data map rules**.

After creating the model structure, you can use predefined derivative rules in CAE Manager (rich client) to derive one more structures relevant to your analysis from an existing structure.

- **CAE Structure Map to create a model structure that is an exact replica of the product structure by using data map rules**.

c. Select the **CAE** domain. This is the default domain.

d. To generate a model structure, click **Execute**.

3. Generate a model structure with JT files mapped from the geometry structure.

a. Open the geometry structure (item revision) in the **Overview** tab.

b. Choose **More Commands** > **New** > **Generate CAE Structure**.

In the **Generate CAE Structure** panel, select one of the following options:

- **Data Map to create a model structure that is an exact replica of the product structure by using data map rules**.

After creating the model structure, you can use predefined derivative rules in CAE Manager (rich client) to derive one more structures relevant to your analysis from an existing structure.

- **CAE Structure Map to create a model structure that is an exact replica of the product structure by using data map rules**.

c. Select the **CFD** domain.

When you choose the **CFD** domain, the JT files are mapped from the geometry structure to the model structure.

d. To generate a model structure, click **Execute**.

4. Create analysis revisions from predefined analysis packages or CAE packages and analyze results.

a. Open the model structure (item revision) in the **Overview** tab.

b. Choose **More Commands** > **New** > **CAE Package**.

c. From the **Results** panel, open a site package.

d. **Specify input, output, and other parameters as appropriate** and click **Execute**.

e. **Capture and verify the results**.

Import the product geometry using a preconfigured tool

1. Navigate to the **CAE 3D Geometry** item revision you have created, select it, and click **Open**.

   (Optional) After you search for simulation item revisions, you can select multiple geometry item revisions and launch a preconfigured tool to import the product geometry.

2. Click the **Overview** tab.

3. Access help for a launch tool.

   a. (**Analyst** workspace) Choose **Open in Simulation Tool**.

   (Default workspace) Choose **Open** > **Open in Simulation Tool**.

   b. Select the tool, click **Open in New Tab**, and click **Help**.

   (Optional) To download the help, click **Description File** and select **Download File**.

4. Add a launch tool to your favorites.

   a. (**Analyst** workspace) Choose **Open in Simulation Tool**.

   (Default workspace) Choose **Open** > **Open in Simulation Tool**.

   b. Select the tool, click **Open in New Tab**, and click **Manage** > **Add to Favorites**.

5. To import the product geometry using a preconfigured tool, **launch a simulation tool**.

> Note:
>
> If you do not have preconfigured simulation tools, import the product geometry from the CAD model to a local machine, simplify the geometry using a simplification tool, and upload it to the geometry revision you created.

Simplify the product geometry using a simplification tool

The CAD model is used to define the geometry of a part or an assembly. During the final stages of the design process, the geometry contains numerous details, such as sharp edges, bolt holes, or fillets, which are not required for the analysis. You can import the geometry and use any third-party tool to simplify the geometry before defining a mesh.

Create external links or folders for geometry revisions

You can create external links to files or folders that are managed outside the database but are tracked from Teamcenter.

1. Navigate to the **CAE 3D Geometry** revision you have created, open it, and click the **Overview** tab.
2. Click **Add to** ⊕ in **EXTERNAL LINKS**.
3. Select **PROPERTIES**, specify a name and the URL or a shared location, and then click **Add**.
4. To delete a web link, select the web link, click **Edit**, and select **Delete External Links**.

Add a related revision to a geometry revision

1. Open a geometry analysis from the appropriate folder in **Explorer**.

   Alternatively, search for a geometry revision and open it.

2. To view all related CAE revisions in the context of the geometry revision, click the **Overview** tab.

   The **Related Objects** section displays a pie chart that summarizes the number and types of related simulation objects and a table that displays all the related simulation objects.

   You can hover over the pie chart slice to view the number of related simulation objects to the simulation object you have selected. You can also select or deselect the appropriate related objects under the pie chart to hide or display those objects from the chart.

   > Note:
   >
   > The count displayed for various related simulation objects is based on the number of related objects in the database. It does not change based on filtration.

   You can filter the data within the table columns to see only the data that is relevant to you.

   For more information, see *Filter data in a table column* in *Active Workspace Fundamentals*.

3. To view traceability information, select a related revision in the **Related Objects** table.

   The **TRACEABILITY INFORMATION** section displays how the selected revision is related to other revisions.

4. To view related revisions and their relationships, click the **Overview** tab.

5. To add a related object, click **Add Simulation** ⊕, select a revision from the **Add Simulation** panel, and click the **Add** button.

View the associated material revisions of the product structure in a geometry revision

You can view associated material revisions of the product structure in a geometry revision.

Procedure

1. Open a product structure with associated material revisions.
2. Generate a geometry structure by using data map rules.
   a. Choose **More Commands** > **New** ✳ > **Generate CAE Structure**.
   b. To generate the geometry structure, select the **Data Map** option and the **CAEGA** domain.
3. Open the generated geometry structure, select a BOM line, and choose the **Materials** tab.

   The system displays the material object related to the product structure. Open the material object and choose the **Where Used** tab. It displays the geometry revision as one of the referenced items.
4. Open the generated geometry structure, select a BOM line, and choose the **Relations tab**.

   The system displays the source and target relations of the material object to the geometry revision and the related product structure.

Mark 3D geometry revisions as up-to-date for changes to attachments and related revisions

If 3D geometry revisions and their related revisions undergo changes related to revisions, attachments, parameters, or materials, you can use the **Mark Up-To-Date** command to mark the 3D geometry revisions as up-to-date.

You can also view the CAE status of released 3D geometry revisions if the **CAE_allow_cae_status_on_released_objects** site preference is set to **true** at your site.

Procedure

1. Open a 3D geometry revision and mark it as up-to-date.
   a. Open a **CAE 3D Geometry Revision** from the appropriate folder in **Explorer**.

Alternatively, search for a 3D geometry revision and open it.

The header section displays the CAE status as **Up-to-date** or **Out-of-date**.

b. If the status is out-of-date, hover your mouse over the status. The system displays a tooltip.

The tooltip provides the reason for the revision being out-of-date. For example, the dependent attachment has been modified.

c. Click the **Out-of-date** hyperlink.

The system opens the **Overview** tab. The **Out-of-Date Information and Objects** section displays the status and the reason why the related revision is out-of-date.

d. Click **Edit** and select **Mark Up-To-Date**.

> Note:
>
> If attachments or related objects are attached with the relationship specified in the **CAE_significant_relation_types_for_CAEGeometry** site preference and they get updated, modified, or revised, then the CAE status on the 3D geometry revision changes to out-of-date. The default values for this preference are **CAE Source**, **CAE Target**, **NX Simulations**, and **Specifications**.

2. Search for multiple geometry revisions and mark them as up-to-date.

a. Search for multiple CAE geometry revisions.

b. Select the geometry revisions you want to mark as up-to-date and click **Edit** > **Mark Up-To-Date**.

Make a copy of the 3D geometry revision or revise it

You can make a copy of the of the 3D geometry revision or revise it.

Procedure

1. Make a copy of the 3D geometry revision.

a. Select the 3D geometry revision.

b. Choose **More Commands** > **New** > **Save As**.

The **Save As** dialog opens.

c. (Optional) Specify a new name if you want to create a copy and description.

d. (Optional) Select a new destination folder.

The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

A. Remove the **Newstuff** folder and click the **Add** button to select another folder.

B. Select the folder and click **Add**.

e. To create a copy, click **Save**.

2. Revise the 3D geometry revision.

a. Select the 3D geometry revision.

b. Choose **More Commands** > **New** > **Revise**.

c. (Optional) Specify required information as appropriate.

d. (Optional) Select a new destination folder.

The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

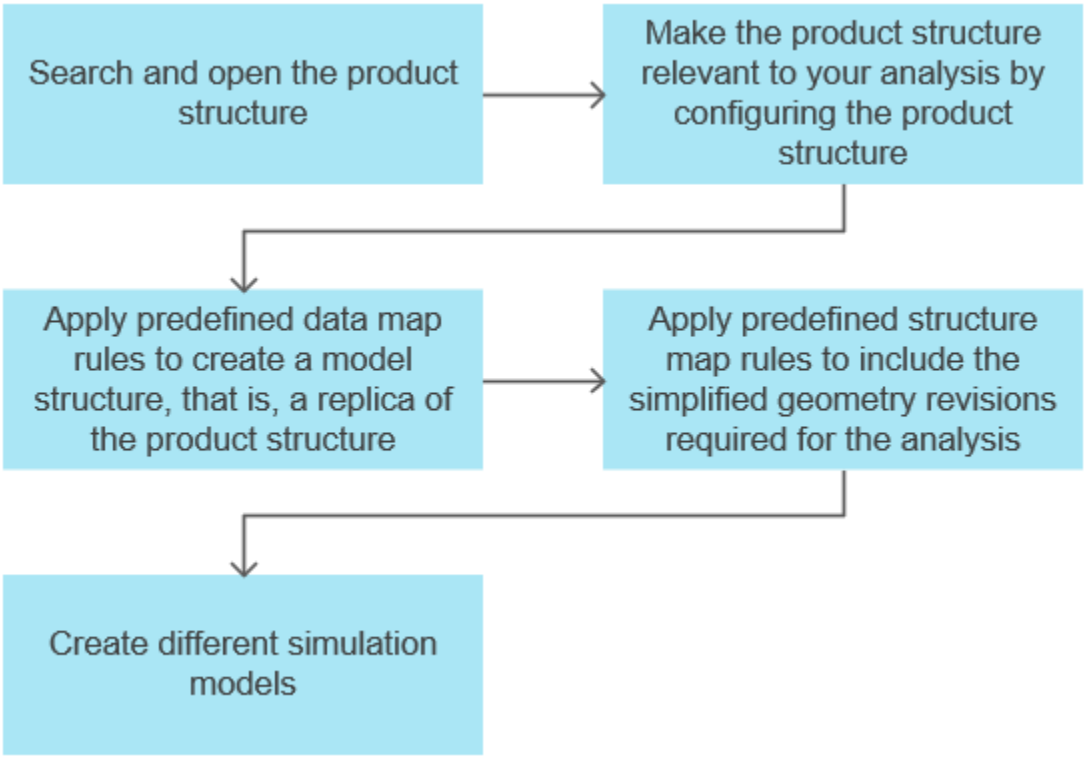
A. Remove the **Newstuff** folder and click the **Add** button to select another folder.

B. Select the folder and click **Add**.

e. To revise, click **Save**.

6. Create the simulation model and define a mesh

Create simulation models



1. **Open the product structure you want to analyze**

   An engineering manager reviews design requirements and assigns design changes for validation to a simulation analyst using a workflow. The workflow contains the design requirements, configuration information, subassembly, and components required for analysis.

2. **Configure the product structure**

   If you work in a product environment with a lot of variability, such as the automobile industry, you can apply revision rules, effectivity, or variant rules to make the product structure relevant to your analysis.

3. **Apply predefined data map rules**

   The simulation administrator defines the data map rules.

Based on these rules, the system creates model revisions for each generic item revision in the product structure, names the resulting model revisions with the default CAE prefix, and defines default relationships between product revisions, geometry revisions, and model revisions.

4. **Apply predefined structure map rules**

   The lead analyst or the designated analyst creates structure map rules.

   In an organization, different groups of analysts perform different types of analyses. There are specialists for NVH analysis, thermal analysis, and durability analysis. The lead analyst creates many types of structure map rules. You can use this option to create a model structure for a specific type of analysis.

   Typically, the model structure is similar to the, but not the same as the product structure. Structure map rules allow you to remove BOM lines from the product structure based on filter criteria, reuse existing model revisions for a part that has been previously analyzed, and create new model revisions for the new parts you want to analyze. In addition, these rules help define default relationships between product revisions, geometry revisions, and model revisions.

5. **Create different simulation models**

   You can apply predefined structure map rules to the product structure to create different types of models for different types analysis. You can create different models to perform NVH analysis, thermal analysis, durability analysis, and so on.

Different ways to generate simulation models

If you are analyzing a small product structure with few components, you can **create model revisions** *individually* for each component. However, if you are analyzing a large product structure with many components, you can create the *complete* model structure using the **Data Map** or the **CAE Structure Map** option.

- *Create a model structure for a specific type of analysis*, **using the CAE Structure Map option**.

  The lead analyst or the designated analyst creates structure map rules.

  In an organization, different groups of analysts perform different types of analyses. There are specialists for NVH analysis, thermal analysis, and durability analysis. The lead analyst creates many types of structure map rules. You can use this option to create a model structure for a specific type of analysis.

  Typically, the model structure is similar to the, but not the same as the product structure. Structure map rules allow you to remove BOM lines from the product structure based on filter criteria, reuse existing model revisions for a part that has been previously analyzed, and create new model revisions for the new parts you want to analyze. In addition, these rules help define default relationships between product revisions, geometry revisions, and model revisions.

- *Create a model structure that is an exact replica of the product structure*, **using the Data Map option**.

  The simulation administrator defines the data map rules.

  Based on these rules, the system creates model revisions for each generic item revision in the product structure, names the resulting model revisions with the default CAE prefix, and defines default relationships between product revisions, geometry revisions, and model revisions.

- **Interactively select specific BOM lines**.

  Interactively select specific BOM lines, particularly when filter or skip rules are not available but all other rules are available in the structure map rule.

When you select the **Data Map** or the **CAE Structure Map** option, the system asynchronously executes this command on the Teamcenter server and you can continue working. The system sends an email notification after successful completion or failure. If successful, the system creates the model structure and places it in the configured output folder in the rich client. You can search for this structure and open it.

Create model revisions manually

You can create model revisions manually and view and rearrange the model revision properties.

1. Create model revisions manually

   a. Search for the geometry revision you created earlier, open it, and click the **Overview** tab.

   b. Choose **More Commands** > **New** > **Create Simulation**.

   c. Select **CAE 3D Model** and type a name for the model revision.

   d. (Optional) Type a description.

   e. (Optional) Select a preconfigured analysis type, for example, **Structural** or **Thermal**.

   f. (Optional) Select a preconfigured solver, for example, **NXNastran** or **Ansys**.

   g. (Optional) Specify a project ID or click **Add Project** and select a project.

   h. To create the model revision, click the **Add** button.

2. View and rearrange the model revision properties

   a. Open a model revision and click the **Content** tab.

b. Click the **Configuration** icon above the model revision table and select **Arrange**.

The properties that are available in the **Content** tab by default have a tick mark associated with them.

c. (Optional) To include a property that is not available by default, select the property by selecting it and click the **Arrange** button.

When you select a property, a tick mark appears beside it.

d. (Optional) To rearrange properties, select a property and click **Move up** or **Move down** and click the **Arrange** button.

Generate a model structure for a specific type of analysis using structure map rules

1. Open a product structure (item revision) by performing a search.
2. (Optional) Apply configuration rules as appropriate.
3. Choose **More Commands** > **New** > **Generate CAE Structure**.
4. Select **CAE Structure Map** and click **Add CAE Structure Map** ⊕.
5. Select a structure map from the **Palette** and click **Add**.

   Alternatively, click **Search**, search for a structure map, select it, and click **Add**.
6. To create a model structure for a specific type of analysis, click **Execute**.

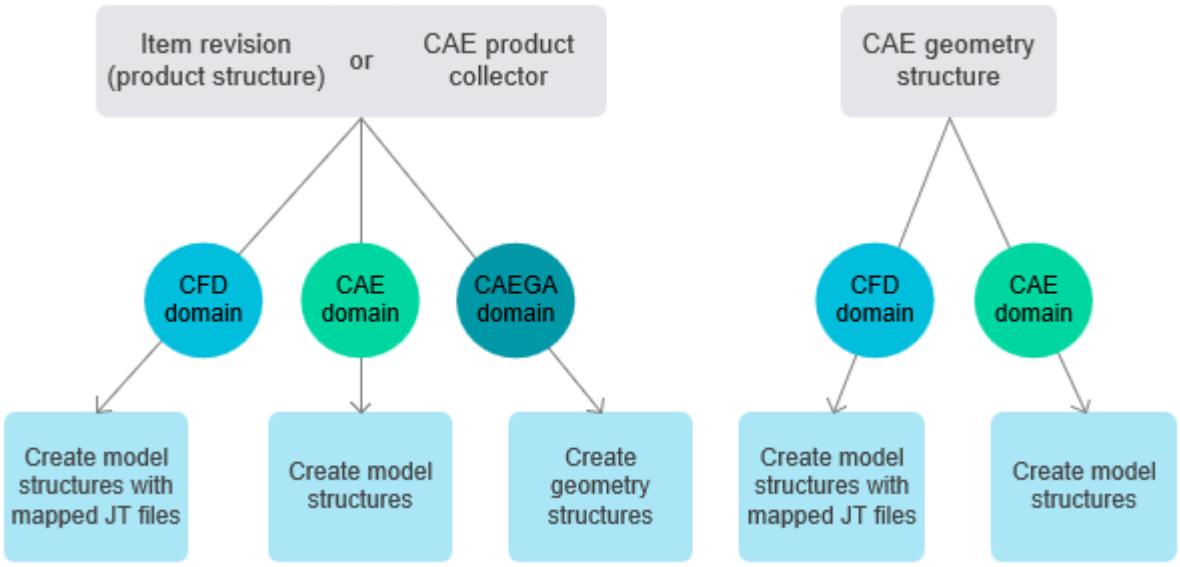
   If the lead simulation analyst has configured predefined simulation tools while creating structure map rules, the system creates the model structure and executes the simulation tools defined as part of the rules. The **Simulation Tool Progress Monitor** dialog box displays the status of the tool launch.

Generate a model structure that is an exact replica of the product structure

1. Search for and open the product structure (item revision).
2. (Optional) Apply configuration rules as appropriate.
3. Click the **Content** tab.

4. Choose **More Commands** > **New** > **Generate CAE Structure**.

5. Select **Data Map** and select one of the following domains.



- **CAE**

  This is the default domain.

  Select this domain to generate a model structure from an existing product structure.

  The system creates a **CAE**-*source_product_structure_name* structure. This structure contains a corresponding **CAE**-*BOM_Line_Name* item revision for each generic item in the product structure.

- **CFD**

  Select this domain to generate a model structure from an existing product structure with the mapping of JT files from the source structure to the output structure.

  This domain option is similar to the default **CAE** option. It additionally maps the JT files.

  The system creates a **CFD**-*source_product_structure_name* structure. This structure contains a corresponding **CFD**-*BOM_Line_Name* item revision for each generic item in the product structure with the JT mapping, if the item revisions in the product structure contain the JT files.

- **CAEGA**

  Select this domain to generate a geometry structure from an existing product structure or a product collector that contains CAD assemblies.

The system creates a **CAEGA-***source_product_structure_name* structure. This structure contains a corresponding **CAEGA-***BOM_Line_Name* geometry item for each generic item in the product structure.

For all the domain options, the system creates a **TC_CAE_Target** relationship between the source and the output item revisions and a **TC_CAE_Source** relationship between the source and output item revisions, if the output is not a subassembly.

The simulation administrator creates domains. Your organization might have different CAE disciplines for safety, durability, and so on. The organization wants the data mapping to be different for each discipline, but there is only one data map XML file for the whole site. Domains are created to handle data mapping differently in such situations.

6. To create a model structure that is an exact replica of the product structure, click **Execute**.

7. (Optional) Create analysis revisions from predefined analysis packages or CAE packages and analyze results.

   a. Open the model structure (item revision) in the **Overview** tab.

   b. Choose **More Commands** > **New** > **CAE Package**.

   c. From the **Results** panel, open a site package.

   d. **Specify input, output, and other parameters as appropriate** and click **Execute**.

   e. **Capture the results and verify the results**.

Generate a model structure by selecting specific BOM lines in a product structure

You can interactively select specific BOM lines, particularly when filter or skip rules are not available but all other rules are available in the structure map rule.

> Example:
>
> Let us assume that there is a skip rule to ignore all bolts in a structure. While interactively selecting BOM lines, even if you select a BOM line that has the bolt as its part by mistake, the system does not process this BOM line while creating the model structure.

1. Open a product structure (item revision) by performing a search.

2. (Optional) Apply configuration rules as appropriate.

3. Select the BOM lines for which you want to generate a model structure.

- If you select the root level structure, the system processes all the subassemblies and their children at their levels.
- If you select a subassembly, the system processes all its children at all levels.
- If you select a subassembly and select some children, the system processes the selected children and all other children in the same subassembly. It ignores all other children of other subassemblies.
- If you select *Child1* from *subassembly1*, even though the same child and subassembly occurs in another assembly, the system filters out the other assembly.

4. Choose **More Commands** > **New** > **Generate CAE Structure**.

   You can create a model structure by using data mapping rules or structure map rules.

5. Select one of the following options:
   - **Data Map** to generate a model structure by using **data map rules**.
   - **CAE Structure Map** to generate a model structure by using **structure map rules**.

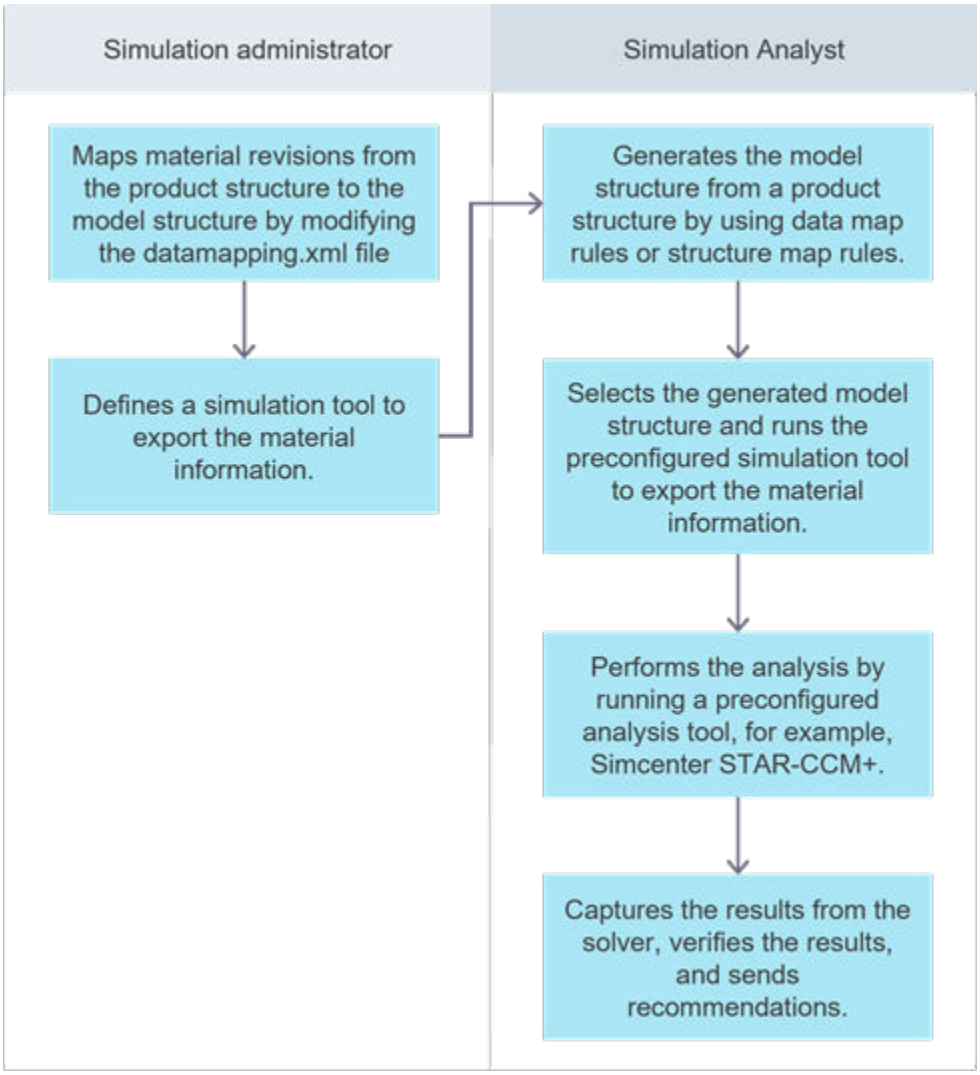
6. To generate the model structure, click **Execute**.

Generate a model structure using preconfigured material revision mapping and export material information

You can generate a model structure from a product structure that contains material revisions, export the material information, and use the exported material information to perform a simulation analysis.

As a prerequisite, Teamcenter Materials Management must be installed for exporting material information.

The process flow for exporting the material information is as follows:



1. Generate a model structure using preconfigured material revision mapping.

   The generated model structure references the material revisions from the product structure.

   a. Open a product structure (item revision) with material revisions by performing a search.

   b. (Optional) Apply configuration rules as appropriate.

   c. Click the **Content** tab.

   d. Choose **More Commands** > **New** > **Generate CAE Structure**.

      You can create a model structure by using data mapping rules or structure map rules.

   e. Generate a model structure by using **data map rules** or by using **structure map rules**.

f. Open the model structure and verify if the structure is created as per the data map rules or structure map rules.

g. (Optional) Open the model structure and verify if the system has created references between the output model structures and the material revisions attached to the source product structure.

h. (Optional) Copy material revision properties.

   A. Copy the material revision attached to the source product structure and paste it to the model or the geometry revision that has a **Materials** relation.

   B. In the **Enter the values for Properties on Relation** dialog box, specify the mass and the unit of measure, for example, grams.

2. Run a preconfigured simulation tool to export the material information.

   a. Open the **model revision you generated with material revisions**.

   b. **Launch a preconfigured simulation tool** for exporting material information.

   c. Open the log file and verify it.

      After the tool is launched, the material file is exported to the same directory as the input files. The log file of the material export is located in the **logs** directory of the scratch location.

3. Perform the simulation analysis with the exported material information and capture results.

   The analysis tool uses the exported material information for running the analysis.

   a. Perform the analysis by **running a preconfigured analysis tool**, for example, Simcenter STAR-CCM+. The analysis tool uses the exported material information for running the analysis.

   b. Capture the **results from the solver, verify the results**, and send recommendations.

Compare structures

Compare the model structure and the associated product structure

You can compare the model structure and the associated product structure and automatically update the model structure or view the differences between them.

Let us assume a scenario where you receive a product structure for analysis. You apply data map rules to the product structure and create the model structure or the mesh assembly. You also generate meshes with connections, define load cases, and perform a solve.

Later, you are notified that there are some minor changes to the product structure. Instead of recreating the complete model structure, you decide to compare the existing model structure with the changed product structure, understand the changes, and make updates to the existing model structure. You compare both structures to find if any new components are added, removed, or revised, and take subsequent actions to update the model structure.

You can:

Compare structures using the guided update to view the differences by generating a report; OR

Compare structures and automatically update the model structure

Compare structures using the guided update to view the differences by generating a report

You can compare the model structure and the associated product structure to view the differences between them by using the **Guided Update** option to generate a report of the differences.

Procedure

1. Open the model structure and choose **Compare** > **Simulation**.

   In the default workspace, the system automatically opens the associated product structure and displays the model structure and the product structure side-by-side in **Split View**.

   In the **Analyst** workspace, the comparison opens side-by-side in **Split View** in the **Compare Simulation** location.

2. In the **Comparison Setting** panel, choose **Guided Update** and select comparison options as appropriate.

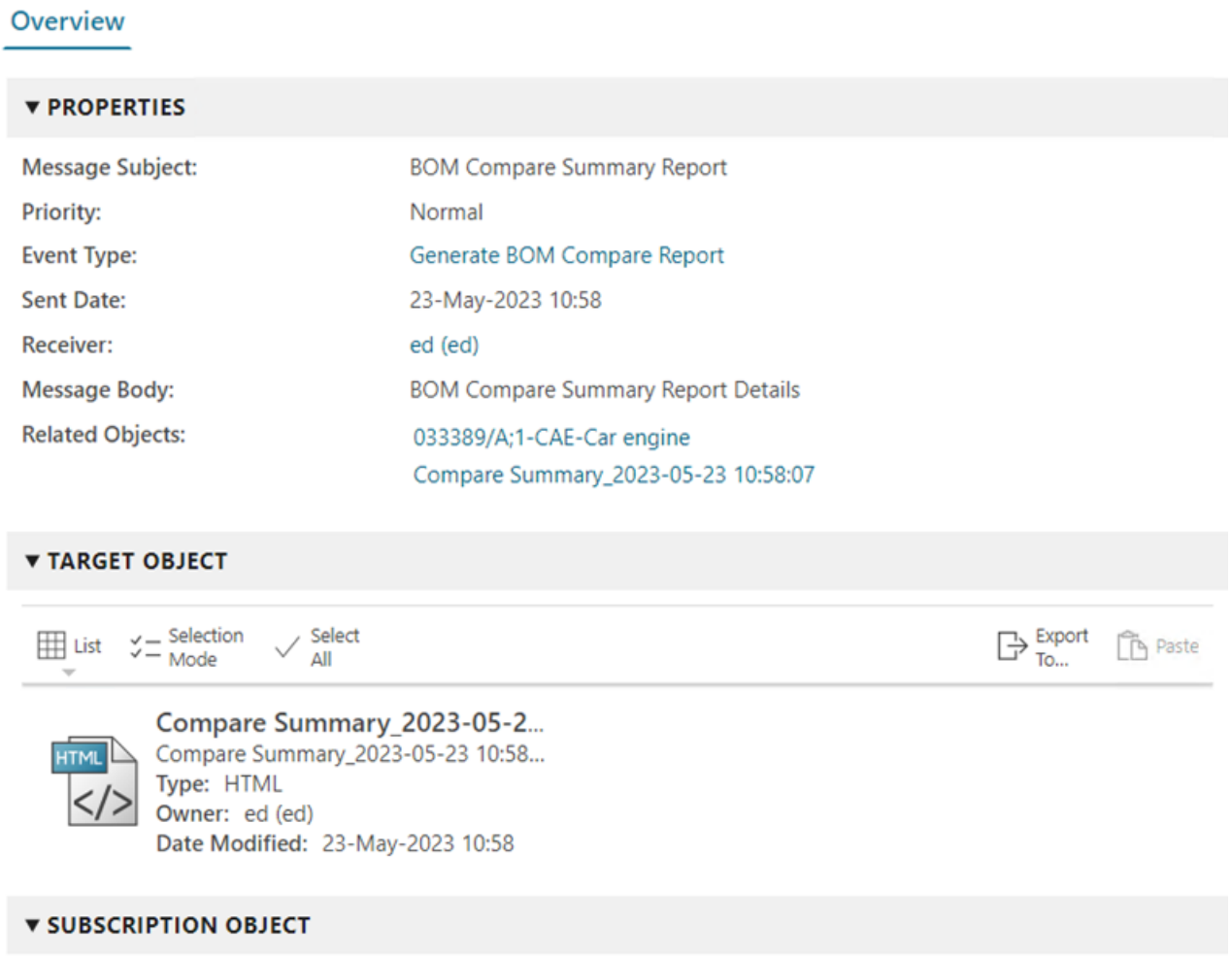
Select this option...	To...
Select All	Select all comparison options.
Model with Newer Product Revision	Determine if the model BOM line is linked to a newer revision of the product BOM line. This is to find out if any CAE models are out-of-date based on revision.
Model with Additional Components than Product Revision	Determine if the number of model BOM lines is more than the number of BOM lines of the linked product structure.
Model without Product Revision	Determine whether the model structure BOM lines are not linked to any product structure BOM lines in the model structure. This is to find out if any models do not contain any CAD data or deleted product item revisions.

Select this option...	To...
Model with updated Product Revision	Determine whether the source product structure BOM has been updated. The product is considered as updated if there are changes to the last modified date in any of the BOM lines or to the transformation information in any of the BOM lines or assembly components. Note: The initial values for the last modified date and transformation information are stored within each BOM line of the model structure when the model is created from the product structure using data map rules. This information is stored on the model only when the **CAE_enable_mark_up_to_date** option is set to **True** before running data map rules on the product structure.
Product without Model Revision	Determine whether the BOM lines in the product structure are not linked to any BOM lines in the model structure. This is to find out if any source product does not have a linked model.

3. Click the **Compare** option in the **Compare Simulation** panel.

   The system displays a message saying that the process is initiated and an alert will be sent when the process is complete.

4. Click **Alerts** and open **Execution Summary** when it is available.



5. Download the **CAE BOM Compare Execution Summary** report from the **Target Object** section of **Execution Summary** and open it.

   The report displays the names of the model and product structure, the time stamp, the total lines processed and not processed. Additionally, it displays information about the failed criteria in distinct colors. The actual comparison is displayed in the table of the report.

BOM Compare Summary(2023-05-23 10:58:07)

Product: 033382/A;1-Car engine
Model: 033389/A;1-CAE-Car engine
Number of BOM Lines failed: 2
Number of BOM Lines compared: 6

Compare options:

Model with Newer Product Revision, Model with Additional Components than Product Revision, Model without Product Revision, Model with Updated Product Revision, Product without Model Revision

Table:

Level	Item ID	Item Revision	Item Revision Name	Rationale
0	033389	A	CAE-Car engine	
1	033390	A	CAE-Engine block	
1	033391	A	CAE-Piston	
1	033392	A	CAE-Crankshaft	Model Revision without related Product Revision.
1	033396	A	CAE-Cylinder	
1	033397	A	CAE Timing belt	Model Revision without related Product Revision.

Note:

If the **CAE Model Structure** has CAE boundary condition BOM lines, then those BOM lines from the model structure are not considered for the BOM comparison. However, these BOM lines are displayed in the comparison report with a white background.

6. (Optional) In the default workspace, to select another comparison option, click **More Commands** > **View** > **Compare Simulation**, and choose the appropriate options from the **Comparison Settings** panel.

   In the **Analyst** workspace, click the **Compare** button above the structures in **Split View**.

Compare structures and automatically update the model structure

You can compare the model structure and the associated product structure and update the model structure automatically by choosing the **Automatic Update** option.

Procedure

1. Open the model structure and choose **Compare** > **Simulation**.

In the default workspace, the system automatically opens the associated product structure and displays the model structure and the product structure side-by-side in **Split View**.

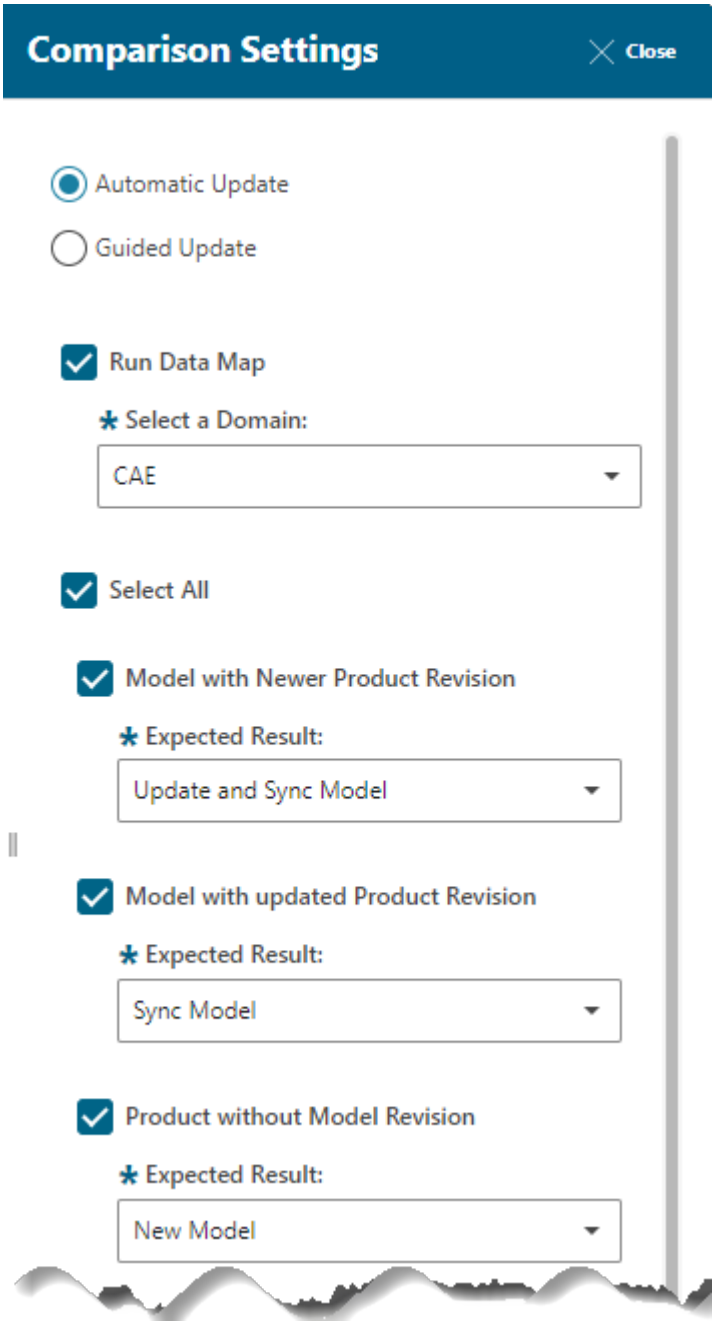
In the **Analyst** workspace, the comparison opens side-by-side in **Split View** in the **Compare Simulation** location.

2. To update the model structure automatically, select **Automatic Update** in the **Comparison Setting** panel.

3. Accept the default selection for the **Run Data Map** check box for all the comparison scenarios.

4. Choose **Select All** to select all the comparison options with their default update actions. Alternatively, select one of the following comparison options as described in the subsequent steps.

   The **AWC_CAE_Update_Structure_Default_Actions** user preference determines the default update actions for the comparison options.



5. Select the appropriate update action based on the scenario.

Scenario	Update action to perform
The BOM line in the source product structure that has a newer revision and the corresponding BOM line in the model structure has an older revision.	To update the model and create a relation to the newer revision of the product BOM line without changing the revision of the model, choose the **Model with Newer Product Revision** comparison option and select the **Update and Sync Model** update action.

