

Misterine Studio

User Manual & Quick Start Guide

V1.4.0

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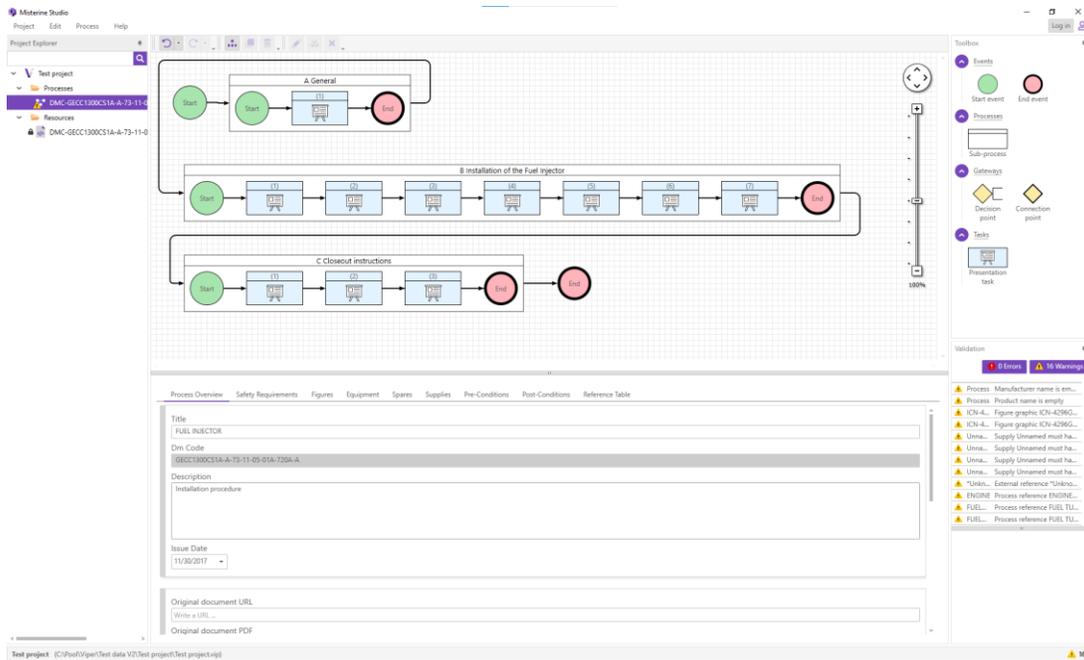
Introduction

Misterine Studio is a desktop software for authoring AR technical manuals that are published to the Misterine App application. AR technical manuals combine the detailing of processes of a technical manual with a new way of presenting the visual information related to that process using Augmented Reality. This method presents visual cuing overlaid onto the physical environment in a manner that is fully embedded into the world. An example is shown in the image below. The colored parts are augmentations shown virtually being inserted into the physical cone below. At the upper right, the same physical part as the purple part is visible. The augmentations can also animate to show the user explicitly each task to be performed, here inserting the fitting and affixing with bolts and nuts seen on either side (green and orange colors respectively).



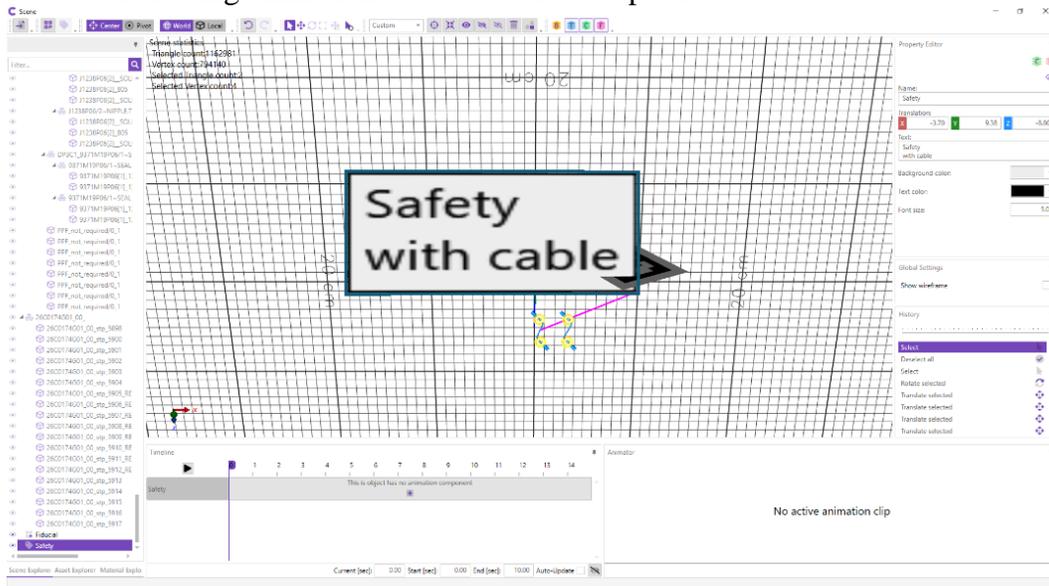
To achieve this Misterine Studio has two main interfaces that work together to allow authoring of the AR technical manuals. The main Misterine Studio interface facilitates the creation of the Process that should be performed. Both creation of Processes by hand and via import of the industry standard S1000D definition of the process. A progress flow graph is a basis for editing the process and providing all related materials, like images, reference data, etc.

An example of a Process that is created by importing an S1000D is shown below. In the center is the flow of this linear process. The textual description task B(3) is shown just below it. Here a rich text editor is provided allowing hyperlinking and text changes. A toolbox on the right provides basic nodes to create and adapt flows, including branching processes via Decision Points. Validation of the flow is continually performed and displayed below that toolbox.



Each task may have a 3D scene attached to it, which is how the augmentations are defined. There is a specialized interface provided for this purpose. It is similar to user interfaces used in CAD and 3D modeling software.

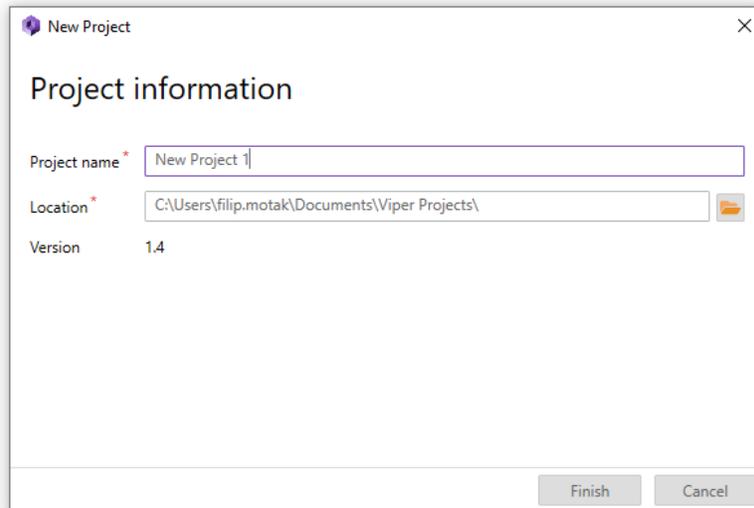
Below is an example of a 3D scene of one of the steps above. In this case four bolts on the fuel injector are to be secured with a lock cable. We see this in the center of the interface. A scene hierarchy is shown on the left-hand side showing all imported geometry. Properties of individual components are shown and can be edited on the right-hand side. At the bottom of the interface, we see interfaces for creating animations at two levels of expertise.



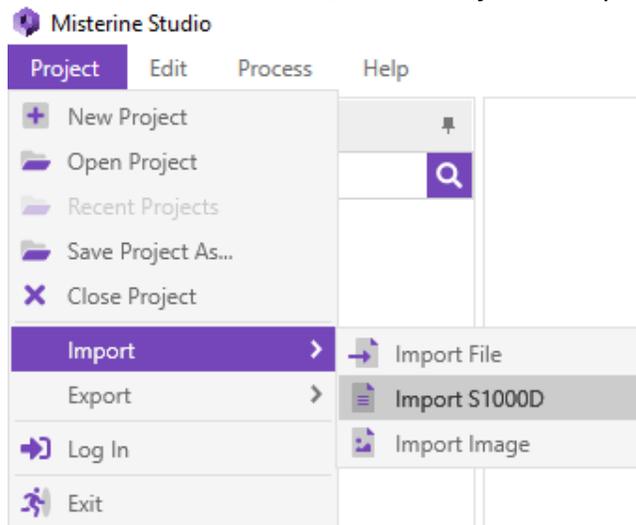
Quick Start

- Start Misterine Studio by double-clicking on *Misterine Studio.exe*
- Create a new Project by *Project* → *New Project*

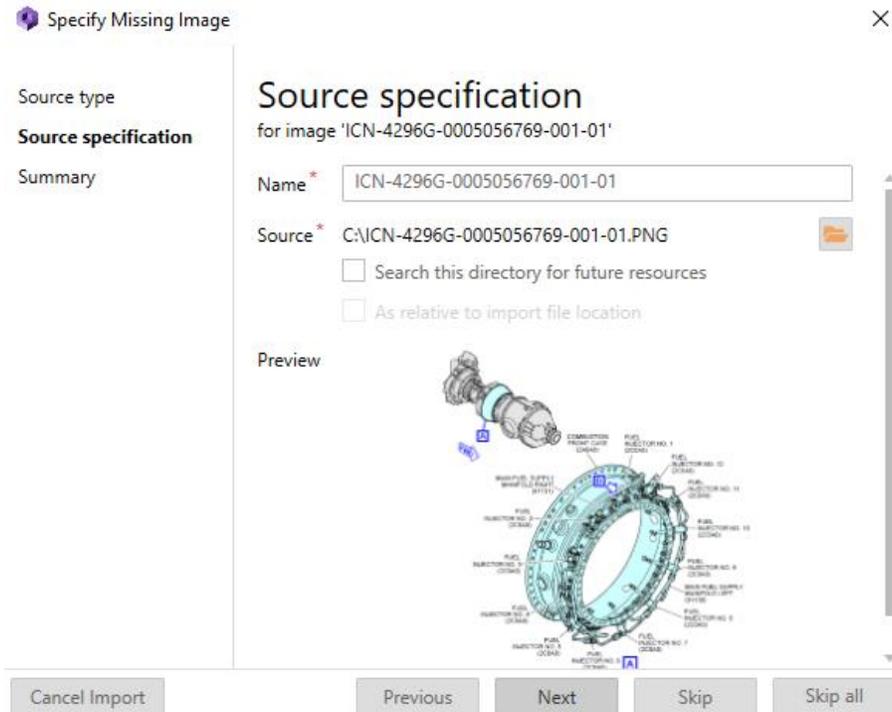
- Select a folder where the project is to be placed
- A new folder with the name of the project will be created in this location. The project structure will be created in that new folder.



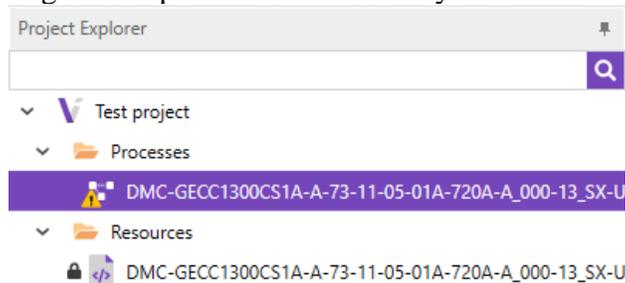
- Import an external source for the Process, via the *Project* → *Import* → *Import S1000D*.



- During importing a dialog for missing images can show up. Images can be ignored or you can add them as prompted.

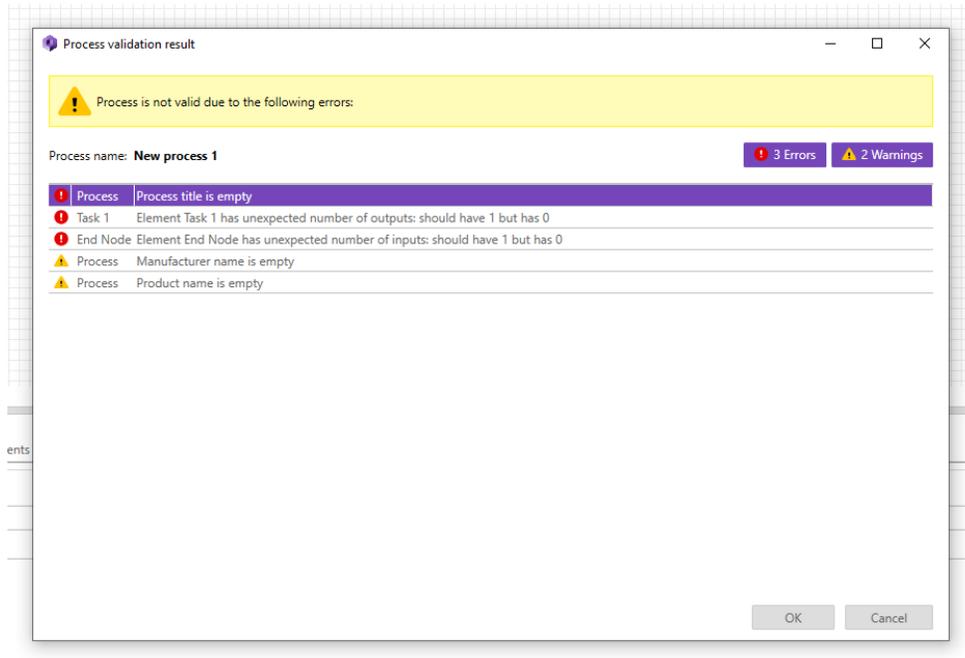


- After importing, the Process will be named in the Project Explorer based on the value set in Preferences. This name is for your identification purposes only and can be changed.
- Double-click on the Process in the Project Explorer to open it for editing.
- In case of any problems, a warning will be issued next to the process name in the Process Explorer. Any change to the process is immediately validated.

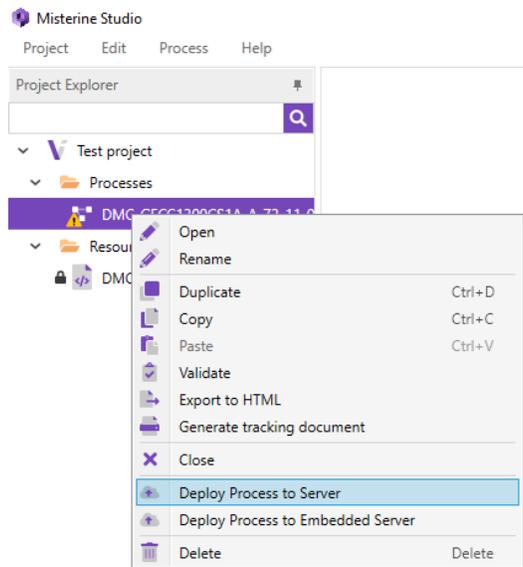


You can view the Validation status on a pane on the right-hand side, which is opened by default. If the pane is closed, you can still view the status in the lower-right corner of the application.

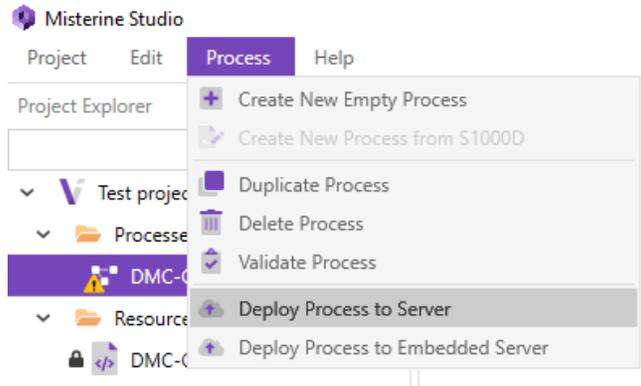
Clicking on that notification will navigate you to the Process Validation dialog window with more detailed information about warnings and errors.



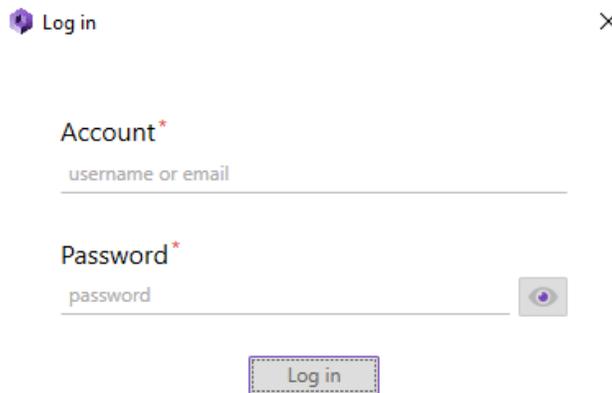
- The Process is complete, though with no augmented content, and even so it can be deployed to the Server. By context (right) clicking on the Process in the Project Explorer or using the *Process* menu and selected *Deploy Process to Server* you can deploy to the Server.



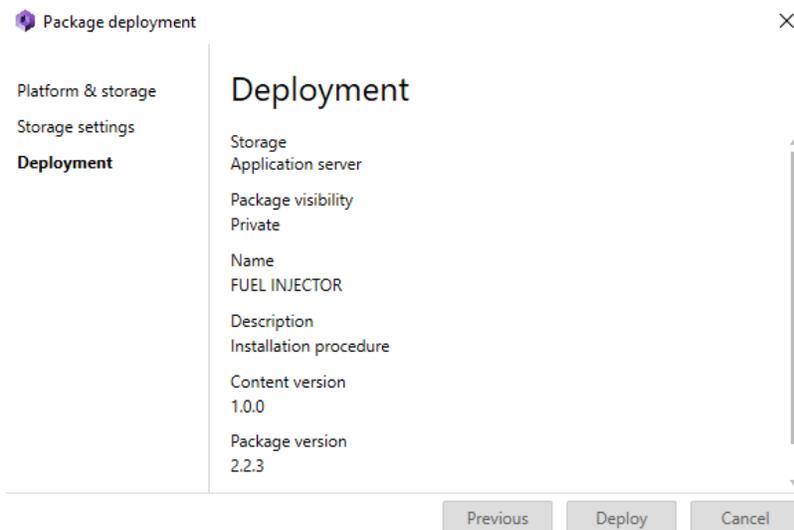
Another option how to deploy a Process is *Process* → *Deploy Process to Server*.



- Deployment requires authentication consisting of User name and Password. A dialog for entering the credentials will pop up.



- Click through the deployment steps to finish the deployment.



Installation

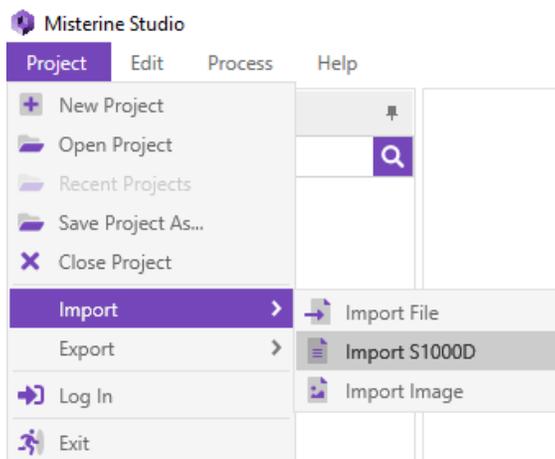
Minimum Requirements

PC with Windows 10. 16GB RAM. NVidia 1050 or equivalent graphics card. 1GB of disk space available. Installation of , [.NET 4.8 runtime](#) and [Microsoft Visual C++ Redistributable x64 for Visual Studio 2015, 2017 and 2019](#).

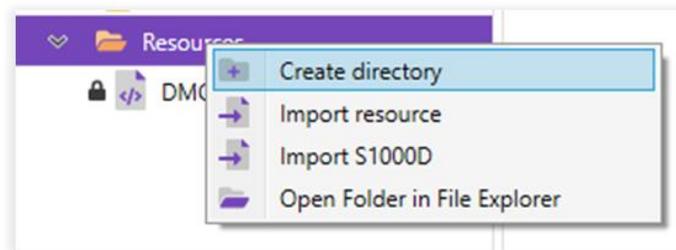
Importing from External Sources S1000D

Procedural (Proced) Modules of the S1000D International specification for technical publications can be loaded into Misterine Studio. This will create a fully populated Process flow and fill in the front matter if present in the file.

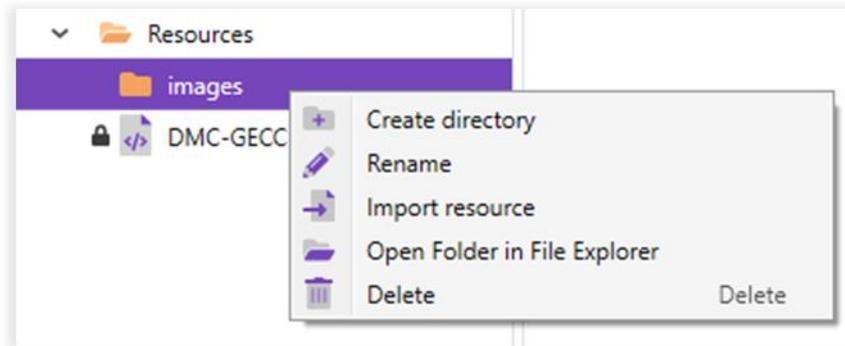
Currently, external definitions of components like equipment, spares, etc. are not supported. To import the file, in S1000D format, use the *Import S1000D* action in the *Project* menu.



S1000D refers to images frequently. If those are already in the project as resources, they will automatically be connected to the Process. If not, you will be prompted to specify the missing images. It is possible to skip this during the import and connect them later. It is generally advisable to import all images in advance into a sub-folder of the resources section of the Project Explorer.



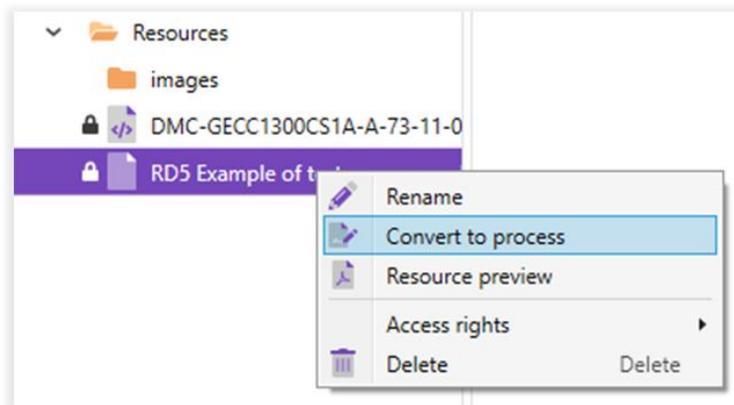
You can import all images at one time. Simply select *Import resource* and then multi-select all the images you need.



Text

Simple text files can be used to specify a sequential workflow of a Process. These may be pre-existing files or can simply be leveraged for more rapid creation of simple workflow specifications, i.e. skipping creation of the process flow in the graphical editor.

To import from a text file, the file must first be added as a resource. This can be achieved by using the *Project* menu and selecting *Import File* or by context (right) click on the Resources folder in the Project Explorer (or any sub-folder) and select *Import Resource*. After importing, context (right) click on the resource and select *Convert to process*. Change the name if required. This name does propagate to the official name of the Process.



Licensing

Misterine studio can work with two types of license - Studio Trial license and a Full license. While Studio Trial license free, the Full license is paid.

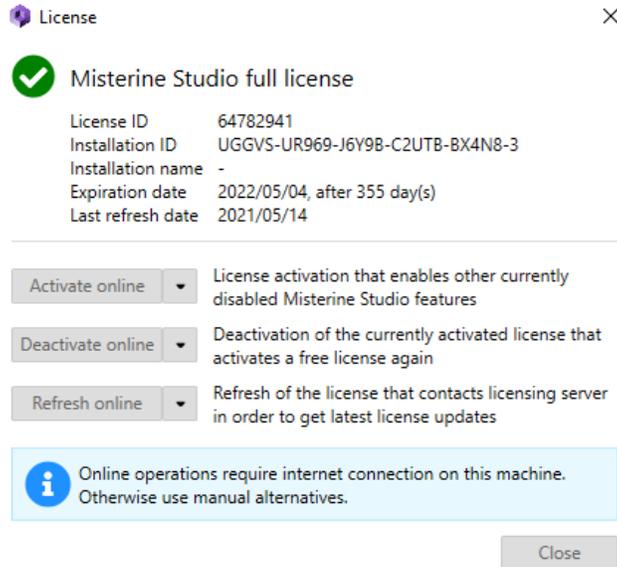
The Studio Trial license provides a slightly limited functionality, see the table bellow.

