SIEMENS

SINUMERIK

Industrial Edge for Machine Tools Manage MyAI

Operating Manual

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Version 2.1
Valid for SINUMERIK 840D sl / 840DE sl / SINUMERIK ONE

11/2022
A5E51559301B AB

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ **DANGER**
indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ **WARNING**
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ **CAUTION**
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ **WARNING**
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction 1

From simple, standardized CNC machines to premium modular machine designs – the SINUMERIK CNCs offer the right solution for all machine concepts. Whether for individual parts or mass production, simple or complex workpieces – SINUMERIK is the highly dynamic automation solution, integrated for all areas of production. From prototype construction and tool design to mold making, all the way to large-scale series production.

Visit our website for more information SINUMERIK (https://www.siemens.com/sinumerik).

1.1 About this documentation

Target group

This document addresses users of Manage MyAI.

Benefits

The Operating Manual helps users familiarize themselves with the control elements and commands. It brings users into a position where they can work with Manage MyAI.

Standard scope

This documentation only describes the functionality of the standard version. This may differ from the scope of the functionality of the system that is actually supplied. Please refer to the ordering documentation only for the functionality of the supplied drive system.

It may be possible to execute other functions in the system which are not described in this documentation. This does not, however, represent an obligation to supply such functions with a new control or when servicing.

For reasons of clarity, this documentation cannot include all of the detailed information on all product types. Further, this documentation cannot take into consideration every conceivable type of installation, operation and service/maintenance.

The machine manufacturer must document any additions or modifications they make to the product themselves.

Websites of third-party companies

This document may contain hyperlinks to third-party websites. Siemens is not responsible for and shall not be liable for these websites and their content. Siemens has no control over the information which appears on these websites and is not responsible for the content and information provided there. The user bears the risk for their use.

1.2 Documentation on the internet

1.2.1 Documentation overview SINUMERIK ONE

Comprehensive documentation about the functions provided in SINUMERIK ONE Version 6.13 and higher is provided in the Documentation overview SINUMERIK ONE.

You can display documents or download them in PDF and HTML5 format.

The documentation is divided into the following categories:

- User: Operating
- User: Programming
- Manufacturer/Service: Functions
- Manufacturer/Service: Hardware
- Manufacturer/Service: Configuration/Setup
- Manufacturer/Service: Safety Integrated
- Information and training
- Manufacturer/Service: SINAMICS

1.2.2 Documentation overview SINUMERIK 840D sl

Comprehensive documentation about the functions provided in SINUMERIK 840D sl Version 4.8 SP4 and higher is provided in the Documentation overview SINUMERIK 840D sl (https://support.industry.siemens.com/cs/ww/en/view/109766213).

You can display the documents or download them in PDF and HTML5 format.

The documentation is divided into the following categories:

- User: Operating
- User: Programming
- Manufacturer/Service: Functions
- Manufacturer/Service: Hardware
- Manufacturer/Service: Configuration/Setup
- Manufacturer/Service: Safety Integrated
- Manufacturer/Service: SINUMERIK Integrate/MindApp
- Information and training
- Manufacturer/Service: SINAMICS

Industrial Edge User Documentation

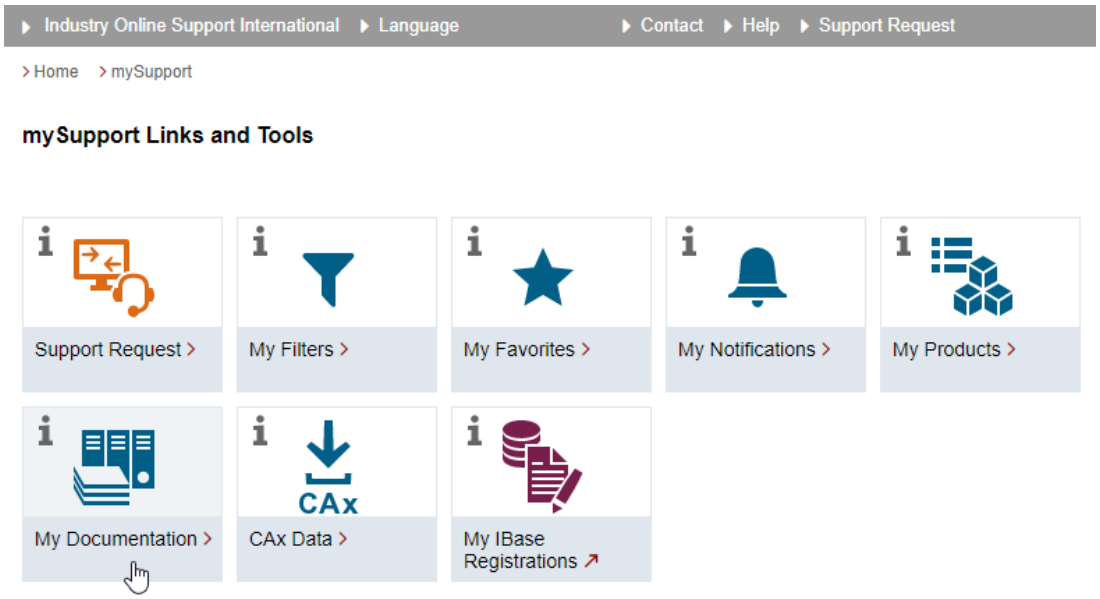
For information about Industrial Edge, please reference to Industrial Edge User Documentation (http://industrialedge.io.code.siemens.io/developer.web/user-docu/industrialedge.html).

1.3 Feedback on the technical documentation

If you have any questions, suggestions or corrections regarding the technical documentation which is published in the Siemens Industry Online Support, use the link "Provide feedback" which appears at the end of the entry.

With the "mySupport documentation" web-based system you can compile your own individual documentation based on Siemens content, and adapt it for your own machine documentation.

To start the application, click on the "My Documentation" tile on the mySupport homepage (https://support.industry.siemens.com/cs/ww/en/my):



The configured manual can be exported in RTF, PDF or XML format.

Note

Siemens content that supports the mySupport documentation application can be identified by the presence of the "Configure" link.

1.4 Service and Support

Product support

You can find more information about products on the internet:

Product support (https://support.industry.siemens.com/cs/ww/en/)

The following is provided at this address:

- Up-to-date product information (product announcements)
- FAQs
- Manuals
- Downloads
- Newsletters with the latest information about your products
- Global forum for information and best practice sharing between users and specialists

- Local contact persons via our Contacts at Siemens database (→ "Contact")
- Information about field services, repairs, spare parts, and much more (→ "Field Service")

Technical support

Country-specific telephone numbers for technical support are provided on the internet at address (https://support.industry.siemens.com/cs/ww/en/sc/4868) in the "Contact" area.

If you have any technical questions, please use the online form in the "Support Request" area.

Training

You can find information on SITRAIN at the following address (https://www.siemens.com/sitrain).
SITRAIN offers training courses for automation and drives products, systems and solutions from Siemens.

Siemens support on the go

With the award-winning "Siemens Industry Online Support" app, you can access more than 300,000 documents for Siemens Industry products – any time and from anywhere. The app can support you in areas including:

- Resolving problems when implementing a project
- Troubleshooting when faults develop
- Expanding a system or planning a new system

Furthermore, you have access to the Technical Forum and other articles from our experts:

- FAQs
- Application examples
- Manuals
- Certificates
- Product announcements and much more

The "Siemens Industry Online Support" app is available for Apple iOS and Android.

Data matrix code on the nameplate

The data matrix code on the nameplate contains the specific device data. This code can be read with a smartphone and technical information about the device displayed via the "Industry Online Support" mobile app.

1.5 Important product information

Using OpenSSL

This product can contain the following software:

- Software developed by the OpenSSL project for use in the OpenSSL toolkit
- Cryptographic software created by Eric Young.
- Software developed by Eric Young

You can find more information on the internet:

- OpenSSL (https://www.openssl.org)
- Cryptsoft (https://www.cryptsoft.com)

Compliance with the General Data Protection Regulation

Siemens observes standard data protection principles, in particular the data minimization rules (privacy by design).

For this product, this means:

The product does not process or store any personal data, only technical function data (e.g. time stamps). If the user links this data with other data (e.g. shift plans) or if he/she stores person-related data on the same data medium (e.g. hard disk), thus personalizing this data, he/she must ensure compliance with the applicable data protection stipulations.

Note regarding the General Data Protection Regulation

Siemens respects the principles of data privacy, in particular the data minimization rules (privacy by design). For this product, this means:

The products process the following personal data: User name, password, optionally name and first name. It does not involve data from the personal or private sphere. The above mentioned data is required for the access restriction function (login). The data saved is limited to the absolute minimum as this is absolutely necessary to make a differentiation between the access rights. The above-mentioned data cannot be saved with anonymity or with pseudo-anonymity as the objective of differentiating access rights would not be possible. Our products do not automatically delete the data mentioned above. If necessary, this data can be deleted in the corresponding user administration. If you have any questions, then please contact our customer support organization.

Safety notes 2

2.1 Fundamental safety instructions

2.1.1 General safety instructions

⚠ WARNING

Danger to life if the safety instructions and residual risks are not observed

If the safety instructions and residual risks in the associated hardware documentation are not observed, accidents involving severe injuries or death can occur.

- Observe the safety instructions given in the hardware documentation.
- Consider the residual risks for the risk evaluation.

⚠ WARNING

Malfunctions of the machine as a result of incorrect or changed parameter settings

As a result of incorrect or changed parameterization, machines can malfunction, which in turn can lead to injuries or death.

- Protect the parameterization against unauthorized access.
- Handle possible malfunctions by taking suitable measures, e.g. emergency stop or emergency off.

2.1.2 Warranty and liability for application examples

Application examples are not binding and do not claim to be complete regarding configuration, equipment or any eventuality which may arise. Application examples do not represent specific customer solutions, but are only intended to provide support for typical tasks.

As the user you yourself are responsible for ensuring that the products described are operated correctly. Application examples do not relieve you of your responsibility for safe handling when using, installing, operating and maintaining the equipment.

2.1.3 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit
https://www.siemens.com/industrialsecurity (https://www.siemens.com/industrialsecurity).

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under
https://www.siemens.com/cert (https://www.siemens.com/cert).

Further information is provided on the Internet:

Industrial Security Configuration Manual (https://support.industry.siemens.com/cs/ww/en/view/108862708)

⚠ WARNING

Unsafe operating states resulting from software manipulation

Software manipulations, e.g. viruses, Trojans, or worms, can cause unsafe operating states in your system that may lead to death, serious injury, and property damage.

- Keep the software up to date.
- Incorporate the automation and drive components into a holistic, state-of-the-art industrial security concept for the installation or machine.
- Make sure that you include all installed products into the holistic industrial security concept.
- Protect files stored on exchangeable storage media from malicious software by with suitable protection measures, e.g. virus scanners.
- On completion of commissioning, check all security-related settings.

2.2 Security Features of Industrial Edge

Please see Industrial Edge User Documentation (https://documentation.mindsphere.io/resources/html/manage-my-sinumerik-edge-app-management/en-US/user-docu/reverseproxy.html) regarding security related features to setup for Industrial Edge, in particular the chapter about reverse proxy and user management.

For more information, see also edge security (https://documentation.mindsphere.io/resources/html/manage-my-sinumerik-edge-app-management/en-US/user-docu/platform-security.html).

2.3 Safety notes for OEM and users

⚠ WARNING

Industrial security concept

The Operation PCs used to visualize and configure Manage MyAI by OEM or by customer is supposed to have security measures implemented,
i.e. hardware is maintained according to standard IT protection mechanisms (active virus scanner, active firewall, encrypted HDD, access control etc.).
This is in responsibility of OEM and/or customer

For additional information on industrial security measures that may be implemented, please visit Industrial Security (https://www.siemens.com/industrialsecurity).

Overview 3

3.1 Manage MyAI

Manage MyAI

Manage MyAI is a MindSphere application that allows the cloud-based training of various AI models to be started and trained. Training these AI models allow Protect MyMachine /Setup and Analyze MyWorkpiece /ToolCheck Edge applications for the Industrial Edge for Machine Tools to be able to execute online visual analytics, make predictions and solve real-world problems arising from the shopfloor.

Creating AI models for visual analytics is based on 3 steps:

1. Collecting training data, in this case taking example images.
2. Training the AI model with the collected training data.
3. Perform the visual analytic by infering the AI model on new images.

Training an AI model within the visual analytics framework is a very important step in the model creation process. The model creation process starts with acquiring image data that captures the problem of interest and sending it to MindSphere using the appropriate Industrial Edge for Machine Tools application. Once the data is available on the cloud, the labeling and consequently the training processes can be started using the Manage MyAI application. Our approach utilizes state-of-art AI algorithms which are trained and specifically designed to work with image data and have optimized architecture.

Manage MyAI allows a training process to be started as well as gives overview of the training status. Given that training AI models is a complex process that requires a decent amount of computing power as well as image data storage, Manage MyAI overcomes these requirements by utilizing cloud resources.

MindSphere application Manage MyAI

- Training of Models
  - Start of model trainings based on provided image data for corresponding model on Edge Assets, which have Industrial Edge for Machine Tools Apps “Protect MyMachine /Setup 2.1” or “Analyze MyWorkpiece /ToolCheck 1.2” installed.
  - The model is generated automatically once the training process has been approved using Manage MyAI. The generated model is then available in the corresponding Edge Asset on MindSphere.

3.2 Managing users and rights

MindSphere application

The following roles are available:

- Standard users
  - mmai
- Administrator
  - mmai

You edit users and roles in the MindSphere application "MindSphere Settings".

Further information can be found at: MindSphere documentation (Settings in mindsphere user documentation (https://documentation.mindsphere.io/resources/html/settings/en-US/index.html))

MindSphere application

4

You can open the MindSphere application Manage MyAI in the following ways:

- Sign in to MindSphere and start the application
- Directly enter the URL of the application into the Internet browser

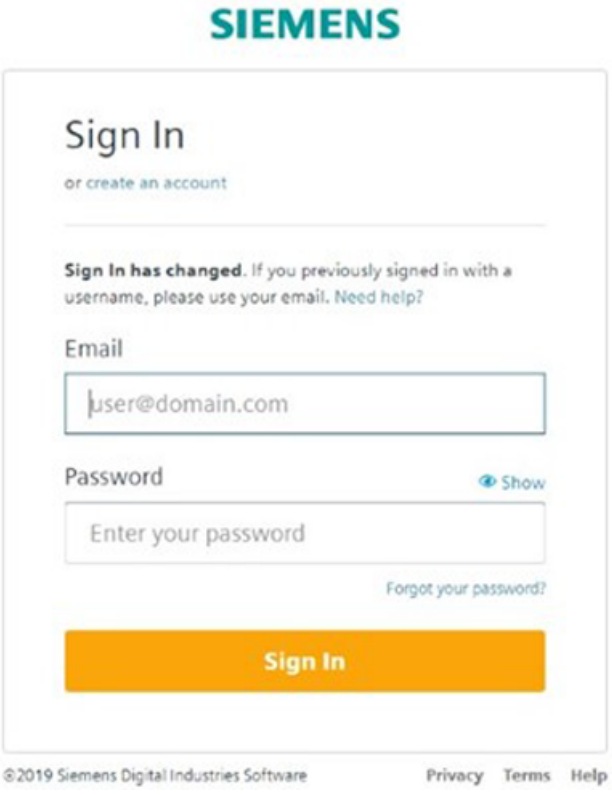
Requirement

- Industrial Edge for Machine Tool Assets must be configured.
  Further information on the configuration is provided in: "Manage MyAI" Installation Manual.

4.1 Sign in via MindSphere

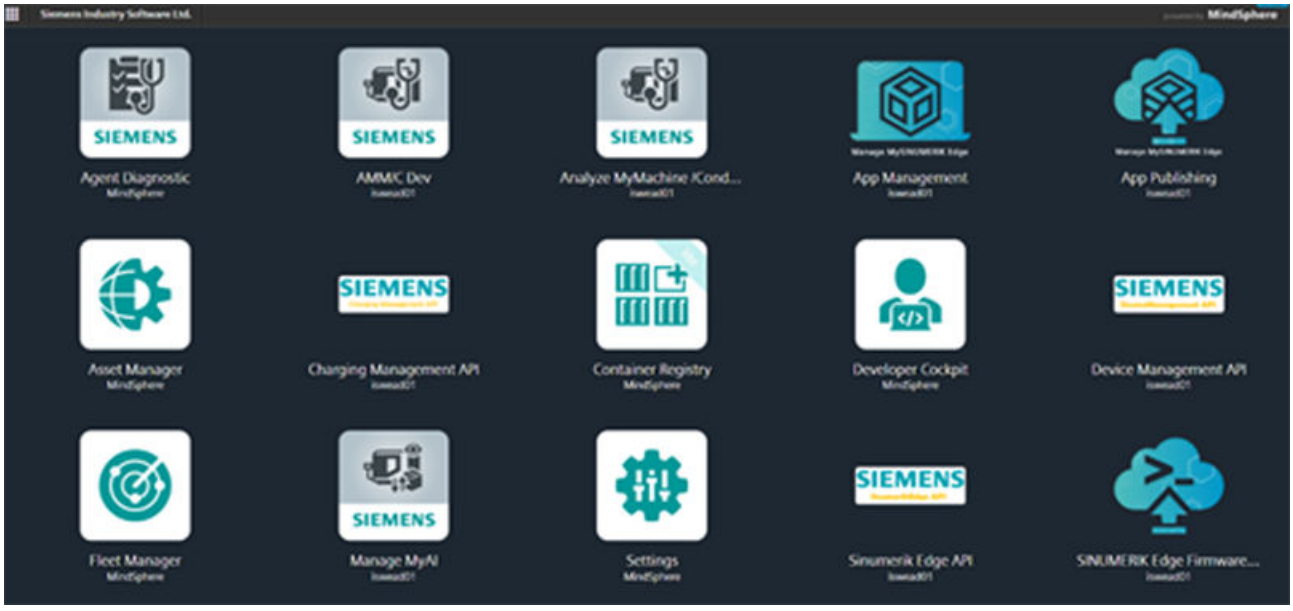
Procedure

1. Open the web site: `https://<tenant-name>.eu1.mindsphere.io`
2. The "Sign In" window opens.



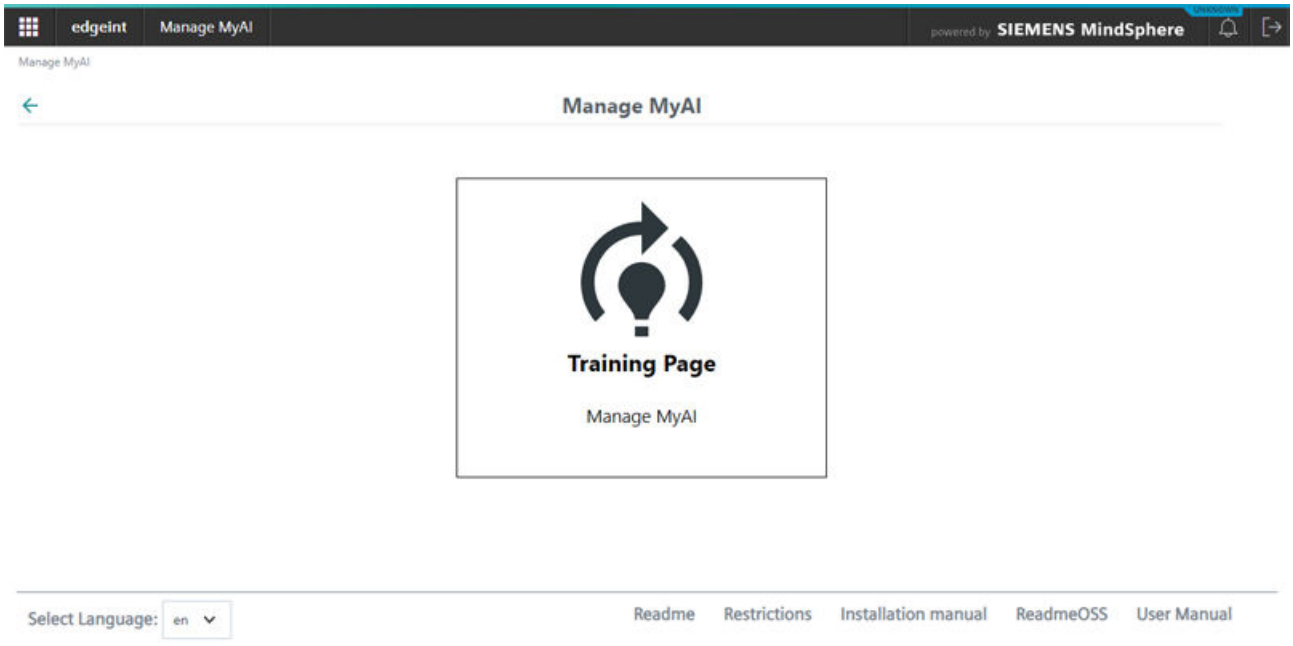
3. Enter your email address and your password.

4. Click the "Sign In" button.
   It is strongly required that your tenant admin is enabling **Multi Factor Authentication** (MFA) for your tenant for security reasons. It is also possible that additional entries are required if MFA is used for your tenant.
5. Navigate to Manage MyAI application on the MindSphere Launchpad.



6. Click on the "Manage MyAI" application.

7. The home page of the MindSphere application "Manage MyAI" opens.

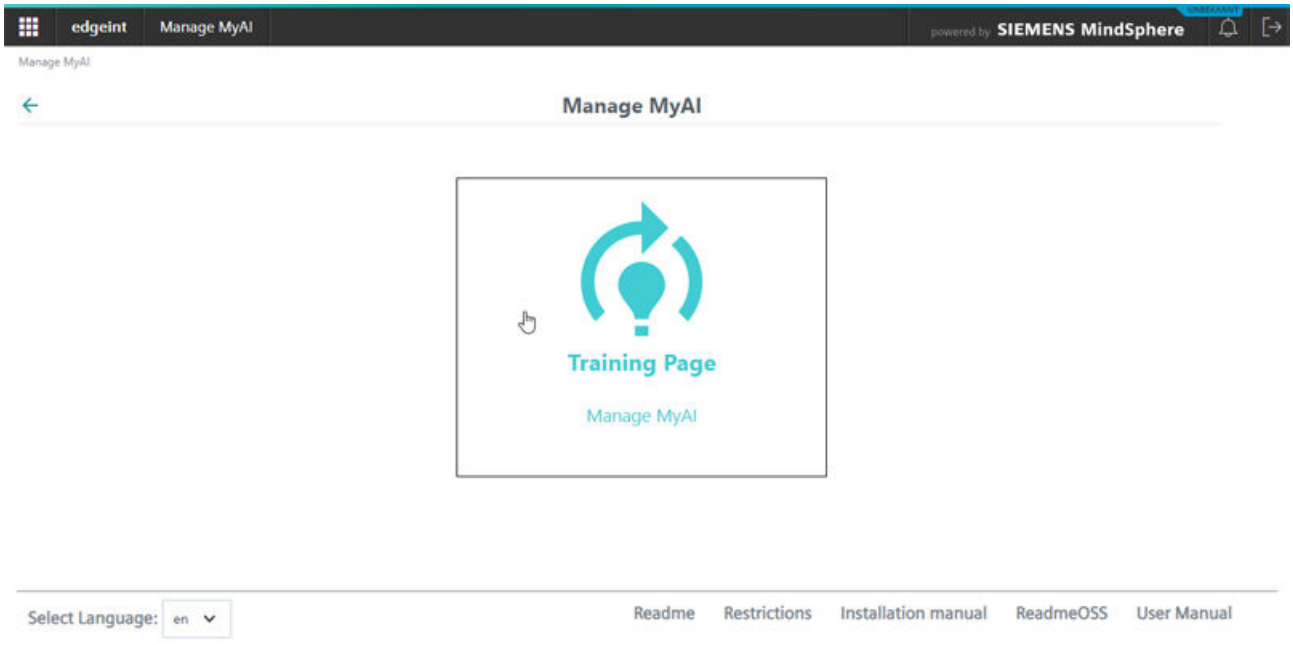


4.2 Sign in via URL

Procedure

1. Enter the following address in the browser:
   `https://<user-tenant-name>-mmai-<operator-tenant-name>.eu1.mindsphere.io`
   The Sign In window opens.
2. Enter the username and the password.

