
MODEL BUILD-UP

SIMPLIFIED

IN KOMVOS

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1. Introduction

This document is a tutorial for KOMVOS software and its use in the workflow of Model build-up. The target of the document is to help the users become familiar with KOMVOS functionalities and with the advantages of working with KOMVOS on demanding tasks in terms of time and effort.

The example demonstrated for the scope of this tutorial concerns a door sub-assembly. Such an example enables the demonstration of the basic capabilities of KOMVOS, while at the same time it can be considered easy to handle, even for non-expert users.

1.1. Prerequisites

For the purposes of this tutorial, most terms and functionalities that are essential and used during the Model build-up process are thoroughly described. However, reading the “KOMVOS User Guide” document, accessed within KOMVOS through **Help > Documentation Index: User Guides** is recommended in order to obtain full familiarization and in depth understanding of KOMVOS software and its capabilities.

1.2. Problem description

The target is to execute a workflow process which guides the end-users through the actions that need to be implemented during Model build-up, starting from the definition of the primary properties of the created Subsystems and Simulation Models, to CAD translation of the respective parts, midsurface creation and generation of the mesh representations of parts, up to saving the data to the DM repository. Also, the tutorial indicates how to update the DM by uploading a part's new version and to create a new updated subsystem, as well as how to create a spin-up iteration of a part, to spectate the References of each part and report their Changeset information. The process concludes with the creation of Simulation Runs, as well as the attachment of the simulation results and the post-processing META session.

1.3. Data Files

The files required for this tutorial reside inside the following directory:

.../KOMVOS_Model_Build_Tutorial

This directory consists of:

- The **Initial_Model** folder that contains all data required for the first section of this tutorial, i.e. the structure and CAD data of the selected parts and the *.xml files for the model's hierarchy.
- The **batch_mesh_sessions** directory that contains the meshing scenarios to be used for the creation of meshed representations. These scenarios are stored as *.ansa files.
- The **DM_Results** folder, which includes the Parts, Subsystems, Simulation Models, Loadcases, Simulation Runs and post processing data that will be used at the second part of this tutorial, together with the **batch_mesh_sessions** directory.
- A python script named **PerPartPost.py** that is going to be used as a Post treatment per part script at Settings>Actions.
- A **Session_files** folder, which includes the META session files that are to be used during the post processing actions
- A **Results_files** folder, which includes the NASTRAN output files of each Simulation Run.
- A **config** file which contains the *.xml files that store the required settings and scripts to execute any action in KOMVOS.

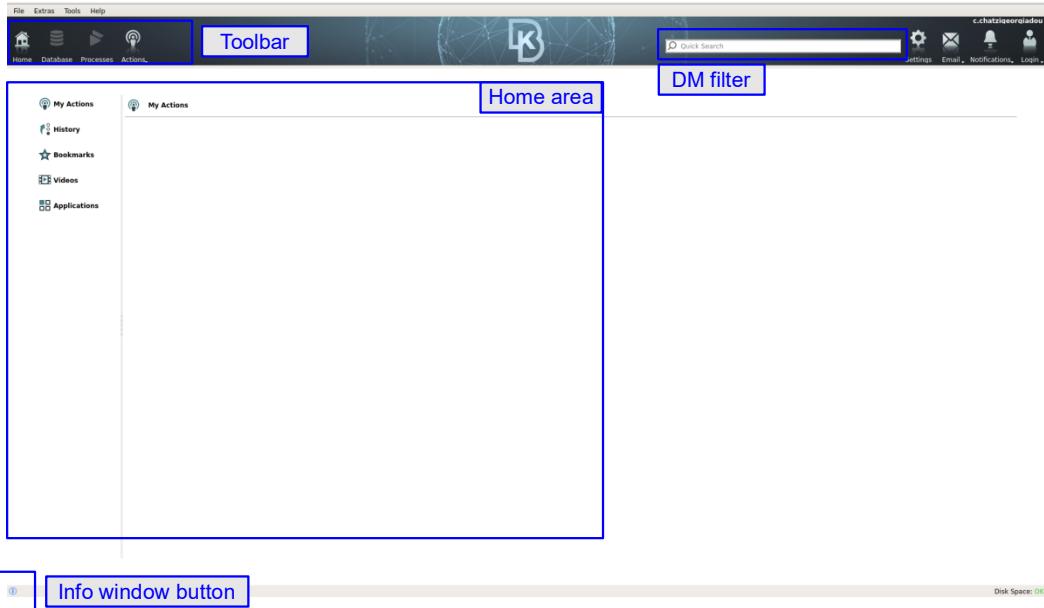
-
- A folder named **Final_DM**s where the resulting DMs from following the tutorial steps are given

2. KOMVOS Graphic User Interface

To begin, in order to follow the steps of this tutorial, copy and save an updated KOMVOS **config** folder from the following path. Also, it is essential that KOMVOS is opened after doing this action.

/.../KOMVOS_Model_Build_Tutorial/

Upon launching KOMVOS the following window appears:



2.1. Important information required

In order for KOMVOS to start and perform properly, the **SDM_CONSOLE_HOME** variable must be defined. This is the **configuration folder** of KOMVOS, where all the required settings and scripts are stored in order to execute any action in KOMVOS.

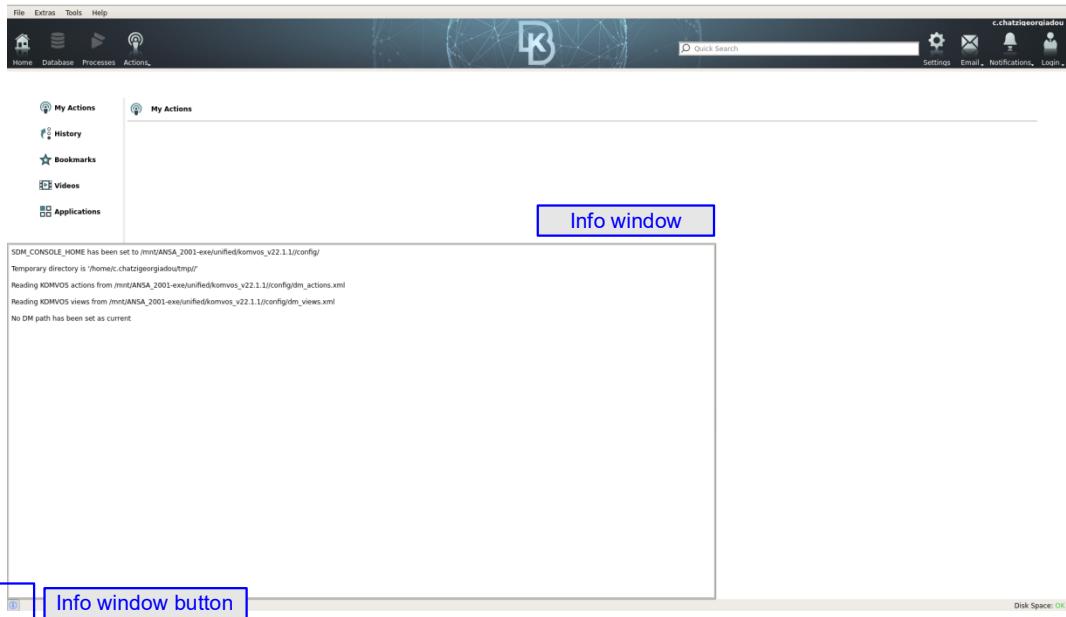
The most important setup files that reside inside the configuration folder are:

- **dm_actions.xml**: used to add and control the general actions on entities of the database, not related to a specific part/ subsystem.
- **dm_views.xml**: used to control the view of the data and also the actions that are related to a specific part/ subsystem.
- **dm_structure.xml**: the file where all the needed attributes for the proper definition of parts, subsystems and simulation models are defined i.e. used to set up the data structure.

! The **dm_actions.xml** as well as the **dm_views.xml** files are fully customizable and thus they can be adjusted to include any other preferred actions.

2.2. Communication with users

In the *Info window*, information regarding what has been read from KOMVOS and from which location (configuration folder) is displayed, as well as any errors that occurred upon start up. Info window opens by clicking on the *Info window button*. As soon as the cursor is clicked outside from the *Info window*, the window minimizes automatically.



2.3. Home tab

Upon starting KOMVOS, the *Home* tab is launched, where the history of all performed actions, stored filters and documentation videos reside. It contains five distinct views:



My Actions: A list with all executed or pending actions. By double-clicking on an action the, the specific action is re-triggered.

History: List of all previous actions performed in KOMVOS.

Bookmarks: Any saved bookmark is stored in this list.

Videos: List of documentation videos, e.g. tutorials.

Applications: The available applications that can be launched by KOMVOS.

2.4. DM filter

Quick filtering of the DM contents is provided, in order to facilitate selection of a specific entity from the DM by typing Server Id, Name or Module Id:



2.5. Perform General actions

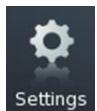
General actions with KOMVOS can be defined under Toolbar> Actions.

These actions are defined in the `dm_actions.xml` file that is stored in the **configuration folder** of KOMVOS.



By pressing the **Actions** icon, the menu of general actions that can be performed appears.

2.6. Settings



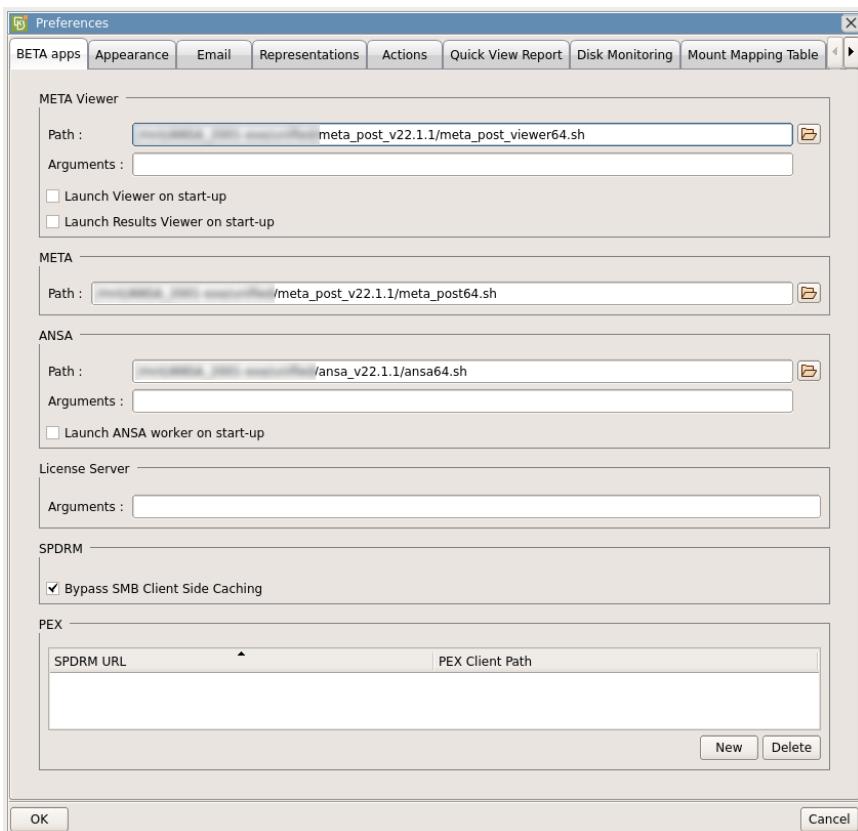
From the **Settings** button, several settings for KOMVOS can be defined. Once the button is pressed, the *Preferences* window is launched.

! It is recommended that when KOMVOS is used by the employees of a company, these settings are the same for all users. Thus, they should be set and modified only by the person who defines the workflow that will be executed with KOMVOS.

2.6.1. BETA apps

In the *BETA apps* tab, the correct paths of software executable that will be used for the various user actions must be defined.

Before starting the tutorial, make sure to set the correct paths for the ANSA and META Viewer applications that will be used throughout the workflow.



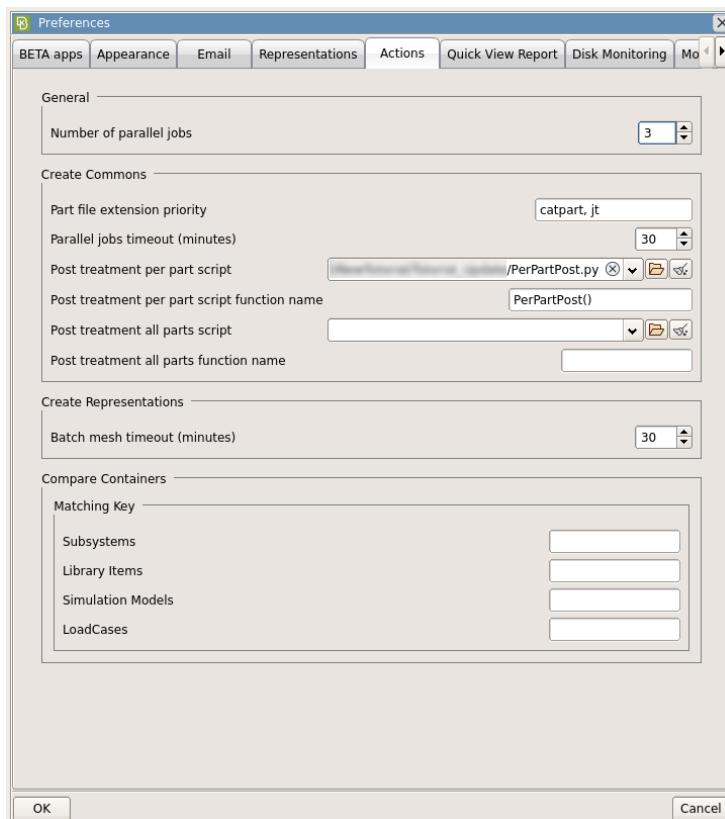
NOTE !: Before starting the Model build-up process in KOMVOS, make sure that in ANSA the option Tools>Settings>Modular Environment>Save in DM> **Advanced options of Parts > Light Representation File: JT file** is selected and saved in **ANSA.defaults**.

2.6.2. Actions

In the *Actions* tab, some special settings to be taken into account when executing user actions, must be set, such as the:

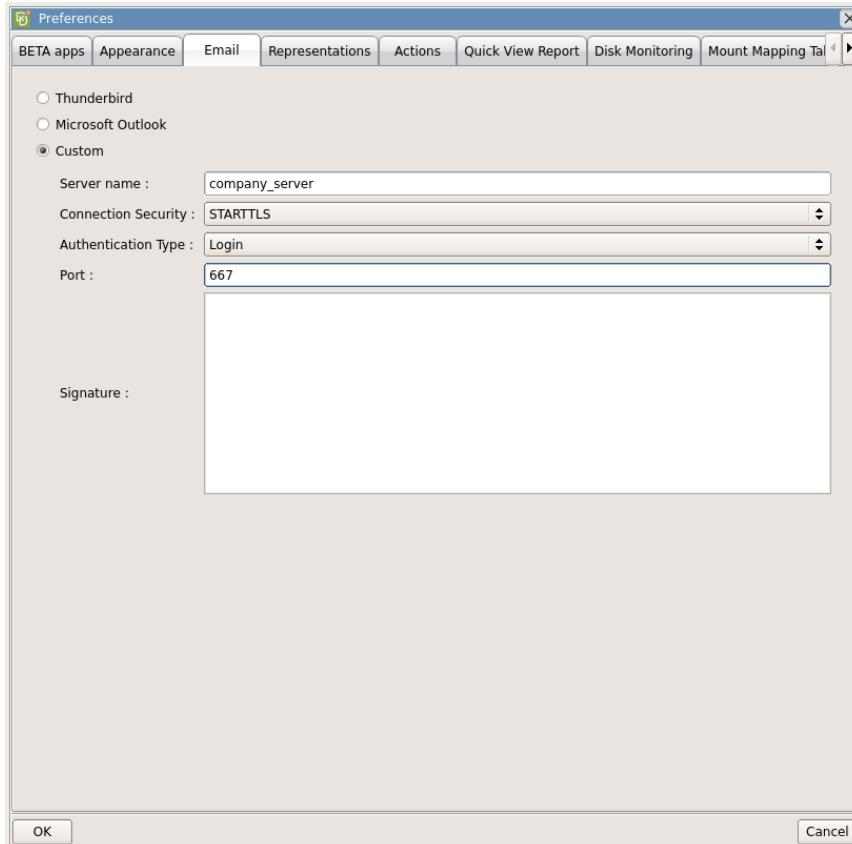
- *Number of parallel jobs*: In general, if the number of parallel jobs > 0, KOMVOS will be handling parts in parallel processes, and, subsequently, additional software licenses will be used. For the scopes of this tutorial it is recommended to set the number of parallel jobs to **3** or to the maximum possible value, which is determined automatically based on the number of processors of the workstation.
- *Part file extension priority*: Files that will be searched for the translation of the CAD data, which in this case should be set to **catpart, jt**.
- Post treatment actions, if necessary. For this case, a *Post treatment per part script* will be defined in order to keep only the necessary properties from each CAD file as well as to assign information about the *Status* and *Material* to each part. To do this, click on the folder icon and select the script file **PerPartPost.py** from the *configuration* tutorial folder and insert as a *Post treatment per part script function name*: **PerPartPost()**

NOTE !: If the script file **PerPartPost.py** is saved in KOMVOS config folder there is no need to give the full path, only script name is necessary.



2.6.3. Email

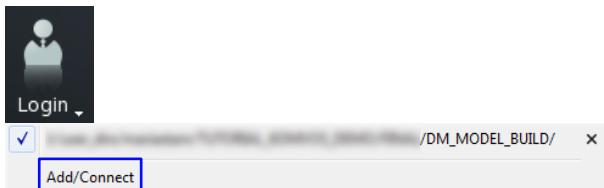
In the *Email* tab, the appropriate email account must be set up, so that the users can communicate directly from within KOMVOS, without the need to use any other email software.



3. Critical information prior to working in KOMVOS

3.1. Set up the DM root directory

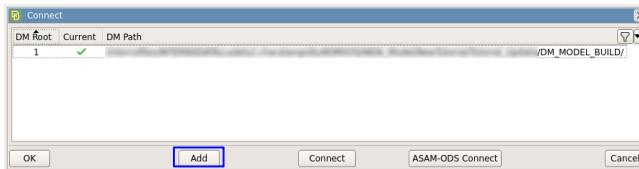
Before start using KOMVOS, a directory that will be used as the DM repository (from now on called the “DM folder”) must be defined in a desired location on the drive. This directory should be accessible by all users working with KOMVOS. KOMVOS will interact with the DM folder in order to store and retrieve all the needed data.



By pressing the **Login** button, the list of the already defined DM folders (if any) is displayed and the appropriate folder can be selected.

In case that a DM folder has not been established yet, a new directory shall be defined to be used as the DM repository. A relative name should be given to the directory as well, e.g. DM_MODEL_BUILD.