Functionality	Studio Trial	Studio full license
Create/open processes	✓	✓
Import S1000D	✓	✓
Add augmentations	✓	✓

Add animations	✓	✓
Export as HTML	✓	✓
Publish to Embedded Server	✓	✓
Publish to External Server	✗	✓
Refer to public resources	✓	✓
Refer to auxiliary processes	✗ limited	✓
Manage visibility of processes public/protected	✗	✓
Unlimited nr. of processes in project	✓	✓
Unlimited nr. of processes on Misterine App	✗ one only	✓

The instruction manuals are not limited on size, number of steps, decision points, augmentations, resources. The only principle difference between Studio Trial and Studio full license is its capability to deploy the result to a publicly (or on premise) available server. The internal embedded server is available on all Studio licenses.

Studio licenses can be managed (activated, deactivated) in the Application menu *Help* → *License*. The dialog window with license overview and all possible license actions will be opened.



Activation

If Misterine Studio is run for the first time, Studio Trial license is automatically activated and the user can use Misterine Studio with a limited functionality.

There are two ways to active the Studio - Online activation and Manual activation. In any case, the activation consists of entering a License ID and an activation Password.

An already activated instance of Misterine Studio can be easily deactivated



Please, do not forget to deactivate the old license before activating a new one. Only one license to a given instance of Studio can be active at a time.

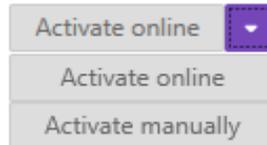
Online activation

Online activation is a default way for activating Studio Full license. For its purpose an internet connection is required because a direct communication with the licensing server is done during the activation. For online activation, click the Activate Online button, a dialog will show up.

Fill the license ID and activation password into the form. Eventually, an installation name can be set. The name serves as a custom note about the activation, f.e. 'John Green computer'. After clicking the *Activate* button, Misterine Studio is automatically activated for use on this computer.

Manual activation

Manual activation is an alternative to the on-line activation for cases, where there is no internet connection or when the company policy does not allow for making direct connection to the Misterine License Server. The activation can be started by clicking on the arrow next to the *Activate online* button.



After selecting the *Activate manually*, an additional dialog will show up with three steps for manual license activation.

Step 1

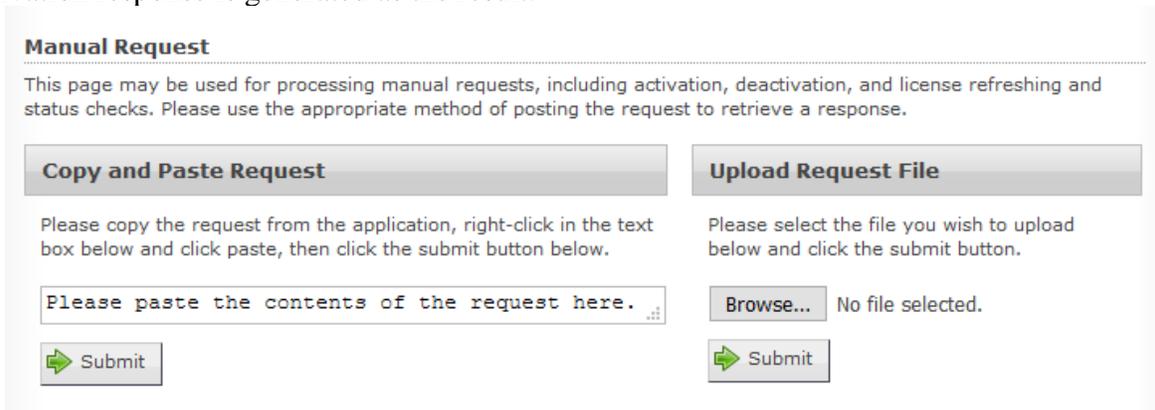
The first step is very similar to the online activation - license ID and activation password must be filled, and optionally the installation name. Instead of *Activate* button there is *Generate activation request* button which will generate a request for the next step.

Step 2

The second step is about taking generated request from the first step and providing it to someone who has a computer with the internet connection. The request can be sent by an email or by any other trusted communication tool.

User can copy the generated request manually using standard way for copying (CTRL + C or right-click and select *Copy*) or by clicking one of the prepared buttons. Button *Copy to Clipboard* does the same thing like the standard way for copying. Button *Save to file* offers an option for saving the generated request to the external file.

The provided request has to be processed by the licensing server web page. This web page can be opened by clicking on *Open activation page* button. On this page, based on the request, the activation response is generated as the result.

A screenshot of a web page titled 'Manual Request'. At the top, there is a heading 'Manual Request' followed by a paragraph: 'This page may be used for processing manual requests, including activation, deactivation, and license refreshing and status checks. Please use the appropriate method of posting the request to retrieve a response.' Below this, there are two columns of options. The left column has a heading 'Copy and Paste Request' and a text box containing the text 'Please paste the contents of the request here.' with a small icon on the right. Below the text box is a 'Submit' button with a green arrow icon. The right column has a heading 'Upload Request File' and a 'Browse...' button next to the text 'No file selected.'. Below the 'Browse...' button is another 'Submit' button with a green arrow icon.

Step 3

The third step requires a generated activation response from the previous step. The response has to be pasted into a prepared form. There is a button *Load from file* to load a file content into the form for cases when the user saved the generated response as a file. In standard way for pasting the user can use either button *Paste from Clipboard* or CTRL+V shortcut or right-click and select *Paste* from the opened context menu.

When the third step is done, the user can click *Activate* button which will process the activation response and activate the Studio.

The generated activation response for a license can be used only once. When the license is later deactivated, the reactivation will require repeating the whole activation process again.

The image shows a dialog box titled "License - Manual activation" with a close button (X) in the top right corner. The dialog is divided into three main sections:

- Step 1: Enter activation information and generate activation request**
 - License ID* (text input field)
 - Password* (password input field with a "Write an activation password" placeholder and an eye icon for visibility toggle)
 - Installation name (text input field with a "Write an optional installation name" placeholder)
 - Generate activation request (button)
- Step 2: Copy generated request and paste it to the web page**
 - Activation request (text area containing "No generated request")
 - Open activation page (button)
 - Save to file (button)
 - Copy to clipboard (button)
- Step 3: Copy the response from the web page and paste it below**
 - Activation response (text area containing "Paste or import an activation response")
 - Load from file (button)
 - Paste from clipboard (button)

At the bottom of the dialog, there are two buttons: "Activate" and "Cancel".

Deactivation

Deactivation is the opposite operation for the activation. When a license is no longer used on a computer it can be deactivated and activated again on a different one. For this purpose, same as for the activation, there are two possible ways – online and manual deactivation.

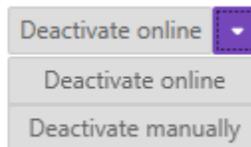
When the currently activated license is deactivated, Studio Trial license is automatically set instead and Misterine Studio functionality is limited.

Online deactivation

The easiest way to deactivate the license is online deactivation which requires internet connection. The user can do it just by clicking the *Deactivate online* button in the license overview dialog window. No additional steps are required and the activated license is automatically deactivated.

Manual deactivation

As other manual alternatives, deactivation doesn't require the internet connection either. This option can be found by clicking on the arrow next to the *Deactivate online* button. Unlike the manual activation, manual deactivation is done only in two steps.



After the click an additional dialog will show up.

License - Manual deactivation

Step 1: Copy generated request and paste it to the web page

Deactivation request

```
<DeactivateInstallation> <EncryptionKeyID>79d20503-27bd-419e-b362-4a00158d53f6</EncryptionKeyID> <EncryptedData Id="PrivateData" Type="http://www.w3.org/2001/04/xmlenc#Element" xmlns="http://www.w3.org/2001/04/xmlenc#"> <CipherData> <CipherValue>IaicP2zrpAdzf8rmAdP4fUE0n0VXCHW55rc42zk3TqVZmGsnncRfAbO9qrlPd11berVnCLnmoawWeUPtaMS2fj3vJPI8IDTF6OWOxA1dXvmMw4JIVkS9EXpJIITZLsF1xKv5pBis2RFpENPa5sqayHMJJsfFPWh/EysfnWBySs56sKvtjwun3QEiqmSLgfq4nuxjHWamCF3WRXUWorz+SDxp0AMK/
```

Open deactivation page Save to file Copy to clipboard

Step 2: Copy the response from the web page and paste it below

Deactivation response

Paste or import a deactivation response

Load from file Paste from clipboard

Deactivate Cancel

Step1

Click the Deactivate button and the deactivation request is automatically generated when the dialog is opened. In order to finish with the license deactivation, you must send the data provided in this step from a computer with internet connection. To do so, transfer the request (text) either via email or as a file to another computer send then send it from there. You can use the standard way for copying (CTRL + C or right-click and select *Copy*), eventually by clicking the *Copy to clipboard* button which does the same, or click *Save to file* button that saves the request to the external file. In order to move to the next step, the deactivation response must be generated on the licensing server web page.

This web page can be opened by clicking on the *Open deactivation page* button, once the computer is connected to the internet.

Step2

Finish the deactivation by pasting the server response into the Step 2 section of the form. The deactivation code can be in a form of a file or in a form of plain-text pasted from clipboard. For loading the external file click *Load from file* button to load a file content into the form.

Click the *Activate* button to finally deactivate the license.

The generated deactivation response can be used only once. For any other deactivation a new response has to be generated when deactivating manually.

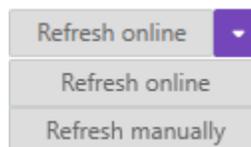
Refresh

In order to keep the activated license active, it is necessary to refresh the license regularly. The refresh operation is fundamental and in standard situations it is done automatically. However, there are situations when the automatic refresh is not possible. It can be caused for example by restrictions of networking or simply by a lack of the internet connection.

If the license is not refreshed within 90 days since the last refresh, it starts acting like the Studio Trial license. License refresh expiration is automatically announced 10 days before the license is invalidated.

The refresh of the license can be performed in these ways:

1. Automatically when Studio is opened.
2. Online upon request
3. Manually upon request



Online refresh

For computers with access to the internet, the online refresh must be enforced only if the license parameters were changed. With the internet connection the automatic refresh should work properly being triggered when Studio is started.

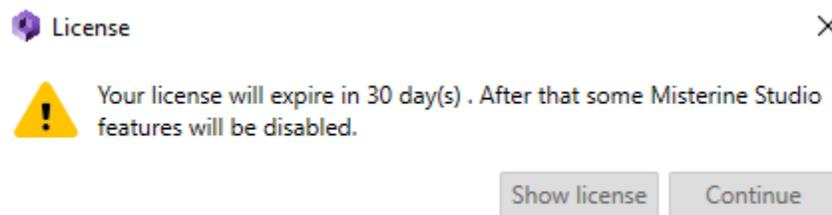
Manual refresh

With restricted or no internet connection, manual refresh is the only option to refresh a valid license. It works in the same manner as manual deactivation, please refer to the manual [deactivation](#) process.

Expiration

The Studio full license is a time-limited license. It will expire after 365 days from the date of purchase. After this period, it is necessary to renew the license in order to have full access to all Misterine Studio features again.

If the license is expired or not renewed, the Studio will act as if having Studio Trial license. Before this should happen, a license expiration warning is shown 30 days before the actual license expiration.



You can check date of expiration and number of days until the license expires in the license overview dialog.

Creating and Managing Projects

A Project is a data structure containing Processes, Resources, and Templates. To create a project, click *Project* → *New Project* in the application menu and follow the instructions in the wizard dialog. Every project will create a physical folder on the disk named after the Project name. This folder will contain the project file (with .vip extension) as well as other project files. Instruction manuals, processes and other resources of a project stay on the computer until one or multiple processes are published to a server. Even then only the relevant files are encoded and transferred to the server, the rest is never published nor transferred anywhere.

Adding Processes

To add a new empty Process, click *Process* → *Create New Empty Process* in the application menu or right-click the *Processes* folder in the Project Explorer and choose *Create New Process*;

Processes are explained in the section [Creating and Editing a Process Flow](#).

Adding Scene Templates

To add a new Scene Template, right-click the *Scene Templates* folder and choose *Create New Scene Template*.

Scene Templates are explained in the section [Scene Templates](#).

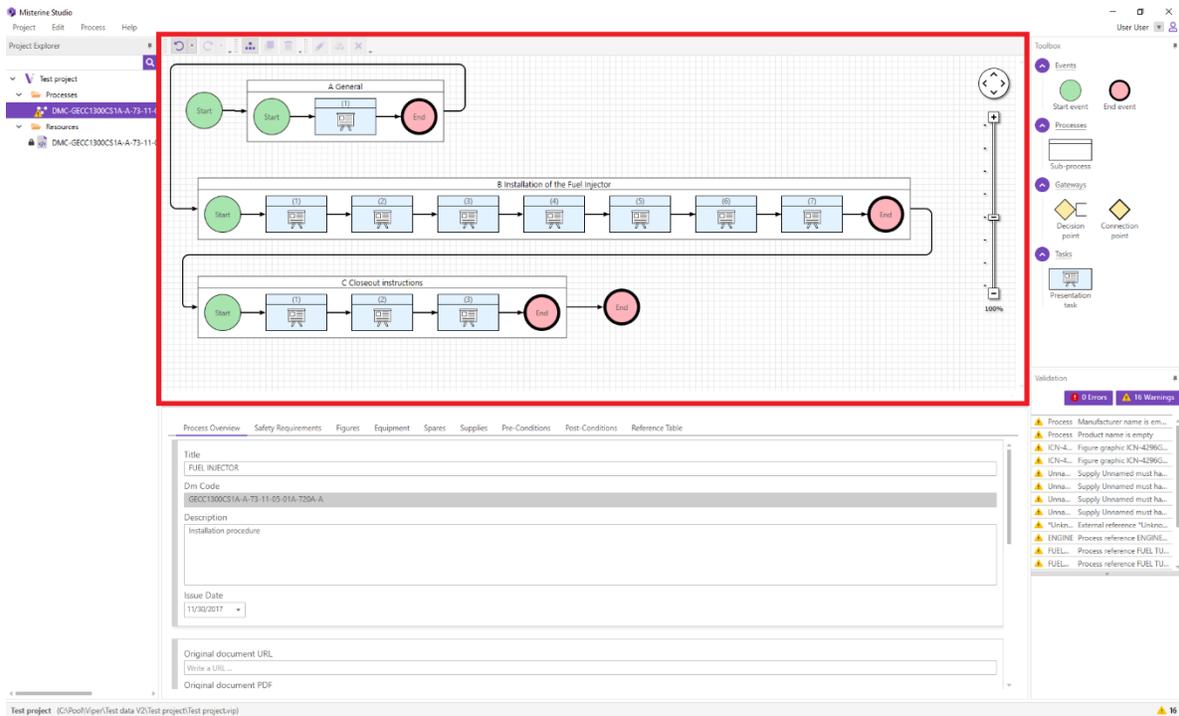
Adding Resources

To add resources, click *Project* → *Import* in the application menu and choose the type of file to import. Resources may also be imported by right-clicking the *Resources* folder and choosing the appropriate option.

Resources are explained in the section [Resources](#).

Creating and Editing a Process Flow

The main visual focal point of the main Misterine Studio application is the Process Flow (diagram) Editor. It is outlined in red below. This is the definition of the Process, also known as procedure, that the user will do in the Misterine App.



The Process is displayed and defined by a graph flow. The arrows of the graph define the order of tasks that the user should perform.

The elementary unit of work the user should do is called a Task (also known as a step). A sequenced of Tasks and other nodes in the graph define the instruction manual flow. Besides Tasks, there are other types of nodes in the graph, namely:

Flow Nodes



Start Event

Start nodes indicate where a Process starts. A process must have exactly one Start Event node. Start Event nodes also exist in Sub-Processes, but outside of Sub-Processes there may be just one. Other than the logical beginning of the process, the Start Event node has no other practical visualization.



End Event

End Even node indicates the end of the Process. It is a logical node for the purposes of indicating the end and it has no other practical visualization. End nodes exist also in Sub-Processes, described below.



Presentation Task

Presentation Tasks are the fundamental work that the Misterine App user does. These are often called steps for a procedure.



Sub-Process

Sub-Process is a logical separator in a Process. Typically, it is used to hold a complex task that is logically one thing, but requires the user to perform multiple individual tasks. Sub-Processes can be embedded up to 8 levels. A Sub-Process must always contain a Start, End and at least one Presentation Task.



Decision Point

Decision Points are places where different sets of Presentation Tasks could be required based on some choice. This is a single input node with at least two outgoing directions (1:N). In the current implementation, there is only one way to "resolve" the decision, a Simple Form, which is just a question with multiple answers that the user themselves decide. These will be described more below.



Connection Point

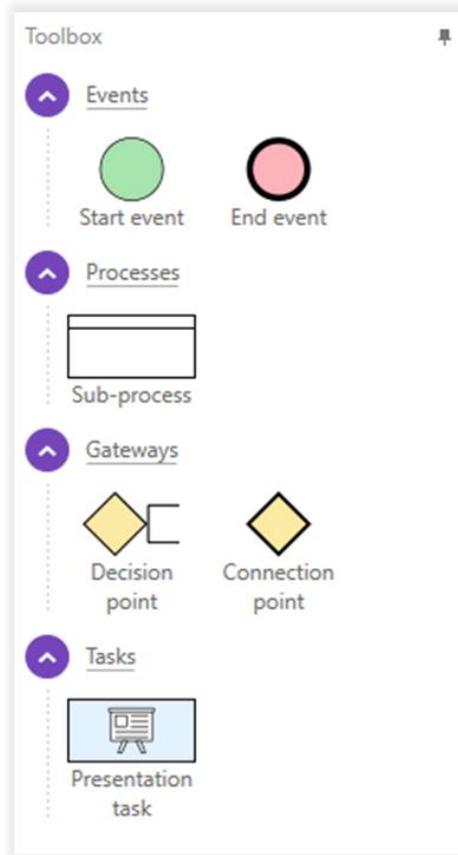
Connection Points are logical blocks that collect multiple input streams into a single outward direction (N:1). They are used in conjunction with Decision Points. The Misterine App user will not directly experience these nodes.

Toolbox

All of these flow nodes can be added to a Process Flow graph by hand. On the right-hand side of the application is a pane called Toolbox. It is opened by default, but can be unpinned (closed).

Nodes can be added to a Process Flow by two methods. You can drag'n drop any node into the Process Flow Editor. This will place a single node. If you need to place multiple of the same node, e.g. a Presentation task, you can click the node type in the Toolbox. Each click onto the editor will place a node. This continues until you press the ESC key or click right mouse button.

Nodes can be placed on the Process canvas or also into Sub-Processes on the canvas.



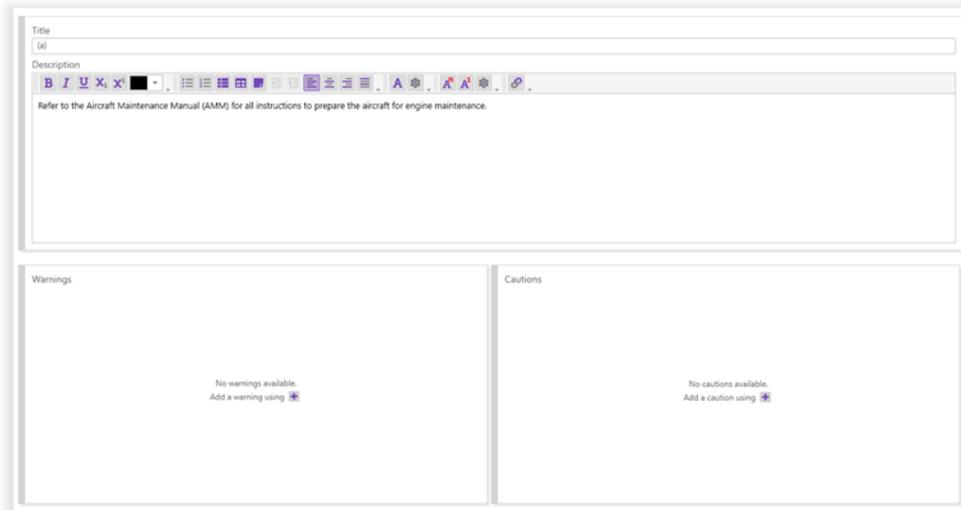
Flow Node details

When a Presentation Task, Sub-Process or Decision Point is selected in the graph, the details of it will appear in the panel below the graph. Here you can specify the content that will be presented to the Misterine App user.

Presentation Task and Sub-Process details

Title and **Description**: This is the text information presented for them to be able to complete the flow node. This is frequently the exact task that exists in a traditional manual.

Warnings and **Cautions**: These are Safety notifications that are displayed to the user before they can perform the action of this task. Warnings are displayed with a red box and require explicit confirmation. Cautions are displayed with a yellow box and can be dismissed more easily.



Decision Point details

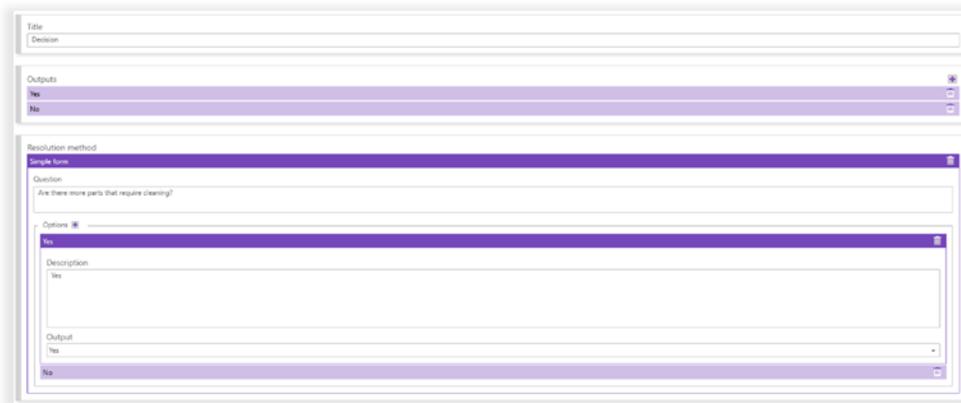
Title: The title of the Decision Point is most visible when viewing the overview of the Process in the Misterine App.

Outputs: Outputs are the directions you can go after making a choice. They are named to assist with connecting the Resolution Method (see below) and connecting the graph. These names are only used in Misterine Studio and not visible to the Misterine App user.

Resolution Method: This is the way that this decision will be made. Currently, Misterine Studio has a single resolution method, a Simple Form. This is a simple question and multiple-choice answer for the user. Each choice leads to one of the Outputs.

The question is simple text. Options consist of a Description, which is simple text that is presented to the Misterine App user, and an Output.

To be valid, all outputs must have at least one resolution option that triggers that output. All fields must be non-empty.



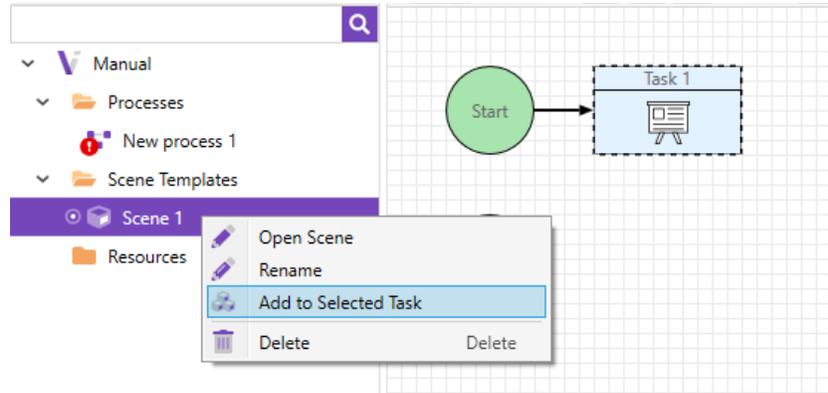
Scene Templates

Scene Templates are 3D augmentation scenes without relations to any processes or tasks. Instead, these templates serve as a base for any future scenes created on the tasks in a given project.

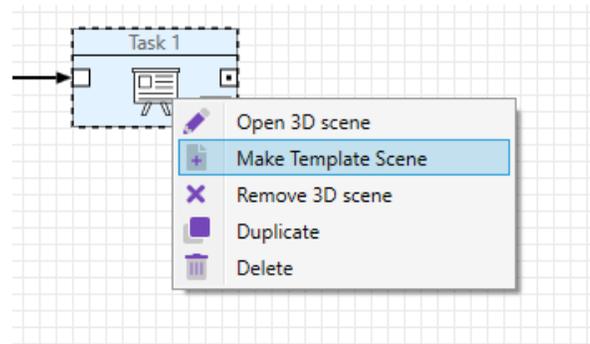
Scene Templates can be edited as any other scenes. Open the Scene Designer by double-clicking the item in Project Explorer or by bringing up the context menu and choosing the *Open* option.