3. Click the "Sign In" button.
4. The home page of the MindSphere application "Manage MyAI" opens.



4.3 Sign out

1. Open the home page of Manage MyAI or the MindSphere overview page.
2. Click on "Sign out" in the upper right corner to sign out from MindSphere.

Using Manage MyAI

5

5.1 Manage MyAI home page

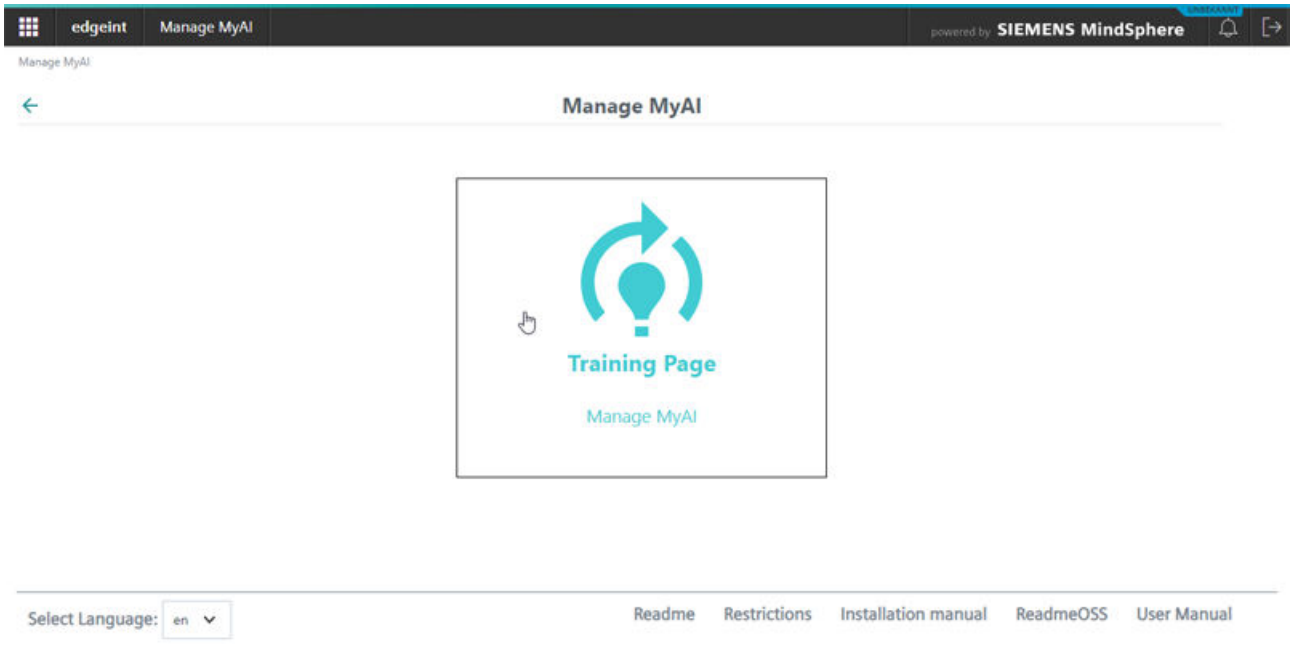
Using Manage MyAI

The aim of Manage MyAI application is to train and generate AI models that are later used by the corresponding Industrial Edge for Machine Tools applications.

Note

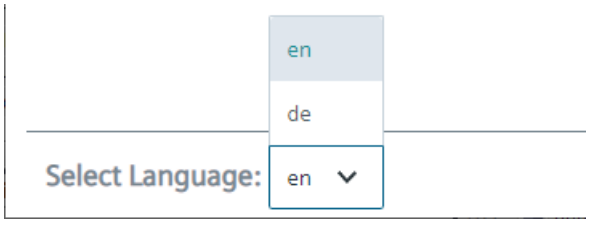
The model generated by Manage MyAI should be checked for working import, execution and performance on the corresponding Edge App. The model must be manually validated for accuracy by the operator after having it imported into the corresponding Edge App. All this must be done before using it in a full-scale production.

- Manage MyAI home page will be displayed after opening Manage MyAI.



- **Training Page** - this page allows a training process to be started as well as gives overview of the training status. A detailled description of the Training Page follows in the next section.

- **Language Selection** - Manage MyAI supports two language options: German and English. Please select your preferred language by clicking on the Select Language drop down menu in the left bottom corner of the page.



- **Readme -** To download the Readme documentation with latest changes please click on Readme button in the right bottom corner of the UI. You will automatically be redirected to the corresponding PDF file.
- **Restrictions** - To download the Restriction documentation with latest restrictions please click on Readme button in the right bottom corner of the UI. You will automatically be redirected to the corresponding PDF file.
- **Installation Manual -** To download the Installation Manual for Manage MyAI application please click on Installation Manual in the right bottom corner of the UI. You will automatically be redirected to the corresponding PDF file.
- **ReadmeOSS** - To download the documentation of license conditions and copyright notices in product documentation please click on ReadmeOSS button in the right bottom corner of the UI. You will automatically be redirected to the corresponding PDF file.
- **User Manual** - To download the Operating Manual for ManageMyAI application please click on User Manual in the right bottom corner of the UI.You will automatically be redirected to the corresponding PDF file.

5.2 Training Page

The training pages gives an overview about important model and training information and allows to perform actions like labeling, data augmentation and model training.

1. By clicking on the "Training Page" button of Manage MyAI home page you open the training page. Each row presents a model and its training to manage model trainings.
2. Click on a specific row for selecting a model training.

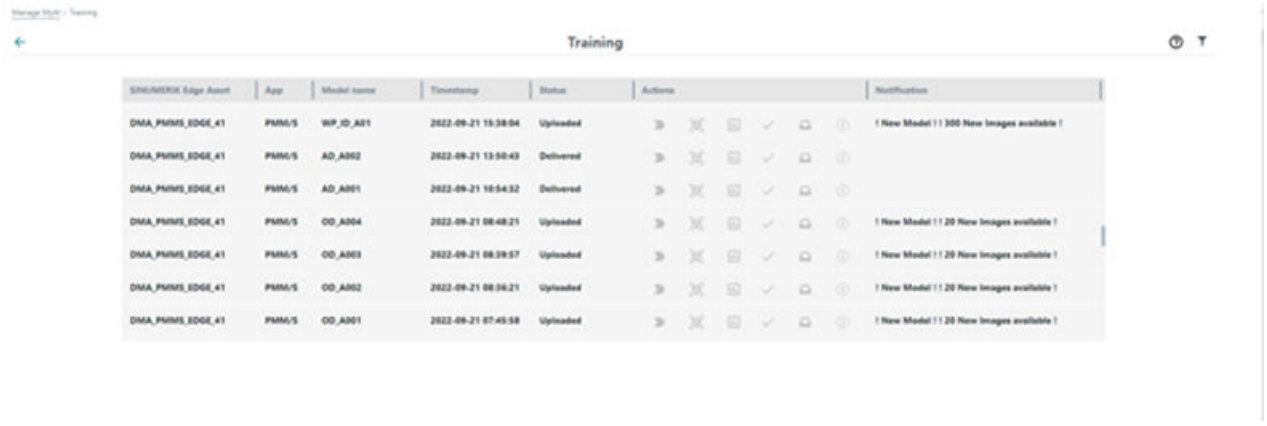


Figure 5-1 Trainings

Note

If you don't see any model training, you need to wait until the scanning of the Edge Assets by Manage MyAI has found your submitted models out of your Edge App. This might take more than 1h.

UI-Elements

"Training Page" of Manage MyAI application consists of the following UI entries:

- **Industrial Edge for Machine Tools Asset** – this field contains the Edge Asset name
- **App** – this field contains the name of the application that was used to collect the data. This field can have one of the following entries:
  - **PMM/S** for Protect MyMachine /Setup
  - **AMW/TC** for Analyze MyWorkpiece /ToolCheck
- **Model name** – this field contains the model name that was given by the operator during data acquisition within the corresponding Edge App
- **Timestamp** – this field contains the timestamp of the data submission on MindSphere

- **Status** – this field contains the status of the model training process, and it can have one of the following entries:
  - **(Images) Uploaded** – the model training is not started, but its image data and training metadata was uploaded from Edge Asset to Manage MyAI in MindSphere.
  - **Training in Progress** – the model is being trained (currently maximum of one model training process can be trained at the same time)
  - **Waiting in Queue** – the model training will be placed in a queue when another the model training is currently performed. The maximum number of active training processes at the same time is one.
  - **Delivered** – the model training is completed and the .model file has been generated and it can be downloaded from the corresponding Edge App asset on MindSphere

  The following states only occur if there was some problem. You may find more information about these states in chapter "Training Status".
  - **No connection/Waiting** – the training has been interrupted/stopped due to internet connectivity issues. Please wait until the internet connectivity issues are solved and the old status reappears.
  - **Authentication failed** - SSL problems, the user must wait. The following tooltip message will appear "Authentication at Training Pipeline failed. Please retry later."
  - **Failed** – Training failed for some reason: No images, not enough images, too similar images etc.
  - **Trained** – the model training was completed, and trained model has been generated, but it could not be uploaded to the corresponding Edge Asset on MindSphere.
- **Actions** - this field contains different actions that can be done before, for and after model training. They are described in the next section.
- **Notification** - thisfield contains status information, e.g. if new images are available or a new model is available.
  You must export the model on your own by "Export model" button (see below), and upload it afterwards to Edge Asset in Fleet Manager manually. You may of course also provide the exported model file directly to your Edge App user, who can upload it then into Edge App.

Action elements

This area contains the different action that can be done before, for and after a model training:

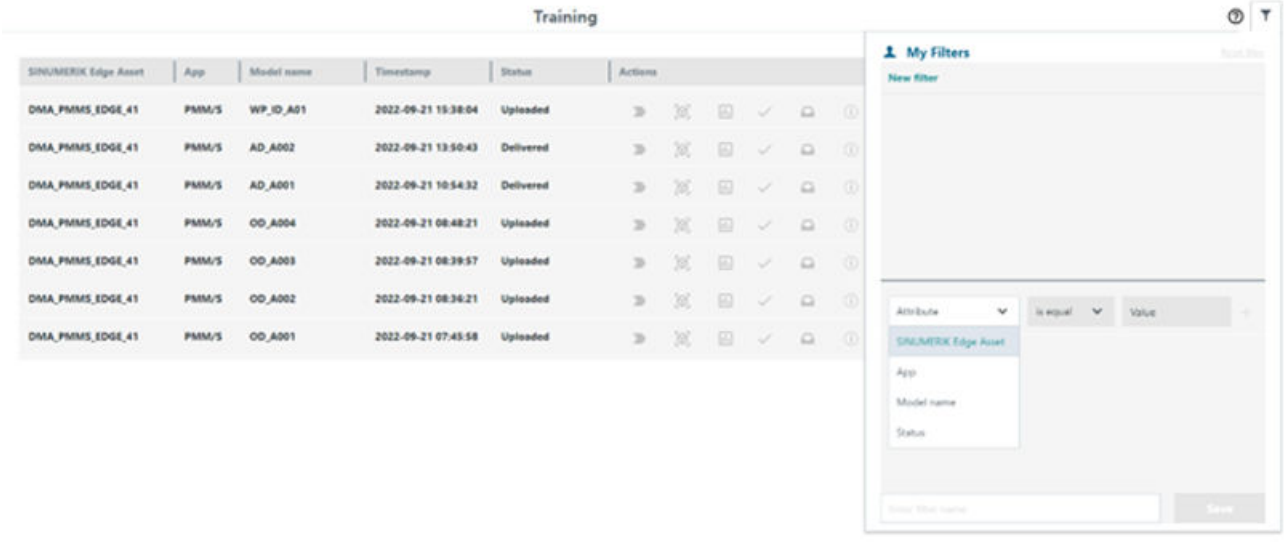
Action	Description
	"Labeling Page" Allows the labeling process of the currently gathered unlabeled data to be started. This action is mandatory for model training workflow. There is a separate chapter Labeling Page (Page 26) dedicated to this feature which explains in greater detail the labeling process of different use-cases.
	"CAD-based Data Generator" Allows the creation of training data out of CAD STEP models (.stp files). This can help to reduce the amount of real training data required for model training.

Action	Description
	"Data Augmentation" Allows the augmenting of current image data by generating new images from existing real image data. This action is not mandatory for model training workflow. There is a separate chapter Data Augmentation Page (Page 70) for this feature, which will allow to train a model with even a lower number of real images being provided. Additionally, it will make the model more robust to changes in used input image data.
	"Approve" Allows starting of the model training incl. approval of occurring costs for training. This is the main action for requesting and purchasing a model training. This action will be described in the next steps. Please be aware that during a running Data Augmentation starting a model training is not allowed, i.e. you will get a corresponding error message in the UI.
	"Model Information" o ModelProviding overview of model history, access to trained models and additional model information This action is not mandatory for model training workflow, but it's quite convenient for keeping track of the trained models for a model training. There's a separate chapter Model Information (Page 76) for this feature, which will provide you an overview about your trained models, about the requested and used training hours and about the accuracy of the model. Additionally, you will be able to access previous trained models of your model training.
	"Export Model" Allows for downloading latest trained model as .model file to local client. This action is not mandatory for model training, but it allows for downloading the latest trained model as .model file to local client. This is some convenient feature, if you want to keep a copy of the trained model locally or if there are problems in uploading the trained model to Edge Asset.

Filtering

The "Filtering" icon in the upper right corner allows defining filters for filtering the list of model trainings based on column as attribute, e.g., for filtering for "Model name"

1. Click the "Filtering" icon to display the corresponding Filter page.



5.3 Labeling Page

Description

This page allows for the labeling process of current unlabeled image data to start. The labeling process is crucial for model training workflow, and it varies for different use-cases such as "Workpiece Identification", "Workpiece Rotation Analysis", "Tool-wear Analysis", "Anomaly Detection" and "Object-Detection". The different labeling features that will be available in the labeling process on Manage MyAI application are based one the use-case selection in the Edge App "Create Model Page" as part of the data acquisition process. It is important to note that only labeled images will be used for model training.

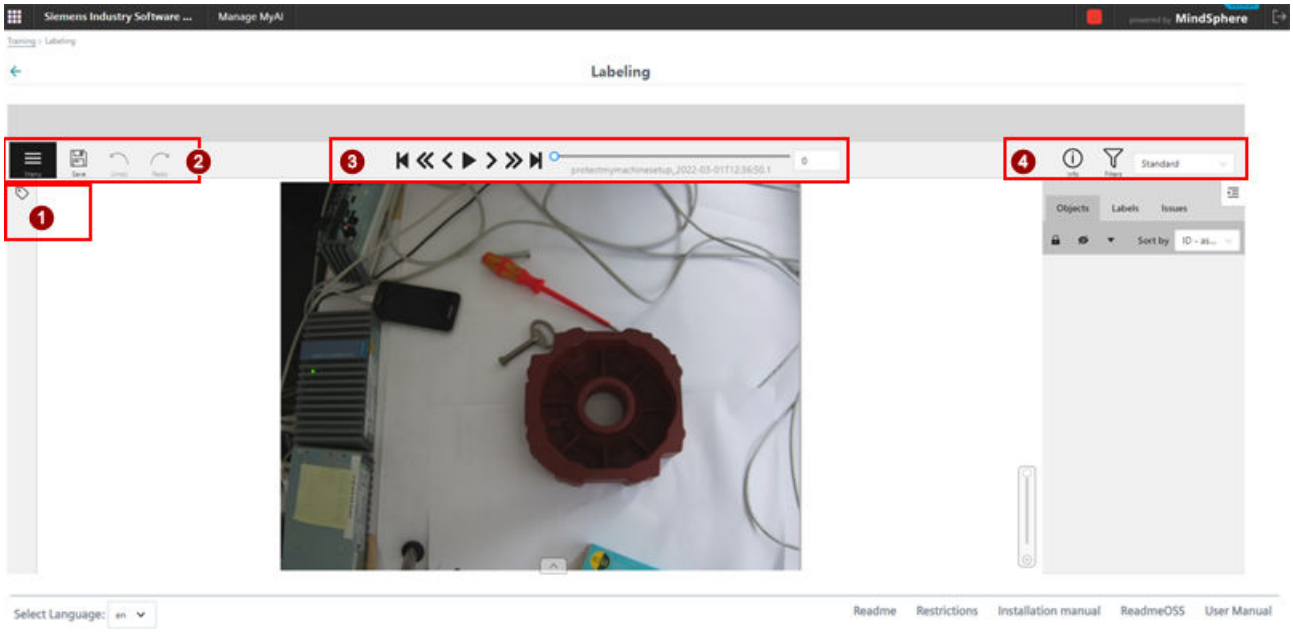
5.3.1 Labeling Page for Workpiece Idenfication, Workpiece Rotation Analysis and Toolwear Analysis use cases

This chapter is valid for both Protect MyMachine /Setup use cases - Workpiece Identification and Workpiece Rotation Analysis, and for Analyze My Workpiece /ToolCheck use case Toolwear Analysis.

Workpiece Identification, Workpiece Rotation Analysis and Toolwear Analysis use-cases require each image to have one and only one label. In the terminology of Manage MyAI this is called TAG-ing an image with the appropriate label.

Procedure

- The labeling process starts by clicking on the respective icon on the corresponding Workpiece Identification, Workpiece Rotation Analysis or Toolwear Analysis model which redirects the user to the labeling page that looks like on the image shown under. It is important to note that only labeled images will be used for model training.



① TAG-ing pane
② Control pane
③ Navigation pane
④ Overview pane

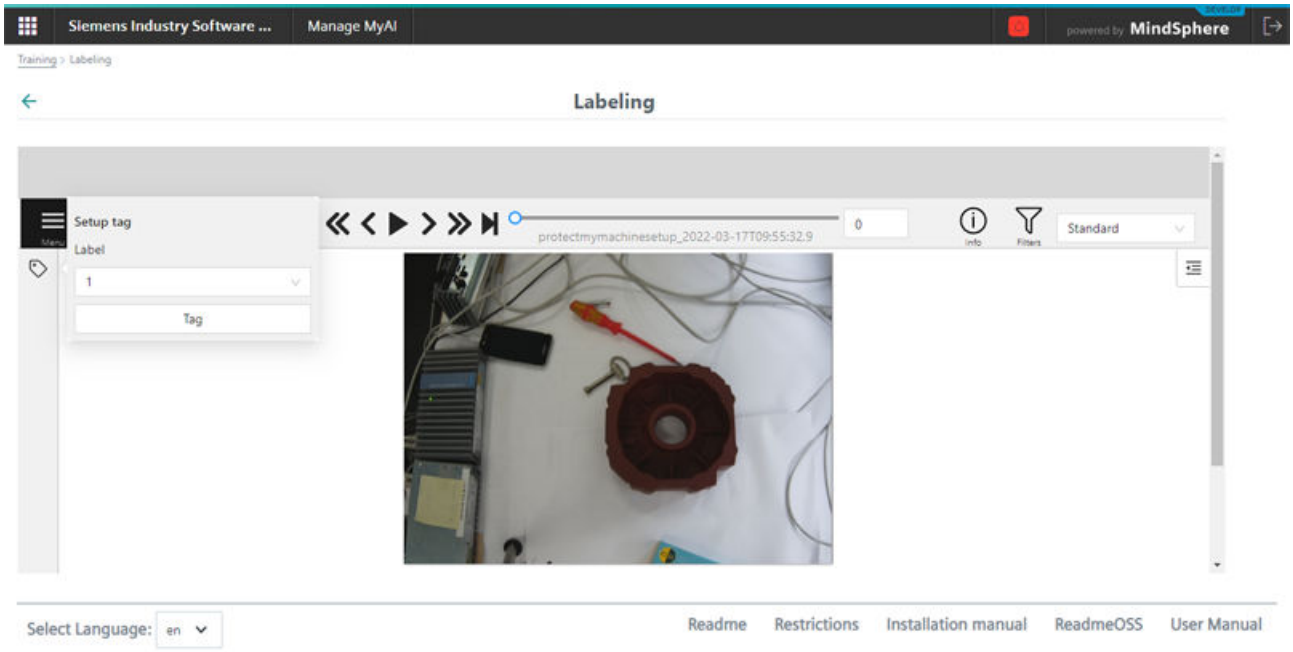
The labeling page is split to 4 panes with various features:

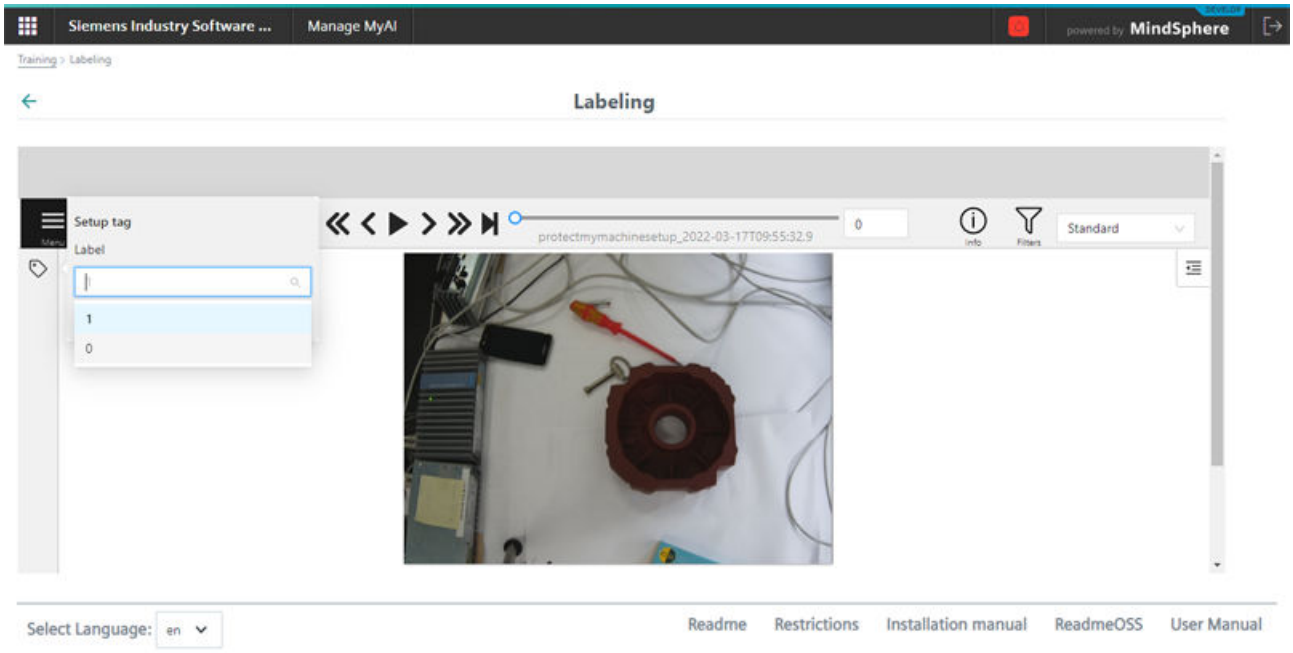
1. TAG-ing pane
   The TAG-ing pane is the most important pane in the labeling page. It is important to note that the images will be pre-labeled based on information provided from the data acquisition process from the Edge Apps. In other words, each image will have an assigned TAGGED label based on its pre-labeling from the Edge Apps. The pre-label of TAGGED image will appear in the Overview pane on the right side. The user is advised to check the assigned pre-labeling and delete/adjust as needed. Important is that the pre-labels directly correspond to the ordinal indices (i.e., 0, 1, 2 ..) of the text labels created as part of the Data Acquisition process on the Edge Apps.