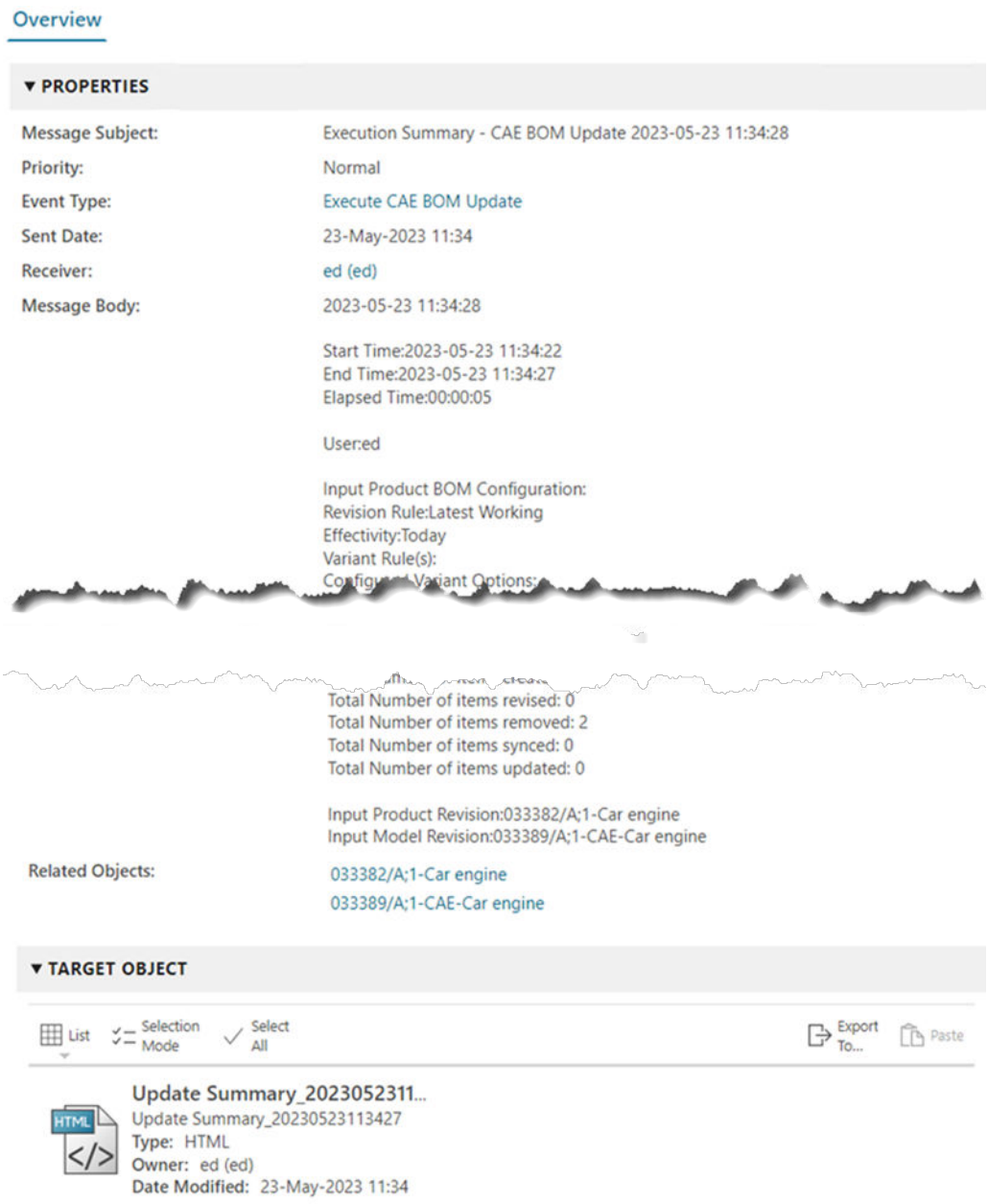
Scenario	Update action to perform
	For more information, see **Example 1: Update and sync the model for a newer product revision**.
	To revise the model and create a relation to the newer revision of the product BOM line, choose the **Model with Newer Product Revision** comparison option and select the **Revise the Model** update action. For more information, see **Example 2: Revise the model for a newer product revision**.
	To create a new model and create a relation to the newer revision of the product BOM line, choose the **Model with Newer Product Revision** comparison option and select the **Create a New Model** update action. For more information, see **Example 3: Create a new model for a newer product revision**.
The BOM line in the source product structure that has one of the attributes, such as **Description**, updated and the corresponding BOM line in the model structure does not have a description.	To update the description in the BOM line, choose the **Model with Updated Product Revision** comparison option and select the **Sync Model** update action. For more information, see **Example 4: Sync the model for an updated product revision**.
The source product structure has an additional BOM line and that is not available in the model structure.	To create a new model for the additional BOM line in the product structure, choose the **Product without Model Revision** comparison option and select the **New Model** update action. For more information, see **Example 5: Create a new model for a product without the model revision**
The model structure has an additional BOM line and the associated BOM line is not available in the product structure.	To delete the model from the model structure, choose the **Model without Product Revision** comparison option and select the **Remove Model** update action. For more information, see **Example 6: Remove the model for a product without the revision**
The model structure has two BOM lines that are associated to the same BOM line in the product structure.	To delete the two models from the model structure, choose the **Model with Additional Components than Product**

Scenario	Update action to perform
	Revision comparison option and select the **Remove Model** update action. For more information, see **Example 7: Remove the model for additional components than product revision**.
The product structure has an additional BOM line that is not available in the model structure. Additionally, one of the BOM lines in the product structure has a newer revision.	• To add the new BOM line to the model structure, choose the **Product without Model Revision** comparison option and select the **New Model** update action. • To update the relation of the model BOM line to the product revision with the newer revision, choose the **Model with Newer Product Revision** comparison option and select the **Update and Sync Model** update action. For more information, see **Example 8: Create a new model and update and sync the model for a newer product revision and a product without the model revision**

6. To start the comparison and update actions, click **Execute**.

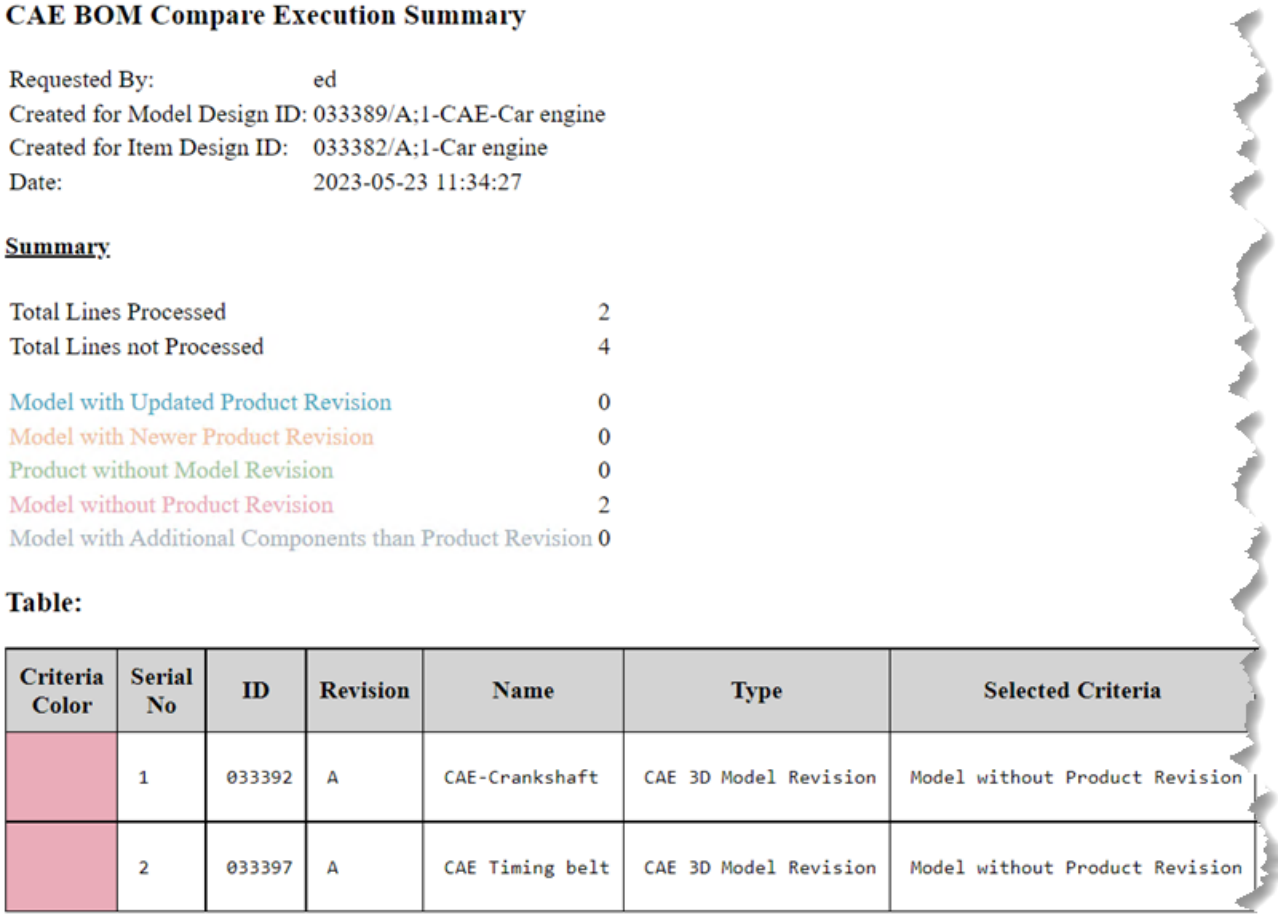
   The comparison and update actions happen asynchronously.

7. Click **Alerts** and open **Execution Summary** when it is available.



8. Download the **CAE BOM Compare Execution Summary** report from the **Target Object** section of **Execution Summary** and open it.

   The report displays the names of the model and product structure, the time stamp, the total lines processed and not processed. Additionally, it displays information about the failed criteria in distinct colors. The actual comparison is displayed in the table of the report.



CAE BOM Compare Execution Summary

Requested By: ed
Created for Model Design ID: 033389/A;1-CAE-Car engine
Created for Item Design ID: 033382/A;1-Car engine
Date: 2023-05-23 11:34:27

Summary

Total Lines Processed	2
Total Lines not Processed	4
Model with Updated Product Revision	0
Model with Newer Product Revision	0
Product without Model Revision	0
Model without Product Revision	2
Model with Additional Components than Product Revision	0

Table:

Criteria Color	Serial No	ID	Revision	Name	Type	Selected Criteria
	1	033392	A	CAE-Crankshaft	CAE 3D Model Revision	Model without Product Revision
	2	033397	A	CAE Timing belt	CAE 3D Model Revision	Model without Product Revision

9. To view the changes to the model structure, refresh the **Compare** > **Split View** by reloading the page in the browser.

Example 1: Update and sync the model for a newer product revision

You can compare the model structure and the associated product structure and update the model structure automatically by choosing the **Automatic Update** option.

In this comparison scenario, let us assume that there is a BOM line in the source product structure that has a newer revision and the corresponding BOM line in the model structure has an older revision.

To update the model and create a relation to the newer revision of the product BOM line without changing the revision of the model, choose the **Model with Newer Product Revision** comparison option and select the **Update and Sync Model** update action.

Procedure

1. Open the model structure and choose **Compare** > **Simulation**.

The system automatically opens the associated product structure and displays the model structure and the product structure side-by-side in **Split View**.

2. Select the product BOM line that has a newer revision. Verify that the revision is B, for example.

3. Select the model BOM line corresponding to the product BOM line (revision B). Verify that the revision is A, for example.

4. To verify the target relationship, click the **Overview** tab below the model structure and select the object with the **CAE Target** relation in **Related Objects**.

   The model BOM line has a **CAE Target** relation to the older product BOM line (revision A).

5. Select **Automatic Update** and accept the default selection for the **Run Data Map** check box.

6. Choose the **Model with Newer Product Revision** comparison option and select the **Update and Sync Model** update action.

7. To start the comparison and update actions, click **Execute**.

   The comparison and update actions happen asynchronously.

8. To verify that the comparison is complete, click **Alerts** and open **Execution Summary** when it is available.

9. Refresh the **Compare** > **Split View** by reloading the page in the browser.

10. Select the model BOM line that corresponds to the product BOM line (revision B). Verify the revision of the BOM line in the model structure. It is *unchanged*.

11. To verify the changed target relationship, click the **Overview** tab below the model structure and select the object with the **CAE Target** relation in **Related Objects**.

    The model BOM line has a **CAE Target** relation to the newer product BOM line (revision B).

Example 2: Revise the model for a newer product revision

You can compare the model structure and the associated product structure and update the model structure automatically by choosing the **Automatic Update** option.

In this comparison scenario, let us assume that there is a BOM line in the source product structure that has a newer revision and the corresponding BOM line in the model structure has an older revision.

To revise the model and create a relation to the newer revision of the product BOM line, choose the **Model with Newer Product Revision** comparison option and select the **Revise the Model** update action.

Procedure

1. Open the model structure and choose **Compare** > **Simulation**.

   The system automatically opens the associated product structure and displays the model structure and the product structure side-by-side in **Split View**.

2. Select the product BOM line that has a newer revision. Verify that the revision is B, for example.

3. Select the model BOM line corresponding to the product BOM line (revision B). Verify that the revision is A, for example.

4. To verify the target relationship, click the **Overview** tab below the model structure and select the object with the **CAE Target** relation in the **Related Objects** section.

   The model BOM line has a **CAE Target** relation to the older product BOM line (revision A).

5. Select **Automatic Update** and accept the default selection for the **Run Data Map** check box.

6. Choose the **Model with Newer Product Revision** comparison option and select the **Revise Model** update action.

7. To start the comparison and update actions, click **Execute**.

   The comparison and update actions happen asynchronously.

8. To verify that the comparison is complete, click **Alerts** and open **Execution Summary** when it is available.

9. Refresh the **Compare** > **Split View** by reloading the page in the browser.

10. Select the model BOM line that corresponds to the product BOM line (revision B).

    Verify that the revision has changed from A to B.

11. To verify the changed target relationship, click the **Overview** tab below the model structure and select the object with the **CAE Target** relation in the **Related Objects** section.

    The model BOM line has a **CAE Target** relation to the newer product BOM line (revision B).

Example 3: Create a new model for a newer product revision

You can compare the model structure and the associated product structure and update the model structure automatically by choosing the **Automatic Update** option.

In this comparison scenario, let us assume that there is a BOM line in the source product structure that has a newer revision and the corresponding BOM line in the model structure has an older revision.

To create a new model and create a relation to the newer revision of the product BOM line, choose the **Model with Newer Product Revision** comparison option and select the **Create a New Model** update action.

Procedure

1. Open the model structure and choose **Compare** > **Simulation**.

   The system automatically opens the associated product structure and displays the model structure and the product structure side-by-side in **Split View**.

2. Select the product BOM line that has a newer revision. Verify that the revision is B, for example.

3. Select the model BOM line corresponding to the product BOM line (revision B).

   Note down the ID of this BOM line. This BOM line is going to be replaced with a new model.

4. To verify the target relationship, click the **Overview** tab below the model structure and select the object with the **CAE Target** relation in the **Related Objects** section.

   The model BOM line has a **CAE Target** relation to the older product BOM line (revision A).

5. Select **Automatic Update** and accept the default selection for the **Run Data Map** check box.

6. Choose the **Model with Newer Product Revision** comparison option and select the **New Model** update action.

7. To start the comparison and update actions, click **Execute**.

   The comparison and update actions happen asynchronously.

8. To verify that the comparison is complete, click **Alerts** and open **Execution Summary** when it is available.

9. Refresh the **Compare** > **Split View** by reloading the page in the browser.

10. Select the model BOM line that corresponds to the product BOM line (revision B).

    Verify that a new model is created. The ID of the BOM line has changed.

    The name is the same because it is generated using data map rules.

11. To verify the changed target relationship, click the **Overview** tab below the model structure, select the object with the **CAE Target** relation in the **Related Objects** section.

    The new model BOM line has a **CAE Target** relation to the newer product BOM line (revision B).

Example 4: Sync the model for an updated product revision

You can compare the model structure and the associated product structure and update the model structure automatically by choosing the **Automatic Update** option.

In this comparison scenario, let us assume that there is a BOM line in the source product structure that has one of the attributes, such as **Description**, updated. The corresponding BOM line in the model structure does not have a description. To update the description in the BOM line, choose the **Model with Updated Product Revision** comparison option and select the **Sync Model** update action.

Procedure

1. Open the model structure and choose **Compare** > **Simulation**.

   The system automatically opens the associated product structure and displays the model structure and the product structure side-by-side in **Split View**.

2. Select the product BOM line that has the **Description** field updated and note down the description.

3. Select the model BOM line corresponding to the product BOM line with the **Description** field updated. Verify that the field is empty.

4. Select **Automatic Update** and accept the default selection for the **Run Data Map** check box.

5. Choose **Model with Updated Product Revision** and select the **Sync Model** update action.

6. To start the comparison and update actions, click **Execute**.

   The comparison and update actions happen asynchronously.

7. To verify that the comparison is complete, click **Alerts** and open **Execution Summary** when it is available.

8. Refresh the **Compare** > **Split View** by reloading the page in the browser.

9. Select the model BOM line corresponding to the product BOM line with the **Description** field updated.

   Verify that the field is updated.

Example 5: Create a new model for a product without the model revision

You can compare the model structure and the associated product structure and update the model structure automatically by choosing the **Automatic Update** option.

In this comparison scenario, let us assume that there is an additional BOM line in the source product structure and that is not available in the model structure. To create a new model for the additional BOM line in the product structure, choose the **Product without Model Revision** comparison option and select the **New Model** update action.

Procedure

1. Open the model structure and choose **Compare** > **Simulation**.

   The system automatically opens the associated product structure and displays the model structure and the product structure side-by-side in **Split View**.

2. Verify the product structure. It has an additional BOM line that is not available in the model structure.

3. Select **Automatic Update** and accept the default selection for the **Run Data Map** check box.

4. Choose **Product without Model Revision** and select the **New Model** update action.

5. To start the comparison and update actions, click **Execute**.

   The comparison and update actions happen asynchronously.

6. To verify that the comparison is complete, click **Alerts** and open **Execution Summary** when it is available.

7. Refresh the **Compare** > **Split View** by reloading the page in the browser.

8. Verify the model structure.

   The system creates a new model BOM line for the additional product BOM line.

9. To verify the target relationship for the new model BOM line, click the **Overview** tab below the model structure and select the object with the **CAE Target** relation in the **Related Objects** section.

   The model BOM line has a **CAE Target** relation to the additional product BOM line.

Example 6: Remove the model for a product without the revision

You can compare the model structure and the associated product structure and update the model structure automatically by choosing the **Automatic Update** option.

In this comparison scenario, let us assume that the model structure has an additional BOM line and the associated BOM line is not available in the product structure. To delete the model from the model structure, choose the **Model without Product Revision** comparison option and select the **Remove Model** update action.

Procedure

1. Open the model structure and choose **Compare** > **Simulation**.

   The system automatically opens the associated product structure and displays the model structure and the product structure side-by-side in **Split View**.

2. Verify the model structure. It has an additional BOM line and the associated BOM line is not available in the product structure.

3. Select **Automatic Update** and accept the default selection for the **Run Data Map** check box.

4. Select the **Model without Product Revision** comparison option and choose the **Remove Model** update action.

5. To start the comparison and update actions, click **Execute**.

   The comparison and update actions happen asynchronously.

6. To verify that the comparison is complete, click **Alerts** and open **Execution Summary** when it is available.

7. Refresh the **Compare** > **Split View** by reloading the page in the browser.

8. Verify the model structure.

   The system removes the additional BOM line from the model structure.

Example 7: Remove the model for additional components than product revision

You can compare the model structure and the associated product structure and update the model structure automatically by choosing the **Automatic Update** option.

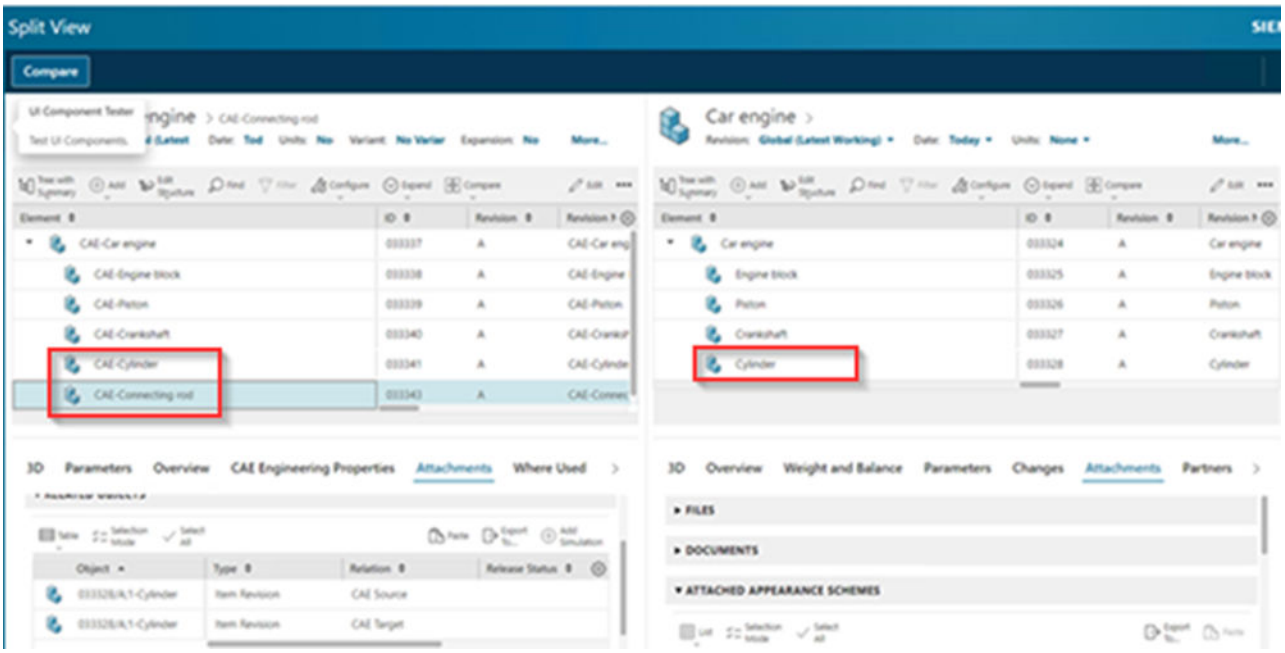
In this comparison scenario, let us assume that the model structure has two BOM lines that are associated to the same BOM line in the product structure. To delete the two models from the model structure, choose the **Model with Additional Components than Product Revision** comparison option and select the **Remove Model** update action.

Procedure

1. Open the model structure and choose **Compare** > **Simulation**.

   The system automatically opens the associated product structure and displays the model structure and the product structure side-by-side in **Split View**.

2. Verify the model structure. It has two BOM lines that are associated to the same BOM line in the product structure.



3. Select **Automatic Update** and deselect the default selection for the **Run Data Map** check box.

4. Select the **Model with Additional Components than Product Revision** comparison option and choose the **Remove Model** update action.

5. To start the comparison and update actions, click **Execute**.

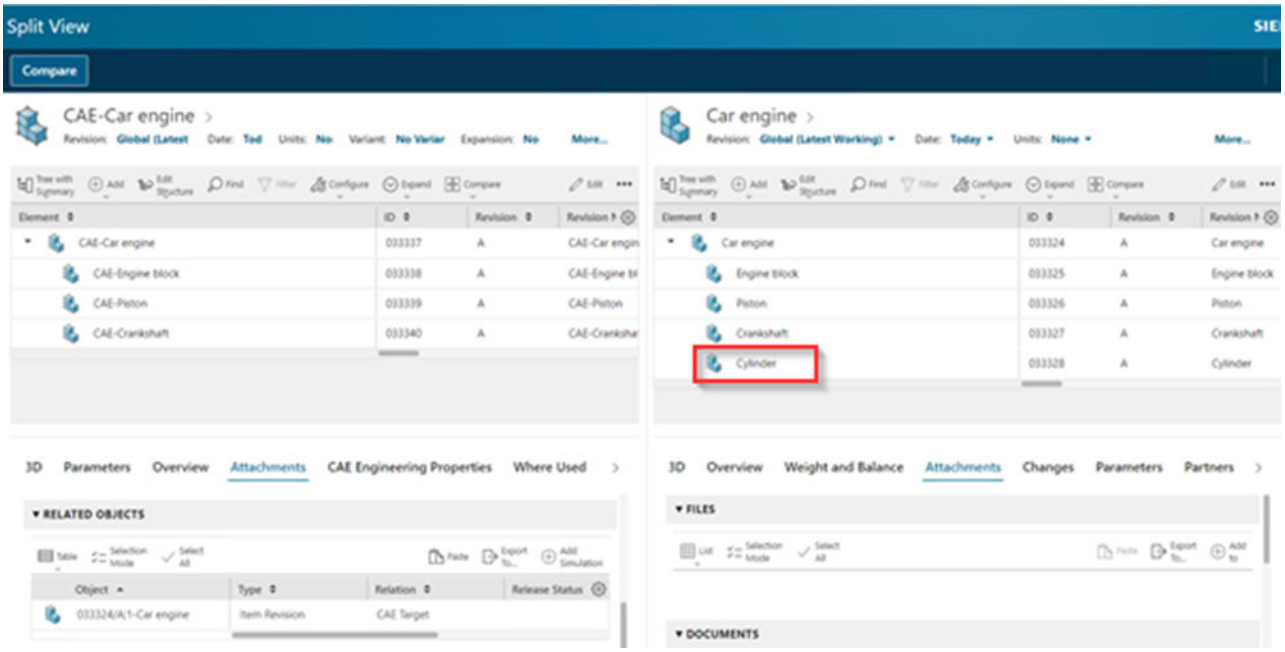
   The comparison and update actions happen asynchronously.

6. To verify that the comparison is complete, click **Alerts** and open **Execution Summary** when it is available.

7. Refresh the **Compare** > **Split View** by reloading the page in the browser.

8. Verify the model structure.

   The system removes the two BOM lines from the model structure.



Example 8: Create a new model and update and sync the model for a newer product revision and a product without the model revision

You can compare the model structure and the associated product structure and update the model structure automatically by choosing the **Automatic Update** option.

In this comparison scenario, let us assume that the product structure has an additional BOM line that is not available in the model structure. Additionally, one of the BOM lines in the product structure has a newer revision. This means that the corresponding model BOM line has a relation with the previous revision of the product BOM line.

In such a scenario, you have to choose two comparison options to update the model structure. To add the new BOM line to the model structure, choose the **Product without Model Revision** comparison option and select the **New Model** update action. To update the relation of the model BOM line to the product revision with the newer revision, choose the **Model with Newer Product Revision** comparison option and select the **Update and Sync Model** update action. However, this action does not change the revision of the model BOM line.

Procedure

1. Open the model structure and choose **Compare** > **Simulation**.

   The system automatically opens the associated product structure and displays the model structure and the product structure side-by-side in **Split View**.

2. Verify the product structure. It has an additional BOM line and the associated BOM line is not available in the model structure.

3. Select the product BOM line that has the latest revision. Verify that the revision is D, for example.

4. Select the model BOM line corresponding to the product BOM line (revision D). Verify that the revision is A, for example.

5. To verify the target relationship, click the **Overview** tab below the model structure and select the object with the **CAE Target** relation in the **Related Objects** section.

   The model BOM line has a **CAE Target** relation to the older product BOM line, that is, revision C.

6. Select **Automatic Update** and accept the default selection for the **Run Data Map** check box.

7. Select the **Model with Newer Product Revision** comparison option and choose the **Update and Sync Model** update action.

8. Select the **Product without Model Revision** comparison option and choose the **New Model** update action.

9. To start the comparison and update actions, click **Execute**.

   The comparison and update actions happen asynchronously.

10. To verify that the comparison is complete, click **Alerts** and open **Execution Summary** when it is available.

11. Refresh the **Compare** > **Split View** by reloading the page in the browser.

12. Verify the model structure.

    The system creates a new model BOM line for the additional product BOM line.

13. Select the model BOM line corresponding to the product BOM line (revision D). Verify that the revision is unchanged, that is, revision A.

14. To verify the target relationship, click the **Overview** tab below the model structure and select the object with the **CAE Target** relation in the **Related Objects** section.

    The model BOM line has a **CAE Target** relation to the latest product BOM line, that is, revision D.

Generate meshes using a preconfigured meshing application

1. Navigate to the **CAE 3D Model** revision you created earlier, open it, and click the **Overview** tab.

2. To generate meshes using a preconfigured meshing application, **launch a simulation tool**.

If you do not have preconfigured simulation tools at your site, create the **CAE 3D Model** item revision in the context of the **CAE 3D Geometry** item revision you created earlier, run the meshing application to generate the mesh data and apply meshes, and then upload the mesh data to the **CAE 3D Model** item revision.

3. Add a launch tool to your favorites.

   a. (**Analyst** workspace) Choose **Open in Simulation Tool**.

   (Default workspace) Choose **Open** > **Open in Simulation Tool**.

   b. Select the tool, click **Open in New Tab**, and click **Manage** > **Add to Favorites**.

4. (Optional) Access help for a launch tool.

   a. (**Analyst** workspace) Choose **Open in Simulation Tool**.

   (Default workspace) Choose **Open** > **Open in Simulation Tool**.

   b. Select the tool, click **Open in New Tab**, and click **Help**.

   (Optional) To download the help, click **Description File** and select **Download File**.

View and recapture the pedigree information of the product structure as the model pedigree

If pedigree operations are enabled by the simulation administrator, when you create a CAE 3D model structure based on a product structure using data map or structure map rules, the system automatically captures the pedigree information of the product structure as the model pedigree. Pedigree information captures the exact configuration of various structures, including the revision rule, effectivity, and variant rules, and persists that information in the database. Therefore, as a simulation analyst, you have clear traceability of what was analyzed.

1. View the pedigree information.

   a. Navigate to the **CAE 3D Model** revision, open it, and click the **Overview** tab.

   b. See the **PEDIGREE INFORMATION** section.

2. Recapture the pedigree information.

   Let us assume a scenario where you create a CAE 3D model structure based on the product structure by using data map rules or structure map rules. If pedigree operations are enabled by the simulation administrator, the system automatically captures this information. Later, when the revision rule or the effectivity of the product structure changes, you can recapture the pedigree information as the model pedigree.

a. Open the product structure, choose the **Overview** tab, and select the associated **CAE 3D Model Revision**.

b. Select the **Capture Pedigree** option.

The pedigree information is updated.

The system enables this option only when you select the associated model revision.

Create external links or folders for model revisions

You can create external links to files or folders that are managed outside the database but are tracked from Teamcenter.

1. Navigate to the **CAE 3D Model** revision you have created, open it, and click the **Overview** tab.
2. Click **Add to** ⊕ in **EXTERNAL LINKS**.
3. Select **PROPERTIES**, specify a name and the URL or a shared location, and then click **Add**.
4. To delete a web link, select the web link, click **Edit**, and select **Delete External Links**.

Update datasets and file names associated with the parent CAE structure

As a simulation analyst, you can update datasets and file names associated with the parent CAE structure as per the naming pattern specified by the simulation administrator at your site.

Prerequisites

This topic assumes that the simulation administrator at your site has edited the **CAE_renaming_pattern_for_dataset_and_file_names** site preference to set a preference value. This preference is used to specify the naming pattern for datasets and their related files at the site level. The **Update Dataset and File Name** command is visible on the **Files** tab of the CAE object only when you set a preference value.

Procedure

1. Open a CAE object such as **CAE 3D Model** and click the **Files** tab.
2. Select the root level of the CAE object in the **File Containers** view and select the **Update Dataset and File Name** command in the **File Contents** secondary view.

   If you select any other object, the command is not visible.

The **Update Dataset and File Name** command is visible on the **Files** tab of the CAE object only when you set a preference value.

> Example:
>
> The simulation administrator sets the preference value to **"object_name"_"object_desc"_"item_revision_id"**.
>
> Consider a CAE 3D model revision with **Revision** as **A**, **Name** as **Lower Arm 010**, and **Description** as **IMW_Lower_Arm_010**. In such a case, based on the preference value and the value of the respective properties on the parent CAE object, the datasets and their related files are renamed as **Lower Arm 010_IMW_Lower_Arm_010_A**.

All the datasets and file names associated with the parent CAE structure are renamed as per the naming pattern.

The following are not renamed:

- Released datasets and their associated files.
- Datasets containing files with identical extensions.
- Datasets that are checked out.

Add a related revision to a model revision

1. Open a model revision from the appropriate folder in **Explorer**.

   Alternatively, search for a model revision and open it.

2. To view all related CAE revisions in the context of the model revision, click the **Overview** tab.

   The **Related Objects** section displays a pie chart that summarizes the number and types of related simulation objects and a table that displays all the related simulation objects.

   You can hover over the pie chart slice to view the number of related simulation objects to the simulation object you have selected. You can also select or deselect the appropriate related objects under the pie chart to hide or display those objects from the chart.

   > Note:
   >
   > The count displayed for various related simulation objects is based on the number of related objects in the database. It does not change based on filtration.

   You can filter the data within the table columns to see only the data that is relevant to you.

For more information, see *Filter data in a table column* in *Active Workspace Fundamentals*.

3. To view traceability information, select a related revision in the **Related Objects** table.

   The **TRACEABILITY INFORMATION** section displays how the selected revision is related to other revisions.

4. To view related objects and their relationships, click the **Overview** tab.

5. To add a related object, click **Add Simulation** ⊕, select a revision from the **Add Simulation** panel, and click the **Add** button.

Mark 3D model revisions as up-to-date for changes to attachments and related revisions

In a complex product development environment, different analysts perform different tasks of the overall analysis. For example, abstractions are delivered by one group, models built by another group, and load cases defined by another group. In such scenarios, it becomes critical to know when the analysis data, possibly with multiple dependencies, is out-of-date. The analyst can then act on it and ensure that the analysis is built with the correct set of data to deliver accurate results.

If a model revision undergoes changes related to attachments, you can use the **Mark Up-To-Date** command to update to the latest revisions and mark the 3D model revision as up-to-date. Additionally, a 3D model revision has related revisions such as product, geometry, and analysis revisions. If the related revisions undergo a revision change or updates for materials or parameters, the CAE status of the 3D model revision shows as out-of-date. In such cases, you can use this command to update to the latest revisions and mark the 3D model revision as up-to-date.

You can also view the CAE status of the released 3D model revisions if the **CAE_allow_cae_status_on_released_objects** site preference is set to **true** at your site.

1. Open a 3D model revision and mark it as up-to-date.

   a. Open a **CAE 3D Model Revision** from the appropriate folder in **Explorer**.

      Alternatively, search for a 3D model revision and open it.

      The header section displays the CAE status as **Up-to-date** or **Out-of-date**.

   b. If the status is out-of-date, hover your mouse over the status. The system displays a tooltip.

      The tooltip provides the reason for the revision being out-of-date. For example, the dependent item revision has a newer revision.

> Note:
>
> Baselined revisions are not considered as newer revisions.

c. Click the **Out-of-date** hyperlink.

The system opens the **Overview** tab. The **Out-of-Date Information and Objects** section displays the status and the reason why the related revision is out-of-date.

d. Click **Edit** and select **Mark Up-To-Date**.

2. Search for multiple model revisions and mark them as up-to-date

When you search for multiple model revisions and mark them as up-to-date, the system updates only those revisions that are not up-to-date.

a. Search for multiple CAE model revisions.

b. Select the model revisions you want to mark as up-to-date and click **Edit** > **Mark Up-To-Date**.

3. Execute the dashboard and mark model revisions as up-to-date.

When you execute the dashboard and mark model revisions as up-to-date, the system updates only those revisions that are not up-to-date.

a. **Execute queries to view the dashboard results**.

b. Select multiple model revisions and click **Edit** > **Mark Up-To-Date**.

4. Release model revisions by using a workflow and mark them as up-to-date.

If the administrator at your site has configured a workflow to release CAE objects and mark the released objects as up-to-date, you can use this workflow to release CAE objects and the system automatically marks them as up-to-date. After all the work related to analysis revisions is complete, you can release the model revision using the workflow. When you use this workflow to submit a model revision, the model revision and all the related analysis revisions are marked as up-to-date.

a. Select the model revision you want to release and choose **More Commands** > **Manage** > **Submit to Workflow**.

b. Select the **TCM Release Process** template and click **Submit**.

c. In the **Inbox**, perform the task that was added by clicking **Complete**.

d. Open the model revision.

The system marks the model revision and all the related analysis revisions as up-to-date.

Make a copy of the 3D model revision or revise it

You can make a copy of the of the 3D model revision or revise it.

Procedure

1. Make a copy of the 3D model revision.
    a. Select the 3D model revision.
    b. Choose **More Commands** > **New** > **Save As**.
    c. (Optional) Specify a new name if you want to create a copy and description.
    d. (Optional) Select a new destination folder.

        The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

        A. Remove the **Newstuff** folder and click the **Add** button to select another folder.

        B. Select the folder and click **Add**.

    e. To create a copy, click **Save**.
2. Revise the 3D model revision.
    a. Select the 3D model revision.
    b. Choose **More Commands** > **New** > **Revise**.
    c. (Optional) Specify required information as appropriate.
    d. (Optional) Select a new destination folder.

        The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

        A. Remove the **Newstuff** folder and click the **Add** button to select another folder.

        B. Select the folder and click **Add**.

e. To revise, click **Save**.

View the associated material revisions of the product structure in a model revision

You can view the associated material revisions of the product structure in a model revision.

Procedure

1. Open a product structure with associated material revisions.

2. Generate a model structure by using data map rules.

   a. Choose **More Commands** > **New** > **Generate CAE Structure**.

   b. To generate a model structure, select the **Data Map** option and the **CAE** domain. This is the default domain.

3. Open the generated model structure, select a BOM line, and choose the **Materials** tab.

   The system displays the material object related to the product structure. Open the material object and choose the **Where Used** tab. It displays the model revision as one of the referenced items.

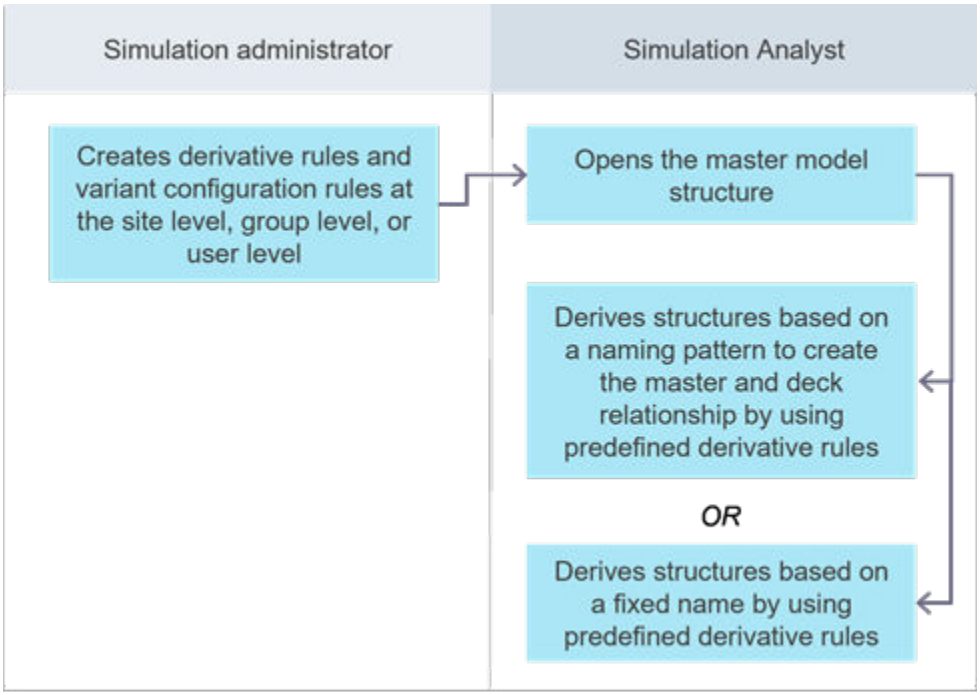
4. Open the generated model structure, select a BOM line, and choose the **Relations tab**.

   The system displays the source and target relations of the material object to the model revision and the related product structure.

7. Derive model structures to validate different simulation scenarios

Why derive structures?

The process flow for deriving structures is as follows:



As a simulation analyst, during the virtual validation of a vehicle, you may create hundreds of different deck structures or simulation variants to understand the effects of different materials or to optimize the weight of the vehicle. This is done by varying the load cases, materials, thickness, meshes, and geometry and then generating results to validate the vehicle against these different load cases. Many variants are created for this purpose, with each variant representing a load case.

You can use predefined derivative rules and variant configuration rules to quickly derive one or more structures relevant to your analysis from an existing structure. Derivative rules and variant configuration rules are defined at the site level by the simulation administrator, at the group level by the group administrator, and at the user level by the analyst. You can use these predefined rules to quickly derive one or more simulation variants from an existing one. You can then make modifications to the structure by varying load cases, meshes, or materials to evaluate different options and can view the complete traceability between the different variants.

You apply derivative rules after configuring the product structure. After you load a model structure that has a reference to a configurator context and derive one or more structures, the derived structures have

the context set to the same configuration context as that of the source model structure. Further, all the variant formula from the source model structure is mapped to the derived structures.

You can:

Derives structures based on a naming pattern by using predefined derivative rules. By selecting a naming pattern, you can create the master and deck relationship.

OR

Derives structures based on a fixed name by using predefined derivative rules. The fixed name method does not create the master and deck relationships.

Derive structures based on a naming pattern using predefined derivative rules

You can derive structures based on a naming pattern by using predefined derivative rules. By selecting a naming pattern, you can create the master and deck relationship.

1. Open a CAE model structure.
2. (Optional) To **apply a variant rule**, click **Variant** and select a variant rule.
3. Choose **More Commands** > **New** > **Derive CAE Structure**.
4. (Optional) To add a derivative rule to the **Favorites** tab, choose the derivative rule and select the **Add to Favorites** option.
5. To run the derivative rule, choose the derivative rule, and click **Next**.
6. Specify the number of structures you want to derive.
7. Select **Naming Pattern**.
8. To create the master and deck relationship while deriving structures, select **Unique Auto-generated number**.