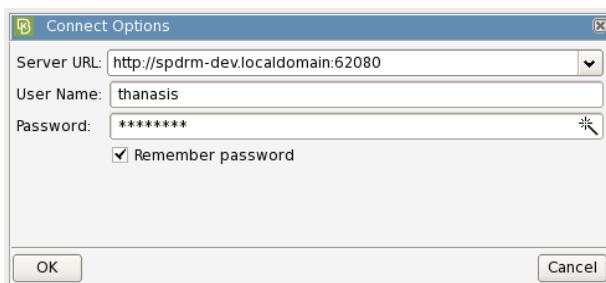
In order to do so, click on the **Add/Connect** button.



Once the *Connect* window appears, press the **Add** button to access the *File Manager* and select the desired directory as the new DM folder.

Note that this window can host more than one root directories, but each time only one can be the current. To set a directory as current, select the option **Set Current** from its context menu or double-click on it.

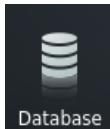
!: Mind to place *the batch_mesh_sessions* directory inside the newly created DM_MODEL_BUILD folder, as it will be used in one of the succeeding steps of the Model build-up process.



KOMVOS can connect to any SDM System and use this as DM Folder.

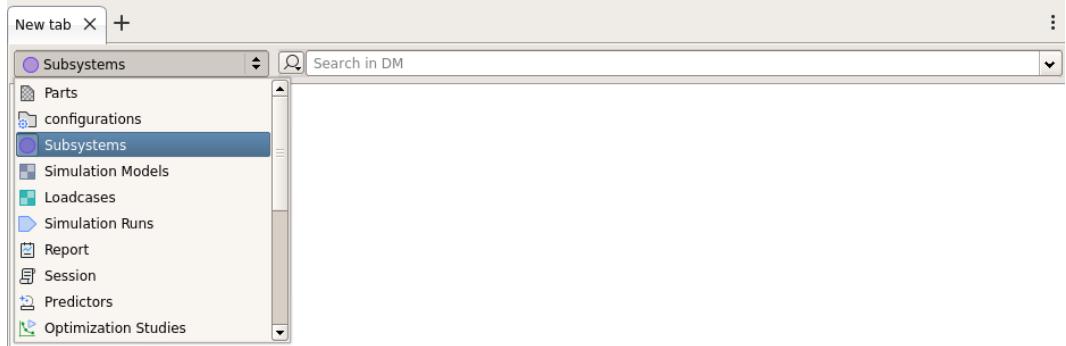
By clicking on the **Connect** button the *Connect Options* window pops-up, where the user can connect to a URL Server by providing the URL path and his/ hers credentials.

3.2. DM Entities view in KOMVOS



To navigate in the connected DM, press the Database button.

A new tab opens. Select the desired DM entity from the drop-down menu (e.g. view the Subsystems or Parts that have been stored in DM), press **Enter** in the empty search filter and the DM entity appears in a new tab.



The lists of data can be expanded or collapsed, data can be displayed in tree or flat view, columns can be added or removed and one or more filters can be used according to the user needs, by pressing the respective buttons in the upper right area of the list.

A screenshot of the KOMVOS interface showing the 'Subsystems' tab. The interface includes a toolbar with 'New tab', 'Parts', 'Subsystems' (selected), and a '+' button. Below the toolbar are buttons for 'Where Used', 'Lifecycle', and 'Iteration'. The main area displays a tree view of 'FR_Cabin' components. Several UI elements are highlighted with blue boxes: 'Tree/ Flat view mode' points to the view mode switch; 'Expand/Collapse' points to the expand/collapse icons; 'Column filtering' points to the column filtering dropdown; 'Add/Remove columns' points to the column management icons; 'DM Status' points to the status bar at the bottom left; and 'DM path' points to the status bar at the bottom right. The status bar also shows 'DM:' and the path '/DM_MODEL_BUILD/ Subsystems 1 | selected 1'.

By pressing the **Refresh** button, the contents of the tab are automatically updated, according to the contents of the current DM folder.

GENERAL NOTE !:The Status attribute of the Parts/ Groups and Subsystems is very useful in cases where it is necessary to save an item in the DM and mark it somehow, in order to identify its state at any time and proceed to further actions.

Status
○ : Empty
○ : Work in progress
○ : OK
○ : Warning
○ : Error
○ : Not built yet
○ : More than one status involved, show an approximation of the OK status percentage
⚠ : Saving pending

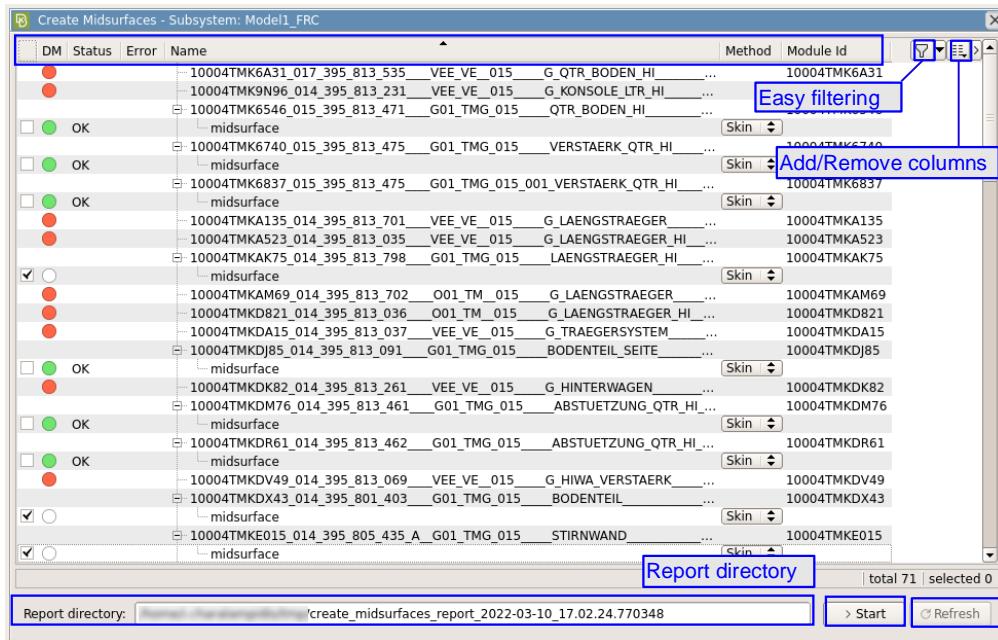
In KOMVOS, the current Status of a selected entity is displayed in the Status column of the *Parts and Subsystems* tab and is color coded.

The available Status values are:

- ○ **Empty:** signifying the entities that do not exist under the current representation in DM.
- ○ **Work in Progress (WIP):** for entities that currently take place in a specific action.
- ○ **OK:** for entities that can be found in DM under a specific representation.
- ○ **Warning:** for entities whose representation has been saved in DM but still need to be checked.
- ○ **Error:** signifying the entities where an error has occurred and thus could not be saved in DM.
- ○ **Not built yet:** for entities that have not yet been built in the DM.
- ⚠ : For new and/ or modified entities that have still not been saved.
- ○ : Displaying the percentage of the OK status, in case that more than one status is involved.

3.3. Action windows in KOMVOS

Each time an action is performed on a Subsystem, the respective *action window* is launched. In action windows, all the essential information regarding the parts of the Subsystem that participate in the action is displayed.



In action windows, columns can be added or removed and one or more filters can be applied according to the user needs by pressing the respective buttons.

The values of the columns *DM*, *Status*, *Error* and *Representation* are automatically updated when an action is completed or the **Refresh** button is pressed.

- : Not found in DM
- : Found in DM
- : Common representation missing from DM

In the DM column, an overview of the status of the parts is displayed in the DM folder.

The available values are:

- ● **Representation Not found in DM:** The specific representation of the part is not currently found in the DM folder.
- ● **Representation Found in DM:** The specific representation of the part exists in DM.
- ● **Missing previous representation:** The specific representation (generated in a former step) of the part is missing from the DM folder, so it cannot participate in the current action.

In the *Report directory*, a temporary folder is created where the *.log files for every part can be retrieved. This directory will be automatically deleted once the performed action is completed and as soon as the action window is closed.

Each action can be triggered by pressing the **Start** button and will be applied on the marked parts. The progress of the action can be viewed either from the *Terminal/cmd window* or by pressing the **Refresh** button.

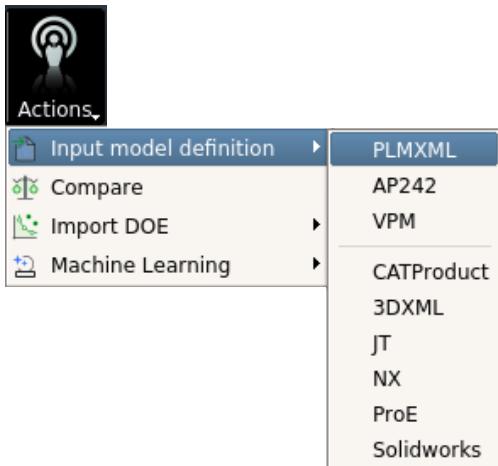
4. Model build-up workflow in KOMVOS

4.1. Model creation and CAE structure definition

In this first step of the workflow process, the model definition will be read from the .xml file in order to create and save the corresponding Subsystem and Simulation Model inside the newly created DM_MODEL_BUILD and attach the CAE structure of our model.

4.1.1. Import the assembly hierarchy information

The assembly hierarchy information, i.e. the product structure file, for this example is given in *.xml format that can be read from KOMVOS and can be retrieved from the **Actions** button.



Go to Actions > Input model definition > PLMXML.

The File Manager appears. Select the product definition file from the tutorial data:

/.../KOMVOS_Model_Build_Tutorial/Initial_Model/
395_800_415_____VEG_TMG_015_____AUFBAU
1_____JJMMTT-
10004TMK5Y86_A

KOMVOS reads the product definition and launches the *Part Manager* tab. In the *Structure* tab of *Part Manager*, the hierarchy of the model is displayed.

DM	Name	Module Id	Version	Transformation Matrix	Instances	Part Files
(All)						
10004TMK5Y86_015_395_800_415	VEG_TMG_015...	10004TMK5Y86	015	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.1	1	1
10004TMK6158_014_395_813_738	VEG_TMG_01...	10004TMK61...	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.1	1	1
10004TMK6D22_014_395_813_069	VEG_TMG...	10004TMK6D...	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.1	1	1
10004TMK6GW62_014_395_813_261	VEG_T...	10004TMK6...	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.1	1	1
10004TMK9C32_014_395_813_037	VEG...	10004TMK9C...	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.1	1	1
10004TMK9D29_014_395_813_035	...	10004TMK9D...	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.1	1	1
10004TMK9E26_014_395_813_231	...	10004TMK9E...	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.3	1	1
10004TMK9N96_014_395_813_037	...	10004TMK9N...	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.3	3	3
10004TN12T78_014_395_813_2...	...	10004TN12T78	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.3	3	3
100050TE8520_011_395_813_23...	...	100050TE8520	011	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.3	3	3
10004TMK9T78_014_395_813_701	...	10004TMK9T78	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.1	1	1
10004TMKA135_014_395_813_7...	...	10004TMKA1...	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.1	3	3
10004TN12Y63_014_395_813_8...	...	10004TN12Y63	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.1	3	3
10004TN13135_014_395_813_7...	...	10004TN13135	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.1	3	3
10004XNAXC77_012_395_813_7...	...	10004XNAXC...	012	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.1	3	3
10004TMKA52_014_395_813_035...	...	10004TMKA5...	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.1	3	3
10004XNAY859_012_395_813_035...	...	10004XNAY859	012	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.1	3	3
10004TMKA911_014_395_813_036...	...	10004TMKA9...	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.1	1	1
10004TMK9E26_014_395_813_231...	...	10004TMK9E...	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.30....	3	1
10004TMK9N96_014_395_813_2...	...	10004TMK9N...	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.30....	3	3
10004TN12T78_014_395_813_2...	...	10004TN12T78	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.30....	3	3
100050TE8520_011_395_813_23...	...	100050TE8520	011	1.0.0.0.0.1.0.0.0.0.1.0.0.0.30....	3	3
10004TMK9E26_014_395_813_231...	...	10004TMK9E...	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.3	1	1
10004TMK9N96_014_395_813_2...	...	10004TMK9N...	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.3	3	3
10004TN12T78_014_395_813_2...	...	10004TN12T78	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.3	3	3
100050TE8520_011_395_813_23...	...	100050TE8520	011	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.3	3	3
10004TMK9E26_014_395_813_231...	...	10004TMK9E...	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.3	1	1
10004TMK9N96_014_395_813_2...	...	10004TMK9N...	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.3	3	3
10004TN12T78_014_395_813_2...	...	10004TN12T78	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.3	3	3
100050TE8520_011_395_813_23...	...	100050TE8520	011	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.3	3	3
10004TMKAC02_014_395_813_702...	...	10004TMKAC...	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.1.1	1	1
10004TMKAK75_014_395_813_7...	...	10004TMKAK...	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.1	3	3
10004TMKAM69_014_395_813_7...	...	10004TMKA...	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.1	3	3
10004TN13329_014_395_813_8...	...	10004TN13329	014	1.0.0.0.0.1.0.0.0.0.1.0.0.0.0.1.1	3	3

total 123 | selected 0

Parts 85 Part Files 227

Found in DM 0 File exists 82

Not found in DM 85 File does not exist 145

Check in DM **Check in DM**

All functionalities applied to tree list windows are available here as well. Columns can be added or removed according to user needs by pressing the respective button in the upper right area of the list.

The columns **Instances**, **Transformation Matrix**, **Version** and **Part Files** give information about the number of instances of the particular part/group that exist in the assembly, their transformation matrix, their Version and the number of physical files referred for the particular part/group, respectively.

By pressing the **Check in DM** button, KOMVOS checks inside the set DM folder for existing representations of the incoming parts and shows the existing representations as found from the 'Check in DM' function.

Switching to the *Part Files* tab, all parts that are referenced in the .xml structure file are displayed in flat view and in correspondence with their respective file(s).

Moreover, in this tab additional informative columns may be visible with metadata read from the .xml file, and could be used for filtering and identification purposes. The columns differ, depending on the contents of the .xml file.

The screenshot shows the Part Manager tab in KOMVOS. At the top, there are tabs for 'Part Manager' (selected) and 'META Viewer'. Below the tabs are buttons for 'Set all Active', 'Hide Inactive', 'Reset Template', 'Apply Template', and 'Utilities'. Underneath these are two tabs: 'Structure' (selected) and 'Part Files'. The main area displays a hierarchical tree of parts under the 'DM' category. Each part entry includes fields for 'Name', 'Module Id', 'Version', 'Transformation_Matrix', 'Instances', and 'Part Files'. A status bar at the bottom indicates 'total 312 selected 0'.

DM	Name	Module Id	Version	Transformation_Matrix	Instances	Part Files
10004TMKSY86_015	395_800_415_VEG_TMG_015...	10004TMKSY86_015		1.0.0.0.0.1.0.0.0.0.0.1...	1	1
10004TMK6A31_017	395_813_355_VEE_VE_015...	10004TMK6A31_017		1.0.0.0.0.1.0.0.0.0.1...	1	3
10004TMK6D22_014	395_813_069_VEG_TMG_015...	10004TMK6D22_014		1.0.0.0.0.1.0.0.0.0.1...	1	1
10004TMK6W62_014	395_813_261_VEG_TMG_015...	10004TMK6W62_014		1.0.0.0.0.1.0.0.0.0.1...	1	1
10004TMK9C32_014	395_813_037_VEG_TMG_015...	10004TMK9C32_014		1.0.0.0.0.1.0.0.0.0.1...	1	1
10004TMK9D29_014	395_813_035_VEG_TMG_015...	10004TMK9D29_014		1.0.0.0.0.1.0.0.0.0.1...	1	1
10004TMK9E26_014	395_813_231_VEG_TMG_015...	10004TMK9E26_014		1.0.0.0.0.1.0.0.0.0.1...	3	1
10004TMK9N96_014	395_813_231_VEE_VE_015...	10004TMK9N96_014		1.0.0.0.0.1.0.0.0.0.1...	3	3
10004TMK9T78_014	395_813_701_VEG_TMG_015...	10004TMK9T78_014		1.0.0.0.0.1.0.0.0.0.1...	1	1
10004TMK6158_014	395_813_738_VEG_TMG_015...	10004TMK6158_014		1.0.0.0.0.1.0.0.0.0.1...	1	1
10004TMK6352_016	395_813_535_VEG_TMG_015...	10004TMK6352_016		1.0.0.0.0.1.0.0.0.0.1...	1	1
10004TMK6546_015	395_813_471_G01_TMG_015...	10004TMK6546_015		1.0.0.0.0.1.0.0.0.0.1...	1	3
10004TMK67A0_015	395_813_475_G01_TMG_015...	10004TMK67A0_015		1.0.0.0.0.1.0.0.0.0.1...	1	3

Below the tree, there are summary statistics: Parts 85, Part Files 227, Found in DM 0, File exists 82, Not found in DM 85, File does not exist 145. A 'Check in DM' button is also present.

4.1.2. Visual inspection of the model

A graphical preview of the model is provided in KOMVOS, as long as the respective JT files are available for the parts.

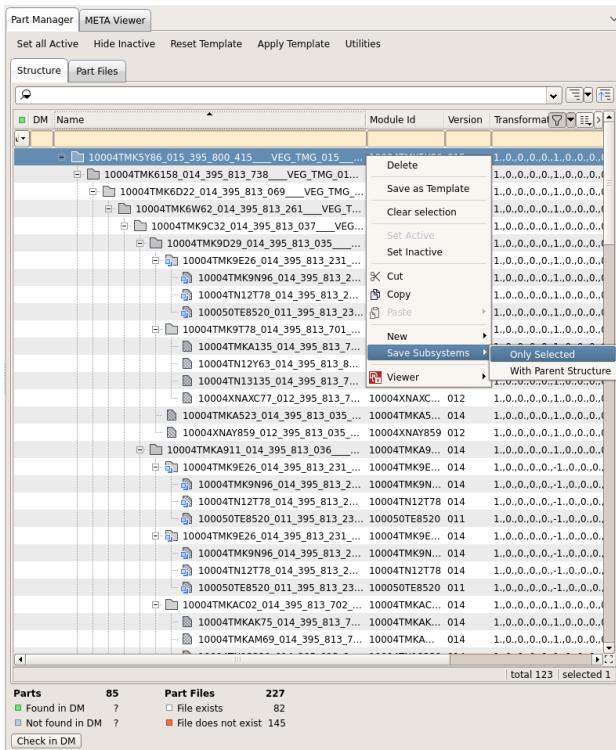
From the *Part Manager* tab select the outermost group and from its context menu select the option **Viewer> Open**.