   Note

   TAG-ing an image with a label is only possible when there is NO TAG used as a pre-labeling or if the TAGGED label was previously removed from the user.

   When the image is unlabeled, the TAG-ing process with the corresponding labels starts by clicking on the Setup Tag icon on the upper left corner and selecting the appropriate tag indices (i.e., 0, 1, 2 ..) for a specific image, and clicking on the Tag button.
   Important is that the label indices available under the TAG pane directly correspond to the order of the text labels created as part of the Data Acquisition process on the Edge Apps. In other words, the label configuration for these use-cases is defined as pre-labeling on the Create Model page from our Edge Apps. The user is advised to check the order of the labels on the Edge App side to avoid any mislabeling. The label of TAGGED image will appear in the Overview pane on the right side.



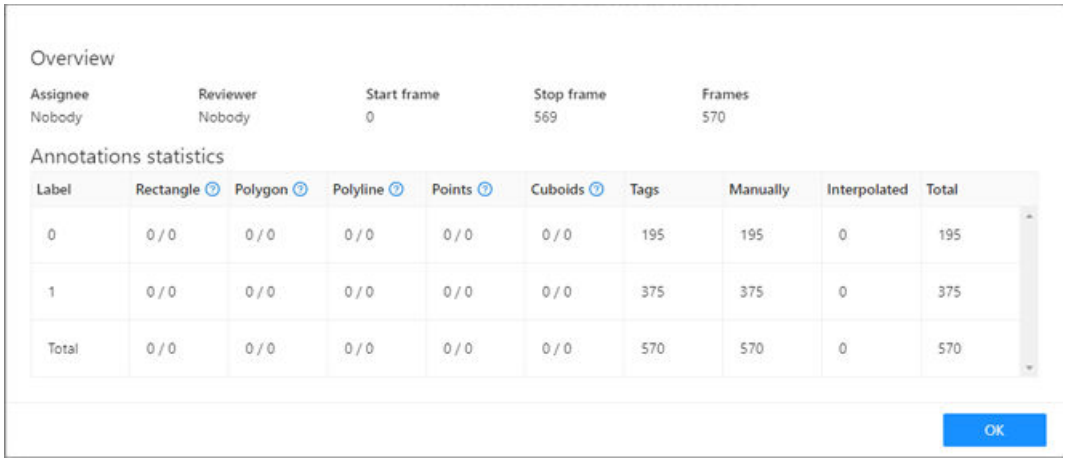


2. Control pane
   The Control pane is responsible for saving, undoing, and redoing changes in the labeling process. The Control pane also consists of the Menu option that can be used to go to Model configuration page (only relevant for Object Detection use-case).

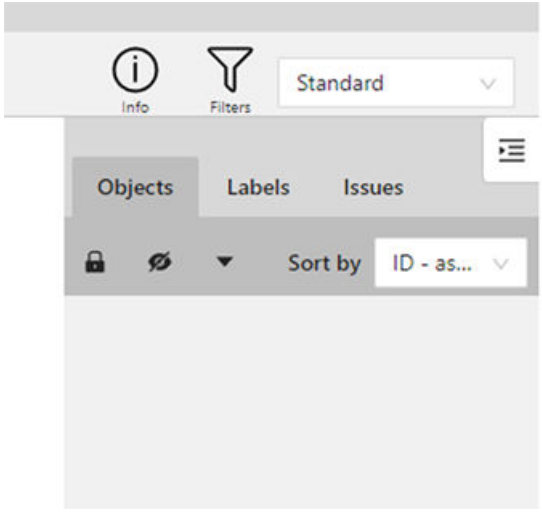
Note

It is recommended to regularly save changes during the labeling process.

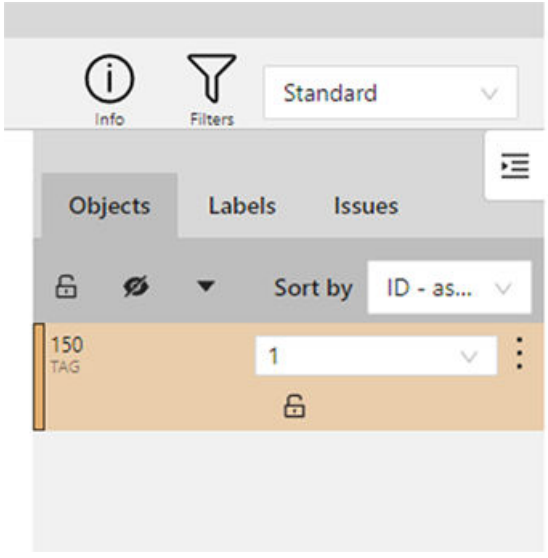
3. Navigation pane
   The Navigation pane offers various commands to navigate through the entire dataset. Once the labeling on a specific image is done, the user can use the Go Next button to go to the next unlabeled image and continue with the labeling process.
4. Overview pane
   The Overview pane is the second most important pane after TAG-ing pane in the labeling process. This pane consists of:
   – Info icon: an overview of the dataset and it's labeling progress.

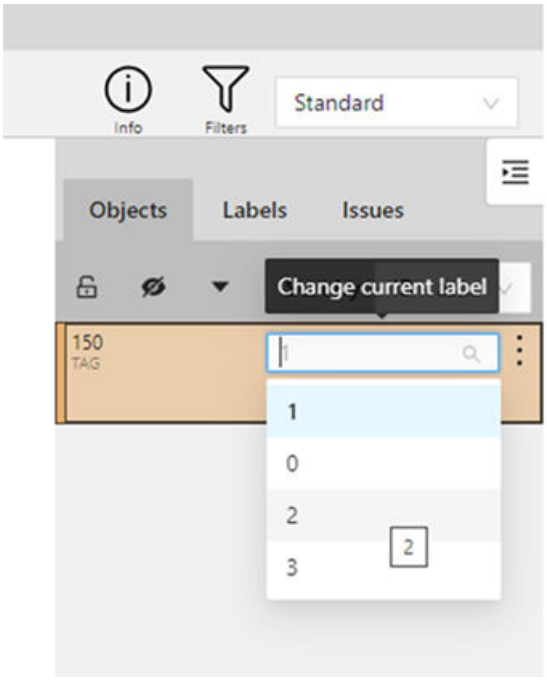


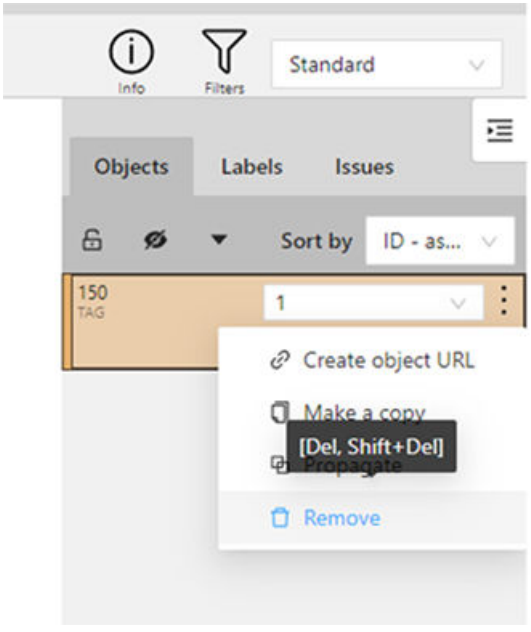
– Objects tab: an overview of the associated TAG label for this image.
Empty area under Objects tab means the image does not have a TAGGED label. Please refer to the TAG-ing pane section above for more details on how to add TAGGED label per image.



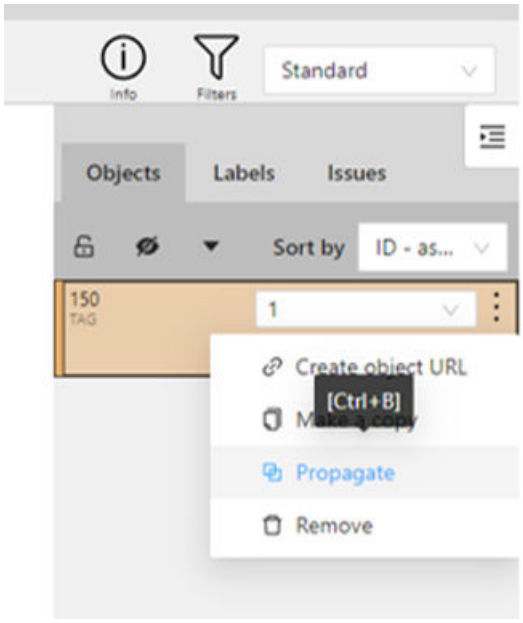
Area under Objects Tag with one TAGGED label means the image has been successfully labeled. Once the label is being placed, the user is still able to change the current label and delete the label from the Objects Tags. Please note to save the changes using the Save button under the Control pane in case of change/deletion of label. Unfortunately, unsaved changes will be lost once the page has been refreshed or exited.

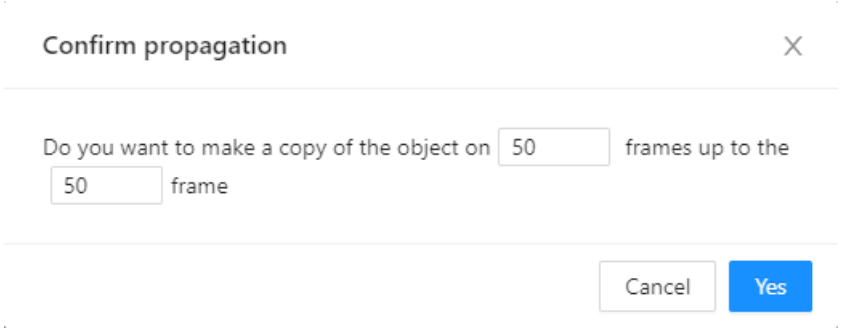




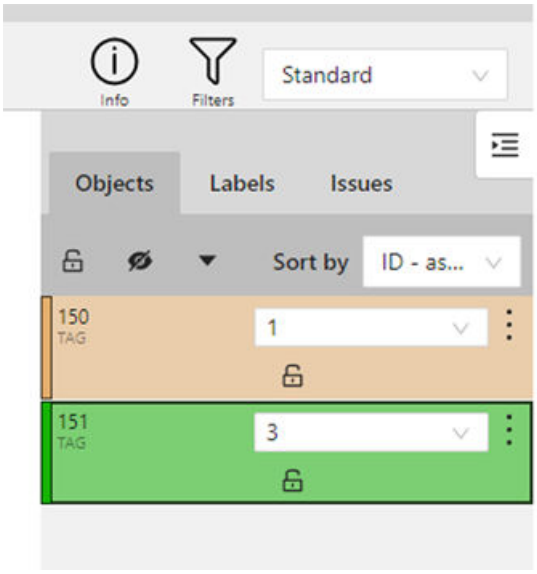


The TAGGED label shown under the Object Tag also offers a very useful feature called **"Propagate"**. **Propagate** speeds up the labeling process by interpolating the TAGGED label of the selected image to the upcoming images in the dataset. This is a useful feature if the user knows that the upcoming images in the labeling process belong to the same label class as the current one and can automate the process to some extent. **Propagating** works by specifying the number of consecutive frames (i.e., images) the user wish to propagate through, starting from the frame number the operator is currently working on and is only possible in a forward manner, and not backwards.

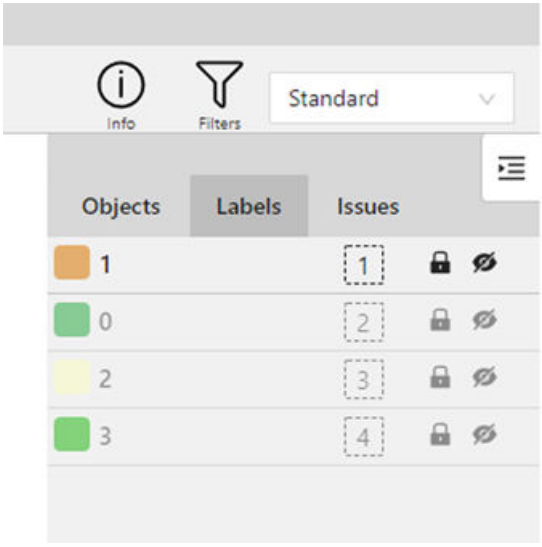




Notes to "Propagate":
Propagate can cause two or more TAGGED labels to appear in the same Objects area in the image. In this case the latest added TAG label will be used as final for the model training process (i.e., latest label overrides any pervious). More TAG labels under the Object area are not recommended, so whenever possible, please try to remove the incorrect TAGGED label to avoid any confusion and/or mislabeling.



– Labels Tab: an overview of the available labels and the used label for the selected image.



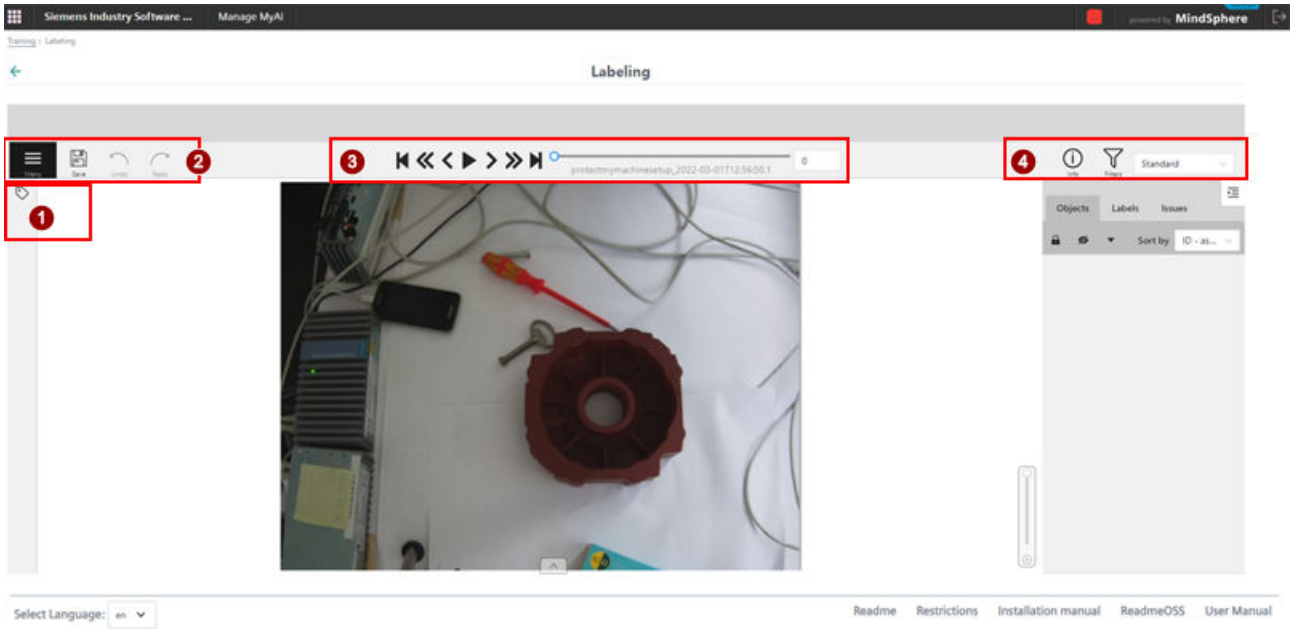
Deletion of model: Please contact Siemens key account manager if you wish to delete the entire model/training data.

5.3.2 Labeling Page for Anomaly Detection use-cases

Anomaly Detection use-case require dataset consisting of only non-anomalous, normal data. For that purpose, Manage MyAI has a predefined label **none** that is available for the anomaly detection use-cases. **none** refers to no anomalies, so the normal image samples in the dataset has to be TAGGED using this label. Please be advised that the **none** label is predefined and cannot be changed.

Procedure

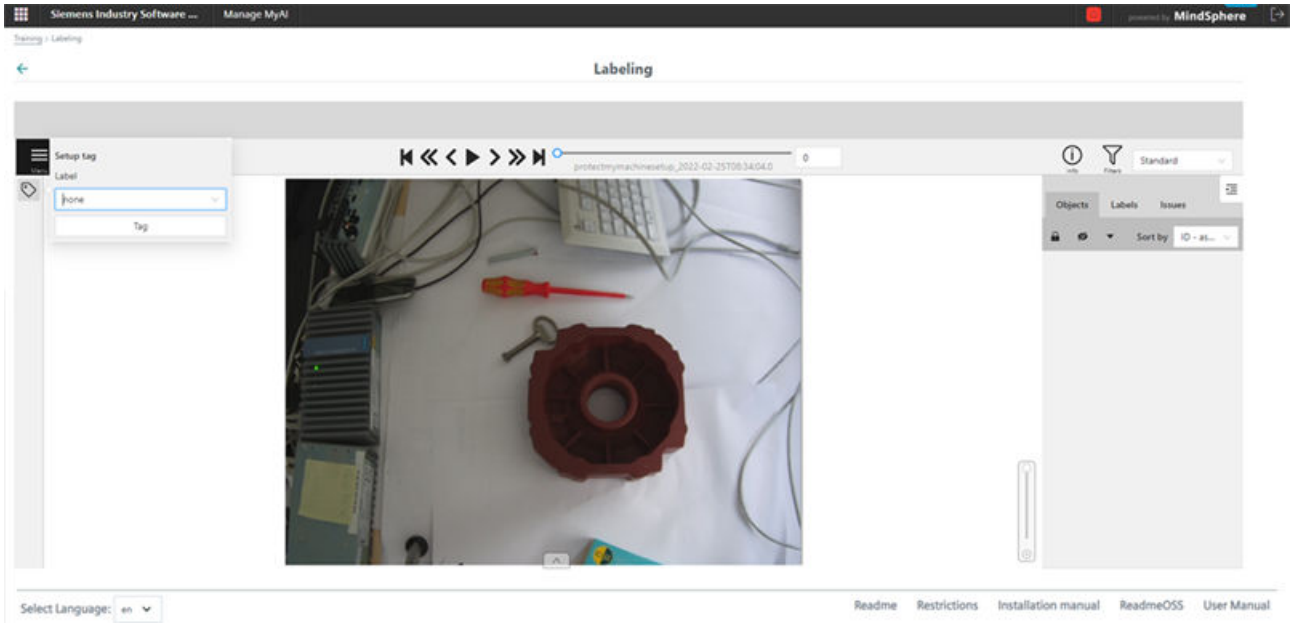
The labeling process starts by clicking on the respective icon on the corresponding Anomaly Detection model which redirects the user to the Labeling page that looks like on the image shown under. It is important to note that only labeled images will be used for model training.



① TAG-ing pane
② Control pane
③ Navigation pane
④ Overview pane

The labeling page is split to 4 panes with various features:

1. TAG-ing pane
   The TAG-ing pane is the most important pane in the labeling page. It is important to note that the images will be pre-labeled based on information provided from the data acquisition process from the Edge Apps. In other words, each image will have an assigned **none** TAG label based on its pre-labeling from the Edge Apps. The pre-label of **none** TAGGED image will appear in the Overview pane on the right side. The user is advised to check the assigned pre-labeling and delete as needed.
   TAG-ing an image with a label is only possible when there is NO TAG used as a pre-labeling or if the TAGED label was previously removed from the user.
   When the image is unlabeled, the TAG-ing process with the **none** label starts by clicking on the Setup Tag icon on the upper left corner and clicking on the Tag button. The label of successfully TAGGED image will appear in the Overview pane on the right side. Please be advised that the **none** label is predefined and cannot be changed.

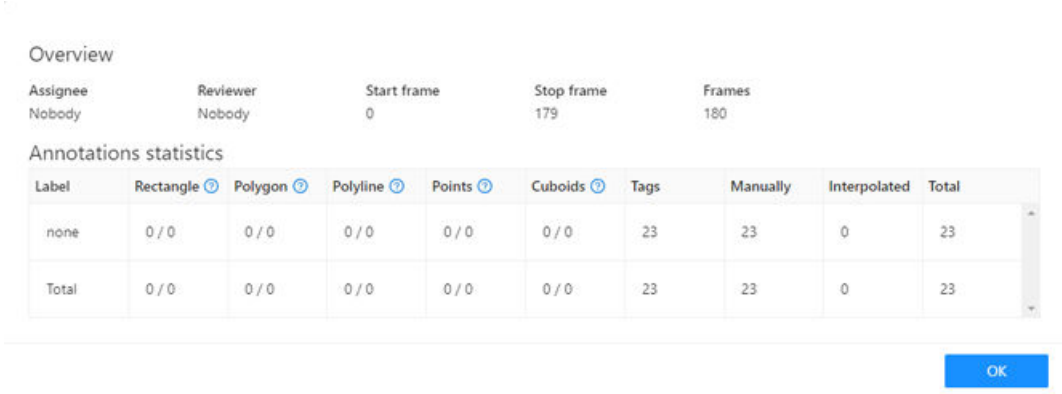


2. Control pane
   The Control pane is responsible for saving, undoing, and redoing changes in the labeling process. The Control pane also consists of the Menu option that can be used to go to Model configuration page (only relevant for Object Detection use-case).

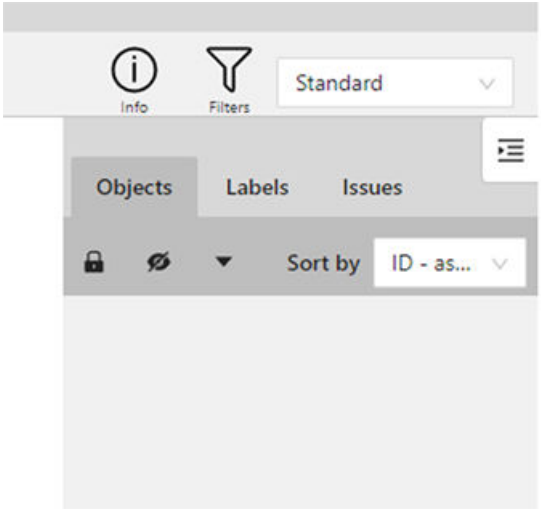
Note

It is recommended to regularly save changes during the labeling process.

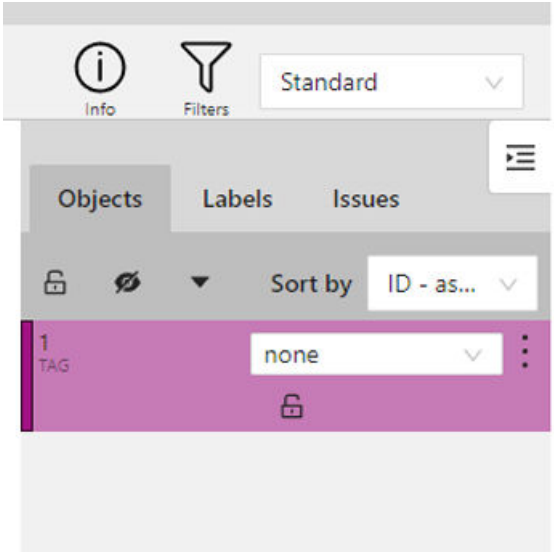
3. Navigation pane
   The Navigation pane offers various commands to navigate through the entire dataset. Once the labeling on a specific image is done, the user can use the Go Next button to go to the next unlabeled image and continue with the labeling process.
4. Overview pane
   The Overview pane is the second most important pane after TAG-ing pane in the labeling process. This pane consists of:
   – Info tab: an overview of the dataset and it's labeling progress.