Many Scene Templates can exist in the project but only one can be set as the default template. By default any new scene created in a presentation task will create a copy of this default template. This behavior may be changed in Preferences.

To create a new scene with a template as a base, select the task, right-click the base template and choose *Add to Selected Task* in the context menu. Another option is to drag and drop the template onto the task itself.



It is also possible to create a template from an existing scene attached to an existing task. Just right-click the task with the scene attached and choose *Make Template Scene* in the context menu.



Resources

Misterine Studio keeps track of two kinds of resources, source files and true resources. For large projects, it is possible to organize the project resources by creating and using folders.

Source files include S1000D XML files and TXT files (see [Importing from External Sources](#) above). You can trigger the (re)import of these files by context (right) clicking on the resource and selecting *Convert to process*.

True resources include:

- Image files (JPG, PNG, BMP)
- PDF files

These true resources can be:

- Renamed

- Previewed
- Access rights can be set. Currently, this is limited to shareability settings that affect only the resource when deployed in a Process to the Misterine App. It is primarily useful with original PDF manuals.

Preview option

Misterine Studio shows the common information about resources and processes that are included into a project. Previews can be shown for processes, images, XML files, PDF files and TXT files. You can see the Preview Panel under the Project Explorer panel. If nothing is selected or selected an item that cannot be previewed the Panel shows the message 'No other details. Select single item for preview'.

Process preview appears if any process is selected. The process preview contains common information about process. Also a user can navigate to the original PDF resource file or to the source file from which the process was created (it can be TXT file or S1000D).

Process preview contains the information about deployments to remote servers. This table contains date and time of deployments, QR code which can be saved, and link that can be copied to the clipboard.

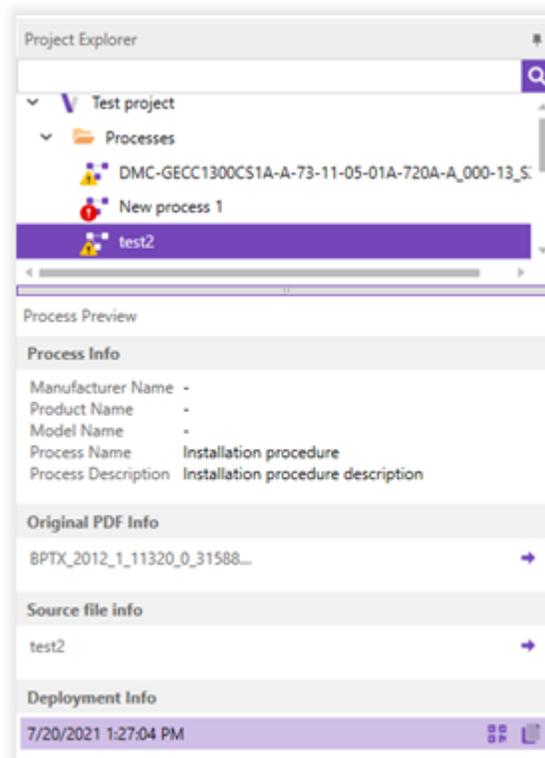
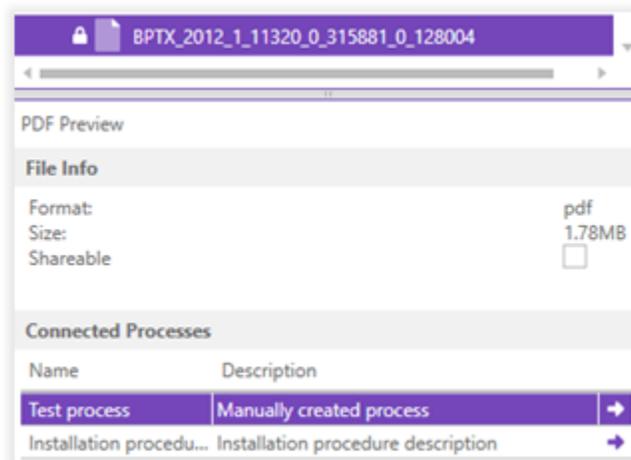


Image preview appears if any image is selected. The image preview contains a small representation of image itself and the information about image parameters: dimensions, format and

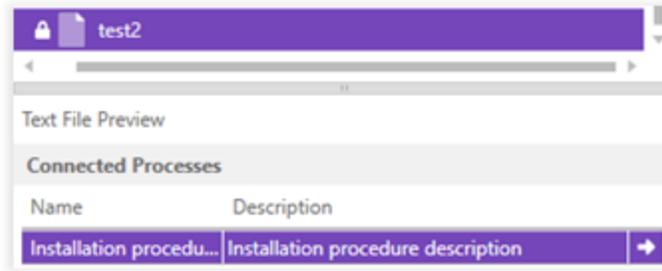
size in MB. If an image is used somewhere in processes the table 'Connected Processes' appears. User can navigate to a process where the image was used.



PDF Preview appears if any PDF file was selected. The PDF Preview contains the information about a file: format, size in MB and access rights. A user can set the shareable property from the Preview. If a PDF file was used somewhere in other processes the table 'Connected processes' appears. User can navigate to a process where the PDF file was used.



TXT file Preview and **XML file Preview** contains only the information about connected processes. User can navigate to a process where the TXT or XML file was used.



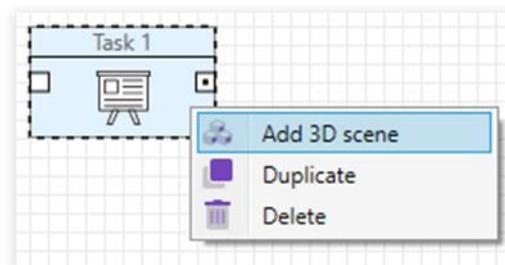
Adding Augmentations

Misterine Studio uses a layer concept that is fundamental to how our system works. This system is used in many design tools, include 3D modeling software, so it is likely to be familiar to the user. Our design is slightly different as there is more of a relationship than in most software. How to deal with layers in Misterine Studio is described below in a section [Dealing with Layers](#). There are fundamentally three different components that the user needs to specify for the AR scene.

1. The physical scene - the parts of a model that will be physically present during the Presentation Task in the Process. We call this the Background.
2. Tracking - the purpose of tracking is to create an understanding of the physical environment and our relationship to it. It is a necessary step for being able to locate augmentations.
 - a. Tracking methods are based on external objects called AR Positioners (i.e., Fiducial Markers or Interactive Anchors). For this, the AR Positioner needs to be situated to the background in the same place it would be in the real world.
 - b.
3. The augmentations. This is the actual AR components of the scene. This may be parts of the model and even things that are part of the Background / Tracking. It could also be other models, like a tool. Augmentations could also be animated.
 - a. We differentiate augmentations into two, those that are automatically shown and those that are optional. The automatically shown we term as part of the Foreground. The optional we denote as part of the Context.

Adding Scene

To start adding augmentations, it is necessary to add a Scene that serves as a container for all augmentations. The Scene can be added only to Presentation Task using button  or using an option *Add 3D scene* in its context menu.

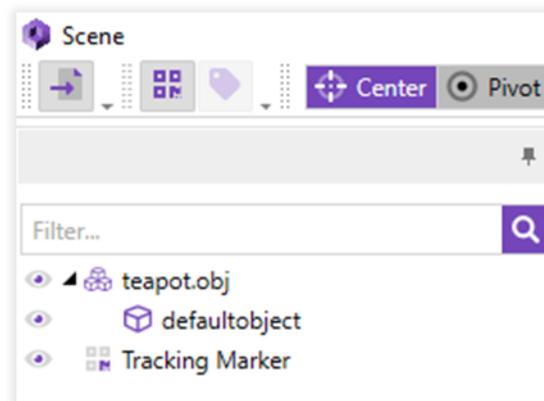


Dealing with Models

Misterine Studio currently supports 3D models in triangle soup format with per face group coloring.

Importing

CAD and 3D models can be imported via the button  or by drag'n'drop onto the Scene Explorer component



Supported formats:

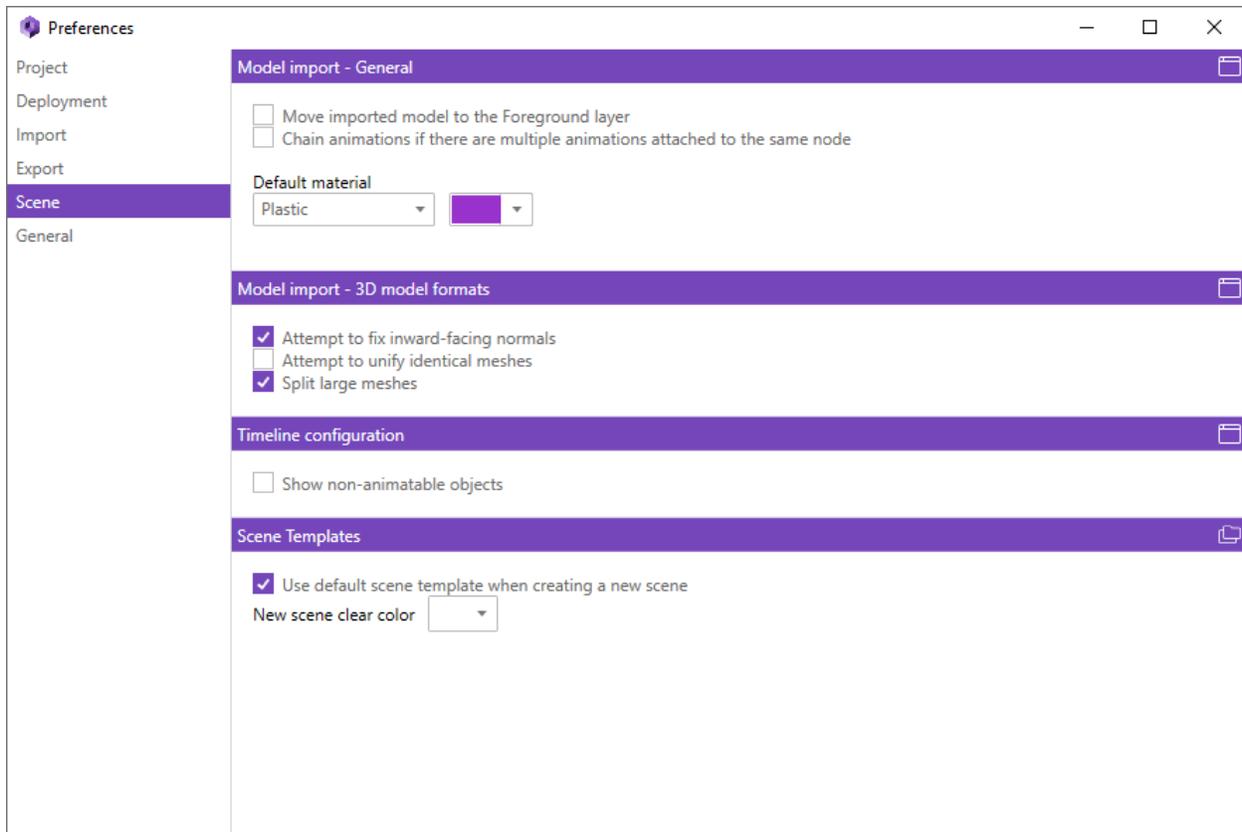
- CAD formats: STEP, DXF
- common 3D graphics formats* (.3d, .3ds, .3mf, .ac, .ac3d, .acc, .amf, .ase, .ask, .assbin, .b3d, .blend, .bvh, .cob, .csm, .dae, .dxf, .enff, .fbx, .glb, .gltf, .hmp, .ifc, .ifczip, .irr, .irrmesh, .lwo, .lws, .lxo, .md2, .md3, .md5anim, .md5camera, .md5mesh, .mdc, .mdl, .mesh, .mesh.xml, .mot, .ms3d, .ndo, .nff, .obj, .off, .ogex, .pk3, .ply, .pmx, .prj, .q3o, .q3s, .raw, .scn, .sib, .smd, .stl, .ter, .uc, .vta, .x, .x3d, .x3db, .xgl, .xml, .zgl)

*graphics formats that support animations only import the geometry and materials (including textured).

Scene settings

The scene settings can be changed in the Preferences dialog under *Edit* → *Preferences* → *Scene*.

The form contains the following sections.



Model import – General

This section contains the general settings relevant for all supported types of models and includes the following inputs:

- *Move imported model to the Foreground layer* - When checked, all nodes from the imported model scene graph are automatically included in the Foreground layer.
- *Chain animations if there are multiple animations attached to the same node* - If there are multiple animations attached to the same node you have option to chain them. Chaining means that the next animation will start playing on a timeline after the previous one and so on. When the animations are not chained they will start at 0 and only the first one will be played since you can only apply one keyframe animation at a time.
- *Default material* - Allows a user to change properties (color, shader type) of the default material. The default material is applied to geometry when no material is attached in the imported model.

Model import – 3D model formats

This section contains the settings relevant to the import of 3D model formats and includes the following inputs:

- *Attempt to fix in-facing normals* - When checked, the imported process searches the model for meshes that have normal vectors facing inwards and inverts those normals. This is done by comparing the bounding box of all vertices and their normals with the bounding box volume of the same vertices without their normals.

- *Attempt to unify identical meshes* - When checked, the imported model is searched for duplicated meshes; Duplicates are replaced with a reference to the first mesh. This improves App performance and decreases the size of deployed Processes.
- *Split large meshes* - When checked, large meshes are split into smaller sub-meshes. Most of the time this should be activated as it can lead to performance improvements and increase your scene compatible with lower end devices. If you intend on using the Studio decimation function you may need to deactivate this functionality.

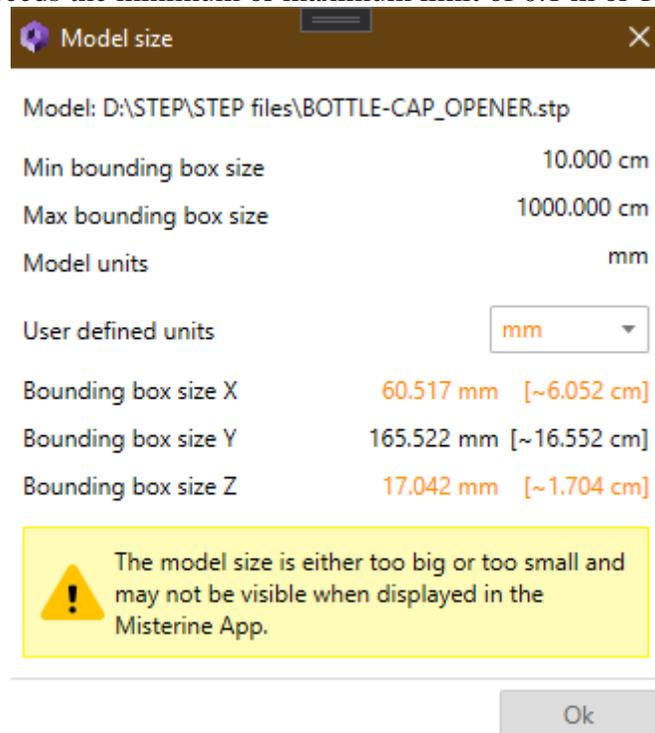
Timeline configuration

- *Show non-animatable objects* – By default all selected objects are shown in the Timeline. For interactive anchor no animation can be created and a row with this information will be shown in the Timeline window. To hide these objects, toggle this checkbox.

Model units

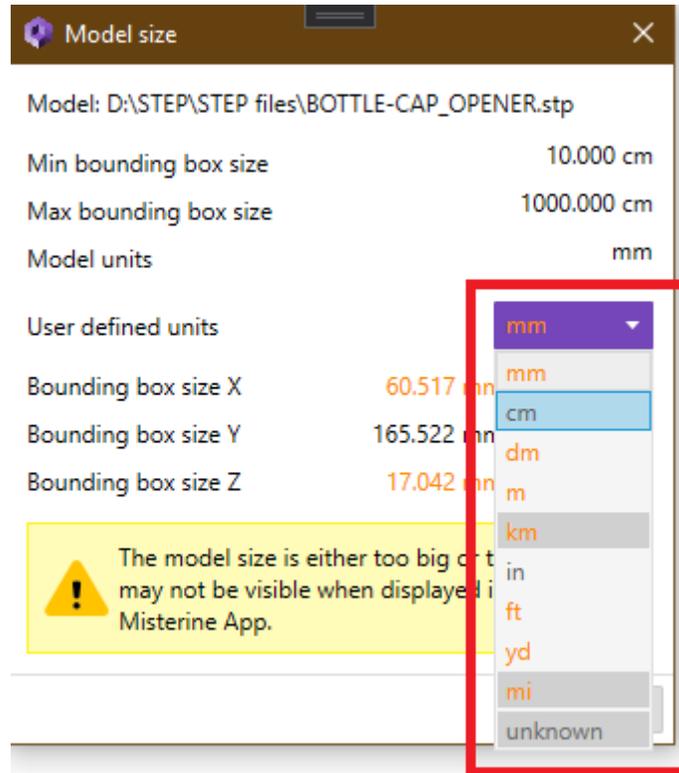
3D models may contain units in which the corresponding model was designed. If available, this information is extracted from a model during the import. The default units are used otherwise based on the format of the imported model.

Since augmentations make sense only at a reasonable scale, the model bounding box size is checked immediately after the model import. The user is warned using the following dialog if the bounding box size exceeds the minimum or maximum limit of 0.1 m or 10 m, respectively.



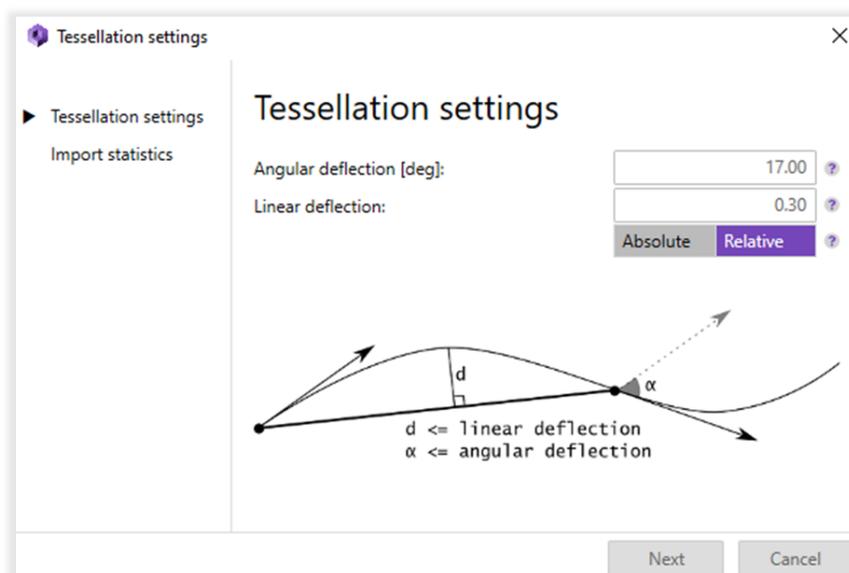
The dialog displays the original units extracted from the imported together with its bounding box size. The size that exceeds the minimum or maximum limits is highlighted in a different color. The dialog provides the user with an option to select different units and preview the bounding box size in the selected units. Units can be changed using the drop-down menu as depicted in the following figure.

The units in the list are distinguished by a highlight if the model bounding box exceeds the limits. This can help the user to quickly determine which units are probably the best fit. After the proper units are confirmed, the model is imported to a 3D scene scaled based on the selected units. This check is done only during the import of the model. The imported model is added to the list of model assets and this check is not performed when this asset is added to a 3D scene.



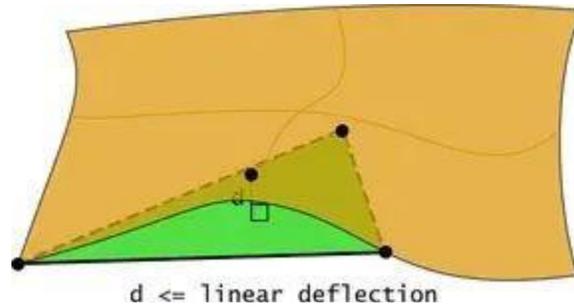
Tessellation

When importing parametric CAD formats, namely STEP, a process called Tessellation must be performed.

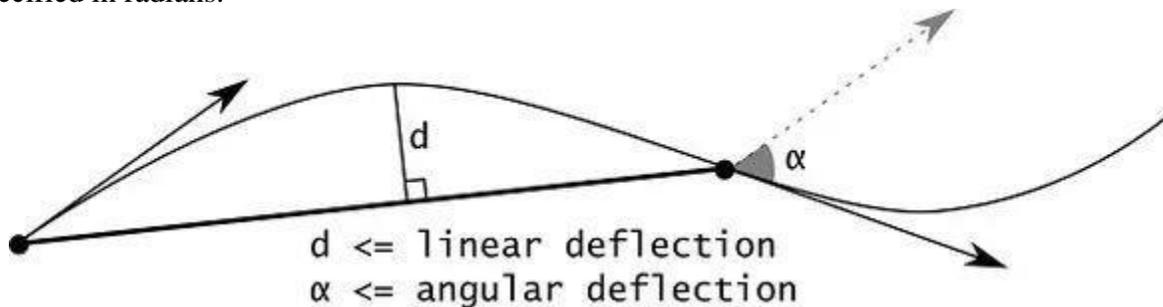


The meshing algorithm provides two options to define triangulation – linear and angular deflections. In the first step, all edges from a face are discretized according to the specified parameters. In the second step, the faces are tessellated.

Linear deflection



Linear deflection limits the distance between a curve and its tessellation. Angular deflection is relatively simple and allows using a default value (12 - 20 degrees). The angular deflection is specified in radians.



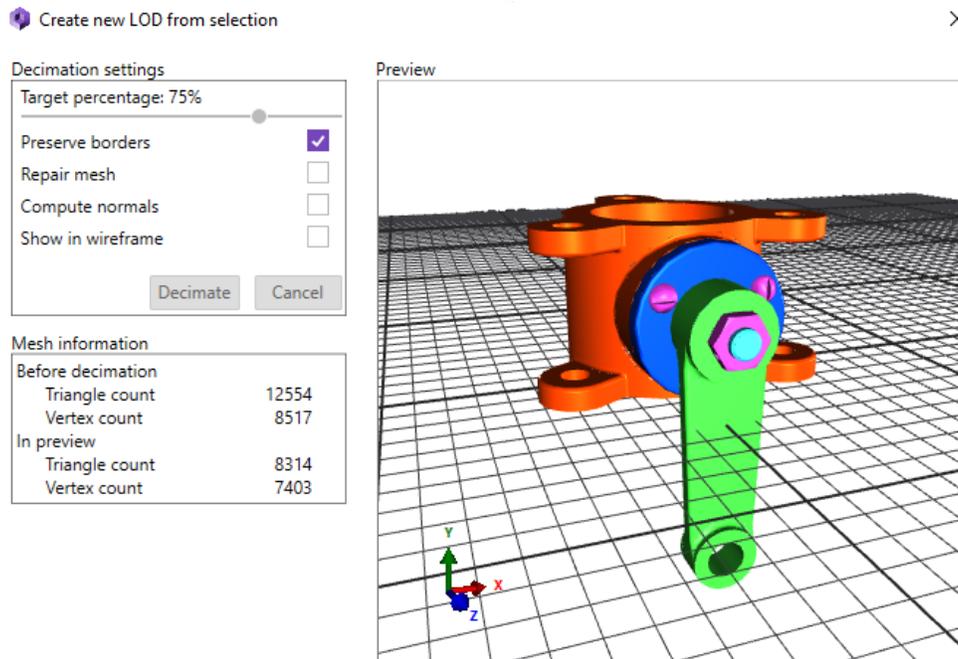
Angular deflection

Angular deflection limits the angle between subsequent segments in a poly-line. Note that if a given value of linear deflection is less than shape tolerance then the algorithm will skip this value and will take into account the shape tolerance. Linear deflection has an absolute meaning and the application should provide the correct value for its models. The range of the input values is (0, Inf) for absolute, and (0, 1] for relative deflection.

The user should provide deflection parameters to compute a satisfactory mesh. Giving small values may result in a too huge mesh (consuming a lot of memory, which results in a long computation time and slow rendering) while big values result in an ugly mesh.