The screenshot shows the Part Manager tab in KOMVOS. On the left, the 'Structure' tab is selected, displaying a hierarchical tree of parts under the 'DM' category. On the right, a 3D viewer window displays a green mechanical assembly with various components highlighted in purple. A context menu is open over one of the parts, showing options like 'Delete', 'Save as Template', 'Clear selection', 'Get Active', 'Set Inactive', 'Cut', 'Copy', 'Paste', 'New', 'Save Subsystems', 'Open', 'Hide', 'Merge', 'Clear', and 'Close'. The status bar at the bottom of the viewer window shows 'All Steps/Sub: Active Label: None'.

This visual inspection helps to verify if the correct model is displayed in Part Manager and to remove any unnecessary parts before the final import of the model into KOMVOS.

4.1.3. Create and save the Subsystem in DM

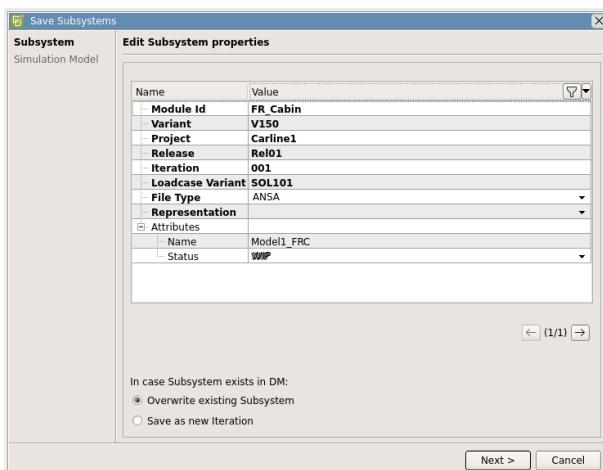
At this point the Subsystem entity that will represent the Door sub-assembly, as well as the Simulation Model entity containing this Subsystem will be created for the first time and will be stored in the DM folder.



From the **Structure** tab of the **Part Manager** window select the outermost group and from its context menu select the option **Save Subsystems> Only Selected**.

! The option With Parent Structure is used in cases of specifically selected parts (i.e. parts where a filter has been applied), in order to save the parts with their parent structure and not just as a flat list of parts.

The Save Subsystems wizard pops-up and at the *Edit Subsystem properties* tabs the Properties and Attributes of the Subsystem are displayed.



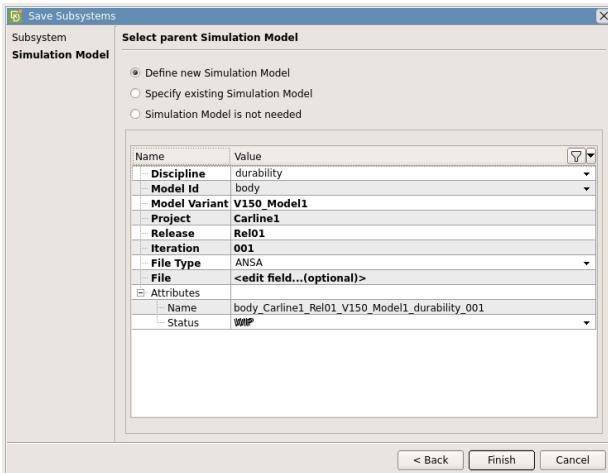
Edit the fields of the window as shown in the picture.

Mind to press **Enter** every time a value is typed in the respective field, so as to proceed to the next field.

! A “blank” representation (empty **Representation field) implies the “common” representation.**

Leave the option **Overwrite existing Subsystem** at the “In case Subsystem exists in DM” area and press **Next** in order to proceed.

NOTE !: Subsystem variant is V150, because the used PLMXML corresponds to a 150% model. This means that this model includes every possible configuration/variant of the main model (cabrio, left-steering, right-steering etc.).



In the appearing *Select parent Simulation Model* tab, leave the option **Define new Simulation Model**.

Fill the empty fields as shown in the picture (optionally, the desired values from the respective drop-down menus can be inserted instead).

Press **Finish** to complete the process.

NOTE !: The data structure, i.e. the Properties and attributes of the generated Subsystems and Simulation Models in KOMVOS refer to the `dm_structure.xml` file and are fully customizable, according to the needs of the users and/or organizations. For more information about the configuration of the `dm_structure.xml` file, please refer to "KOMVOS User Guide" document.

The respective Subsystem and Simulation Model have now been created in the DM_MODEL_BUILD repository.

Open a new tab, select **Subsystems** from the drop-down menu and press **Enter** in the empty search filter. The newly created subsystem is displayed in the *Subsystems* tab.

Contents	Module Id	Variant	Project	Release	Iteration	Representation	LoadCase	Is Group	Status
FR_Cabin	FR_Cabin	V150	Carline1	Rel01			SOL101	ANSA	common
Carline1 , Rel01 , V150 (Project , Release, Variant)	FR_Cabin	V150	Carline1	Rel01	001				common
common	FR_Cabin	V150	Carline1	Rel01	001		SOL101	ANSA	common
10004TMKS86_015_395_800_415_____VEG.T...	10004TMK5Y86								common
10004TMK6158_014_395_813_738_____VEG...	10004TMK6158								common
10004TMK6D22_014_395_813_069_____...	10004TMK6D22								common
10004TMK6W62_014_395_813_261...	10004TMK6W62								common
10004TMK9C32_014_395_813_0...	10004TMK9C32								common
10004TMK9D29_014_395_81...	10004TMK9D29								common
10004TMK9E26_014_395...	10004TMK9E26								common
10004TMK9N96_014_3...	10004TMK9N96								common
10004TN12T78_014_3...	10004TN12T78								common
100050TEB520_011_3...	100050TEB520								common
10004TMK9T78_014_395...	10004TMK9T78								common
10004TMKA135_014_3...	10004TMKA135								common

At this point, the representation file of the Subsystem that is stored in the DM contains only the hierarchy of the Subsystem, with the parts being empty, as indicated from their Status.

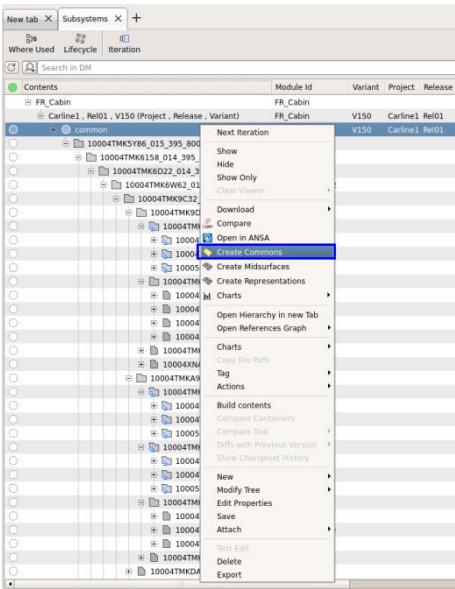
NOTE !: All actions regarding the Model Build-up process from now on will be performed on the Subsystems, i.e. from the Subsystem context menu.

NOTE !: The creation of Subsystems and Simulation Models can be also done manually in KOMVOS, either from *File> New> Subsystem* and *File> New> Simulation Model* respectively, or by right clicking inside the respective tab, i.e. *Subsystems* tab or *Simulation Models* tab and selecting **New Subsystem** or **New Simulation Model**.

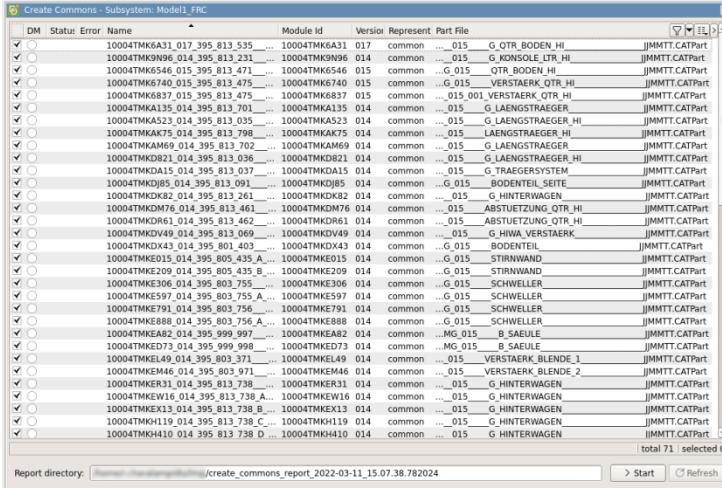
4.2. Create Commons

In this step, the CAD files of parts need to be translated. To this direction, the **Create Commons** action needs to be performed on the Subsystem. During this action, the CAD files will be translated, and stored in DM, the corresponding attributes (e.g. Module Id, Name, Version, etc.) will be assigned to each file, the geometry of parts will be checked and finally the parts will be saved under the ‘common’ representation.

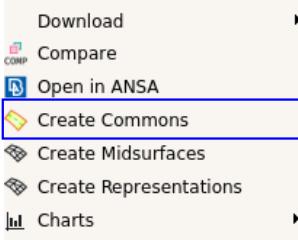
These parts will be the basis for the creation of any discipline-dependent mesh representation that will be generated in the following steps.



The *Create Commons* action window is launched.



To perform this step, right click on the Subsystem and select the **Create Commons** option from its context menu.



KOMVOS automatically recognizes and marks the parts where the action will be applied, i.e. the parts that do not have the 'common' representation in the selected DM Folder.

Press **Start** in order to trigger
the Create Commons action.

NOTE !: The Create Commons function is running in batch mode, raising parallel ANSA sessions according to the number of parallel jobs that were set in paragraph 2.6.2.

Use the **Refresh** button to update the contents of the action window. Once the action is finished, the window remains open and provides useful information about the status of the parts.

DM	Status	Error	Name	Module Id	Version	Represent	Part File	
✓	○	Error	Missing file 10004TMK6A31_017_395_813_535...	10004TMK6A31	017	common	..._015_G_QTR_BODEN_HI	JJMMTT.CATPart
✓	○	Error	Missing file 10004TMK9N96_014_395_813_231...	10004TMK9N96	014	common	..._015_G_KONSOLE_LTR_HI	JJMMTT.CATPart
✓	●	OK	10004TMK6546_015_395_813_471...	10004TMK6546	015	common	..._015_G_QTR_BODEN_HI	JJMMTT.CATPart
✓	●	OK	10004TMK6740_015_395_813_475...	10004TMK6740	015	common	..._015_G_VERSTAERK_QTR_HI	JJMMTT.CATPart
✓	●	OK	10004TMK6837_015_395_813_475...	10004TMK6837	015	common	..._015_001_VERSTAERK_QTR_HI	JJMMTT.CATPart
✓	○	Error	Missing file 10004TMKA135_014_395_813_701...	10004TMKA135	014	common	..._015_G_LAENGSTRAEGER	JJMMTT.CATPart
✓	○	Error	Missing file 10004TMKA523_014_395_813_035...	10004TMKA523	014	common	..._015_G_LAENGSTRAEGER_HI	JJMMTT.CATPart
✓	●	OK	10004TMKAK75_014_395_813_798...	10004TMKAK75	014	common	..._015_LAENGSTRAEGER_HI	JJMMTT.CATPart
✓	○	Error	Missing file 10004TMKAM69_014_395_813_702...	10004TMKAM69	014	common	..._015_G_LAENGSTRAEGER	JJMMTT.CATPart
✓	○	Error	Missing file 10004TMKDB21_014_395_813_036...	10004TMKDB21	014	common	..._015_G_LAENGSTRAEGER_HI	JJMMTT.CATPart
✓	○	Error	Missing file 10004TMKDA15_014_395_813_037...	10004TMKDA15	014	common	..._015_G_TRAEGERSYSTEM	JJMMTT.CATPart
			10004TMKD85_014_395_813_091...	10004TMKD85	014	common	..._015_BODENTIEL_SEITE	JJMMTT.CATPart
○	○	Error	Missing file 10004TMKDK82_014_395_813_261...	10004TMKDK82	014	common	..._015_G_HINTERWAGEN	JJMMTT.CATPart
✓	●	OK	10004TMKDM76_014_395_813_461...	10004TMKDM76	014	common	..._015_ABSTUETZUNG_QTR_HI	JJMMTT.CATPart
✓	●	OK	10004TMKDR61_014_395_813_462...	10004TMKDR61	014	common	..._015_ABSTUETZUNG_QTR_HI	JJMMTT.CATPart
✓	○	Error	Missing file 10004TMKDV40_014_395_813_069...	10004TMKDV40	014	common	..._015_G_HIWA_VERSTAERK	JJMMTT.CATPart
✓	●	OK	10004TMKDX43_014_395_801_403...	10004TMKDX43	014	common	..._015_BODENTIEL	JJMMTT.CATPart
✓	●	OK	10004TMKE015_014_395_805_435_A...	10004TMKE015	014	common	..._015_STIRNWAND	JJMMTT.CATPart
✓	●	OK	10004TMKE209_014_395_805_435_B...	10004TMKE209	014	common	..._015_STIRNWAND	JJMMTT.CATPart
✓	●	OK	10004TMKE306_014_395_803_755...	10004TMKE306	014	common	..._015_SCHWELLER	JJMMTT.CATPart

As can be seen from the window, some parts have been successfully saved under the ‘common’ representation in the DM, while for other parts the corresponding files are missing, so there is not possible to be saved under “common” representation.

Close the *Create Commons* action window and select **OK** at the emerging confirmation window.

Press the **Refresh**  button in the Subsystems tab to update its contents. The status of the Groups and Parts is also updated to WIP.

Open a new tab, select **Parts** from the drop-down menu and press **Enter** in the empty search filter. The *Parts* tab appears displaying the ‘common’ representation of the Parts.

New tab	Parts	Subsystems	Simulation Models	+
 	Commons			
 	Search in DM			
Contents	Module Id	Version	Study Version	File
10004TMKDA15	10004TMKDA15			
014	10004TMKDA15	014		
0	10004TMKDA15	014	0	ANSA con
common	10004TMKDA15	014	0	ANSA con
10004TMKDj85	10004TMKDj85			
014	10004TMKDj85	014		
0	10004TMKDj85	014	0	ANSA con
common	10004TMKDj85	014	0	ANSA con
10004TMKDK82	10004TMKDK82			
014	10004TMKDK82	014		
0	10004TMKDK82	014	0	ANSA con
common	10004TMKDK82	014	0	ANSA con
10004TMKDM76	10004TMKDM76			
014	10004TMKDM76	014		
0	10004TMKDM76	014	0	ANSA con
common	10004TMKDM76	014	0	ANSA con
10004TMKDR61	10004TMKDR61			
014	10004TMKDR61	014		
0	10004TMKDR61	014	0	ANSA con
common	10004TMKDR61	014	0	ANSA con
10004TMKDV49	10004TMKDV49			
014	10004TMKDV49	014		
0	10004TMKDV49	014	0	ANSA con
common	10004TMKDV49	014	0	ANSA con
10004TMKDX43	10004TMKDX43			

Notice that the common representation is missing for the parts with no CAD file association.

Name	Value
Module Id	10004TMKDR61
Version	014
Study Version	0
File Type	ANSA
Representation	common
Name	10004TMKDR61_014_395.8...
Status	OK
PID	1
Material Name	Default MAT2 Material
Thickness	1
Mesh Parameter Name	
Properties Info	[{"Id": "1", "Name": "PartBody..."}]
Materials Info	[{"1": [{"Id": "2", "Name": "Def..."}]}
Has Connections	NO
Part Type	Undefined
Treatment	Undefined
Treatment Parameters	
Geometric Description	Undefined
Is Multi Body	NO
Build Status	Needs Build
ANSA Creation Date	30-MAR-2022 14:20:11
ANSA Modification Date	30-MAR-2022 14:20:11
Software Version	22.1.1
User	
DM Creation Date	30-MAR-2022 14:19:46
DM Modification Date	30-MAR-2022 14:20:11
Contents Hash	zr2kvu3hmouuklnk5bnurfb...
Contents Loose Key	j311q22q4txsx4gth1ydxddlh...

Access the *Subsystems* or *Parts* tab and select one of the successfully treated parts.

Its meta-data can be viewed in the *Details* tab:

- the basic attributes (also known as **Properties**), which define a unique DM object and
- the secondary attributes



In the *References* tab, the various entity types where the specific part is referenced are displayed. Clicking on any of these entity types, its *Details* tab automatically emerges, providing further information.

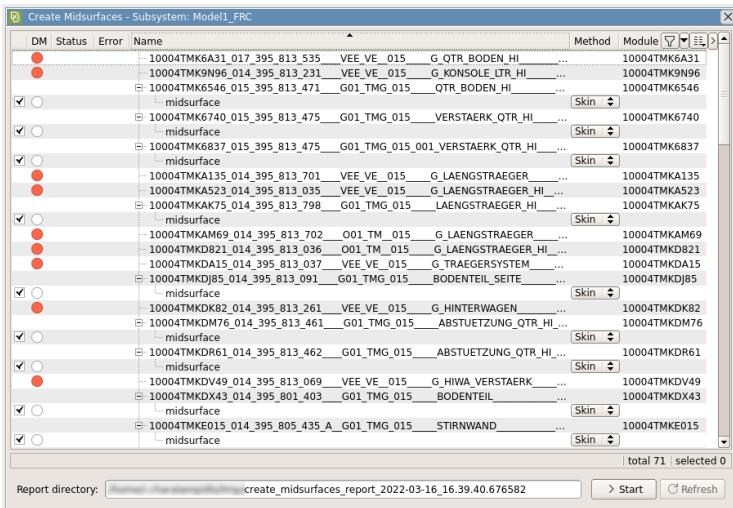
Type	Name	Iteration	Iteration
Subsystems (1)	Model1_FRC	001	ANSA
Simulation Models (1)	body_Carline1_Rel01_V150_Model1_durability_001	001	ANSA

4.3. Create Midsurfaces

At this point the creation of Middle Surface of the parts takes place, so that parts with solid description get their thin shell description. The Skin or Casting function will be performed in the parts and they will be saved in the DM_MODEL_BUILD repository under the 'midsurface' representation.

In this step, the **Create Midsurfaces** action is performed on the Subsystem.

To perform this step, right click on the Subsystem and select the **Create Midsurfaces** option from its context menu. The respective action window is launched.

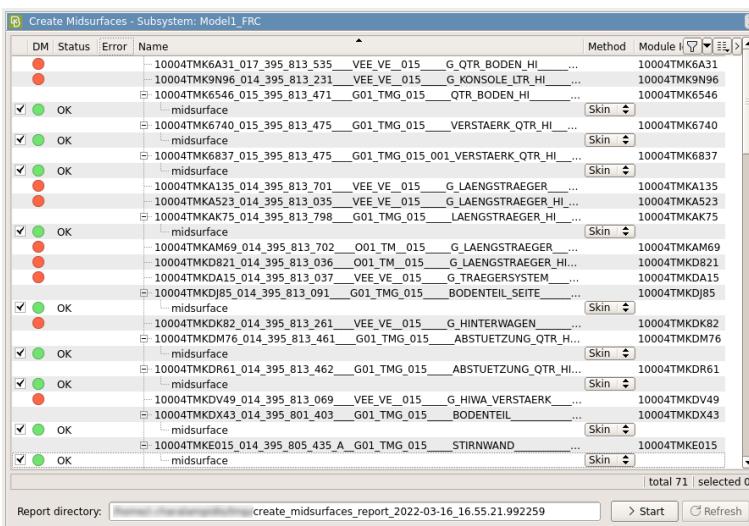


KOMVOS automatically recognizes and marks the parts where the action will be applied.