   For example, if the **Basename** is **SV01** and you select the unique auto-generated option, the system generates the next unique number, **0001**. The system computes the name based on the base name, for example, **SV01-Deck0001**.

   If you generate five decks, the next four decks are named automatically as **SV01-Deck0002**, **SV01-Deck0003**, **SV01-Deck0004**, and **SV01-Deck0005**.

If there are existing decks, the counter starts from the next available number. For example, if you derive five more decks, the next five decks are named sequentially from **SV01-Deck0006** to **SV01-Deck0011**.

9. (Optional) Change the destination folder. By default, it is **Newstuff**.

10. To derive structures, click **Derive**.

    The system executes the derive operation asynchronously on the server. An alert is triggered when the operation is complete.

11. Click **Alerts**, open the alert, and view the details of the derive operation in the notification.

12. To access the output folder of the derive operation, in the notification, click the output folder link in **Related Objects**.

    The system provides up to five links to the output objects. You can find the remaining output by clicking the link and accessing the output folder.

Structure type	Indicator
Master structures	
Derived structures	

    The visual indicators are displayed only after a master and deck relationship is created.

    Alternatively, search for the derived structures by running the **CAE – Find Decks from Master** query. You can see the same visual indicators for deck structures when you run this query.

13. To view the related simulation objects, open an output, and click the **Overview** tab.

    If pedigree operations are enabled, you can view the pedigree information from the master structure.

14. (Optional) To view the process log of the derive operation, click the **Files** tab and select the log.

15. To view the related simulation objects of the master structure, open an output and click the **Overview** tab.

    If pedigree operations are enabled, you can view the pedigree information from the master structure.

16. To view the master and deck relationship, click the **Relations** tab.

    It allows you to view and navigate the relations between different objects in a graph view.

Derive structures based on a fixed name using predefined derivative rules

You can derive structures based on a fixed name by using predefined derivative rules. The fixed name method does not create the master and deck relationships.

1. Open a CAE model structure.
2. (Optional) To **apply a variant rule**, click **Variant** and select a variant rule.
3. Choose **More Commands** > **New** > **Derive CAE Structure**.
4. (Optional) To add a derivative rule to the **Favorites** tab, choose the derivative rule and select the **Add to Favorites** option.
5. To run the derivative rule, choose the derivative rule, and click **Next**.
6. Specify the number of structures you want to derive.
7. Specify a fixed name.

   The system populates the name of the topline element in the **Fixed Name** box.
8. (Optional) Edit the populated fixed name as appropriate.
9. (Optional) Change the destination folder. By default, it is **Newstuff**.
10. To derive structures, click **Derive**.

    The system executes the derive operation asynchronously on the server. An alert is triggered when the operation is complete.
11. To access the output folder of the derive operation, in the notification, click the output folder link in **Related Objects**.

    The system provides up to five links to the output objects. You can find the remaining output by clicking the link and accessing the output folder.

    Alternatively, search for the derived structures by running the **CAE – Find Decks from Master** query.

12. (Optional) To view the process log of the derive operation, click the **Files** tab and select the log.

13. To view the related simulation objects of the master structure, open an output and click the **Overview** tab.

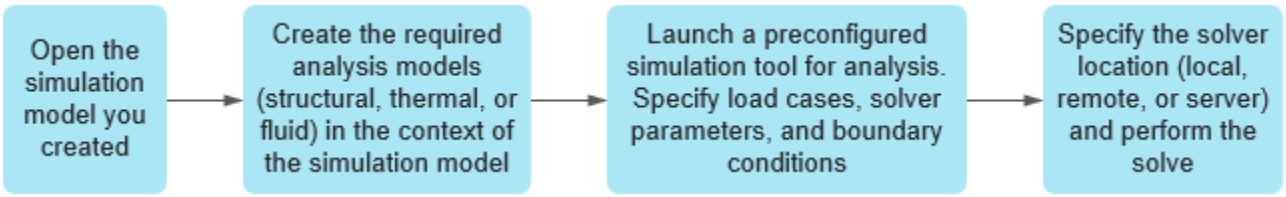
    If pedigree operations are enabled, you can view the pedigree information from the master structure.

14. To view the master and deck relationship, click the **Relations** tab.

    It allows you to view and navigate the relations between different objects in a graph view.

8. Create the analysis and perform a solve

Create analysis revisions and solve the analysis



1. **Open the simulation model**

   Open the simulation model you created earlier.

2. **Create the analysis**

   The analysis model represents the specific analysis such as thermal, structural, or fluid you want to perform. It includes load cases, solver parameters, and boundary conditions. You create analysis revisions mostly in the context of model revisions.

3. **Perform the solve using a preconfigured simulation tool**

   After creating the analysis revision, you can select the specific revision and launch a preconfigured simulation to upload the load cases and solver parameters. You can also specify the solver location (local, remote, or server) and perform the solve.

   In the **simulated side-impact example**, different analysis models were used to vary the load cases. For example, an analysis model to simulate a **3000** pound SUV-like barrier that hits the driver side door at **30** mph. Similarly, another analysis model to change the barrier weight to **3200** pounds and the speed to **35** mph.

Create CAE 3D analysis revisions

1. Search for the model revision you created, open it, and click the **Overview** tab.
2. Choose **More Commands** > **New** > **Create Simulation**.
3. Select **CAE 3D Analysis**.
4. (Mandatory) Type a name for the analysis revision.
5. (Optional) Specify a description, analysis type, solution type, solver name, and project ID.

6. (Optional) To specify a project, in **PROJECTS**, click **Add Project** ⊕ and select a project.

7. (Optional) To specify an analysis template, click **Add Analysis Template** ⊕ and select a template from **Palette**, and click **Add**.

   Alternatively, click **Search**, search for a template, and add it.

8. (Optional) To specify a result template, **Add Result Template** ⊕ and select a template from **Palette**.

   Alternatively, click **Search**, search for a template, and add it.

9. To create the simulation analysis revision, click **Create**.

10. Create external links or folders for analysis revisions

    You can create external links to files or folders that are managed outside the database but are tracked from Teamcenter.

    a. Navigate to the **CAE 3D Analysis** revision you have created, open it, and click the **Overview** tab.

    b. Click **Add to** ⊕ in **EXTERNAL LINKS**.

    c. Select **PROPERTIES**, specify a name and the URL or a shared location, and then click **Add**.

    d. To delete a web link, select the web link, click **Edit**, and select **Delete External Links**.

11. To view all related CAE revisions in the context of the analysis revision, click the **Overview** tab.

    The **Related Objects** section displays a pie chart that summarizes the number and types of related simulation objects and a table that displays all the related simulation objects.

    You can hover over the pie chart slice to view the number of related simulation objects to the simulation object you have selected. You can also select or deselect the appropriate related objects under the pie chart to hide or display those objects from the chart.

    > Note:
    >
    > The count displayed for various related simulation objects is based on the number of related objects in the database. It does not change based on filtration.

    You can filter the data within the table columns to see only the data that is relevant to you.

    For more information, see *Filter data in a table column* in *Active Workspace Fundamentals*.

12. To view traceability information, click the **Overview** tab and select a revision from the **Related Objects** table.

    The **TRACEABILITY INFORMATION** section displays how the selected revision is related to other revisions.

13. View and add related objects.

    a. To view related objects and their relationships, click the **Overview** tab.

    b. To add a related object, click **Add Simulation** ⊕, select a revision from the **Add Simulation** panel, and click the **Add** button.

14. To view all related test objects, click the **Physical Test** tab.

15. After creating an analysis revision, you can:

    - **Associate analysis templates, result revisions, and result templates to an analysis revision**
    - **Create boundary conditions and associate them with an analysis revision**

Create the analysis template

You can create analysis templates to specify different load cases. After creating a template, you can associate it to an **analysis revision**.

You can create these templates to perform 3D analysis simulations, for example, CFD, FEA, or structural. They contain setup files (like **.sim** files or macros) which you can use to enable a consistent simulation workflow and ensure repeatable and consistent results. A template can be related directly to a 3D analysis. All the CAE 3D analyses which are performed based on this template can be easily tracked in Teamcenter.

1. On the **HOME** page, click **CREATE SIMULATION**.

2. In the **Create Simulation** panel, select the **CAE 3D Analysis Template** type.

3. (Mandatory) Specify a name for the analysis template.

4. (Optional) In **PROJECTS**, click **Add Project** ⊕ and select a project.

5. To create the template, click **Create**.

6. Open the template you created.

7. To add the required files for this template, in the **Overview** tab, click **Add to** ⊕ in **FILES**.

8. Click **Choose File** and select the required file for this template.

9. **Associate the analysis template you have created to an analysis revision**.

Create boundary conditions and associate them with an analysis revision

After creating boundary condition revisions, you can associate them with an analysis revision. When you revise the analysis revision or save it as a different revision, the boundary condition revisions are *not* copied across.

1. Create a CAE boundary condition revision.

    a. On the **HOME** page, click **CREATE SIMULATION**.

    b. In the **Create Simulation** panel, select the **CAE 3D Boundary Condition** type.

    c. (Mandatory) Specify a name for the boundary condition.

    d. (Optional) Click **Add Project** ⊕ and select a project.

    e. To create the boundary condition, click **Create**.

    f. Add boundary conditions.

        A. Open the boundary condition you created.

        B. In the **Overview** tab, click **Add to** ⊕ in **FILES**.

        C. Click **Choose File** and select the file containing the simplified geometry.

2. Associate the boundary condition type to an analysis revision.

    a. Navigate to an analysis revision, open it and click the **Overview** tab.

    b. Click **Add Simulation** ⊕ in the **RELATED OBJECTS** table.

    c. In the **Add Simulation** panel, select the **CAE 3D Boundary Condition** type, and select it from **Palette**.

    Alternatively, click **Search**, specify your search criteria, and select it.

    d. From the **Relation** menu, select the **CAE Include** relationship or the **CAE Extract** relation.

    The default relation is **CAE Include** relationship.

> Note:
>
> You cannot add a boundary condition revision to an analysis revision with the **CAE Extract** relation if the boundary condition revision is already attached to a **CAE 3D Result** or a **CAE 3D Analysis** revision with the same relation.

e. To include the boundary condition, click **Add**.

The **Related Objects** table displays the CAE boundary condition and the relation.

Mark boundary conditions as up-to-date for changes to attachments and related revisions

You can mark boundary conditions as up-to-date for changes to attachments and related revisions such as **CAE 3D Analysis** and **CAE 3D Result**.

In a complex product development environment, different analysts perform different tasks of the overall analysis. For example, the CFD analysis is done by one group, and the heat flux load is sent to another group as a boundary condition. Similarly, another group does structural analysis and this group receives a boundary condition object from the program requirements group. In such scenarios, it becomes critical to know when the analysis data, possibly with multiple dependencies, is out-of-date. The analyst can then act on it and ensure that the analysis is built with the correct set of data to deliver accurate results.

You can create a **CAE 3D Boundary Condition** revision in the context of a **CAE 3D Analysis** or a **CAE 3D Result** revision. If any of these related revisions are changed, the status of the boundary condition shows as out-of-date. Similarly, if any attachments are added or removed from the **CAE 3D Boundary Condition** revision, the status of the boundary condition shows as out-of-date.

You can also view the CAE status of released 3D boundary conditions if the **CAE_allow_cae_status_on_released_objects** site preference is set to **true** at your site.

> Note:
>
> The system evaluates **CAE 3D Analysis** revision changes for **CAE0Extract** relationship only.

Procedure

1. Open a **CAE 3D Boundary Condition** revision from the appropriate folder in **Explorer**.

   Alternatively, search for a boundary condition and open it.

   The header section displays the CAE status as **Up-to-date** or **Out-of-date**.

2. If the status is out-of-date, hover your mouse over the status. The system displays a tooltip.

The tooltip provides the reason for the revision being out-of-date. For example, a dependent attachment has been added.

3. Click the **Out-of-date** hyperlink.

   The system opens the **Overview** tab. The **Out-of-Date Information and Objects** section displays the status and the reason why the boundary condition is out-of-date.

4. To update the status, choose **More Commands** > **Edit** and select **Mark Up-To-Date**.

Associate analysis templates, result revisions, and result templates to an analysis revision

You can **associate analysis templates**, **result revisions**, and **result templates** to an analysis revision.

1. Associate analysis templates to an analysis revision.

   a. Open the analysis revision you created.

   b. Click the **Overview** tab.

   c. From the **Related Objects** tab, click **Add Simulation**, and select **CAE 3D Analysis Template**.

   d. Select an analysis template from the **Palette** tab.

      Alternatively, click the **Search** tab, specify your search criteria, select an analysis template, and click **Add**.

2. Associate result revisions to an analysis revision.

   a. Open the analysis revision you created.

   b. Click the **Overview** tab.

   c. From the **Related Objects** tab, click **Add Simulation**, and select **CAE 3D Result**.

   d. Select multiple result revisions from the **Palette** tab.

      Alternatively, click the **Search** tab, specify your search criteria, select multiple result revisions, and click **Add**.

      The system adds the result revisions to the **Related Objects** table with the **CAE Results** relation.

3. Associate result templates to an analysis revision

a. Open the analysis revision you created.

b. Click the **Overview** tab.

c. From the **Related Objects** tab, click **Add Simulation**, and select **CAE 3D Result Template**.

d. Select result templates from the **Palette** tab. You can select more than one template.

   Alternatively, click the **Search** tab, specify your search criteria, select result templates, and click **Add**.

   The system adds the result revisions to the **Related Objects** table with the **CAE Based On** relation.

Visualize result files such as JTs and images associated with analysis revisions

You can use the universal viewer to view object attachments. The universal viewer is displayed in an object's **Overview** tab if there are attachments for the object. The universal viewer supports file types such as PDF, text, HTML, Microsoft Office files, images and Direct Model (JT) files.

> Note:
>
> It is recommended that you store one JT file per Direct Model dataset. The universal viewer does not support multiple JT files in a single Direct Model dataset. In addition, CAE JT files containing results quantities are not supported.

1. Select a **CAE 3D Analysis** or **CAE MDAO Analysis** revision that contains several secondary results and reports as attachments.

2. Click the **Overview** tab for a preview of the selected file type.

   The system displays a preview of the first file type attached to the revision.

3. To preview the next attached file type, click the **Next** button.

4. To navigate through a preview of attachments, click the **Next** or **Previous** button as appropriate.

Mark 3D analysis revisions as up-to-date for changes to attachments and related revisions

In a complex product development environment, different analysts perform different tasks of the overall analysis. For example, abstractions are delivered by one group, models built by another group, and load cases defined by another group. In such scenarios, it becomes critical to know when the analysis data,

possibly with multiple dependencies, is out-of-date. The analyst can then act on it and ensure that the analysis is built with the correct set of data to deliver accurate results.

A 3D analysis revision has related revisions such as product, geometry, analysis, and model revisions. If the related revisions undergo a revision change or updates to parameters or materials, the CAE status of the analysis revision shows as out-of-date. In such cases, you can use the **Mark Up-To-Date** command to update to the latest revisions and mark the 3D analysis revision as up-to-date.

You can also view the CAE status of released 3D analysis revisions if the **CAE_allow_cae_status_on_released_objects** site preference is set to **true** at your site.

1. Open a 3D analysis revision and mark it as up-to-date.

    a. Open a **CAE 3D Analysis Revision** from the appropriate folder in **Explorer**.

    Alternatively, search for a 3D analysis revision and open it.

    The header section displays the CAE status as **Up-to-date** or **Out-of-date**.

    b. If the status is out-of-date, hover your mouse over the status. The system displays a tooltip.

    The tooltip provides the reason for the revision being out-of-date. For example, the dependent item revision has a newer revision.

    > Note:
    >
    > Baselined revisions are not considered as newer revisions.

    c. Click the **Out-of-date** hyperlink.

    The system opens the **Overview** tab. The **Out-of-Date Information and Objects** section displays the status and the reason why the related revision is out-of-date.

    d. Click **Edit** and select **Mark Up-To-Date**.

2. Open multiple analysis revisions and mark them as up-to-date.

    When you select multiple analysis revisions to mark them as up-to-date, the system updates the status of only those revisions that have undergone changes to attachments or related revisions.

    a. Open a CAD assembly and click the **Overview** tab.

    The CAD assembly has a related model revision and related analysis revisions.

    b. In the CAD assembly, select a related analysis revision.

The header section displays the CAE status as **Out-of-date**.

c. Hover your mouse over the status. The system displays a tooltip. The tooltip provides the reason for the revision being out-of-date.

In this case, the tooltip displays the following message:

```
Dependent item revision(s) have a newer revision
```

d. In the **Overview** tab, select the related analysis revisions you want to mark as up-to-date and choose **More Commands** > click **Edit** > **Mark Up-To-Date**.

The system updates the status of the revisions that have undergone changes to attachments or related revisions.

3. Search for multiple analysis revisions and mark them as up-to-date.

When you search for multiple analysis revisions and mark them as up-to-date, the system updates only those revisions that are not up-to-date.

a. Search for multiple CAE analysis revisions.

b. Select the analysis revisions you want to mark as up-to-date and choose **More Commands** > **Edit** > **Mark Up-To-Date**.

4. Execute the dashboard and mark analysis revisions as up-to-date.

When you execute the dashboard and mark analysis revisions as up-to-date, the system updates only those revisions that are not up-to-date.

a. **Execute queries to view the dashboard results**.

b. Select multiple analysis revisions and click **Edit** > **Mark Up-To-Date**.

5. Release CAE objects using a workflow and mark them as up-to-date.

Consider the administrator at your site has configured a workflow to release CAE objects and mark the released objects as up-to-date. In such a case, you can use this workflow to release CAE objects and the system automatically marks them as up-to-date. After all the work related to analysis revisions is complete, you can release the model revision using the workflow. When you use this workflow to submit a model revision, the model revision and all the related analysis revisions are marked as up-to-date.

a. Select the model revision you want to release and choose **More Commands** > **Manage** > **Submit to Workflow**.

b. Select the **TCM Release Process** template and click **Submit**.

c. In the **Inbox**, perform the task that was added by clicking **Complete**.

d. Open the model revision.

The system marks the model revision and all the related analysis revisions as up-to-date.

Make a copy of the 3D analysis revision or revise it

You can make a copy of the of the 3D analysis revision or revise it.

Procedure

1. Make a copy of the 3D analysis revision.

   a. Select the 3D analysis revision.

   b. Choose **More Commands** > **New** > **Save As**.

   The **Save As** dialog opens.

   c. (Optional) Specify a new name if you want to create a copy and description.

   d. (Optional) Select a new destination folder.

   The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

   A. Remove the **Newstuff** folder and click the **Add** button to select another folder.

   B. Select the folder and click **Add**.

   e. To create a copy, click **Save**.

2. Revise the 3D analysis revision.

   a. Select the 3D analysis revision.

   b. Choose **More Commands** > **New** > **Revise**.

   The **Revise** dialog opens.

   c. (Optional) Specify required information as appropriate.

d. (Optional) Select a new destination folder.

The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

A. Remove the **Newstuff** folder and click the **Add** button to select another folder.

B. Select the folder and click **Add**.

e. To revise, click **Save**.

View and recapture the pedigree information of the model structure as the analysis pedigree

If pedigree operations are enabled, the system captures the pedigree information when you create an analysis revision in the context of a model revision. Pedigree information captures the exact configuration of the model revision, including the target, revision rule, effectivity, variant rule, and the configured variant rule option, and persists that information in the database. For example, pedigree information in the form of **Revision Rule=Released for Analysis**, **Effectivity=Aug 31, 2015**, **loadcase=frontal crash**, and **speed=40kmph**. This is captured in the analysis revision as the *analysis pedigree*. Therefore, you have clear traceability of what was analyzed later.

1. View pedigree information.

a. Navigate to the **CAE 3D Analysis** revision, open it, and click the **Overview** tab.

b. See the **PEDIGREE INFORMATION** section.

2. Recapture pedigree information.

Let us assume a scenario where you create a CAE 3D analysis structure based on the model structure by using derivative rules. If pedigree operations are enabled by the simulation administrator, the system automatically captures this information. Later, if this information changes in the model structure, you can recapture the pedigree information as the analysis pedigree.

a. Open the product structure, choose the **Overview** tab and select the associated **CAE 3D Analysis Revision**.

b. Select the **Capture Pedigree** option.

The pedigree information is updated.

The system enables this option only when you select the associated analysis revision.

Perform a solve using a preconfigured analysis tool

1. Navigate to the **CAE 3D Analysis** revision you have created, open it, and click the **Overview** tab.
2. Access help for a launch tool.
   a. (**Analyst** workspace) Choose **Open in Simulation Tool**.

      (Default workspace) Choose **Open** > **Open in Simulation Tool**.

   b. Select the tool, click **Open in New Tab**, and click **Help**.

      (Optional) To download the help, click **Description File** and select **Download File**.
3. Add a launch tool to your favorites.
   a. (**Analyst** workspace) Choose **Open in Simulation Tool**.

      (Default workspace) Choose **Open** > **Open in Simulation Tool**.

   b. Select the tool, click **Open in New Tab**, and click **Manage** > **Add to Favorites**.
4. To perform a solve using a preconfigured analysis tool, **launch a simulation tool**.

> Note:
>
> If you do not have preconfigured simulation tools, you must create the **CAE 3D Analysis** item revision in the context of the **CAE 3D Model** item revision, define load cases, solver parameters and boundary conditions, and manually run the solver application to perform the solve.

9. Find recommended simulations based on the data in a verification request

Find recommended simulations

In Model-Based Systems Engineering, verifications are done to evaluate whether a product, service, or system complies with a regulation, requirement, specification, or other imposed condition.

As a simulation analyst, creating a new verification request requires extensive manual review of requirements, CAD data, and input or output parameters before starting the simulation. Finding the most relevant data based on simulation history is challenging, leading to varying success rates among analysts.

You can use the **Recommended Simulations** tab to quickly find the simulation data with the parameters that are most relevant to the verification request you are creating. This ensures that you have a consistent set of comparable results to start your work.

When verification requests are created, the input and output parameters are automatically included based on the selected object. These parameters have data types such as integer, double, boolean, string, or point and properties such as goal, minimum, and maximum values. These properties are indexable. The system periodically runs an indexer in the background to mark simulation objects that are associated with verification requests containing these parameters.

The **Recommended Simulations** tab displays simulation objects and other subtypes that have the best matches. They are presented in the order of their relevance based on the parameters from all verification requests in the database.

Find a recommended simulation based on a verification request

You can quickly find a recommended simulation based on the data in a verification request.

Prerequisites

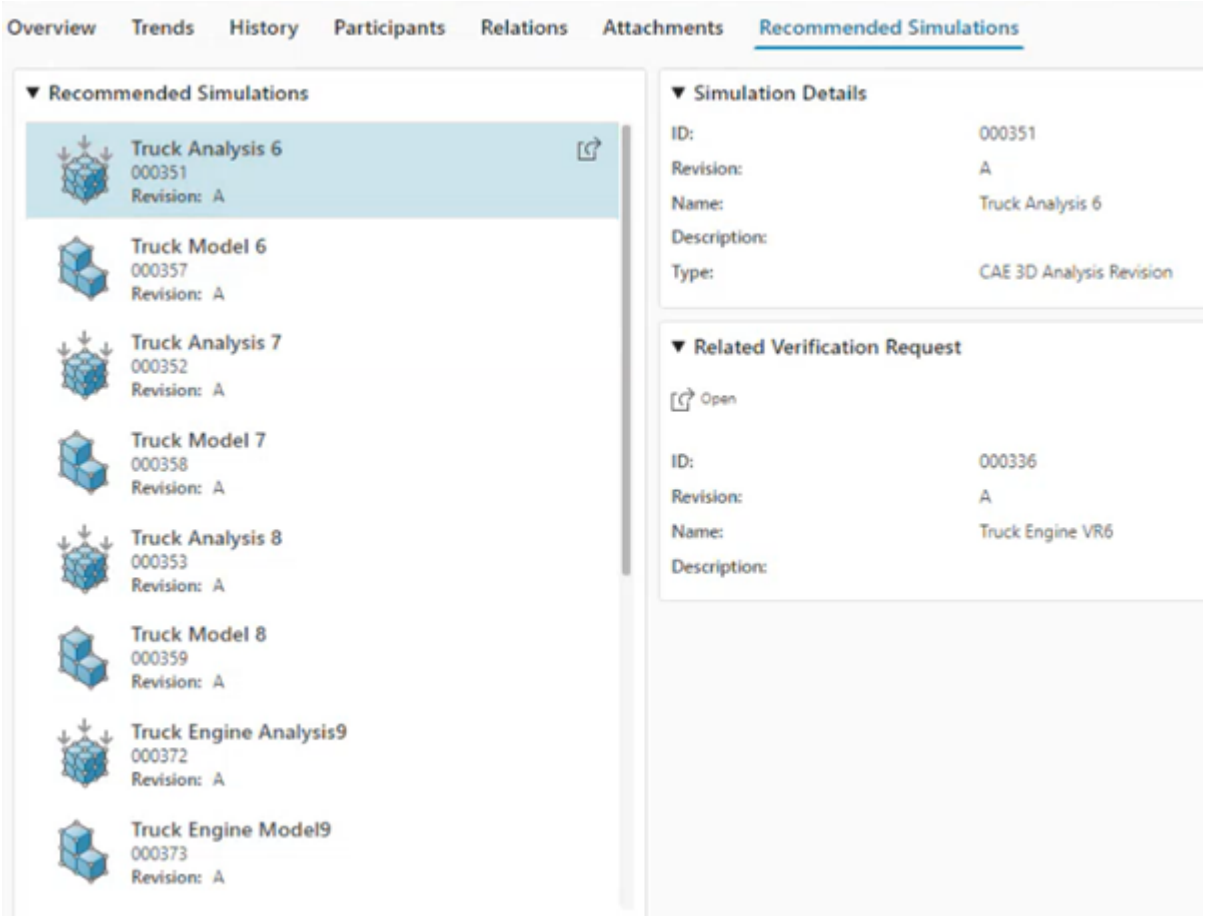
The **Simulation Process Management with Measurable Attribute for Active Workspace** feature must be installed.

Procedure

1. Open a verification request.

2. Click the **Recommended Simulations** tab.

The tab displays CAE objects and other subtypes that have the best matches in the order of their relevance based on the parameters in the verification request.

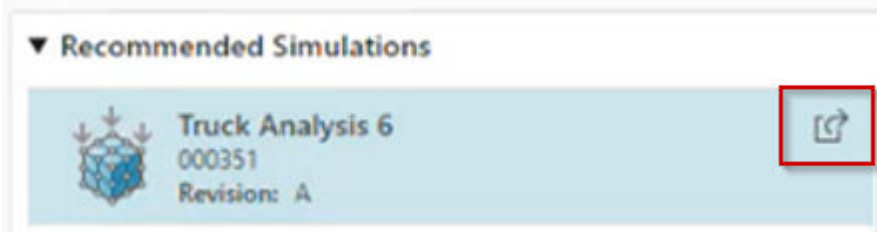


3. Select the appropriate CAE object and open the related verification request.

4. Click the **Overview** tab and navigate to the **Parameters** section.

5. Click **Open** in the **Related Verification Request** section to verify if the parameters in the verification or simulation request are similar to your assigned verification request or simulation request.

6. Select the appropriate CAE object and click **Open** in the **Recommended Simulation** section to open the CAE object and verify if the parameters are similar based on the previous verification or simulation request.

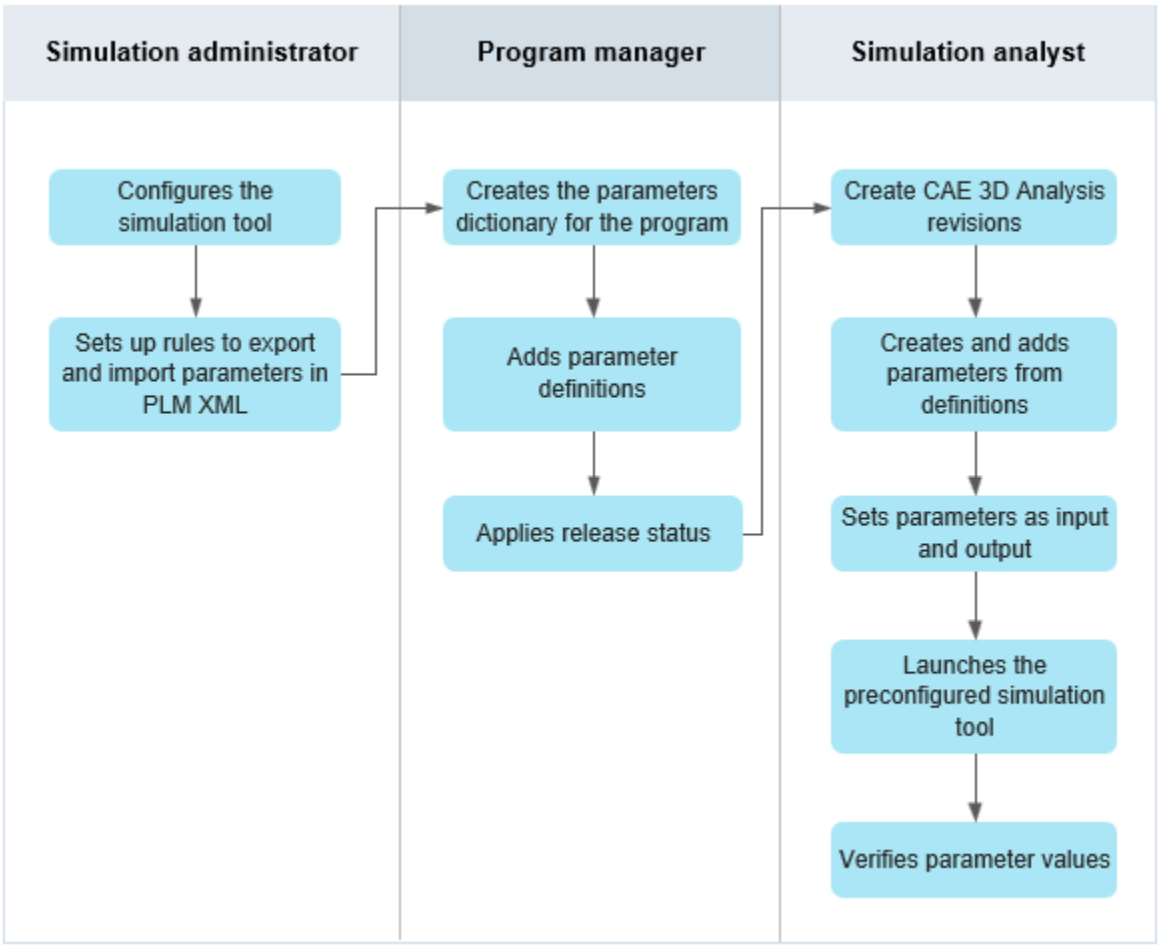


7. Copy the CAE object to your assigned verification or simulation request if the previous CAE work can be reused, or if you can simply reference the legacy data and improve your current CAE work.

   By leveraging historical data, you can make better and more consistent decisions based on the lessons learned from the previous programs for which you have performed CAE work with similar requirements.

10. Perform simulations using integrations

Set parameter values for analysis objects



The global parameter management solution allows you to define and manage different types of parameters, including variables, characteristics, measurements, calibration, and configuration. You maintain parameters in a single source dictionary that is shared across domains, applications, and life cycles.

For more information about parameters, see *About parameter management* in *Model-Based Systems Engineering*.

For using parameters in CAE task flows, you can **set parameter values by using a preconfigured simulation tool** or **set parameters values manually**.

Set parameter values by using a preconfigured simulation tool

1. Create a **CAE 3D Analysis** revision to capture the artifacts of the simulation you want to perform.

2. Copy the parameters and paste them to an analysis revision:

   a. Search for the **Parameter Project** and open it.

   b. Select the required parameters and click **Copy**.

   c. Open the analysis revision to which you want to copy the parameters, click the **Parameters** tab, and click **Paste** at the top of the table.

3. To set the parameter definitions as input or output, select a parameter, click **Set Usage** at the top of the table, and choose **Input** or **Output** as appropriate.

4. To specify the parameter values using a simulation tool, select the analysis revision and **launch a preconfigured simulation tool**.

   The system exports the input files and a PLM XML file of the input and output parameters, invokes the launch script, and provides the exported inputs to the launch script. The launch script then invokes the simulation tool to include the input files and parameters.

5. Perform the simulation (interactively or in batch), generate the output files, and create a PLM XML file with output parameters containing names and values.

6. Exit the simulation tool and the launch script.

   The system imports the configured output files and also imports the PLM XML file with the output parameters. After the tool launch is complete, the system displays a notification.

7. Refresh the analysis revision and verify the parameter values.

8. (Optional) Select the analysis revision with the parameter values and click **New** and choose **Revise**. The parameter values are carried forward to the new revision.

9. (Optional) To view traceability or pedigree information, select or open the analysis revision with the parameter values and click the **Overview** tab.

   The **TRACEABILITY INFORMATION** and the **PEDIGREE INFORMATION** sections display the respective information.

10. (Optional) If any parameter value is subsequently changed, open the analysis revision with the parameter values.

    The header section displays the CAE status as **Up-to-date** or **Out-of-date**.

    The system marks an analysis revision as out-of-date if any of its corresponding input parameters are modified since the last time the analysis was marked as up-to-date.

For out-of-date analysis revisions, take appropriate action, for example, run the simulation tool again.

Set parameters values manually

As a simulation analyst, you can set parameters in the CAE analysis objects as input and output manually if simulation tools are not configured at your site. To do so:

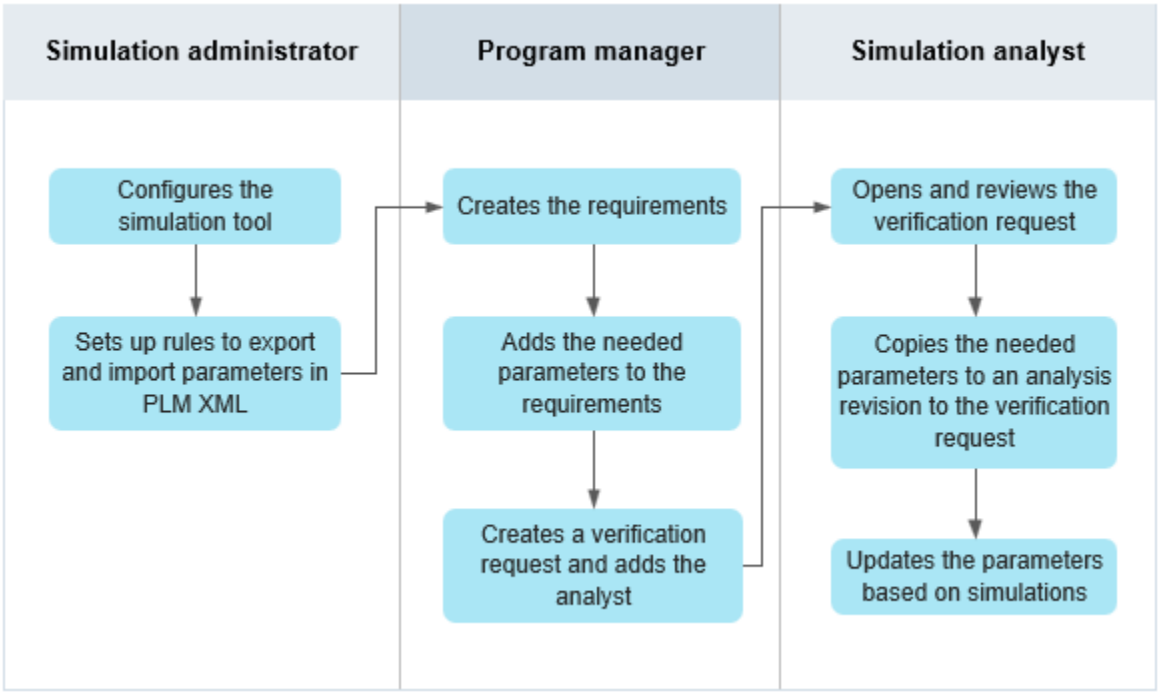
1. Select the analysis revision or open the analysis revision and click the **Parameters** tab.
2. Add parameters.
   a. Click ⊕ **Add Parameter** and select a parameter.
   b. Specify values as appropriate and click **Add**.
3. Edit parameter values.
   a. Select the parameter you want to edit and click **Edit** > **Start Edit**.
   b. Modify values as appropriate.
   c. To save your changes, click **Edit** > **Save Edits**.
4. To delete the parameter, select it, and click **Edit** > **Delete Parameter**.

Update parameter values in analysis objects using Verification Management

The Teamcenter Verification Management solution provides an integrated environment for verification events, including simulated tests and physical tests. It links individual tests and analyses to the necessary resources while providing full traceability across the lifecycle of the project.

For more information about design verification and validation, see *Model-Based Systems Engineering*.

The process is as follows:



Simulation analysts can open and review the verification request, copy the needed parameters, and update the parameters based on simulations. To do so:

1. Open the verification request.

2. On the **HOME** page, click **CREATE SIMULATION**.

3. Click **Add** in the **Simulation Analysis** tab.

4. Select **CAE 3D Analysis Revision**, **CAE 1D Analysis Revision**, or **CAE MDAO Analysis Revision** and click **OK**.

   The system adds the object to the verification request. It also creates a relationship between the verification request and the analysis revision.

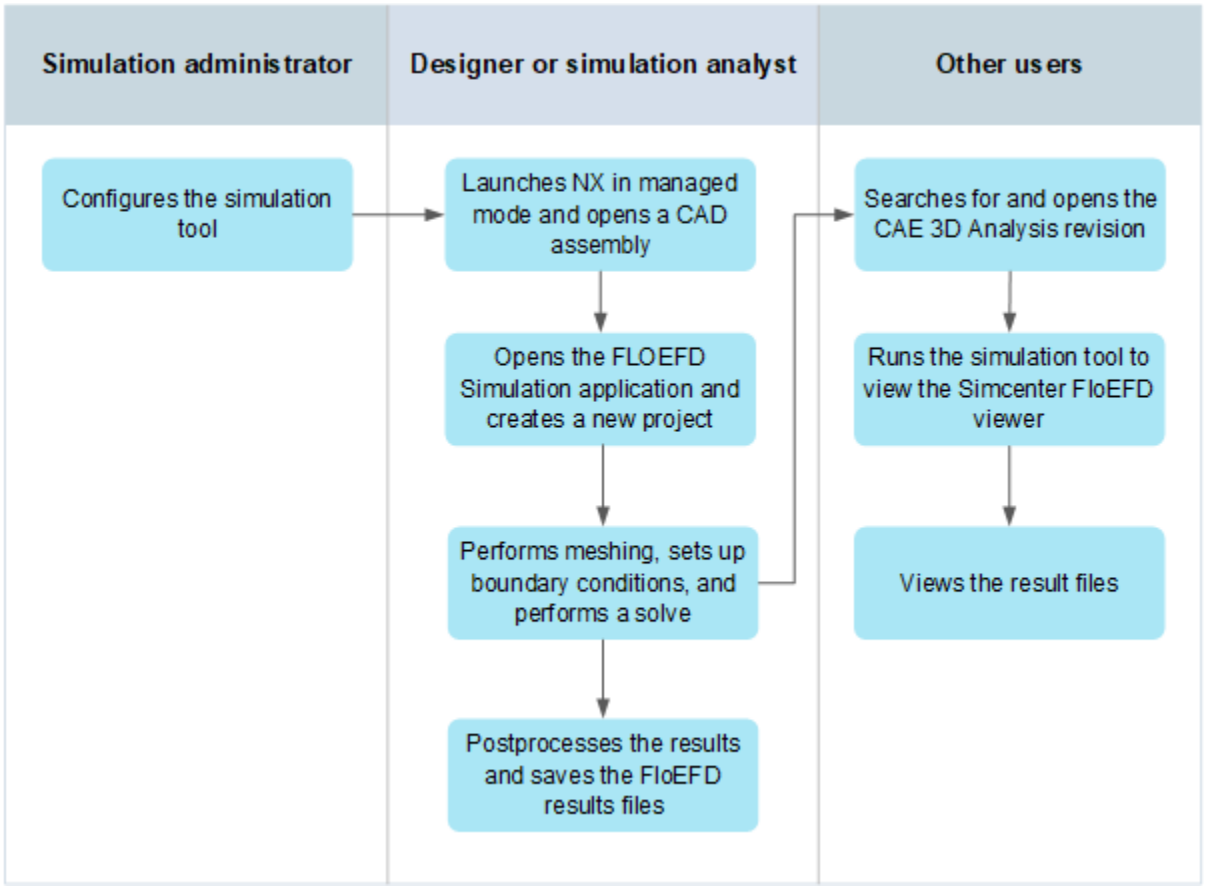
5. To copy the parameters from the verification request to the analysis revision, select the **Copy Parameters** option.