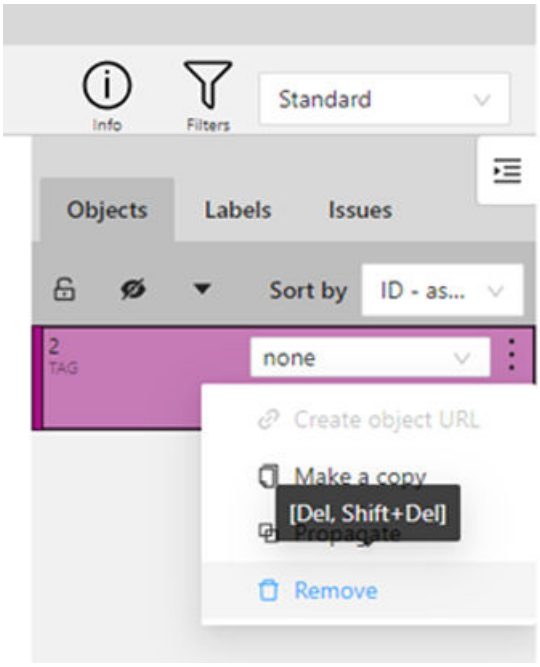


– Objects tab: an overview of the associated TAG label for this image.
Empty area under Objects Tag means the image does not have a TAGGED label. Please refer to the TAG-ing pane section above for more details on how to add TAGGED label per image.

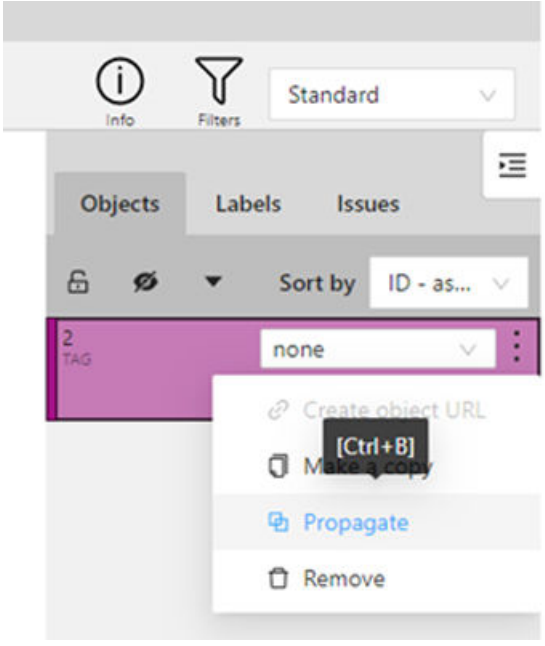


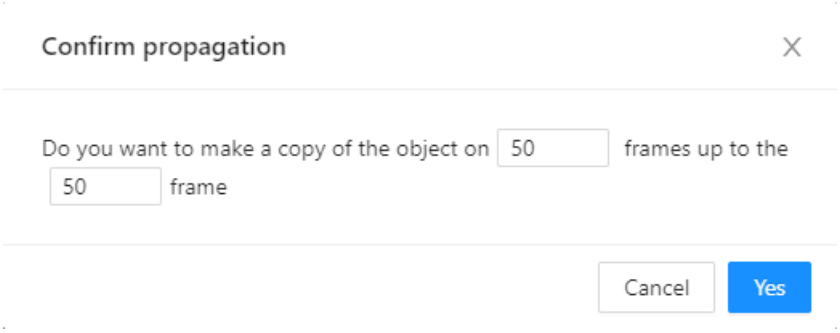
Area under Objects Tag with **none** TAGGED label means the image has been successfully labeled. Once the label is being placed, the user is only able to delete the label from the Objects Tags. Please be advised that the **none** label is predefined and cannot be changed. Please note to save the changes using the Save button under the Control pane in case of addition/deletion of a label. Unfortunately, unsaved changes will be lost once the page has been refreshed or exited.



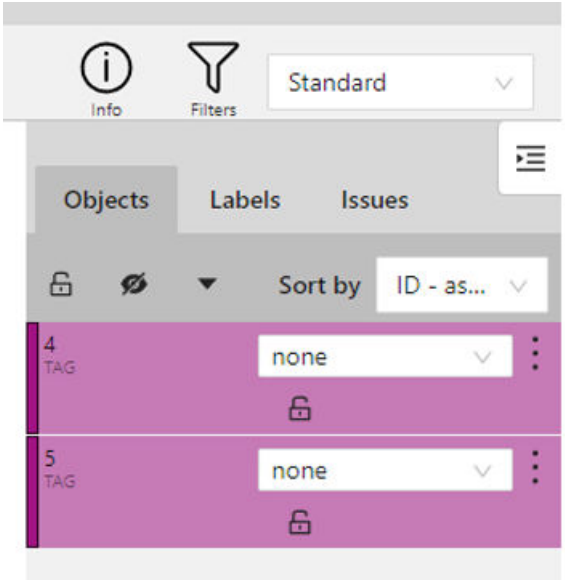


The TAGGED label shown under the Object Tag also offers a very useful feature called **Propagate**. **Propagate** speeds up the labeling process by interpolating the **none** TAGGED label of the selected image to the upcoming images in the dataset. This is a useful feature if the user knows that the upcoming images in the labeling process belong to the same label class as the current one and can automate the process to some extent. **Propagating** works by specifying the number of consecutive frames (i.e., images) the user wish to propagate through, starting from the frame number the operator is currently working on, and is only possible in a forward manner, and not backwards.

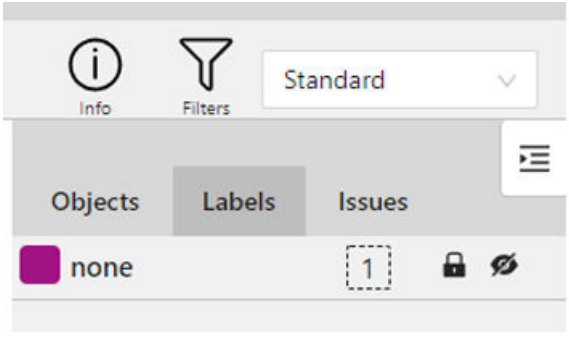




Notes to "Propagate":
Propagate can cause two or more none TAGGED labels to appear in the same Objects area in the image. More TAG labels under the Object area are not recommended, so whenever possible, please try to remove the redundant none TAGGED label to avoid any confusion.



– Labels Tab: an overview of the available labels and the used label for the selected image. This feature is useful for the Workpiece Identification, Workpiece Rotation Analysis, Toolwear Analysis and Object Detection use-cases.



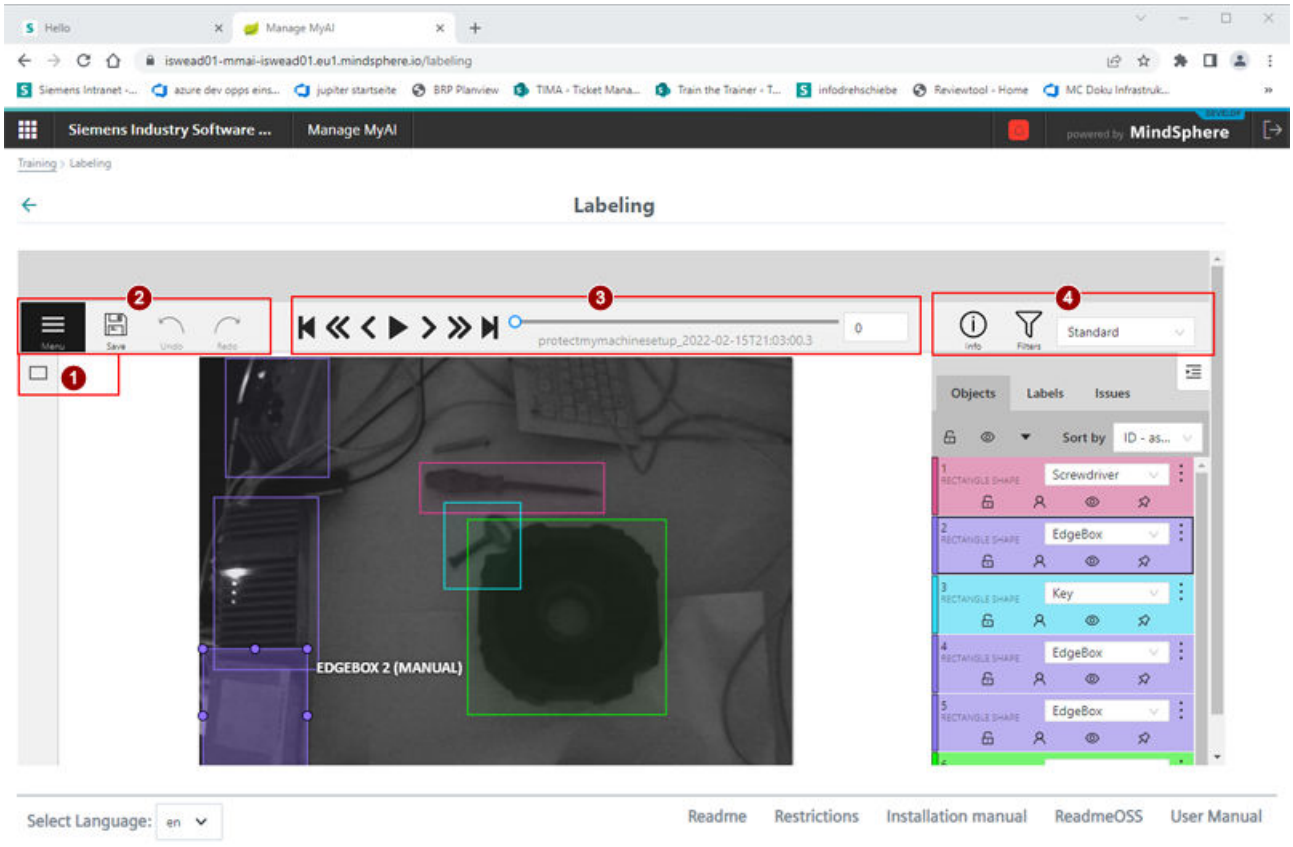
Deletion of model: Please contact Siemens key account manager if you wish to delete the entire model/training data.

5.3.3 Labeling Page for Object Detection use-cases

Object Detection use-case require dataset consisting of bounding boxes around the objects of interest in an image. A bounding box is a rectangle that serves as a point of reference for the object detection model. Labeling for Object Detection use-cases is nothing but drawing these rectangles over images, outlining the object of interest within each image by defining its X and Y coordinates. An example of bounding boxes is shown on the image under.

Procedure

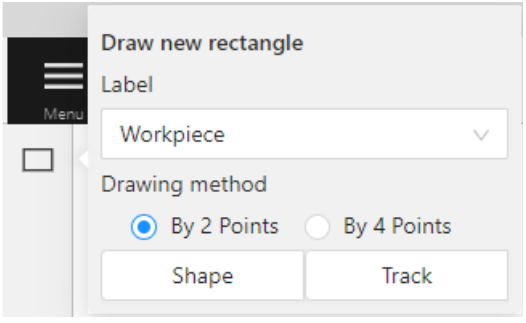
- The labeling process starts by clicking on the respective icon on the corresponding Object Detection model on Manage MyAI UI which redirects the user to the labeling page that looks like on the image shown under. It is important to note that only labeled images will be used for model training.

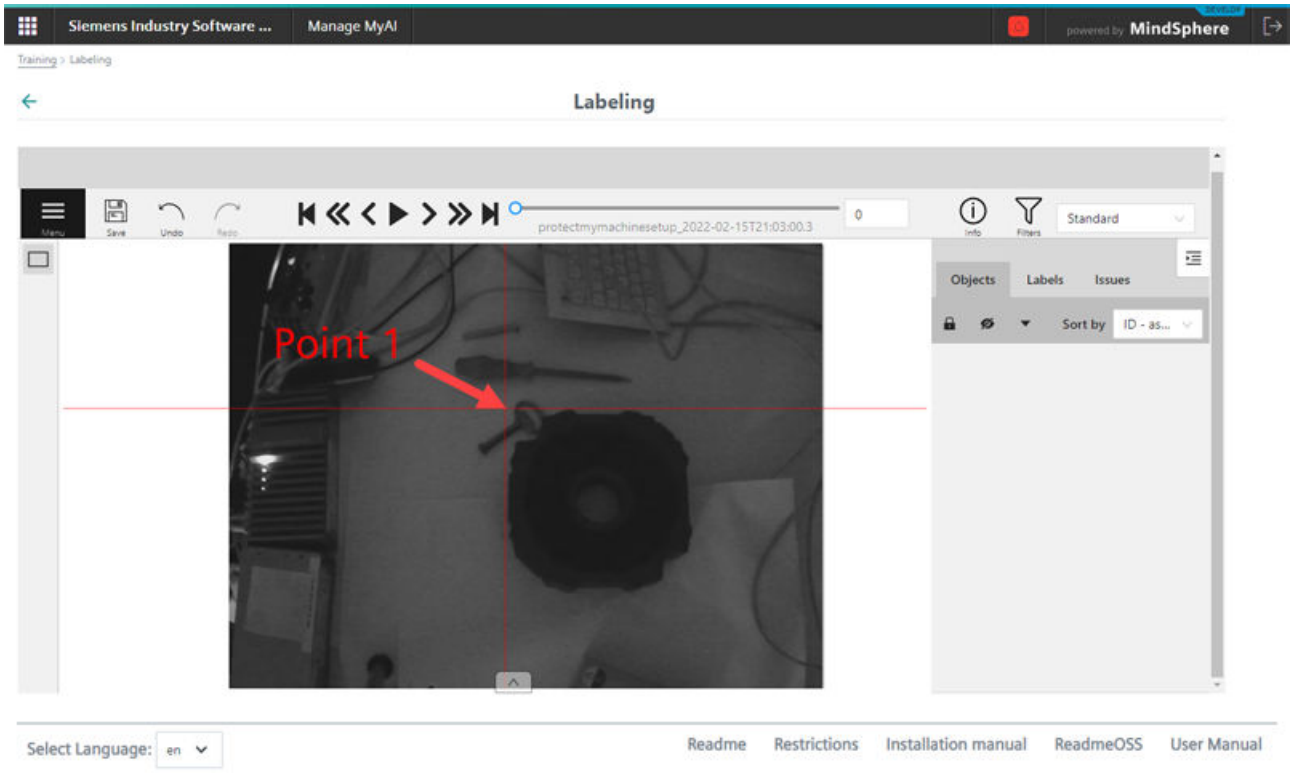


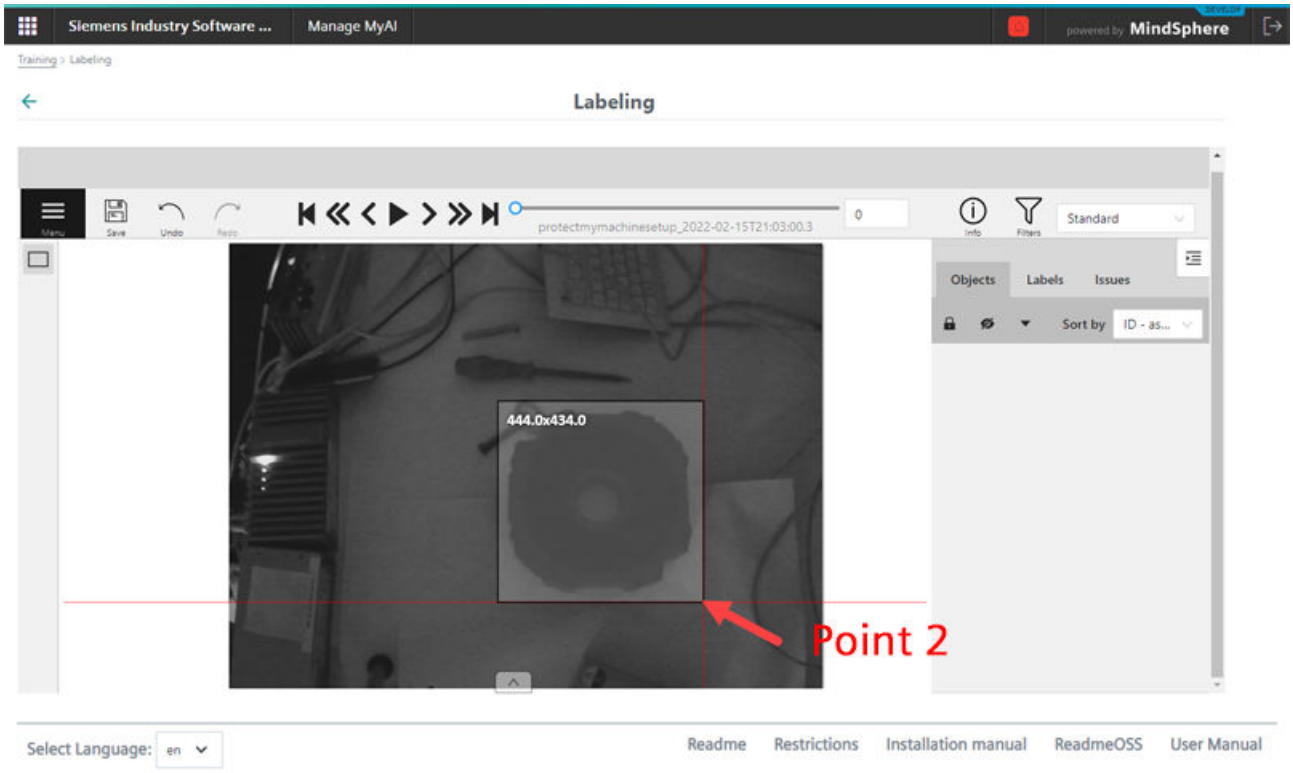
① Drawing pane
② Control pane
③ Navigation pane
④ Overview pane

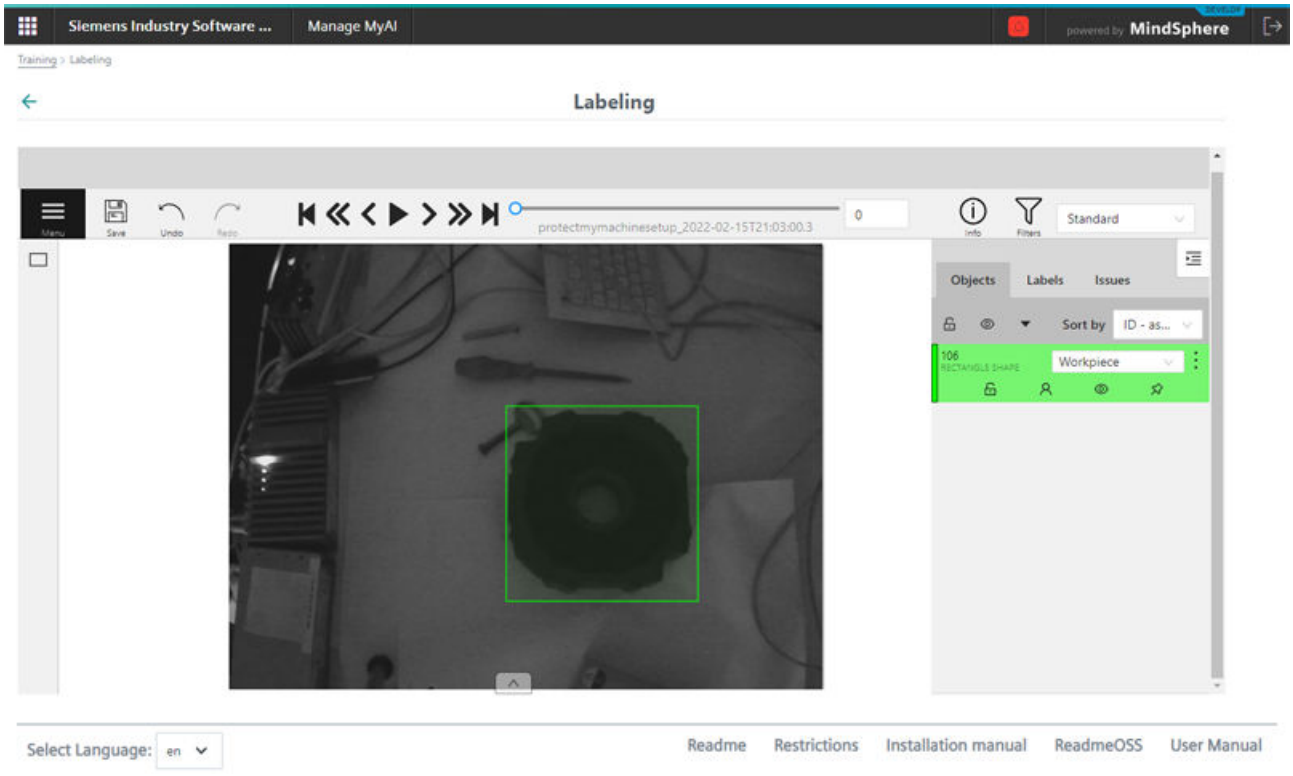
The labeling page is split to 4 panes with various features:

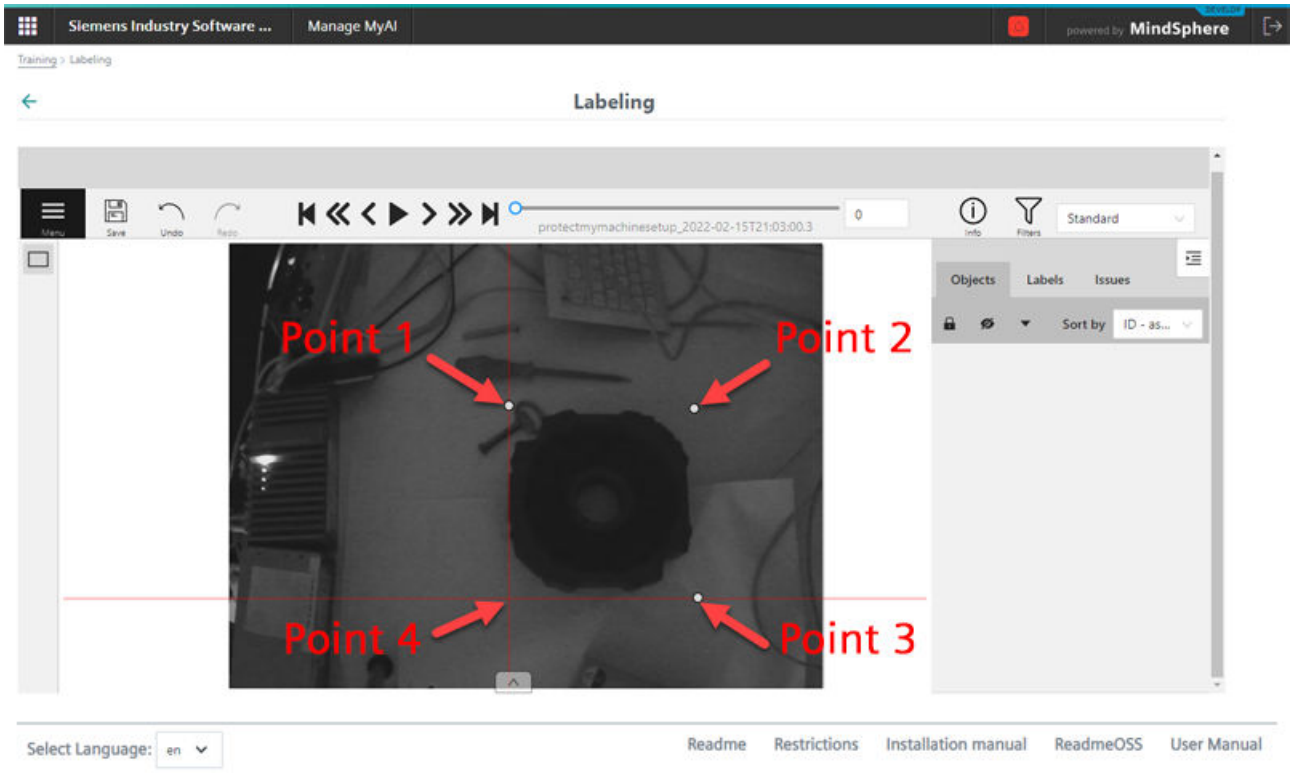
1. Drawing pane
   The Drawing pane is the most important pane in the labeling page. Drawing of bounding boxes around the objects of interest within an image starts by clicking on the draw icon on the upper left corner and selecting one of already predefined labels (by the user) and followed by selecting the drawing method shape. Unlike other use-cases, the labeling process for Object Detection use-case does not have already predefined labels that the user can choose. The user must define the labels before the labeling can take place. Please follow section Defining labels (Page 46) for more details.
   Manage MyAI supports two drawing methods: “By 2 Points” and “By 4 Points”. The drawing method using 2 points require selection of two diagonal points in a rectangle. The selection of a point on the image is done by simply clicking on the image area. The drawing method with 4 points require selection of 4 points in each of the rectangular edges around the object of interest. The bounding box will then be automatically created.