As seen, only the parts with 'common' representation in the DM repository will participate in this action (parts with no CAD association files, are excluded from the midsurface creation).

For the scopes of this tutorial though, the Skin method will be selected for all parts.

Press **Start** in order to trigger the action. Once the action is finished, the *Create Midsurfaces* action window remains visible, giving useful information about the status of the parts.



Most of the parts have been successfully saved under the 'midsurface' representation in the DM.

Some parts though, could not be saved in the DM with this representation, since the Skin method failed and the Status returned an Error message.

For these parts, the Casting method should be selected from the respective drop-down menus. Press **Start** in order to trigger the action again.

Close the *Create Midsurfaces* action window and select **OK**.

Now, press the **Refresh** button in the *Parts* tab to update its contents.

Module Id	Version	Study Version	File
10004TMKEA82	014		
10004TMKEA82	0	0	
10004TMKEA82	common		ANS A
10004TMKEA82	midsurface		mid
10004TMKED73			
10004TMKED73	014	014	
10004TMKED73	0	0	
10004TMKED73	common		ANS A
10004TMKED73	midsurface		mid
10004TMKEJ55			
10004TMKEJ55	014	014	
10004TMKEJ55	0	0	
10004TMKEJ55	common		ANS A
10004TMKEJ55	midsurface		mid
10004TMKEL49			
10004TMKEL49	014	014	
10004TMKEL49	0	0	
10004TMKEL49	common		ANS A
10004TMKEL49	midsurface		mid
10004TMKEM46			
10004TMKEM46	014	014	
10004TMKEM46	0	0	
10004TMKEM46	common		ANS A
10004TMKEM46	midsurface		mid
10004TMKER31			

The parts, for which the Skin method failed, do not have a 'midsurface' representation inside the DM_MODEL_BUILD repository.

For these parts, the *Create Midsurfaces* action can be repeated from the context menu of the Sub-system.

DM	Status	Error	Name	Method	Modi
●			10004TMKHL56_015_395_800_415_VEE_VE_015_AUFBAU_1	...	10004TMKHL56
●			10004TMKHR38_015_395_800_415_A_001_TM_015_AUFBAU_1	...	10004TMKHR38
●			10004TMKHV26_015_395_800_415_B_001_TM_015_AUFBAU_1	...	10004TMKHV26
●			10004TMKHW23_015_395_800_415_C_001_TM_015_AUFBAU_1	...	10004TMKHW23
●			10004TMKJ059_015_395_800_415_D_001_TM_015_AUFBAU_1	...	10004TMKJ059
●			10004TMKJ253_014_395_800_415_E_001_TM_015_AUFBAU_1	...	10004TMKJ253
●			10004TMKK805_014_395_800_415_F_001_TM_015_AUFBAU_1	...	10004TMKK805
●			10004TMKKA96_014_395_800_415_G_001_TM_015_AUFBAU_1	...	10004TMKKA96
●			10004TMKCC90_014_395_800_415_H_001_TM_015_AUFBAU_1	...	10004TMKCC90
●			10004TMKHK75_014_395_810_101_B_G01_TM_015_TANKKLAPPE_1	...	10004TMKHK75
□	●		midsurface	Skin	▼
□	●		10004TMKKG66_014_395_810_101_A_G01_TMG_015_TANKKLAPPE_1	...	10004TMKKG66
□	●		midsurface	Skin	▼
□	●		10004TMKLL63_014_395_810_102_B_G01_TMG_015_TANKKLAPPE_2	...	10004TMKLL63
□	●		midsurface	Skin	▼
□	●		10004TMKKN57_014_395_810_102_A_G01_TMG_015_TANKKLAPPE_2	...	10004TMKKN57
□	●		midsurface	Skin	▼
□	●		10004TMN2066_014_395_803_171_VEE_VE_015_VERSTAERKUNG	...	10004TMN2066
✓	○		10004TN12778_014_395_813_213_G01_TMG_015_KONSOLE_LTR_HI	...	10004TN12778
✓	○		midsurface	Casting	▼
✓	○		10004TN12Y63_014_395_813_811_G01_TMG_015_PRALLTOPF_HI	...	10004TN12Y63
✓	○		midsurface	Casting	▼
✓	○		10004TN13135_014_395_813_797_G01_TMG_015_LAENGSTRAEGER_HI	...	10004TN13135
✓	○		midsurface	Casting	▼
✓	○		10004TN13329_014_395_813_812_G01_TMG_015_PRALLTOPF_HI	...	10004TN13329
✓	○		midsurface	Casting	▼
□	●		10004TN13717_014_395_813_295_G01_TMG_015_BODETEIL_HINTEN	...	10004TN13717
□	●		midsurface	Skin	▼
□	●		10004TN13911_014_395_813_092_G01_TMG_015_BODETEIL_SEITE	...	10004TN13911
□	●		midsurface	Skin	▼
				total 71 selected 0	
Report directory:	/create_midsurfaces_report_2022-03-21_15.19.19.904846		> Start	⟳ Refresh	

Once the action window pops-up, they are automatically marked in the list of Parts. Afterwards, the **Casting method** and **Start button** are selected.

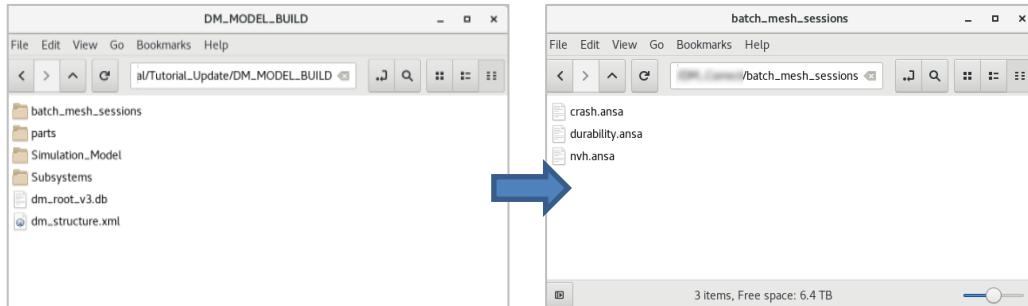
In this way, the healed parts will also obtain the 'midsurface' representation.

NOTE !: Since missing the 'midsurface' representation is not a process stopper at this point, re-running the action will not be performed in this tutorial.

4.4. Create Mesh Representations

Now that the parts have their ‘common’ and ‘midsurface’ representations saved in the DM, the assignment of the available mesh types per part, for e.g. different discipline representations, is ready to take place.

In order for KOMVOS to recognize the requested mesh representations of parts, the batch meshing session files that are contained in the `batch_mesh_sessions` directory, should already reside within the DM folder.

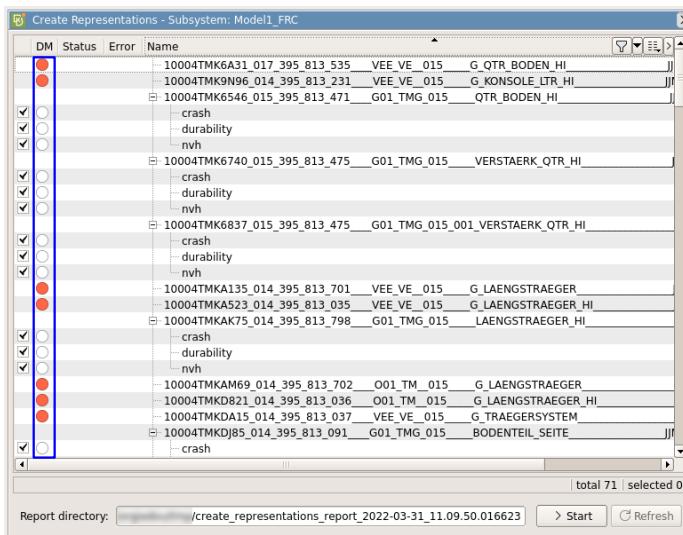


Then, proceed to the meshing of the parts, according to the target mesh values of the available mesh scenarios and save them back to the DM.

For this purpose, the **Create Representations** action needs to be performed on the Subsystem.

To perform this step, right click on the Subsystem and select the **Create Representations** option from its context menu.

In the appearing action window, the desired meshing scenario can be selected to be executed, by marking/ unmarking the respective mesh representation.



Select both available batch mesh session(s) for the parts and press **Start** in order to trigger the action.

Once the action is finished, press **Refresh** and close the *Create Mesh Representations* action window.

By pressing **Refresh** at the *Parts* tab, all representations of the parts saved so far in the DM_MODEL_BUILD folder (included the recently saved mesh representations) are displayed.

The screenshot shows the CATIA V5 interface with the 'Parts' tab selected. The main area displays a hierarchical list of saved representations under the 'Contents' tab. A blue box highlights two specific nodes: 'common' and 'crash' under the '0' node of the '10004TMK6740' entry. The columns in the table are 'Module Id', 'Version', 'Study Version', and 'File'. The 'File' column contains icons representing different types of representations, such as ANSA common, ANSA crash, ANSA durability, ANSA midsurface, and ANSA nvh.

Module Id	Version	Study Version	File
10004TMK6740	015	0	ANSA common
10004TMK6740	015	0	ANSA crash
10004TMK6740	015	0	ANSA durability
10004TMK6740	015	0	ANSA midsurface
10004TMK6740	015	0	ANSA nvh
10004TMK6837	015	0	ANSA common
10004TMK6837	015	0	ANSA crash
10004TMK6837	015	0	ANSA durability
10004TMK6837	015	0	ANSA midsurface
10004TMK6837	015	0	ANSA nvh
10004TMKA135	014	0	ANSA common
10004TMKA135	014	0	ANSA crash
10004TMKA523	014	0	ANSA durability
10004TMKA523	014	0	ANSA midsurface
10004TMKA523	014	0	ANSA nvh
10004TMKA911			

Thus, we can see that the Model has been successfully built though a standardized workflow, allowing automation and implementation of the process even from non-expert users in the field of CAE analysis.

5. Update the Model

When new CAD versions are released from the CAD department, we would like to add the new parts and the new part versions in the DM_MODEL_BUILD directory in order to include them in our model.

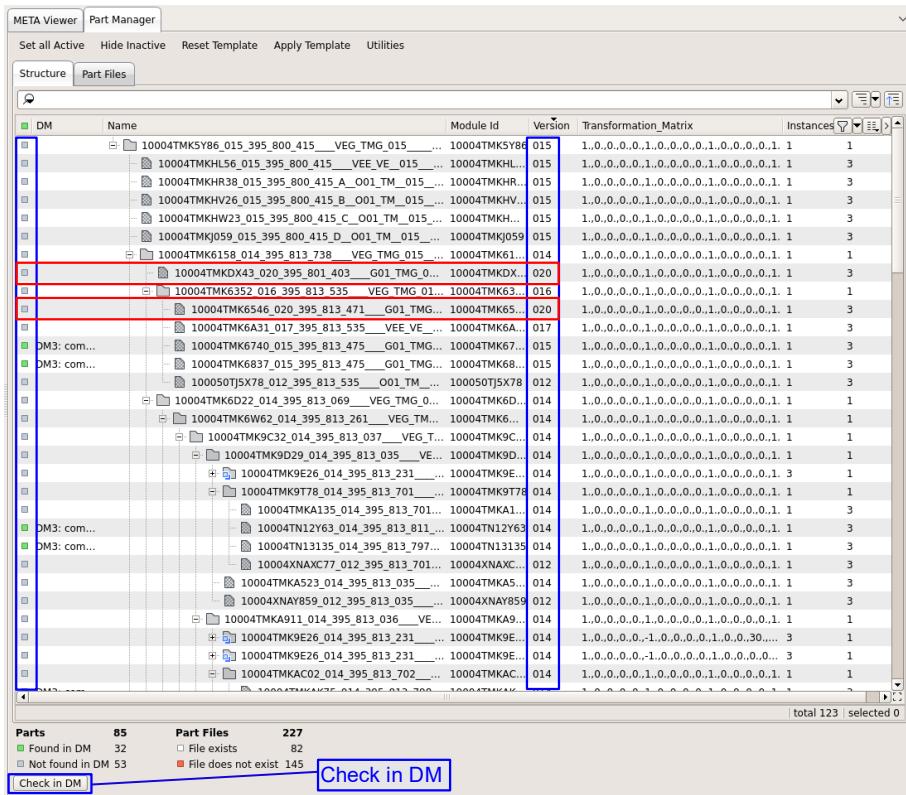
A new product tree that includes the updates and the additional part(s) as a new assembly hierarchy tree will be therefore imported in KOMVOS. Some parts of the updated assembly are saved as *.step files. To run the **Create Commons** action for these parts as well, change some settings shown in paragraph 2.6.2. Specifically, add **step** in *Part file extension priority*, before **jt**, as shown in the below image.



5.1. Import the updated assembly hierarchy information

The new assembly hierarchy version can be imported and read in KOMVOS by following the procedure described in Paragraph 4.1.1. The updated product structure file can be retrieved from the tutorial data:

/.../KOMVOS_Model_Build_Tutorial/Initial_Model/395_800_415____VEG_TMG_015____AUFBA
U_1_____JJMMTT-10004TMK5Y86_B.xml/



The **Part Manager** window is launched, displaying the updated assembly hierarchy information.

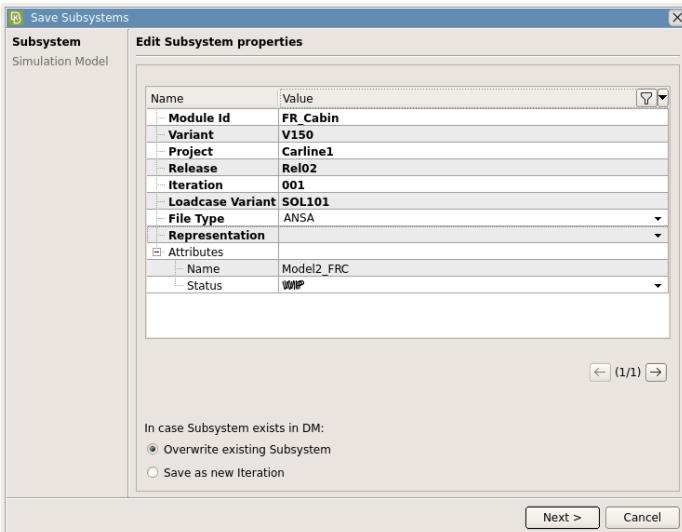
Press the **Check in DM** button. The DM column is automatically updated and presents the available representations of parts in DM.

Parts that already exist in DM_MODEL_BUILD repository are marked with the green sign. These parts exist in the repository with exactly the same signature (Module Id, Version, Part Name) with the one in the initial assembly hierarchy tree and do not need to be processed again.

Some parts, though, - 2 parts in specific - are identified with a new version, 020.

5.2. Create a Subsystem for the updated model

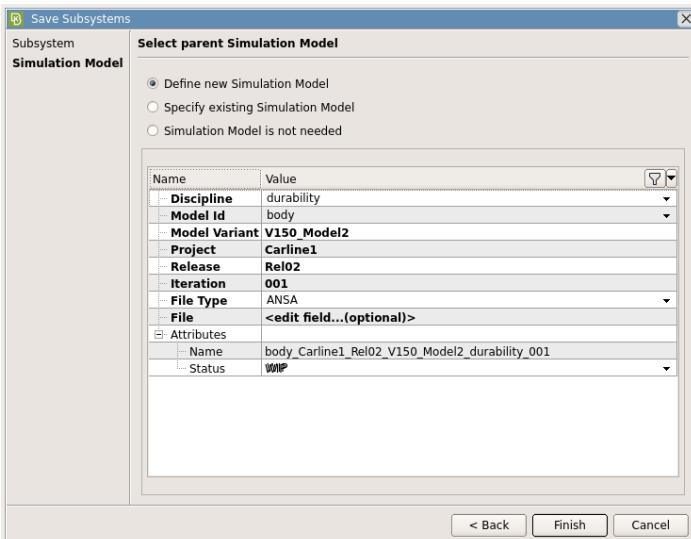
In order to create a Subsystem for the updated data, work as described in Paragraph 4.1.3.



Edit the fields of the **Edit Subsystem properties** tab in **Save Subsystems** window as shown in the picture.

Mind to press **Enter** every time a value is typed in the respective field, so as to proceed to the next field.

Press **Next** in order to proceed.

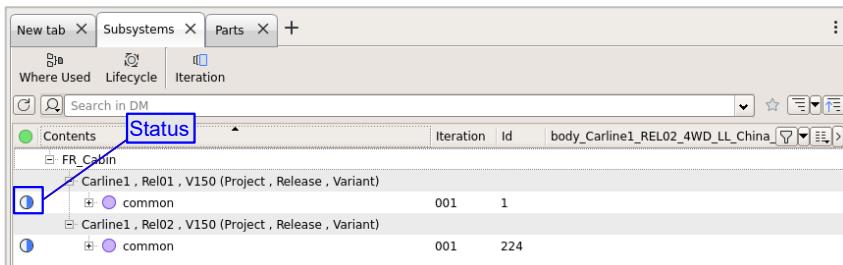


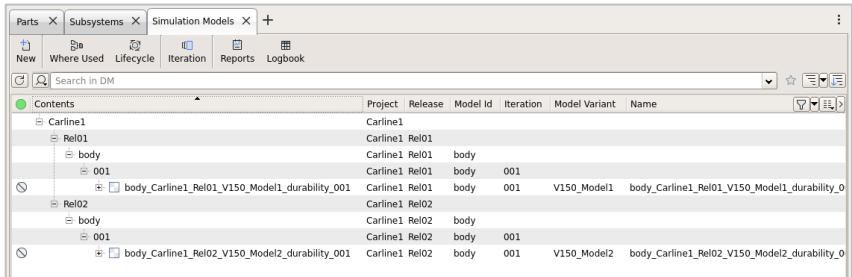
In the **Select parent Simulation Model** tab, fill the empty fields as shown in the picture (optionally, the desired values from the respective drop-down menus can be inserted instead).

Press **Finish** to complete the process.

The respective Subsystem and Simulation Model have now been created in the DM_MODEL_BUILD repository.

The newly created Subsystem and Simulation Model are displayed in the respective tabs after pressing the **Refresh** button.





NOTE !: At this point, the two Subsystems can be compared in order to identify their differences, as described in the following paragraphs.