   Alternatively, manually copy the parameters.

6. To update the measurement values inside the verification request, select the object added to the request and launch a preconfigured simulation tool that can extract and write back the parameter values. Alternatively, manually specify these values after the simulation is complete.

7. (Optional) To delink parameters from the analysis revision, select the analysis revision and remove it from the verification request.

Perform simulations using Simcenter FLOEFD



Simcenter FLOEFD for NX provides fluid flow and thermal simulation capabilities. It works with NX running both in native or managed mode. In managed mode, FLOEFD project data is saved together with the NX geometry in Teamcenter.

The simulation data model has been extended to capture project, simulation, and results data from FLOEFD.

1. Launch NX in managed mode and open a CAD assembly.

2. Open the FLOEFD Simulation application and create a new project.

   The system creates the new **CAE 3D Analysis revision** with a target relationship to the item revision (product structure).

3. Save the project.

   The system saves the project under **CAE 3D Model** revision in the **CAE FloEFD** dataset.

4. Perform the simulation and save the results.

The system saves the results files to the **CAE FloEFD** dataset in the **CAE 3D Analysis** revision.

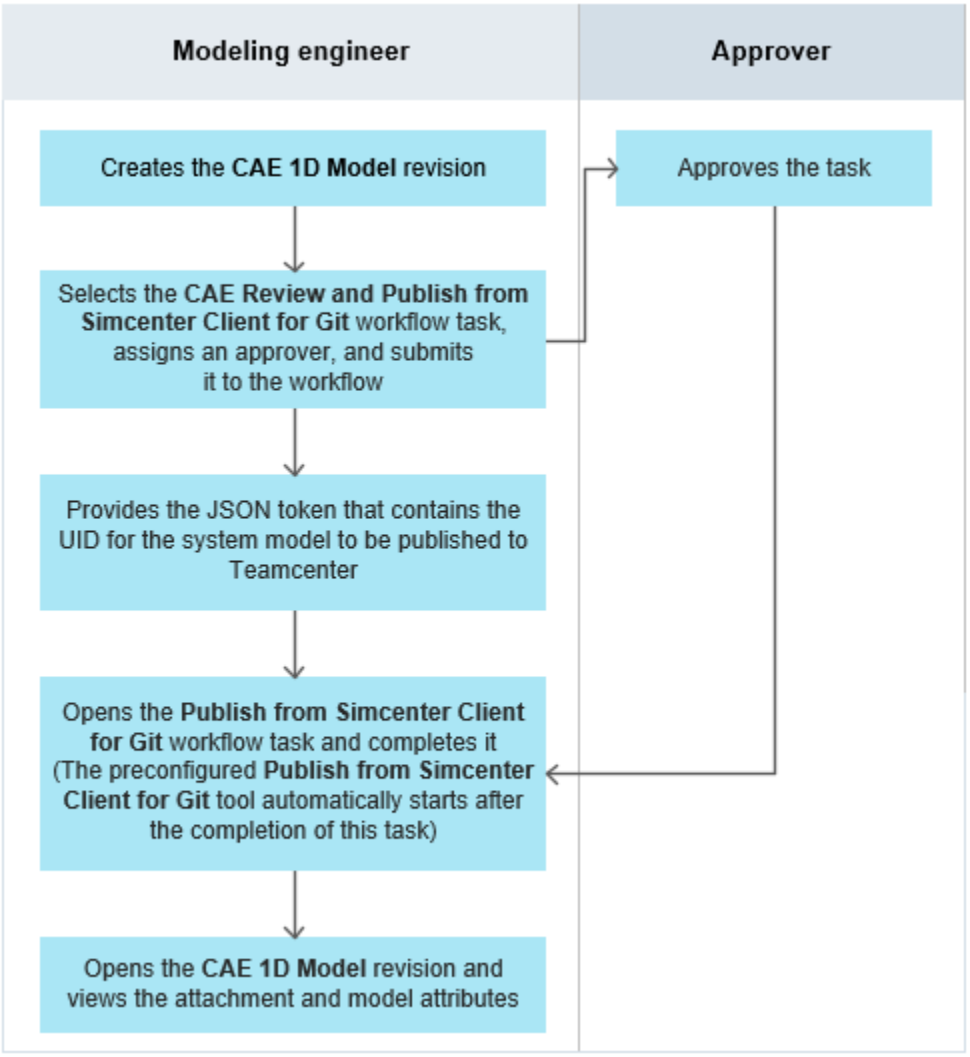
5. To view the files stored in Teamcenter, open the **CAE FloEFD** dataset.

Publish Simcenter system simulation models from Git

After modeling engineers complete their work and the system simulation models are ready to be released, the data is imported from the Simcenter Client for Git (SCG) repository to Teamcenter. The data that is imported is the released data or the *gold copy* of the data. As a modeling engineer, you can use the preconfigured **CAE Review and Publish from Simcenter Client for Git** and **CAE Publish from Simcenter Client for Git** tools to publish the gold copies of system simulation models to Teamcenter from the SCG repository.

The following procedure assumes that the simulation administrator has set up the sample configurations by running the **tcsim_quick_setup.pl** script and that the default **CAE Review and Publish from Simcenter Client for Git** and **CAE Publish from Simcenter Client for Git** tools are available.

The process is as follows:



1. (Modeling engineer) Create the **CAE 1D Model** revision.

    a. On the **HOME** page, click **CREATE SIMULATION**.

    b. Select **CAE 1D Model** revision and specify a name for the 1D model revision.

    c. Select or specify values as appropriate in the other boxes and click **OK** to create the 1D model revision.

2. (Modeling engineer) Select a workflow, assign an approver, and submit it to a workflow.

    a. Select the 1D model revision and choose **More Commands** > **Manage** > **Submit to Workflow**.

    b. Select the **CAE Review and Publish from Simcenter Client for Git** workflow.

c. To assign the task to an approver, click **Assignments** and select the **Review** task.

d. From **Users**, select the appropriate group, drag-and-drop a user to the **Task** pane, and click **Modify**.

e. To submit the workflow, click **Submit**.

The system sends the task control to the user who initiated the workflow.

3. (Modeling engineer) Provide the JSON token that contains the UID.

The publish utility reads the UID, selects the relevant system model from SCG, and publishes it to Teamcenter.

a. To view tasks, click **Inbox** and open the **Decode token and Update Model Attributes** task.

b. Specify a valid token. Copy the token from SCG, paste it into the **Comments** box, and click **Complete**.

The task invokes an action handler, and the control then passes to the approver.

4. (Approver) Approve the task.

a. To view tasks, click the **Inbox** and open the **perform-signoffs** task.

b. (Optional) In **Targets**, open the object, and verify the model version and model identifier that was automatically decoded from the provided token.

c. Go back to **Inbox**.

d. In **Action**, optionally specify a comment and click **Approve**.

The task goes back to the modeling engineer who initiated the task.

5. (Modeling engineer) Complete the task.

a. Click **Inbox** and open **Publish from Simcenter Client for Git**.

b. Click **Complete**.

The preconfigured **Publish from Simcenter Client for Git** tool launches automatically.

c. Open **Simulation Tool Progress Monitor** and verify the task entry for **Publish from Simcenter Client for Git**.

d. Browse to the *temp* directory of the simulation tool.

The **git.attributes.xml** file, the launch script, and a ZIP file are available.

The XML file has information about the UID and other attributes, and the ZIP file has the 1D model along with its dependencies from SCG.

e. Open the **CAE 1D Model** revision you created.

f. Click the **Overview** tab.

In **Properties in Work in Progress System**, verify whether the model name, model creation date, and other attributes are updated.

g. Click the **Overview** tab.

The ZIP file that has the 1D model from SCG is attached.

6. (Modeling engineer) Use the 1D model in a system simulation tool.

a. Select the **CAE 1D Model** revision and choose **Open** > **Open in Simulation Tool** > **Simcenter Amesim**.

b. Extract the ZIP file and import it into the system simulation tool.

7. (Modeling engineer) Delete the mapping created by the export operation.

After the model collection is stored inside Teamcenter, the same model collection cannot be shared with Teamcenter again. To share again, the Teamcenter mappings must be deleted inside SCG.

a. Select the **CAE 1D Model** revision and choose **More Commands** > **Manage** > **Submit to Workflow**.

b. Select **CAE Delete Attributes in Simcenter Client for Git** and click **Submit**.

The system deletes the Teamcenter mapping in SCG.

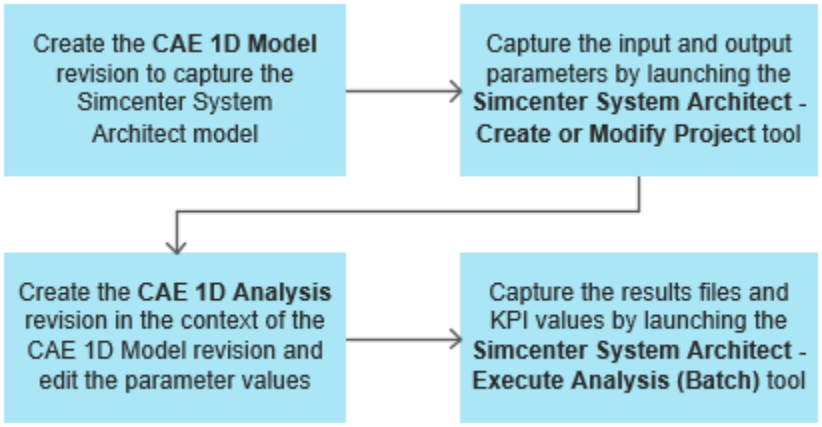
Perform simulations using Simcenter System Architect

Optimize system integration with Simcenter System Architect

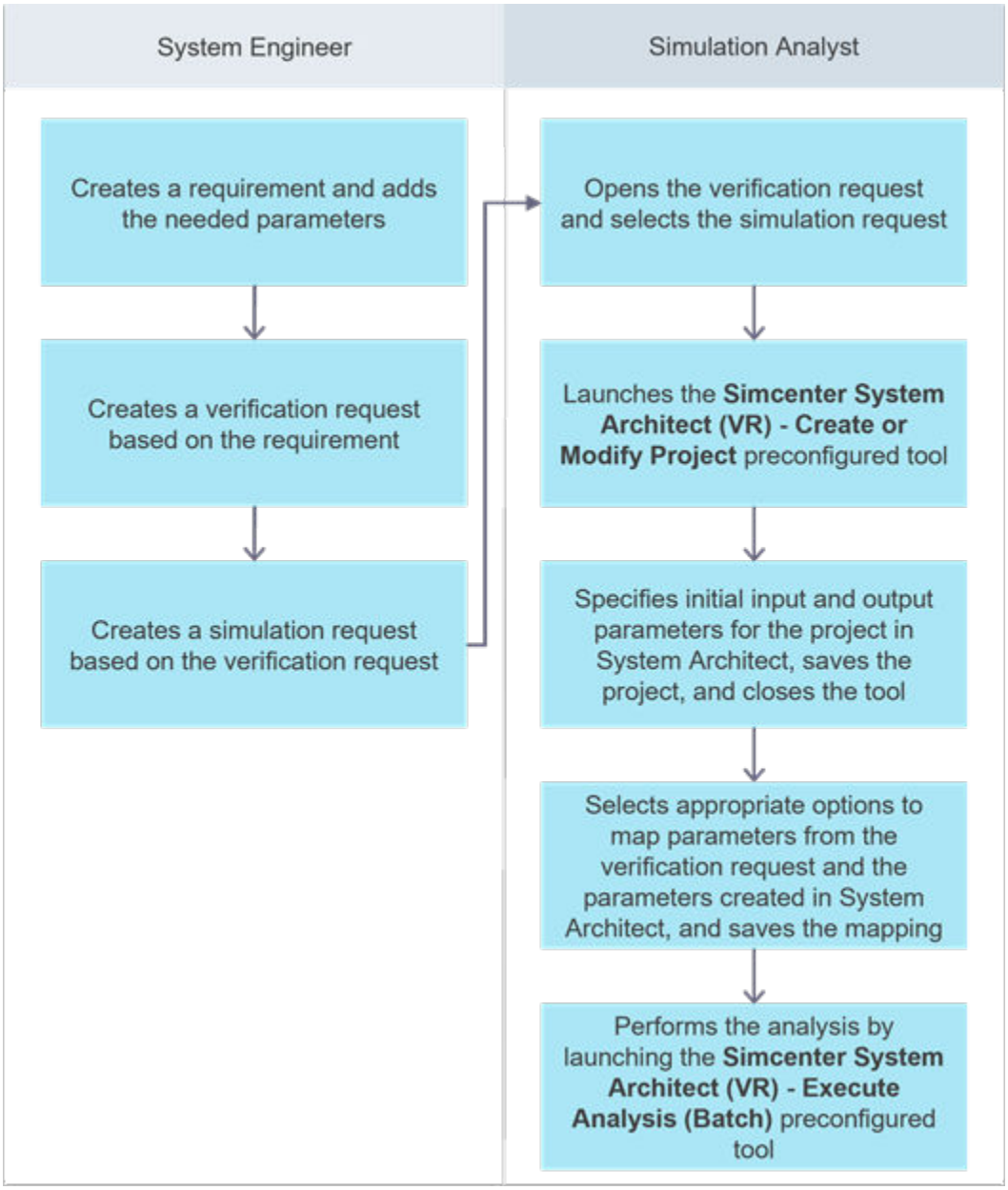
Simcenter System Architect helps enhance system integration, configuration, and simulation architecture management. You can perform co-simulation of multiple heterogeneous models, enabling collaboration across domain boundaries and silos. Product performance can be continuously monitored throughout the design cycle by updating, exchanging, and reusing simulation assets as the design evolves.

You can perform simulations in a standalone mode without verification request or an integrated mode with a verification request.

The process for a standalone mode without verification request is as follows:



The process for an integrated mode with verification request is as follows:



Perform standalone simulations without a verification request in Simcenter System Architect

As a simulation analyst, you can perform standalone simulations without a verification request in Simcenter System Architect.

Prerequisites

The following procedure assumes that the simulation administrator has set up the sample configurations by running the **tcsim_quick_setup.pl** script and that the **Simcenter System Architect - Create or Modify Project** and **Simcenter System Architect - Execute Analysis (Batch)** default tools are available.

Procedure

1. Create the **CAE 1D Model** revision to capture the Simcenter System Architect model.

    a. On the **HOME** page, click **CREATE SIMULATION**.

    b. Select the **CAE 1D Model** revision and specify a name for the 1D model revision.

    c. Select or specify values as appropriate in the other boxes and click **OK** to create the 1D model revision.

2. Launch the simulation tool to create a project.

    a. Select the **CAE 1D Model** revision and choose **Open** > **Open in Simulation Tool** > **Simcenter System Architect - Create or Modify Project**.

    b. Select the **Launch without configured Input** option, and click **Open** to launch the simulation tool.

    Simcenter System Architect is launched, and an empty project is created.

3. View input and output parameters, and attached project files after the tool launch is complete.

    a. Open the **CAE 1D Model** revision after the tool launch is complete.

    Simcenter System Architect packages the data prepared, including all dependent models into a **sarpck** package file.

    b. To view the input and output parameters, click the **Parameters** tab.

    The input and output parameters are displayed.

    c. (Optional) To view additional columns in the **Input Parameters** table, click **Table Settings** > **Arrange** and add columns such as **Formula**, **Max**, **Max Operator**, **Min**, **Min Operator**, and **Units**.

    Similarly, you can add additional columns to the **Output Parameters** table such as **Goal**, **Goal File**, **Max**, **Max Operator**, **Min**, **Min Operator**, and **Units**.

    d. To view the **sarpck** file and the Simcenter System Architect PNG file, click the **Overview** tab.

4. Create the **CAE 1D Analysis** revision in the context of the **CAE 1D Model** revision and capture the **key performance indicator (KPI) values**.

    a. Select the **CAE 1D Model** revision you created earlier.

b. Choose **More Commands** > **New** > **Create Simulation**.

c. Specify a name for the **CAE 1D Analysis** revision, select or specify values as appropriate for the other fields, and click **Create**.

d. Click the **Parameters** tab, and edit the input parameters values.

The system automatically copies the parameters over to the **CAE 1D Analysis** revision.

5. Launch the simulation tool to run the analysis in batch mode and capture the results files and KPI values.

a. Select the 1D analysis revision and choose **Open** > **Open in Simulation Tool** > **Simcenter System Architect - Execute Analysis (Batch)**.

b. Click **Open** to launch the simulation tool.

The analysis runs in batch mode.

6. View the results files and KPI values after the tool launch is complete.

a. Open the **CAE 1D Analysis** revision after the tool launch is complete.

b. To view the KPI values generated by the simulation tool, click the **Parameters** tab.

c. To view the results files, click the **Overview** tab.

The results are displayed as PNG files.

Perform simulations based on a verification request in Simcenter System Architect

As a simulation analyst, you can perform integrated simulations based on a verification request in Simcenter System Architect.

The requirements engineer gathers requirements and creates a requirement revision, which includes input and output parameters such as acceleration, body mass, and spring stiffness. The system engineer then generates a verification request from this requirement revision. The system automatically copies the input and output parameters from the requirement revision to the verification request. Subsequently, the system engineer creates a simulation request from the verification request, and the system again copies the input and output parameters to the simulation request. As a simulation analyst, you can perform simulations based on the simulation request attached to the verification request.

Prerequisites

The following procedure assumes the **Simcenter System Architect (VR) - Create or Modify Project** and **Simcenter System Architect (VR) - Execute Analysis (Batch)** preconfigured tools are available.

The simulation analyst must ensure that the Simcenter Amesim installation directory is specified correctly in Simcenter System Architect. For more information about specifying the installation directory and other prerequisites, refer to the Simcenter System Architect tool help.

Procedure

1. Create the model.

    a. Open the verification request and select the simulation request.

    b. Choose **Open** > **Open in Simulation Tool** > **Simcenter System Architect (VR) - Create or Modify Project** preconfigured tool.

    This tool launches System Architect where you can create the project.

    c. Specify the initial input and output parameters for the project in System Architect.

    For more information, refer to the Simcenter System Architect tool help.

    d. Save the project and close System Architect.

    The parameter values are automatically populated on the simulation request and **CAE 1D Analysis** and **CAE 1D Model** revisions when you save the project and exit the tool.

    e. To view the status, open **the Simulation Tool Progress Monitor in a separate tab of the browser**.

    When the status is complete, the system displays the **Teamcenter mapping gateway** dialog box.

    f. To map the input and output parameters from the verification request and the parameters created in System Architect, select the appropriate options in the **Teamcenter mapping gateway** dialog box that opens on the client machine.

    g. Click **Save** to save the mapping.

    When you save the mapping, the system architect adds the parameter values to a JSON file. The system converts the parameter values from the JSON file to a PLM XML file and imports the data to Teamcenter. Additionally, the system automatically creates the **CAE 1D Model** and **CAE 1D Analysis** revisions and attaches them to the simulation request.

h. To view the status, open **the Simulation Tool Progress Monitor in a separate tab of the browser**.

When the status is complete, you can open the simulation request.

i. Open the simulation request.

In the **Overview** tab, you can view the mapped input and output parameters by clicking and expanding each parameter. The mapped parameters follow the naming convention of the simulation objects, which differs from the naming convention of the requirement revision. For example, if **Body Mass** is the naming convention in the requirement revision, it appears as **Vehicle_Body_Mass** for simulation objects.

j. In the **Overview** tab, select the **CAE 1D Model** revision, click **Open**, and choose the **Parameters** tab.

This tab displays the input and output parameters that you created in System Architect.

k. To view the attached model file, click the **Overview** tab of the **CAE 1D Model** revision and download the attached file from the **Files** area.

This contains the details of the model you created in System Architect.

l. In the **Overview** tab, select the **CAE 1D Analysis** revision, click **Open**, and choose the **Parameters** tab.

This tab displays the input and output parameters that you created in System Architect.

2. Modify an existing model.

a. Open the verification request and select the simulation request.

b. Choose **Open** > **Open in Simulation Tool** > **Simcenter System Architect (VR) - Create or Modify Project** preconfigured tool.

This tool launches System Architect where you can modify the project. You can modify the input and output parameters you specified initially for the project. For more information, refer to the Simcenter System Architect tool help.

c. Save the project and close System Architect.

The parameter values are automatically populated on the simulation request, 1D model and 1D analysis when you save the project and exit the tool.

d. To view the status in Active Workspace, open **the Simulation Tool Progress Monitor in a separate tab of the browser**.

When the status is complete, the system displays the **Teamcenter mapping gateway** dialog box.

e. Click **Save** to save the mapping for the parameter values that are changed.

When you save the mapping, system architect updates the changed parameters and values to a JSON file. The system converts the parameters and values from the JSON file to a PLM XML file and imports the data to Teamcenter.

f. To view the status in Active Workspace, open **the Simulation Tool Progress Monitor in a separate tab of the browser**.

When the status is complete, you can view the modified parameters from the simulation request.

g. Open the verification request and select the simulation request.

It contains the modified initial input and output parameters. You can view the modified input and output parameters by clicking and expanding each changed parameter.

h. In the **Overview** tab, select the **CAE 1D Model** revision, click **Open**, and choose the **Parameters** tab.

This tab displays the input and output parameters modified by you in System Architect.

i. In the **Overview** tab, select the **CAE 1D Analysis** revision, click **Open**, and choose the **Parameters** tab.

This tab displays the input and output parameters modified by you in System Architect.

3. Create the analysis.

After creating the simulation model, you must perform the simulation analysis.

a. Open the simulation request in Active Workspace and choose **Open** > **Open in Simulation Tool** > **Simcenter System Architect (VR) - Execute Analysis (Batch)** preconfigured tool.

Since this is a batch mode tool, the execution is performed in the background. After the execution is complete, System Architect updates the JSON files with the parameter values. The system converts the parameter values from the JSON file to a PLM XML file and imports the data to Teamcenter.

b. To view the status in Active Workspace, open **the Simulation Tool Progress Monitor in a separate tab of the browser**.

When the status is complete, you can open the simulation request.

c. Refresh the simulation request and click the Overview tab.

   The **Output Parameters** table displays the measured values.

d. In the **Overview** tab, select the **CAE 1D Analysis** revision, click **Open**, and choose the **Parameters** tab.

   The **Output Parameters** table displays the measured values.

Perform simulations using MDAO

Optimize systems across engineering disciplines through simulation using MDAO

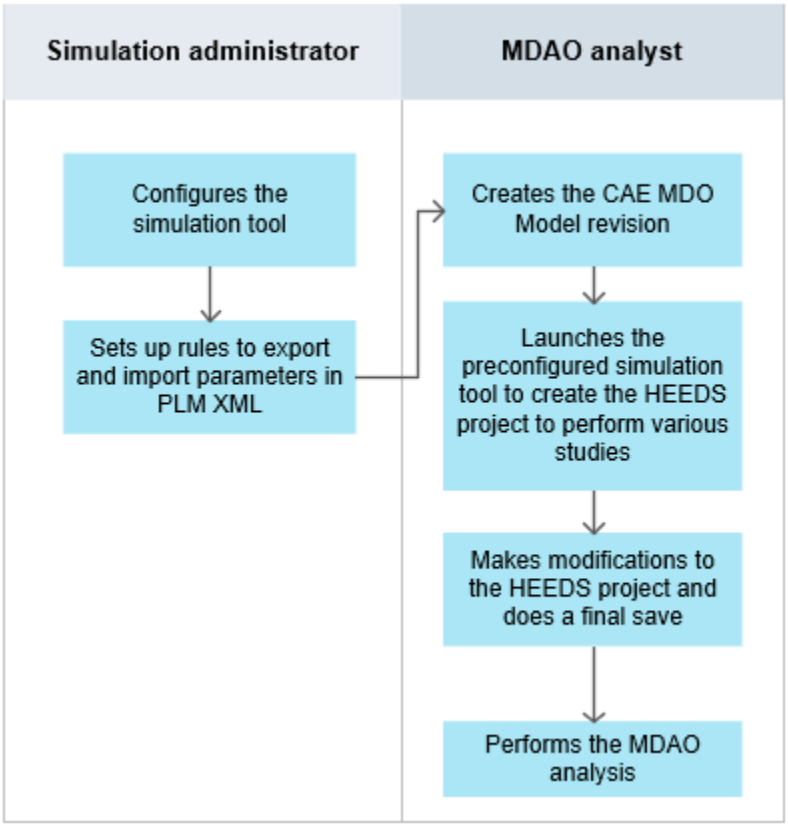
Multidisciplinary Analysis and Optimization (MDAO) is a software-driven methodology that lets you optimize systems through simulation and across engineering disciplines.

MDAO simulations can be run as a part of the larger Model Based System Engineering (MBSE) task flow. This task flow involves creating requirements in Teamcenter, building system models in tools such as System Modeling Workbench (SMW), and using this information to build MDAO models designed in HEEDS. The results from the MDAO analysis are then analyzed to verify if the design or model meets the set requirements.

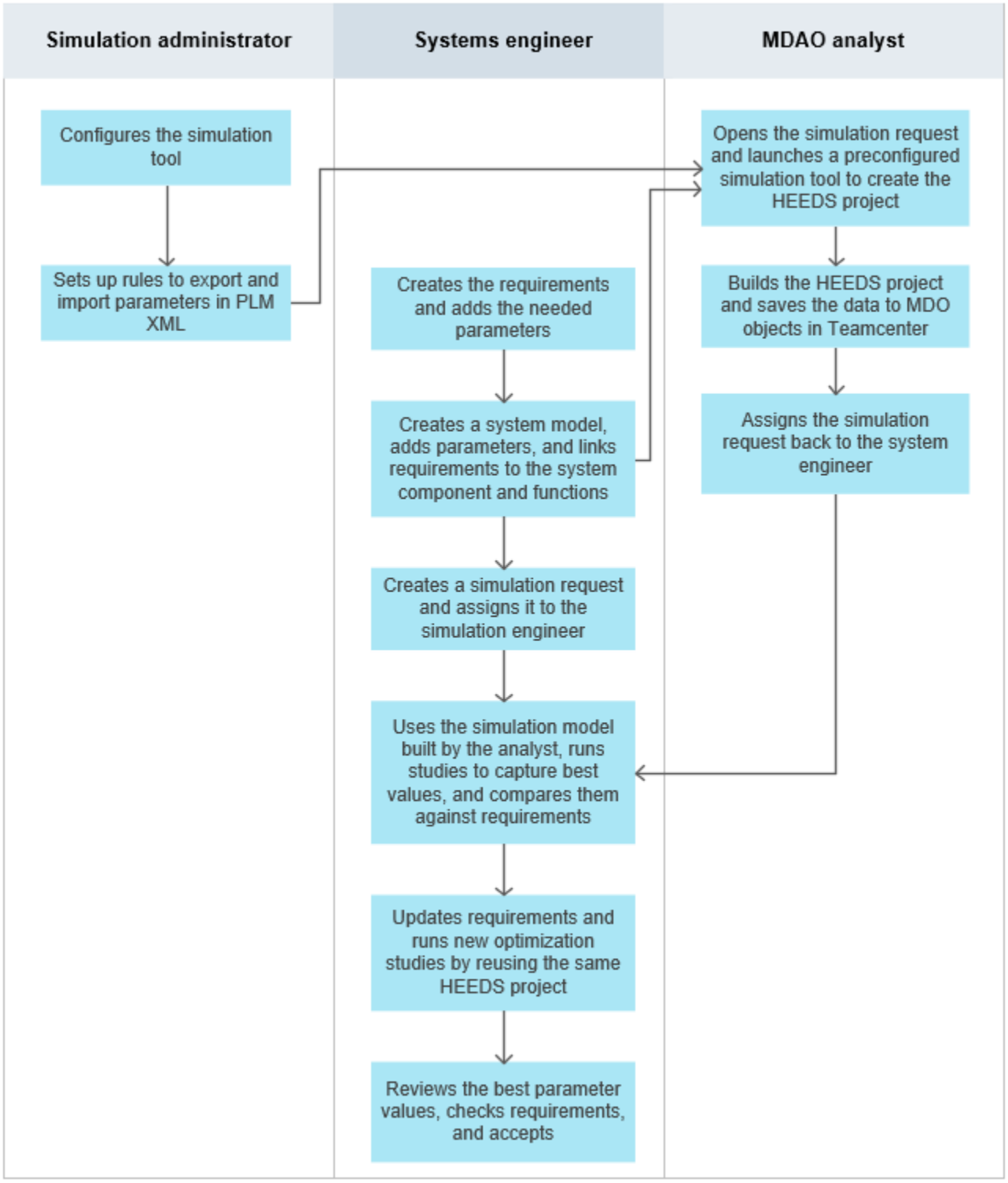
To enable this task flow, it is important to have a mechanism in place that allows the transfer of parameter values from requirements to simulation and vice versa. This is done using Teamcenter Parameter Management and it has been enabled in **CAE MDAO Model** and **CAE MDAO Analysis** revision objects. This allows for linking parameters coming from requirements or system definitions with simulation parameters stored in MDAO objects.

As an MDAO analyst, you can capture HEEDS projects and studies for the analysis and perform the MDAO analyses using the HEEDS desktop application or perform the MDAO analysis by using the web-based HEEDS Connect application.

Task flow for performing the MDAO analysis using the **HEEDS desktop application** or **using the web-based HEEDS Connect application**:



Task flow for performing the **MDAO analysis with the verification request**:



Perform the MDAO analysis using the HEEDS desktop application

As an MDAO analyst, you can capture HEEDS projects and studies for the analysis and perform the MDAO analyses using the HEEDS desktop application.

Prerequisites

The following procedures assume that the simulation administrator has run the quick setup script (**tcsim_quick_setup.pl**) to create sample configurations and that the required HEEDS integration tools are available.

Procedure

1. Create the MDAO model.

   You can use the MDAO model to manage templates for performing multi-disciplinary analysis optimization (MDAO) simulations, for example, HEEDS or Star-CCM+ optimizations. Analysts can use this model to create templates of studies within HEEDS and return those updated models and studies into Teamcenter. It can be related directly to an MDAO analysis such that the MDAO analysis can use the templates from the MDAO model object to enable a consistent simulation task flow that ensures repeatable and consistent results. It can also be used from a verification request as part of a larger MBSE study that encompasses Teamcenter requirements, verification, and simulation. All MDAO analysis studies which are based on an MDAO model can also be quickly retrieved.

   a. On the **HOME** page, click the **CREATE SIMULATION** tile. From the **TYPE** menu, select **CAE MDAO Model**.

   b. Specify the **ID** and **Revision** or accept the default values.

   c. (Mandatory) Specify a name for the MDAO model and click **Create**.

2. Create the HEEDS project.

   a. (Default workspace) Select the MDAO model and choose **Open** > **Open in Simulation Tool**.

   b. Select the **HEEDS - Create or Modify Template** tool.

      This is the tool to open the HEEDS application and create the HEEDS project.

      You can create a new project or select an existing project on the local machine.

   c. Perform the necessary steps in the HEEDS application, save the project, and close the application.

      The system exports the data to Teamcenter.

   d. Navigate to the *ESP_ROOT* directory from the tool launch in the **Simulation Tool Progress Monitor** tab and open the **heeds.xml** file.

This is the PLM XML file through which the data exchange happens. You can view the MDAO model information and the exported parameters in this file. This XML file also contains the HEEDS parameters.

e. To verify the status of the tool launch, open the **Simulation Tool Progress Monitor** tab.

f. To verify changes to attachments after the tool launch is complete, select the MDAO model, and choose the **Overview** tab.

The HEEDS project and the snapshot of the project are displayed in this tab.

g. Select the MDAO model, and choose the **MDAO Project** tab.

The study names of the project, the input files, and the input and output parameters are displayed in this tab.

3. Update the HEEDS project.

a. (Default workspace) Select the MDAO model, and choose **Open** > **Open in Simulation Tool** .

b. Select the **HEEDS - Create or Modify Template** tool.

This opens the HEEDS application with the existing project.

c. Make the necessary modifications to the project in HEEDS and click **File** > **Save (Final)**.

The system exports the data to the **heeds.xml** file in the *ESP_ROOT* directory.

When you perform a **Save (Final)**, the system automatically creates the **CAE MDAO Analysis** and **CAE 3D Analysis** revisions.

The parameters are imported to the **CAE MDAO Analysis** revision. The **CAE 3D Analysis Revision** contains all the HEEDS input files. These input files are references in the **CAE MDAO Analysis Revision** in the **Input Files** table.

d. Navigate to the *ESP_ROOT* directory from the tool launch in the **Simulation Tool Progress Monitor** tab and open the **heeds.xml** file. Verify whether the changes have been exported to this file.

e. To verify the status of the tool launch, open the **Simulation Tool Progress Monitor** tab.

f. To view the created analysis revision after the tool launch is complete, select the **CAE MDAO Model** revision, choose the **Overview** tab, and select the **CAE MDAO Analysis** revision under the **Related CAE MDAO Analysis** section.

g. To view the **CAE 3D Analysis** revision that is automatically created, select the **CAE MDAO Analysis** revision, and choose the **Overview** tab.

   The 3D analysis revision is automatically created to capture the input files for the analysis execution.

h. To view the input files for the analysis execution, open the **CAE 3D Analysis** revision and choose the **Overview** tab.

i. Navigate back to the **CAE MDAO Analysis** revision and choose the **Overview** tab.

   The HEEDS project and the snapshot of the project are displayed in this tab.

j. Choose the **MDAO Study** tab.

   The HEEDS study name, the input files, and the input and output parameters are displayed in this tab. The input files table displays the input file list and the dataset from the **CAE 3D Analysis** revision to which it is referenced.

4. Perform the MDAO analysis.

You can use the MDOA analysis workspace object to manage multi-disciplinary analysis optimization (MDAO) simulations and studies, for example, HEEDS or Star-CCM+ optimizations, and their associated results. It is used to create studies within HEEDS and return those updated models and studies into Teamcenter. This object can be related directly to a CAE 3D Analysis and MDAO model such that the MDAO analysis can use the templates from the MDAO model object to enable a consistent simulation task flow that ensures repeatable and consistent results.

a. (Default workspace) Select the **CAE MDAO Analysis** revision and choose **Open** > **Open in Simulation Tool**.

b. Select the **HEEDS - Execute Analysis** tool to open the HEEDS application, perform a study run, save the analysis results, and close the HEEDS application.

c. To verify the status of the tool launch, open the **Simulation Tool Progress Monitor** tab.

d. To verify the best values for the parameters after the tool launch is complete, choose the **MDAO Study** tab.

   The best values for the parameters are displayed in the input and output parameters tables.

e. Verify the results of the analysis by choosing the **Overview** tab. All the results of the MDAO analysis are imported back to Teamcenter and they are displayed in this tab.

Perform the MDAO analysis using the web-based HEEDS Connect application

As an MDAO analyst, you can perform the MDAO analyses by using the web-based HEEDS Connect application.

HEEDS Connect is a web-based application that provides sharing, monitoring, and control of analysis results from anywhere. Unlike desktop applications, it is a collaboration tool for multiple users across an organization. HEEDS Connect can be used only to execute HEEDS studies and do the postprocessing. You must use HEEDS MDAO to create HEEDS projects and studies.

Prerequisites

The following procedures assume that the simulation administrator has run the quick setup script (**tcsim_quick_setup.pl**) to create sample configurations and that the required HEEDS integration and HEEDS connect tools are available.

Procedure

1. Create the MDAO model.

    a. On the **HOME** page, click the **CREATE SIMULATION** tile. From the **TYPE** menu, select **CAE MDAO Model**.

    b. Specify the **ID** and **Revision** or accept the default values.

    c. (Mandatory) Specify a name for the MDAO model and click **Create**.

2. Create the HEEDS project.

    a. (Default workspace) Select the MDAO model and choose **Open** > **Open in Simulation Tool**.

    b. Select the **HEEDS - Create or Modify Template** tool.

    This is the tool to open the HEEDS MDAO desktop application and create the HEEDS project.

    You can create a new project or select an existing project on the local machine.

    c. Perform the necessary steps in the HEEDS application, save the project, and close the application.

    The system exports the data to Teamcenter.

    d. Navigate to the *ESP_ROOT* directory from the tool launch in the **Simulation Tool Progress Monitor** tab and open the **heeds.xml** file.

This is the PLM XML file through which the data exchange happens. You can view the MDAO model information and the exported parameters in this file. This XML file also contains the HEEDS parameters.

e. To verify the status of the tool launch, open the **Simulation Tool Progress Monitor** tab.

f. To verify changes to attachments after the tool launch is complete, select the MDAO model, and choose the **Overview** tab.

The HEEDS project and the snapshot of the project are displayed in this tab.

g. Select the MDAO model, and choose the **MDAO Project** tab.

The study names of the project, the input files, and the input and output parameters are displayed in this tab.

3. Update the HEEDS project.

a. (Default workspace) Select the MDAO model and choose **Open** > **Open in Simulation Tool**.

b. Select the **HEEDS - Create or Modify Template** tool.

This opens the HEEDS application with the existing project.

c. Make the necessary modifications to the project in HEEDS and click **File** > **Save (Final)**.

The system exports the data to the **heeds.xml** file in the *ESP_ROOT* directory.

When you perform a **Save (Final)**, the system automatically creates the **CAE MDAO Analysis** and **CAE 3D Analysis** revisions.

The parameters are imported to the **CAE MDAO Analysis** revision. The **CAE 3D Analysis** revision contains all the HEEDS input files. These input files are referenced in the **CAE MDAO Analysis** revision in the **Input Files** table.

d. To verify the status of the tool launch, open the **Simulation Tool Progress Monitor** tab.

e. To view the created analysis revision after the tool launch is complete, select the **CAE MDAO Model** revision, choose the **Overview** tab, and select the **CAE MDAO Analysis** revision under the **Related CAE MDAO Analysis** section.

f. To view the **CAE 3D Analysis** revision that is automatically created, select the **CAE MDAO Analysis** revision, and choose the **Overview** tab.

The 3D analysis revision is automatically created to capture the input files for the analysis execution.

g. To view the input files for the analysis execution, open the **CAE 3D Analysis** revision and choose the **Overview** tab.

h. Navigate back to the **CAE MDAO Analysis** revision and choose the **Overview** tab.

The HEEDS project and the snapshot of the project are displayed in this tab.

i. Choose the **MDAO Study** tab.

The HEEDS study name, the input files, and the input and output parameters are displayed in this tab. The input files table displays the input file list and the dataset from the **CAE 3D Analysis** revision to which it is referenced.

4. Perform the MDAO analysis.

a. (Default workspace) Select the **CAE MDAO Analysis** revision and choose **Open** > **Open in Simulation Tool**.

b. To perform the analysis, select the **HEEDS Connect - Execute Analysis** tool and click **Open** to send the HEEDS study parameters to the HEEDS Connect application.

> Note:
>
> Verify if HEEDS Connect is up and running before performing this step.

c. To verify the status of the tool launch, open the **Simulation Tool Progress Monitor** tab.

d. Open HEEDS Connect in a browser to view the and run the study. After the study is complete, postprocess the results as appropriate. After you are ready to upload the results to Teamcenter, navigate back to the **Home** page of HEEDS Connect, right-click the study, and select **Upload to TcSim**.

e. To verify the best values for the parameters after the tool launch is complete, choose the **MDAO Study** tab.