Decimating Models

Frequently models may be too high of a resolution, meaning they have too many triangles. Ideally, we want fewer than one million triangles in a scene. Misterine Studio provides a Decimation functionality to reduce the size of the model.  button opens the decimation dialog.



Target Percentage: this is a percent value that indicates what size you want the model reduced to. In the example above we are targeting 75% of the original size. The value can be adjusted by dragging the slider.

Preserve borders: Man-made objects often consist of hard edges (cylinder is a perfect example). Preserving borders attempts to find such edges and "fix" them to prevent decimation from removing them. This can prevent the algorithm from reaching the desired size.

Repair mesh: Applies algorithms to fill holes, merge vertices, stitch edges, and many others in an attempt to automatically "repair" an input mesh, where "repaired" means the mesh is closed and manifold. When the mesh is manifold decimation can provide better results as it works with the mesh as a whole and does not create holes.

Compute normals: forces the replacement of the normals on the faces to new ones calculated on the reduced faces.

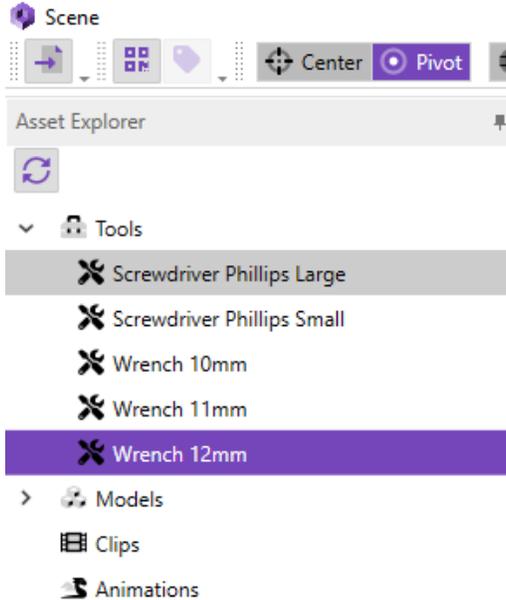
The information panel on the bottom left provides information on how effective the current settings are and the preview updates to show the appearance with these settings.

Reusing Models

Any model that has been imported is available as an asset in the Asset Explorer tab. In the image below, we see Assets that are Tools that are 3D models of common tools. Below that is the Models section, which are those models already imported somewhere in the Project.

Re-importing will cause the model to be duplicated which will increase the size of the deployed Process. By using the asset when starting again from a blank scene, the same model resources will be used. This saves space in deployment and also will lead to less delays when moving between scenes.

Additional sections here are Clips and Animations which are explained in the [Creating and using Animation and Clip Assets](#) section below.

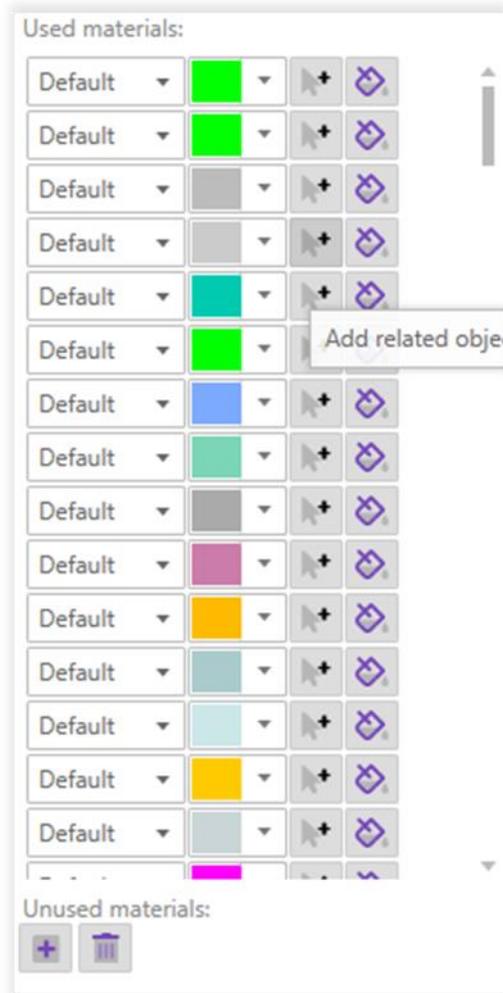


Changing Appearance (Materials)

Misterine Studio currently supports only changes to material appearance and color. For augmented situations, this is usually sufficient as such renderings work best for highlight parts. When a mesh is selected (a cube icon in the Scene Explorer), the material assigned to it is shown in the properties.

In the Property Editor the  button will cause the material to be highlighted in the Material Explorer. This is important as the material may be shared by multiple meshes/surfaces. Any modification performed in the Property Editor will prompt the user to either change all or only local if the material is shared.

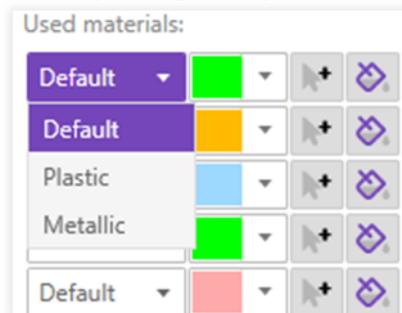
Material Explorer is a tab where the Scene Explorer is found. Here all materials in the scene are shown. Modifying them here causes all meshes with the material to update. The  button next to the color selector adds all meshes with this material to the current selection set. The  icon on the right updates all selected meshes to have that material. Unused Materials are shown at the bottom and you can create a new material in this space in preparation for applying it to models.



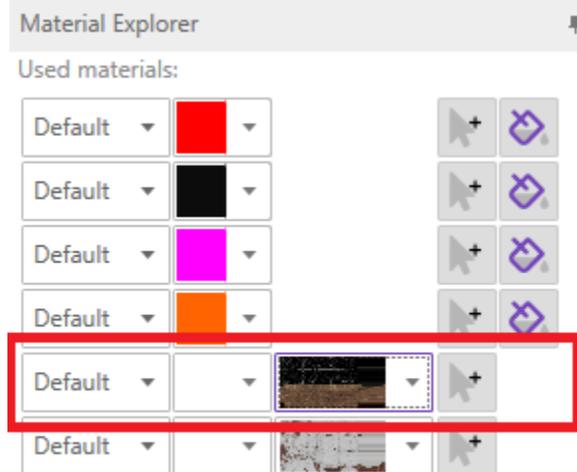
Materials can be one of three types:

- Default - general purpose shading for catching the attention of the user
- Plastic - a semi-shiny shading similar to many hard plastics
- Metal - a shiny shading similar in effect to a metallic surface

Colors can be freely specified, including transparency.



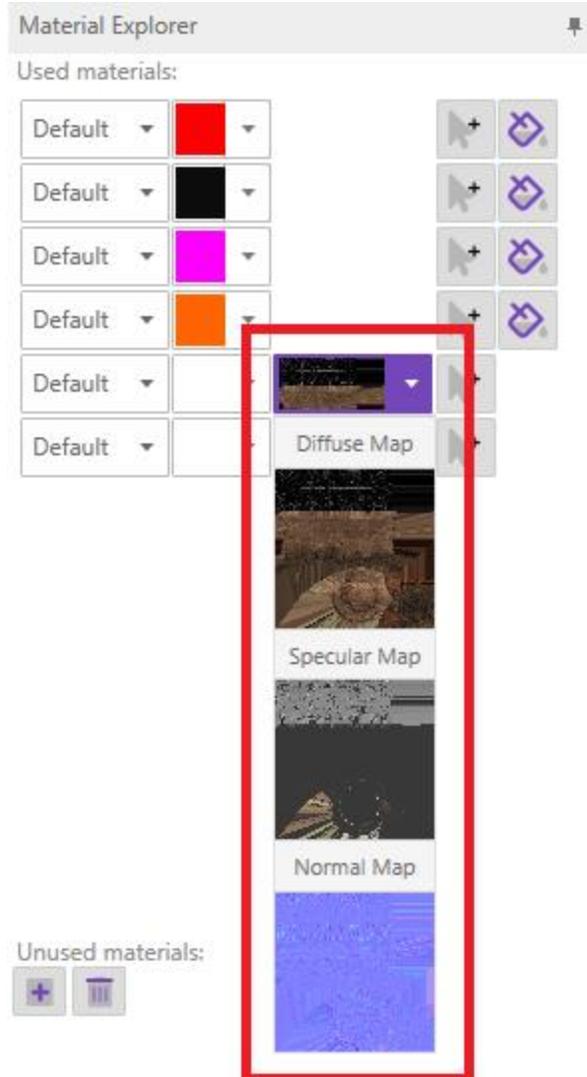
Some 3D model formats support textured materials. If there's texture attached to a material, it is imported with the model and a corresponding thumbnail is displayed.



The import of the following texture maps is supported:

- Diffuse map
- Normal map
- Specular map

A thumbnail of each supported texture map can be seen in a drop-down menu (if available) as depicted in the following figure.



The texture map can be previewed in a separate window by clicking on the corresponding thumbnail in a drop-down menu.

Textured materials cannot be re-assigned to other objects in a 3D scene.

Specifying Scene **Position in the Real World** (also known as **Tracking**)

The following scene registration methods are supported.

- Tracking Markers
- Interactive Anchors

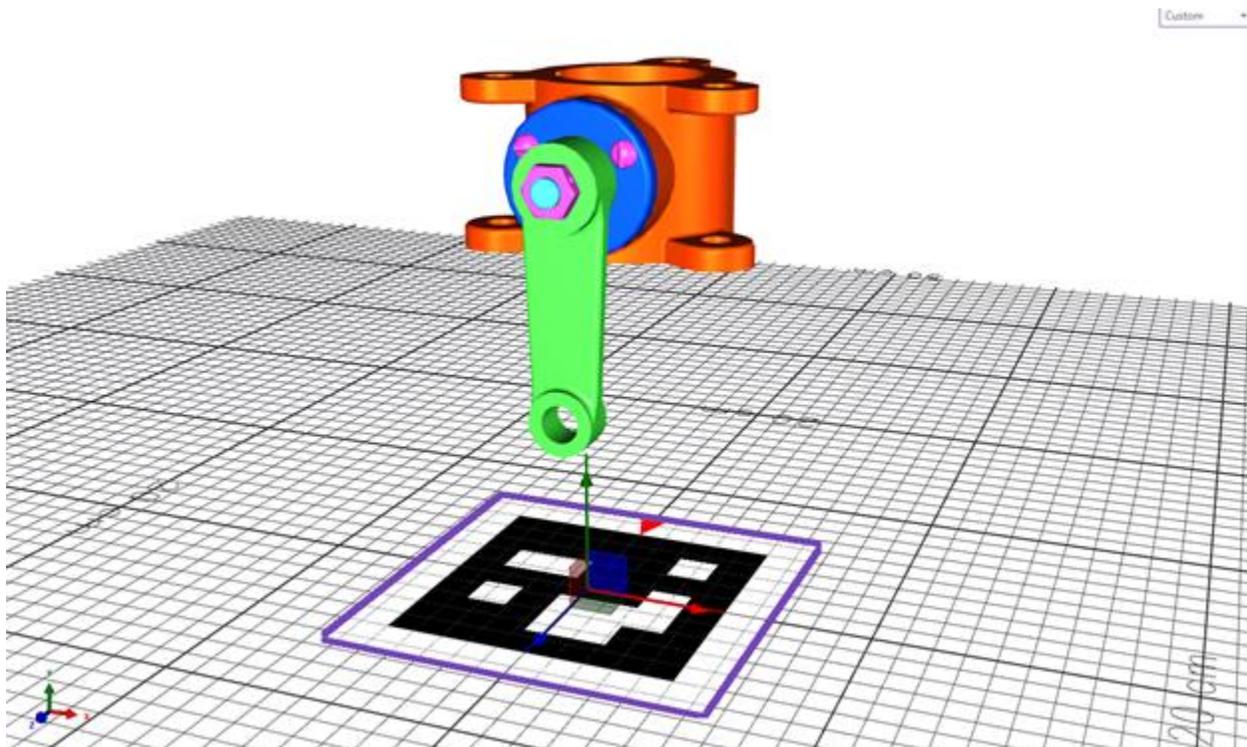
AR Positioners can be positioned the same way as any other object in a scene. You can also use the special *Position Tracking marker* mode which is enabled by clicking the  button or by pressing T. This mode snaps the AR Positioner onto any face of the model under the pointer. When the AR Positioner snaps to a face, it also orients flush to the face. The up direction is determined by the viewport, i.e., the camera view you look at it.

Every scene requires at least one AR Positioner to be present. More registration methods can be used together in one scene at the same time.

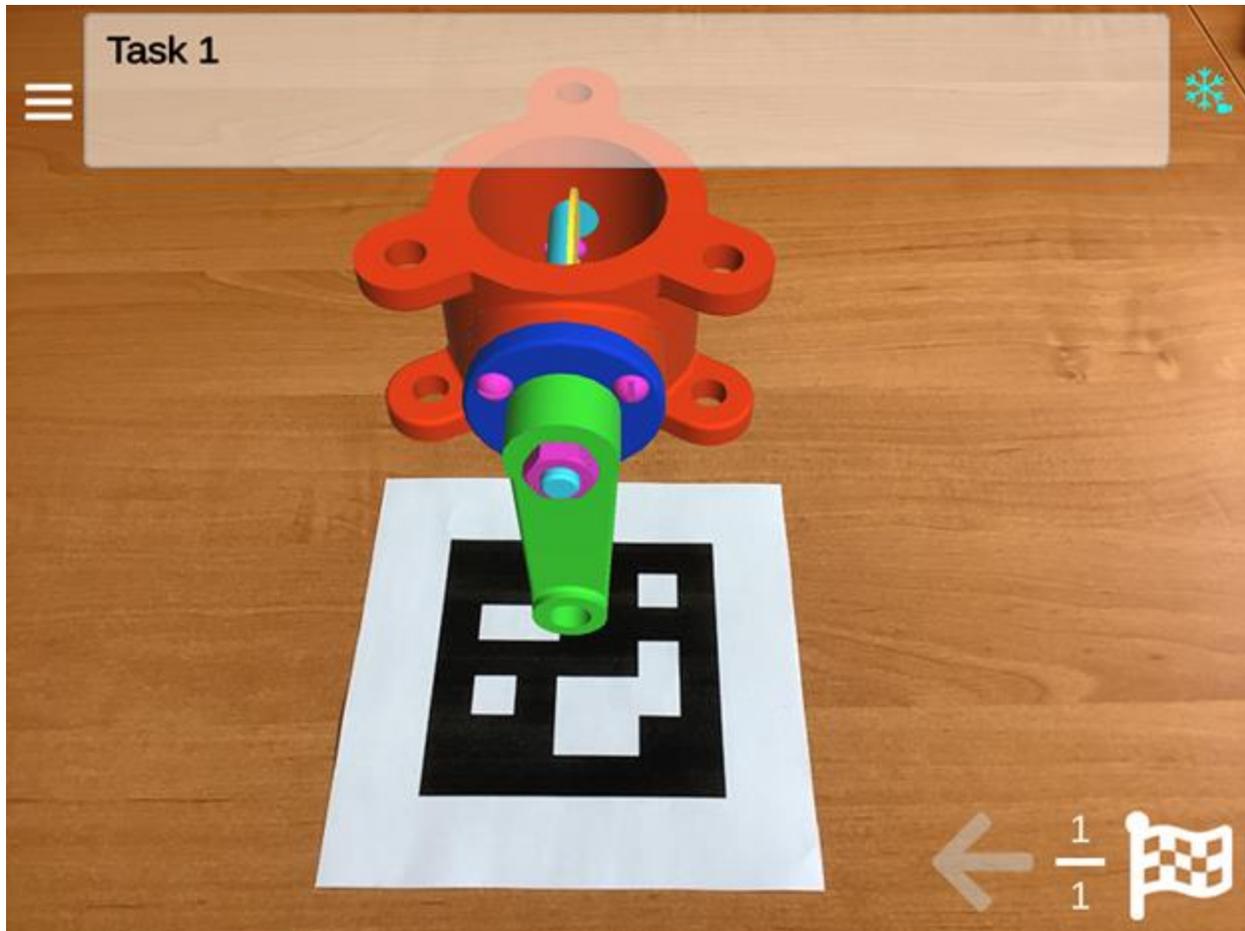
Tracking Markers

Tracking Markers (also known as Fiducial Markers) serve to achieve proper positioning of augmentations in the context of the physical environment. This method involves locating a Tracking Marker in a scene to a desired relative position to the augmented object.

 button adds a Tracking Marker to the scene. Markers are uniquely identified by a combination of format - the number of squares used in the design - and an ID. Only one marker of the same format and ID combination can only be present in a scene, and best practice would be to have that marker always in the same position/orientation for the entire Process. Mixing different physical sizes in a single Process is not supported by the Misterine App.



The Tracking Marker should be printed and placed in the physical environment at the same relative position to the augmented object as its virtual counterpart. The physical counterpart is registered by Misterine App using a device camera which enables displaying the augmentations at the proper location. How to export Tracking Markers for printing is described in section [Export of Tracking Markers to PDF](#).

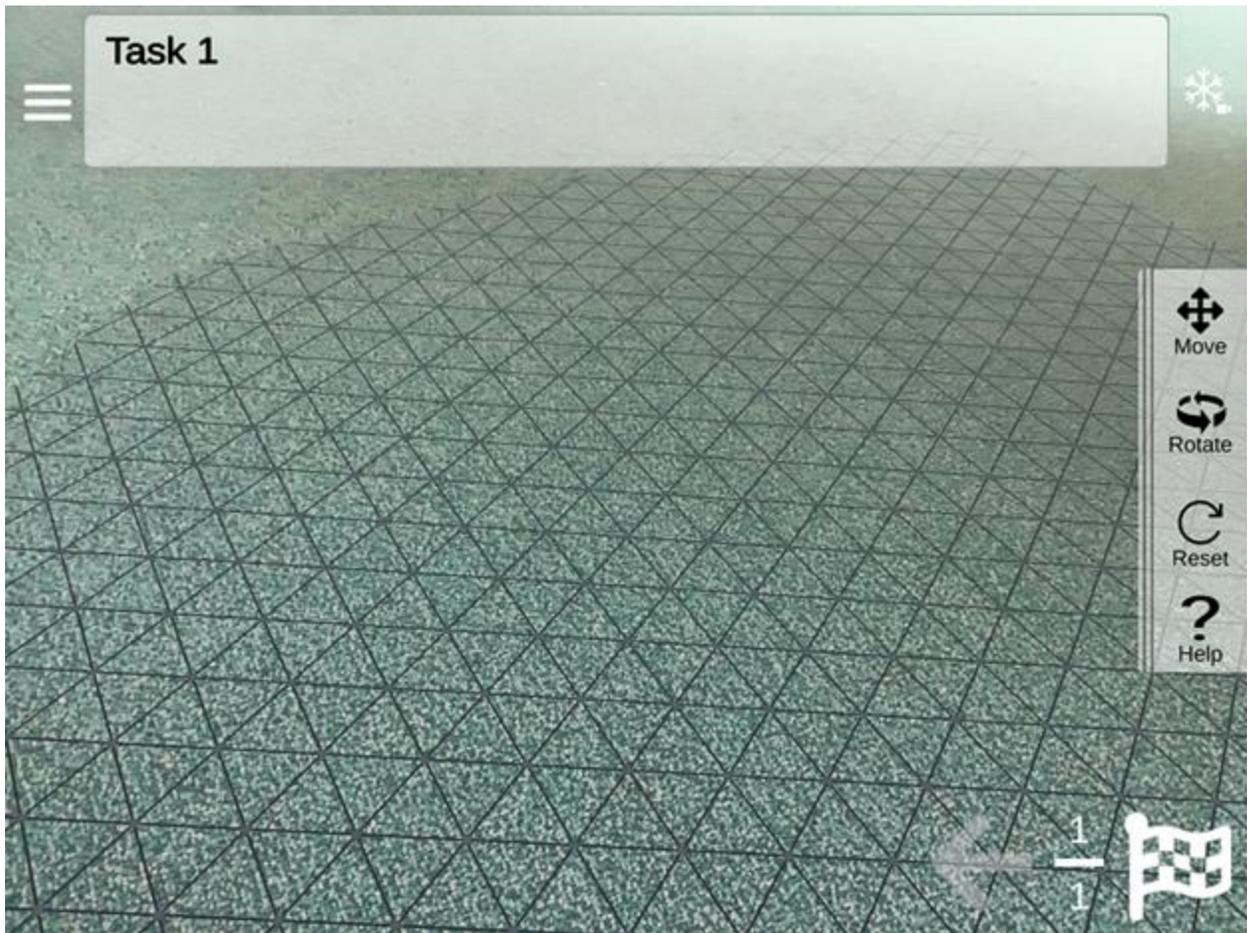
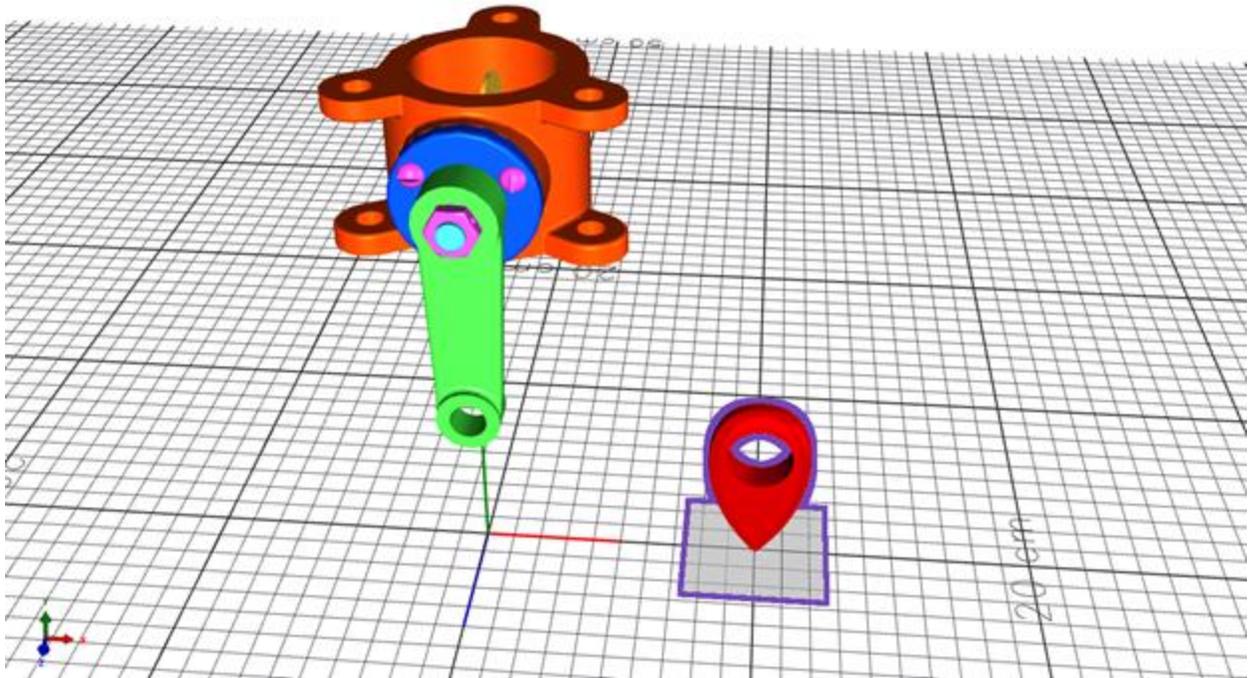


Interactive Anchors

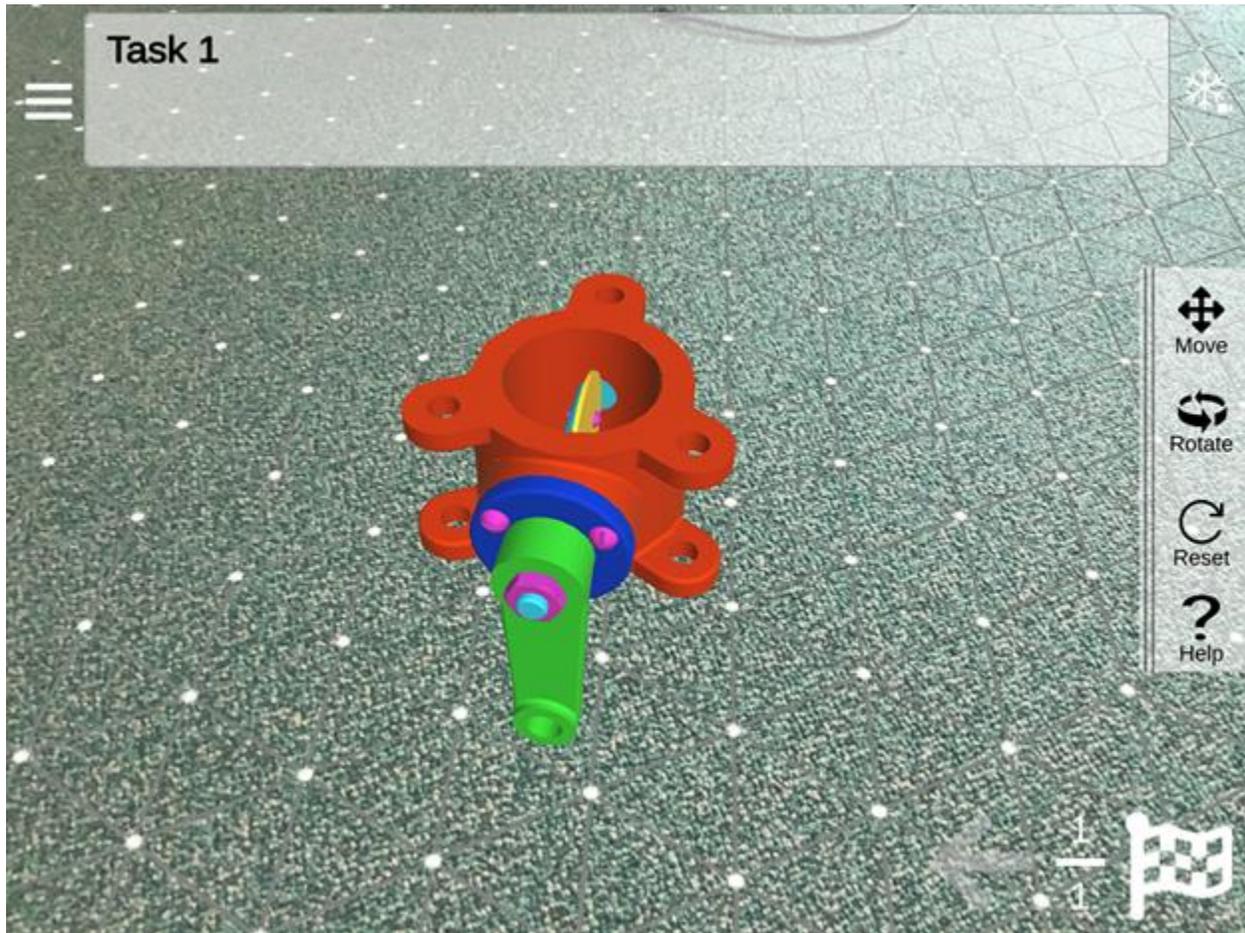
Sometimes it is more appropriate to simply let the user roughly position the scene into their physical environment via an interactive process. In this process they see flat spaces mapped and can simply indicate where to place the scene by 'touch'. This does not provide precise positioning of augmentations. Unlike Tracking Markers, there's no need for printing and locating any markers in the physical environment.



button adds an Interactive Anchor to the scene. Only one Interactive Anchor can be used per scene.