5.3. Perform all actions on the updated data

Once the Subsystem with the updated has been created, the steps described in Paragraphs 4.2, 4.3 and 4.4 can be repeated to create and save inside the DM folder the “common”, “midsurface”, “crash”, “nvh” and “durability representation of the parts that does not exist in the repository.

NOTE !: In order to demonstrate Visibility Checks in next chapter, proceed only to “Create Commons” action.

!: Notice that before starting each action, KOMVOS fetches directly from the DM repository the parts that already exist under the specific representation and does not perform the actions on them again, thus saving valuable memory and time resources.

The 2 parts with version 020 will participate in the translation and the generation of the ‘common’ representation.

After each action on the updated Subsystem is completed, press the **Refresh** button at the Parts tab in order to view the corresponding representation of all parts and their versions that have been saved in the DM_MODEL_BUILD repository.

New tab X Parts X Subsystems X +

View Commonalities

Search in DM

Contents	Module Id	Version	Study Version	File
014	10004TMKDR61	014		
0	10004TMKDR61	014	0	
common	10004TMKDR61	014	0	ANSA common
crash	10004TMKDR61	014	0	ANSA crash
durability	10004TMKDR61	014	0	ANSA durability
midsurface	10004TMKDR61	014	0	ANSA midsurface
nvh	10004TMKDR61	014	0	ANSA nvh
+ 10004TMKD49	10004TMKD49			
+ 10004TMKDX43	10004TMKDX43			
014	10004TMKDX43	014		
0	10004TMKDX43	014	0	
common	10004TMKDX43	014	0	ANSA common
crash	10004TMKDX43	014	0	ANSA crash
durability	10004TMKDX43	014	0	ANSA durability
midsurface	10004TMKDX43	014	0	ANSA midsurface
nvh	10004TMKDX43	014	0	ANSA nvh
020	10004TMKDX43	020		
0	10004TMKDX43	020	0	
common	10004TMKDX43	020	0	ANSA common
crash	10004TMKDX43	020	0	ANSA crash
durability	10004TMKDX43	020	0	ANSA durability
midsurface	10004TMKDX43	020	0	ANSA midsurface
nvh	10004TMKDX43	020	0	ANSA nvh
+ 10004TMKE015	10004TMKE015			
014	10004TMKE015	014		

6. Additional actions in KOMVOS

As of yet, we have seen how the Model build-up process can be implemented in KOMVOS, in an automated and straightforward way, even from non-expert users, without the demand of CAE knowledge.

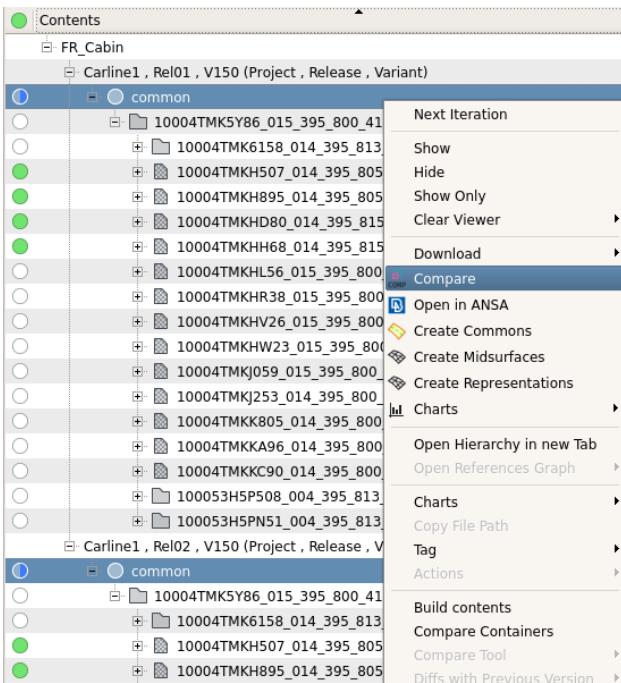
In the following paragraphs, a more realistic case of a Model that was built in KOMVOS will be presented, in order to explore more functionalities of the software and achieve further understanding of the workflow itself.

6.1. Compare Subsystems

Expand the Subsystems in order to view their contents, status and get details about the parts from the *Details* tab.

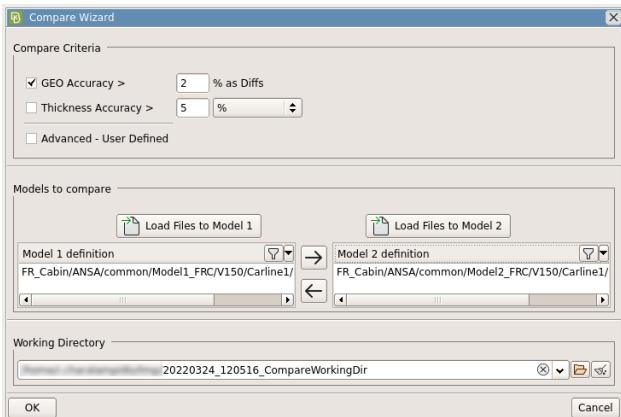
The screenshot shows the KOMVOS Subsystems interface. At the top, there are tabs for 'Where Used', 'Lifecycle', and 'Iteration'. Below that is a search bar labeled 'Search in DM'. The main area displays two subsystems: 'FR_Cabin' and 'Carline1 , Rel01 , V150 (Project , Release , Variant)'. The 'Carline1 , Rel01 , V150' subsystem is expanded, showing its contents under the 'common' folder. The contents include various part numbers such as 10004TMK5Y86, 10004TMK6158, 10004TMKH507, 10004TMKH895, 10004TMKH80, 10004TMKHH68, 10004TMKHL56, 10004TMKJR38, 10004TMKHV26, 10004TMKHW23, 10004TMKJ059, 10004TMKJ253, 10004TMKK805, 10004TMKKA96, 10004TMKKC90, 100053H5P508, and 100053H5P5N51. The 'Details' tab for the '10004TMKHH68' part is selected, showing its attributes: Name (10004TMKHH68), Version (014), Study Version (0), File Type (ANSA), Representation (common), and other properties like Name, Status, PID, Material Name, and Thickness. On the right side of the interface, there is a small 3D model preview of a curved metal component.

As can be seen, the attributes of the parts (e.g. Status, User, Material etc.) are now varied. There are also differences between the number, versions and attributes of the parts of the two Subsystems.

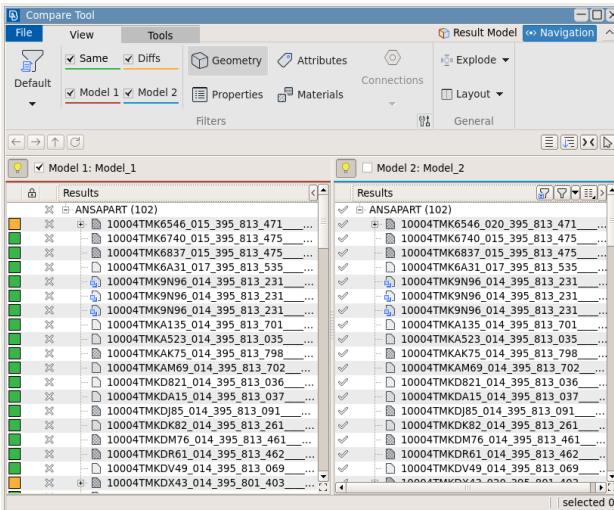


In order to easily identify the differences between the two Subsystems and get precise information in terms of geometry and attributes, click on both Subsystems simultaneously and select **Compare** from their context menu.

! It is also possible to apply the action on one Subsystem only (from its context menu) and proceed to comparison with another model outside KOMVOS.



Activate 'GEO Accuracy' and press **OK**.

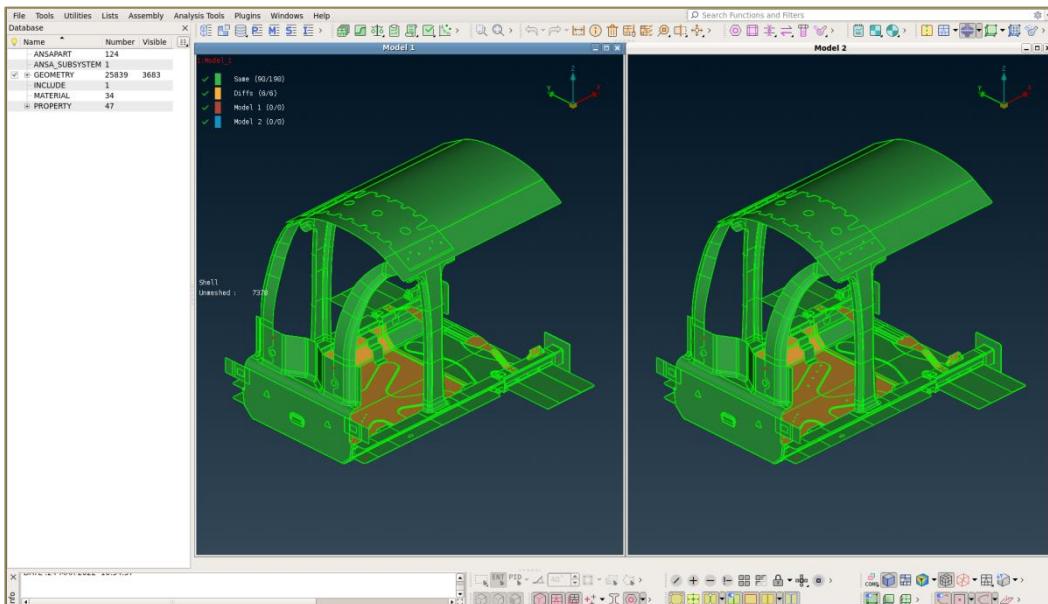


The **Compare Tool** window emerges, displaying the differences between the two models.

From this window, select the differences to focus on, filtering out the rest.

At the end, ANSA interface with **Compare** window and a preview of all the differences identified by the **Compare** tool appear.

!: Apart from the Subsystems, the Compare action can also be applied on Parts.



Note that the Compare functionality is one of the most powerful tools when checking the number and quality of the incoming data.

6.2. Compare Containers

In KOMVOS it is also possible to compare similar entities (e.g. Simulation Models, Subsystems, Parts) in a swift and more concise way by using the 'Compare Containers' functionality.

In the Subsystems tab, pick the two available Subsystems simultaneously and from their context menu, select the **Compare Containers** option.

The screenshot shows two windows side-by-side. The left window is titled 'Simulation Models' and displays a tree view of a model structure under 'Carline1'. The right window is titled 'Compare Containers' and shows a comparison between 'Model1_FRC' and 'Model2_FRC'. The 'Properties' tab is selected, displaying various parameters for both models. A detailed table below lists specific properties like File Type, Iteration, and Loadcase Variant, comparing their values between the two models. The 'Contents' tab is also visible, showing a list of components and their status (e.g., green checkmark, yellow warning, red error).

Property	Model1_FRC	Model2_FRC
File Type	ANSA	ANSA
Iteration	001	001
Loadcase Variant	SOL101	SOL101
Module Id	FR_Cabin	FR_Cabin
Project	Carline1	Carline1
Release	Rel01	Rel02
Representation	common	common
Variant	V150	V150

By right-clicking on a certain row e.g. a row of parts where differences have been detected, it is possible to further expand the comparison in Part level, when selecting **Compare Containers**.

The screenshot displays two side-by-side CAD software interfaces, likely for comparing two different models or configurations. Both interfaces have a top navigation bar with tabs for 'New tab', 'Subsystems', 'Compare Containers', and 'Compare Containers'. Below the tabs are dropdown menus for 'View' (set to 'All') and 'Differences' (with options for 'Only Differences' and 'Highlight Differences').

Left Interface (Model1_FRC):

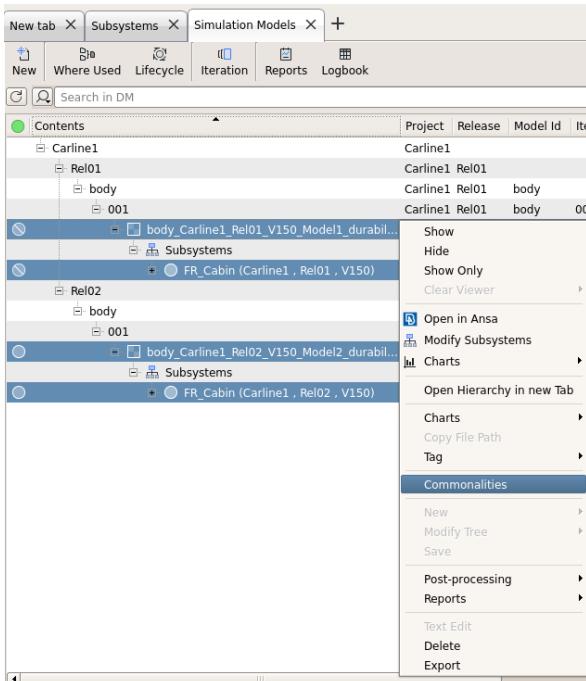
- Properties:**
 - File Type: ANSA, ANSA
 - Iteration: 001, 001
 - Loadcase Variant: SOL101, SOL101
 - Module Id: FR_Cabin, FR_Cabin
 - Project: Carlline1, Carlline1
 - Release: Rel01, Rel02
 - Representation: common, common
 - Variant: V150, V150
- Attributes:**
 - General
- Contents:**
 - 10004TMK5Y86 (checked)
 - 10004TMK6158 (checked)
 - 10004TMK6352 (checked)
 - 10004TMK6546 (selected):**
 - Properties:**
 - File Type: ANSA
 - Module Id: 5546
 - Representation: common
 - Compare Containers (button)
 - Compare Tool (button)
 - Version: 015

! : As aforementioned, apart from the Parts and Subsystems, the ‘Compare Containers’ functionality is also available for the Simulation Models.

6.3. Commonalities

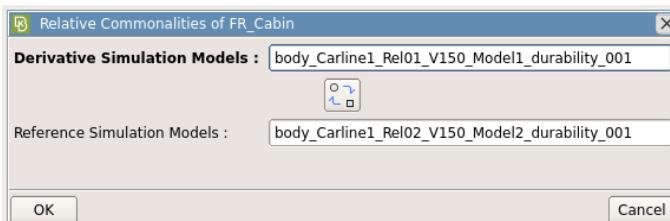
A common case in the CAE industry is the need to simulate different variants of the same model, for instance the normal and sunroof variants, or the cabrio, coupe and limousine variants of the model.

KOMVOS allows and facilitates the identification of the common, shared parts among the different variants of the same model through the **Commonalities** function. This functionality identifies the parts that participate in more than one variant, known also as ‘carry-over’ parts, so as not to be processed again, thus saving a substantial amount of time and effort.



To trigger the action, in the *Simulation Models* tab select the Subsystems under each Simulation Model and the action **Commonalities** from the context menu.

Change picture and add that both the simulation model and subsystem need to be selected as well as that the right click must be done on the simulation model.

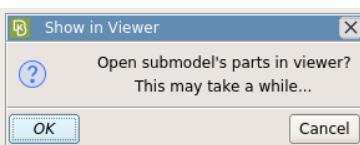


The *Relative Commonalities* window appears in order to define the derivative and reference Simulation Models.

Optionally, the models can be reversed by pressing the **toggle** button.

In this case, the models are correctly set, so press the **OK** button to proceed.

Press also **OK** to the confirmation window that appears.



New tab X Subsystems X Simulation Models X Relative commonalities X +

New Import Where Used Lifecycle

body_Carline1_Rel01_V150_Model1_durability_001 body_Carline1_Rel02_1

common

(Module Id: FR_Cabin)

100047MK5Y86_015_395_800_415_____VEG_TMG_...

100047MK615B_014_395_813_738_____VEG_T...

100047MK6D22_014_395_813_069_____VE...

100047MKG662_014_395_813_261_____...

100047MK9C32_014_395_813_037_...

100047MK9D29_014_395_813_0...

100047MK9E26_014_395_81...

100047TN12T78_014_395_...

100047MK9N98_014_395_...

100050TE8520_011_395_...

100047MK9778_014_395_81...

100047MKA523_014_395_81...

10004XNAY859_012_395_813...

100047MKA911_014_395_813_...

100047N13717_014_395_813_2...

100047MKDA15_014_395_813_0...

100050TE8A05_011_395_813_03...

100047TN13911_014_395_813_092...

100047MKD985_014_395_813_091...

100047MKDK82_014_395_813_261...

100050TE8H801_011_395_813_261...

100047MKDM76_014_395_813_461_...

100047MTKDR61_014_395_813_462_...

100047TMKDVG9_014_395_813_069_...

100050TE8BN63_011_395_813_069_...

100047MK6352_016_395_813_535_____VEG...

100047MK6546_015_395_813_471_...

100047MK6837_015_395_813_475_...

100047MK6740_015_395_813_475_...

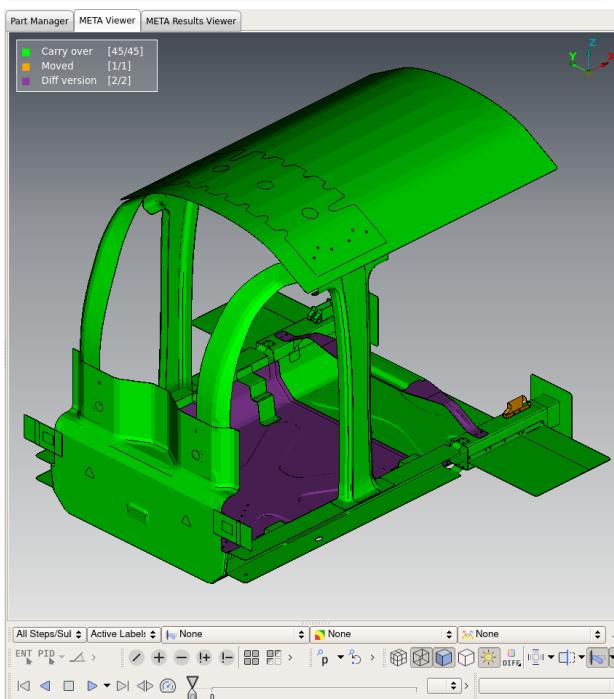
100047MK6741_017_395_813_475_...