The best values for the parameters are displayed in the input and output parameters tables.

f. Verify the results of the analysis by choosing the **Overview** tab. All the results of the MDAO analysis are imported back to Teamcenter and they are displayed in this tab.

Perform the MDAO analysis on the verification request

As an MDAO analyst, you can create a HEEDS project based on a verification request, capture the data required for the analysis, and perform the analysis.

Prerequisites

The following procedures assume that the simulation administrator has run the quick setup script (**tcsim_quick_setup.pl**) to create sample configurations and that the required verification scope tools are available. It is also assumed that a **Verification Request** object has been created from a set of requirements and system definition. Additionally, a **Simulation Request** object has been created under the **Verification Request** to store and validate the simulation data.

Procedure

1. Create the HEEDS project.

    a. (Analyst workspace) Select the simulation request and choose **Open in Simulation Tool**.

    (Default workspace) Select the simulation request and choose **Open** > **Open in Simulation Tool**.

    b. Select the **HEEDS - Create Model (Verification Scope)** tool.

    This is the tool to open the HEEDS application and create the HEEDS project.

    You can create a new project or select an existing project on the local machine.

    c. Perform the necessary steps in the HEEDS application, save the project, and close the application.

    The system exports the data to Teamcenter.

    d. To verify the exported data, navigate to the *Temp\ESP_ROOT* directory from the tool launch in the **Simulation Tool Progress Monitor** tab and open the **heeds.xml** file.

    This file displays details about the simulation request, the **CAE MDAO Model** revision, and the exported parameters.

    e. To verify the status of the tool launch, open the **Simulation Tool Progress Monitor** tab.

    f. To verify if the newly created **CAE MDAO Model** object is attached to the **Simulation Request** object after the tool launch is complete, select the **Simulation Request** object, and choose the **Overview** tab.

The **CAE MDAO Model** object is attached to the **Simulation Request** object in the **SIMULATION MODELS** section.

g. To verify the exported HEEDS data, open the simulation model, and choose the **MDAO Project** tab.

This tab displays the HEEDS study names, input files, and HEEDS project level input and output parameters.

h. To view the uploaded HEEDS project files, open the **CAE MDAO Model** revision and choose the **Overview** tab.

2. Update the HEEDS project.

a. (Author workspace) Select the **Simulation Request** object containing the requirements, system model definition, and their associated parameters, and choose **Open** > **Open in Simulation Tool**.

(Analyst workspace) Select the **Simulation Request** object containing the requirements, system model definition, and their associated parameters, and choose **Open in Simulation Tool**.

b. Select the **HEEDS - Modify Model (Verification Scope)** tool.

This opens the HEEDS application with the existing project.

c. Make the necessary modifications to the project and click **File** > **Save (Final)** in the HEEDS application.

The system exports the data to the **heeds.xml** file in the *ESP_ROOT* directory.

In addition to the simulation request information, the MDAO model information also gets exported to this file.

The system automatically creates the existing **CAE MDAO Analysis** and creates the **CAE 3D Analysis** revisions. The **CAE MDAO Analysis** revision contains the HEEDS study related information including the input and output parameters, The **CAE 3D Analysis** revision contains the HEEDS input files required for the HEEDS study. In addition, the system creates relationships between existing and newly created objects. Both the **CAE MDAO Model** and **CAE MDAO Analysis** revisions are placed under the **Simulation Models** section of the **Simulation Request** object.

d. Navigate to the *ESP_ROOT* directory from the tool launch in the **Simulation Tool Progress Monitor** tab and open the **heeds.xml** file. Verify whether the changes have been exported to this file.

e. To verify the status of the tool launch, open the **Simulation Tool Progress Monitor** tab.

f. To verify the status of the newly created MDAO analysis revision after the tool launch is complete, select the **Simulation Request** object and choose the **Overview** tab.

   The **SIMULATION MODELS** section displays the newly created **CAE MDAO Analysis** revision.

g. Open the **CAE MDAO Analysis** revision and choose the **Overview** tab.

   This tab displays the newly created **CAE 3D Analysis** revision.

h. To view the study names of the project, the input files, and the input and output parameters, choose the **MDAO Study** tab. The input files table displays the input file list and the dataset in the **CAE 3D Analysis** revision to which they are referenced.

i. To view the HEEDS project details and the related objects, choose the **Overview** tab.

j. To view the inputs required for the analysis, open the **CAE 3D Analysis** revision, and choose the **Overview** tab.

3. Perform the analysis on the simulation request.

   a. (Default workspace) Select the **Simulation Request** object and choose **Open** > **Open in Simulation Tool**.

   b. Select the **HEEDS - Execute Analysis (Verification Scope)** tool to open the HEEDS application, perform a study run, save the analysis results, and close the HEEDS application.

   c. Verify the status of the tool launch in the **Simulation Tool Progress Monitor** tab. After the tool launch is complete, select the **Simulation Request** object, and choose the **Overview** tab.

      The input and output **PARAMETERS** section displays the parameters and the pass or fail status of each parameter.

   d. Verify the results of the analysis by choosing the **Overview** tab. All the results from the HEEDS study are imported back to Teamcenter and they are displayed in this tab.

Perform simulations using Simcenter STAR-CCM+

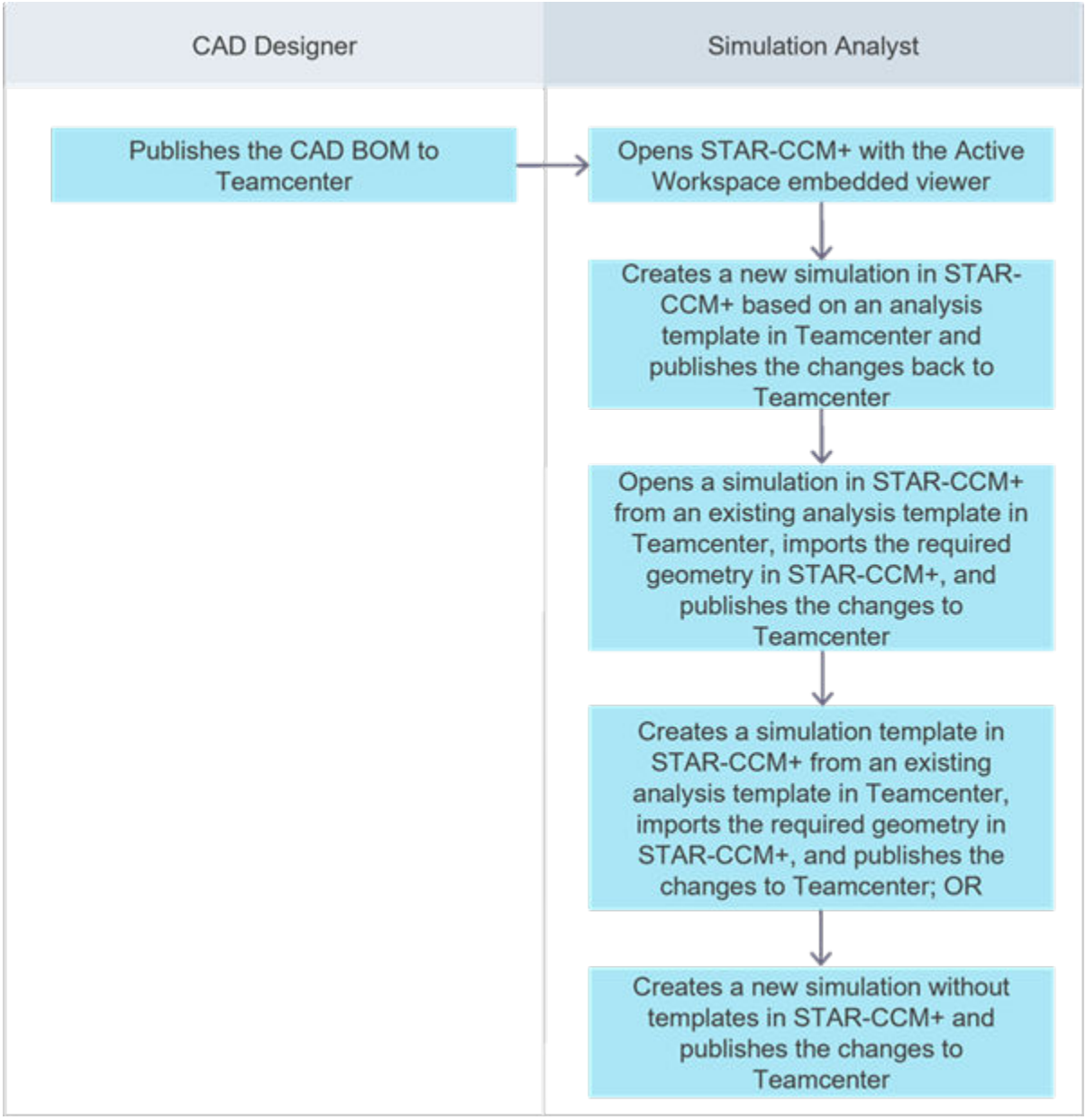
Perform computational fluid dynamics analysis using Simcenter STAR-CCM+

Simcenter STAR-CCM+ is a software used for computational fluid dynamics (CFD) analysis. It helps reduce simulation preparation time with automated meshing and preprocessing of complex geometries.

As a simulation analyst, you can use the Simcenter STAR-CCM+ application to connect to Teamcenter (Active Workspace interface) and perform tasks such as create a new simulation in STAR-CCM+ based on a CAE 3D analysis template in Teamcenter, open a simulation in STAR-CCM+ from an existing 3D analysis revision in Teamcenter, and create a simulation template in STAR-CCM+ from a 3D analysis template in

Teamcenter for performing analyses. You can then complete the analysis and import the files back to Teamcenter by performing all the tasks in STAR-CCM+ application.

The task flow is as follows:



Perform the simulation based on a template using the STAR-CCM+ application

As a simulation analyst, you can create a new simulation in STAR-CCM+ application based on a CAE 3D analysis template in Teamcenter. Additionally, you import the required geometry and publish the template to bring the changes back to Teamcenter.

Prerequisites

The STAR-CCM+ application, the appropriate JDK version as required by STAR-CCM+, and Teamcenter Tool Launcher Client (TTLC) must be installed on the client machine from where the integration is being run.

Procedure

1. Create a new simulation in STAR-CCM+ application based on an analysis template in Teamcenter and import the changes back to Teamcenter.

    a. Launch the STAR-CCM+ application and click **Connect** > **Teamcenter** > **Open Active Workspace** to log on to the embedded Active Workspace.

    In the URL box, you must specify the Active Workspace URL followed by **/tc**, for example, **http://10.22.148.88:3000/tc**

    Contact the administrator at your site for the Active Workspace URL and the default port number.

    b. Search and open the appropriate **CAE 3D Analysis Template** revision having a simulation template file (***.simt**) attached to it.

    c. Click **More Commands** > **New** > **Create Simulation** and select **CAE 3D Analysis** in embedded Active Workspace view. Specify information as appropriate and create the 3D analysis revision.

    d. In **Explorer**, select the analysis revision, and click **Connect** > **Teamcenter** > **Create Simulation**.

    e. To import the simulation back to Teamcenter from STAR-CCM+, click **Connect** > **Teamcenter** > **Publish Simulation**.

    f. To verify the import, select the **CAE 3D Analysis** revision and click the **Overview** tab in embedded Active Workspace view.

    The generated simulation file attached to the analysis revision is displayed in this tab.

2. Open a simulation in STAR-CCM+ application from an existing 3D analysis revision in Teamcenter, import the required geometry, and publish the template to import the changes to Teamcenter.

    a. Start the STAR-CCM+ application by running the **.bat** file and click **Connect** > **Teamcenter** > **Open Active Workspace** to log on to the embedded Active Workspace.

    b. Search and open an existing **CAE 3D Analysis** revision with the simulation file.

    c. To create the simulation, click **Connect** > **Teamcenter** > **Open Simulation**.

d. To import geometry for the simulation, select a CAD object such as a **CAE 3D Geometry** revision in embedded Active Workspace view, click **Connect** > **Teamcenter** > **Import Geometry**.

   The geometry file is imported to STAR-CCM+ and the files are listed under the **Parts** folder.

e. Save the simulation.

f. To bring the changes in the modified simulation back to Teamcenter, select the **CAE 3D Analysis** revision, and click **Connect** > **Teamcenter** > **Republish Simulation**

g. To verify the modified simulation, select the **CAE 3D Analysis** revision and click the **Overview** tab in embedded Active Workspace view.

   The modified simulation file attached to the analysis revision is displayed in this tab. Look at the **Date Modified** information to verify this change.

3. Create a simulation template in STAR-CCM+ application from a 3D analysis template in Teamcenter, import the required geometry, and import the template to bring the changes to Teamcenter.

   a. Open a **CAE 3D Analysis Template** that does not have any simulation templates.

   b. To create the simulation, click **Connect** > **Teamcenter** > **Open Simulation**.

   c. To import geometry for the simulation, select a CAD object in the embedded Active Workspace, click **Connect** > **Teamcenter** > **Import Geometry**.

      The geometry file is imported to STAR-CCM+ and they are listed under the **Parts** folder.

   d. To create the template, click **Connect** > **Teamcenter** > **Publish As Template**.

      The template is imported back to Teamcenter.

   e. Click the **Overview** tab in the embedded Active Workspace user interface.

      The simulation file attached to the analysis template is displayed in this tab.

Perform the simulation without templates using STAR-CCM+ application

As a simulation analyst, you can create a new simulation in the STAR-CCM+ application and import the simulation to Teamcenter. Additionally, you can import an unmanaged simulation from the application to Teamcenter.

Prerequisites

The STAR-CCM+ application, the appropriate JDK version as required by STAR-CCM+, and Teamcenter Tool Launcher Client (TTLC) must be installed on the client machine from where the integration is being run.

Procedure

1. Create a new simulation in the STAR-CCM+ application and import or publish the simulation to Teamcenter.

    a. Launch the STAR-CCM+ application and click **Connect** > **Teamcenter** > **Open Active Workspace** to log on to the embedded Active Workspace.

    In the URL box, you must specify the Active Workspace URL followed by **/tc**, for example, **http://10.22.148.88:3000/tc**

    Contact the administrator at your site for the Active Workspace URL and the default port number.

    b. Create a **new CAE 3D Analysis revision** in embedded Active Workspace view.

    c. In STAR CCM+ application, click **Connect** > **Teamcenter** > **Create Simulation**.

    Build the simulation file in STAR CCM+ application and save it locally.

    d. To import the simulation file to Teamcenter, click **Connect** > **Teamcenter** > **Publish Simulation**

2. Publish an unmanaged simulation to Teamcenter.

    a. Start the STAR-CCM+ application by running the **.bat** file and click **Connect** > **Teamcenter** > **Open Active Workspace** to **log on to the embedded Active Workspace**.

    b. In STAR-CCM+, open a local or unmanaged (***.sim**) file.

    c. Build the simulation file in STAR CCM+ application and save it locally.

    d. Create a **new CAE 3D Analysis revision** in embedded Active Workspace view.

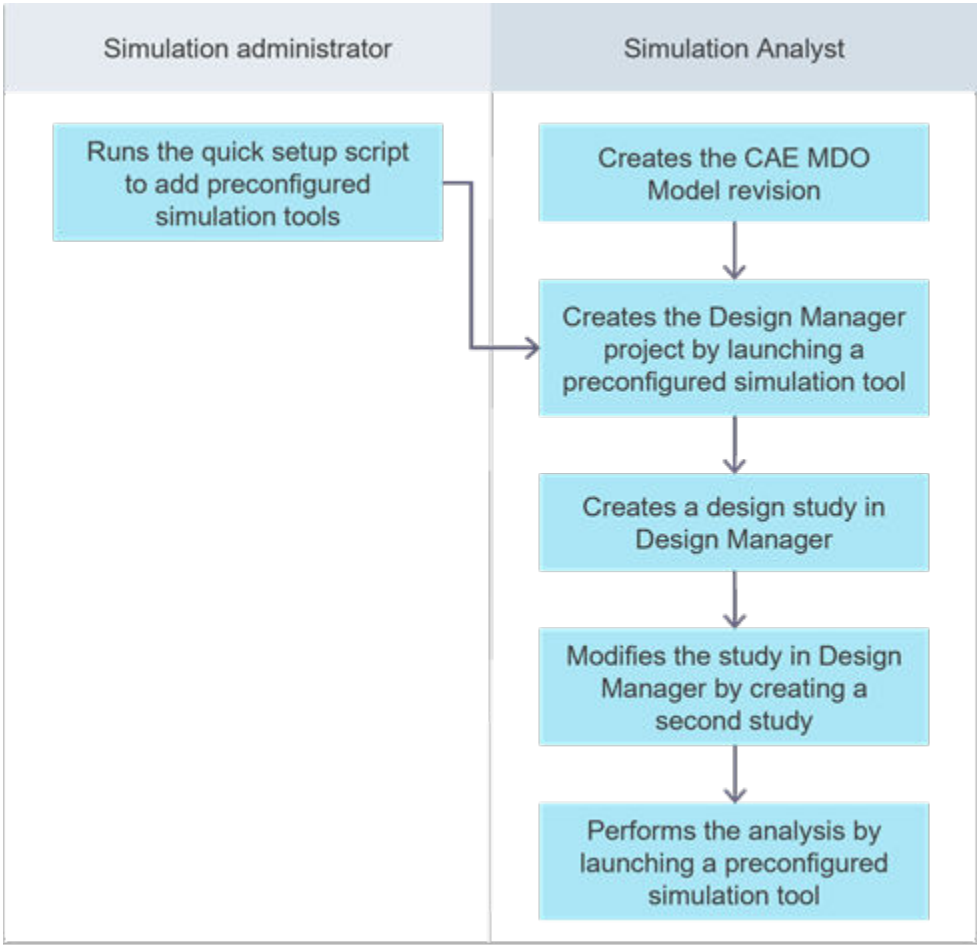
    e. To import the simulation file to Teamcenter, click **Connect** > **Teamcenter** > **Publish Simulation**

Perform simulations using STAR-CCM+ Design Manager

Perform design exploration studies using STAR-CCM+ Design Manager

STAR-CCM+ Design Manager provides an automated approach to running design exploration studies. The performance assessment study runs a product through a predefined set of conditions to understand the influence of key parameters on the performance of the product. The design optimization study algorithm determines the input conditions automatically to improve the product for specific goals.

The process is as follows:



Perform the analysis using Design Manager

As an MDAO analyst, you can create the Design Manager project by launching a preconfigured simulation tool, start a design study in Design Manager, and perform the analysis by launching a preconfigured simulation tool.

Prerequisites

The following procedures assume that the simulation administrator has run the quick setup script (**tcsim_quick_setup.pl**) to create preconfigured simulation tools and that the required Design Manager integration tools are available.

Procedure

1. Create the MDAO model.

    a. On the **HOME** page, click the **CREATE SIMULATION** tile. From the **TYPE** menu, select **CAE MDAO Model**.

    b. Specify the **ID** and **Revision** or accept the default values.

    c. (Mandatory) Specify a name for the MDAO model and click **Create**.

2. Create the Design Manager project by launching a preconfigured simulation tool.

    a. (Default workspace) Select the MDAO model you created in **step 1** and choose **Open** > **Open in Simulation Tool**.

    b. Select the **STAR-CCM+ Design Manager - Create/Modify** tool.

    The system creates the Design Manager project (**.dmprj** file).

3. Create a design study in Design Manager.

    a. Open the Design Manager project (**.dmprj** file created in **step 2**).

    b. To provide a reference simulation file for the study, in Design Manager, choose **Simulation**, right-click, select **Read Reference Simulation** > **Browse**, and provide the simulation file (**.sim**).

    Design Manager reads this file, and all the data and parameters required for the new study are now available.

    c. Specify the input parameters, responses, and scenes as appropriate.

    The input parameters are already available from the **.sim** file selected for the project.

    d. (Optional) Change the run settings as appropriate by choosing **Settings** > **Run Settings**. For example, you can execute two jobs at a time and specify four compute processes.

    e. To save the study, click **Save** in Design Manager.

The Design Manager project file is saved.

f. Close Design Manager.

MDAO analysis objects are created automatically, and one object is created for each study.

The system imports the input files to Teamcenter, automatically creates the **CAE 3D Analysis** revision, and the input files are mapped to it.

g. In Active Workspace, open the **CAE MDAO Model** revision and select the **MDAO Project** tab.

The revision is populated with the study information.

Only input files are shown and no parameters are imported.

h. To see the associated **CAE MDAO Analysis** revision that is automatically created by the system, select the **Overview** tab.

The associated analysis revision is displayed with the name as the study name.

i. To view the study details, open the associated analysis revision and select the **MDAO Study** tab.

The study status is displayed as **Not Started**.

j. View the input file (**.sim**) attached to the 3D analysis revision.

A. Select the **Overview** tab.

B. Open the **CAE 3D Analysis** revision from the **Input Item Revisions** section.

C. Choose the **Overview** tab to view the input file.

4. Modify the study you have created in Design Manager by creating a second study.

a. (Default workspace) Select the MDAO model you created in **step 1** and choose **Open** > **Open in Simulation Tool**.

b. Select the **STAR-CCM+ Design Manager - Create/Modify** tool.

c. Add a second study and specify input parameters, responses, and scenes as appropriate.

d. To save the study, click **Save** in Design Manager.

The Design Manager project file is saved.

e. Close Design Manager.

MDAO analysis objects are created automatically, and one object is created for each study.

The system imports the input files to Teamcenter, automatically updates the **CAE 3D Analysis** revision, and the input files are mapped to it.

f. In Active Workspace, open the **CAE MDAO Model** revision and select the **MDAO Project** tab.

The revision is updated with the study information. You can view two studies in the **Study** column and the study names are separated by commas.

g. To see the associated **CAE MDAO Analysis** revision that is automatically created by the system, select the **Overview** tab.

The associated analysis revision for the second study is displayed with the name as the study name.

h. To view the details of the second study, open the associated analysis revision and select the **MDAO Study** tab.

The study status is displayed as **Not Started**.

i. View the input file (**.sim**) attached to the 3D analysis revision for the second study.

A. Select the **Overview** tab.

B. Open the **CAE 3D Analysis** revision for the second study from the **Input Item Revisions** section.

C. Choose the **Overview** tab to view the input file.

5. Perform the analysis by launching a preconfigured simulation tool.

a. Select the **CAE MDAO Analysis** revision that was automatically created in **step e** and choose **Open** > **Open in Simulation Tool**.

b. Select the **STAR-CCM+ Design Manager - Run Study** tool.

Alternatively, you can select the **STAR-CCM+ Design Manager - Run Study Batch** tool to run the Design Manager project in batch mode.

The system loads the Designer Manager project file associated with the MDAO model revision. It starts the execution automatically since the study name and all other data are available.

c. In Design Manager, verify the status of the design studies and wait for the execution of the studies to be complete.

d. To save the results of the study, click **Save** in Design Manager.

e. Close Design Manager.

f. To view parameters based on the best design, in Active Workspace open the **CAE MDAO Analysis** revision, and choose the **MDAO Study** tab.

   The study status is displayed as completed and the **Input Parameters** and **Output Parameters** sections are updated, for example, with minimum measured and maximum measured values, value usage, and resolution.

g. (Optional) If you want to specify the file that is present on your desktop, you can select **Input File Path**, choose **More Options** > **New** > **Select Input File**, and specify the complete file path.

   You can select datasets **In Teamcenter** or choose **Outside Teamcenter**. Choose the latter option to specify the file path to the file on your desktop.

   The system allows only datasets within Teamcenter or a file from outside Teamcenter.

h. To view the zip file of the Design Manager project and the design study, choose the **Overview** tab.

   The design study zip file contains the details of the design study.

i. View the results files.

   A. In the **Simulation Tool Progress Monitor**, select **STAR-CCM+ Design Manager - Run Study** tool, and choose **Open Directory**.

   B. Select the *ESP_ROOT* > **Design_Study** folder.

      The folder name and the compressed file have the same name as the Design Manager project name.

      The mesh information, scene, and plot files are available in this directory as STAR view and PNG files.

j. View the log files.

   A. In the **Simulation Tool Progress Monitor**, select **STAR-CCM+ Design Manager - Run Study** tool, and choose **Open Directory**.

B. Select the *ESP_ROOT* > *ESP_LOGS* directory.

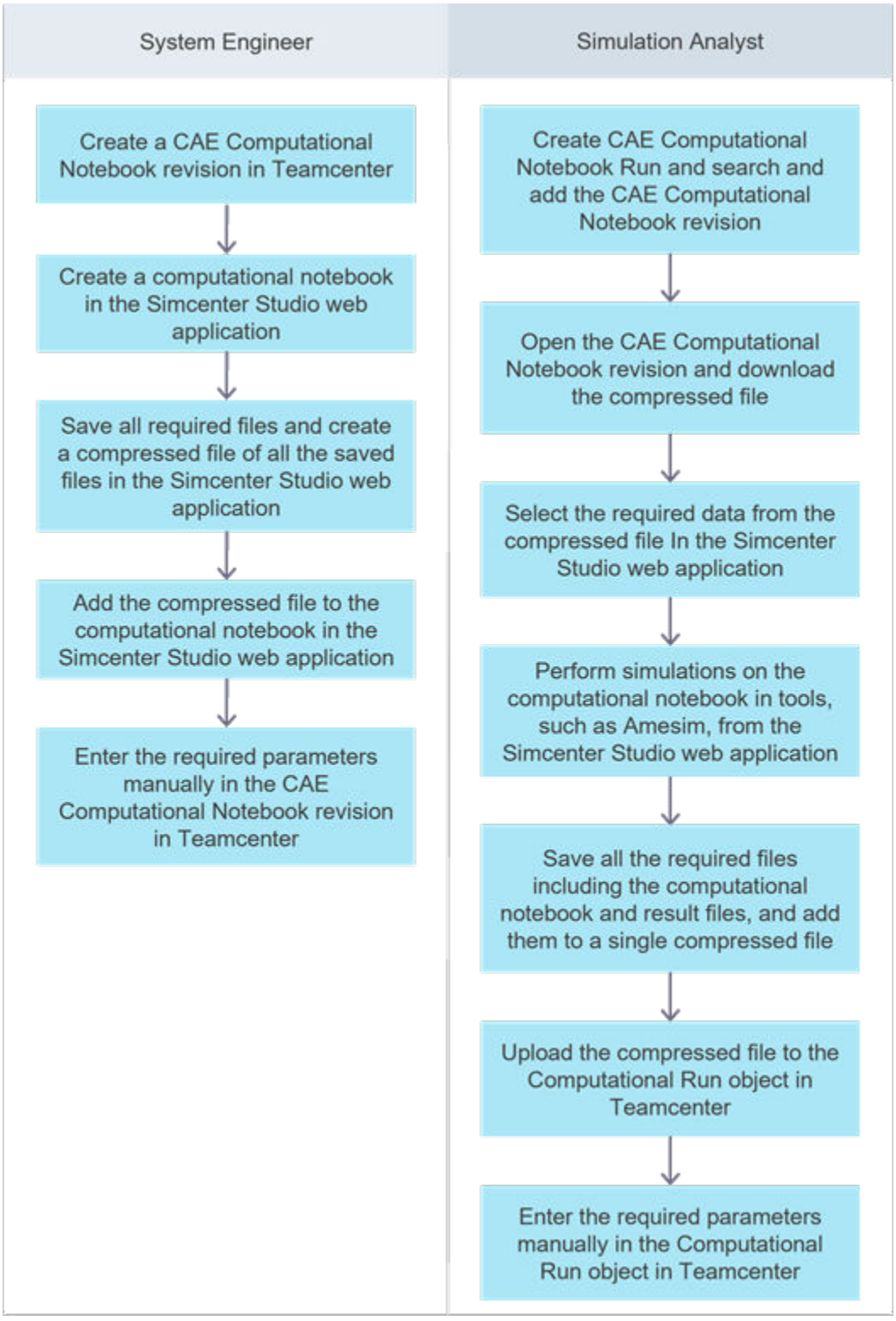
The log files are available in this directory.

Perform simulations using Simcenter Studio

Create different system architectures using Simcenter Studio

Simcenter Studio is a web-based application for engineers and data scientists to create novel and topologically different system architectures. It generates and evaluates system architectures during the early concept phase. The software has a computational notebook that contains narrative text and mathematical equations, code, models, model block diagrams, simulation as code, and result visualization. All of these are combined in one document for easy usage. This integration is currently manual.

The tool is based on the Jupyter framework. For more information, see **https://jupyter.org/**.



Create the computational notebook by using Simcenter Studio

As a system engineer, you can create a computational notebook by using the Simcenter Studio web application. The computation notebook is for creating the mathematical equations, code, models, and other data required for the simulation.

Procedure

1. Log on as a simulation analyst to the **Analyst** workspace.

2. Open the **CAE 1D Model** revision that contains the **CAE Amesim** file as per the requirement.

   This is the input file for Simcenter Studio.

3. Create a computational notebook in the context of the 1D model revision. To do so:

   a. Choose **More Commands** > **New** > **Create Simulation** > **CAE Computational Notebook** revision.

   b. Specify a name for the computational notebook and other details as appropriate, and click **Create**.

   c. (Optional) To view the relationship between the computational notebook and the 1D, select the **CAE Computational Notebook** revision and choose the **Relation** tab. Expand the outgoing relation and click the connector. The system displays the **Include** relationship.

4. Open the Simcenter Studio web application to create a computational notebook.

   The notebook contains narrative text and mathematical equations, code, models, model block diagrams, simulation as code, and result visualization

5. To download files from the Simcenter Studio web application, select the required files, click the **File** menu, and choose **Download**.

   The files are downloaded as a compressed file (***.nbzip**).

6. Upload the files to **Teamcenter**.

   a. In Active Workspace, navigate to the **CAE Computational Notebook** revision and choose the **Overview** tab.

   b. In the **Files** section, click **Add to**, choose the compressed file (***.nbzip**), and click **Add**.

7. To upload input parameters for the simulation manually, choose the **Parameters** tab, click **Quick Add**, and enter the data.

8. (Optional) To delete the computational notebook, open the **CAE 1D Model** revision, select it from the **Notebook** section in the **Overview** tab, and choose **More Commands** > **Edit** > **Delete**.

9. (Optional) Revise the computational notebook.

   When you perform a revise operation, the compressed file (***.nbzip**) included in the **Attachment** tab is not carried forward to the new revision. The other files with **Specification** relation are carried forward.

   a. Open the **CAE Computational Notebook** revision and choose **More Commands** > **New** > **Revise**.

   b. (Optional) Specify required information as appropriate.

   c. (Optional) Select a new destination folder.

      The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

      A. Remove the **Newstuff** folder and click the **Add** button to select another folder.

      B. Select the folder and click **Add**.

   d. To revise, click **Save**.

10. (Optional) Make a copy of the computational notebook.

    When you make a copy, the compressed file (***.nbzip**) included in the **Attachment** tab is not carried forward to the new revision. The other files with **Specification** relation are carried forward.

    a. Open the **CAE Computational Notebook** revision and choose **More Commands** > **New** > **Save As**.

    b. (Optional) Specify a new name if you want to create a copy and description.

    c. (Optional) Select a new destination folder.

       The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

       A. Remove the **Newstuff** folder and click the **Add** button to select another folder.

       B. Select the folder and click **Add**.

d. To create a copy, click **Save**.

Create the computational notebook run to perform simulations in Simcenter Studio

As a simulation analyst, you can create a computational notebook run in Teamcenter and perform simulations by using the Simcenter Studio web application.

Procedure

1. Log on as a simulation analyst to the **Analyst** workspace.

2. Create a computational notebook run.

   a. Select a folder and choose **More Commands** > **New** > **Create Simulation**.

   b. Select **CAE Computational Notebook Run**, specify a name (mandatory), and include other information as appropriate.

   c. Select **CAE Computational Notebook** and choose the computational notebook created by the system architect in *Create the computational notebook by using Simcenter Studio* and click the **Create** button.

3. Perform simulations from the Simcenter Studio web application.

   a. Open the **CAE Computational Notebook Run** you created.

   b. Choose the **Overview** tab and download the compressed file.

   c. Open the Simcenter Studio web application and perform the simulation.

   d. To download files with simulation results from the Simcenter Studio web application, select the required files, click the **File** menu, and choose **Download**.

      The files are downloaded as a compressed file (***.nbzip**).

   e. To upload the downloaded files with simulation results, choose the **Overview** tab. In the **Files** section, click **Add to**, choose the compressed file, and click **Add**.

   f. To specify the result parameters manually, choose the **Parameters** tab, click **Quick Add** and enter the data.

4. (Optional) Revise the computational notebook run.

When you perform a revise operation, the compressed file (***.nbzip**) included in the **Attachment** tab is not carried forward to the new revision. The other files with **Specification** relation are carried forward.

a. Open the **CAE Computational Notebook Run** revision and choose **More Commands** > **New** > **Revise**.

b. (Optional) Specify required information as appropriate.

c. (Optional) Select a new destination folder.

The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

A. Remove the **Newstuff** folder and click the **Add** button to select another folder.

B. Select the folder and click **Add**.

d. To revise, click **Save**.

5. (Optional) Make a copy of the computational notebook run.

When you make a copy, the compressed file (***.nbzip**) included in the **Attachment** tab is not carried forward to the new revision. The other files with **Specification** relation are carried forward.

a. Open the **CAE Computational Notebook Run** revision and choose **More Commands** > **New** > **Save As**.

b. (Optional) Specify a new name if you want to create a copy and description.

c. (Optional) Select a new destination folder.

The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

A. Remove the **Newstuff** folder and click the **Add** button to select another folder.

B. Select the folder and click **Add**.

d. To create a copy, click **Save**.

11. Create CAE analysis package definitions for common simulation tasks

Create CAE packages based on a common template

Analyst groups in companies typically perform multiple types of analyses based on a product definition or a set of requirements and validate them. Examples include strength analysis, durability analysis, fluid analysis, or crash analysis. They also perform these analyses multiple times, for example, based on different load cases or different input geometry variations. The processes and tools used and the input and output may vary across analyses.

To create an analysis package for a specific type of analysis, the analysts must know which items, datasets, and relationships to create and then create multiple CAE item revisions one at a time and establish relationships between different item revisions.

At a site, analysts may have different categories of analysis packages. Based on a common template, these different users (based on their roles) create different package definitions and save them to the database to make this process easier and more efficient.

Analysts can use the package definitions created by the simulation administrator or the group administrator to create their own CAE item revisions. They can use these packages to define input parts (item revisions), output items, the relationships between the output item revision to their input parts, and the output datasets within one or more output item revisions.

- Site-level package definitions.

  These are standardized and approved package definitions created by the simulation administrator and used by multiple analysts across the enterprise to create a set of CAE item revisions for a specific analysis.

  For more information, see *Simulation Process and Data Management — Deployment and Administration*.

- Group-level package definitions.

  These are standardized and approved package definitions created by the group administrator and used by multiple analysts across the enterprise to create a set of CAE item revisions for a specific analysis. Access to these are limited to members of that group.

  For more information, see *Simulation Process and Data Management — Deployment and Administration*.

- User-level package definitions.

These are created by an analyst and used only by this analyst.

For more information about creating user-level packages in rich client, see Configure CAE packages in *Simulation Process and Data Management on Rich Client — Usage*.

Create analysis revisions by executing predefined CAE packages

1. On the **HOME** page, click **CAE PACKAGES**.
2. From the displayed packages, open the package.
3. Specify the input.

   If you select an input object, the system resolves the preconfigured keywords and updates the property values of the output item.

   The keyword examples for preconfigured input rules are as follows:

   Example 1:

Item ID pattern configuration for CAE package	**After the package is executed with the input item ID as 000387**	**After the package is executed the second time with the same input item ID**	**After the package is executed with a different input item ID as 000341**
CAE Analysis is configured as **INPUTID".sim"N**	Item ID for **CAE Analysis** is **000387.sim1**	Item ID for **CAE Analysis** is **000387.sim2**	Item ID for **CAE Analysis** is **000341.sim1**
CAE Model is configured as **INPUTID".fem"N**	Item ID for **CAE Model** item ID is **000387.fem1**	Item ID for **CAE Model** is **000387.fem2**	Item ID for **CAE Model** is **000341.fem1**
CAE Result is configured as **INPUTID".res"N**	Item ID for **CAE Result** is **000387.res1**	Item ID for **CAE Result** is **000387.res2**	Item ID for **CAE Result** is **000341.res1**
CAE Geometry is configured as **INPUTID".i"N**	Item ID for **CAE Geometry** is **000387.i1**	Item ID for **CAE Geometry** is **000387.i2**	Item ID for **CAE Geometry** is **000341.i1**

   Example 2:

CAE package configuration for CAE Analysis	After the package is executed with input ID as 000387 and input item name as NX_Numbers for CAE Analysis
The item ID pattern is configured as **INPUTID".sim"N**.	The item ID is **000387.sim1**.
The name pattern is configured as **INPUTNAME".sim"N**.	The item name is **NX_Numers.sim1**.
The item description pattern is configured as **"Test Package for .sim - "N**.	The item description is **Test Package for .sim - 1**.

Example 3:

CAE package configuration for CAE Analysis	After the package is executed with input ID as 000387 and input item name as NX_Numbers for CAE Analysis
The item ID is not configured, that is, item ID pattern is empty.	The item ID is automatically generated by the system.
The item name pattern is configured as **INPUTNAME".sim"N**.	The item name is **NX_Numers.simN**.
The item description pattern is configured as **"Test Package for .sim - "N**.	The item name description is **Test Package for .sim - N**.

Example 4:

Item ID pattern configuration for CAE Geometry	Existing numbers in the database for the pattern N	Missing numbers in the database for the pattern N	Allocated numbering for the pattern N after the package is executed
INPUTID".i"N	1, 2, 3, 4, 5, 7, 9	6, 8	6, 8, 10, 11, and so on

For more information about keywords, see *Configure CAE packages* in *Simulation Process and Data Management on Rich Client — Usage*.

a. In the **Object** column of the **INPUTS** table, click the box you want to edit and click **Add** ⊕. Make the appropriate selection in the **Add** panel and choose the **Add** button.

b. (Optional) To remove the object, click **Remove** ✕.

4. Specify the output.

When you select an output object, the system resolves the preconfigured keywords and updates the property values of the output item.

a. To add properties, in the **OUTPUT** table, click **Add Properties**. The system selects the first row automatically and the table rows become non editable.

   The **Add Properties** panel is pinned automatically and remains open. You must specify or select the properties in the **Add Properties** panel.

b. To add an existing object for the output, click the box and click **Add**. Make the appropriate selection from the **Palette** or the **Search** tab in the **Add** panel and click the **Add** button.

   The system reuses existing objects while executing packages.

c. To edit another row, click the row without closing the **Add Properties** panel. Specify or select properties as appropriate.

   Repeat this step to edit other rows.

d. (Optional) To edit the **Name**, **Item ID**, or **Description** boxes directly, click the respective box and specify the appropriate values.

e. To clear all the boxes in the **OUTPUT** table, click **Clear All**.

5. (Optional) Specify a destination folder for the system to create the output objects. By default, it is **Newstuff**.

   You can also specify a subfolder under the destination folder for the system to create the output objects.

   The system remembers the destination folder value when you execute a CAE package subsequently.

6. To enable the creation of logs, select **Persist Log**.

   By default, logs are disabled.

7. To create the package, click **Execute**.

   You can execute, for example, a predefined CAE package to create analysis revisions and boundary condition revisions with the **CAE Extract** relation.

8. To view the related revisions and the relations created by the CAE package, navigate to the output folder, open the analysis revision, and click the **Overview** tab.

   If you have executed a predefined CAE package to create analysis revisions and boundary condition revisions with relations, the system displays the **CAE Extract** relation with the boundary condition revisions for the analysis revision.

9. Open the package log file from the destination folder specified in **step 5**.

   The log contains details of the existing output objects and details of the subfolder, if specified.

12. Specify key performance indicator (KPI) values for analysis revisions

Why specify KPI values?