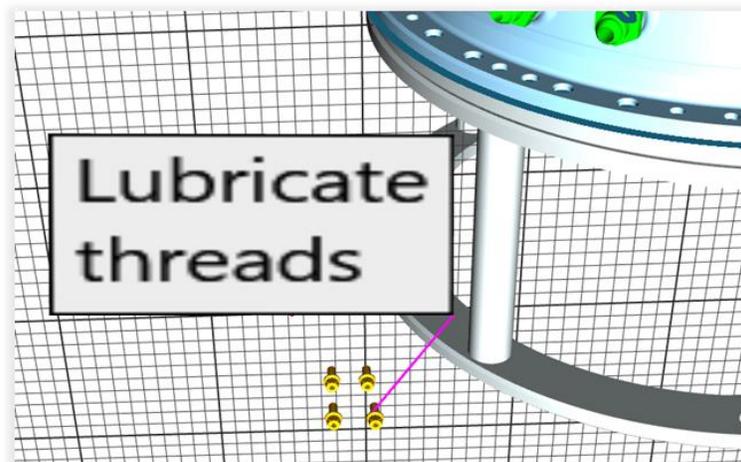


The augmentations are located relative to that selected point. The position of augmentations can be later adjusted manually.



Inserting Labels

Labels are text elements that are placed into the scene in 3D space.



They consist of a label that is typically floating in space and a line going to an object. or space where an object would be. When pressing the button  to create a label, a popup will request the label text. This can be modified later in the Property Editor.

Labels are always attached to an object or hierarchy node. The text will automatically be prepopulated with the name of the scene graph node it is attached to.

For placement of the arrow to the underlying object, Misterine Studio supplies an assistance tool  (or press Y) that snaps the line onto the mesh faces of the object(s).

Inserting Notes

Notes are documents that can contain text and other multimedia while being placed in the 3D scene. To add a Note to the scene, click the  icon in the designer toolbar or press the associated key shortcut ([A3 Keyboard Shortcuts](#)).

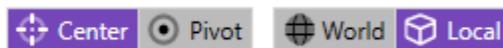
Note editor is explained in section [Note Editor](#).

Manipulating Models

Manipulations of models occur via a gizmo that appears in the 3D view. The standard QWER mapping is used for shortcuts to access them. They are also available via the buttons:



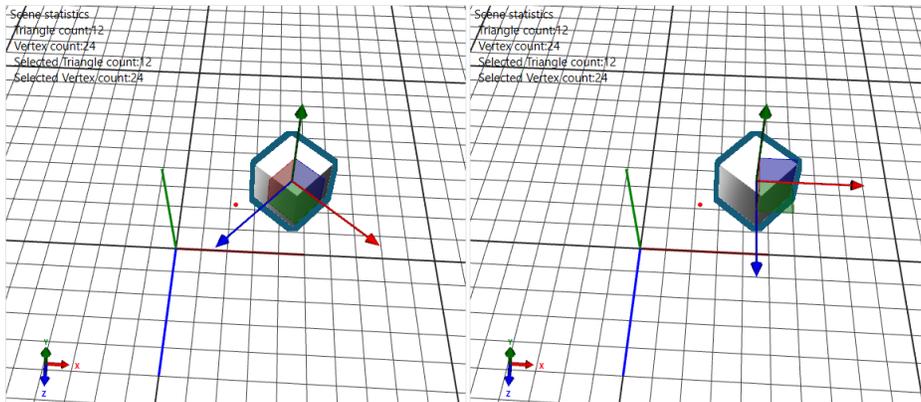
Gizmos can work in a local coordinate system of a specific model part, or in a world coordinate system, which is common for all model parts in a scene. The currently used coordinate system can be changed using a switch in a scene toolbar menu. You can also set if origin of following transformation is set to a pivot of a transformed model part or to its center.



Images below show some differences in a usage of various settings.

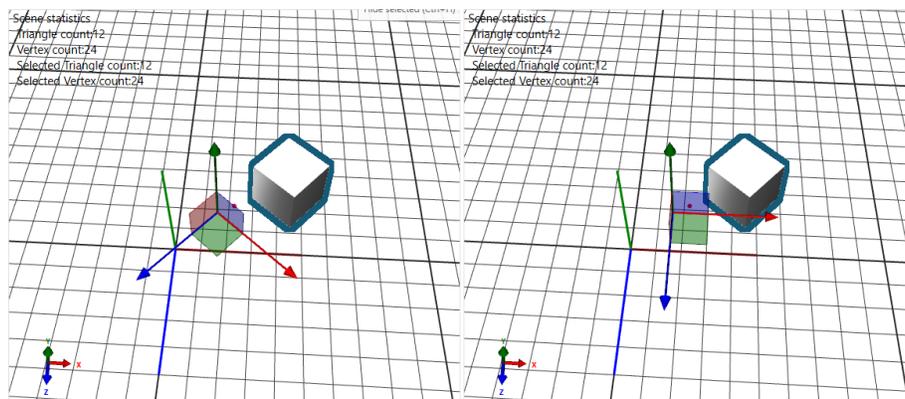
Local (left) vs. World (right) with the center as the origin

Origin is set to the center position of the model but since there is a local transformation applied to it, the local coordinate system is also rotated. On the other hand, world coordinate system ignores this local change. You can easily compare the coordinate system of the gizmo with the axes in bottom left corner; if they are the same you are using world coordinates.



Local (left) vs. World (right) with the pivot as the origin

Almost same effect as the previous image shows, but with a transition of the origin to the pivot position. The position of pivot depends on how the hierarchy of the object is structured. The pivot corresponds to the origin of the transformation coordinate system. In this case, the cube was modeled in such a way, that the origin didn't lie inside of the cube (as is commonly done) but had an offset, i.e. where the gizmo's center is.



Local vs. World without transformation

If there isn't any local transformation applied to the model then the Local and World coordinate system are the same.

Except using gizmos for doing transformations, transformations values can also be manually changed in the Property Editor. The rotation is represented in Euler angles and degrees. It is important to remember, that these properties show the state of the object – that is they display the local transformation values.

When the value is too small or too large to fit in the text field, it will be replaced using scientific notation.

Translation:

X	0	Y	0	Z	0
---	---	---	---	---	---

Rotation:

X	0	Y	0	Z	0
---	---	---	---	---	---

Scale:

X	1e-6	Y	1	Z	1
---	------	---	---	---	---

Changing View

RMB + Drag: rotate the camera around the center point (red dot)

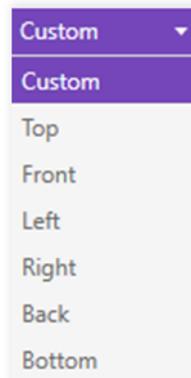
MMB + Drag: translate the camera along the view plane

Mouse wheel: zoom

The  button and the F key shortcut center the view onto the selected object and zoom to fit it. If no object is selected and F key is pushed, the visible scene is centered and the camera zoomed to fit.

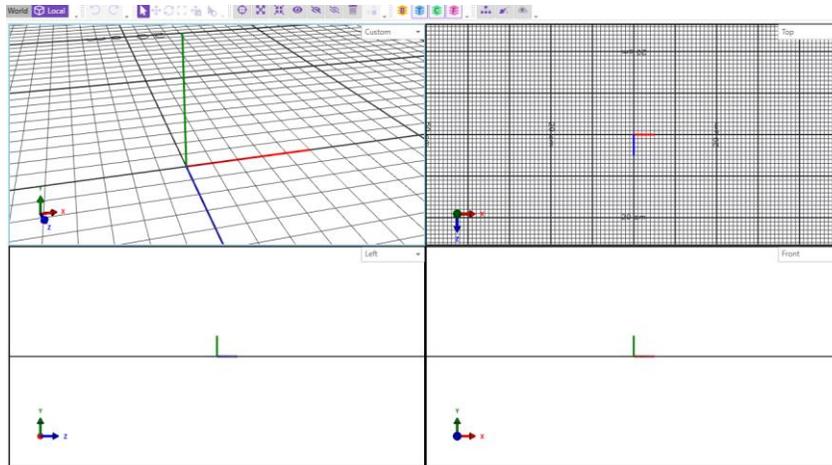
The dropdown seen below allows setting the viewport to standard views along the fundamental axes, with the current selection centered and zoomed.

The dropdown seen below allows setting the viewport to standard views along the fundamental axes, with the current selection centered and zoomed.



Multi-View Layout (4:1 viewport)

Multi-view layout can be activated and deactivated either by pressing the  /  button or by using the CTRL + Space shortcut. By activating this feature, the viewport is split into four independent viewports displaying the same scene. These viewports can then be arbitrarily moved or rotated to enable different viewing angles. The position of camera is stored per each view.



Scene Statistics

Basic information about the scene complexity is displayed in the status bar, located in the bottom right corner.

44306 triangles (37986 in selection) | 4 materials

The status bar contains information about the total triangle count in the whole scene and the number of triangles in currently selected objects. It also displays the number of materials currently used in the scene. By clicking this section, the user can view more detailed information about the scene.

Scene statistics

Scene

Number of triangles: 90297
 Number of materials: 23 (41.002 MB)
 Most complex object: Fence_NurbsPath.001 (29232 triangles)

Mesh information

Name	# of triangles	Bounding box [cm]	# of triangles per v	# of materials	Hierarchy
Sign_Cube.020	220	6.9 x 6.9 x 1.7	2.77	2	Root → overgrow
Top_Cube.023	1369	7.1 x 7.1 x 2.3	11.65	1	Root → overgrow
BoxFloor_Plane.00	2	6.5 x 6.5 x 0.0	0.05	1	Root → overgrow
Door_Cube.043	7032	7.0 x 7.0 x 13.1	11.13	1	Root → overgrow

Foreground layer

Number of triangles: 90297
 Number of materials: 23 (41.002 MB)
 Most complex object: Fence_NurbsPath.001 (29232 triangles)

Mesh information

Name	# of triangles	Bounding box [cm]	# of triangles per v	# of materials	Hierarchy
Sign_Cube.020	220	6.9 x 6.9 x 1.7	2.77	2	Root → overgrow
Top_Cube.023	1369	7.1 x 7.1 x 2.3	11.65	1	Root → overgrow
BoxFloor_Plane.00	2	6.5 x 6.5 x 0.0	0.05	1	Root → overgrow
Door_Cube.043	7032	7.0 x 7.0 x 13.1	11.13	1	Root → overgrow

Selection

Number of triangles: 108
 Number of materials: 1 (14.382 KB)
 Most complex object: Ivy.014_Plane.009 (6 triangles)

Mesh information

Name	# of triangles	Bounding box [cm]	# of triangles per v	# of materials	Hierarchy
Ivy.014_Plane.009	6	2.0 x 2.2 x 2.2	0.63	1	Root → overgrow
Ivy.015_Plane.009	6	2.0 x 2.2 x 2.1	0.64	1	Root → overgrow
Ivy.016_Plane.009	6	1.9 x 2.1 x 2.2	0.68	1	Root → overgrow
Ivy.017_Plane.009	6	2.1 x 2.1 x 2.1	0.66	1	Root → overgrow

This object has no animation component

This window contains complex statistics about the whole scene, its foreground layer, and about the objects currently in selection. Each section provides a breakdown of all the objects belonging to it with information such as the number of triangles, size of the bounding box, number of materials and its size, and more. The window is non-modal and you can continue working while keeping the statistics page open. The idea behind this dialog window is to allow the user to optimize their scenes for more seamless deployment and visualization.

Dealing with Layers

There are four layers (Background, Foreground, Tracking, Context) in Misterine Studio and each of them has a specific purpose.

Defining the Background is fairly straight forward. The user can add 3D models to the scene. The models will appear. They will then be able to hide elements of the model to simplify working with a specific part of the model. All the other parts would be hidden. This can happen within the hierarchy of the LSG simplifying the process. It can be done in a tree view explorer module or via the 3D interface. Multiple models can be added to Background.

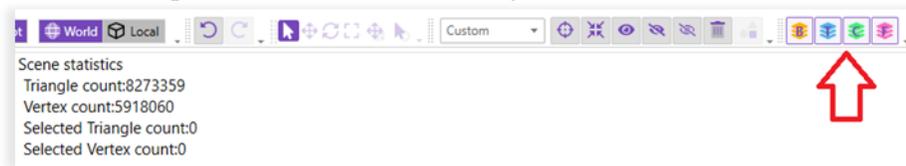
Tracking marker(s) would be added to the scene in the Tracking layer. The marker would be positioned in its spatial position via standard manipulations. There are also tools like snap to face to facilitate the placement.

Tracking hint tools will be added from the toolbox directly into the Tracking layer and can only exist there. They are there to transmit a priori information to the system so it can optimize the computer vision methods.

The Foreground and Context layers both function the same at the moment. This will change in the future, where the context layer will be any augmentations that can optionally be shown. The user can add models, for instance tools used in the Presentation Task, to the scene. They can also show portions of the model that were hidden in the Background, for instance in an assembly procedure this would be necessary. They can then position it as needed. A special key-frame animation module will allow objects in these layers to be animated at the node level only. For the animation module we will follow the typical UI designs.

Changing Visible Layers in Viewport

On the right side of the top bar of icons are all the layers.



These control which layers are visible in the rendered viewport. In the example to the right, all layers are currently shown in the viewport. In this next example, only the Tracking (T) and Foreground (F) layers are visible.



Changing Layer of Objects

Model objects and individual sub-parts of those models can be assigned to any of the layers via the same icons in the Property Editor. Models can be in all layers, though presence in Tracking currently does not have any effect.

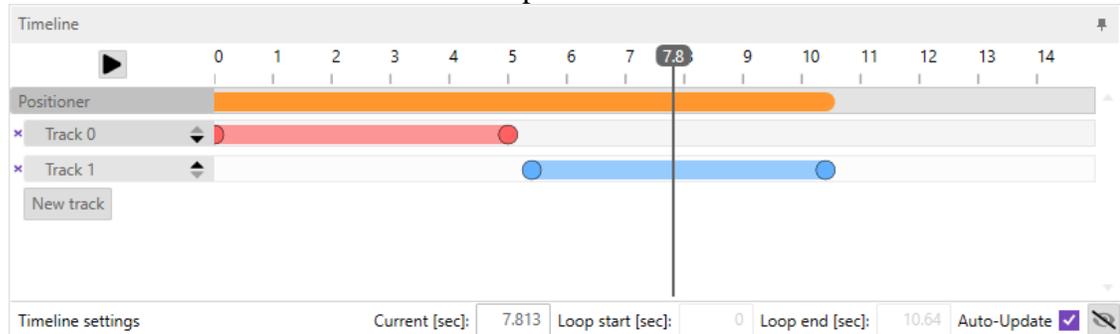
Labels can only be placed into the Context and Foreground layers (currently no effective difference on deployment).

Tracking Markers can only be found in the Tracking layer.

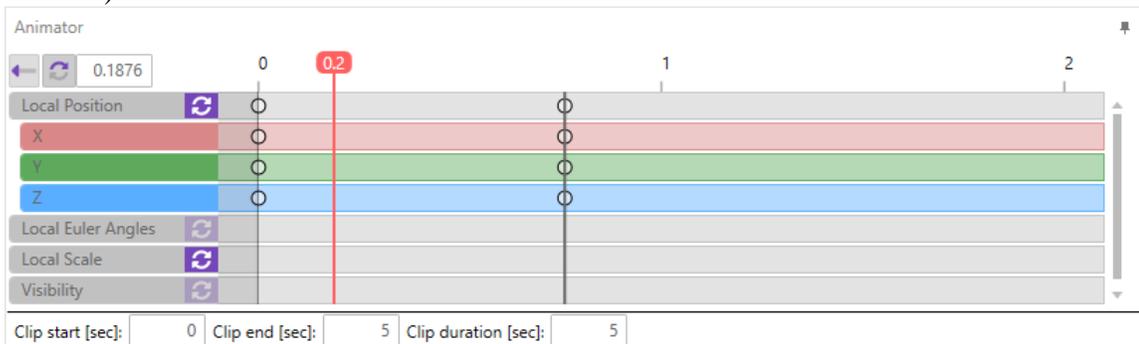
Animating Models

The interface has two main components, the Timeline and the Animator. Each window has its own timeline (if displayed for keyframe animation). It is important to differentiate between

1. Timeline current time – Marked with grey line and is shown in keyframe Animator as well. It shows the time that will be used to sample the animation.



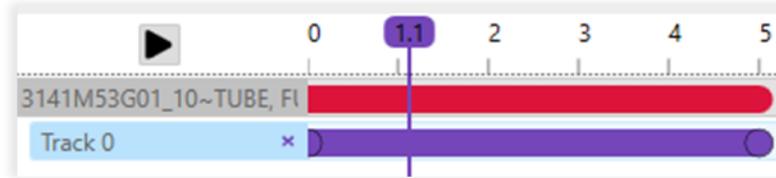
2. Animator current time – Marked with red line and corresponds to current time used to create keyframes. Red color is associated with keyframes or the process itself (red outline for viewports when keyframing, animated properties have reddish color, keyframe clip is also red).



3. Current clip time – Each clip consists of keyframes and additional properties like stretch. These properties affect how the clip will be sampled. The grey line in keyframe Animator correspond to the clip time. Clip time is nothing else then projection of the timeline current time.
4. The times are not synchronized but it can be toggled by checking the “sync” button next to the current time in the Animator. When toggled, the time that is set in the Timeline will be also set in the Animator.

Creating an animation - Basics

1. Select an object (or hierarchy node)
2. Click the **+** button in the middle of the timeline.
3. This adds a track to the object and creates a fly-out animation
4. The clip is automatically selected and therefore ready to edit
5. The clip length can be changed by dragging on the ends of the purple clip in the timeline. The clip does not have to be selected for this to work.



Using the Timeline

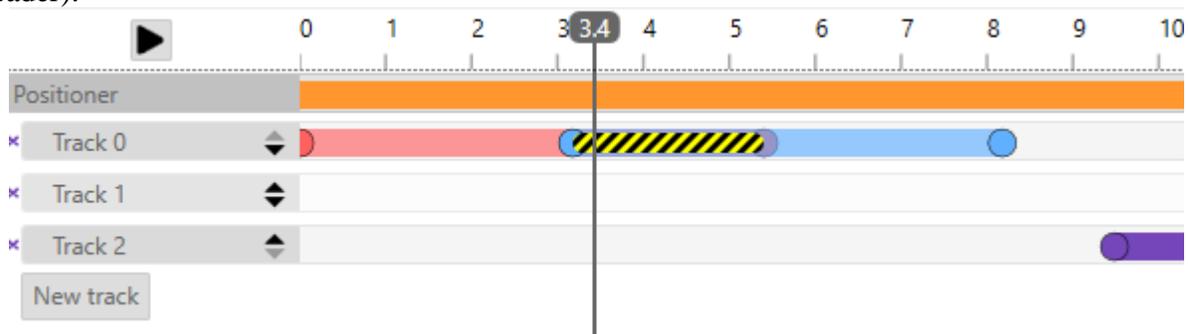
The Timeline is intended to permit users without extensive experience the ability to create at least minimal animations. The basis for the Timeline is clips. Clips in the Timeline are an encapsulation of a keyframed animation. They may be strictly the same, but they may be more.

We differentiate between two clips – one is colored red and the other blue. Blue clips are backed by a generator (some mathematical representation of a certain action – fly-out, rotate etc.) and red clips are keyframed.

Moving clips

Clips can be moved in the Timeline simply by dragging them left and right. This changes the relative timing to the start of the (tracked) scene. Dragging the clip (or its end points) can be constrained to snap to endpoints when holding Shift. You can also move a clip to the current time using its context menu.

It is possible to move clips between tracks while holding Alt and the clip. If you have more than one clip in the track you can move the whole track using the arrows next to the name of the track. Alternatively, you can just reorganize the tracks by dragging the track (hold and drag the track header).



If you move a clip (or create one over already existing one) you can easily end up with multiple clips at the same time which can result in undefined (and definitely unexpected) behavior. Check for overlaps highlighted in yellow/black stripes.

Keyframed clips

As the name suggests, these clips consist of keyframes. Each keyframe is a pair of value and timestamp. When selected, the clip is shown in the Animator with default view showing the properties. The keyframe represents the local state in time.

Keyframe Properties

A keyframe clip may be designed at a certain length. For instance, our keyframer only allows 360deg of rotation. There are various conditions, such as this where the base clip defines a unit of animation, but the desired effect is greater. To those ends, you can change the length of the clip and change the behavior. Each keyframed clip provides some additional properties that can be tweaked.

1. *Stretch* just takes the keyframes and maps them so that first keyframe is at time 0 and the last keyframe is at the end of the clip.

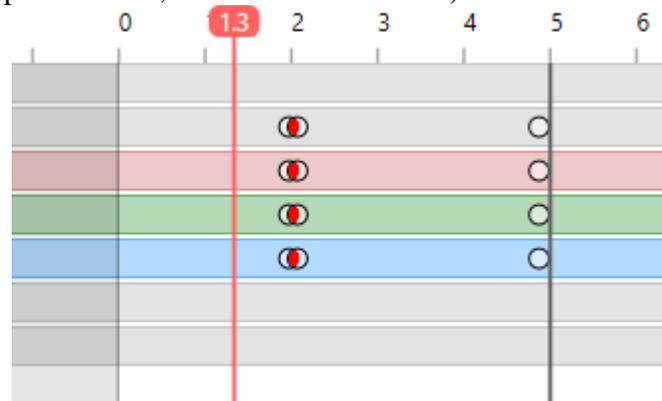
2. *Reverse* inverts the time used for sampling effectively changing the direction of animation.
3. If you want to repeat the above-mentioned rotation, you can toggle *Repeat*. You can specify the number of repetitions where 1 means no repetition. If you want to create the effect of moving forward and back, you can toggle *Mirror*.
4. (Advanced user) If you import an animation (or restore from an asset) you can have different axis. To solve this, you can change the up/right axis. The last (forward axis is computed from these to create right-handed coordinate system).
5. When nothing is toggled the values are sampled in the clip range and the keyframe's time corresponds to global time by simple addition of clip start time. Note that when the clip starts with an offsetted position and not in time 0, there will be visible jump to the position in clip.