DM:

<input checked="" type="checkbox"/>	New	0
<input checked="" type="checkbox"/>	Diff Version	2
<input checked="" type="checkbox"/>	Carry over	98
<input checked="" type="checkbox"/>	Moved	1
<input checked="" type="checkbox"/>	Diff Version Moved 0	

By expanding the Subsystem and the columns of the Simulation Models, the results of the action are displayed and all parts are identified according to the following types:

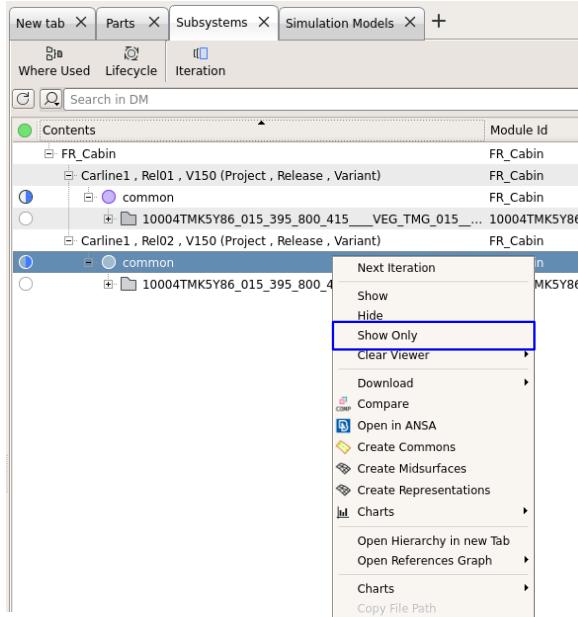
- New: the parts that are imported for the first time in the model
 - Diff. Version: the parts that have only updated their version
 - Carry over: the common parts of the Simulation Models
 - Moved: the parts that have only a different position
 - Diff. Version Moved: the parts that have a different version and a different position in the two models.



The results are also displayed in META Viewer, where a specific type of parts can be isolated and displayed by using the 'Show only' option on the legend.

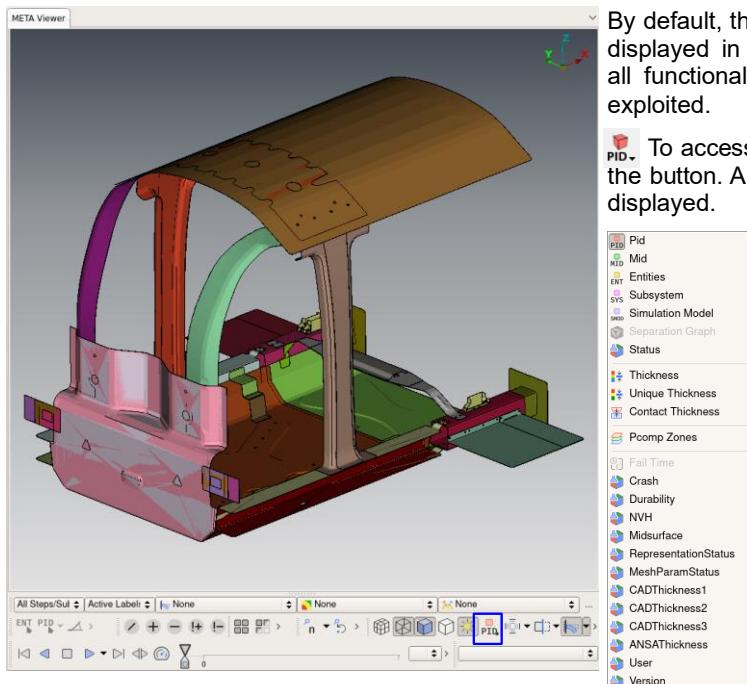
6.4. Monitor the process through Visibility Checks

KOMVOS provides the ability to run several checks during the workflow process with the aid of META Viewer. Thus, a visual inspection of the model is possible at any step during the process, allowing for timely identification of any problems or bottlenecks and effective introduction of corrective actions.



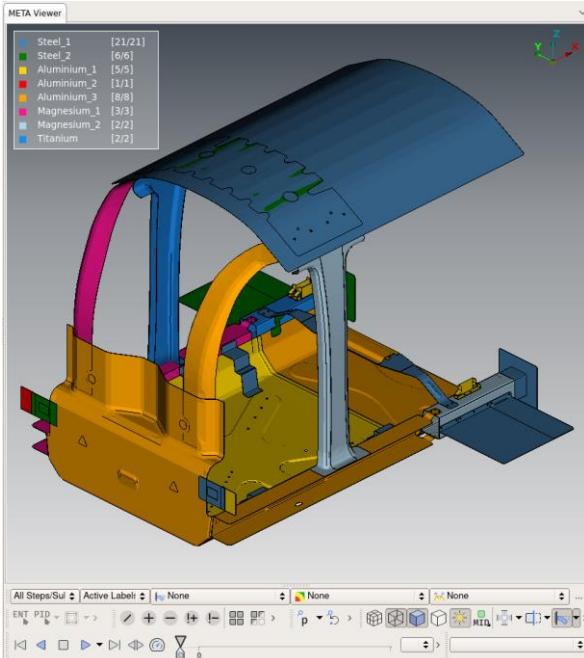
In order to invoke Meta Viewer and proceed with the visual inspection of the model, select the desired Subsystem and subsequently select **Show** from its context menu.

!: In case that the same or another entity is already displayed in Meta Viewer, select the **Show Only** option, so as to remove the previous view and display only the selected entity.



By default, the Properties of the model are displayed in META Viewer. Note that the all functionalities of the tool can be fully exploited.

!: To access more visibility checks, press the button. A list of the available checks is displayed.

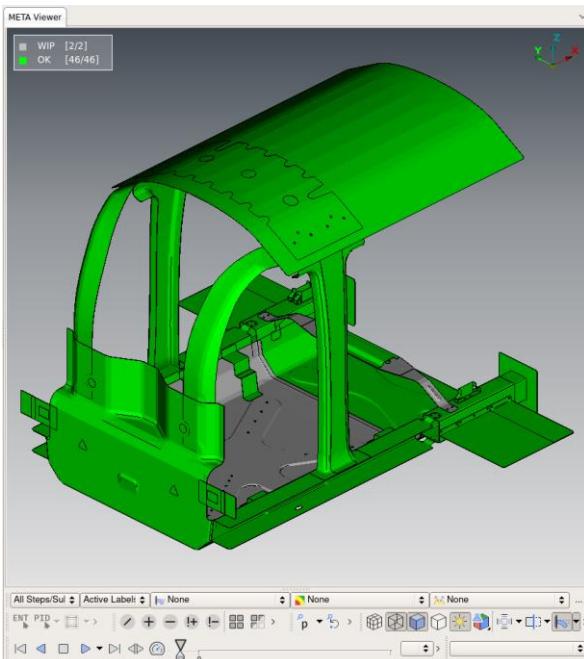


One of the major problems in the preparation of a Simulation Model is the proper assignment of the materials.

For the visual inspection of materials per part and the identification of any erroneous Material assignment select the **Mid** option from the list.

The model is colored according to the materials. Note that all focus functionality is available for the materials as well.

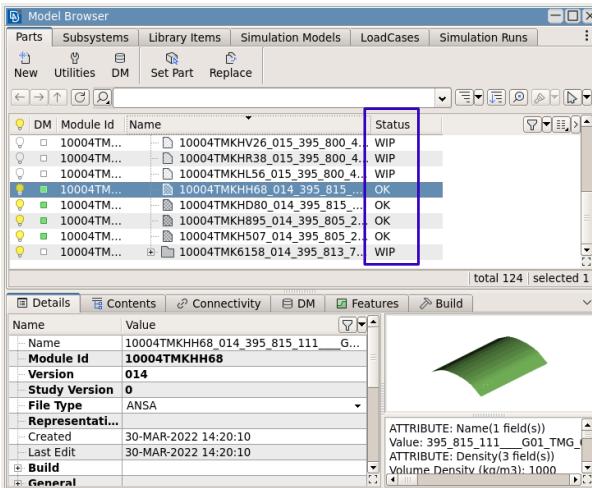
This way the material distribution can be checked at any step of the process.



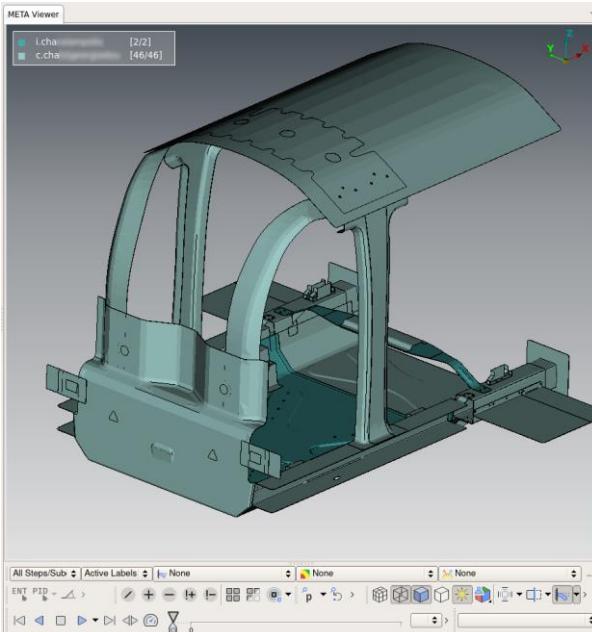
The viewer also offers a visualization of the Status control of the parts that constitute the selected Subsystem.

This can be achieved by selecting the **Status** option from the list.

The model is colored according to the status of the 'common' representation of parts (as displayed in the *Subsystems* tab).



NOTE !: In KOMVOS, the **Status** of a part refers to the **DM/Status** attribute in ANSA that is displayed on the Model Browser Details tab. In respect of the process, a part's status is considered OK at different stages (e.g. after creating the midsurface representation) depending on the user. Hence, this attribute is fully customizable and in the case of the tutorial, only the Version A parts are considered OK.

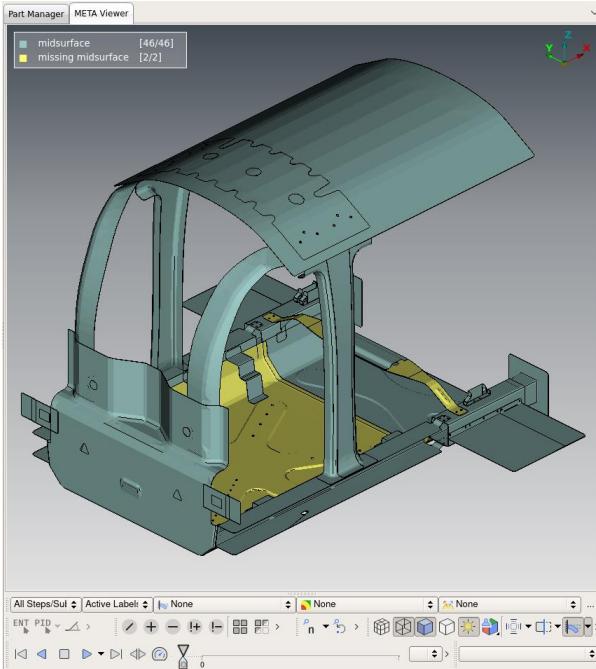


Identification of the **Users** that are handling specific entities and are working in the same DM is also assured from visibility checks.

As can be seen in the picture, the parts of the model are colored per user, thus facilitating the delegation of assignments and corrective actions.

!: In this example, the different users had to be added in the `palettes.xml` file in order to be identified.

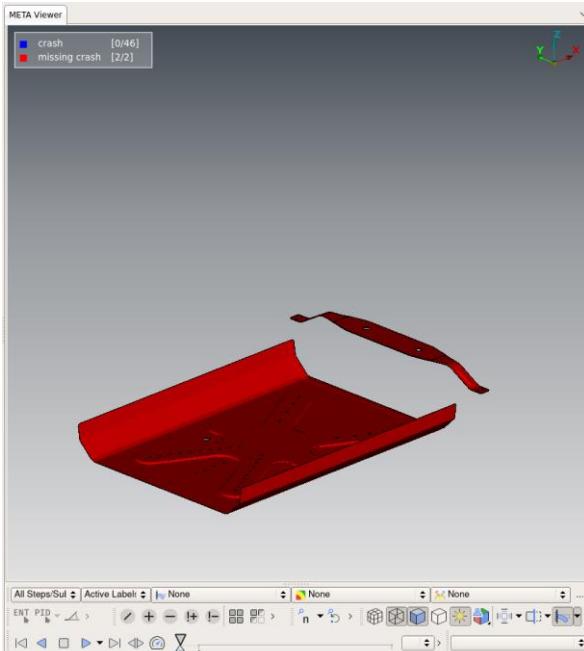
```
<colorMode name="Users" extraInfo="visibleEntities">
  <palette default="1" name="Users">
    <color name="l.cha" r="69" g="169" b="169"/>
    <color name="c.cha" r="155" g="200" b="196"/>
    <color name="User1" r="192" g="92" b="196"/>
    <color name="User2" r="155" g="128" b="196"/>
    <color name="User3" r="355" g="8" b="0"/>
    <color name="User4" r="0" g="255" b="0"/>
    <color name="User5" r="0" g="0" b="255"/>
    <color name="User6" r="50" g="0" b="255"/>
    <color name="User7" r="255" g="0" b="255"/>
    <color name="User8" r="255" g="255" b="0"/>
    <color name="User9" r="255" g="255" b="0"/>
    <color name="User10" r="255" g="255" b="0"/>
    <color name="N/A" r="128" g="48" b="128"/>
  </palette>
</colorMode>
```



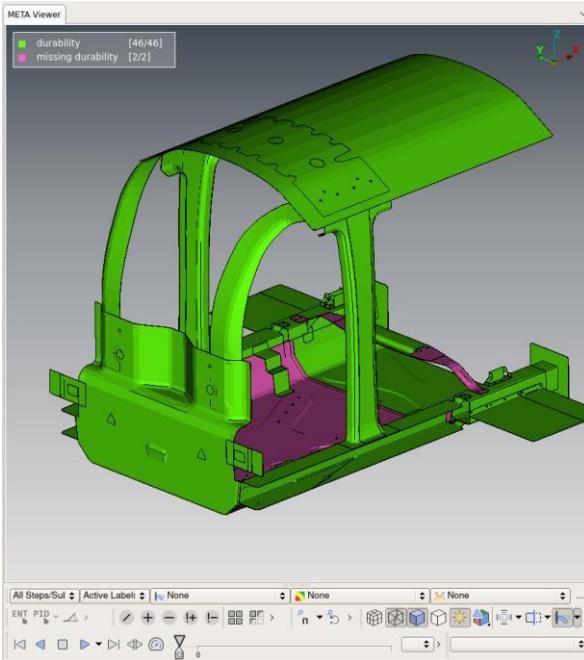
Upon workflow execution, some parts may not succeed –for various reasons– to obtain the needed representation.

One of the most important checks during process monitoring is the identification of such missing representations and can be performed by selecting the respective representation option from the list (e.g. **Midsurface**, **Crash**, **Durability** and **NVH**).

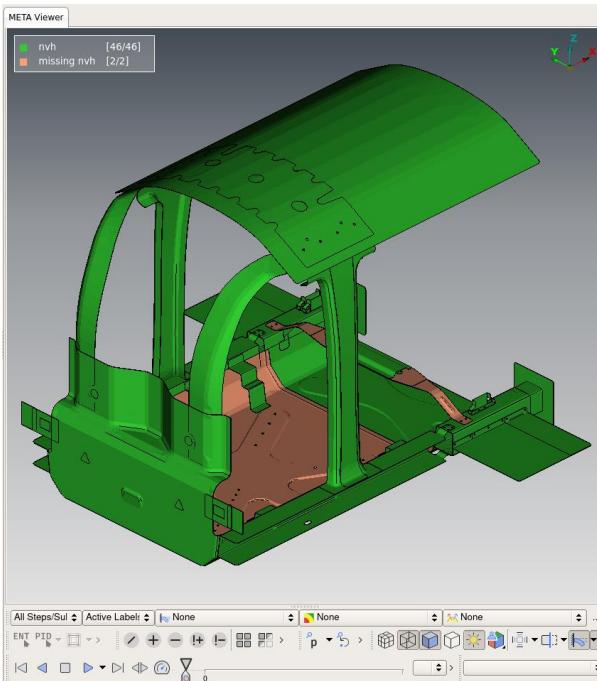
In this example, by selecting the **Midsurface** option from the list of checks, the model is colored as displayed, indicating the parts that are missing the ‘midsurface’ representation.



Similarly, in the adjacent picture, the result when selecting the **Crash** option from the list of checks and isolating only the ‘missing crash’ parts (by pressing **Show only** on the ‘missing crash’ label) is displayed.

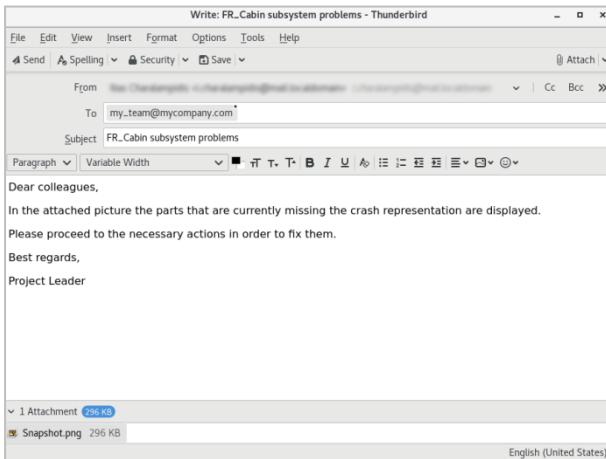


And the result from selecting the **Durability** option.

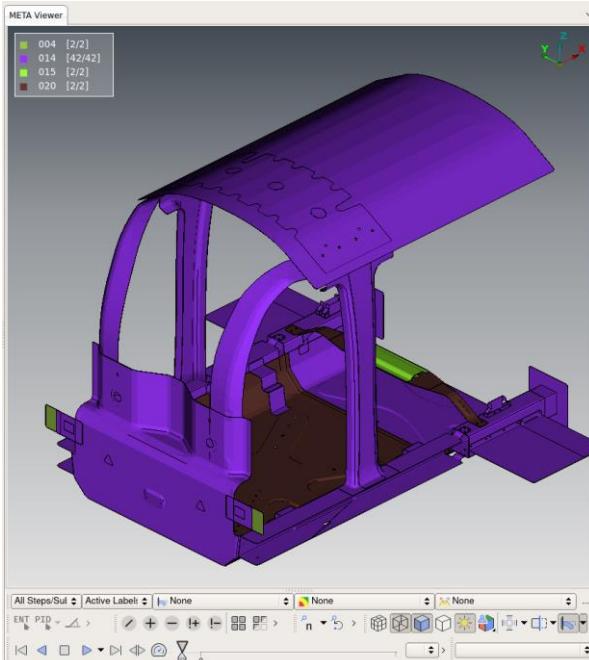


Lastly, the result from selecting the **NVH** option.

With the aid of the Visibility checks, these parts can be easily identified in the Structure and be opened in ANSA. This way, any necessary corrections can be made and then, by loading the corrected parts in KOMVOS the mesh representations can be created for the healed parts.



Or, in case the part cannot be modified in ANSA, information, images, reports, progress updates regarding problematic parts can be shared in a standardized manner following the “communication protocol” of the company. Thus, take a snapshot, create a copy of the DM for this part and send an email to directly communicate this information with all affected users.