As a simulation analyst, you can specify key performance indicator (KPI) values such as maximum stress, minimum temperature, or maximum displacement *manually* in an analysis revision or an analysis template. Alternatively, you can update the KPI values *automatically* using a preconfigured simulation tool.

After the KPI values are specified manually or updated automatically, the simulation administrator can monitor these values on the **simulation dashboard by using queries**.

Specify KPI values manually

You can specify KPI values *manually* in an analysis revision or an analysis template. If you specify the values in an analysis template, you can associate the template to an analysis revision.

1. Open an analysis revision or analysis template and click the **KPI** tab.
2. Choose **More Commands** > **Edit** > **Start Edit**.
3. Click **Add**.
4. In the **KPI** table, specify values as appropriate.
5. (Optional) To add another table row, click **Add** and specify the values.
6. Choose **More Commands** > **Edit** > **Save Edits**.

Update KPI values automatically using a preconfigured simulation tool

The following procedure assumes that the simulation administrator has set up the sample configurations by running the **tcsim_quick_setup.pl** script and that the default **Extract KPI from Result** tool is available.

After you launch the preconfigured simulation tool, the system exports the results files, an attribute XML file containing the KPI table attributes, the launch script, and the NX Open utility to the staging directory. The system creates the *KPITemplateFile* subdirectory to which it exports the template XML file. It then calls the launch script, which internally calls the NX Open utility with the path to the results file, the path to the template XML file and the path to the output directory path as arguments. The NX Open utility extracts the required KPI values from the results file based on the template XML file and generates the

output KPI text file. The system updates the KPI table in the attribute XML file and populates the KPI table of the analysis revision.

The preconfigured simulation tool is supported on **launch methods** such as local, remote, and server.

1. Open a **CAE 3D Analysis** item revision containing results files and click the **Overview** tab.
2. (**Analyst** workspace) Choose **Open in Simulation Tool**.

   (Default workspace) Choose **Open** > **Open in Simulation Tool**.
3. Select **Extract KPI from Result**.
4. (Optional) Specify the **Default Scratch Location**.
5. (Optional) Choose a template by searching for the item revision that contains the template.

   By default, the system displays the **KPI/A;1-Thermal-Template** template. This contains a sample thermal template XML file dataset. This template file provides the names of the KPI values that are associated with the results files.
6. (Optional) Select the **Launch without configured input** check box to run the tool without any predefined inputs.
7. Resolve file upload conflict options by selecting one of the following options:

   - **Prompt User** if you want the system to displays the conflicts in the **Pending User Action** tab of the **Simulation Tool Progress Monitor**.
   - **Auto Process** if you do want the system to display the conflicts. If you select this option, select:

Option	Description
Upload File/Update URL	The system uploads the output files and creates new versions of existing files with the same name. This is the default option.
Rename and Upload/ Rename and Create URL	The system automatically renames the output files with a suffix, if similar filenames exist, and uploads them to the database.
Skip	The system avoids uploading the output files, if similar files exist in the database.

8. Select the **Display Progress Monitor on Launch** option to open the **Simulation Tool Progress Monitor** in a separate tab of the browser.
9. To launch the tool, click **Open**.

Monitor the tool launch in the **Simulation Tool Progress Monitor** and verify if the tool launch completed successfully.

10. (Optional) Browse to the **KPITemplateFile** directory created by the system in the **Default Scratch Location** path. The system exports the template XML file to this directory.

11. (Optional) Browse to the **Default Scratch Location** path and open the output KPI text file. The name of the output text file is based on the name of the result file attached to the analysis revision. For example, if the result fie name is **result.op2**, the output text file is named as **result.op2.txt**.

    This directory also contains the **Extract_KPI_from_Results.pl** launch script and the **TC4SIM_KPI_EXTRACTOR.zip** compressed file that contains the NX Open utility. The compressed file contains a **help** folder that includes tutorials, examples and a PDF document explaining the functionality of NX Open Utility and instructions on how to add new or to edit existing KPI quantities. These are the default files that are available with the preconfigured KPI extraction tool.

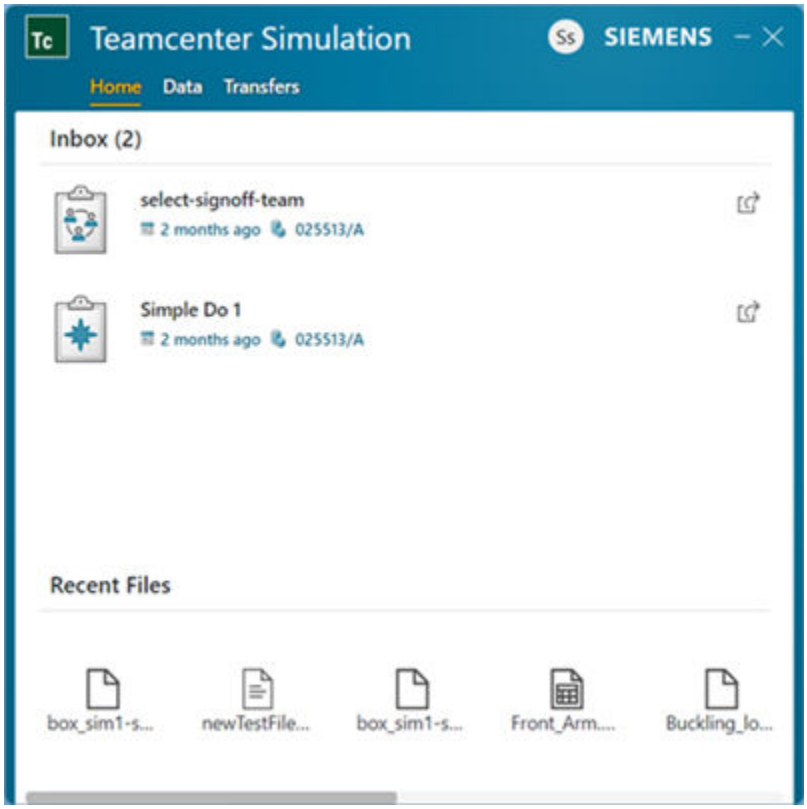
12. Open the analysis revision and click the **KPI** tab. Verify if the **KPI table** is automatically populated.

13. Using the Teamcenter Simulation desktop application

Why use the desktop application?

Not all simulation analysts are familiar with Teamcenter, and they need a simple application to perform daily activities such as reviewing tasks and uploading and downloading files. The Teamcenter® Simulation Software is a desktop application that allows simulation analysts to perform these activities. This desktop application is available on the Windows and Linux operating systems.

As a simulation analyst, you can download this desktop application to your desktop and provide the necessary connection details to connect to the Teamcenter server at your site. After logging on to the desktop application, you can access the **Home** tab to view the tasks listed in the **Inbox** and the latest files you have worked on in **Recent Files**.



Download, install, and specify the connection settings for the desktop application

As a simulation analyst, you can download and install the Teamcenter® Simulation software desktop application to perform daily activities such as reviewing tasks and uploading and downloading files.

After you download the desktop application, you can install the desktop application and specify the settings to connect to Teamcenter.

Procedure

1. Download the **Teamcenter® Simulation Software** from the following location:

   Support Center > **Downloads** > **Additional Downloads**

   You can download the desktop application with the following file extensions as appropriate:

   - **.exe** file extension is an executable that runs on the Windows operating system.
   - **.rpm** file extension is a Red Hat Package Manager that runs on the Red Hat Linux operating system.
   - **.deb** file extension is a Debian software file package that runs on UNIX operating systems such as Ubuntu.

2. Run the executable to start the installation and select the appropriate options to proceed with the installation.

   The user who runs this executable should have read/write access to the installation directory.

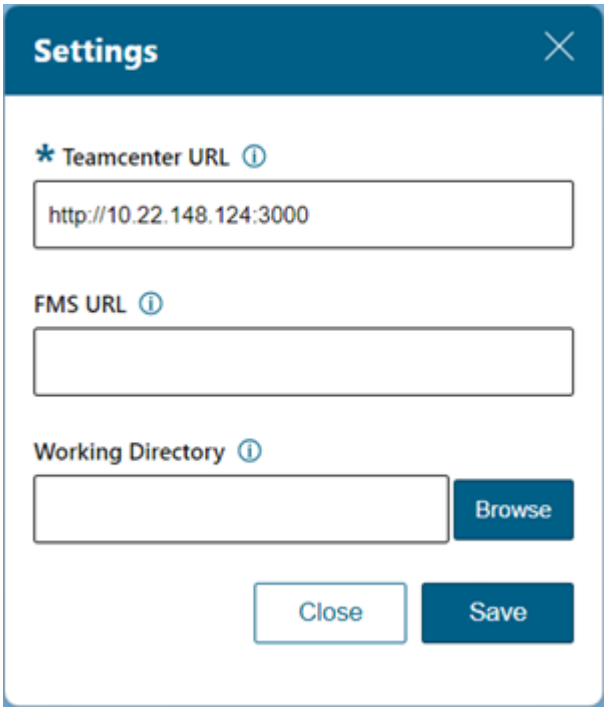
3. After downloading and installing the desktop application, you can run the desktop application to specify the settings to connect to Teamcenter. This is a one-time activity.

   > Note:
   >
   > Contact the system administrator at your site for information about the Active Workspace URL and the FMS URL. The FMS URL information is optional.

   a. (Mandatory) In the **Active Workspace URL** box, specify the URL to the Active Workspace server.

      Example: **10.22.148.88:3000**

      In the above example, the Active Workspace URL is followed by **3000**, which is the default port number. This is the port on which the Gateway Service runs.



b. (Optional) In the **FMS URL** box, specify the URL of the File Management Systems (FMS) master.

   Example: **10.22.148.88:4544**

   In the above example, **4544** is the default port number specified in the **Fms_Bootstrap_Urls** site preference.

c. (Optional) Browse to the location you want to specify as the working directory.

4. (Optional) Use a different file upload rule.

   a. Log out of the desktop application.

   b. Open the **\AppData\Local\Programs\Teamcenter Simulation\settings.json** file and clear the **consolidatedFileUploadRuleSetId** parameter.

```
{
  "activeWorkspaceUrl": "http://10.22.148.124:3000",
  "fmsUrl": "http://vc6s015:4544",
  "workingDirectory": "",
  "consolidatedFileUploadRuleSetId": ""
}
```

> Note:
>
> If the **consolidatedFileUploadRuleSetId** parameter is not available, the system automatically populates this field using a predefined rule for uploading the data for default objects.

c. Replace the **\AppData\Local\Programs\Teamcenter Simulation\CAE_File_Upload_Rule_config.xml** file with a new XML file containing the file upload rules.

> Note:
>
> Contact the simulation administrator at your site for the XML file containing the file upload rules.

d. Log on to the desktop application and upload the required files.

When you close the Simulation desktop application without logging out, it continues to run in the system tray for the Windows operating system. However, this does not apply for the Linux operating system.

Working with the desktop application

As a simulation analyst, you can use the Teamcenter® Simulation software desktop application to perform daily activities such as reviewing tasks and uploading and downloading files.

Procedure

1. View assigned tasks and the recent files you have worked on.

   a. To view tasks assigned to you, click the **Home**. Hover over the appropriate task and click **Open** to view the task in a window embedded with Active Workspace user interface. The simulation analyst can complete the required task in the **Overview** tab of the embedded viewer.

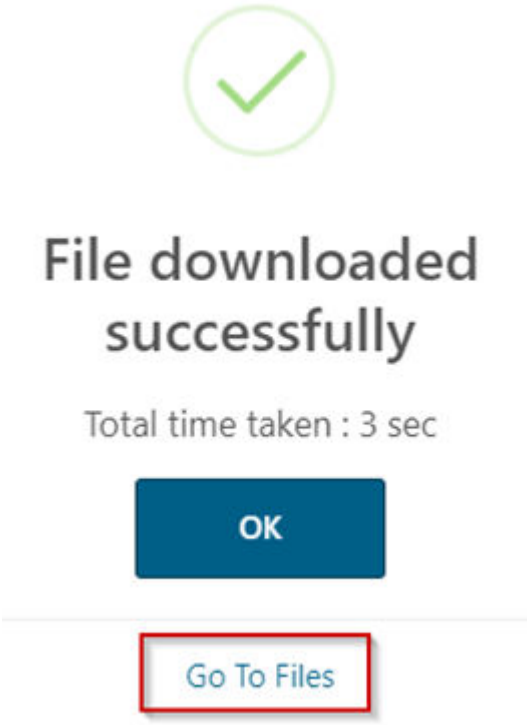
   b. To view the recent files you have worked on, click the **Home** tab. Hover over the appropriate file and click **Open** to view the selected file in a window embedded with Active Workspace user interface. The simulation analyst can complete the required task in the **Files** tab of the embedded viewer.

2. Download files.

   a. To download files, click the **Data** tab.

   b. To download multiple files, press CTRL on your keyboard, select multiple files, and click **Download All**.

c. To navigate quickly to the location where the file was downloaded, click the **Go to Files** hyperlink.



3. Upload files.

> Note:
>
> Downloads and uploads can occur simultaneously. The progress monitor displays both.

a. To upload files, click the **Transfers** tab.

b. Drag and drop the files you want to upload.

When you drag and drop files to upload, you do not have to know the name of the file upload rule. The system recommends the appropriate domain, internally evaluates the domain, selects the correct upload rule, and uploads the file.

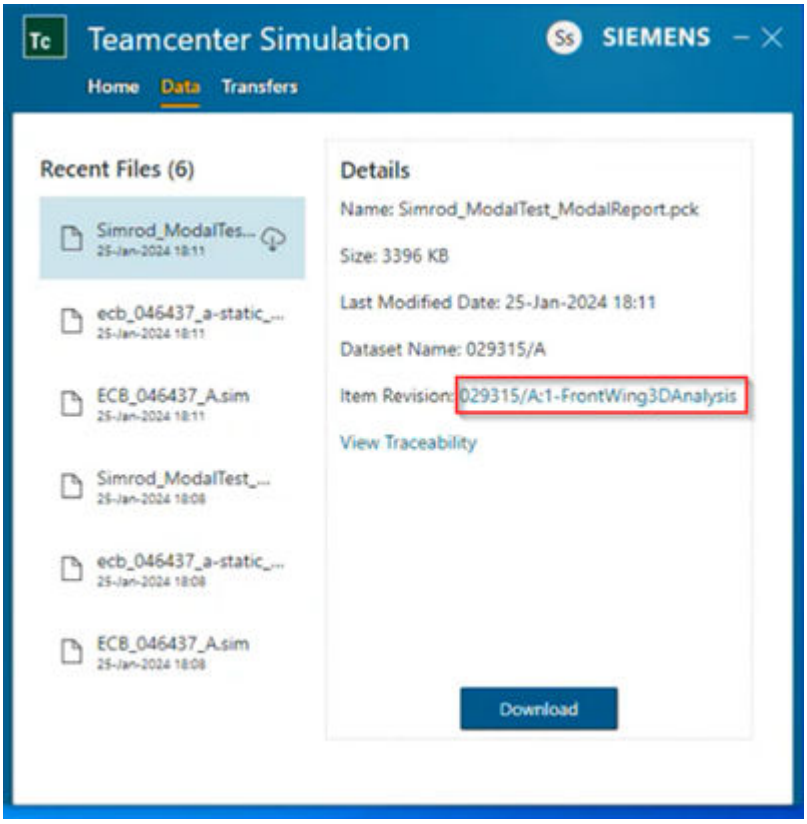
CAE object and their subclasses are categorized into a specific simulation domain and based on the upload rules and the files being uploaded, the system automatically selects the best domain. You can override the domain. The system shows only the CAE objects that are under the specified simulation domain when you upload files.

Domain name	Objects that can be uploaded to this domain
3D simulation	**CAE 3D Analysis**, **CAE 3D Model**, **CAE 3D Result**, **CAE Boundary Condition**, **CAE Product Collector**, **CAE Notebook**. **CAE Notebook Run**, **CAE Analysis Template**, **CAE Result Template**, and all subclasses of these objects.
Multidisciplinary design analysis and optimization	**CAE MDAO Analysis**, **CAE MDAO Template**, and all subclasses of these objects.
Physical testing	**CAE Physical Test Result Template**, **CAE Physical Test Result**, and all subclasses of these objects.
Systems simulation	**CAE 1D Analysis**, **CAE 1D Model**, and all subclasses of these objects.

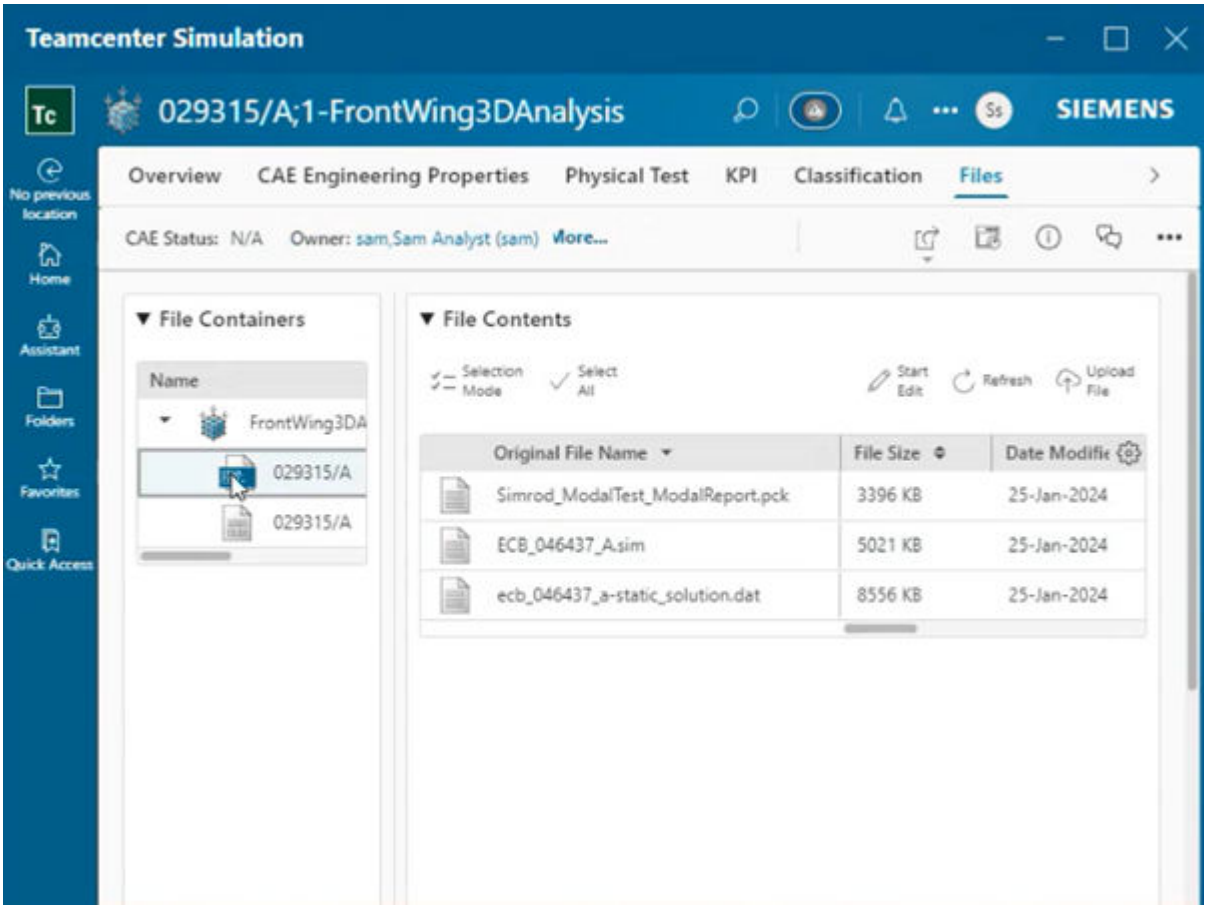
c. Select the target object recommended by the system. If it is not available, click the **New** button to create a new target object.

d. Click **Upload** to upload the files.

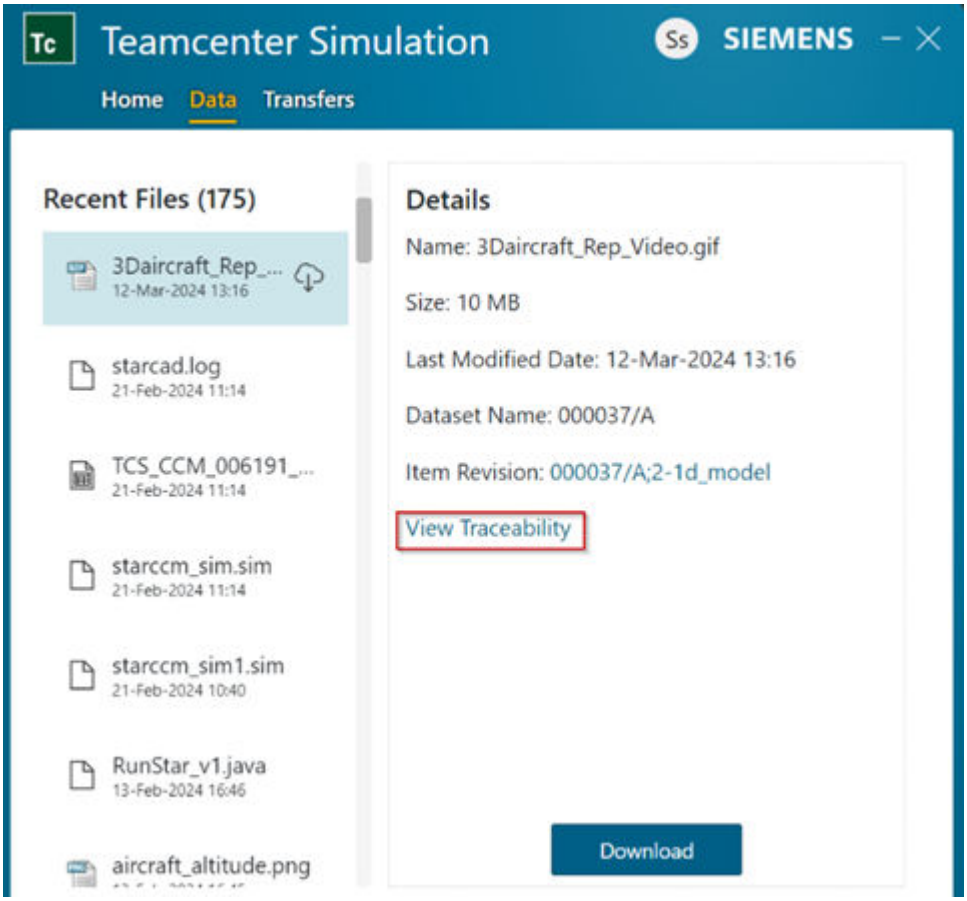
e. (Optional) To verify if the files have been uploaded correctly, select the **Data** tab, select the recent file you have uploaded, and click the **Item Revision** link.



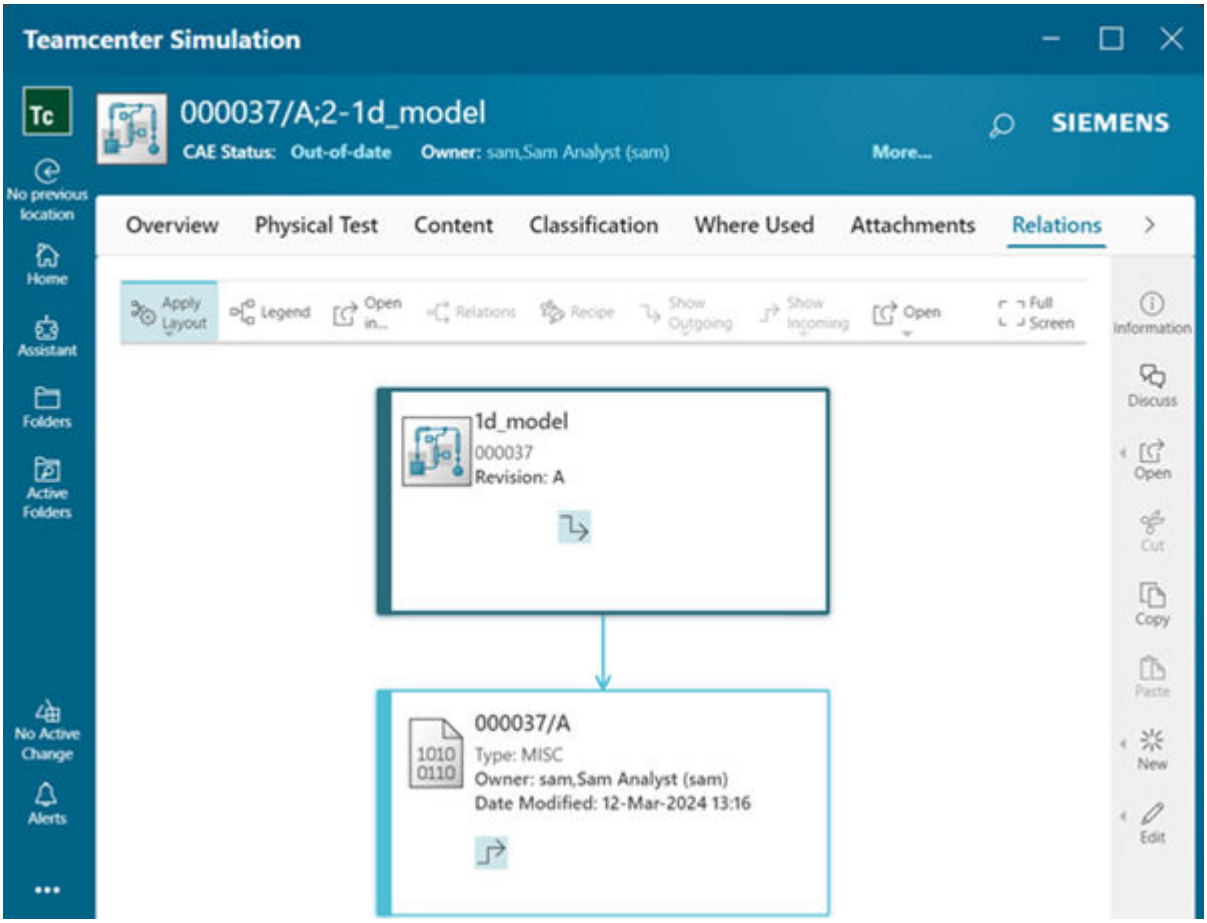
The system displays the embedded viewer with the Active Workspace user interface. You can view the uploaded files under the appropriate object created in **step c**.



f. (Optional) To verify if the object has any related objects, click the **View Traceability** link.



The system displays the embedded viewer with the Active Workspace user interface. You can view the related data to the appropriate object created in **step f**.



4. To view **AppData** and log files, browse to the respective directory depending on the operating system:

   - **Windows**: **%APPDATA%\teamcenter-simulation-app**
   - **Linux**: **$HOME/.config/teamcenter-simulation-app**

14. Launch simulation tools

Launch simulation tools

Simulation Process and Data Management provides a framework for configuring and launching simulation tools that include preprocessors, solvers, postprocessors, and other tools. You can launch simulation tools as a local launch, local detached launch, remote launch, or server launch, depending on how the administrator configures the launch parameters at your site.

Remote launch is used for compute-intensive operations, such as meshing, solve execution, and postprocessing. Such operations do not require interactive user input and can be executed as a batch process on remote machines with load balancing capability and the ability to monitor and administer request queues.

In some cases, instead of storing large result files in the database, organizations prefer storing the generated result files on shared network folders. In such cases, the simulation administrator configures output rules to create web link definitions to shared network folders and input rules to read the web link definitions. As a simulation analyst, you can run predefined simulation tools with web link definitions, and the system creates the web links for file extensions that match the configured input and output rules. The web link definitions are supported on local, remote, server, and workflow launch processes. For intermediate and final import, web links are supported only for the local launch.

The default tool launch page might be customized at your site.

For more information, see *About customizing the tool launch page* in *Simulation Process and Data Management — Deployment and Administration*.

One of the following launch methods might be available by default at your site if the simulation administrator has selected it while configuring the simulation tools.

Launch method	Description
Local Launch	Launches simulation tools in Active Workspace. The Teamcenter Tool Launch Client or Data Share Manager must be installed and configured to enable **Local Launch**.
Remote Launch	Launches simulation tools on a different machine. This machine does not have the Teamcenter server installed on it. However, it has simulation tools and Dispatcher components installed and configured to allow a remote launch of simulation tools. This type of launch is ideal for compute-intensive operations, such as meshing, solve execution, and post processing. Such operations do not require interactive user input. You can execute them as a batch process on remote machines with load-balancing capabilities and can monitor and administer request queues.

Launch method	Description
	Teamcenter Dispatcher must be installed and configured to use **Remote Launch**.
Server Launch	Launches simulation tools on the Teamcenter server.

If your simulation administrator has enabled the **Show Launch Simulation Tool Dialog** option while configuring the simulation tool, the system opens a new browser tab with **Launch Inputs** and **Help** tabs. The **Launch Inputs** tab contains all the necessary launch information while the **Help** tab displays the tool description and the help document for the specific tool. The options available in the **Launch Inputs** tab depend on how the simulation administrator has configured the tool at your site.

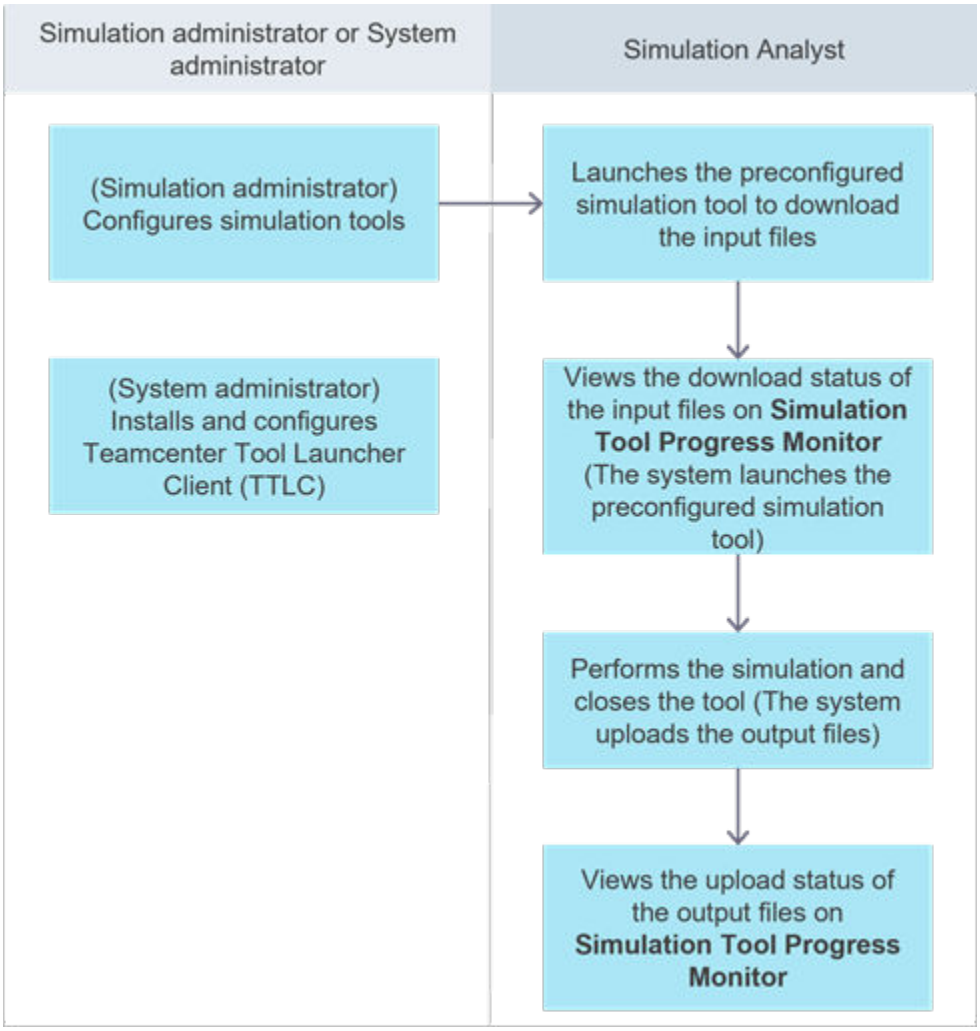
If the simulation administrator has set the maximum file size for a simulation tool and a simulation analyst launches this tool, the system imports the file bigger than the maximum file size as an URL.

Launch simulation tools locally using TTLC

The simulation analyst can launch simulation tools using Teamcenter Tool Launcher Client (TTLC) only if the simulation administrator has configured simulation tools using the **Local Launch** option. TTLC is not required for launch methods such as **Remote Launch** and **Server Launch**.

For information about installing this tool, see Install TTLC for Active Workspace.

The process flow is as follows:



Only **Local Launch** is supported using TTLC.

1. (**Analyst** workspace) Select a CAE item revision and choose **Open in Simulation Tool**.

   (Default workspace) Select a CAE item revision and choose **Open** > **Open in Simulation Tool**.

2. To select the launch method, choose **Local Launch**.

   This option might be available by default if the simulation administrator has selected it while configuring the simulation tools.

3. (Optional) Overwrite the **Default Scratch Location** with a location of your choice. This is the location specified by the simulation administrator in the **Options** dialog box in CAE Manager.

   The tool launch framework uses the default scratch location as the location to store all the input and output files. However, if the user staging location is configured in CAE Manager, the tool launch uses the staging location as the location for all input and output files for the **Local Launch** and **Server Launch** options.

4. (Optional) To run the tool without any predefined inputs, select the **Launch without configured input** check box.

5. To open the **Simulation Tool Progress Monitor** in a separate tab of the browser, select the **Display Progress Monitor on Launch** check box.

6. Specify optional inputs.

   While configuring simulation tools, the simulation administrator cannot practically link all the optional inputs to the primary input item revision and predefine the traversal path for all those inputs that you, as a simulation analyst, want to export in the tool configuration. For example, in addition to the result files (primary input), you may want to select result templates (optional inputs) and send them to a postprocessor. The result templates are not linked to the analysis item revision that holds the result file. In such cases, the simulation administrator configures optional inputs to allow you to select additional inputs such as result templates. During the tool launch process, you can select the desired item revision for each available optional inputs and use these templates, for example, to export only specific types of results.

7. Resolve file upload and URL create conflict options.

   a. Select **Auto Process** and choose one of the following options:

      - **Upload File/Update URL** for the system to upload output files or update URLs. In the case of files, the system creates new versions of existing files with the same name. This is the default option.

      - **Rename and Upload File/Rename and Create URL** for the system to rename and upload the file or rename and create URLs. In the case of files, the system renames the output files with a name provided by the user if similar filenames exist. It then uploads them to the database. In the case of URLs, the system generates a new name for the URL and it cannot be edited.

      - **Skip** to avoid uploading the output files or creating new URLs, if similar files or URLs with the same name exist in the database.

      OR

   b. Select **Prompt User**.

      The system provides options to control each file or URL that is uploaded or updated, respectively. In case there are conflicts, the system displays the **Pending User Action** tab in the **Simulation Tool Progress Monitor**. The options in the **Action** column are similar to the ones available for **Auto Process**. If you select the **Rename and Upload File/Rename and Create URL** option, you can provide a new name for the URL.

8. Resolve file download conflict options.

The download conflict options are available only if the simulation administrator has enabled the **Use Staging Directory** option while configuring simulation tools.

a. Select **Auto Process** and choose one of the following options:

- **Skip** to avoid uploading the output files to the **User Staging** directory, if similar files with the same names exist in the directory.
- **Overwrite** to overwrite to overwrite the existing files in the **User Staging** directory.

OR

b. Select **Prompt User**.

The system displays the **Select Potential File Conflict Resolution** dialog box to control each file that is exported with input rules. In the **Actions** column, you can select the same options as those selected in **Auto Process**.

9. To launch the tool, click **Open**.

10. To view the status of your upload or download, access the **Simulation Tool Progress Monitor**.

The system sets the status as **Uploading** or **Downloading** as appropriate.

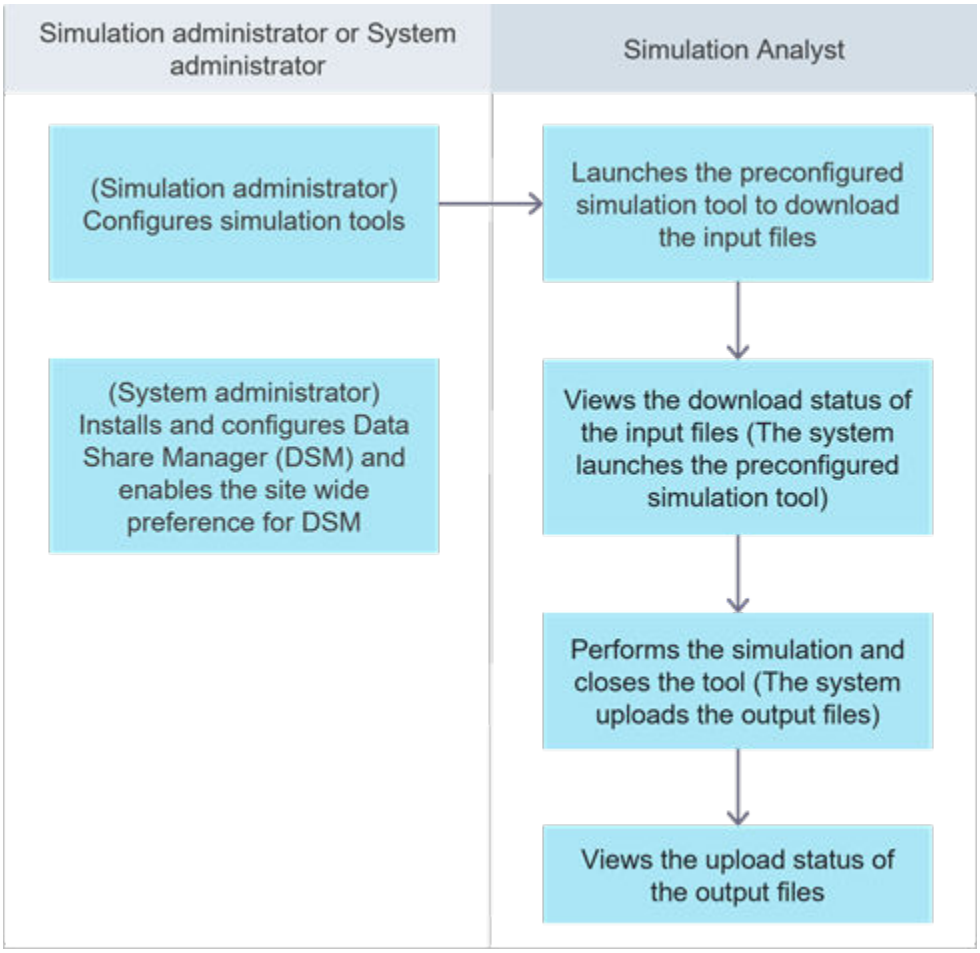
Launch simulation tools locally using DSM

The Teamcenter Data Share Manager (DSM) application provides a way for you to upload and download large data files without interrupting your work.

> Note:
>
> You (or your administrator) must install Data Share Manager on your machine and you must have a valid license key. Find Data Share Manager installation and detailed user instructions in *System Administration→File Management System* in the Teamcenter documentation.
>
> The administrator must also set the **Use_DataShare_Manager** site preference to **true** on the server. Doing so activates Data Share Manager for file uploading and downloading.

> Tip:
>
> If users prefer to the synchronous import and export mechanism for file upload and download instead of using Data Share Manager, they can set the **Use_DataShare_Manager** preference to **false** with a **User** protection scope.

The process flow is as follows:



Only **Local Launch** is supported using Data Share Manager.

1. Select Data Share Manager user session values:

   a. Click your user profile on the home page and click **Manage Profile**.

   b. Under **Data Share Manager**, make sure that **Data Share Manager is installed on this device** and **Use Data Share Manager on this device** check boxes are selected.

   > Note:
   >
   > These values remain selected until you clear your browser cache or change browser applications. If you clear your cache or switch to a different browser, you must select these values again before using the Data Share Manager.