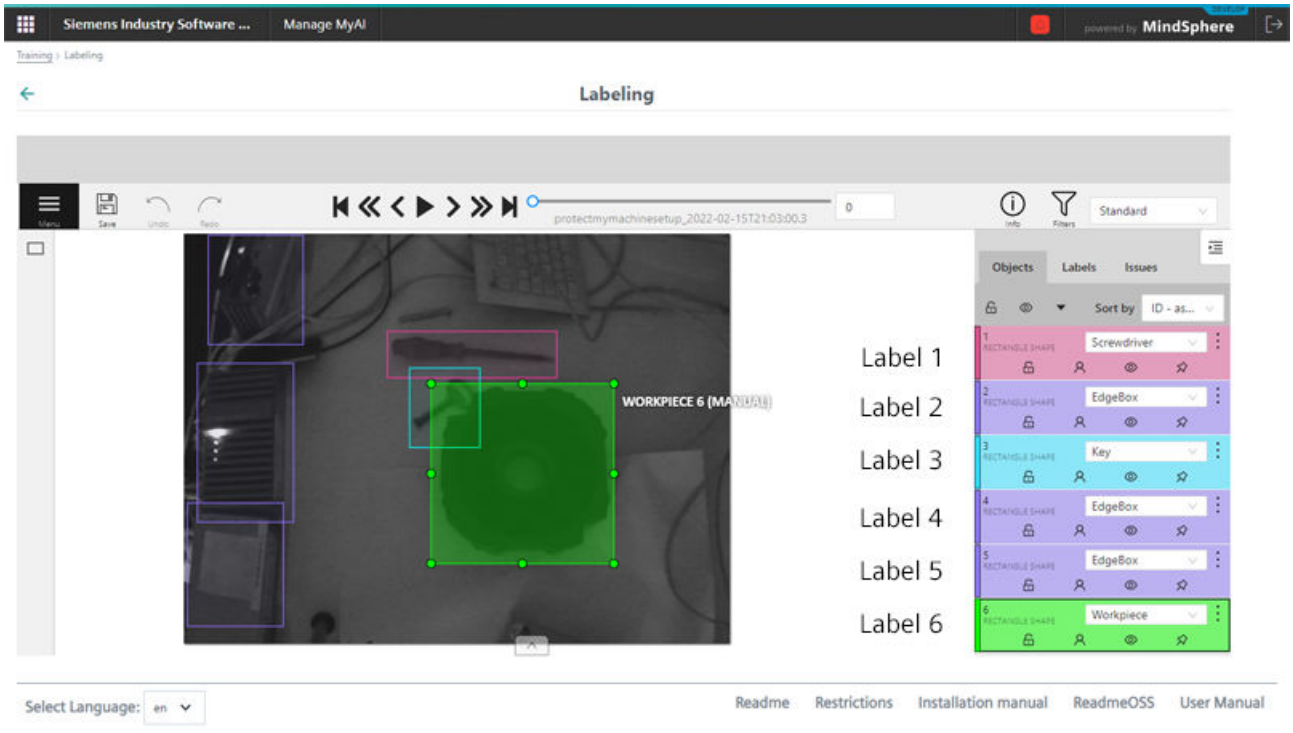





Siemens Industry Software ...
Manage MyAI
powered by MindSphere
Training > Labeling
Labeling
protectmymachinesetup_2022-02-15T21:03:00.3
Standard
Objects
Labels
Issues
Sort by
ID - as...
444.0x434.0
Point 2
Select Language:
en
Readme
Restrictions
Installation manual
ReadmeOSS
User Manual


Siemens Industry Software ...
Manage MyAI
powered by MindSphere
Training > Labeling
Labeling
protectmymachinesetup_2022-02-15T21:03:00.3
Standard
Objects
Labels
Issues
Sort by
ID - as...
106
Workpiece
Select Language:
en
Readme
Restrictions
Installation manual
ReadmeOSS
User Manual


Siemens Industry Software ...
Manage MyAI
powered by MindSphere
Training > Labeling
Labeling
Point 1
Point 2
Point 4
Point 3
Objects
Labels
Issues
Sort by
Standard
Select Language:
en
Readme
Restrictions
Installation manual
ReadmeOSS
User Manual

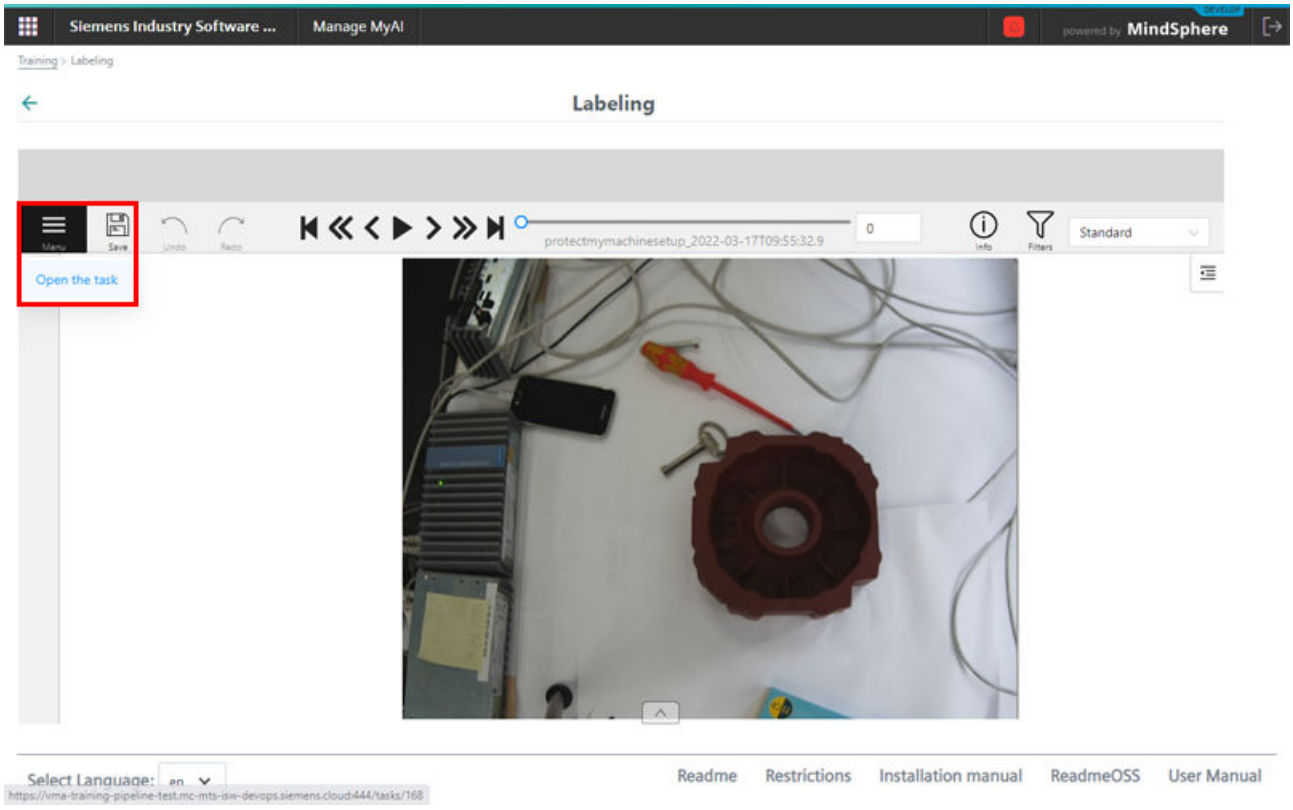

Siemens Industry Software ...
Manage MyAI
powered by MindSphere
Training > Labeling
Labeling
Label 1
Label 2
Label 3
Label 4
Label 5
Label 6
Screwdriver
EdgeBox
Key
EdgeBox
EdgeBox
Workpiece
Objects
Labels
Issues
Sort by
Standard
Select Language:
en
Readme
Restrictions
Installation manual
ReadmeOSS
User Manual

5.3.3.1 Defining labels

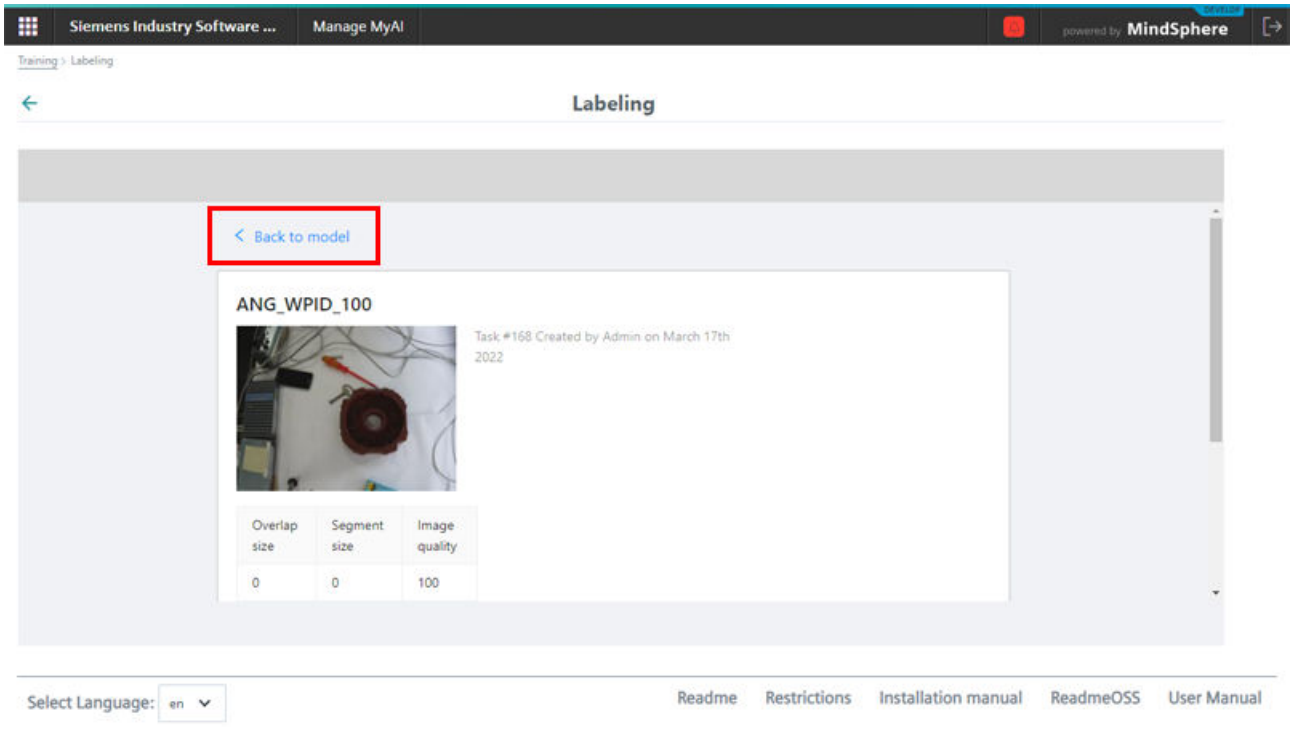
For defining labels the user must navigate to the model configuration page. The model configuration page can be accessed following these steps:

Procedure

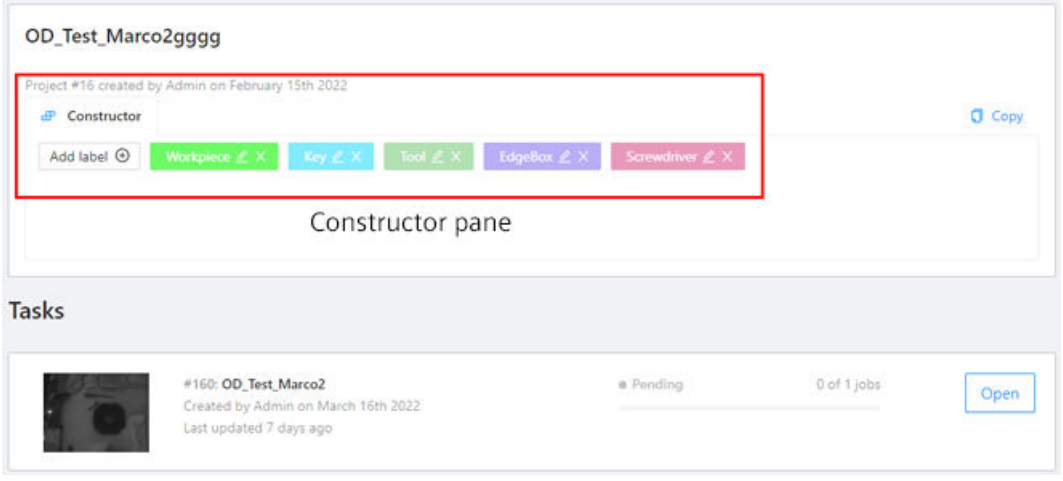
1. Click on the Menu Icon on the Control Pane and select “Open the task”



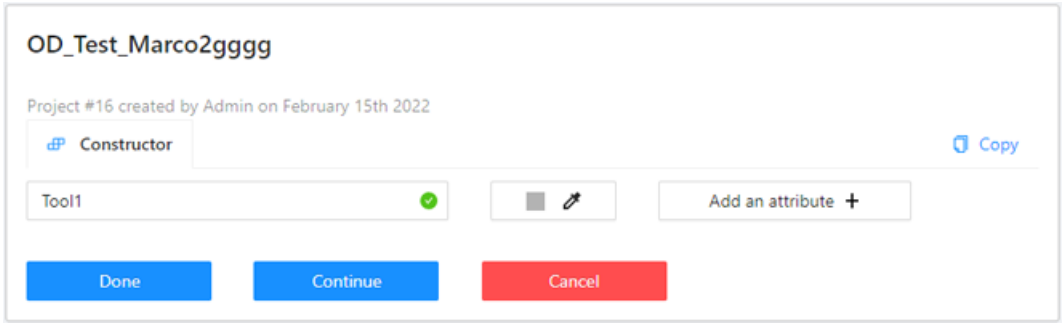
2. Click on the “Back to model” button to navigate to model configuration page.



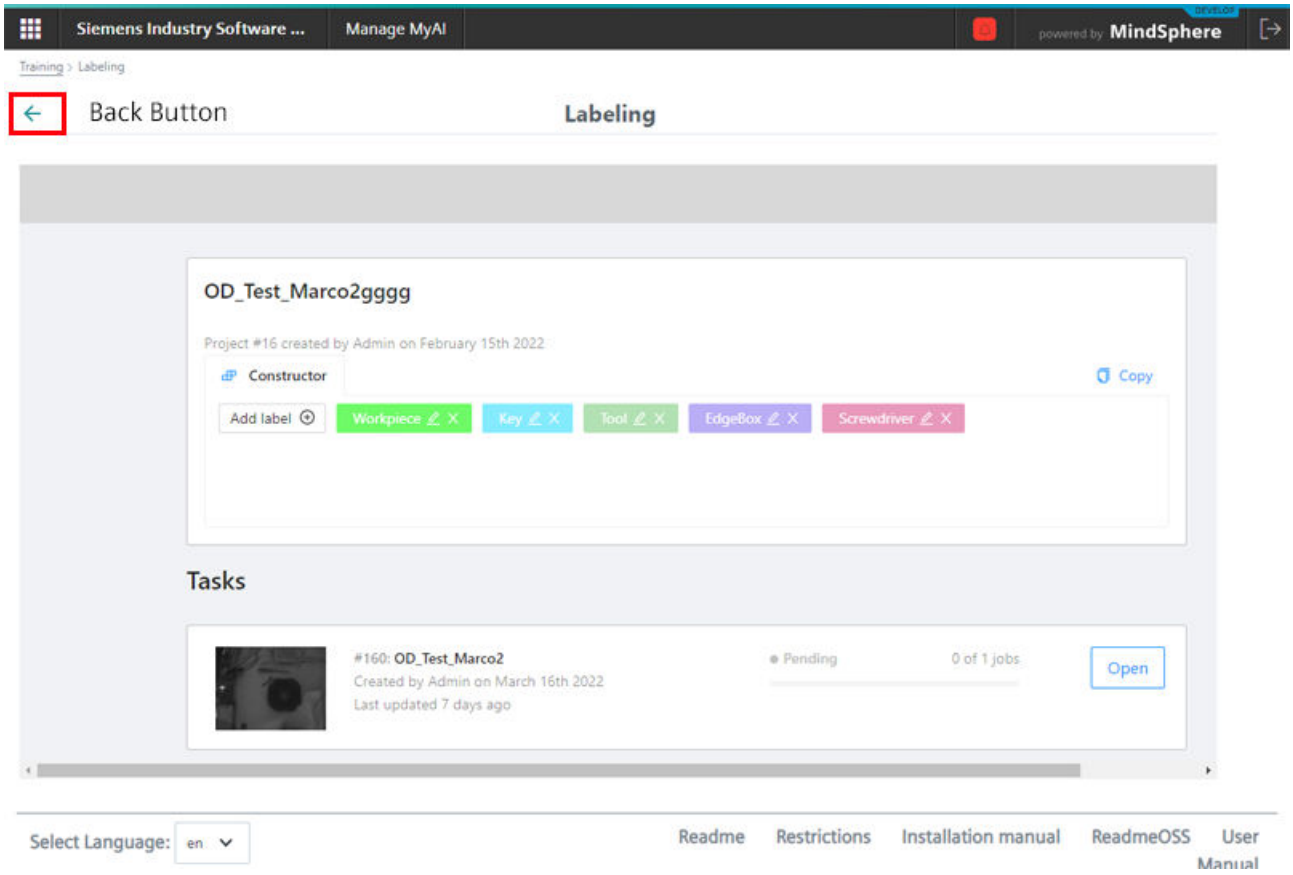
The image under shows the model configuration page. On this page the user can create labels in the Constructor pane by clicking on the "Add label" button.



The "Add label" button opens a window where the user is free to type the label text, select the desired color or allow a color to be randomly assigned to a label, and create the label by clicking on Done.



The user can see all the defined labels in the Constructor pane that can later be used in the actual labeling process. The user has the option to rename/change and/or to delete a label in the Constructor pane before continuing to the label procedure (see first image below). When the user has defined all the required labels needed for the labeling procedure, the user must navigate back to the model overview page using the back button (see second image below) and open the labeling process of the desired model once again.



Deletion of model: Please contact Siemens representative if you wish to delete the entire model/training data.

5.3.3.2 Defining labels - Control pane

The Control pane is responsible for saving, undoing, and redoing changes in the labeling process. The Control pane also consists of the Menu option that can be used to go to Model configuration page (only relevant for Object Detection use-case, please refer to Defining labels (Page 46) section above).

Note

It is recommended to regularly save changes during the labeling process.

5.3.3.3 Defining labels - Navigation pane

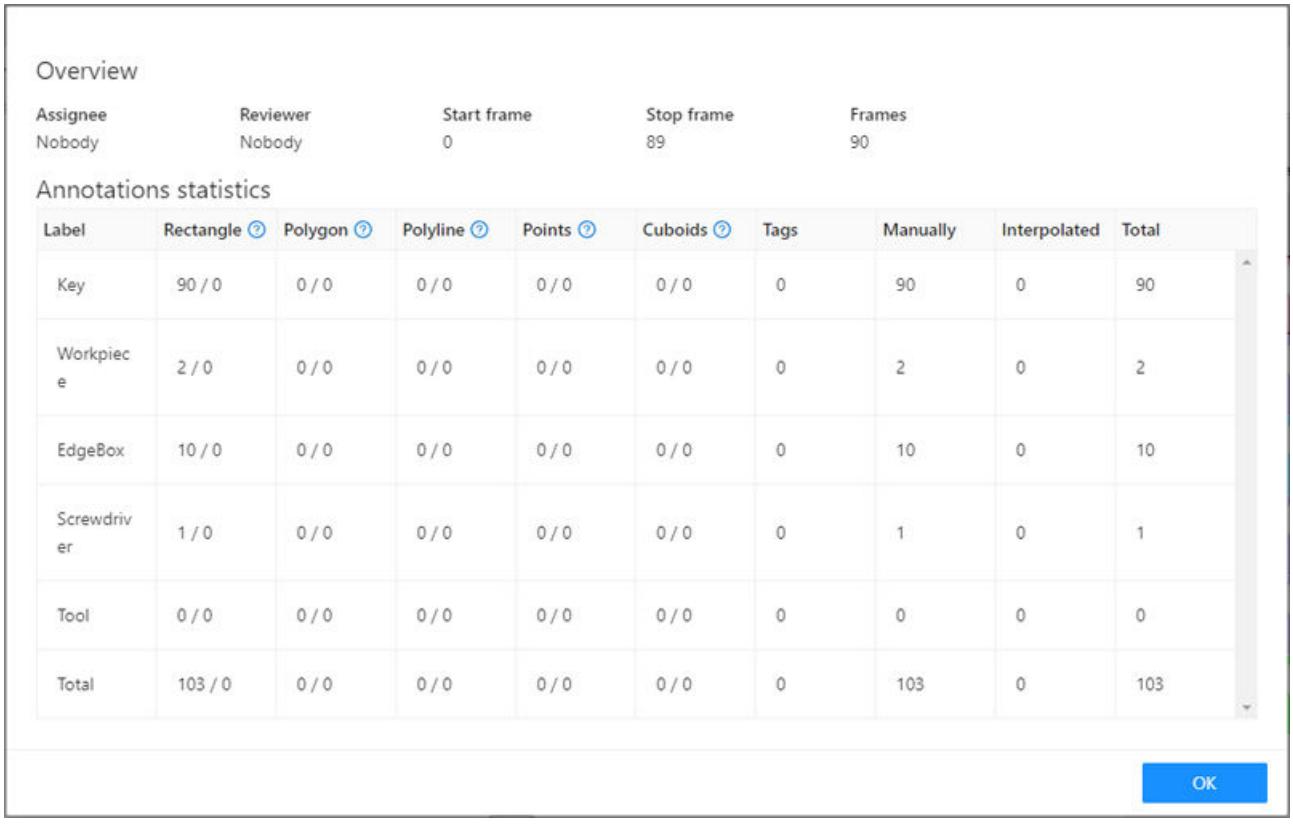
The Navigation pane offers various commands to navigate through the entire dataset. Once the labeling on a specific image is done, the user can use the Go Next button to go to the next unlabeled image and continue with the labeling process.