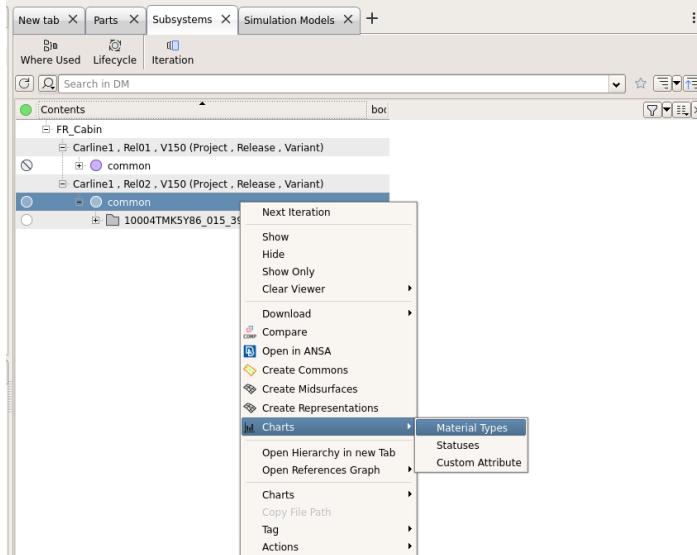
Finally, by selecting the **Version** option from the list of checks, the available versions of parts are displayed on META Viewer.

!: In this example, the different versions had to be added in the palettes.xml file in order to be identified.

!: The list of Visibility checks is customizable from the dm_views.xml, so checks can be added or removed according to the users' and organization's needs.

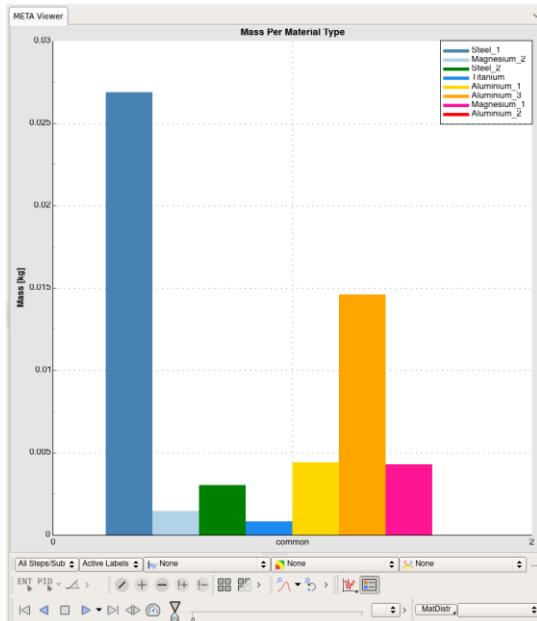
6.5. Monitor the process through Charts Change pictures

Various statistics can also be generated for Parts, Subsystems and Simulation Models in META viewer from the **Charts** action.

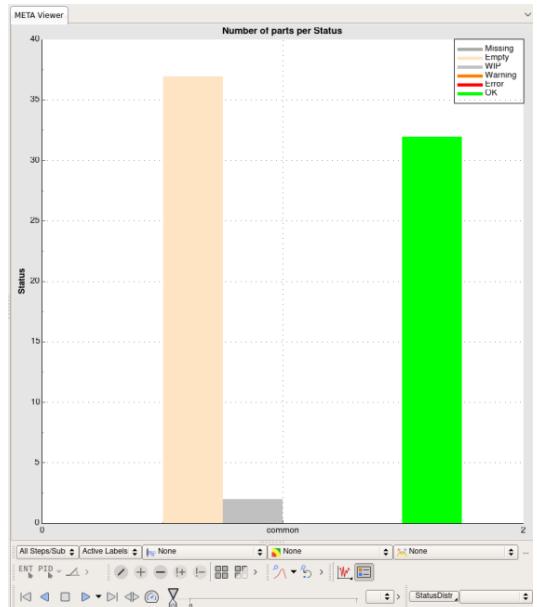


In the **Subsystems** tab, select one of the Subsystems and click on the **Charts** action from its context menu. A sub-menu also appears.

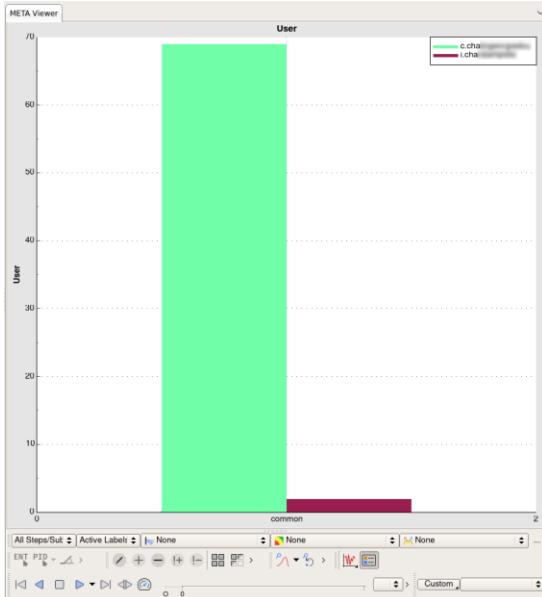
From **Charts > Material Types**, the mass per material type for the selected Subsystem appears:



From **Charts > Statuses**, the number of Parts per status for the selected Subsystem is displayed:



Selecting **Charts> Custom Attribute** and setting ‘User’ as the desired attribute (untick “Custom attribute needs calculation”), the number of parts per user is shown:

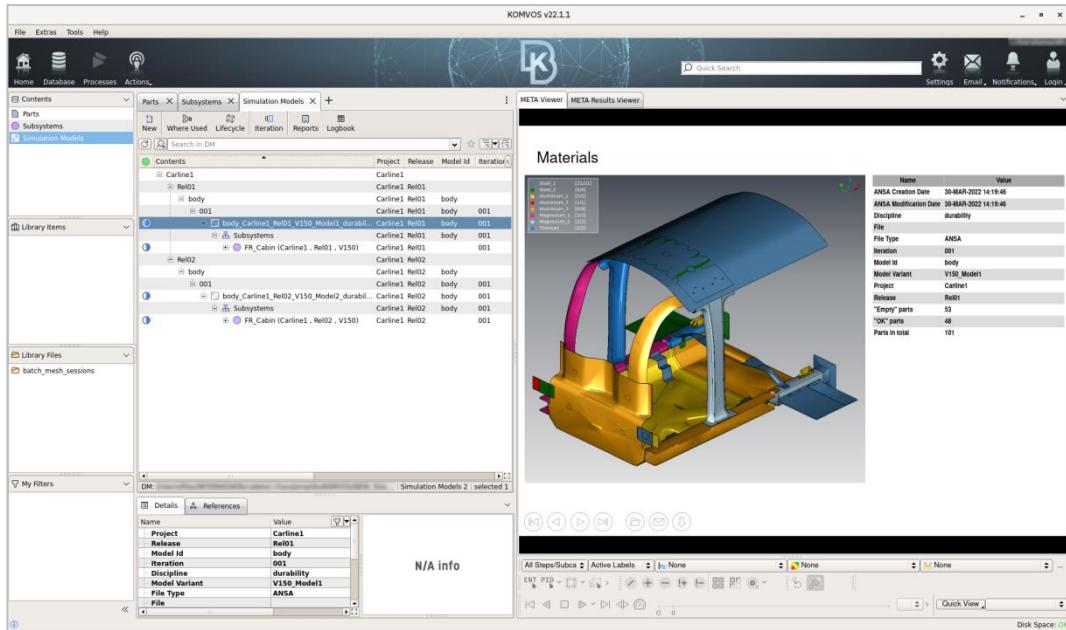


6.6. Generate the Quick report

Responding to the demand for creating reports during pre-processing, KOMVOS software takes advantage of all available capabilities in META post-processor. Using the available functionality, Quick Reports can be generated on the fly and provide necessary information regarding the model.

These reports, capturing the current status of the model, can be easily created in just one step, can be saved for reference and also can be shared with any interest party.

To generate the report, in the *Simulation Models* tab select **Quick View > Show** from the context menu of the Simulation Model and **OK** at the confirmation window, since the report will be created for the first time. The report is almost instantly created.



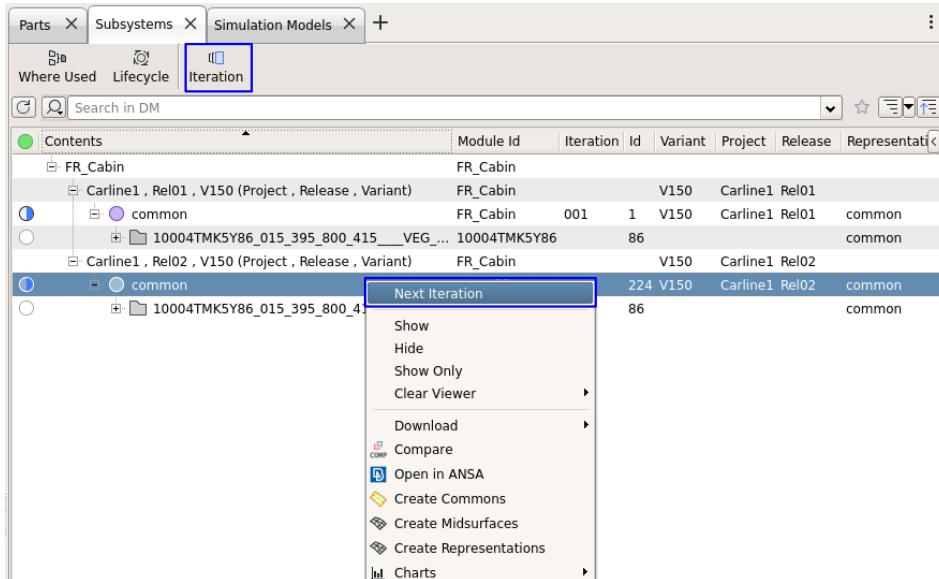
6.7. Model's updates and changes tracking

Often, it is essential to update or/and make changes to the initial model. KOMVOS offers a set of functionalities, that facilitate these processes and records the applied changes.

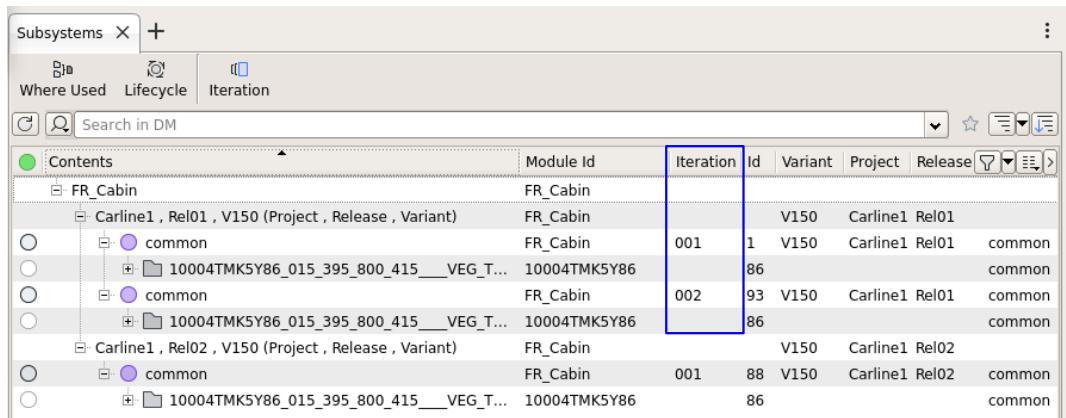
6.7.1. New Iteration

"Iteration" keeps track of user versions of Subsystems and Simulation Models.

In order to create new iterations of the Subsystem/Simulation Model, press the corresponding button **Iteration** (or right-click on subsystem) as shown below.



ANSA opens with the selected subsystem already loaded. Any modification can be made to the subsystem and then save it as a new iteration through **DM>Save in DM**, through Model Browser (more information for this procedure search to *Modular_Model_and_Run_Management* user guide, Chapter "Creating Simulation Loops").

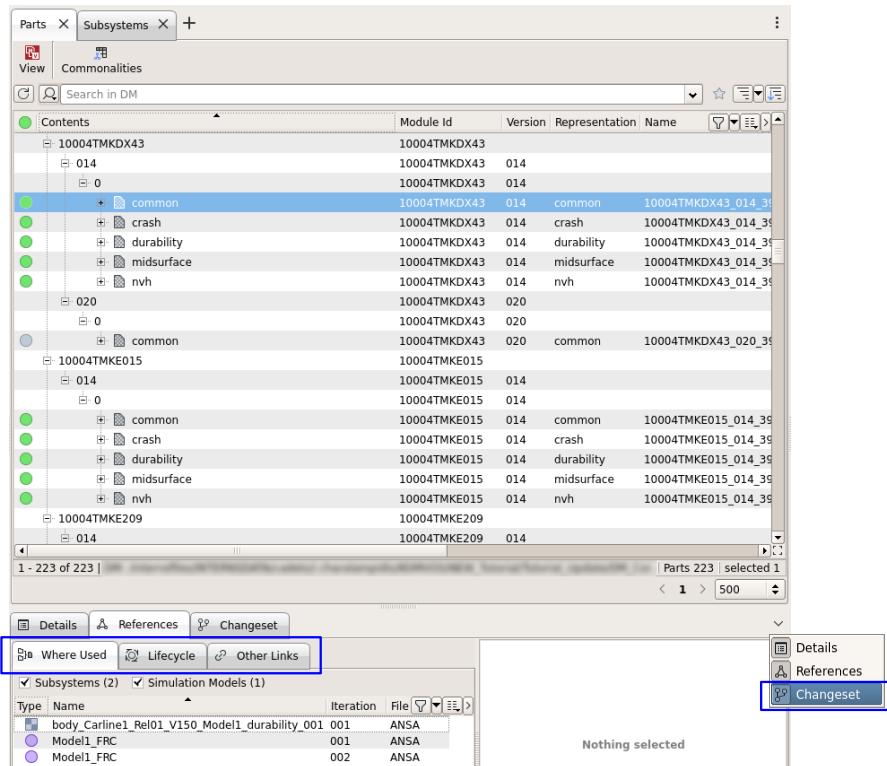


6.7.2. References/Changset

A subsystem is opened in ANSA, by right-clicking **Open in ANSA** and proceeds to several modifications. Before conducting any modification in ANSA, enable **Settings>Model Browser>General>Changset Management (Enable Changset Management)** and select **Parts & Subsystems** from the drop-down menu. Save these settings in **ANS.A_defaults**.

The References tab lists the DM Entities that are related to the selected Subsystem. The types of relationships are grouped in three different sub-tabs:

- **Where Used:** The containers that make use of the selected items are listed in this tab. For example, for the selected Subsystem the Simulation Models and simulation Runs that use it can be displayed. The types of entities to be listed can be activated/deactivated, through the respective check boxes.
- **Lifecycle:** The evolution of the selected Subsystem (or any other DM Object) can be traced through this tab. Additionally, in this tab an overview of the existing ancestors and descendants of the selected Subsystem is displayed.
- **Other Links:** Shows relationships that have been inserted manually by users, through script.



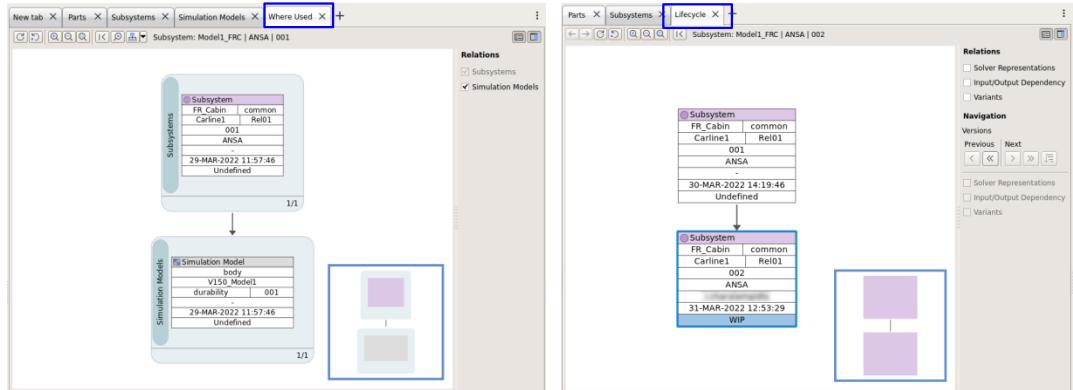
The Changeset tab lists all the recorded modifications of the selected Part/Subsystem or other Entity that represent the difference from its predecessor.

Action	Entity	Timestamp	User	Comment
TOPO>CONS>Open Hole	ANSAPART, Module Id:10004TN12T78, Name:10004TN...	29-MAR-2022 12:49:05	i.cha	
TOPO>CONS>Open Hole	ANSAPART, Module Id:10004TMKD185, Name:10004TM...	29-MAR-2022 12:49:05	i.cha	
TOPO>CONS>Open Hole	ANSAPART, Module Id:10004TN13911, Name:10004TN...	29-MAR-2022 12:50:07	i.cha	

For Subsystems and Simulation Models there are, also, respective buttons for these actions.



By selecting a Subsystem/Simulation Model and clicking one of these buttons, the corresponding tab opens.



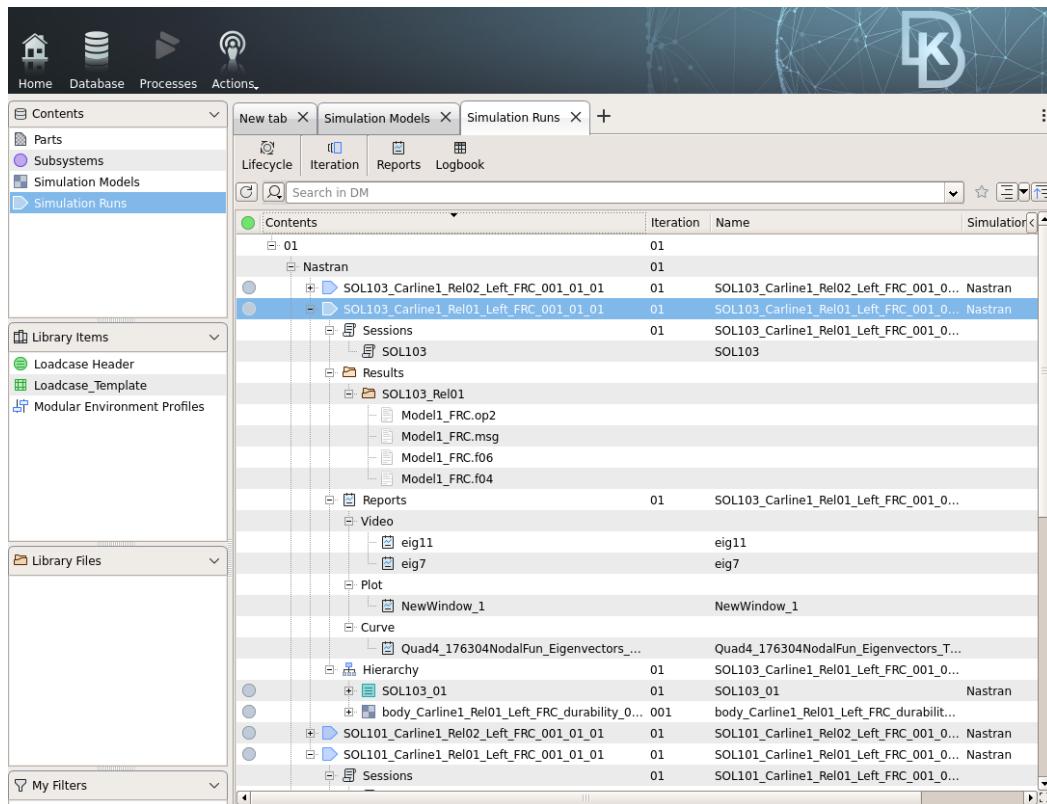
7. Model post-processing workflow in KOMVOS

So far, a DM has been set-up; the necessary actions to build-up the model in KOMVOS are performed and any changed entities are updated through KOMVOS. Moreover, some additional actions regarding visibility checks have been presented. In this chapter, KOMVOS' actions concerning the post-processing and results handling are indicated.