2. (**Analyst** workspace) Select a CAE item revision and choose **Open in Simulation Tool**.

   (Default workspace) Select a CAE item revision and choose **Open** > **Open in Simulation Tool**.

3. To select the launch method, choose **Local Launch**.

   This option might be available by default if the simulation administrator has selected it while configuring the simulation tools.

4. (Optional) Overwrite the **Default Scratch Location** with a location of your choice. This is the location specified by the simulation administrator in the **Options** dialog box in CAE Manager.

   The tool launch framework uses the default scratch location as the location to store all the input and output files. However, if the user staging location is configured in CAE Manager, the tool launch uses the staging location as the location for all input and output files for the **Local Launch** and **Server Launch** options.

5. (Optional) To run the tool without any predefined inputs, select the **Launch without configured input** check box.

6. To open the **Simulation Tool Progress Monitor** in a separate tab of the browser, select the **Display Progress Monitor on Launch** check box.

7. Specify optional inputs.

   While configuring simulation tools, the simulation administrator cannot practically link all the optional inputs to the primary input item revision and predefine the traversal path for all those inputs that you, as a simulation analyst, want to export in the tool configuration. For example, in addition to the result files (primary input), you may want to select result templates (optional inputs) and send them to a postprocessor. The result templates are not linked to the analysis item revision that holds the result file. In such cases, the simulation administrator configures optional inputs to allow you to select additional inputs such as result templates. During the tool launch process, you can select the desired item revision for each available optional inputs and use these templates, for example, to export only specific types of results.

8. Resolve file upload and URL create conflict options.

   a. Select **Auto Process** and choose one of the following options:

      - **Upload File/Update URL** for the system to upload output files or update URLs. In the case of files, the system creates new versions of existing files with the same name. This is the default option.

      - **Rename and Upload File/Rename and Create URL** for the system to rename and upload the file or rename and create URLs. In the case of files, the system renames the output files with a name provided by the user if similar filenames exist. It then uploads them to the database. In the case of URLs, the system generates a new name for the URL and it cannot be edited.

      - **Skip** to avoid uploading the output files or creating new URLs, if similar files or URLs with the same name exist in the database.

OR

b. Select **Prompt User**.

The system provides options to control each file or URL that is uploaded or updated, respectively. In case there are conflicts, the system displays the **Pending User Action** tab in the **Simulation Tool Progress Monitor**. The options in the **Action** column are similar to the ones available for **Auto Process**. If you select the **Rename and Upload File/Rename and Create URL** option, you can provide a new name for the URL.

9. Resolve file download conflict options.

The download conflict options are available only if the simulation administrator has enabled the **Use Staging Directory** options while configuring simulation tools.

a. Select **Auto Process** and choose one of the following options:

- **Skip** to avoid uploading the output files to the **User Staging** directory, if similar files with the same names exist in the directory.
- **Overwrite** to overwrite to overwrite the existing files in the **User Staging** directory.

OR

b. Select **Prompt User**.

The system displays the **Select Potential File Conflict Resolution** dialog box to control each file that is exported with input rules. In the **Actions** column, you can select the same options as those selected in **Auto Process**.

10. To launch the tool, click **Open**.

11. View the status of your download.

> Caution:
>
> Do not cancel the transfer of a simulation output file in Data Share Manager. The tool launch framework currently cannot handle this action.

a. To view the status, access the **Simulation Tool Progress Monitor**.

The system sets the status as **Downloading**.

b. Click the system tray of your computer, open Data Share Manager, and monitor the status of your download.

12. View the status of your upload.

    a. To view the status, access the **Simulation Tool Progress Monitor**.

       The system sets the status as **Uploading**.

    b. Click the system tray of your computer, open Data Share Manager, and monitor the status of your upload.

Launch simulation tools using the Server or Remote method

While configuring simulation tools, the simulation administrator configures the **Default Scratch Location**, **Default User Staging Location**, and the **Default Shared Staging Location** options.

- For the **Server** or **Remote** launch method, the system does not display the **Default Scratch Location** option. Moreover, the **User Staging Directory** is not displayed if the simulation administrator has enabled the **Use Staging Directory** option while configuring simulation tools in the **Simulation Tool Configuration** view.

- For the **Server** launch method, the system considers the directory specified in **Default Scratch Location** configured in the **Simulation Tool Configuration** view. If the above directory is not configured, it uses the system *TEMP* directory. The values set for the UNIX or Windows preference in the **Default Scratch Location** in the **Edit→Options→CAE→Simulation Tools** are also not considered.

- For the **Remote** launch method, it uses the system *TEMP* directory. It does *not* consider the directory specified in **Default Scratch Location** configured in the **Simulation Tool Configuration** view. The values set for the UNIX or Windows preference in the **Default Scratch Location** in the **Edit→Options→CAE→Simulation Tools** are also not considered.

- The administrator also configures the **Folder Naming Pattern**. The system uses a combination of the *TEMP* directory and the folder naming pattern for these launch methods. The *TEMP* directory depends on how the **TC_TMP_DIR** environment variable is set at your site. This variable specifies where the utilities should create temporary files. This value is typically **C:\Temp** on Windows and **/tmp** on Linux.

  If the **TC_TMP_DIR** environment variable is not set at your site, the location is set by the *TEMP* environment variable on your local system.

1. (**Analyst** workspace) Select a CAE item revision and choose **Open in Simulation Tool**.

   (Default workspace) Select a CAE item revision and choose **Open** > **Open in Simulation Tool**.

2. To select the launch method, choose **Server Launch** or **Remote Launch**.

   One of these options might be available by default if the simulation administrator has selected it while configuring the simulation tools.

3. (Optional) To run the tool without any predefined inputs, select the **Launch without configured input** check box.

4. To open the **Simulation Tool Progress Monitor** in a separate tab of the browser, select the **Display Progress Monitor on Launch** check box.

5. Specify optional inputs.

   While configuring simulation tools, the simulation administrator cannot practically link all the optional inputs to the primary input item revision and predefine the traversal path for all those inputs that you, as a simulation analyst, want to export in the tool configuration. For example, in addition to the result files (primary input), you may want to select result templates (optional inputs) and send them to a postprocessor. The result templates are not linked to the analysis item revision that holds the result file. In such cases, the simulation administrator configures optional inputs to allow you to select additional inputs such as result templates. During the tool launch process, you can select the desired item revision for each available optional inputs and use these templates, for example, to export only specific types of results.

6. Resolve file upload and URL create conflict options.

   a. Select **Auto Process** and choose one of the following options:

      - **Upload File/Update URL** for the system to upload output files or update URLs. In the case of files, the system creates new versions of existing files with the same name. This is the default option.

      - **Rename and Upload File/Rename and Create URL** for the system to rename and upload the file or rename and create URLs. In the case of files, the system renames the output files with a name provided by the user if similar filenames exist. It then uploads them to the database. In the case of URLs, the system generates a new name for the URL and it cannot be edited.

      - **Skip** to avoid uploading the output files or creating new URLs, if similar files or URLs with the same name exist in the database.

      OR

   b. Select **Prompt User**.

      The system provides options to control each file or URL that is uploaded or updated, respectively. In case there are conflicts, the system displays the **Pending User Action** tab in the **Simulation Tool Progress Monitor**. The options in the **Action** column are similar to the ones available for **Auto Process**. If you select the **Rename and Upload File/Rename and Create URL** option, you can provide a new name for the URL.

7. Resolve file download conflict options.

The download conflict options are available only if the simulation administrator has enabled the **Use Staging Directory** options while configuring simulation tools. This is not applicable for **Remote** launch.

a. Select **Auto Process** and choose one of the following options:

- **Skip** to avoid uploading the output files to the **User Staging** directory, if similar files with the same names exist in the directory.
- **Overwrite** to overwrite to overwrite the existing files in the **User Staging** directory.

OR

b. Select **Prompt User**.

The system displays the **Select Potential File Conflict Resolution** dialog box to control each file that is exported with input rules. In the **Actions** column, you can select the same options as those selected in **Auto Process**.

8. To launch the tool, click **Open**.

9. To view the status of your upload or download, access the **Simulation Tool Progress Monitor**.

The system sets the status as **Uploading** or **Downloading** as appropriate.

Perform an intermediate import

Simulations, such as design optimization, are compute-intensive and time consuming. You can use the intermediate import option to view the intermediate results generated by simulation tools.

Prerequisites

The following procedure assumes that a tool launch has been started successfully.

Procedure

1. Access the **Simulation Tool Progress Monitor** to view the status.

The system invokes the launch script and generates the intermediate outputs to the **Scratch** or the **Staging directory** while the tool is running.

2. Select an in-progress job and select the **Intermediate Import** command.

3. Access the **Simulation Tool Progress Monitor** to view the status.

The system sets the status as **Intermediate Uploading**.

After the intermediate import is complete, the system changes the status to **In-progress**.

Monitor simulation tools

You can open the **Simulation Tool Progress Monitor** in a separate tab of the browser to view the status of the simulation tools you have launched.

1. On the home page, click the **Tool Progress Monitor** tile.

2. (Optional) To arrange columns, click **Table Settings** > **Arrange** and make the appropriate selections to add or remove columns.

3. (Optional) To sort columns, click the column you want to sort and select an appropriate option.

4. Click the **Pending User Action** tab to verify if there is any unfinished action.

   The **Status** column shows **Conflict** or **Selective Data Import**.

   - **Conflict**: Select the appropriate file, or select all files from the list of files to import and overwrite existing files in the system.

   - **Selective Data Import**: Select the appropriate file or select all files from the list of files to import. This is applicable for **Local Launch** only.

   Click **Process** to import the files.

5. Click **All Jobs** to see the status of all simulation tools you have started. Similarly, you can click other tabs to see completed, failed, in progress, and terminated tools.

   The following are the status of jobs in various tabs of the **Simulation Tool Progress Monitor**:

Status	Description
Complete	The job is complete and successful.
Downloading	The system is exporting input files.
Duplicate	Another tool launch has been started on the same input object while an existing job is still in progress.
Failed	The job has failed.
In Progress	The job is being executed.
Initializing	The job is being initialized.
Intermediate Uploading	The system is importing the intermediate results.

Status	Description
Selective Import	Allows analysts to select the files to import to Teamcenter after successfully launching a simulation tool.
Terminated	The job is terminated by the user from the **Simulation Tool Progress Monitor**.
Upload conflict	During upload, if there are any conflicts that needs the user to perform a pending action, the system waits until the user resolves the conflicts and then proceeds to upload the files.
Uploading	The system is importing the final outputs after exiting the launch script successfully.
No output files found	(If output rules are defined) After the simulation tool execution is complete, the system checks for any matching output files. However, no output files are found.
No files uploaded or Web Links created	(If output rules are defined) After the simulation tool execution is complete, the system finds matching output files. However, they are not imported. This could be due to the following reasons: • **Selective Data Import** is enabled and the import process is canceled. • For resolving file upload and URL create conflict options, the **Prompt User** option is selected and the import is skipped. • For resolving file upload and URL create conflict options, the **Auto-Process** and the **Skip** options are selected. • **Import only Modified files** is selected but no output files are modified. This information is also displayed in the **simulation_process_launch.log** file.
Processing	After files are imported into the database, the system performs a final verification and cleanup before moving the status to its final status.

6. (Optional) To stop a job that is in progress, select the job, and click **Terminate**.

   This command terminates Teamcenter from monitoring the launch script and returning any output back. However, it does not terminate the processes started by the launch script.

7. (Optional) To clear a specific job, select the job, and click **Clear Job**.

   To clear all jobs, select **Clear All**.

8. (Optional) To refresh the progress monitor, click **Refresh**.

Launch and monitor simulation tools configured for HPC

As a simulation analyst, you can launch and monitor simulation tools configured for high-performance computing (HPC).

Prerequisites

The following procedure assumes that an administrative user with DBA privileges has created HPC connections and profiles. Additionally, the simulation administrator has configured the required simulation tools and assigned the HPC configuration for them.

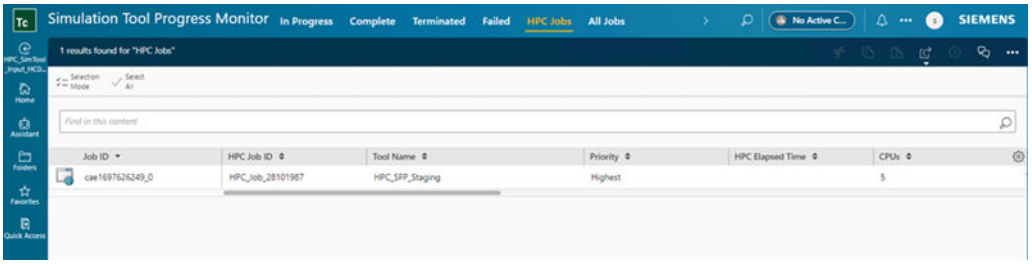
Procedure

1. In the **analyst workspace**, select a **CAE 3D Analysis** revision, choose **Open in Simulation Tool**, and select the configured Nastran simulation tool with HPC configuration.

2. Select the launch method as **Server Launch**, specify the appropriate options, and choose **Open**.

   A **tcsimxml** file is generated and downloaded on the client machine. When you open this file, the system executes the launch script on the client machine. The launch script authenticates the HPC machine and submits the HPC job successfully on the HPC machine.

3. To view the simulation job status, open the **Simulation Tool Progress Monitor** in a separate tab of the browser and choose the **HPC Jobs** tab.



4. (Optional) To refresh simulation jobs, choose another tab and select the **HPC Jobs** tab.

5. (Optional) Resume a simulation job.

   After launching a simulation job, you can shut down the client machine if the simulation is going to take a long time. When you shut down the client machine, the system puts the simulation job in **In Progress** state. You can restart the client machine and resume the job.

   To do so:

a. On the client machine, start Active Workspace, open the **Simulation Tool Progress Monitor** in a separate tab of the browser, and choose the **HPC Jobs** tab.

b. Select the job that is **In Progress** and choose **Resume**.

A **tcsimxml** file is generated and downloaded on the client machine. When you open this file, the system first checks the status of HPC job with the interval value (in minutes) specified in the **CAE_background_updater_hpc_job_interval** preference.

If the HPC job is completed successfully on the HPC machine, the output files are imported back to Teamcenter based on the configured output rules. The system then marks the simulation job status as **Completed**.

c. To view the changed status of the job, choose the **HPC Jobs** tab and check the value in the **Status** column.

6. (Optional) To end a simulation job, select it and click **Terminate**.

Automatically clear simulation jobs using preferences

You can set the following user preferences to automatically clear simulation jobs when a simulation analyst uses simulation tools:

- **CAE_Jobs_Clear_After_Size**
- **CAE_Jobs_Clear_Batch_Size**

These user preferences work together and you must set both of them. The default values are **500** and **100**, respectively.

> Example:
>
> Set the **CAE_Jobs_Clear_After_Size** and the **CAE_Jobs_Clear_Batch_Size** preference value as **50** and **10**, respectively. After you set these preferences, the number of simulation jobs does not exceed the sum of these preference values. Therefore, when you launch the 61st job, the system clears the first 10 jobs in chronological order and they remain at 51 after the tool launch is complete.

The **Simulation Tool Progress Monitor** displays the status of all tools. To view fewer jobs in the **Simulation Tool Progress Monitor**, set lower values for these preferences. However, this impacts the tool launch performance as the system has to clear jobs based on the values you have specified.

Create folders in the context of CAE workspace objects to manage your simulation data

You can create a folder structure in the context of CAE workspace objects such as geometry, model, analysis, and result revision to better manage your simulation data.

You can create an unlimited number of **CAE Folder** objects at various hierarchical levels and rename them. CAE folder names must be unique within the same level. However, CAE folders with the same name can exist at different hierarchical levels.

Prerequisites

The **Teamcenter Data Share Manager (DSM) application must be enabled** for uploading files after creating folders.

Procedure

1. On the **Home** page, click the **Create Simulation** tile and create a CAE workspace object such as geometry, model, analysis, or result revision.

2. Open the workspace object you created and click the **Files** tab.

3. To create a folder, click **Add CAE Folder**.

4. To create a subfolder, select the folder and click **Add CAE Folder**.

5. Upload files without preconfigured file upload rules.

    a. Click your user profile on the home page and choose **Manage Profile**.

    b. Under **Data Share Manager**, make sure that **Data Share Manager is installed on this device** and **Use Data Share Manager on this device** check boxes are selected.

    c. Select the folder to which you want to upload files and click **Upload File**.

    d. Specify the working directory where you want to upload the file, click **Choose File** to select the file you want to upload, and select **Upload**.

    e. To see the status of your upload, click the system tray of your computer and open Data Share Manager.

6. Copy and paste one or more folders.

    a. Select the folders you want to copy and click **Copy CAE Folder**.

b. Select another item revision in the **Tree** view or another folder within the same CAE folder.

c. Select **Paste CAE Folder**.

7. Cut and move folders.

a. Select the folders you want to move and click **Cut CAE Folder**.

b. Select another item revision in the **Tree** view or another folder within the same CAE folder.

c. Click **Paste CAE Folder**.

8. To delete a CAE folder, select the folder you want to delete and click **Delete CAE Folder**.

9. To delete uploaded files, select the appropriate folder, select the files you want to delete in the **File Contents** area, and click **Delete Files**.

10. To download files, select the appropriate folder, select the files you want to download in the **File Contents** area, and click **Download**.

Convert NX managed mode files to the native mode

As a simulation analyst, you can launch a preconfigured simulation tool to convert NX managed mode files to the native mode.

NX is used in managed mode at most sites to create and store CAD assemblies directly in Teamcenter. Subsequently, these designs are then imported into simulation tools so they can be modified or used as a starting point to run simulations. Since the assemblies are saved in NX managed mode, they cannot be directly imported into simulation tools unless the assembly is translated from managed to native.

Prerequisites

The following procedure assumes that the Teamcenter administrator has set the **CAE_Export_NX_Native_Files** preference to **true** to export the NX files to native mode and the simulation administrator has configured simulation tools to convert the (**.prt**, **.sim**, and **.fem**) managed files to the native mode.

Procedure

1. Ensure that the following environment variables are set on the client machine:

- **UGII_BASE_DIR** environment variable that points to the NX installation
- **FMS_HOME** environment variable that points to the FMS installation, for example, **FMS_HOME=***C:\apps\tc\tc14\TR\tccs*

- **UGII_UGMGR_COMMUNICATION=***HTTP*

- **UGII_UGMGR_HTTP_URL=***Tc_Server_Url/aiws/aiwebservice*, for example, **UGII_UGMGR_HTTP_URL=***http://vc6s004:7001/tc/aiws/aiwebservice*

2. Launch a simulation tool that has been configured for **.prt**, **.sim**, and **.fem** files.

   The system exports all the necessary files to the **Scratch** directory, invokes the **ug_clone** utility on the client machine, converts managed mode files to the native mode in the **Scratch** directory, and the simulation tool reads the native files.

   After the tool launch is complete and the tool is closed, the system moves the files back to Teamcenter.

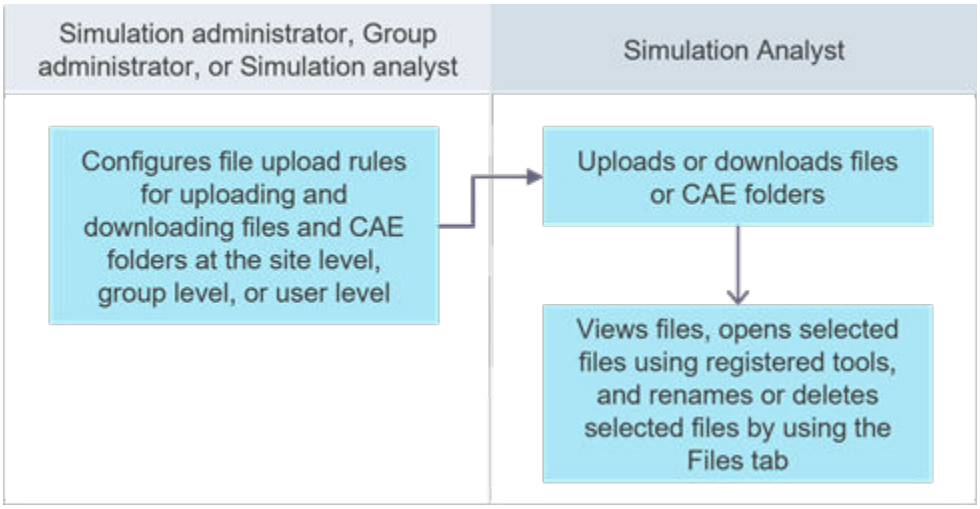
3. Launch other simulation tools to import the native mode files and continue the analysis work.

15. Run simulations on local desktops by downloading or uploading data periodically

About uploading and downloading files or CAE folders

At some sites, not all simulation tools are integrated with Teamcenter. Simulation analysts may prefer to run simulation tools on their local desktops and periodically upload and download the data to or from Teamcenter as needed. Analysts can upload or download files or CAE folders by using predefined file upload rules. Based on these rules, they can upload or download geometry files, mesh data, or analysis data to or from Teamcenter. After uploading or downloading files or CAE folders, they can view files, open selected files using registered tools, and rename or delete selected files in the **Files** tab.

The process flow is as follows:



As a simulation analyst, you can:

- **Upload or download files using predefined rules (without Data Share Manager)**.

  Usually, the browser upload size limit is 2 GB and files bigger than or equal to 2 GB cannot be uploaded using the **File Upload** command. For more details, refer to the documentation for the browser.

  OR;

- **Upload or download files using predefined rules (with Data Share Manager)**.

  There is no file upload size restriction for uploading files using Data Share Manager.

OR;

- **Upload or download CAE folders using predefined rules**.

  TTLC and **Data Share Manager** are prerequisites for uploading CAE folders. There is no file upload size restriction for uploading CAE folders using Data Share Manager.

  Data Share Manager is required for downloading CAE folders as well. Without Data Share Manager, only the files can be downloaded.

Set user preference to honor file naming pattern for file upload rules

As a simulation analyst, you can set the **AWC_CAE_file_upload_honor_file_naming_pattern** user preference to honor file naming pattern for file upload rules. This means that only the files that match the pattern are uploaded to the parent item revision.

Procedure

1. Search for the **AWC_CAE_file_upload_honor_file_naming_pattern** user preference.

   For information about retrieving a list of preferences, see *Where can I get a list of preferences?* in *Teamcenter Preferences*.

2. Set to **true** for the system to honor file naming pattern for file upload rules. This means that only the files that match the pattern are uploaded to the parent item revision.

   By default, it is set to **false**. When set to **false**, the file naming pattern is not honored. In such cases, all files are uploaded to the parent item revision.

3. Save your changes.

Upload or download files using predefined rules (without Data Share Manager)

You can upload files from the operating system to Teamcenter or download them from Teamcenter to the operating system based on predefined file upload rules.

The following procedure describes how to upload or download files without Data Share Manager.

Prerequisites

The administrator must have configured the **Async** service translator and Dispatcher services must be running.

Procedure

1. Access the **Files** tab.

   The **Files** tab is visible in the **Analyst** workspace if you select one or more non-CAE and CAE item revisions. Similarly, the **Files** tab is visible in the **Default** workspace if you select CAE item revisions.

   Select one of the following methods to access the **Files** tab:

   a. Select one or more CAE item revisions and click the **Files** tab in the secondary work area.

   b. In the **Analyst** workspace, select one or more CAE item revisions, and click the **Files** tab in the secondary work area.

      Alternatively, select one or more non-CAE item revisions and one or more CAE item revisions, and click the **Files** tab.

      When you select multiple item revisions, the system displays an extra column in the **File Contents** table. The **Context Item Revision** column displays the owning item revision and you can click the item revision to open it.

   c. Search for CAE item revisions, select them, and click the **Files** tab.

   d. Open a model structure, click the **Content** tab, select one or more model revisions, and click the **Files** tab.

2. Upload files without using Data Share Manager.

   a. Click **Upload File** and select a preconfigured file upload rule.

      The default upload size limit for FMS is 134 MB, and it is configurable.

      The browser upload size limit is 2GB, and files bigger than or equal to 2GB cannot be uploaded by using this command. Each browser has its own file upload limitations.

      There is no file upload size restriction for uploading files using Data Share Manager.

   b. Click **Choose File**, select the file, and click **Upload**.

      If there are file conflicts, the system displays the **Conflict** page

   c. To resolve file conflicts if files with the same names and types exist while uploading, select one of the following options in the **Conflict Option** column and then click **Upload**.

For multiple item revisions, if the **Filename to Item Revision Mapping** dialog box is not configured, then you can resolve item conflicts first. If file conflicts continue to exist, then the system displays the file conflicts.

- **Upload** to upload the existing file with the same name to the database.
- **Rename and Upload** to upload the file with a new name to the database by specifying a valid name.
- **Skip** to skip uploading the file to the database.

> Note:
>
> If the system displays file conflicts options, you must stay on this page to resolve the conflicts and not perform any other actions. If you try to perform some other action such as clicking a command in the navigation pane, refreshing the browser, or executing a search, the system cannot display the file conflicts again.

3. Download files without using Data Share Manager.

   a. Select the file you want to download, and click **Download File**.

   b. To check out datasets, select **Yes** when prompted. Alternatively, select **No** if you do not want to check out the datasets.

4. (Optional) Sort the data in the Files tab.

Upload or download files using predefined rules (with Data Share Manager)

You can upload files from the operating system to Teamcenter or download them from Teamcenter to the operating system based on predefined file upload rules.

The following procedure describes how to upload or download files with Data Share Manager:

1. Start Data Share Manager.

   The Teamcenter Data Share Manager (DSM) application provides a way for you to upload and download large data files without interrupting your work.

   > Note:
   >
   > You (or your administrator) must install Data Share Manager on your machine and you must have a valid license key. Find the Data Share Manager installation and detailed

user instructions in *System Administration→File Management System* in the Teamcenter documentation.

The administrator must also set the **Use_DataShare_Manager** site preference to **true** on the server. Doing so activates Data Share Manager for file uploading and downloading.

Tip:

If users prefer to use the synchronous import and export mechanism for file upload and download instead of using Data Share Manager, they can set the **Use_DataShare_Manager** preference to **false** with a **User** protection scope.

To select Data Share Manager user session values:

a. Click your user profile in the lower left corner of Active Workspace home page, and select **Profile**.

b. Under **Data Share Manager**, make sure that the **Data Share Manager is installed on this device** and **Use Data Share Manager on this device** check boxes are selected.

Note:

These values remain selected until you clear your browser cache or change browser applications. If you clear your cache or switch to a different browser, you must select these values again before using Data Share Manager.

2. Access the **Files** tab.

In the **Analyst** workspace, you can select one or more non-CAE and CAE item revisions. However, in the **Default** workspace, you can select only CAE item revisions.

Select one of the following methods to access the **Files** tab:

a. Select one or more CAE item revisions and click the **Files** tab in the secondary work area.

b. In the **Analyst** workspace, select one or more CAE item revisions, and click the **Files** tab in the secondary work area.

When you select multiple item revisions, the system displays an extra column in the **File Contents** table. The **Context Item Revision** column displays the owning item revision and you can click the item revision to open it.

c. In the **Analyst** workspace, select one or more non-CAE item revisions and one or more CAE item revisions, and click the **Files** tab.

The **Context Item Revision** column is displayed in the **File Contents** table of the **Files** tab.

d. Search for CAE item revisions, select them, and click the **Files** tab.

e. Open a model structure, click the **Content** tab, select one or more model revisions, and click the **Files** tab.

3. Upload files using Data Share Manager:

a. Click **Upload File** .

There is no file upload size restriction for uploading files using Data Share Manager.

b. Specify a working directory in the **File Upload** panel.

You can upload files from the specified working directory only. The system persists the working directory for a subsequent upload operation.

c. Select a preconfigured file upload rule.

d. Click **Choose File**, select one or more files containing the data, and click **Upload**.

e. To resolve file conflicts if files with the same names and types exist while uploading, select one of the following options in the **Conflict Option** column and then click **Upload**.

For multiple item revisions, if the **Filename to Item Revision Mapping** dialog box is not configured, then you can resolve item conflicts first. If file conflicts continue to exist, then the system displays the file conflicts.

- **Upload** to upload the existing file with the same name to the database.
- **Rename and Upload** to upload the file with a new name to the database by specifying a valid name.
- **Skip** to skip uploading the file to the database.

> Note:
>
> If the system displays file conflicts options, you must stay on this page to resolve the conflicts and not perform any other actions. If you try to perform some other action such as clicking a command in the navigation pane, refreshing the browser, or executing a search, the system cannot display the file conflicts again.

f. Open the Data Share Manager console to monitor the status of your uploads.

g. In the **Files** tab, click **Refresh** to verify whether the files have been uploaded.

4. Download files using Data Share Manager:

a. Press the **Ctrl** key and make the required selections. Alternatively, click **Selection Mode** and select the appropriate check boxes corresponding to the item revisions for which you want to download data.

b. Click **Download File** .

c. Specify a working directory in the **File Download** tab.

The system persists the working directory for a consecutive download operation.

d. To check out datasets, select the **Check-out** option in the **File Download** panel. Do not select it if you do not want to check out the datasets.

e. Open the Data Share Manager console to monitor the status of your downloads.

f. Browse to the specified working directory and verify whether the files have been downloaded.

5. (Optional) Sort the data in the Files tab.

Upload or download CAE folders using predefined rules

You can upload CAE folders from the operating system to Teamcenter or download them from Teamcenter to the operating system based on predefined file upload rules.

- TTLC and Data Share Manager are prerequisites for uploading CAE folders. There is no file size restriction for uploading CAE folders using Data Share Manager.
- You can download CAE folders from the **Files** tab or the **Overview** tab. While the **Files** tab displays the complete folder structure, the **Overview** tab displays only the first-level folder.
- Data Share Manager is a prerequisite for downloading CAE folders from the **Files** tab and the **Overview** tab. However, without Data Share Manager, you can download individual files from the **Files** tab.

1. Start Data Share Manager.

The Teamcenter Data Share Manager (DSM) application provides a way for you to upload and download large data files without interrupting your work.

> Note:
>
> You (or your administrator) must install Data Share Manager on your machine and you must have a valid license key. Find Data Share Manager installation and detailed user instructions in *System Administration→File Management System* in the Teamcenter documentation.

The administrator must also set the **Use_DataShare_Manager** site preference to **true** on the server. Doing so activates Data Share Manager for file uploading and downloading.

Tip:

If users prefer the synchronous import and export mechanism for file upload and download instead of using Data Share Manager, they can set the **Use_DataShare_Manager** preference to **false** with a **User** protection scope.

To select Data Share Manager user session values:

a. Click your user profile in the lower left corner of Active Workspace home page, and select **Profile**.

b. Under **Data Share Manager**, make sure that the **Data Share Manager is installed on this device** and **Use Data Share Manager on this device** check boxes are selected.

Note:

These values remain selected until you clear your browser cache or change browser applications. If you clear your cache or switch to a different browser, you must select these values again before using the Data Share Manager.

2. Upload CAE folders.

a. Open a CAE item revision or select one or more CAE item revisions and click the **Files** tab.

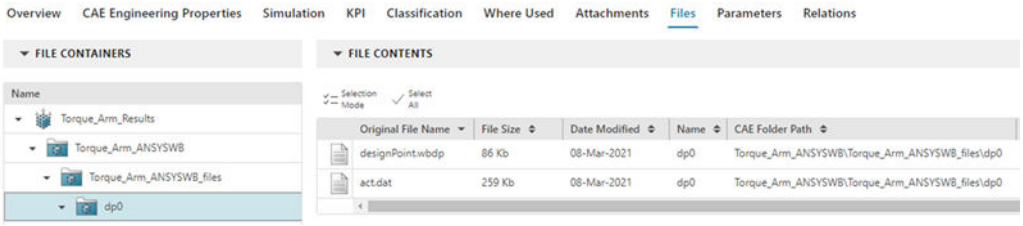
The system displays the **File Containers** tree containing the CAE folders and the datasets under the selected item revisions. When you select a **CAE Folder** or **Dataset**, the system displays the files inside the CAE folder or the dataset in the **File Contents** section.

b. To upload CAE folders, click **Upload Folder**, select a predefined file upload rule, and provide the path of the folder you want to upload.

c. Click **Upload**.

The system resolves the folder conflicts for files within the CAE folder based on the **CAE_file_upload_default_conflict_resolution_option** user preference.

3. Download CAE folders from the **Files** tab.



You can download files with or without DSM:

Download with DSM	The complete folder structure is created and preserved on the operating system.
Download without DSM	Only the selected files are downloaded through the browser and the folder structure is not created or preserved.

a. Open a CAE item revision with CAE folders or select one or more CAE item revisions with CAE folders.

b. To view files, click the **Files** tab.

The system displays the **File Containers** tree containing the CAE folders and the datasets under the selected item revisions. When you select a **CAE Folder** or **Dataset**, the system displays the files inside the CAE folder or the dataset in the **File Contents** section.

c. Select one or more files and click **Download**.

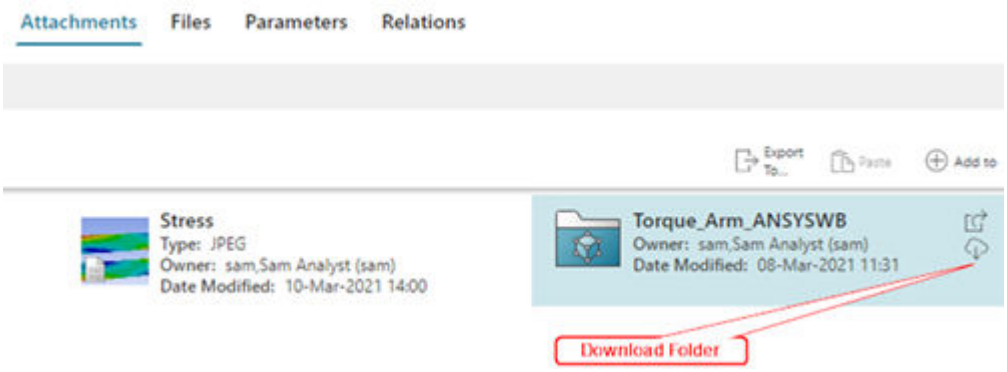
d. In the **Download** panel, specify the working directory and click **Download**.

4. Download CAE folders from the **Overview** tab.

a. Open a CAE item revision with CAE folders or select one or more CAE item revisions with CAE folders and click the **Overview** tab.

The system displays the **File Containers** tree containing the first level of CAE folders and the datasets under the selected item revisions. When you select a **CAE Folder** or **Dataset**, the system displays the files inside the CAE folder or the dataset in the **File Contents** section.

b. Select one or more files and click **Download Folder**.



The system displays the **.plmd** file. When you click this file, the folder is downloaded to the location based on the **Default Download Folder** preference specified in DSM.

Sort the data in the Files tab

You can sort the data in the **Files** tab after you **Upload or download files without Data Share Manager** or **Upload or download files with Data Share Manager**.

1. Sort the **File Contents** columns using a date filter.

    a. Click the table header of the **Date Modified** column you want to sort.

    b. Specify a date range and click **Filter**.

2. Sort the **File Contents** columns using a text filter.

    a. Click the table header of the column you want to sort.

    b. Select an operator. The valid operators are **Contains**, **Does not contain**, **Begins with**, **Ends with**, **Equals**, and **Does not equal**.

    c. Type the text by which you want to filter the column contents and click **Filter**.

    The text filter you specify is not case sensitive. For example, you can type **cae** to filter objects names containing both **CAE** in upper case and **cae** in lower case.

    After applying a text filter, when you hover your mouse over the **Filter** icon, the system displays the text filter you have applied as a tool tip.

    d. To do further sorting, select more column headers and select the appropriate sort options.

3. Sort the **File Contents** columns for common values by using facets.

    a. Click the table header of the column you want to sort.

b. Enable **Show Filters**, select the specific objects you want to be displayed in the dashboard column, and click **Filter**.

You can optionally first apply a text filter and then enable **Show Filters** to further filter the column results.

> Example:
>
> In the **Context Item Revision** column, type **Analysis** in the text filter and then enable **Show Filters** to display only names that have **Analysis** in this column.

4. To reset the filter criteria on a column, click the column header and click **Clear**.

5. To reset all filters, click ⚙ > **Clear all filters**.

6. To refresh the entire table, click **Refresh** ↻ on the top of the table.

   The system preserves the sorting order even after the dashboard is refreshed.

7. To refresh the selected objects, select one or more objects in the table and click **Refresh** ↻ on the top of the table.

   The system preserves the sorting order even after the selected objects are refreshed.

8. Edit the data in the **File Contents** table:

   a. Click **Start Edit** ✎ without selecting any columns.

   b. Click the cell you want to modify and make the changes.

   c. Click **Save Edits** 💾 to save your changes.

9. To delete data, press the **Ctrl** key or click **Selection Mode** ☑ on the top of the table, select one or more columns, and click **Delete** ✕ on the top of the table.

   The system prompts you to **Cancel**, **Delete files only**, or **Delete files and empty datasets**. Choose the appropriate option.

   You can delete files and datasets only if you have write permissions to them. You can change the owner of an object if you have appropriate permissions.

10. (Optional) To rearrange columns, click ⚙ > **Arrange** and remove or add columns as appropriate.

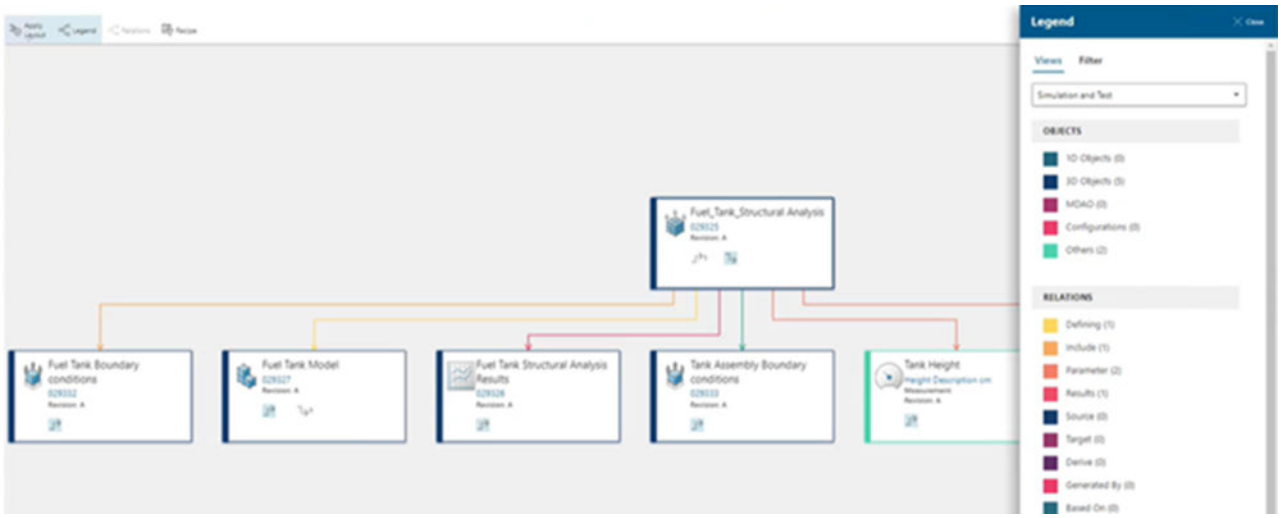
16. View the traceability of simulation data

When you execute the simulation processes and capture artifacts such as abstractions, models, materials, load cases, solver input decks, results, and reports, they are stored in different business objects with relationships. To view the traceability of simulation data, you can access the **Overview** tab to view related objects in a table format or the **Relations** tab to view them in a graphical format.

The **Relations** tab provides a simulation-specific view in the context of CAE objects. In addition, you can apply filters to both objects and relationships to view only relevant information and to navigate through related CAE objects and view their traceability.

1. Open a CAE item revision and click the **Relations** tab.

2. Navigate through the related data by expanding incoming and outgoing relationships.



3. To filter the content, click **Legend**, choose the **Views** tab, and select the **Simulation and Test** view. This is the default view.