5.3.3.4 Defining labels - Overview pane

Tabs of the Overview pane

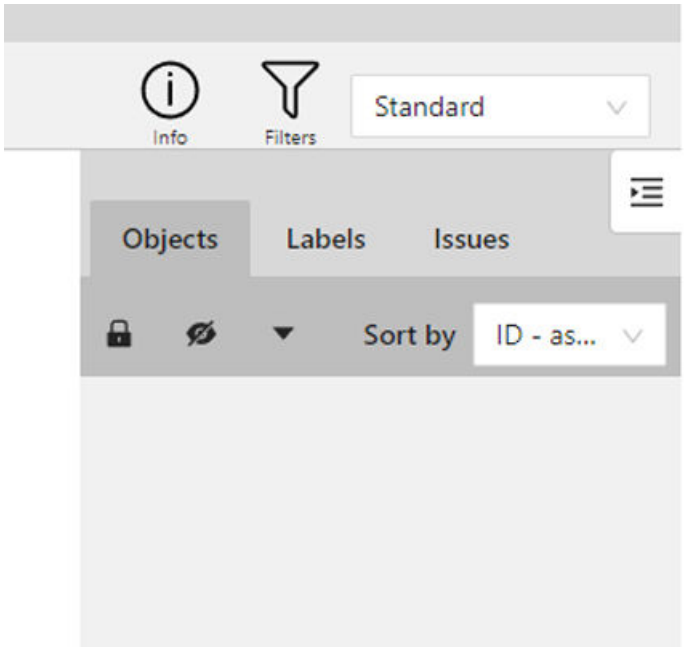
The Overview pane is the second most important pane after the Drawing pane in the labeling process. This pane consists of:

- Info tab: an overview of the dataset and it's labeling progress.

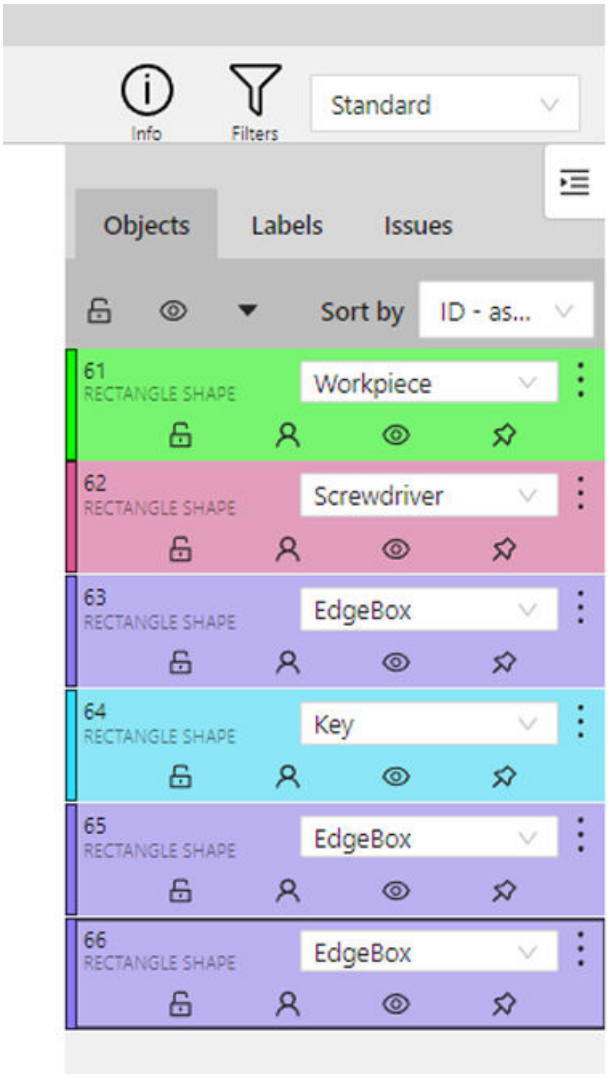


Label	Rectangle	Polygon	Polyline	Points	Cuboids	Tags	Manually	Interpolated	Total
Key	90 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0	90	0	90
Workpiece	2 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0	2	0	2
EdgeBox	10 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0	10	0	10
Screwdriver	1 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0	1	0	1
Tool	0 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0	0	0	0
Total	103 / 0	0 / 0	0 / 0	0 / 0	0 / 0	0	103	0	103

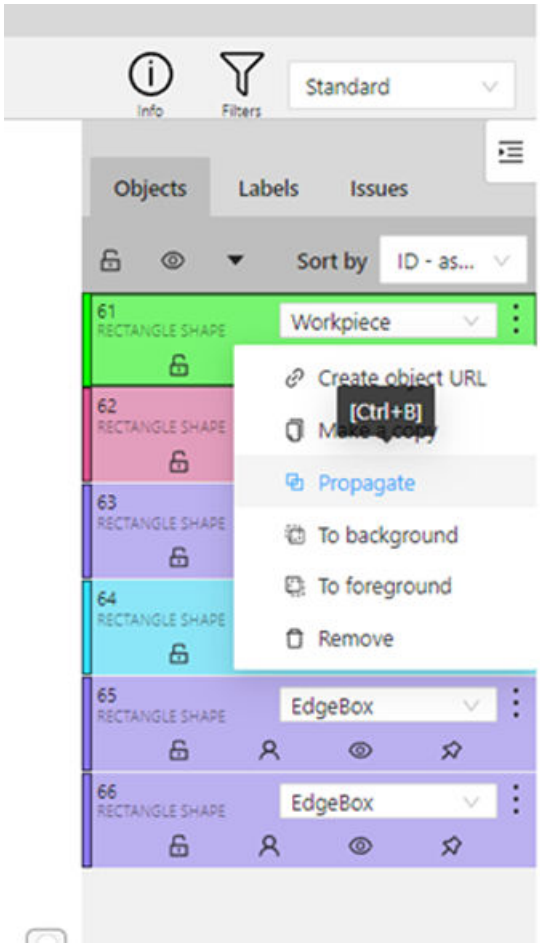
- Objects tab: an overview of the associated bounding box labels for this image.
  Empty area under Objects Tag means the image does not have any bounding box label.
  Please refer to the Drawing pane section above for more details on how to add bounding boxes label per image.

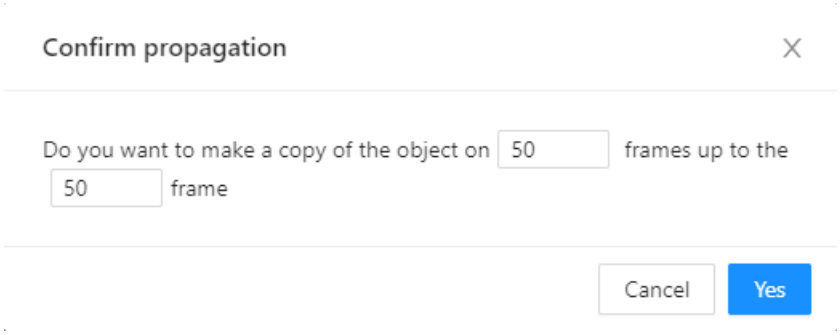


Area under Objects Tag lists all bounding boxes labels associated in the image. Please note to save the changes using the Save button under the Control pane in case of addition/deletion of a label. Unfortunately, unsaved changes will be lost once the page has been refreshed or exited.



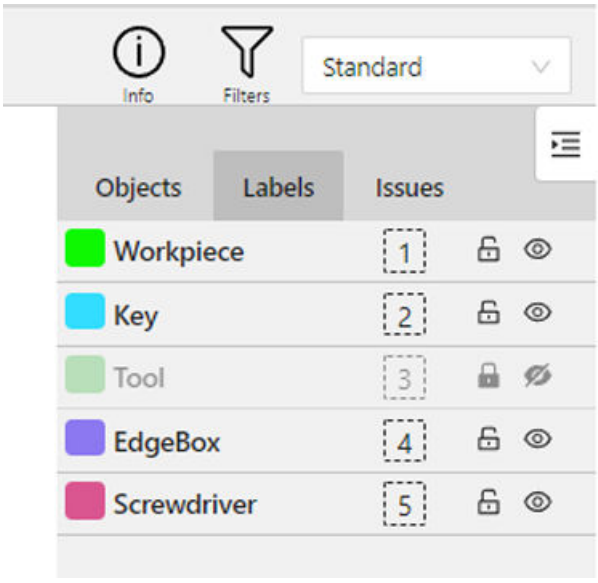
The Object Tag offers a very useful feature called **Propagate** for each of the bounding box label shown under the Object Tag. **Propagate** speeds up the labeling process by interpolating the bounding box label of the selected image to the upcoming images in the dataset. This is a useful feature if the user knows that the upcoming images in the labeling process belong to the same label class as the current one and can automate the process to some extent. Propagating works by specifying the number of frames (i.e., images) you want to propagate through and is only possible in a forward manner, and not backwards.





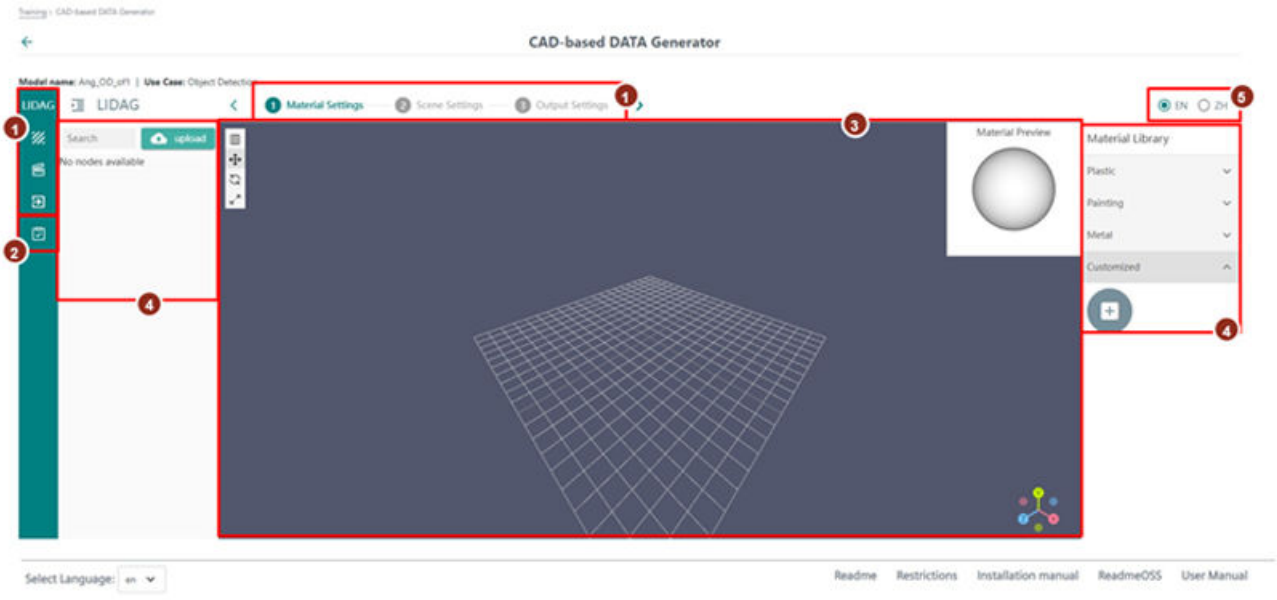
Caveats of Propagate: **Propagate** can cause a bounding box label to appear on the wrong location in the image, or even to appear in an image where it is not needed. Please revise the labeled images that were labeled with the **Propagate** function and adjust/delete/confirm the bounding box labels before saving and completing the labeling procedure.

- Labels Tab: an overview of the available labels and the used label for the selected image. This feature is useful for the Workpiece Identification, Workpiece Rotation Analysis, and Object Detection use-cases.


Info
Filters
Standard
Objects
Labels
Issues
Workpiece
1
Key
2
Tool
3
EdgeBox
4
Screwdriver
5

5.4 CAD-based Data Generator

This page allows the extension of the current image data set by generating new images from CAD data.
This will make the model more robust and allow training a model with a lower number of real images being provided.



① Setting Steps
② Task List
③ CAD Model View
④ Settings Area
⑤ Language Selection

Figure 5-2 CAD-based Data Generator

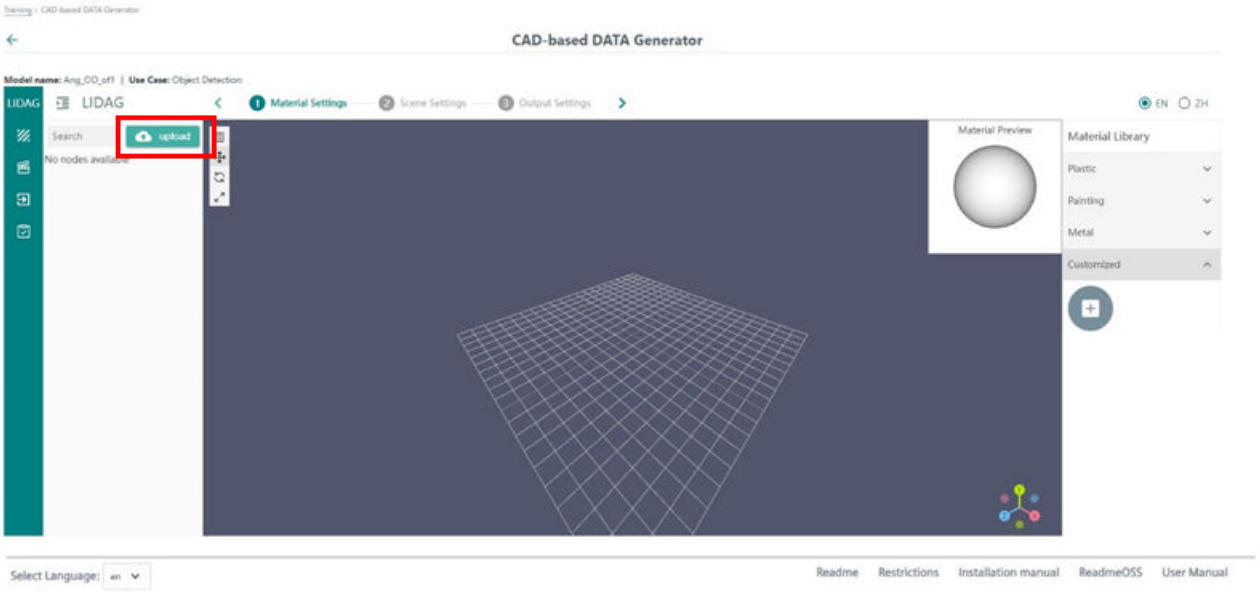
The default CAD-based Data Generator page is split to panes with various features:

1. Setting Steps Pane
   To create training images based on CAD data, settings for Material, Scene (including lightning) and Output must be set. In the CAD-based Data Generator page, these settings are visible on the left side and in step view on the upper part of the page.
2. Task List
   The task list shows done tasks, e.g. when images were generated.
3. CAD Model View
   The CAD model includes a canvas to position workpieces and selected settings in the upper left corner.
4. Settings Area
   The settings area is divided in 2 tabs, one on the left and one on the right side of the CAD Model View. Depending on the Setting step, different settings can be selected and defined here.
5. Language Selection
   The CAD-based Data Generator supports English.

5.4.1 CAD Model integration and material selection

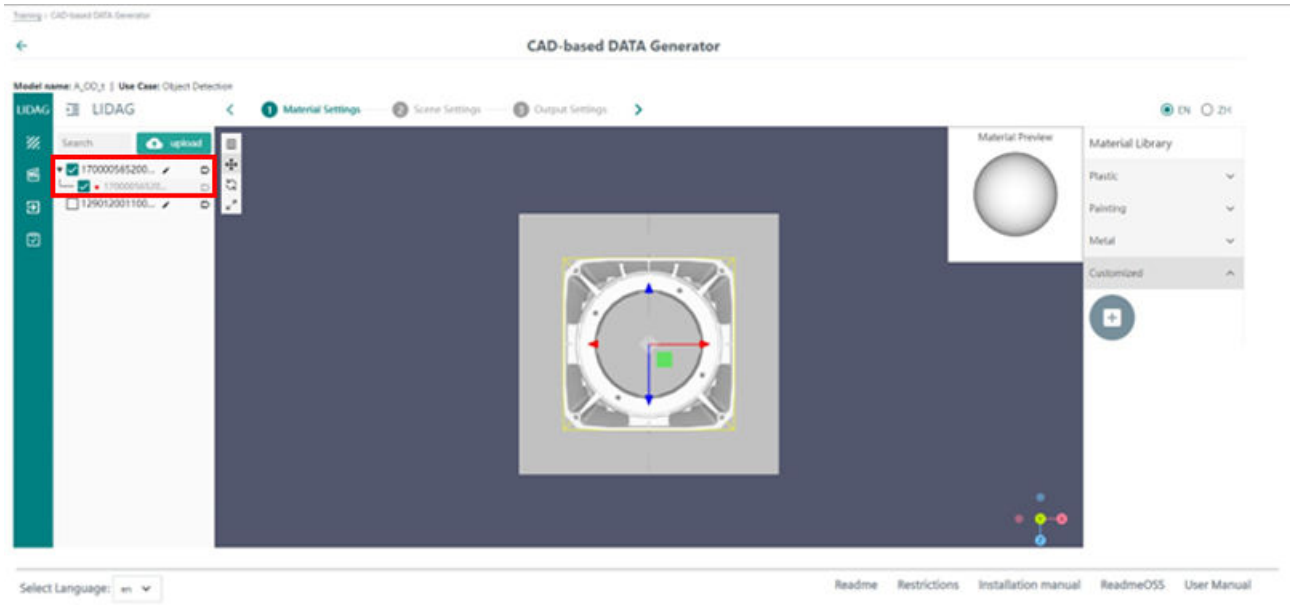
To create CAD-based images for model training, follow these steps:

1. The image creation process starts by uploading a CAD model. This is the basis of the images to create.
   Go to the left settings area and click the “upload" button.



2. Select the required CAD model of your workpiece and click open. It is possible to upload CAD STEP models (.stp files). It is possible to upload multiple CAD models, e.g. CAD models from workpiece and clamping.

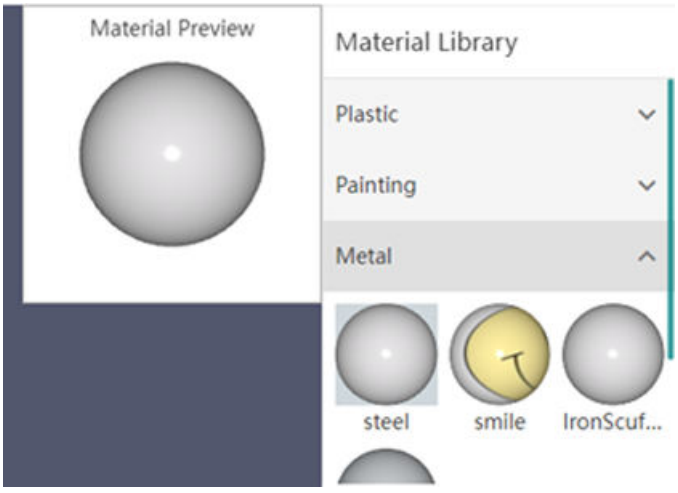
3. All uploaded models are listed in the left settings section under the upload button.
   A CAD model can consist of several parts, where each subpart can be visualized or hidden individually by checking the checkmark next to the model or its parts.
   Please select one CAD model after the other to work with it. The name of the uploaded model can be changes by clicking the “pencil” next to the uploaded model. It is also possible to set a tag name to each uploaded model.



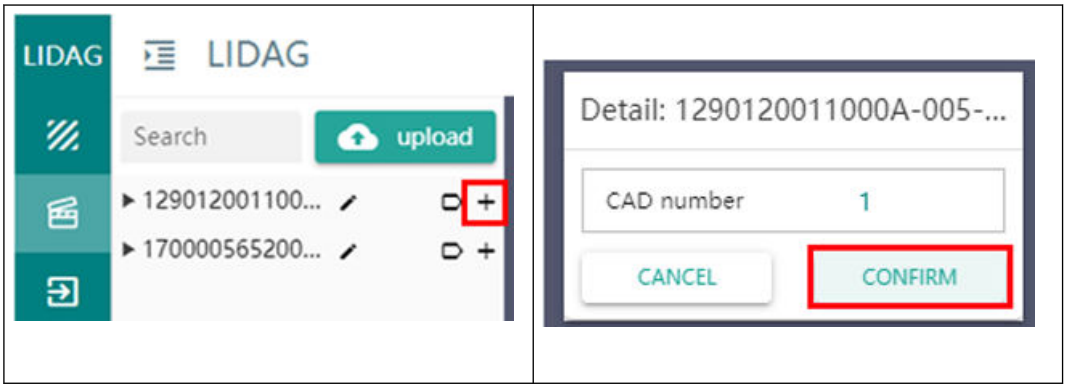
4. To adapt the CAD Model view, the following options are available:

Action	Description
	Click in the CAD Model View and press the left click on the mouse to rotate and change the view of the canvas.
	Click in the CAD Model View and press the right click on the mouse to slide the view of the canvas.
	Hover over or click in the CAD Model View and turn the mouse wheel to zoom in and out.
	Click on the place icon in the upper left of the CAD Model View to enable or disable the canvas.

5. Go to the right setting area and select the material that fits best to the material of the real workpiece.
   It is also possible to upload own materials.



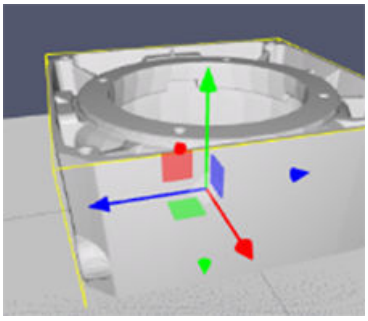
6. When the right material is selected for all CAD models, go to the Scene Settings step, either by clicking the second point in the step view on the upper part of the page or by clicking on the button on the left side.
   In this view, the image composition will be defined.
7. Always when entering the Scene Settings step, a scene is automatically generated. Fill the scene with CAD models. To add one, click the + button next to the CAD models. Select the number of CAD models to add in the scene and “confirm”.



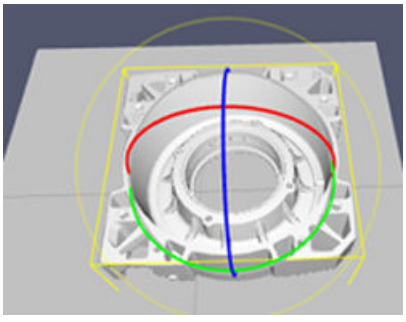
8. The objects(s) will appear on the plane. Position them in the required composition.
   To position, rotate or scale the workpieces, there are 2 options:
   Using icons

	Use the icons on the left of the CAD Model view.

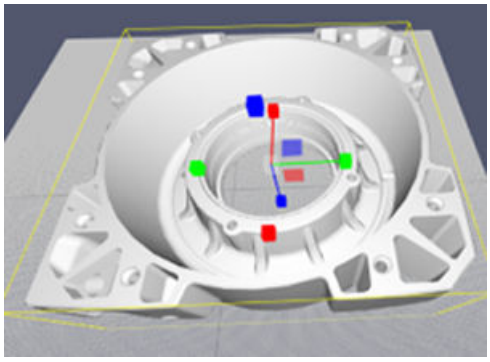
   – To move an object, select it and click on . The coordinate system of the workpiece will appear.
     Click on the red, green or blue arrow and pull or push it to move the workpiece in X,Y or Z direction.
     Click on the red, green or blue areas and move it to move the workpiece in YZ, XZ or XY coordinate plane.



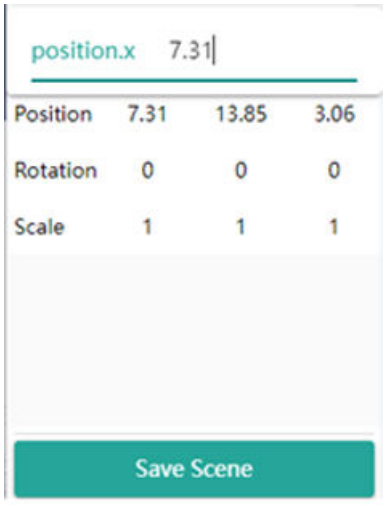
   – To rotate an object, select it and click on . Circles around workpiece will appear.
     Click on the red, green or blue circle and rotate it to rotate the workpiece in X,Y or Z direction.