Editing keyframes

You can edit (create) the keyframes when you go to edit mode using the “Edit” button. When you are in edit mode, red outline around viewports is displayed and any change in property editor or a change using gizmos will be stored as a keyframe. The properties affected by keyframes are position, rotation, scale, and visibility.

You can delete and move the keyframes. When the keyframes overlap, they are highlighted by red color. This might not necessarily be wrong but it can inform you about 2 keyframes inserted at the same time (this overlap is an issue, not when zoomed out).



More information about keyframing can be found in its own section.

Reusing Animations

Clips can be reused in two ways. The first is using copy and paste to duplicate them. The second is by creating a ‘named’ asset, which can then be reapplied.

Copy and paste works as would be expected. With a clip selected simply copy it (CTRL + C). Then select a track where you want to place it, but moving the cursor over that track. The track can be the same track, a different track or a track in a different object. You can have both objects selected and see the tracks, or you can change selection or even scenes before pasting.

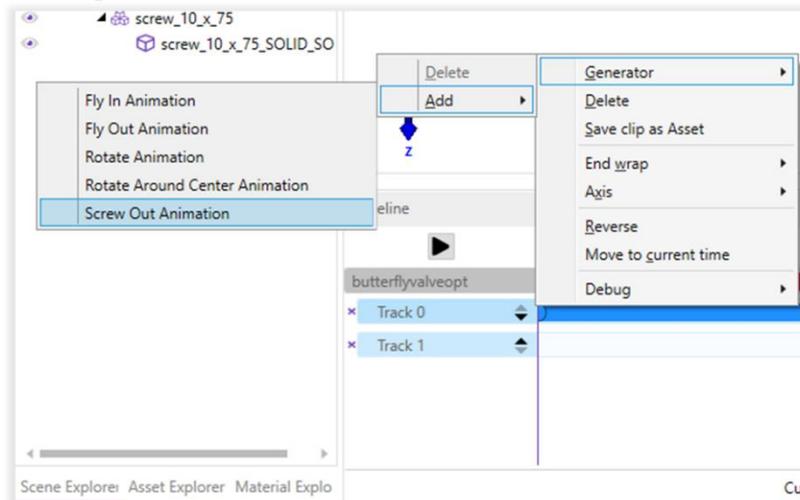
If the clip is particularly interesting or going to be frequently used, it can be helpful to make it into an Asset. If you context (right) click on the clip you have an option to *Save Asset Clip*. This will create an asset that will be available in the clips section of the Asset Explorer. From there you can add it to tracks or objects as required.

Creating and using Animation and Clip Assets

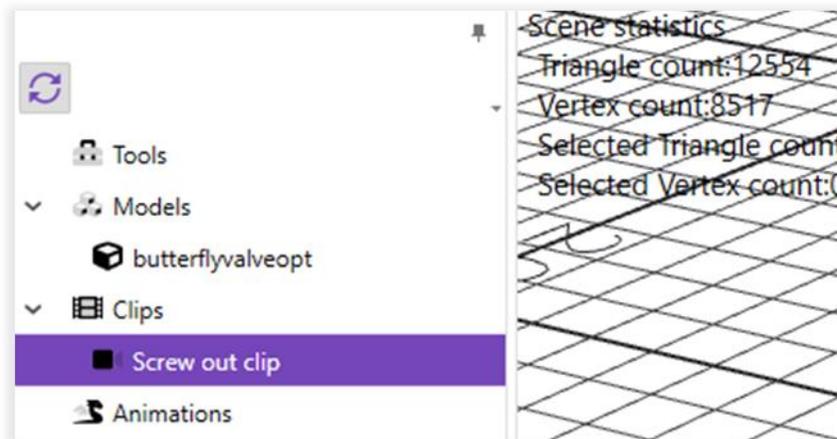
Animation clips and whole animations can be saved as assets for later use.

Clip Assets

Clips can be saved by right-clicking on the corresponding clip and selecting the *Save clip as Asset* context menu option. The user is then asked to enter the name of the clip asset. The name of every clip asset should be unique.



The saved clip asset can be found in the Asset Explorer tab under Clips.



There are two ways to apply clip assets to selected objects in a scene.

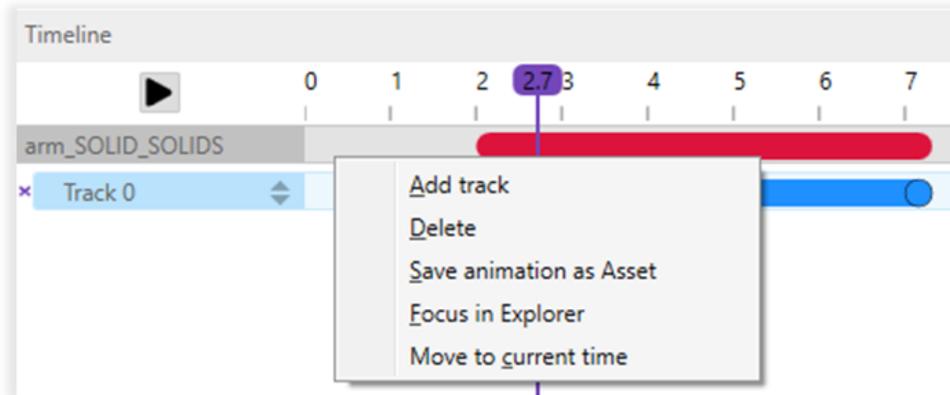
- By dragging the clip asset and dropping in the Timeline pane - the clip starts at the point in the time where it was dropped;
- By right-clicking on the clip asset and selecting the *Add to timeline* context menu option - the clip starts at the current time;

If there's no animation defined for the selected object, it is automatically created. The clip is added to the first empty track. If there's no empty track in the animation (or no track at all), a new track is automatically added to the end of the tracks (the order can be changed manually).

The clip assets can be removed by selecting the asset in the Asset Explorer and pressing DELETE key or using or by right-clicking and selecting the *Delete* context menu option.

Animation Assets

Animation can be saved by right-clicking on the corresponding clip and selecting the *Save animation as Asset* context menu option. The user is then asked to enter the name of the animation asset. The name of every animation asset should be unique.



The saved animation asset can be found in the Asset Explorer tab under Animations.

The animation asset can be applied to the selected objects the same way as clip assets. The only difference is that animation clips are always added to the Timeline origin.

If one or more of the selected objects already contain animations, the user has two options:

- Replace all - all existing animations in the selection are replaced by the applied animation asset.
- Merge all - the existing animations are preserved, the tracks from the applied animation asset are added at the end of each animation.

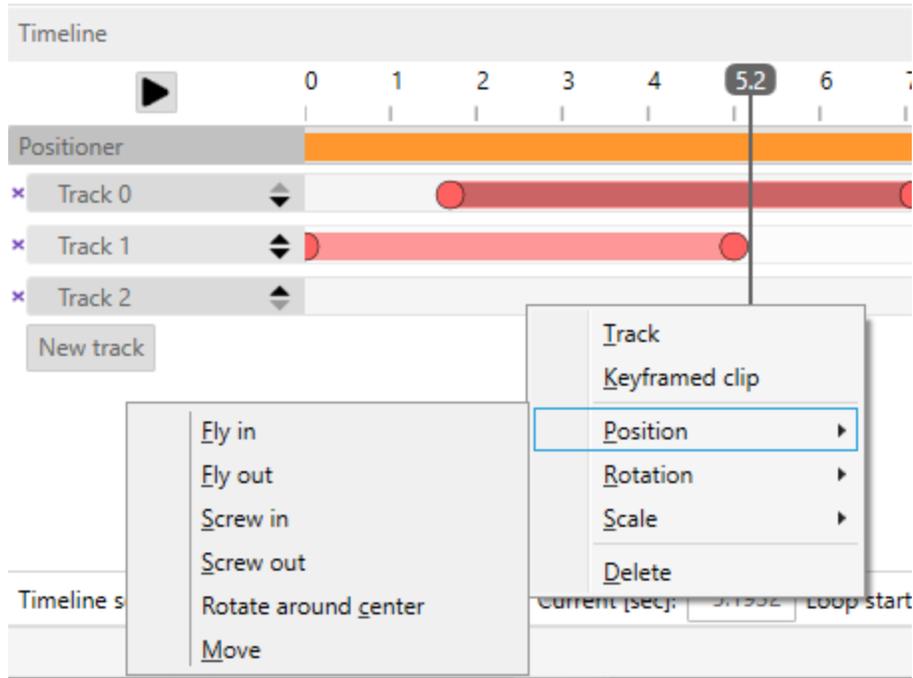
The animation assets can be removed by selecting the asset in the Asset Explorer and pressing DELETE key or using or by right-clicking and selecting the *Delete* context menu option.

Generators

We identified common usages for animation. For these, we have created generators accessible through track context menus. Generator is a function that affects a property or even the whole transform (rotate around center).

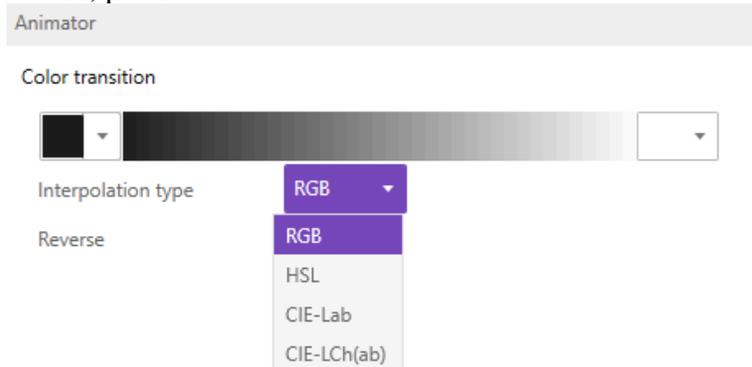
We group these according to properties they can affect. Properties that can be affected are position, rotation, scale, and color. Some generators affect multiple properties like the Screw in that rotates the object and also moves it. The generators can be combined (in the same time or chaining). When two generators overlap their affected properties are checked and the topmost is used (but this can be unpredictable and such usage is discouraged). If the don't affect the same property you can use it to create different animations since these generators represent transformations applied top-down and for combining transform the order matters. For example, if rotation is first (top most track) and translation is below, then it would be the same as changing the node transformation in property editor (setting rotation and translation). However, if you swap these, then rotation will be applied first and the translation would be done on top of this rotated state.

Generally, you should remember that the generator animates from the current state and the original state is in the bottom left corner of the Timeline.

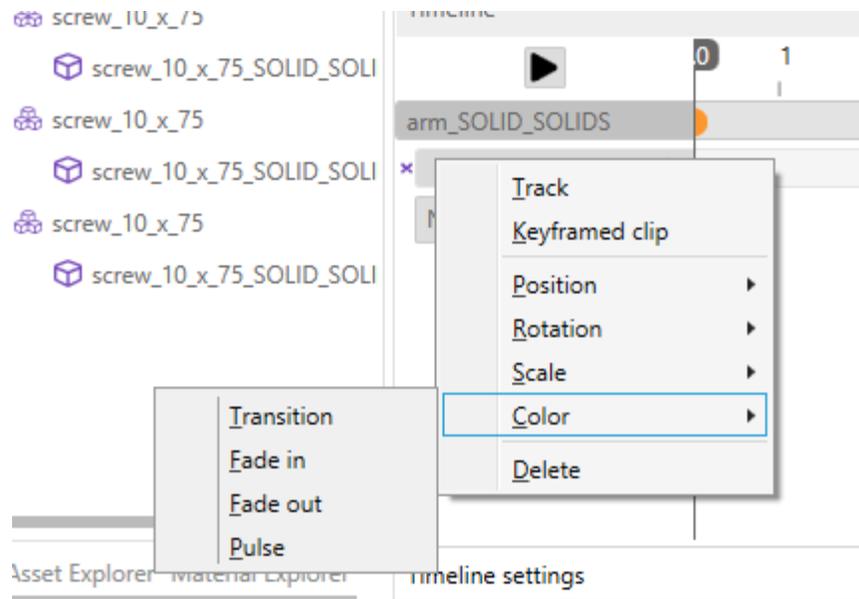


Color generators

If the object has a material assigned, you can also create 4 different color animations – color transition, fade in and out, pulse.



1. *Color transitions* interpolates between two colors and provides 4 different color interpolation types. *RGB* interpolates in *RGB* color space, *HSL* in *HSL* etc. Each of these spaces has some difference. *RGB* can be imagined as a color interpolation in a cube, *HSL* interpolates color hue on a circle and the rest are more complex spaces that try to preserve lightness of the color. If you don't see much difference (and there might be none) *RGB* is a good default.
2. *Fade in/out* animate the transparency of the object.
3. *Pulse* is similar to fading, but it is repeated multiple times.

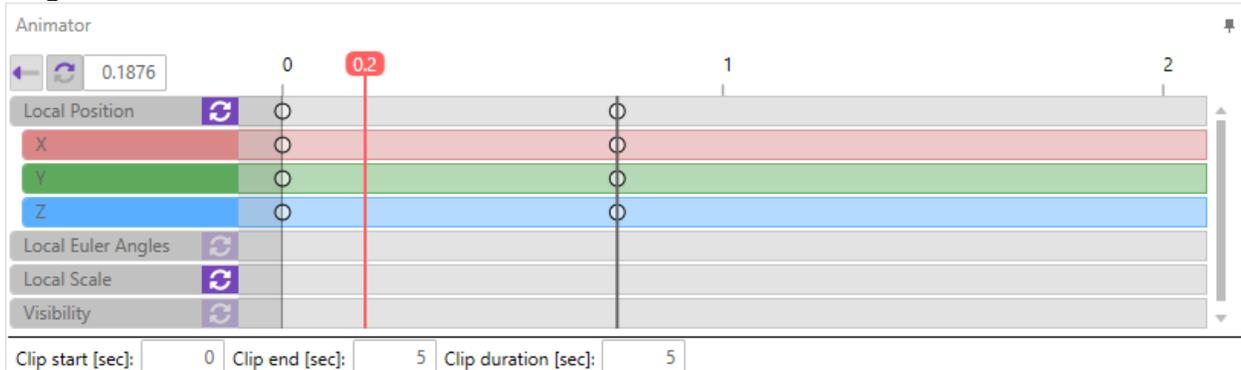


When color is animated, it changes directly the color of a material. Material can be however used by multiple objects, so the color of all these objects will be changed (this might be wanted and if not, just create new material).

Keyframing

Traditional keyframing can be performed while the clip is active in the Animator. This state is indicated by a red framing to the 3D view.

Keyframe Animator underwent some changes from last release. The timeline in Animator is no longer based on frames.

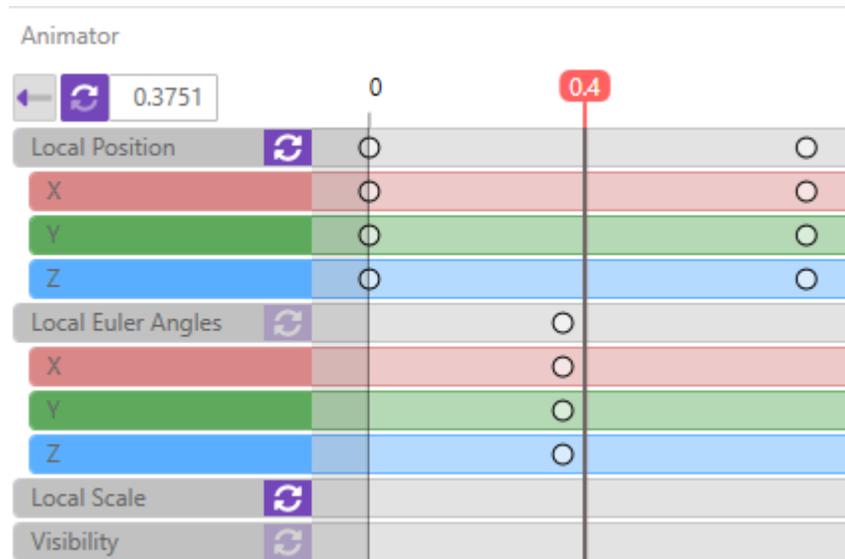


Animator now displays the current time in the clip (0.1876) that is marked with red vertical line. The orange vertical line now shows how is the current Timeline time converted to the clip time. By toggling the synchronization (next to the time), moving the time in Timeline will set the time in the Animator. Decoupling the times allows to make it easier for changing the animation pace. Imagine the case where you create an animation moving object from one place to other. By default, it's a linear interpolation and the speed is constant. Now you might want the object to be halfway sooner. It is simple to do so by moving the Timeline time to get the position you want to sample and then insert the keyframe anywhere because Animator and Timeline have separate times.



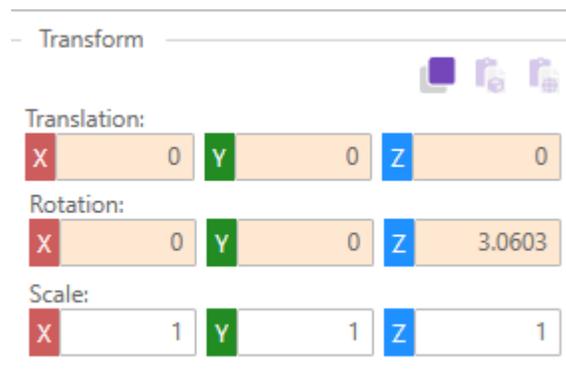
The red line marks the current time in Animator. This is the time where the keyframes will be inserted.

- Any changes using the widgets (movement, rotation, scaling) will automatically add that component to the clip and adds a key at the current moment (under the scrubber). If they exist already, they are updated.



Here we see we have keys for the position and rotation. Scale and visibility are untouched.

- The transform values can be used to change/insert keys for any component that is active. The color of the fields changes to yellow to indicate that the field is active for animating. In the example below the translation and rotation components are keyed, but not the scale. Changes to non-animating fields (scale below) change the base value, not as a keyed value.



- Components (position, rotation, scale, visible) can be activated for a specific clip by right clicking on the row and selecting *Animate*. Alternatively, *Set Key* will animate it and also set the current state as the local keyed values.
- Keys can be added under the scrubber by pressing the K key when the focus is in the Animator window.
- Keys can be moved by dragging the dots. The dot in the gray row, moves all the keys for that component at once.

6. Keys can be deleted by context clicking on the dots and selecting *Delete*. Using the dot in the gray row will delete all the keys for the component.
 1. clearing all the components will remove a keyed time completely

Animation import

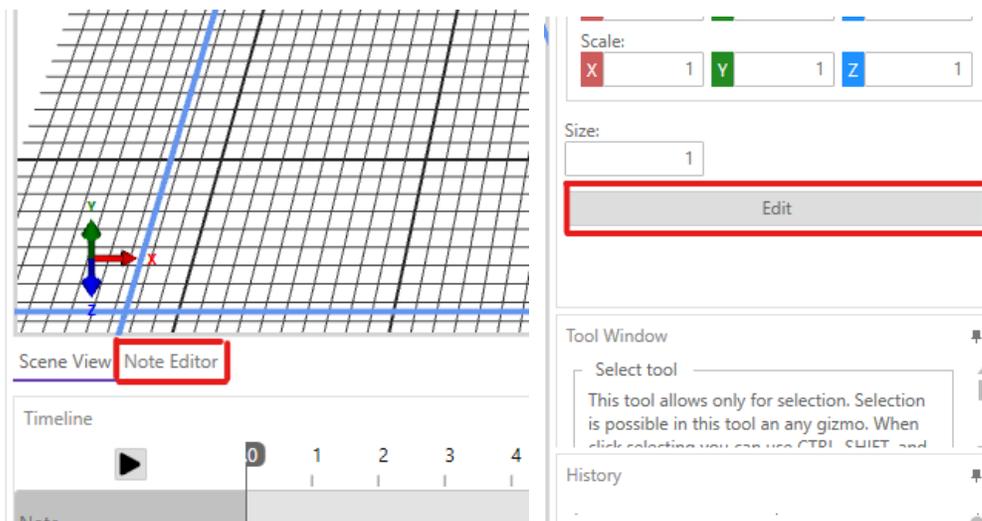
Models formats that support animation import (such as .fbx) also automatically add these animations into Misterine Studio. Currently, we only support per-node animations so skeletal animations will not be imported. All successfully imported animation will be displayed in the Animator. Each animation will be in a track with a keyframe clip. The keyframe clip represents the keyframe data from the imported animation.

Per-node animation

Per-node animation is an animation where we animate the whole object or rather the node that the object is under. We basically save several transformations in time and interpolate between them.

Note Editor

Note editor can be accessed from the Scene Designer by selecting the Note to be edited and then either switching to the *Note Editor* in the viewport or by pressing the *Edit* button in the Property Editor.



Note editor view consists of three main parts: Toolbox, Toolbar and Editor.



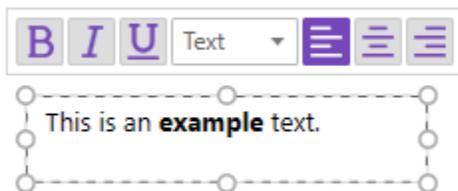
The Toolbar contains a set of tools that can be used to manage the note viewport. Depending on the selected item the toolbar may contain more or less controls. This panel includes buttons for Undo/Redo operations, Zooming and Canvas Settings. If a node in the note is selected, operations for setting the Translation and Size values are available, as well as operations for ordering of overlapping nodes.

The Toolbox contains a set of Nodes that are available for use inside the editor. To add them, just drag and drop them to the editor panel. Alternatively users can click the node and click again in the editor panel to add as many instances of the node as needed. Press Esc or Right-click to cancel the operation.

Nodes added to the Editor panel can be moved by clicking and dragging the mouse, resized by clicking and dragging on the resize border and deleted from the context menu or by pressing the Delete key.

Currently there are two nodes that can be added to the Note:

Text Node



As the name suggests, the Text node can contain formatted text. To input text into the node just click the inside of the node and start typing. When the Text node is selected, an additional toolbar is displayed above the node. This contains controls related to the node itself, in this case formatting options for the input text.

Image Node

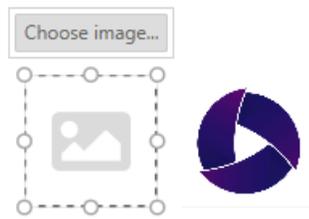
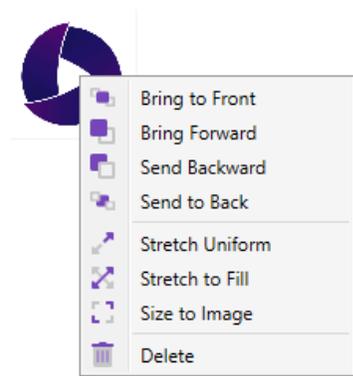


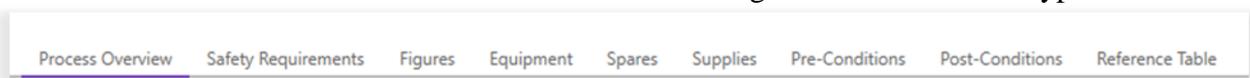
Image nodes can contain images. These are loaded from project resources. Users can specify the behavior of the image inside this node for when the node is resized. Access these options by bringing up the context menu by right clicking on the node and choosing the option.



Process Frontmatter/Metadata

Processes can include lots of supporting information that is not directly part of the text of tasks. This information may be referenced in the text or extra information for the user. Additionally, we can add global Safety Requirements and Pre and Post Conditions which should be met when performing this Process.

When opening a Process or clicking on the background of the diagram area, you will get access to the frontmatter details of the Process. This information is organized into different types.



Process Overview

Title: This is the title of the Process and what will be shown to the user in the Misterine App. This should generally be short.

Description: This is presented with the title in the Misterine App to help the user understand more what the Process does. This may be a longer text, but still remain concise.

Issue Date: When this version of the Process was released. In the case of S1000D this is the issue date of the original manual (DM)

Original document: You can add an original manual in traditional document layout to the Process as a backup for the user. This can be either a website (URL) or a PDF. If specifying a PDF, it must

be a resource in the Project. Also, you may want to set the PDF resources sharable access rights, if you want the Misterine App user to only be able to view rather than download the PDF.