To follow the next steps of this tutorial, load the new DM from the following path:

/.../KOMVOS_Model_Build_Tutorial/DM_Results

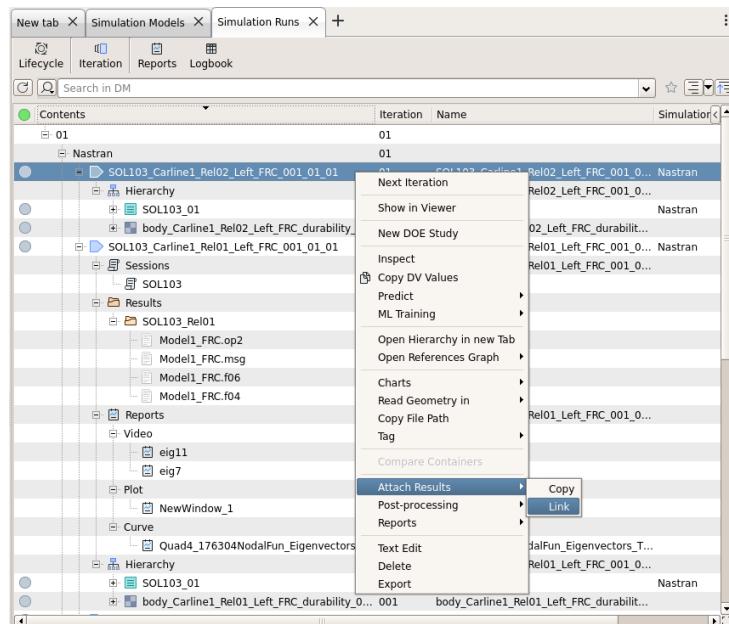
New DM includes, in addition to the DM used in previous chapters, Loadcase Headers and Simulation Runs, as well as, results attached for two of them. More info about Simulation Run setting-up procedure is available in *Modular Model and Run Management* tutorials, specifically the “*Modular set-up of a static simulation for EPILYSIS*”. Modifications between model’s Rel01 and Rel02 differ from those performed in previous chapters, so a new DM should be loaded to follow the next steps.



7.1. Load Results

There are 4 Simulation Runs, one static solution (SOL101) and one normal eigenfrequencies analysis (SOL103) for each Simulation Model. Intentionally, results are attached only for Rel01 Simulation Model, in order to reproduce these actions for Rel02 Model during the tutorial process.

There are two ways to load the results from the used solver to a Simulation Run; either by selecting **Copy** or **Link** to the corresponding Run, as shown in the following image. The difference of the second option is that instead of duplicating results files inside the Simulation Run, only a link to the results folder is made.



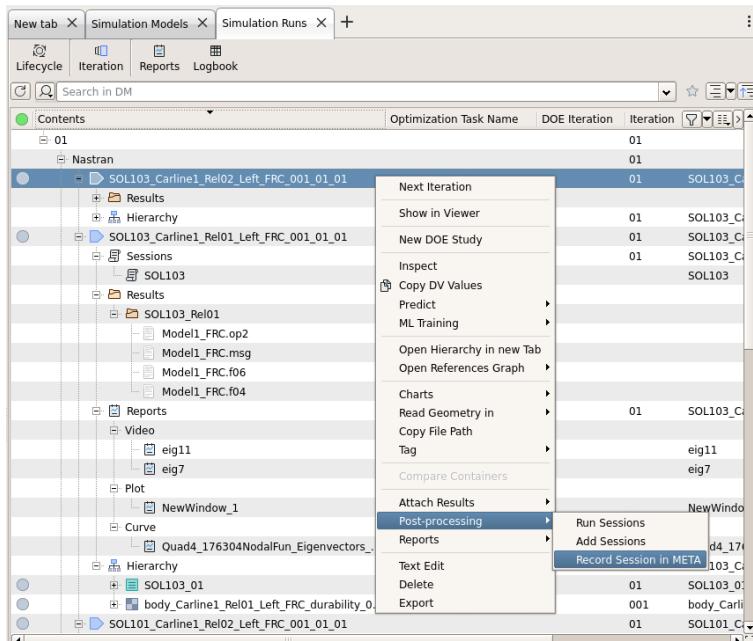
I: It is recommended to **Link** the results to reduce memory usage.

7.2. Results through META Session

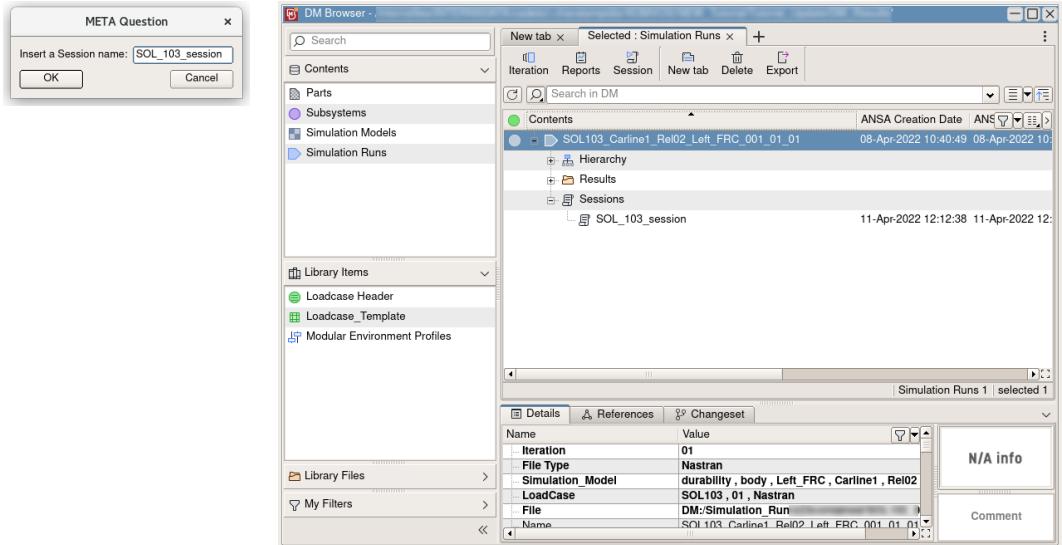
After attaching results files, proceed to post-processing actions using session files, so the necessary for analysis images, plots, curves etc. can be produced.

7.2.1. Record a new session in META

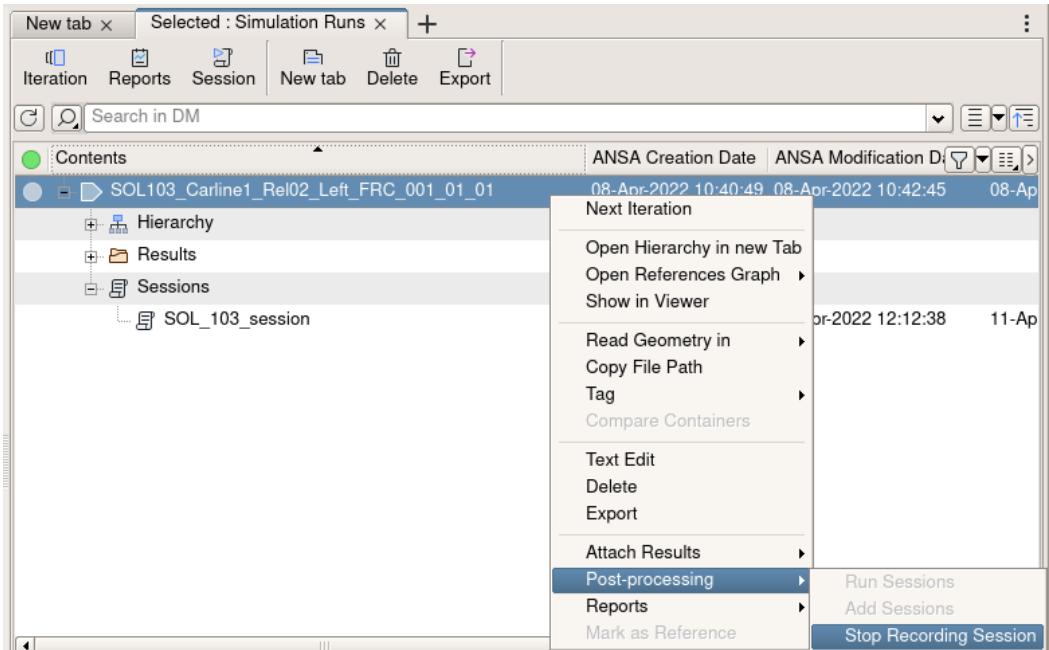
A new META session can be recorded by clicking to the corresponding action from the context list.



META opens, while a small window pops-up, in order to give the desirable name to the recorded session. Afterwards, DM Browser window in META opens too. By double-clicking the selected simulation run, the respective model is loaded and the session recording begins.

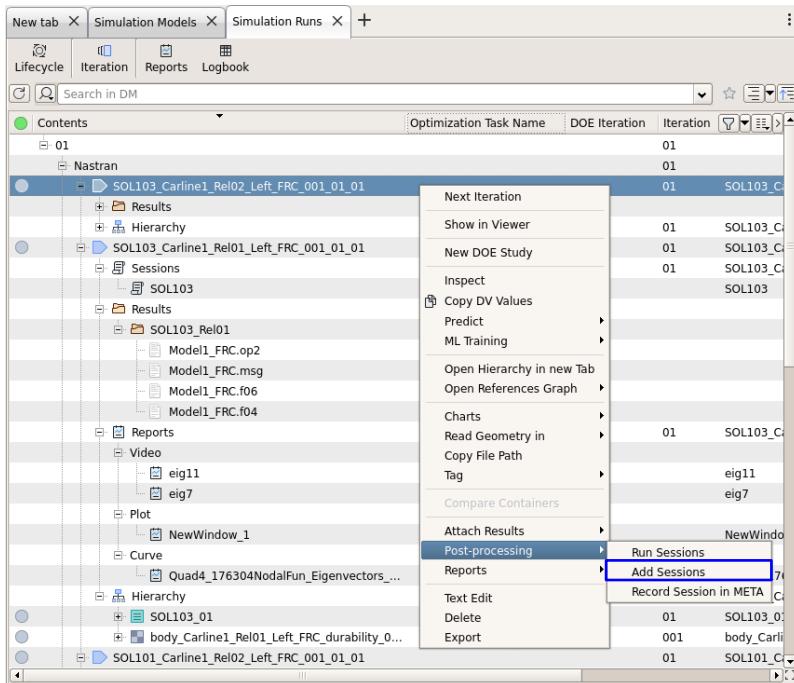


Upon the desired actions execution, click **Stop Recording Session** from the context menu in order to close META and return to KOMVOS.

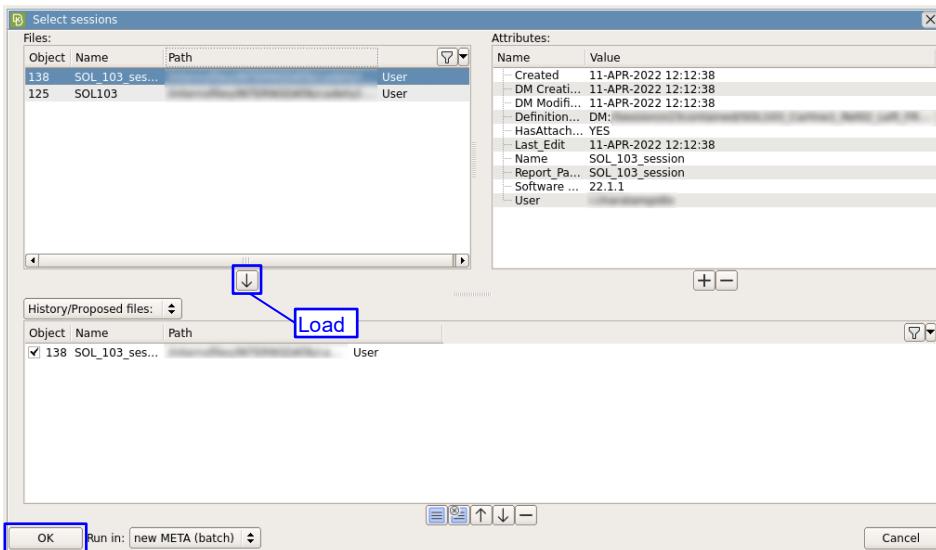


7.2.2. Add and Run an existing session

Often, already prepared sessions are available and specifically made for each loadcase. So, it is fairly common to use them, to produce the desired outputs. In that case, first, the corresponding session should be added in KOMVOS, by clicking **Add Sessions**.



Then, click **Run Sessions**. A wizard pops-up, where the desired session among all available sessions in DM is selected, then loaded and finally, run by clicking **OK**, as shown in the below image.

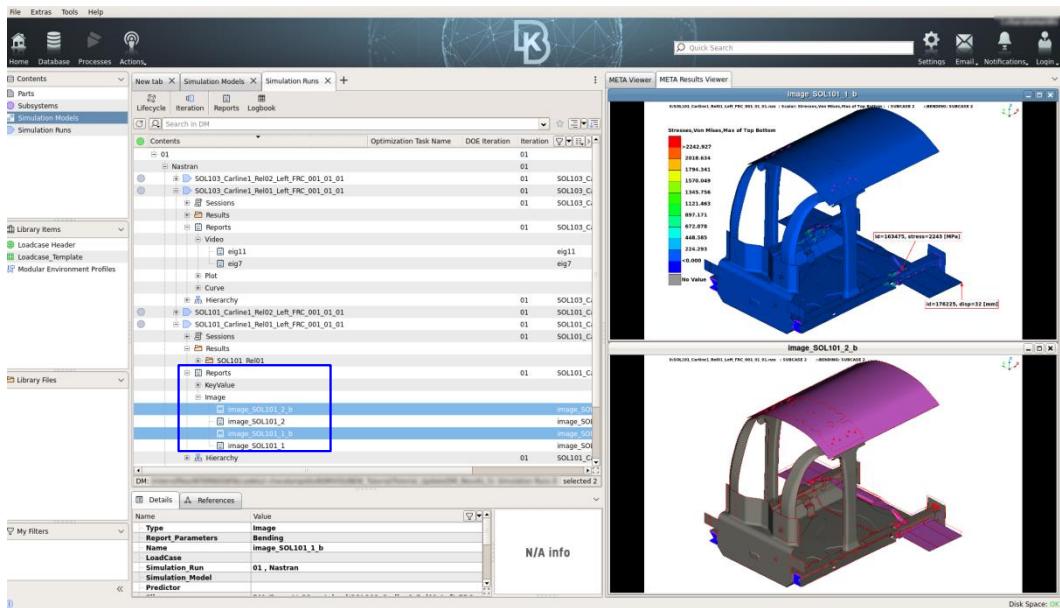


NOTE !:The selected session could be run in a new META either in batch or in GUI mode.

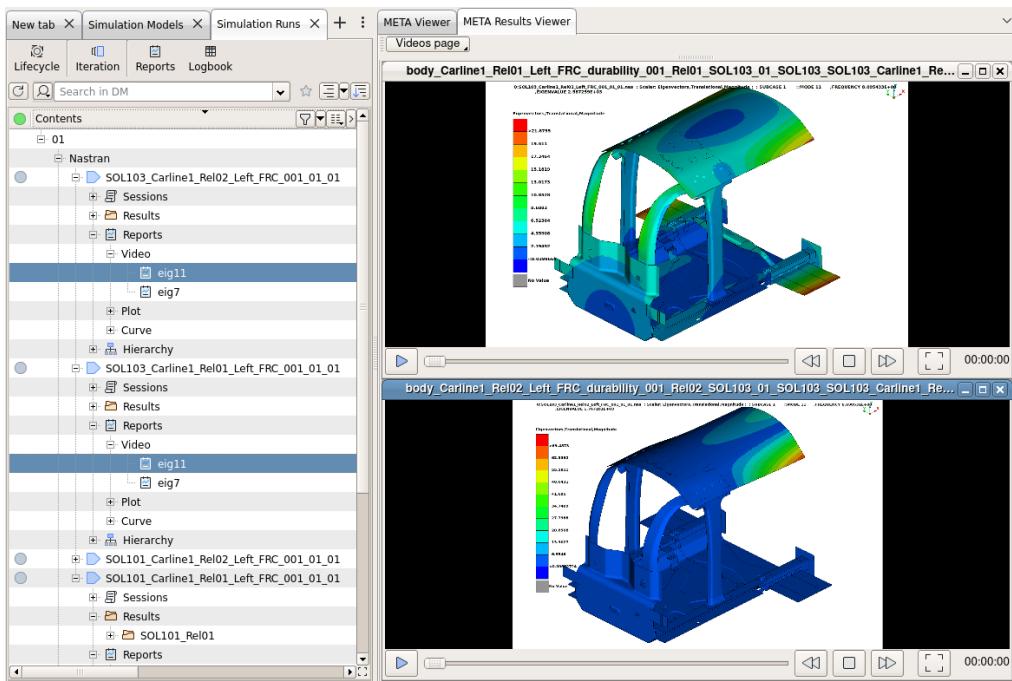
NOTE !: If needed, through the wizard, more than one sessions could be loaded and run, to produce the necessary outputs.

7.3. View and compare results

After session is completed successfully, a **Reports** folder is created inside the corresponding Simulation Run, which contains all the outputs produced by this session. By clicking on each one of them, the respective output appears in "META Results Viewer".



NOTE !: More than one output can be selected, even from different Simulation Runs, in order to evaluate them simultaneously.



Similarly, the same action can be repeated for the rest of the outputs.