   The system updates the graphical view and shows the context object and the related matching CAE objects.

   a. Select the appropriate criteria from **Objects** and **Relations**.

   b. (Optional) To view the corresponding CAE relation name, hover your mouse over a relation.

   c. (Optional) To view the number of incoming or outgoing objects, select any CAE item revision object.

   d. (Optional) To view the incoming or outgoing objects, select the relation link of the CAE item revision.

4. To filter the content, click **Legend** and choose the **Filter** tab and select the appropriate criteria such as reviewed, approved, status, owner, date modified, and last modifying user.

> Example:
>
> To view only revisions related to the CAE item revision you have opened, select the appropriate revisions in the **Type** category.

17. Subscribe to simulation objects to track status changes

As a simulation analyst, you can use simulation objects to create, execute, and track simulation-related tasks. By subscribing to these simulation objects, you can monitor their status changes and receive notifications when modifications occur.

Subscription objects also generate alerts for generating CAE structure, comparing CAE BOM, deriving structures, creating CAE packages, generating dashboard reports, and other operations. This functionality ensures you stay informed and can efficiently manage your simulation workflows.

Procedure

1. In **EXPLORER** or **MY STUFF**, select one or more simulation objects.

2. Choose **More Commands** ••• > **Share** > **Follow**.

   Subscriptions are objects you are following using the **Follow** command. For more information, see *Overview of subscriptions* in *Active Workspace Fundamentals*.

3. In the **Follow** panel, specify the frequency and priority. You can also add other users as followers.

   - **Event Type**

     > Note:
     >
     > If you are already subscribed to an event type, it does not appear in the **Event Type** list.

   - **My Events**

     Select **My Events** to follow multiple events on an object.

   - **Name**

     An editable prepopulated field is displayed when you select a single object to follow.

   - **Frequency**

     Select from **Immediately** (not collated), **Daily** (daily digest), and **Weekly** (weekly digest). The default is **Immediately**.

   - **Priority**

     Select from **Normal**, **High**, and **Low**. The default is **Normal**.

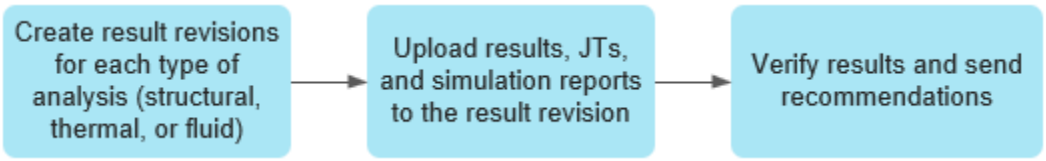
- In the **Followers** section, click **Add Follower** ⊕ to add a follower. In the **Users** section, select the user you want to add and click **Add**.

4. Click **Follow** to follow the object.

5. Verify that your subscription is created. From your Home page, click the **SUBSCRIPTION** tile to display your subscriptions. Then, click the **My Subscriptions** tab, and select the object to which you just subscribed.

18. Capture results and verify results

Capture results from different solvers and verify results



1. **Create result revisions**

   You must create result revisions to manage analysis results from different solvers. The result revision is associated with an analysis revision.

2. **Upload results**

   When the solve is complete, you import the results to the result revision. You can also launch a postprocessor and generate JT files or other visualization files and import them to the result revision.

3. *Verify results and send recommendations*

   After verifying the results, you can release the analysis data to production. You release the data by signing off from a workflow. You can make recommendations while signing off the workflow.

   In the **simulated side-impact example**, the results show that the intrusion beam cannot withstand forces of **3200** pounds at **35** mph. After evaluating results from various scenarios, you sign off the workflow by suggesting a design change for the intrusion beam.

Create CAE result revisions

To capture the simulation results, you must create **CAE 3D Result** revisions. You can use these revisions to manage analysis results from different solvers.

1. Search for the analysis revision you created, open it, and click the **Overview** tab.
2. Choose **More Commands** > **New** > **Create Simulation**.
3. Choose **CAE 3D Result**.
4. (Mandatory) Type a name for the result revision.
5. (Optional) Type a description.

6. (Optional) Select a preconfigured analysis type, for example, **Structural** or **Thermal**.

7. (Optional) Select a preconfigured solver, for example, **NXNastran** or **Ansys**.

8. (Optional) Specify a project ID or click **Add Project** ⊕ and select a project.

9. (Optional) To specify a result template, click **Add Result Template** ⊕ and select a template from **Palette**, and click **Add**.

   Alternatively, click **Search**, search for a template, and add it.

10. To create the result revision, click **Create**.

Create results templates

You can use the **CAE 3D Result Template** workspace object for managing templates of results from a 3D analysis simulation, for example, CFD, FEA, or structural. It can be used to view all the CAE 3D result objects that are based on the workspace object. In addition, this object enables customers to have a consistent postprocessing workflow for CAE 3D results and enables a consistent, reliable, and traceable method for reviewing CAE 3D results. It can be related to a CAE 3D result and CAE 3D analysis. When related to a CAE 3D analysis, you can use the CAE 3D analysis for both storing simulation data as well as the postprocessed data in the form of reports. In addition, you can use the templates from the CAE 3D result template to generate the postprocessed data.

While configuring simulation tools, the simulation administrator cannot practically link all the optional inputs to the primary input item revision and predefine the traversal path for all those inputs that you (as simulation analyst) want to export in the tool configuration. For example, in addition to the results file (primary input), you may want to select results templates (optional inputs) and send them to a postprocessor. These templates are not linked to the analysis item revision that holds the results file. In such cases, the simulation administrator configures optional inputs to allow you to select additional inputs such as results templates.

During the tool launch process, you can select the desired item revision for each of the available optional inputs and use these templates, for example, to export only specific types of results.

1. On the **HOME** page, click **CREATE SIMULATION**.

2. In the **Create Simulation** panel, select the **CAE 3D Result Template** type.

3. (Mandatory) Specify a name for the result template.

4. (Optional) In **PROJECTS**, click **Add Project** ⊕ and select a project.

5. To create the template, click **Create**.

6. Open the template you created.

7. To add the required files for this template, in the **Overview** tab, click **Add to** ⊕ in **FILES**.

8. Click **Choose File** and select the required file for this template.

Add boundary conditions to a results revision using a preconfigured tool

You can use the 3D boundary condition workspace object to manage CAE 3D simulation boundary conditions such as heat flux in CFD, forces in FEA or structural analysis, and electromagnetic forces in an electrical analysis. This workspace object is used as the input for analysis in simulation tool configurations for 3D applications such as Simcenter 3D, Ansys, and Star-CCM+. It can be related directly to a CAE 3D result and a CAE 3D analysis. The boundary condition object can have an input relation to the CAE 3D analysis when it is used to provide inputs to a CAE 3D analysis. On the other hand, if a CAE 3D analysis or a CAE 3D result generates some data which can be used for another 3D analysis as input, this data can be maintained within a boundary condition object using an extract relationship.

Create a CAE boundary condition type

1. On the **HOME** page, click **CREATE SIMULATION**.

2. In the **Create Simulation** panel, select the **CAE 3D Boundary Condition** type.

3. (Mandatory) Specify a name for the boundary condition.

4. (Optional) Click **Add Project** ⊕ and select a project.

5. To create the boundary condition, click **Create**.

6. Add boundary conditions.

    a. Open the boundary condition you created.

    b. In the **Overview** tab, click **Add to** ⊕ in **FILES**.

    c. Click **Choose File** and select the file containing the simplified geometry.

Associate the boundary condition type to a result revision

1. Navigate to a result revision, open it and click the **Overview** tab.

2. Click **Add Simulation** ⊕ in the **RELATED OBJECTS** table.

3. In the **Add Simulation** panel, select the **CAE 3D Boundary Condition** type, select it from **Palette**, and click **Add**.

Alternatively, click **Search**, search for the boundary condition, and add it.

Mark boundary conditions as up-to-date for changes to attachments and related revisions

You can mark boundary conditions as up-to-date for changes to attachments and related revisions such as **CAE 3D Analysis** and **CAE 3D Result**.

In a complex product development environment, different analysts perform different tasks of the overall analysis. For example, the CFD analysis is done by one group, and the heat flux load is sent to another group as a boundary condition. Similarly, another group does structural analysis and this group receives a boundary condition object from the program requirements group. In such scenarios, it becomes critical to know when the analysis data, possibly with multiple dependencies, is out-of-date. The analyst can then act on it and ensure that the analysis is built with the correct set of data to deliver accurate results.

You can create a **CAE 3D Boundary Condition** revision in the context of a **CAE 3D Analysis** or a **CAE 3D Result** revision. If any of these related revisions are changed, the status of the boundary condition shows as out-of-date. Similarly, if any attachments are added or removed from the **CAE 3D Boundary Condition** revision, the status of the boundary condition shows as out-of-date.

You can also view the CAE status of released 3D boundary conditions if the **CAE_allow_cae_status_on_released_objects** site preference is set to **true** at your site.

> Note:
>
> The system evaluates **CAE 3D Analysis** revision changes for **CAE0Extract** relationship only.

Procedure

1. Open a **CAE 3D Boundary Condition** revision from the appropriate folder in **Explorer**.

   Alternatively, search for a boundary condition and open it.

   The header section displays the CAE status as **Up-to-date** or **Out-of-date**.

2. If the status is out-of-date, hover your mouse over the status. The system displays a tooltip.

   The tooltip provides the reason for the revision being out-of-date. For example, a dependent attachment has been added.

3. Click the **Out-of-date** hyperlink.

   The system opens the **Overview** tab. The **Out-of-Date Information and Objects** section displays the status and the reason why the boundary condition is out-of-date.

4. To update the status, choose **More Commands** > **Edit** and select **Mark Up-To-Date**.

Link the results to the CAE result revisions

After you create the **CAE 3D Result** revision, create a web link or a shared location for the results of the simulation analysis.

1. Navigate to the **CAE 3D Result** revision you have created, open it, and click the **Overview** tab.
2. (Optional) Upload the files.
   a. Click **Add to** ⊕ in **FILES**.
   b. Click **Choose File** and select the file to upload.
3. (Optional) Create external links to files or folders that are managed outside the database but are tracked from Teamcenter.
   a. Click **Add to** ⊕ in **EXTERNAL LINKS**.
   b. In **PROPERTIES**, specify a name and the URL or shared location, and then click **Add**.
   c. (Optional) To delete a web link, select it, and click **Edit** and choose **Delete External Links**.

View related revisions, file attachments, and external links

1. Open a result revision from the appropriate folder in **Explorer**.

   Alternatively, search for the result revision and open it.
2. To view all related CAE revisions in the context of the result revision, click the **Overview** tab.

   The **Related Objects** table displays all the related revisions.
3. To view traceability information, select a revision from the **Related Objects** table.

   The **TRACEABILITY INFORMATION** section displays how the selected revision is related to other revisions.
4. To view the status of the simulation process, click **View** 👁 and select **Show Progress Monitor** to open the **Simulation Tool Progress Monitor** in a separate tab of the browser.
5. To view files attached and external links created for this revision, click the **Overview** tab.

Visualize result files such as JTs and images

You can use the universal viewer to view object attachments. The universal viewer is displayed in an object's **Overview** tab if there are attachments for the object. The universal viewer supports file types such as PDF, text, HTML, Microsoft Office files, images and Direct Model (JT) files.

> Note:
>
> It is recommended that you store one JT file per Direct Model dataset. The universal viewer does not support multiple JT files in a single Direct Model dataset. Also, CAE JT files containing results quantities are not supported.

1. Select a **CAE 3D Result** revision that contains several secondary results and reports as attachments.
2. Click the **Overview** tab to view a preview of the selected file type.

   The system displays a preview of the first file type attached to the revision.
3. To preview the next attached file type, click the **Next** button.
4. To navigate through a preview of attachments, click the **Next** or **Previous** button as appropriate.

Make a copy of the 3D result revision or revise it

You can make a copy of the of the 3D result revision or revise it.

Procedure

1. Make a copy of the 3D result revision.
   a. Select the 3D result revision.
   b. Choose **More Commands** > **New** > **Save As**.

      The **Save As** dialog opens.
   c. (Optional) Specify a new name if you want to create a copy and description.
   d. (Optional) Select a new destination folder.

      The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

      A. Remove the **Newstuff** folder and click the **Add** button to select another folder.

B. Select the folder and click **Add**.

e. To create a copy, click **Save**.

2. Revise the 3D result revision.

a. Select the 3D result revision.

b. Choose **More Commands** > **New** > **Revise**.

c. (Optional) Specify required information as appropriate.

d. (Optional) Select a new destination folder.

The **Newstuff folder** is populated by default. At your site, if a different folder is configured by default where newly created objects are stored instead of the **Newstuff** folder, the **Save As** panel indicates that folder.

A. Remove the **Newstuff** folder and click the **Add** button to select another folder.

B. Select the folder and click **Add**.

e. To revise, click **Save**.

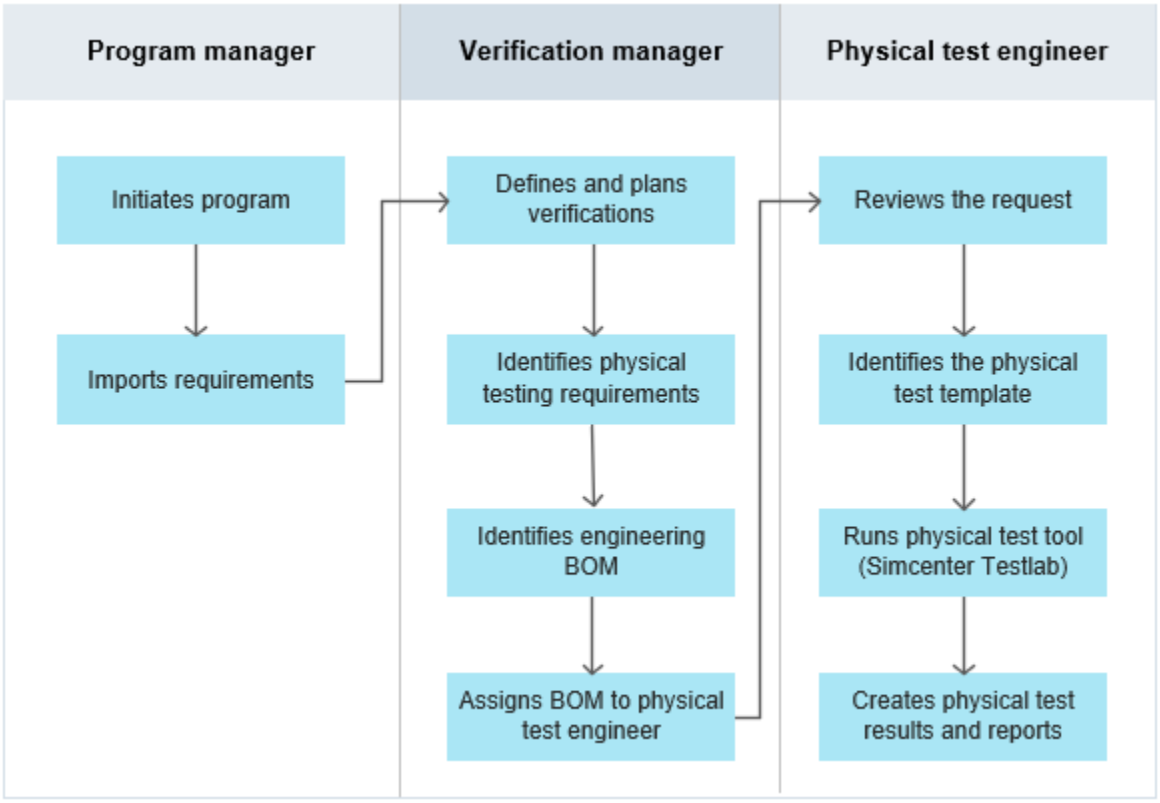
19. Create physical test results

Physical testing task flow

As part of product verification before it is released to the market, a physical test engineer performs prototype testing. An example of this is attaching sensors to the chassis of a vehicle to test it for shock, vibration, and other stresses in real world scenarios. The engineer acquires measured data using software such as Simcenter Testlab.

Simcenter Testlab is a data acquisition and analysis software for noise, vibration, and durability testing. It provides integrated testing, analytics, and modeling tools for a range of testing requirements.

In Teamcenter, the physical testing task flow is as follows:



1. (Simulation administrator) Runs the quick setup script (**tcsim_quick_setup.pl**) to set up the sample Simcenter Testlab configurations and to create the sample **Physical Test Engineer** user account.

2. (Physical testing lead or the designated physical test engineer) Identifies the physical test templates created in Simcenter Testlab (***.tpl** files) and imports them to Teamcenter.

3. (Physical testing lead or the designated physical test engineer) Creates a **Physical Test Result Template** revision and associates the revision to the Simcenter Testlab templates (***.tpl** files).

4. (Physical test engineer) Reviews the verification request and creates a **Physical Test Result** revision based on the **Physical Test Result Template** revision.

   > Note:
   >
   > We recommend creating a physical test result revision in the context of a physical test result template.

5. (Physical test engineer) Manually uploads physical test results and reports from Simcenter Testlab to the **Physical Test Result** revision.

   OR

   Uses the preconfigured simulation tool **Launch Test Tools** to upload physical test results and reports from Simcenter Testlab.

6. (Physical test engineer) Completes the verification request and sends it back to the verification manager.

Create physical test result template revisions

The **Physical Test Result Template** revision is a workspace object for storing physical test templates from test tools such as Simcenter Testlab.

You can use this workspace object to manage templates for testing postprocessing activities, for example, Simcenter Testlab processes and Excel macros. When test engineers perform postprocessing of test data, they prefer to keep these templates stored in Teamcenter and this results in consistent postprocessing workflow for test data. The physical test result template object can be directly related to a physical test result object. This makes it easy to retrieve all the physical test result objects.

Prerequisites

The following procedure assumes that the simulation administrator has run the quick setup script (**tcsim_quick_setup.pl**) to create sample configurations and the sample **Physical Test Engineer** user account.

Procedure

1. Set your **Group** to **Engineering**, **Role** to **Physical Test Engineer** and **Workspace** to **Physical Test Engineer**.

2. Click the **Create Physical Test** tile on the home page.

3. In the **Create Physical Test** pane, select **Physical Test Result Template**.

4. Specify a name for the physical test result template revision, select or specify other values as appropriate, and click **Create**.

5. To view the physical test results, open the physical test result template you have created, and click the **Physical Test** tab.

6. (Optional) To upload or download files by using file upload rules, open the physical test template revision you created earlier, and click the **Files tab**.

   You can associate the Simcenter Testlab templates (***.tpl** files) to this physical test result template by using a preconfigured file upload rule.

7. To view the Simcenter Testlab templates (***.tpl** files), click the **Overview** tab.

8. (Optional) To view the traceability of simulation data, open the physical test result template you have created, and click the **Relations tab**.

9. (Optional) To search for physical test result templates, click **Advanced Search**, select **Physical Test Result Template Revision** from the **Advanced** tab, specify the search criteria, and click **Search**.

Create physical test result revisions

The **Physical Test Result** revision is a workspace object for storing physical test results from test tools such as Simcenter Testlab.

You can use this workspace object to manage test data postprocessing and report creation activities, for example, Testlab projects, PDF, PowerPoint, and Word reports. It can be directly related to a revision such as 3D result, 3D analysis, item, 1D analysis, 1D model and the physical test result template. When test engineers want to store test reports and any associated data on Teamcenter, as well as postprocess raw data using applications like Testlab, it ensures traceability to the product design as well as simulation which is being validated by testing. This object can be created based on templates to ensure a consistent test processing workflow.

Prerequisites

The following procedure assumes that the simulation administrator has run the quick setup script (**tcsim_quick_setup.pl**) to create sample configurations and the sample **Physical Test Engineer** user account.

Procedure

1. Log on to Active Workspace.

2. Set your **Group** to **Engineering**, **Role** to **Physical Test Engineer**, and **Workspace** to **Physical Test Engineer**.

3. Search for the **Physical Test Result Template** revision, select it and click **New** > **Physical Test Result**.

   OR

   Click **New** > **Physical Test Result**.

4. Specify a name for the physical test result revision, select or specify other values as appropriate, and click **Create**.

   If you create a physical test result in the context of a physical test result template, the test type and tool name are automatically copied from the template.

   > Note:
   >
   > We recommend creating a physical test result in the context of a physical test result template. If you are creating a physical test result revision without selecting a physical test result template, you must add the template by selecting the **Add Physical Test Result Template** option.

5. Open the physical test result revision you created earlier.

6. (Optional) To create external links or folders for the physical test result revision, click the **Overview** tab and **Add to** in **EXTERNAL LINKS**.

   You can create external links to files or folders that are managed outside the database but are tracked from Teamcenter.

7. To upload or download **Simcenter Testlab** files by using file upload rules, click the **Files tab**.

   Alternatively, use the preconfigured simulation tool **Launch Test Tools** to upload **Simcenter Testlab** files. To do so:

   a. Select the **Overview** tab and choose **More Commands** > **Open in Test Tool** > **Simcenter Testlab**.

   b. Specify **launch inputs** as appropriate.

   c. (Optional) To include a CAE 3D result for testing, click the **Value** box in the **Optional Inputs** section and specify the CAE 3D result object.

      You need to select this option only if you have not associated a **CAE 3D Result** object with the physical test result revision.

   d. To launch the tool, click **Open**.

e. Monitor the tool launch in the **Simulation Tool Progress Monitor** and verify if the tool launch is completed successfully.

   If an optional **CAE 3D Result** revision is selected, the datasets from the optional inputs, in addition to the datasets from the physical test object, are downloaded to the **Scratch** directory. Any changes made to the physical test object and CAE 3D results files are then automatically imported to Teamcenter and you can view them from the **Overview** tab.

8. To copy the test EBOM, open the verification request in the **Content** tab, select the test EBOM, click **Copy**, select the physical test result, right-click and select **Paste**.

   The EBOM is now displayed in the **PRODUCT and TEST EBOM** table on the **Overview** tab.

9. To view or add parameters to the physical test result revision, click the **Parameters** tab.

   You can add or remove parameters in this tab.

   a. To add parameters, click **More Commands** > **Add**.

   b. In the **Add** panel, specify a name and other parameters as appropriate.

   c. (Optional) To remove a parameter, select it and click **Remove** in the **PARAMETERS** table.

10. To import physical test data packages, click **New** > **Import Physical Test Data**, choose the file, and click **Import**.

    The import is done asynchronously and the system displays an alert when it is complete.

11. (Optional) To search for physical test result objects, click **Advanced Search**, select **Physical Test Result Revision** from the **Advanced** tab, specify the search criteria, and click **Search**.

12. (Optional) To view related simulation objects, click the **Overview** tab.

    The **Related Objects** section displays the related simulation objects.

13. To view traceability information of related simulation objects, click the **Overview** tab and select an object, such as **Result**, **Analysis**, **1D Model**, or **Product and Test EBOM** from the **Related Objects** section. The **TRACEABILITY INFORMATION** section displays the traceability information.

    If there are multiple interrelated objects within the **Related Objects** section, the **Traceability** information section displays all of the revisions, names, and item IDs of the interrelated objects as well as their relation to the physical test result object. The arrow denotes the direction of the relationship. For example, a backward arrow indicates a primary to secondary object relationship.

14. View the relations and the objects related to the physical test results.

a. Open the physical test result revision you have created and click the **Relations tab**.

b. Click **Legend**.

The **Legend** panel displays a list of all the supported relations. You can select the relations or objects from this panel to see the highlighted view.

c. Select the **Physical Test** object to view the relation between the physical test result and the associated physical test template objects.

d. Select the **File** object to view the relation to file objects attached to the physical test result.

e. Select the **Correlation** relation to view the relation between the associated 3D analysis revision and the 3D result revision.

f. Select the **Test Results** relation to view the relation with the test EBOM.

g. Select the **Input** relation to view the relation with the 1D object.

h. Select the **Based On** relation to view the relation with the test result template.

15. To export physical test data from Teamcenter in a structured manner, use PLM XML export.

For more information, see *Sharing data using PLM XML*.

a. Open the physical test result revision.

b. Choose **More Commands** > **Share** > **PLM XML Export**.

c. Select the **CAEConfiguredDataFilesExportDefault** transfer mode.

d. Select the appropriate language and click **Export**.

The export begins and you receive an alert when it is complete.

16. To import physical test data in a structured manner and create Teamcenter objects based on this structure, use PLM XML import.

For more information, see *Sharing data using PLM XML*.

a. Select the folder into which you wish to import the contents of the *.zip* file.

b. Click **New** > **Import PLM XML** to display the **Import PLM XML** panel.

c. Use **Choose File** to locate the *.zip* file on your local system.

d. Select the transfer mode, for example, **CAE_incremental_import** containing the rules appropriate to use when importing the file.

e. Click **Import** to import the objects in the *.zip* file.

The import begins and you receive an alert when it is complete.

Mark physical test revisions as up-to-date for changes to attachments and related revisions

If a related analysis revision or a related result revision undergoes changes related to parameters or attachments, you can use the **Mark Up-To-Date** command to mark the physical test revision as up-to-date.

You can also view the CAE status of the released physical test revisions if the **CAE_allow_cae_status_on_released_objects** site preference is set to **true** at your site.

Procedure

1. Open a physical test revision and mark it as up-to-date.

   a. Open a physical test revision from the appropriate folder in **Explorer**.

   Alternatively, search for a physical test revision and open it.

   The header section displays the CAE status as **Up-to-date** or **Out-of-date**.

   b. If the status is out-of-date, hover your mouse over the status. The system displays a tooltip.

   The tooltip provides the reason for the revision being out-of-date. For example, the dependent item revision has a newer revision.

   c. Click the **Out-of-date** hyperlink.

   The system opens the **Overview** tab. The **Out-of-Date Information and Objects** section displays the status and the reason why the related revision is out-of-date.

   d. Select **Update Latest Reference** or **Add Latest Reference** as appropriate.

   e. Click **Edit** and select **Mark Up-To-Date**.

   > Note:
   >
   > If attachments or related objects are attached with the relationship specified in the **CAE_significant_relation_types_for_PhysicalTestResult** site preference and they get

updated, modified, or revised, then the CAE status on the physical test revision changes to out-of-date. The default values for this preference are **Correlation**, **Input**, and **Specifications**.

2. Search for multiple physical test revisions and mark them as up-to-date.

   a. Search for multiple physical test revisions.

   b. Select the physical test revisions you want to mark as up-to-date and click **Edit** > **Mark Up-To-Date**.

20. Using the simulation dashboard

Why use the simulation dashboard?

The simulation dashboard provides a clear view of the status of all the models and analyses carried out by simulation analysts at the program, milestone, group, or individual user level. It allows decision makers to access the latest information and make correct decisions.

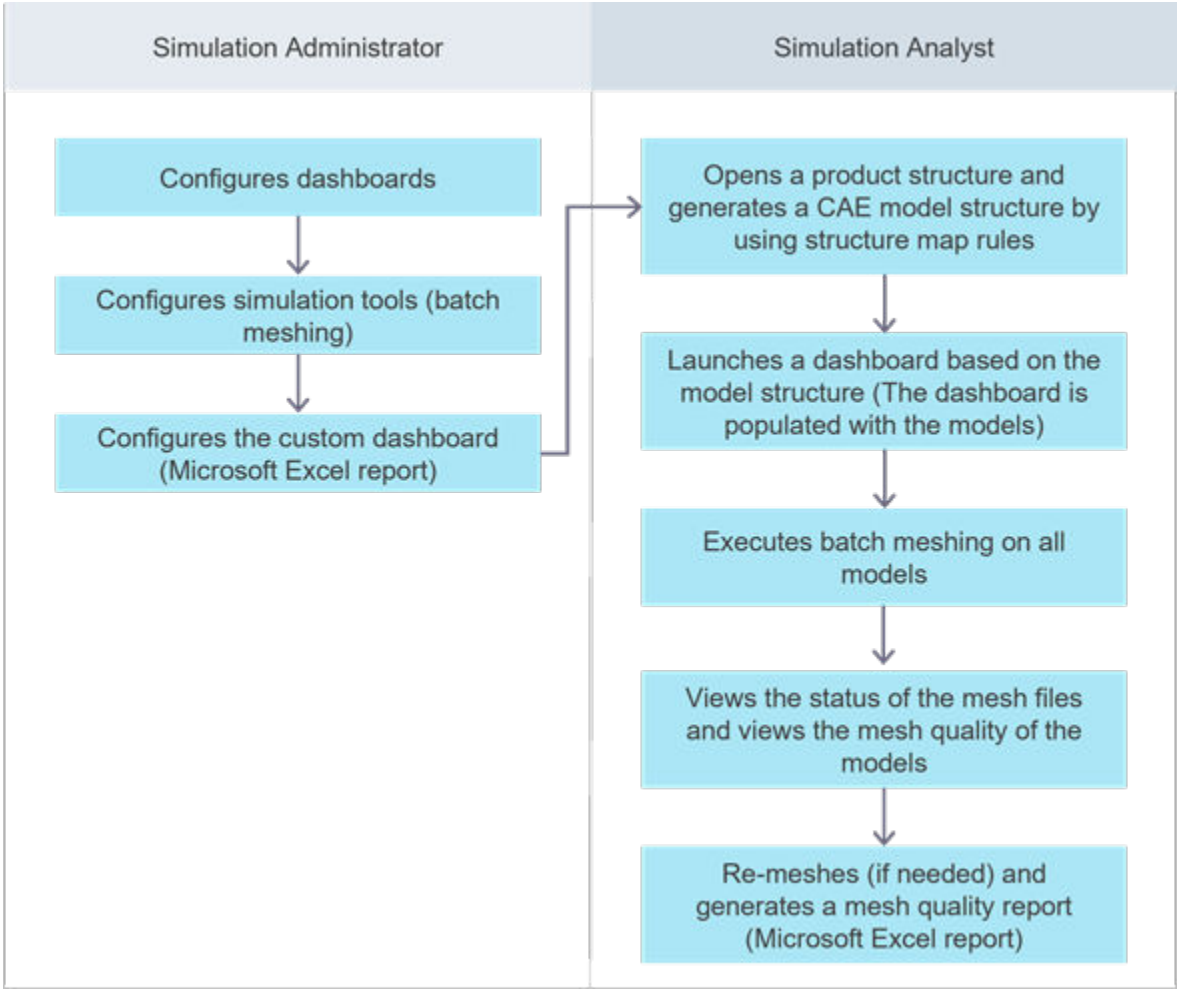
The **Simulation Dashboard**:

- Displays the list and status of all models and analyses based on a query or based on the objects you select, for example, model structure, analysis or model revisions, or folders containing analysis or model revisions.
- Displays the status of all models based on variants of the vehicle or the status of the master structure based on the pedigree information.
- Presents the status of the results corresponding to the models and analyses.
- Monitors key performance indicator (KPI) values such as maximum stress, minimum temperature, or maximum displacement in an analysis revision or analysis template.

You can also export reports, if they are available, in spreadsheet format.

Open a model structure and view the dashboard results

The process flow is as follows:



If the product structure data is configured by using classic variants, such data cannot be monitored in the simulation dashboard when the Product Configurator mode is enabled. In such cases, the system displays the **Not Found** value in the dashboard.

1. Open the model structure, click the **Content** tab, and select some child revisions in the **Tree** view.

2. Click **Simulation Dashboard** on the top of the content area.

3. In the **Select Dashboard** panel, select the **All** tab to view all the model dashboards.

   Alternatively, select the **Favorites** tab to view all the model dashboards that you marked as favorites.

4. Select a dashboard and click **Execute**.

> Note:
>
> When you execute the dashboard queries to display the results, the system considers the root item of the model structure, irrespective of the child model revisions you select in the structure.

5. (Optional) **Sort and refresh the dashboard results**.

6. (Optional) **Edit the dashboard results**.

7. (Optional) **Generate the dashboard report**.

8. (Optional) To view a summary of the dashboard, click **Summary** on the top of the table.

9. (Optional) **Launch simulation tools from the dashboard**.

Select objects and view the dashboard results in the context of the selected objects

1. Use one of the following methods to open the dashboard results:

   - Select multiple model and analysis revisions and choose **More Commands** > **View** > **Simulation Dashboard**.

     In the **Select Dashboard** panel, select the **All** tab to view both model and analysis dashboards. Alternatively, select the **Favorites** tab to view both model and analysis dashboards that you marked as favorites.

   - Select multiple model *or* analysis revisions and choose **More Commands** > **View** > **Simulation Dashboard**.

     In the **Select Dashboard** panel, select the **All** tab to view only model or analysis dashboards. Alternatively, select the **Favorites** tab to view only model or analysis dashboards that you marked as favorites.

2. Select a dashboard and click **Execute**.

3. (Optional) **Sort and refresh the dashboard results**.

4. (Optional) **Edit the dashboard results**.

5. (Optional) **Generate the dashboard report**.

6. (Optional) To view a summary of the dashboard, click **Summary** on the top of the table.

7. (Optional) **Launch simulation tools from the dashboard**.

Select folders and view the dashboard results in the context of the selected folders

You can select folders and view the dashboard results in the context of the selected folders.

1. To open the **Analyst** workspace, log on as an analyst user.

   This method of accessing the dashboards is available only in the **Analyst** workspace.

2. Select a folder that contains analysis or model revisions and choose **More Commands** > **View** > **Simulation Dashboard**.

   > Note:
   >
   > To view all dashboards, select two or more folders containing model and analysis revisions, respectively.

3. In the **Select Dashboard** panel, select the **All** tab to view model or analysis dashboards, respectively.

   Alternatively, select the **Favorites** tab to view model or analysis dashboards, respectively. The dashboards that you marked as favorites are displayed here.

   > Tip:
   >
   > All dashboards are displayed in these tabs if you select two or more folders containing model and analysis revisions, respectively.

4. Select a dashboard and click **Execute**.

5. (Optional) **Sort and refresh the dashboard results**.

6. (Optional) **Edit the dashboard results**.

7. (Optional) **Generate the dashboard report**.

8. (Optional) To view a summary of the dashboard, click **Summary** on the top of the table.

9. (Optional) **Launch simulation tools from the dashboard**.

Search for objects and view the dashboard results in the context of the search

1. Search for model or analysis revisions.
2. Select the revisions and choose **More Commands** > **View** > **Simulation Dashboard**.
3. In the **Select Dashboard** panel, select the **All** tab to view model or analysis dashboards, respectively.

   Alternatively, select the **Favorites** tab to view model or analysis dashboards, respectively. The dashboards that you marked as favorites are displayed here.
4. Select a dashboard and click **Execute**.
5. (Optional) **Sort and refresh the dashboard results**.
6. (Optional) **Edit the dashboard results**.
7. (Optional) **Generate the dashboard report**.
8. (Optional) **Launch simulation tools from the dashboard**.

Execute queries to view the dashboard results

1. On the **HOME** page, click **Simulation Dashboards**.
2. Select a **Model Dashboard** or an **Analysis Dashboard**.
3. To execute a query, click **Input**.
4. In the **Input** panel, select a query from the list.

   The system populates the list of valid queries depending on the type of dashboard you select.
5. Specify or select values as appropriate and click the **Execute** button.
6. (Optional) **Sort and refresh the dashboard results**.
7. (Optional) **Edit the dashboard results**.
8. (Optional) **Generate the dashboard report**.
9. (Optional) To export reports in Microsoft Excel or Microsoft Word format, select a revision or multiple revisions, click **Share** > **Export**. Select the appropriate options to export the data.

10. (Optional) **Launch simulation tools from the dashboard**.

Launch simulation tools from the dashboard

1. **Execute queries to view the dashboard results**.
2. Select one or more objects from the dashboard.
3. (**Analyst** workspace) Choose **Open in Simulation Tool**.

   (Default workspace) Choose **Open** > **Open in Simulation Tool**.
4. Select a preconfigured launch tool.
5. **Specify the required inputs and select a launch method**.

Sort and refresh the dashboard results

Performing a sort of the dashboard results is useful for identifying unfinished tasks. Let us assume that you are performing the design validation of a car assembly. After getting the workflow request, you search for the product structure with the CAD data in Teamcenter, and you apply structure map rules to create a model structure based on the product structure. You **open the model structure, select the meshing dashboard, and execute a query to view the dashboard results**.

> Example:
>
> You can sort the **FEM File** column in the dashboard to find out which components or objects have finite element mesh (**.fem**) files attached to them. If the dashboard objects have **.fem** files attached to them, it means that they were analyzed previously. You can filter out the objects with mesh files by typing **Not Found** in the text filter. The dashboard displays objects that do not have **.fem** files attached to them. You can then launch simulation tools on such objects to start the meshing process.

1. **Execute queries to view the dashboard results**.
2. Sort the dashboard columns using a text filter.
   a. Click the table header of the column you want to sort.
   b. Select an operator. The valid operators are **Contains**, **Does not contain**, **Begins with**, **Ends with**, **Equals**, and **Does not equal**.
   c. Type the text by which you want to filter the column contents and click **Filter**.

The text filter you specify is not case sensitive. For example, you can type **cae** to filter object names containing both **CAE** in upper case and **cae** in lower case.

d. (Optional) After applying a text filter, hover your mouse over the **Filter** icon. The system displays the text filter you have applied as a tooltip.

e. (Optional) Apply a filter criteria on a specific column and then sort the same column. The system applies both the filter and the sort criteria and loads the results as per both the criteria.

f. To sort further, select more column headers and select the appropriate sort options.

> Example:
>
> In the **Object** column, select **Contains** and type **CAE** to show all objects with **CAE** in the object name. For further text-based sorting, select **Equals** in the **Mass** column, and type **1000 KG** to display only objects with a mass of 1000 kilograms.

3. Sort the dashboard columns for common values by using facets.

a. Click the table header of the column you want to sort.

b. Enable **Show Filters**, select the specific objects you want displayed in the dashboard column, and click **Filter**.

You can optionally first apply a text filter and then enable **Show Filters** to further filter the column results.

> Example:
>
> In the **Name** column, type **kpi** in the text filter and then enable **Show Filters** to display only names that have **kpi** in this column.

4. To refresh the entire simulation dashboard, click **Refresh** at the top of the table.

The system preserves the sorting order even after the dashboard is refreshed.

5. To refresh the selected objects, select one or more objects in the simulation dashboard and click **Refresh** at the top of the table.

The system preserves the sorting order even after the selected objects are refreshed.

6. To reset the filter criteria on a column, click the column header and click **Clear**.

7. To reset all filters, click > **Clear all filters**.

8. To view a summary of the dashboard, click **Summary** at the top of the table.

When you refresh the simulation dashboard, the summary information is also refreshed.

9. Execute a query after sorting the dashboard.

   a. Sort the dashboard.

   b. To execute a query, click **Input** at the top of the table.

   c. Specify or select values as appropriate and click the **Execute** button.

      The system preserves the sorting order even after you execute a query.

10. (Optional) **Edit the dashboard results**.

11. (Optional) **Generate the dashboard report**.

12. (Optional) **Launch simulation tools from the dashboard**.

Edit the dashboard results

1. **Execute queries to view the dashboard results**.

2. (Optional) **Sort and refresh the dashboard results**.

3. (Optional) To reset the filter criteria on a column, click the column header and click **Clear**.

4. To edit the dashboard, click **Start Edit** on the top of the table.

5. Make the required changes to the properties displayed in the dashboard.

6. To save your changes, click **Edit** > **Save Edits**.

7. (Optional) **Generate the dashboard report**.

Generate the dashboard report

1. **Execute queries to view the dashboard results**.

2. (Optional) **Sort and refresh the dashboard results**.

3. Click **Generate Dashboard Report** on the top of the table.

   The system generates the dashboard report as per the filter criteria you have applied.

4. Select a template for the report.

5. To save the report, select the **Create Dataset** check box and specify a report name.

6. Click the **Generate Report** button.

   The system generates the report asynchronously and an alert is displayed when it is available. The report is saved to the database and is available from the **Newstuff** folder.

   If you have selected the **Create Dataset** check box, the report is saved in the database with the report name you specified and is available from the **Newstuff** folder.