Language: This setting has no effect at the moment. It is intended for use in Misterine Studio editor in the future, for example for spell checking. Is set from S1000D.

Country: This setting has no effect at the moment. Is set from S1000D.

Process Codes

Multiple QR codes and Barcodes can be created to achieve easier finding of the Process in Misterine App. With those additional identifiers specified the specific Process can be found by scanning a code from a physical object (for example from the box) related to the Process.

The number of Process Codes is unlimited, but codes must be unique within a group of a single type. Also based on the type every code has to be in a specific format.

The format of QR Codes is an unlimitedly long text where characters are from ISO-8859-1 character set. Example: *Process 12345/54321*

The format of Barcodes is an unlimited number of groups separated by a single space. Every group can contain an unlimited number of alphanumeric characters. Example: *abc123 def456 ghi789*

Process codes

QR code

Code

Enter string identifier for QR Code scan unique to the product.

Barcode

Code

Enter string identifier for Bar or Code scan on the product box. For example GTIN, UPC, ESN, etc.

Safety Requirements

Global Safety requirements can be specified here. These affect the entire Process. The user will be presented with these before starting the actual tasks of the Process. There are three types of notifications defined. The order of presentation is strictly following this ordering.

Warnings: This is the highest level. These will be presented with a red border. The Misterine App user must acknowledge the warning before they can continue.

Cautions: These are displayed with a yellow border. They are informative for safety. The Misterine App user must acknowledge the caution, but they are easier to dismiss.

Notes: These are purely informative. The Misterine App user can skip through these. They are displayed with a gray border.

Figures

Figures are the diagrams and images presented in traditional print (and web) versions of manuals. A figure consists of a Title and one or more images. Figures are referenced in the text.

Equipment, Spares, Supplies

These are any tools, parts, or disposables that the user may require to perform the task. These follow the S1000D standards definition, but with some extensions. Most notable it is possible to add an image in addition to the specification.

At a minimum, at least a Title or Shortname must be specified. In addition, a Specification should be added. Specifications can be created in several ways depending on the sourcing of materials and the target group. There are four specification types, derived from S1000D:

- **Ident Number:** Simple specification method specifying, Manufacturer Name, Serial # and Part #.
- **NATO Stock Number:** Useful in contexts where the NATO stock numbers are used, such as military and other governmental agencies.
- **Tool Reference:** Manufacturer Name and a tool number.
- **Catalog Sequence Number:** (Supplies only) Consists of an Item and Figure Number and external reference to the catalog

Pre-Conditions & Post-Conditions

Pre and Post Conditions specify what the situation should be before and after the Process is executed respectively. This information is displayed to the user in Misterine App, but is not mandatory. They can skip this information.

Both have the same specification: a description and an external reference. A reference is not required.

Reference Table

A table is generated which collects all external references found in the Process. They cannot be created directly here, but they can be edited here. The user in the Misterine App will have access to a table of references in the frontmatter.

External References exist in three forms in this table. References to other Processes, incomplete references to other Processes, and URLs. Incomplete references to Processes occur on import of S1000D if the referenced DM has not yet been included in the Project. These are marked with a red dot. Importing the referenced DM later will automatically complete the references.

Type	Specification	Technical Name	Description
>	GECC1300CS1A-A-72-31-03-01A-250A-C	COMPRESSOR ROTOR STAGE 2 BLISK	Cleaning
>	GECC1300CS1A-A-72-31-03-01A-351A-C	COMPRESSOR ROTOR STAGE 2 BLISK	Test for surface cracks with dye penetrant
-	-	External Reference "Unknown link title"	Cold-working repair
∨	https://my.geaviation.com/portal/ge/index#/techpubs/techdocs/pgms/gek108792/m	External Reference https://my.geaviation.com/portal/ge/index#/techpubs/techdocs/p	Inspection methods
-	https://my.geaviation.com/portal/ge/index#/techpubs/techdocs/pgms/gek108792/m	External Reference https://my.geaviation.com/portal/ge/index#/techpubs/techdocs/p	Inspection methods
-	https://my.geaviation.com/portal/ge/index#/techpubs/techdocs/pgms/gek108792/m	External Reference https://my.geaviation.com/portal/ge/index#/techpubs/techdocs/p	Visual inspection requirements of rotating parts
-	https://my.geaviation.com/portal/ge/index#/techpubs/techdocs/pgms/gek108792/m	External Reference https://my.geaviation.com/portal/ge/index#/techpubs/techdocs/p	Blending and removal of high metal procedures

External references shown in the table include all references. In addition, the same reference target (e.g. a URL) may be described differently in the text of the hyperlink of the task descriptions. We keep track of this and display it here. If there are different hyperlink texts, a foldout will show all variations. We see this with an URL in the example above.

Working with Rich Text

The Misterine Studio supports rich text markup for many text fields. The description of tasks includes all markup. The bar looks like this:



The first section seen includes standard markup of text: bold, italics, underline, subscript, superscript and color.

The second section includes layouting options in this order:

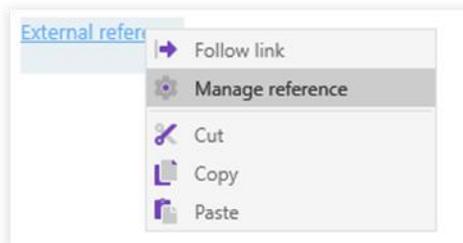
- Bullet lists

- Numbered lists
- Definition lists - these are pseudo tables that more precisely do what we are writing here. There is a term (definition list) and a description of that term.
- Tables - full width tables
- Notes - notes are boxes that are inserted below the current paragraph and boxed. These are informative and used as side notes.
- Text justification - this works also within table cells

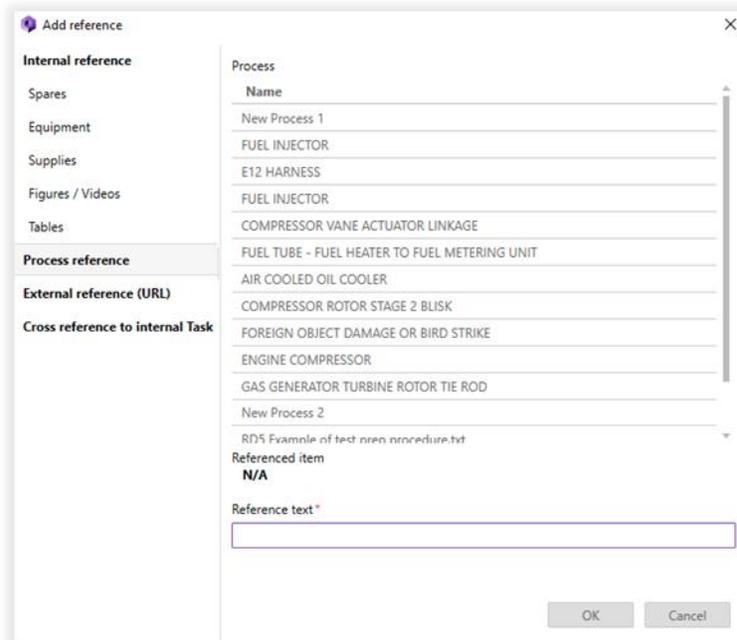
The third section defines Acronyms. The  button will insert a new acronym on the spot where the cursor is. The  button enables management of acronyms. Acronyms are controlled globally to a Process.

The fourth section defines footnotes. As with Acronyms, footnotes are controlled at the Process level. The  inserts a new footnote. The  button inserts a footnote reference for an existing footnote at the current position. The  button opens an interface for the management of footnotes, including editing of the footnote text.

The final section is for (hyper) links. A new link can be added with the  button. This button is not visible when cursor of the rich text editing area is within already created link. Instead of it the  button is shown. Purpose of this button is to remove a link under the cursor. Links can be edited and managed by opening a context menu of specific link to manage and selecting *Manage reference* option.



When adding a link, a popup will show up to enable finding the proper reference.



Link Reference Types

Internal References: These are references to Spares, Equipment, Supplies, Figures, and Tables. Tables are found in the text of the same task or other tasks. In the Misterine App, Spares, Equipment and Supplies will show a tooltip with basic information to the user in place. Figures will open the images for viewing. Tables will open an overview with the table shown in the context of the text of the task.

Process Reference: this is a reference to another Process. In the Misterine App, these links lead the user to complete the Process within the current Process. In the image in the previous section, we see a list of available Processes that can be chosen from.

External References: These are references to external sources, such as URLs or other reference materials the user will be aware of. In the Misterine App, URLs are opened in a device native browser.

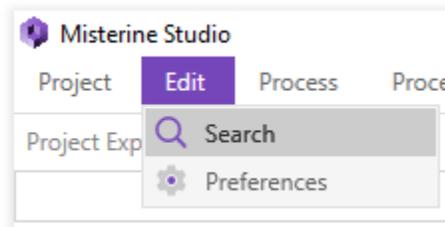
Cross reference to internal Task: These links, when clicked, provide a form of jump to another task in the same Process. If possible, it is suggested that the Decision Point be used instead of this method.

Autolinking Assistance Tool

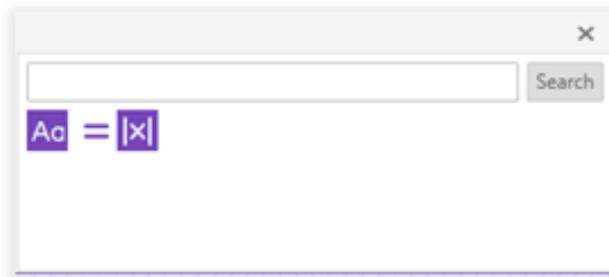
While writing text if you know some information about the target of a link that you would add with the tool described above, you can use our intellisense-like tool to complete this task quicker. While typing you can press the CTRL + SPACE key combination. A context menu will show up with suggestions for links that match your current text under the cursor. You can use arrow keys to select a link target and automatically create the link.

Searching

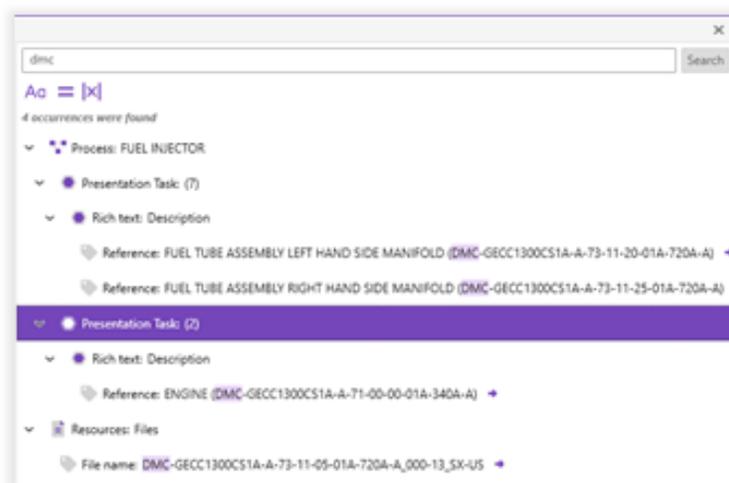
Misterine Studio supports the ability to search certain text inside a project. Use the menu item 'Search' to open a modal search window. This window can be pinned to any panel side of the Studio.



The search can be conducted using three regimes: 'Match case', 'Match whole word' and 'Use regular expression'. The regimes can be combined, for example a search can run with 'Match case' and 'Use regular expression' regimes turned on. If no regime is selected, then the search tries to find words in case insensitive mode and matching parts of words or the whole words.

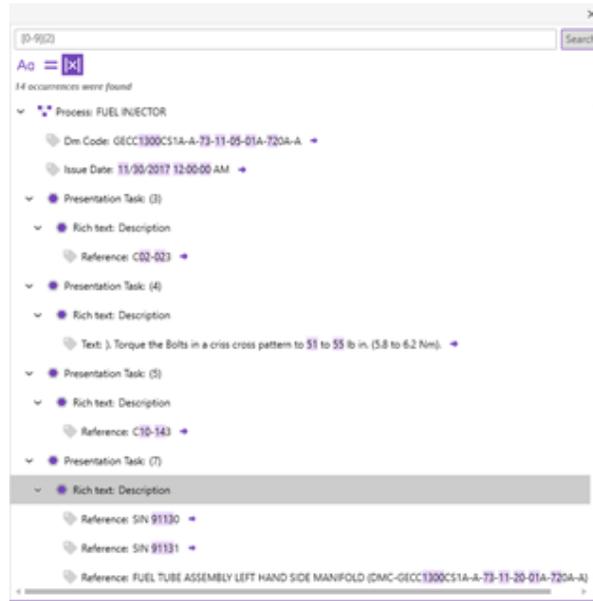


The searching goes through all text properties of the process, process elements and resources. The results of the searching are presented as a tree, where the topmost parent is a process or resources and the bottom most child is a text property with a highlighted found word.

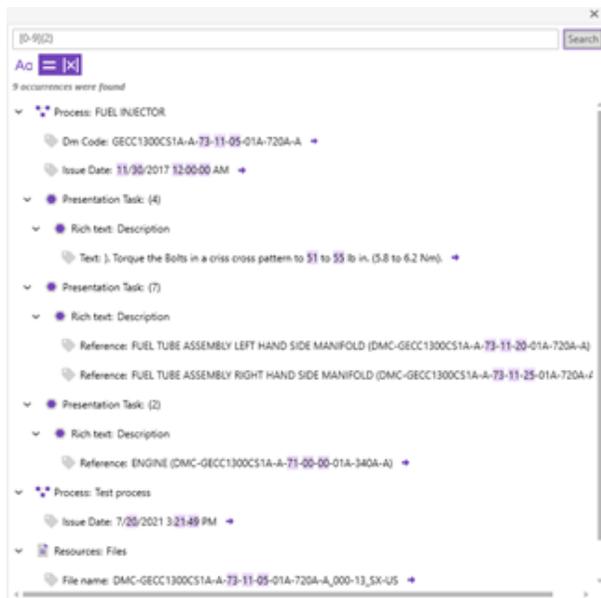


The bottom most child element in the search tree has the arrow button. Clicking on that button user will be navigated to an element where the specified text was found.

Searching can be conducted with the regular expressions. User should toggle the button and type the regular expression in the searching field. For example, the regular expression `[0-9]{2}` means that the text must contain two digits from zero to nine. It was not specified that there must be exactly two digits that is why the search found text that contains more than two digits in a row.



To specify the restriction on the digits count the user should toggle the button and run the search again.



If a user tries to use a wrong regular expression an error message “Regular expression is incorrect” will be shown.

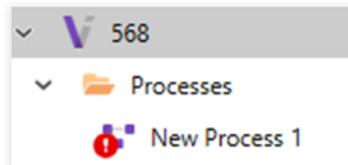
Process Validation

Processes are validated continuously for completeness. Two levels of issues are identified: warnings and errors. Errors must be fixed. Warnings are very likely mistakes that should be corrected, but could be allowed in special cases. A red circular icon with an exclamation point is used for Processes with errors present. A yellow triangle is used for warnings. We validate:

- Process flow (graph) is valid, meaning there is path from start to finish without any dead ends.
- Process flow nodes (Presentation task, Decision points, Sub-process) are fully defined
- 3D scene, if present, contains tracking information and at least one augmentation
- Metadata information must be minimally complete

The validation state is shown in multiple places at various levels of detail.

The current state of all Processes is shown in the Project Explorer on the icon of the Process.

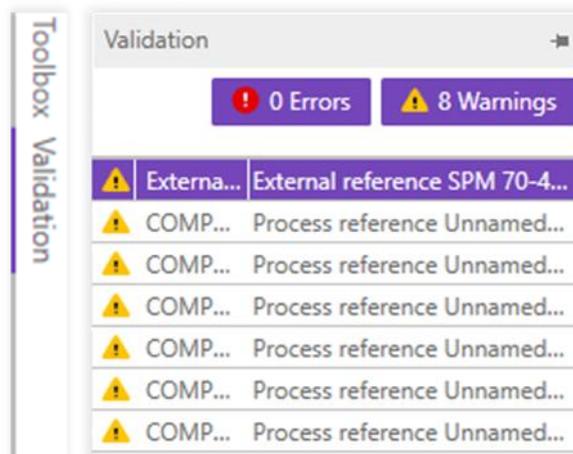


The open Process (the diagram is showing) status is shown on the left-hand side of the lower status bar. Clicking on this image will open the Validation tab that is docked on the right side of the Process Flow (diagram) editor.



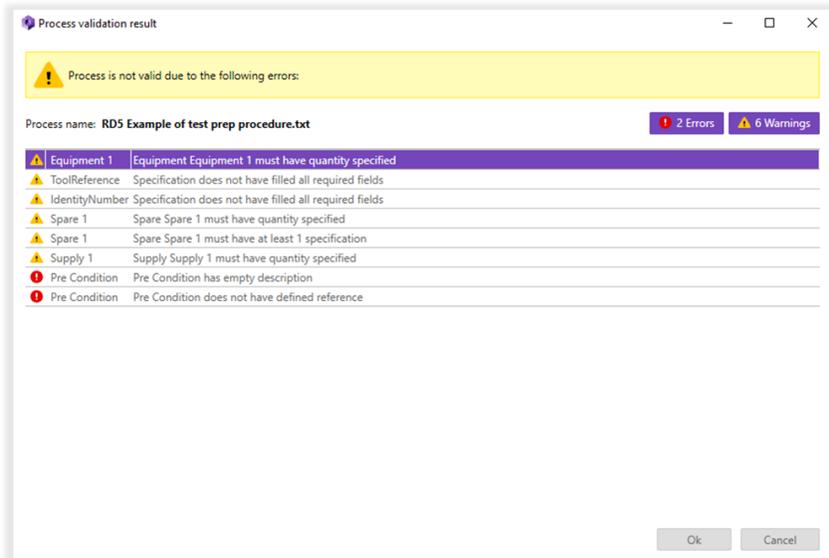
The Validation tab in the closed state is shown to the left below. The open tab is shown on the right.

The  button can be used to keep it open.



In the Validation tab, we can filter by Warnings and Errors. We can also click on the individual issues to be taken to the issue spot and have the problem highlighted.

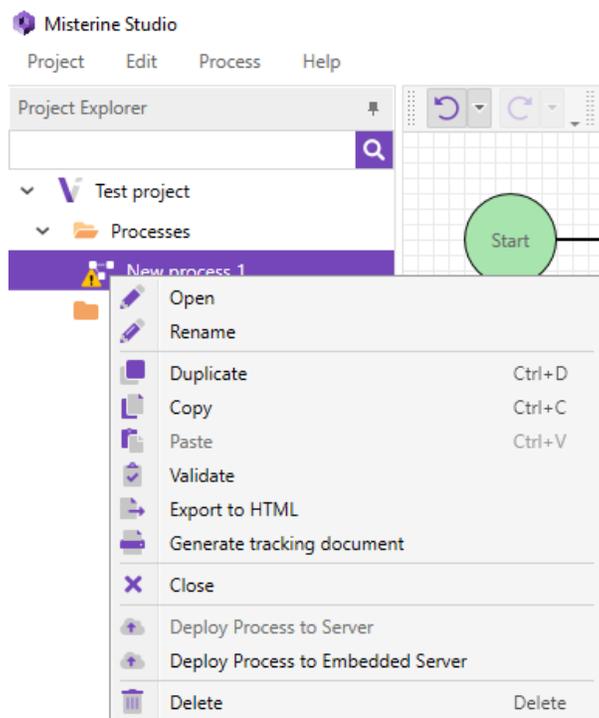
Finally, before deployment, the validation state is checked. If any issues exist, a popup will appear. In the following example, we see six Warnings and two Errors are present. It is not possible to deploy a Process with errors. A Process with only errors may be deployed.

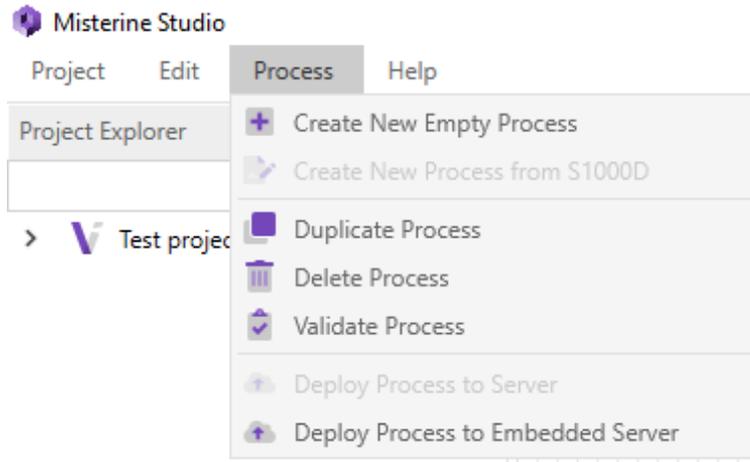


Process Deployment

A Process deployment is the final phase of a Process creation. It is possible to deploy a package locally on the embedded server or remotely on the application server.

The option to deploy can be found in a Process context menu or in the application menu *Process* → *Deploy Process to Embedded Server / Deploy Process to Server*.





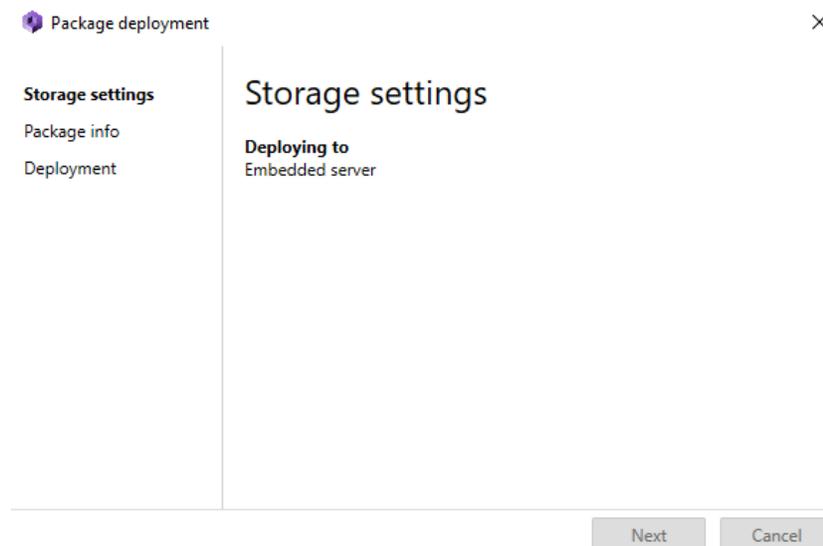
When any *Deploy* option from the context menu is clicked the deployment dialog is shown with the first page containing information about the embedded server or the remote server.

Storage Settings

Storage settings form differs based on an option chosen by the [context menu or application menu](#).

For embedded server deployment the form displays the information that the package will be deployed to the embedded server. If the PC has multiple Network Interface Cards (NICs) the server will be running on all available IP addresses. The default port for embedded server is 57002.

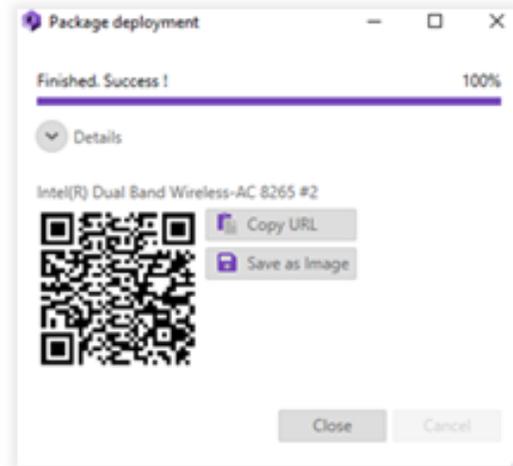
Embedded server is starting after the *Next* button is clicked. The deployed package will be available until the progress dialog is closed.



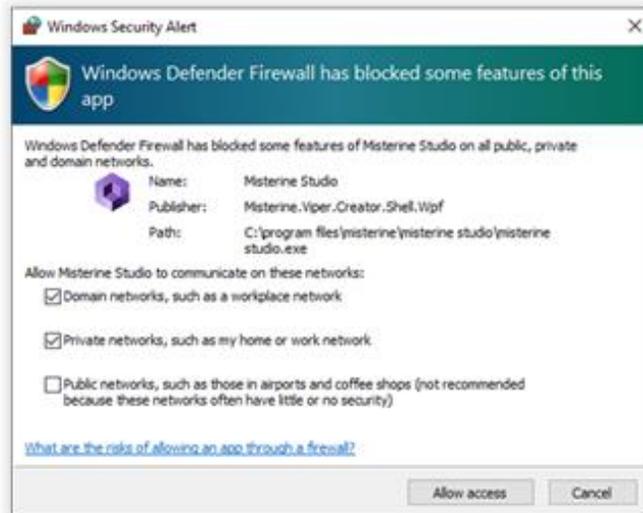
Embedded server connectivity issues

If the QR code is read by the Misterine App and you get a message "Specified Server not found", please follow these steps:

1. Make sure our phone or tablet is connected to the same local network as your desktop computer running the Misterine Studio. Typically, in a home or business environment, this should be case. Some companies may have multiple Wi-Fi networks, one for guests, others for employees. Make sure you use the proper one; ask your IT department if you are not sure.
2. Make sure the embedded server is running. Any time this step of the deployment wizard dialog is visible the embedded server is running. Closing this dialog also shuts down the server.