– To scale an object, select it and click on . A coordinate system with boxes at the end will appear in the workpiece.
Click on the red, green or blue boxes and move it to scale the workpiece in X,Y or Z direction.



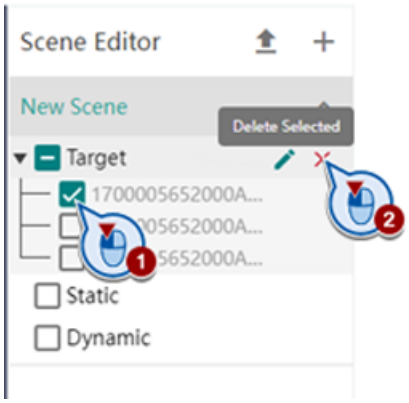
– Use the settings table. When clicking on the workpiece, a table in the right settings area will appear. It shows the position, rotation and scale for X,Y and Z coordinates.
Click on one value, changed it and click <Enter> on your keyboard. The change will directly be visualized in the Model View.



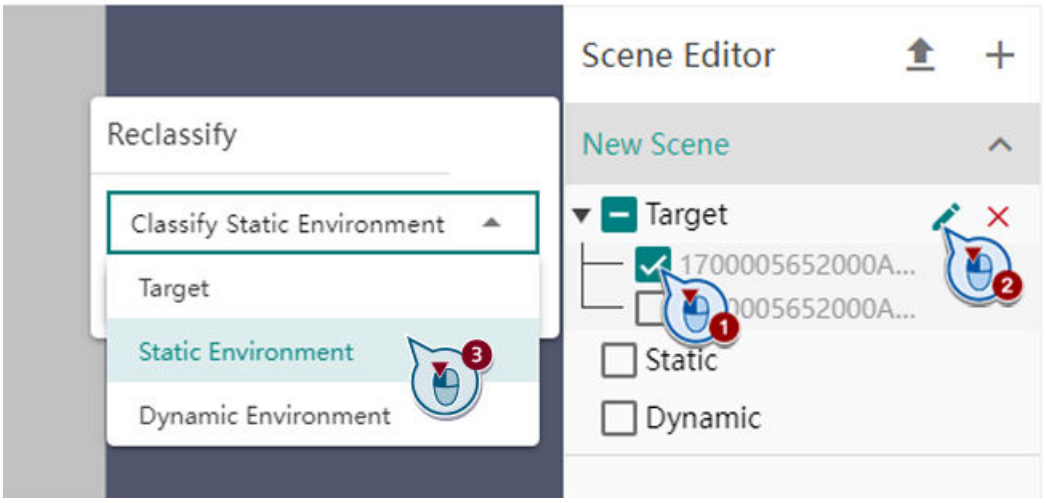
9. Add all CAD models that belong to one scene. This can be e.g., one workpiece, several workpieces or a work piece together with its clamping. When objects have a certain positioning towards each other in reality, you can readjust this with the CAD models.

5.4.2 Setup of Scenery

1. To delete workpieces, go to the Scene Editor on the right.
2. Go to the current Scene, open the target section and select the object to delete.

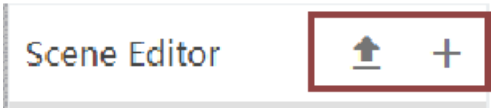


3. When the scene is as desired, stay in the scene view and define, which objects are “target” and should later be detected by the AI model and which objects are “static” as part of the background in the scene. When adding objects to the scene, they are added as "targets" by default.
   Move objects to the “static” background section by selecting the object, clicking the “pencil” button and reclassifying the object to the desired section. Then Confirm.



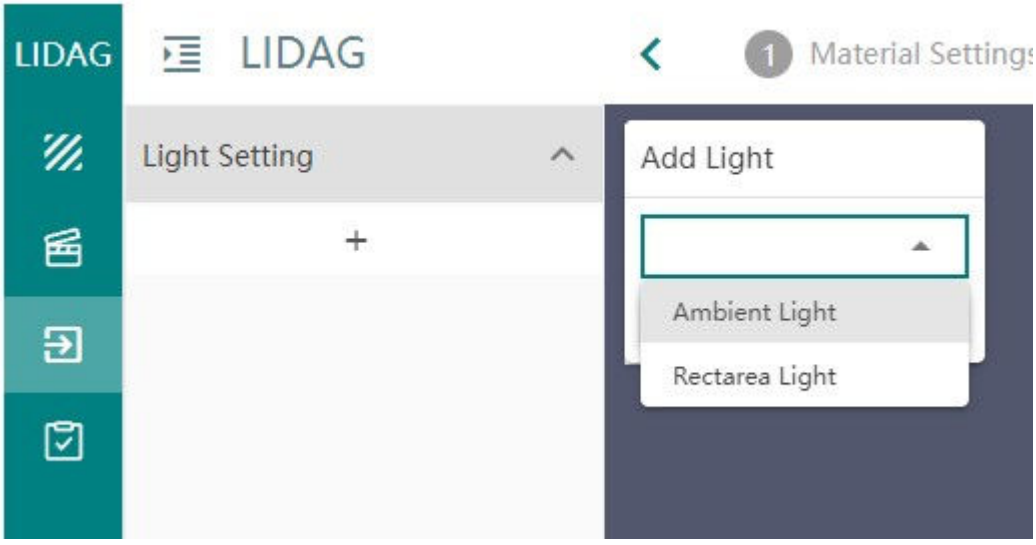
4. When all objects are in the right section, save the scene with the button in the lower right corner.

Then options are available to add a tag, delete, export or duplicate a scene. It is also possible to import scenes as .json files and to create several scenes.

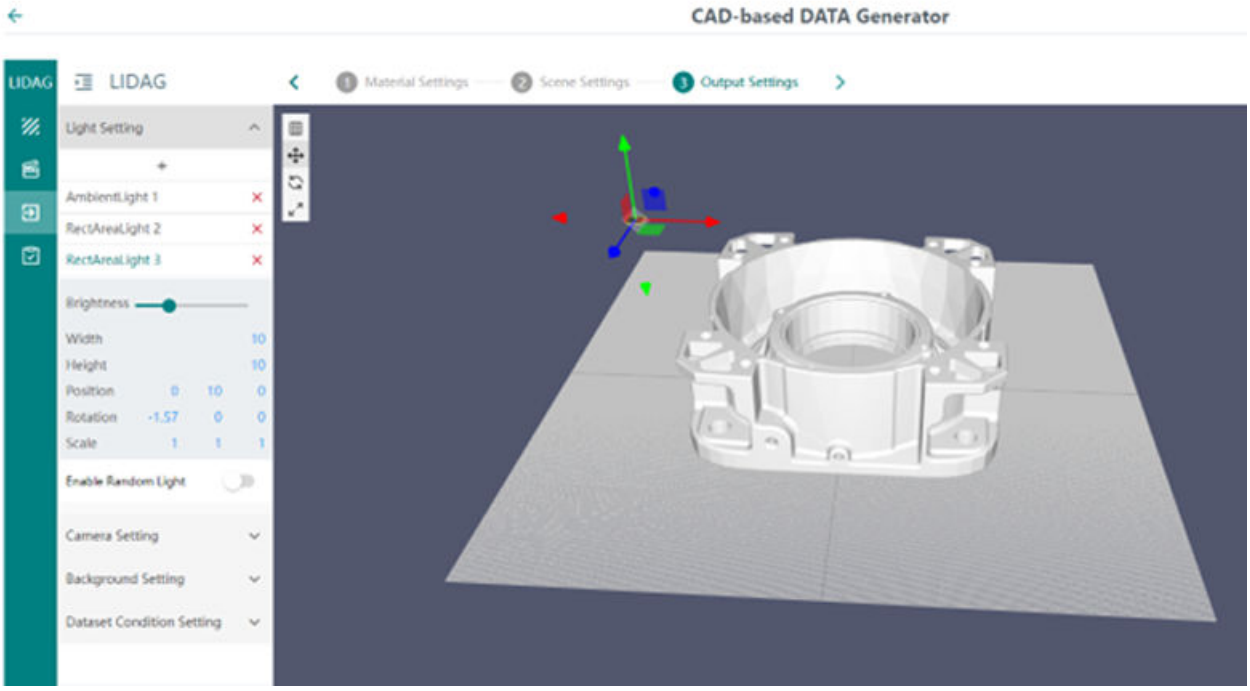


5.4.3 Definition of image settings

1. Go to the Output Settings step, either by clicking the third point in the step view on the upper part of the page or by clicking on the button on the left side.
   In this page, image settings, like lightning, camera resolution and background will be defined for the generated scene.
2. Start with adding lightning to the scene, by clicking on the + button in the light setting section on the left.
   You can add an ambient light source and several rectarea light sources.

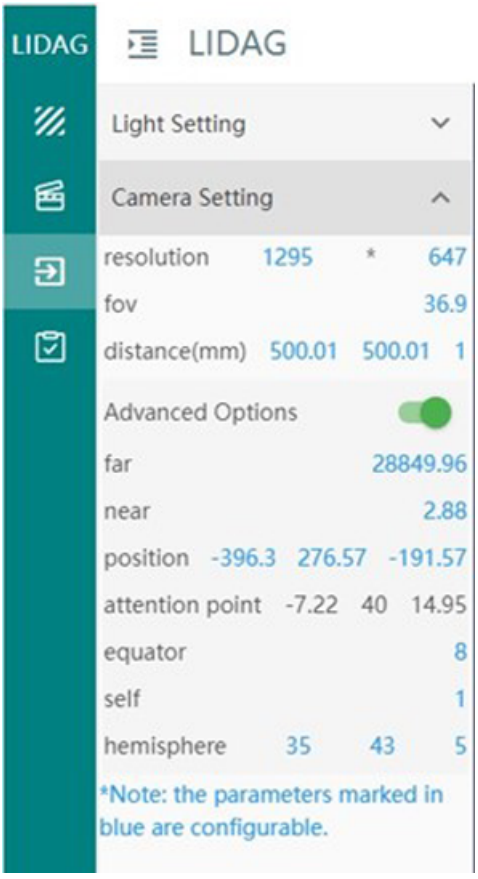


Both light sources can be adapted in its brightness.



As the name says, the ambient light will light up the whole scene and can not be moved. The rectarea lights sources can be positioned in the scene in the same way as other objects. Additionally, a number of random lighning can be added. The random light will automaticaly change parameter(e.g., size,brightness, color, position, rotation) based on your manual settings light.

3. When the lightning fits to your needs, close the Light Setting tab and open the Camera Setting tab.

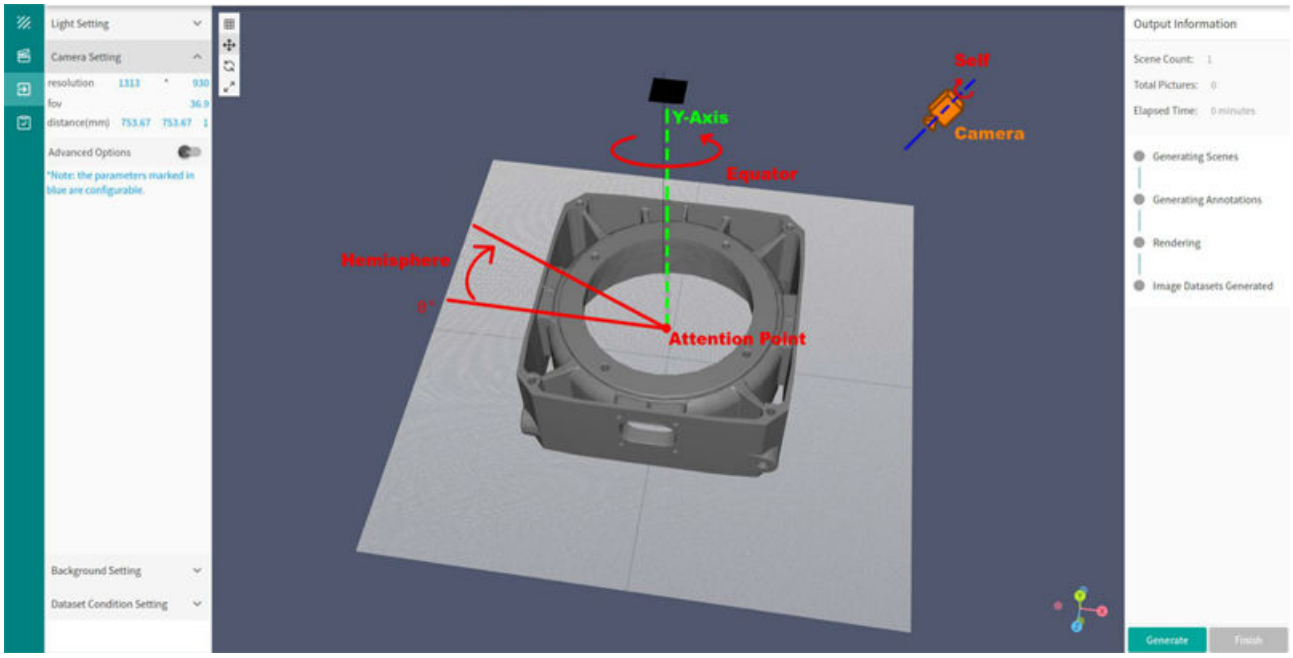


The blue marked parameters can be configured:

– **camera resolution** – resolution of the generated image in pixel. It is recommended to use the same resolution as the image resolution from the real camera.

– **FoV** – Field of View (FoV, also called angle of view) is the width of the scene that the camera detects on its sensor. It refers to the maximum area a camera can capture.

– **distance (in mm)** – distance from the camera to the workpiece calculated using the X, Y and Z coordinates of the workpiece. This value should be selected so that the camera image shows a full view of the relevant workpiece.
Further options can be set by selecting the "Advanced Options". **Far** and **near** indicate the furthest and the nearest point respectively relative to the camera in which the scene will appear. **Position** is only used for preview, and does not affect the final image. The other parameters can be read out from the image below.



Note

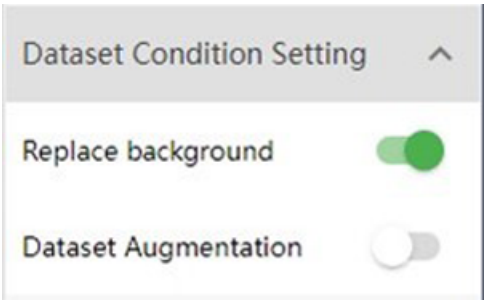
Your view on the workpiece represents the camera. From this view, the camera distance and its position are derived.
If a distance or position is set via the table and the Model view is changed afterwards via the mouse, the distance and position values in the table will be overwritten.

4. When the Camera Settings are done, close Camera Settings tab and open the Background Setting tab. This step is optional and should only be done if no variation in the background of the generated images is desired.

5. Upload a background image as .hdr files by clicking on the **+** button.
6. When the Background Settings are done, close the tab and open the Dataset Condition Setting tab.
   Select if the background should be replaced in the generated images and if Data Augmentation should take place.

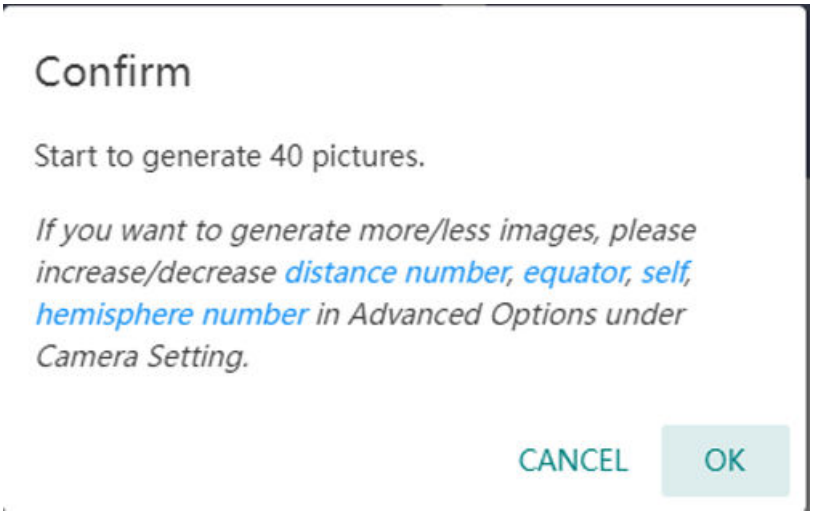
Note

It is recommended to enable the "replace background" option and to disable the "Dataset Augmentation" option. When Data Augmentation should be performed, we recommend to do this via the Data Augmentation page (described in the next section) for all images, for real and generated ones, together in one step.

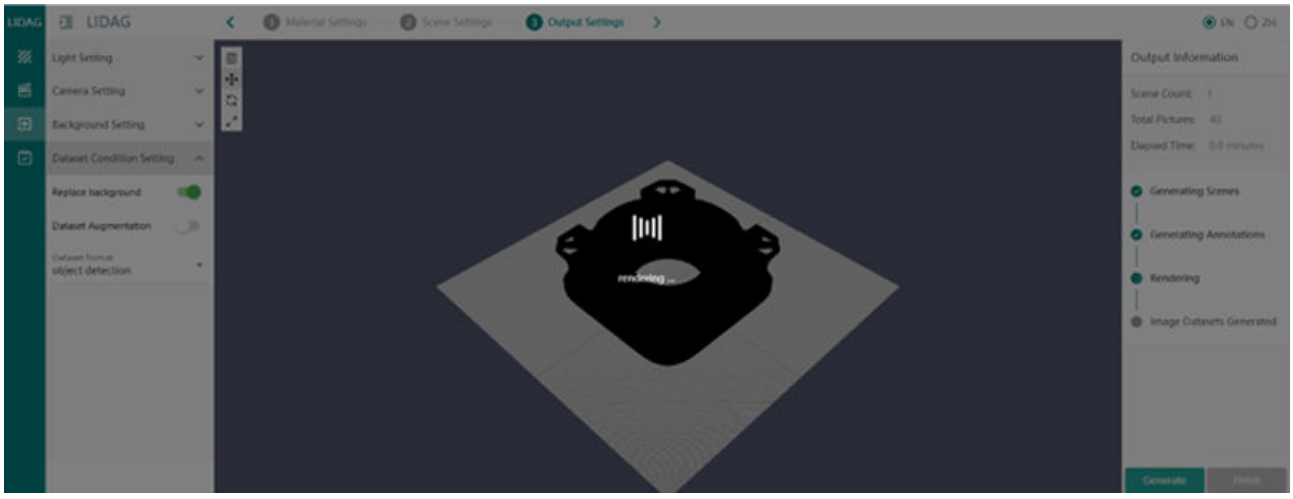


5.4.4 Image generation

1. Click on the “Generate” button in the lower right corner to start the data generation.
   A pop up window will show how many images will be created and which parameters are to be adapted to create more images.



2. When accepting the pop up message, the right Settings area will visualize the current status step and the elapsed time of the data generation.



3. When all steps are green, the image data generation is done. Click on the Finish button to see the dataset creation in the task list.

Note

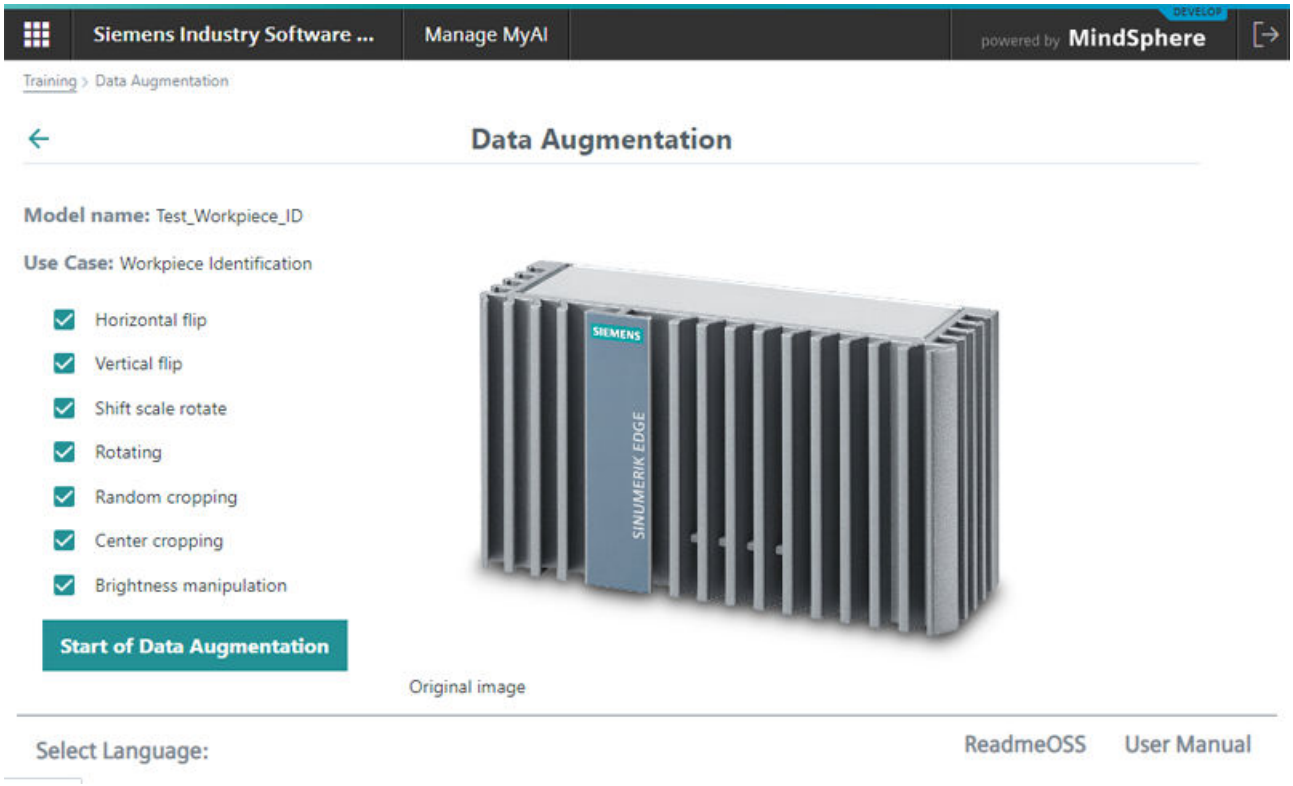
It can take some time (~15 minutes) until the generated data is available for training. When they are available, a "new Images available!" message will show up on the Notification section of the Training page.
The created images are automatically labeled, but we recommend to check the created labels in the Labeling page.

5.5 Data Augmentation Page

Description

This page allows augmenting current image data by generating new images from existing real image data.

This allows training a model with even a lower number of real images being provided. Additionally, it will make the model more robust to changes in used input image data.



The "Data Augmentation Page" of Manage MyAI application consists of the following UI entries, showing the current selected Data Augmentation method for the specific model:

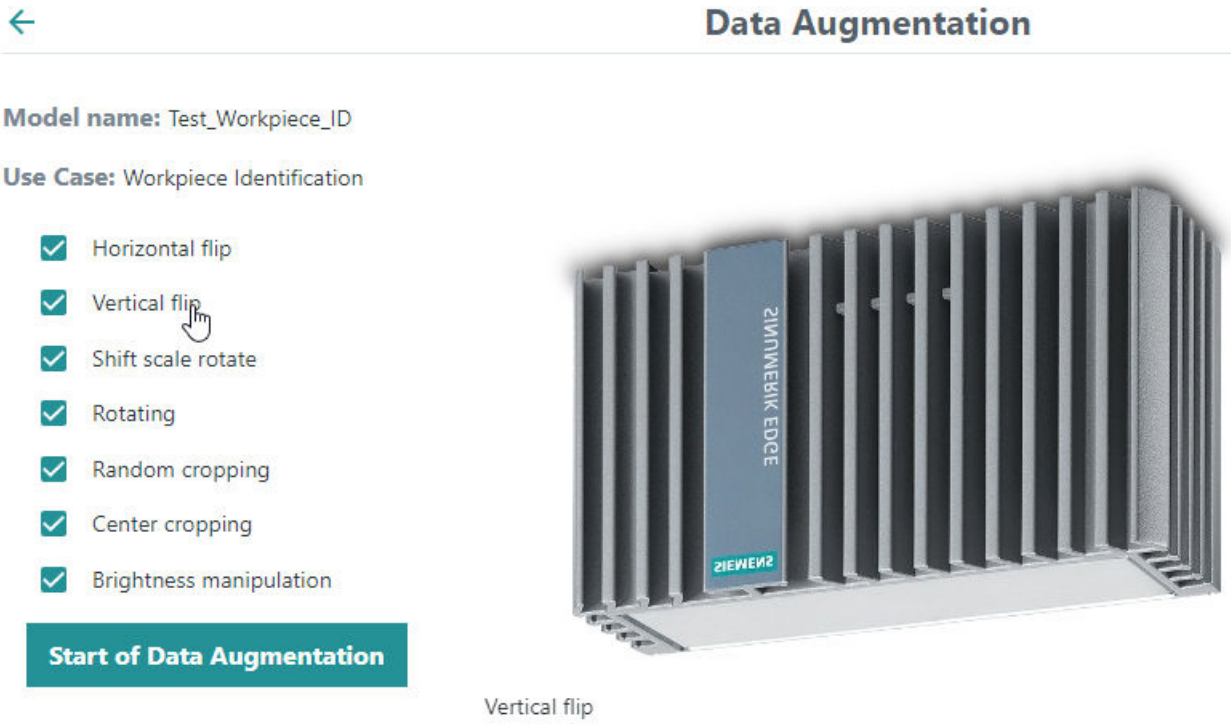
- Model name – this field contains the model name that was given by the operator during data acquisition within the corresponding Edge App
- Use Case – this field contains the name of the Use Case for which this model was created in Edge App and being submitted for training
- List of selectable Data Augmentation methods:
  - Horizontal flip
  - Vertical flip
  - Shift scale rotate
  - Rotating
  - Random cropping
  - Center cropping
  - Brightness manipulation

Image area

The Image area is showing exemplified result of this Data Augmentation method on the original image.

- When “Data Augmentation Page” opens, it’s showing some original unchanged exemplified image.

- When hovering over the different methods, the displayed image will change showing some exemplified result for this Data Augmentation method, e.g., for Vertical Flip.



Vertical flip

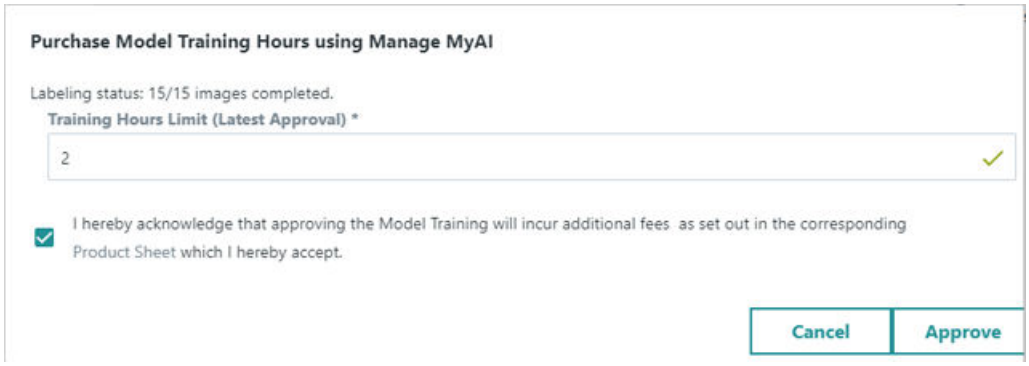
- "Start of Data Augmentation" button – allows for starting data augmentation based on the selected data augmentation methods, using the current real uploaded images as base
  - During a running Data Augmentation, you won't be able to "Approve" any training. Please wait until current Data Augmentation has finished.
  - Starting "Data Augmentation" for a model in "Training in Progress" is not possible. Please wait until current training has finished.
  - The new created images by "Data Augmentation" will be added automatically to the image data of the corresponding model training.
    The new created images will automatically get the same "label" that was provided to the original image, e.g., by its labeling in Edge App.
    The user is advised to check the assigned pre-labeling in "Labeling" page and delete/adjust as needed.
  - Some Data Augmentation methods do not make much sense for some use cases, e.g., doing some "Rotating" on use case "Workpiece Rotation Analysis".
    Please be aware that this is not prevented by the software, i.e., it's your responsibility to select appropriate Data Augmentation methods for your use case and model.

5.6 Model training and downloading

The following section describes the steps to start a model training and to download the trained model.

Model training

1. Go to the Actions area in the Training page.
2. Click on the “Approve” button in the row of the corresponding model that you wish to train. The dialog for purchase of model training hours for Manage MyAI is displayed:



3. Enter the requested number of maximum hours of training. If the training finishes before the maximum requested hours are reached, only the actual training hours will be billed.
4. Approve the purchase of model training hours by selecting the checkbox. When this is done, the Approve button to start the training will get clickable.
5. Approve the training by clicking on the "Approve" button.
   The status field of the selected model will change to **Training in Progress** or **Waiting in Queue** depending on the number of currently started model training processes. This means the training will run.
   If you see a change on the status field of the training to Delivered, the training was successfully done.

Model download

When the model has the status “Delivered”, then it is ready for download. To download the model, click on the Export model icon in the Actions section. The model will be downloaded to your local computer. Depending on the size of the model, the download can take some time.

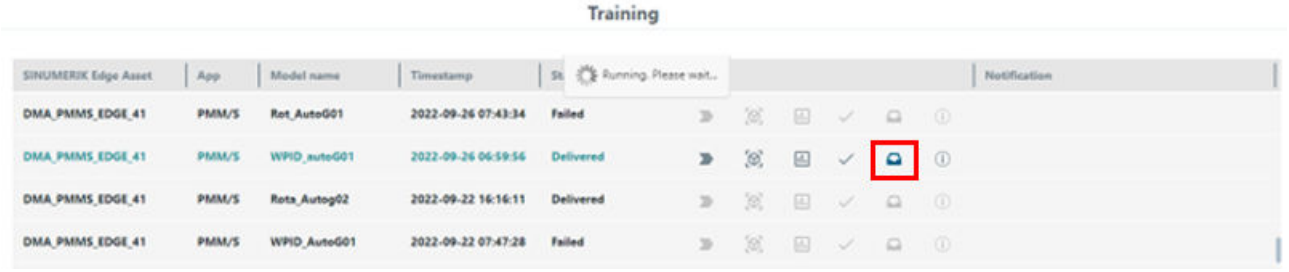
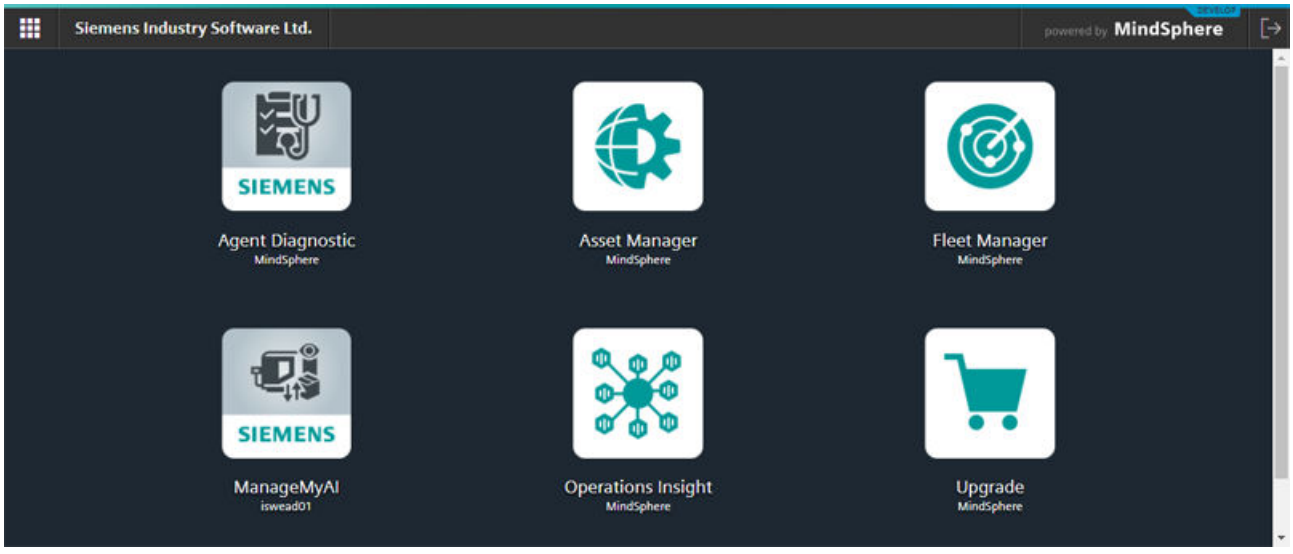


Figure 5-3 Download model

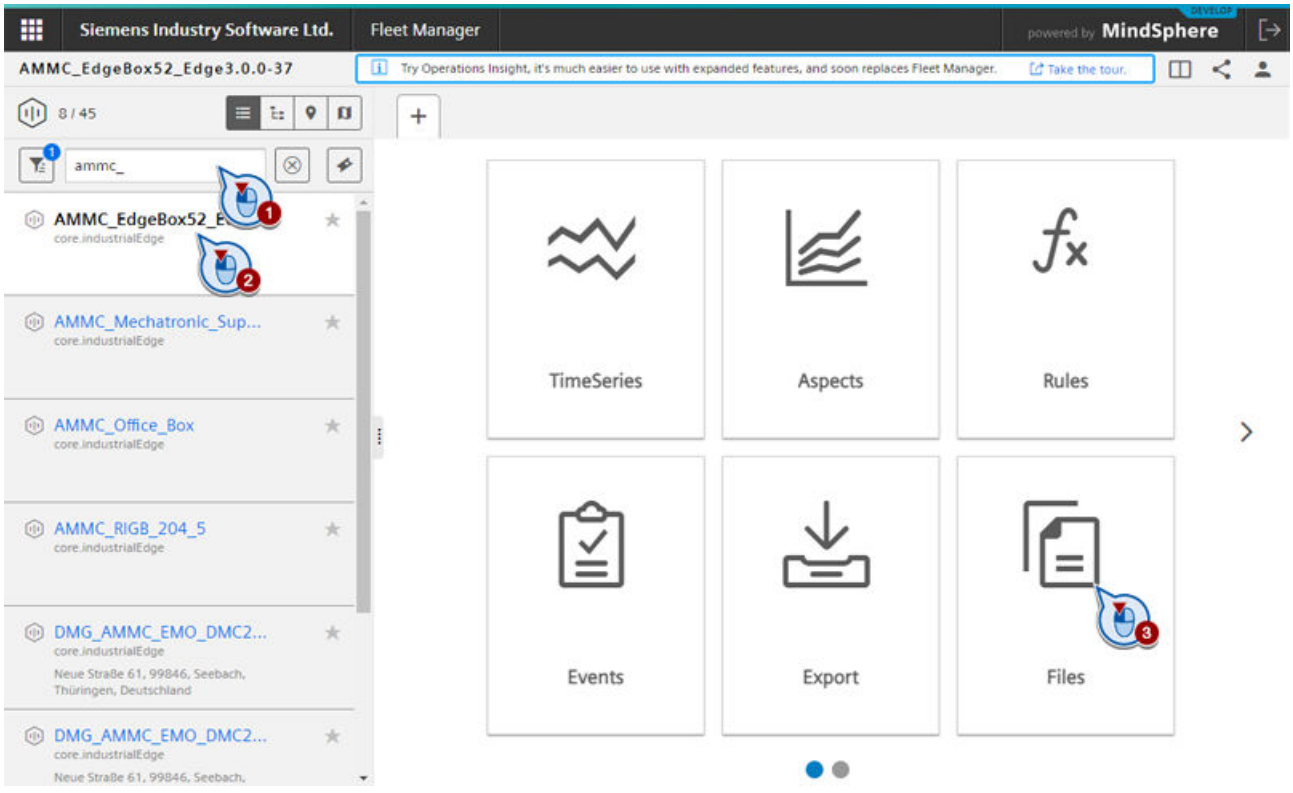
A second option to download the trained model is via the Edge Asset. The MindApps Fleet Manager or Operations Insight can be used to access and download the <<Model Name>>.model in the files of the Edge Asset. The following steps to download the model

file are similar for Fleet Manager and Operations Insight, here described exemplarily for Fleet Manager.

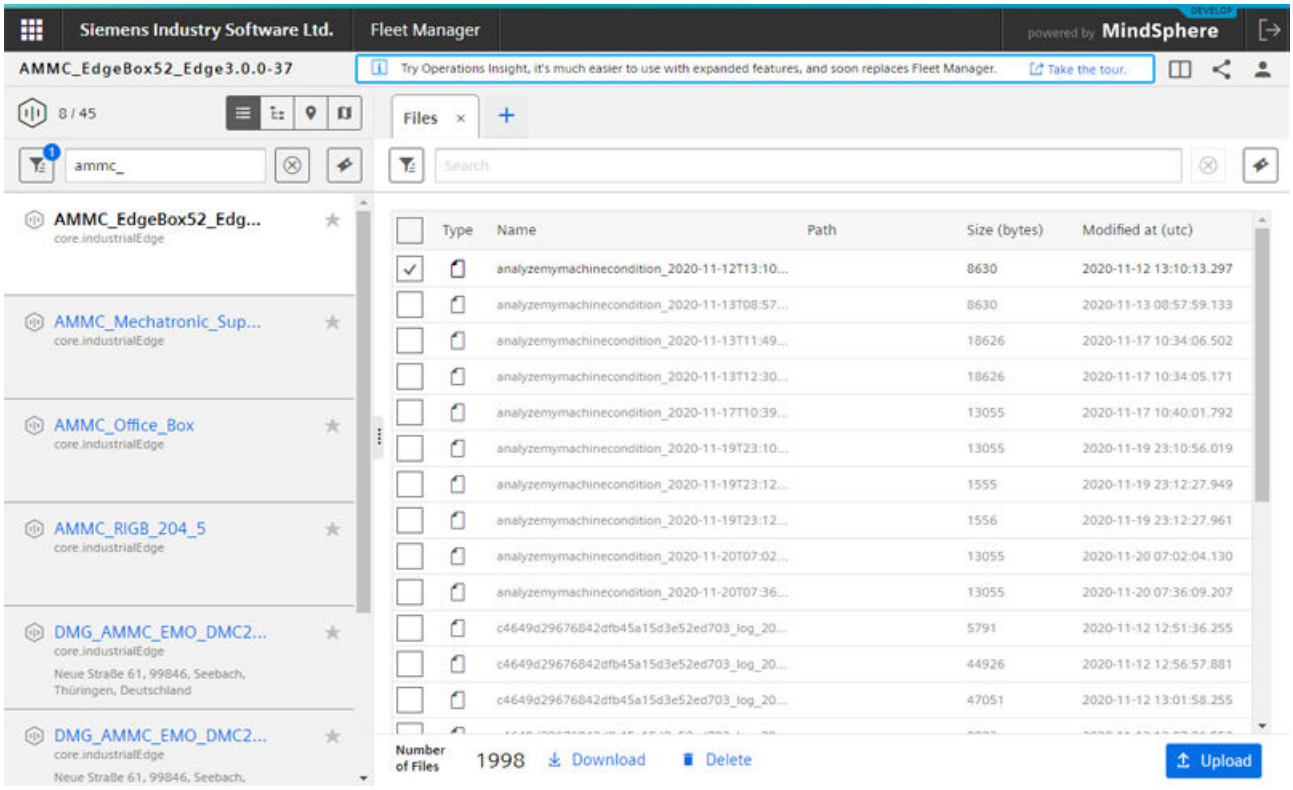
1. Navigate to the MindSphere Launchpad and choose Fleet Manager.



2. Find your Edge Asset through the search box and click it, then select the Files.



3. All log files which are uploaded to the MindSphere should be listed in this section. Search, filter, download, delete operations are possible through this pane.



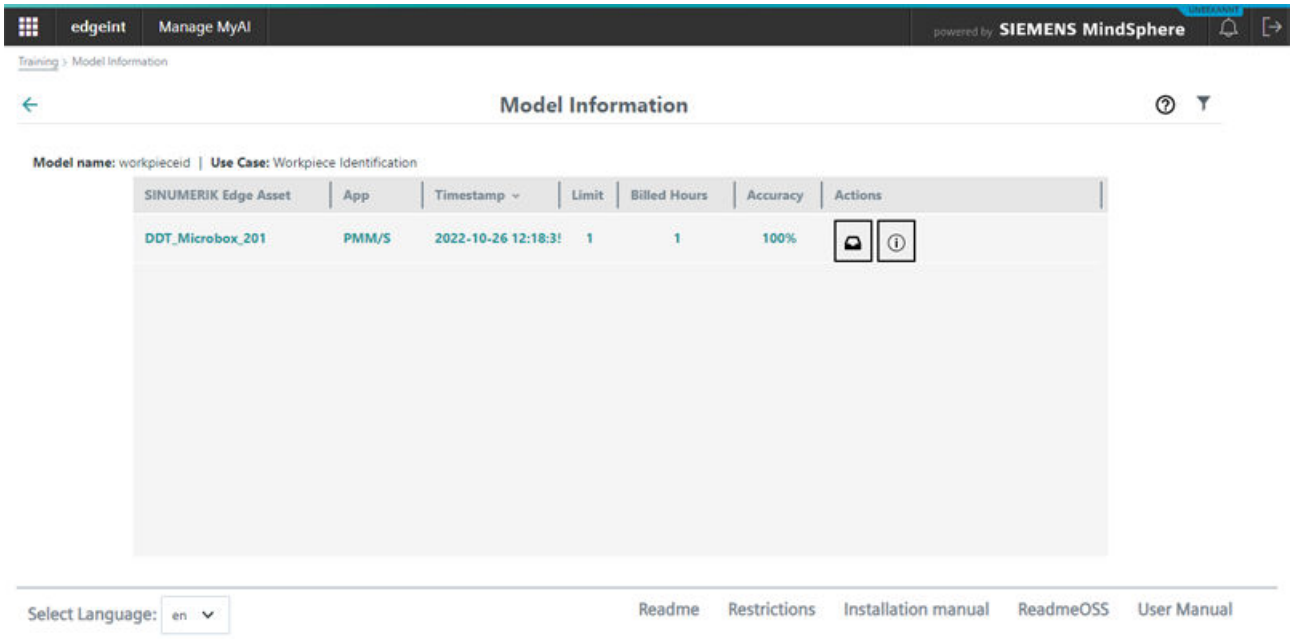
4. Download of .model files: filtering by <<Model Name>> and selecting the file with .model extension. Follow the upload instructions on the separate operation manual of the specific Edge application.

5.7 Model Information Page

Description

This page provides for an existing model training an overview of model history, access to trained models and additional model information.

In detail you will get an overview about your trained models, about the requested and used training hours and about the accuracy of the model. Additionally, you will be able to access previous trained models of your model training.



The “Model Information Page” of Manage MyAI application consists of the following UI entries, in which one table row represents one single trained model:

- **Industrial Edge for Machine Tools Asset** – this field contains the Edge Asset name
- **App** – this field contains the name of the application that was used to collect the data. This field can have one of the following entries:
  - **PMM/S** for Protect MyMachine /Setup
  - **AMW/TC** for Analyze MyWorkpiece /ToolCheck
- **Timestamp** – this field contains the timestamp of the data submission on MindSphere
- **Limit** – this field contains the number of training hours which were used for the training of the specific model
- **Billed Hours** – number of really billed hours for the training of this model
- **Accuracy** – accuracy of the model out of training.
- **Actions** – this area contains the different actions that can be done for model information:

	“Export Model”: Allows for downloading selected trained model as .model file to local client if applicable.This is some convenient feature if you want to keep a copy of a formerly trained model locally.

	"More Details": Gives further information on the AI technology behind the model, like e.g. network architecture, batch size and epochs. This information is not targeted for everyday users, but more for AI experts.

	"Filtering": Filtering-icon in the upper right corner allows defining filters for filtering the list of trained models based on column as attribute.

Training Status and Troubleshooting

A

A.1 Training Status

Type of Status	
The following status types are displayed in the MindApp for each single training.	
Status: Uploaded	**Images from Edge Asset have been uploaded to training pipeline** Ready for approval of training (also data augmentation is still possible before) Approve training (incl. confirmation for possible additional costs).
Status: Training in Progress	**Model is being trained.** Approval for starting this training was done by user. Wait until training is completed.
Status: Waiting in Queue	**Model is added in the training queue.** Model training processes reached the limit of maximum of one training process active at the same time. The system waits until the active training process is completed then the training will be started automatically. **Remark**: There is a limit about how many trainings will be added to "Waiting in Queue". If queue is full, trainings will stay in current state and must be approved again later.
Status: Delivered	**Training is completed and the .model file has been generated.** Model file is accessible on the Training page and the corresponding Edge asset on MindSphere.
Status: No connection/Waiting	**Training has been interrupted/stopped due to internet connectivity issues.** Wait until connectivity issues are solved.
Status: Authentication failed	**Training has been interrupted/stopped due to SSL issues.** Wait and retry again later and if problem still exists, please contact our customer support organization.

Type of Status	
Status: Failed	**Training failed.** Training failed for some reason: No images, not enough images, too similar images etc. for getting trained model. • No images or not enough images: Depending on specific use cases there's some minimum number of labeled images required. These are minimal numbers and do not guarantee some well trained model. By not fullfilling these limits, training does not make any sense at all and does not start. – Workpiece Identification: 200 images – Workpiece Rotation Analysis: 200 images – Toolwear Analysis: 200 images – Anomaly Detection: 20 images – Object Detection: 20 images It is highly recommended to extend the number of images mentioned above for training. The number of images and their quality have a direct influence on the quality of the trained model. • too similar images etc.: Even though having required high numbers of labeled images, training might fail based on too similar images, bad quality of images, blurry images etc. Please check images of the corresponding training in Labeling Pages; please check and adjust labeling and/or please provide more and/or better images if applicable, according to corresponding Edge App user manual. You must submit new training data according to corresponding Edge App user manual. • If done successfully and the images are available in Manage MyAI, please retry approving the new training. It might take some time (up to a few hours) until the new data is listed. • If problem still exists, please contact our customer support organization.
Status: Trained	**Training was done, but .model file could not be provided to the asset** The model training was completed and .model file has been generated, but it could not be uploaded to the corresponding Edge Asset on MindSphere, e.g., because of connection problems. Please use the "Export model" button to export the model to your local client. You may of course also provide the exported model file directly to your Edge App user, who can upload it then into Edge App.

A.2 Troubleshooting

Description

Error message: Training purchased unsuccessfully

This error message can appear if there is some problem with the purchasing of the training.

Please wait some time and try again later.

If still failing, please contact our customer support organization.

Error message: Request failed

This error message can appear if there are some general problems with the requests between web based user interface and backend MindSphere services, e.g. connectivity problems, MindSphere problems etc.

Please try to refresh your web browser page (e.g. by key F5) and try again.

If still failing, please wait some time and try again later.

If still failing, please contact our customer support organization.

Appendix A

B

B.1 Abbreviations

List of abbreviations

Abbreviation	Meaning
UI	User Interface
Edge App	Industrial Edge for Machine Tools Application
MindApp	MindSphere Application

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