3. If you see multiple QR codes on the last sept of the deployment wizard, there are multiple active network cards connected to your computer. Some may be physical, some virtual, like the VPN. Usually, your mobile device will be connected to only one of these networks. If you don't know which network is correct, you can try reading each until you find the right network.
4. If your desktop computer is connected to a VPN, make sure the mobile device is also connected to the same VPN.
5. Connection to the desktop computer may also be blocked by windows firewall. You should enable the connection when the embedded server is run for the first time. The following window will appear:



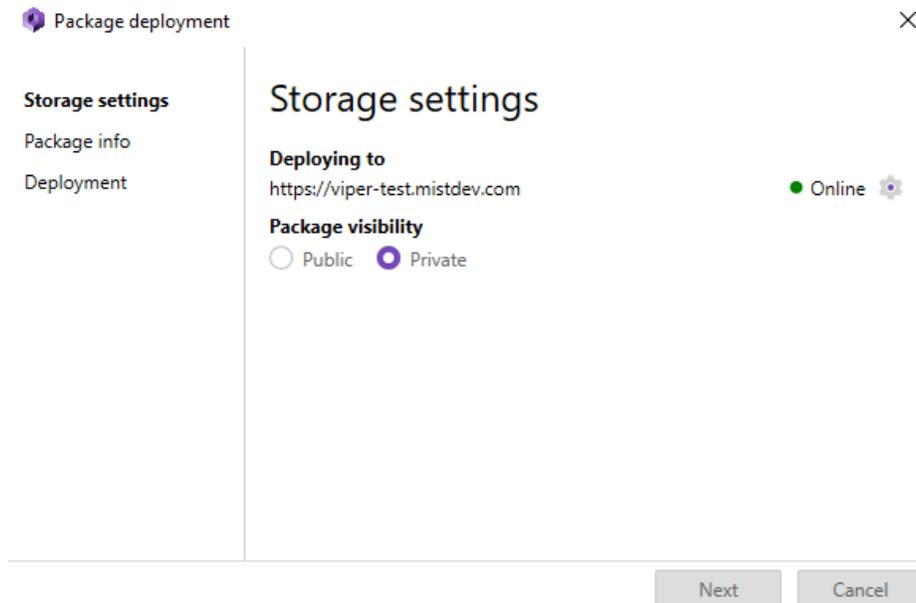
Click the domain (if available) and the private networks checkbox and then the Allow access button.

6. It may happen, that the Misterine Studio will not find any network interface for running the embedded server. If so, please make sure you have at least one network card (cable, Wi-Fi) active and connected.
7. The access to the embedded server from the Misterine Application may be also blocked by your company firewall or a third-party firewall installed on your computer. Such firewalls may be installed as a part of anti-virus protection. Please, consult with an IT specialist on how to set such a firewall with Misterine Studio. The firewall may be also a part of your IT infrastructure. In this case, consult the situation with your company IT specialist. As a workaround you can run a hotspot on your mobile device. This will work if your desktop computer may connect to the ad-hoc network of your phone/tablet. In such a case the local network will be considered a “Public” one and you need to setup your firewall to allow incoming network on the Public interface to the Misterine Studio (see point 5).
8. In very rare cases the Misterine Studio may not find any server port available for running the embedded server. By default, it tries to run on port 57002. If this one is already in use by another application, it will try the next port 57003. If this one is also occupied, it will continue trying 100 ports in the row till 57102. If all of them are occupied, an error will be shown informing that the server could not run. If an available free port is found, you may be prompted for rights to open it via the same dialog as in point 5. Please, click the domain and private networks, if available and then the Allow access button.

For application server deployment the form informs about current Server status and allows to choose a visibility for deployed package.

The Server address is the same address set in *Edit* → *Preferences* → *Deployment*. The form checks if the Server is prepared for a deployment. In case of issues error messages are listed in tooltip of  icon that appears next to the Online/Offline state.

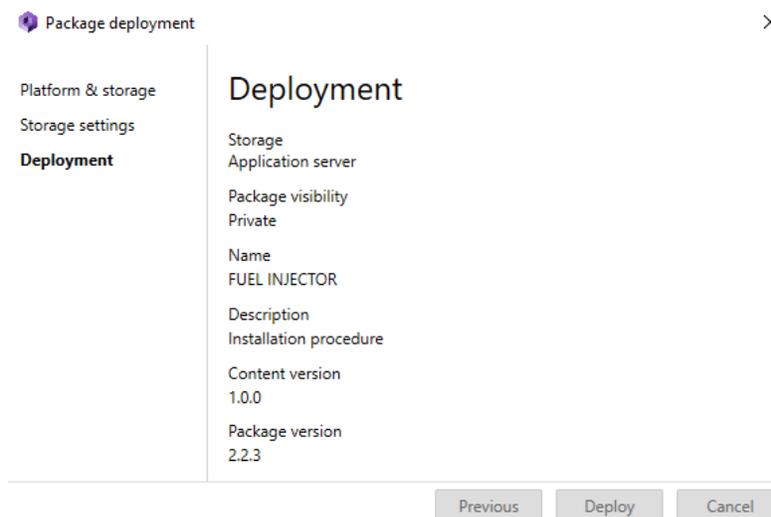
It is possible to directly open Preferences dialog with the Server address. However, the deployment process will be cancelled and after wanted changes in the Preferences dialog it must be run again from the beginning.



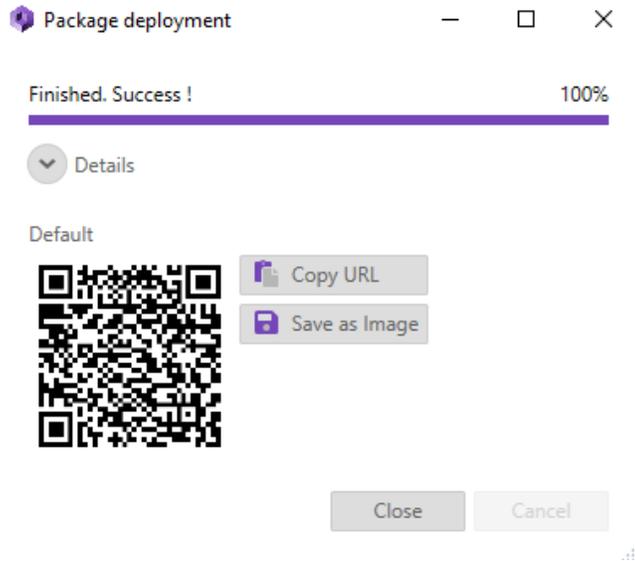
A package visibility can be set to either *Public* or *Private*. Public visibility means, that even anonymous (not logged) users of Misterine App can find and download that package. Private packages are only for logged users.

Deployment

The last page contains summary with all information about package to be deployed. By clicking the *Deploy* button, building and deploying of a package will start and a dialog informing about progress will appear.



When the deployment is finished the progress dialog will display the QR-Code. This code can be used in the Misterine App to access the deployed package.



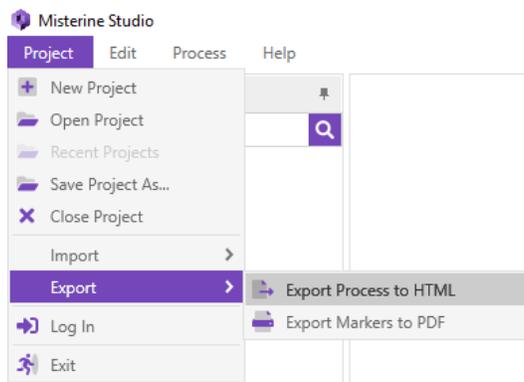
It is possible to copy the generated link as a text or save the QR-Code as an image.

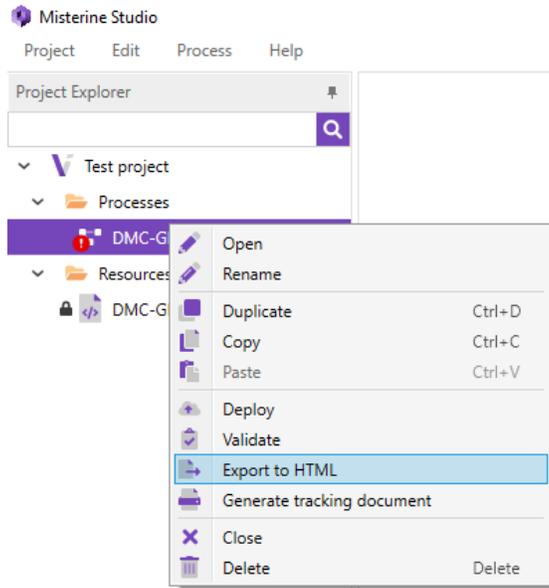
Export

When Process is completed, some parts of it can be easily exported to different formats for further usage.

Export of a Process to HTML

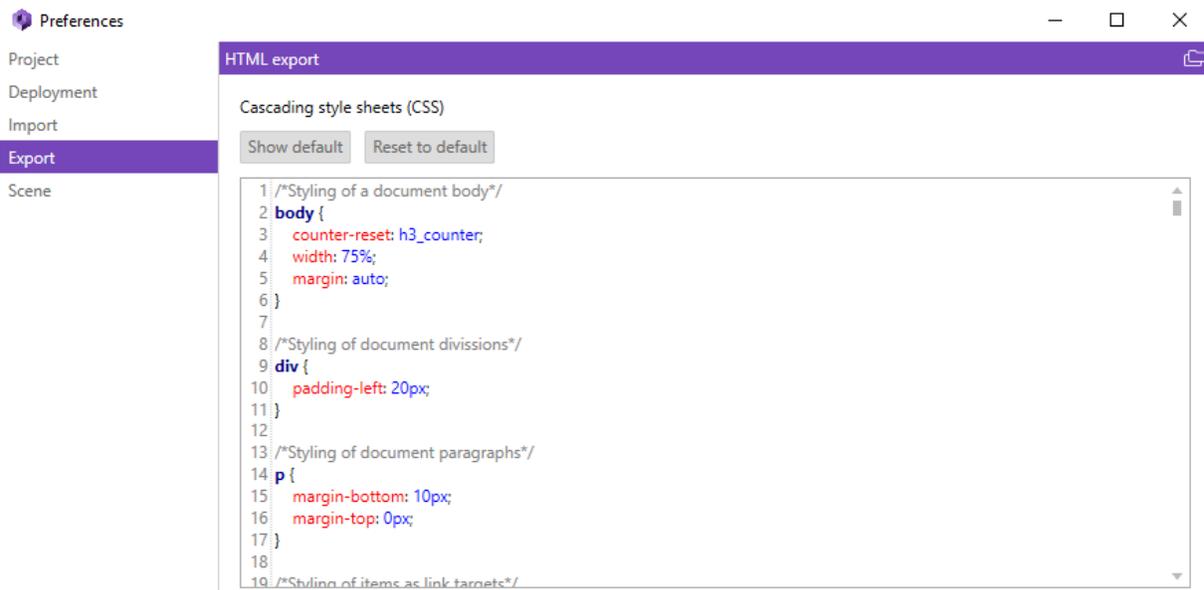
Except deploying a Process in a form of package, there is also a possibility to export it to HTML document. The purpose of this document is to offer an overview of values (name, description, steps, figures etc.) set during a Process creation. The document can be also printed out and can be used without any electronic device. Export to HTML document can be done by using *Project* → *Export* → *Export Process to HTML* with one Process selected in Project Explorer or by using a context menu option *Export to HTML* of a Process you want to export.





The only limitation of this feature is excluding Scenes (models, animations etc.) from the document because the Scenes are used for augmented reality which is not possible in HTML format.

When a Process is exported to the HTML document, the default CSS (Cascading Style Sheets) is applied. For those who are familiar with this kind of styling you can see a content of the default CSS in *Preferences* → *Export* → *HTML export*.



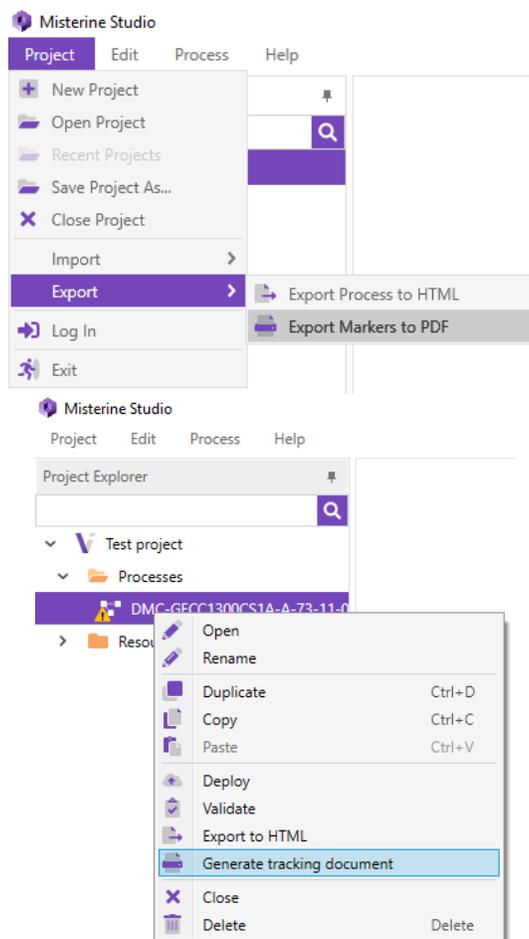
A CSS can be freely changed, but take in mind, only classes defined in the default CSS can be used. Any other classes are ignored. It is recommended to take the default CSS and modify it to achieve desired result.

The result of the export is following structure:

- *{name of the Project}* – Root folder of the exported Process
 - *icons* – Folder containing all supporting icon images used in HTML document
 - *images* – Folder containing all images used in the Process by a user (f.e. figures)
 - *{title of the Process}.html* – Final HTML file

Export of Tracking Markers to PDF

For using an augmented reality in Misterine App you have to have Tracking Markers used in Misterine Studio printed out. For this purpose, an option for generating a PDF file containing Tracking Markers is accessible by using *Project* → *Export* → *Export Markers to PDF* or by using a context menu option *Generate Tracking Document* of a Process you want to print out Tracking Markers for.



The final PDF document contains all Tracking Markers used in all Scenes of a selected Process in Project Explorer. After generating the PDF document is immediately opened in an application assigned for opening PDF files by an operation system.

A1) S1000D Limitations

Lists (Random/Sequential/AttentionRandom/AttentionSequential)

- A list item is limited to one para element

- List types has to be the same on the same level.
- Only simple numbering is supported (nested lists start again from 1)
- Titles are not supported

Styles

- Emphasis can be converted to character styles (bold, italic, ...) when parsing from S1000D. Information about emphasis is not being kept from that point forward in the deployment process.

Links

- Internal reference to anything other than steps, figures, supplies, equipment, spares, & Tables

Tables

- Tables cannot be embedded in tables
- We do not support cell rotation
- We support only % column spacing
- Groups are not supported
- The widths of columns are supported for the whole table, not individual rows
- Tables cannot have margins
- Tables inside lists cannot have indentation
- We do not support tgstyle tag for Business Rules and standard table types (see BRDP-S1-00121)
- Vertical justification not supported
- Support for irregular tables is limited
- Warnings and Cautions are not supported

Rich Text

- Acronyms: we do not support bullet points inside of acronyms
- Acronyms: we do not support rich text (superscript, subscript) in acronym search
- Inline images are not supported

A2) General Limitations

Lists

- A list item is limited to one para element
- List types have to be the same on the same level.
- Indenting list, while the cursor is on the first item, causes indentation for the whole list, not a level shift
- Only simple numbering is supported (nested lists start again from 1)
- Deleting the first item in lists will cause inconsistent numbering
- It is possible to create scattered lists (lists interrupted by text) but they will be unscattered in the next session
- Titles are not supported

Tables

Table structure

- We do not support cell rotation
- We support only % column spacing
- The widths of columns are supported for the whole table, not individual rows

- Support for irregular tables is limited (irregular tables are turned into rectangular ones)

Table placement

- Tables cannot have margins
- Tables inside lists cannot have an indentation
- Tables inserted as first list item will be added before the list

Table selection

- Multiple cell selection and typing behavior is inconsistent (when selectin from bottom-up / from top to bottom)
- Column selection causes scrolling

Table behavior

- Pressing enter at the beginning of the very first cell causes a new line to appear above the table
- Manually set row height is not preserved
- Tables created inside lists will inherit lists in all its cells
- Tables created inside lists split the list and add another empty item
- Pressing TAB creates in the last cell creates a new row with the same options (formatting and lists, etc.)

Table Copy & Paste

- Cut and pasted tables that are being referenced will lose the reference

Scrolling

- Horizontal scrollbar is displayed even when content decreases in width
- Horizontal is only displayed when Vertical scrollbar is at the very bottom

Hyperlinks

- Links appear to have format applied to them, but it is lost in next session

Selection

- Selecting a format that changes caret style (italic) and navigating elsewhere does not clear the style

3D Models

- Limit of 41.5 million triangles on a single mesh on import
- Max size of a scene for deployment to the newest generation of iPad is ~4.5 million triangles.

A3) Keyboard Shortcuts

Sections below describe controls, shortcuts and hints for using different parts of Misterine Studio.

Project

Project Explorer

UP	Select project item below the last selected project item
DOWN	Select project item above the last selected project item
SPACE	Expand / Collapse folder
DELETE	Delete selection
CTRL + C	Copy project item (only for Process)
CTRL + V	Paste project item (only for Process)

CTRL + D	Duplicate project item (only for Process)
RMB	Open context menu
LMB select	Select project item in the tree
CTRL + LMB	Add a project item to a selection

Process

Process Editor

CTRL + C	Copy current selection
CTRL + V	Paste copied selection on a mouse position or on a position of a source with an offset (if mouse is not over edit area)
CTRL + D	Duplicate current selection
DELETE	Delete current selection
CTRL+Z	Undo
CTRL+Y	Redo
ESC or RMB	Cancel node creating action if it's in progress
RMB	Open context menu for selected object(s)
LMB	Select object / Deselect all objects if not clicked on object
CTRL + LMB	Add object to current selection
LMB + Drag	<ul style="list-style-type: none"> ● Start creation of a connection (Output anchor point) ● Change endpoint of a connection (Connection start or end) ● Move (Node) ● Box selection (none)
Double LMB	Open scene (only for Presentation Task)
Mouse wheel	Zoom in / out

Toolbox

LMB / RMB	<ul style="list-style-type: none"> ● Expand / Collapse (Toolbox group) ● Select / Deselect (Toolbox item) = Start / End node creation action using click'n click (click on Toolbox item, click on Process Flow edit area)
LMB + Drag	Start node creation action using drag'n drop (drag Toolbox item, drop on Process Flow edit)

Validation

UP	Select validation item above currently selected validation item
DOWN	Select validation item below currently selected validation item
ENTER / Double LMB	Navigate to a place relative to selected validation item
LMB / RMB	Select a validation item in the list

Rich Text Editor

CTRL + B	Make text bold
CTRL + I	Make text italic
CTRL + U	Make text underlined
CTRL + =	Make text subscripted
CTRL + SHIFT + =	Make text superscripted
CTRL + SPACE	Open popup with suggestions
UP	Move to a suggestion above currently selected suggestion (only Suggestions popup)

DOWN	Move to a suggestion below currently selected suggestion (only Suggestions popup)
ENTER	Confirm currently selected suggestion (only Suggestions popup)

Scene

Scene Editor

CTRL + F	Focus the search field (type in and press Enter to search)
CTRL + I	Import a model
CTRL + Z	Undo
CTRL + Y	Redo
CTRL + 1	Add a tracking marker
CTRL + 2	Add an interactive anchor
CTRL + 3	Add a label to the selection
CTRL + 4	Add a note
ALT + M	Show / Hide radial menu
ALT + C	Move the selection to origin
CTRL + H	Hide selected
CTRL + SHIFT + H	Show selected
CTRL + SHIFT + I	Inverse selection
Q	Select tool
W	Translate tool
E	Rotate tool
R	Scale tool
T	Snapping tool
Y	Move label line start position
F	Focus on selection (focus all if nothing is selected)
DELETE	Delete selected object (if in a text field, it works on the text inside)
CTRL + A	Select all
CTRL + SHIFT + A	Select all that is visible (the selection is stopped by first invisible node)
CTRL + D	Deselect all
CTRL + V	Insert a model (only if an object file in Windows Explorer is selected and copied before)
LMB	Select object in the scene / Deselect all
CTRL + LMB	Toggle selection
SHIFT + LMB	Add to selection
ALT + LMB	Select common parent of the current selection when clicked on
RMB	Rotate around a target (displayed as a small red sphere). If the mouse is over an object, the target is the 3D point under the mouse cursor. While rotating, the red sphere is connected to its projection to XZ plane with yellow line.
Shift + LMB + Vertical mouse movement	Zoom to an object under the mouse (if any), or to the target (red sphere)
Mouse wheel	Zoom to center
RMB + Mouse wheel	Zoom to the center of rotation

CTRL + Space	Toggle between multi-view layout and single-view layout
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Scene Explorer

LMB	Select object in the tree / Deselect all
RMB	Open context menu
CTRL + RIGHT	Move the horizontal scrollbar to the right
CTRL + LEFT	Move the horizontal scrollbar to the left
SHIFT+SCROLL	Move the horizontal scrollbar
CTRL + UP	Move the focus up
CTRL + DOWN	Move the focus down
SHIFT+UP/DOWN	Add to selection when moving from focused object. Removes from selection when going back.
RIGHT	Expand an assembly
LEFT	Collapse an assembly
UP	Select the node up from the current one
DOWN	Select the node down from the current one
CTRL+SPACE	Select / Deselect focused object.
CTRL+ENTER	Select / Deselect focused object.
HOME	Select the first object in the tree
END	Select the last object in the tree
CTRL+HOME	Focus the first object in the tree
CTRL+END	Focus the last object in the tree
SHIFT+HOME	Select all between last selected and top of the tree
SHIFT+END	Select all between last selected and end of the tree

Filtering in Scene Explorer

Scene Explorer offers basic filtering of items based on their name, or special filters for more restrictive filtering. All possible filters are listed in a table below.

:m {VALUE}	Filters meshes with name containing {VALUE}
:nm {VALUE}	Filters non-meshes with name containing {VALUE}
:tm {VALUE}	Filters tracking markers with name containing {VALUE}
:ia {VALUE}	Filters interactive anchors with name containing {VALUE}
:l {VALUE}	Filters labels with name containing {VALUE}
:a {VALUE}	Filters nodes with animations with name containing {VALUE}
:ma {VALUE}	Filters nodes with materials with name containing {VALUE}
:n {VALUE}	Filters notes with name containing {VALUE}
::{KEY} {VALUE}	Filters nodes with property key containing {KEY} and with property value containing {VALUE} (only for models imported from JT file)

- if {VALUE} is unspecified, the related restriction is ignored

Examples

:tm filters all Tracking Markers

:tm Marker1 filters all Tracking Markers with name containing *Marker1*

:number filters all items with property key containing *number*

:*number* 123 filters all items with property key containing *number* and with property value containing 123

Animator

G	Regenerate the keyframes (if keyframe generator is active)
K	Create keyframe at current time
C	Set the time to current time (Clip start/end time input field must be focused)

Timeline

RMB	Open a context menu
CTRL + SHIFT + C	Copy the clip (The clip must be selected. The clip is serialized to JSON format)
CTRL + C	Copy the selected clip
CTRL + V	Paste the content of clipboard to highlighted track at current time – can be, for example, a selected clip (if the clipboard content is incompatible to paste, nothing happens)
CTRL + Drag	Duplicate and move the clip
ALT + Drag	Move the clip between tracks
SHIFT + Drag	Snap the clip to clip endpoints, 0, and current time

History

HOME	Focus on the first object in the history
END	Focus on the last object in the history
UP	Focus on node up from the top
DOWN	Focus on node down from the top
SPACE	Move to this point in history