SIEMENS

SINUMERIK

SINUMERIK Edge
Analyze MyWorkpiece /Monitor

Operating Manual

Valid for control:
SINUMERIK ONE
SINUMERIK 840D sl / 840DE sl

Valid for software:
Analyze MyWorkpiece /Monitor Version 3.2

09/2022
A5E47919940B AE

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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A5E47919940B AE
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1.1 About SINUMERIK

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).

1.2 About this documentation

Overview

This document describes how you operate Analyze MyWorkpiece /Monitor.

Target group

The operating manual addresses all machine tool users. This publication provides information required by the user to understand the Analyze MyWorkpiece /Monitor software.

Benefits

The operating manual allows the target group to get familiar with the software user interface. Based on the manual, the target group is capable of responding to disturbances and taking corrective action.

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.

1.3 Documentation on the internet

1.3.1 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 (https://support.industry.siemens.com/cs/ww/en/view/109768483).

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

1.3.2 Documentation overview SINUMERIK 840D sl

You will find extensive documentation on the functions of SINUMERIK 840D sl from version 4.8 SP4 at 840D sl documentation overview (https://support.industry.siemens.com/cs/ww/en/view/109766213).

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
- Manufacturer/Service: SINUMERIK Integrate/MindApp
- Information and training
- Manufacturer/Service: SINAMICS

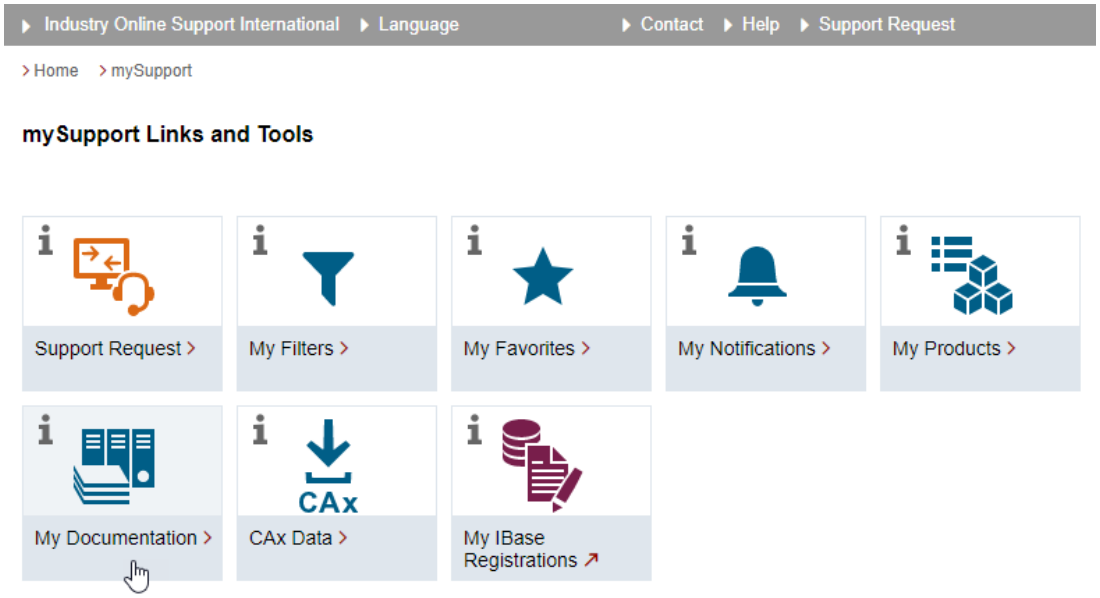
1.4 Feedback on the technical documentation

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

1.5 mySupport documentation

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.

1.6 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 (frequently asked questions)
- 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.

1.7 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)

1.8 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.

Fundamental safety instructions 2

2.1 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.

2.2 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.

2.3 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.

Overview 3

3.1 System description

Analyze MyWorkpiece /Monitor is a SINUMERIK Edge application for qualitative monitoring and evaluation of the processing procedure. Various measured values are stored for this purpose during processing.

The functionality of the application can be divided into the following steps:

1. Training machining operation
   - Users import or create a model as basis for monitoring the machining process.
2. Monitoring the machining operation
   - The user defines and configures the process steps or operations to be monitored in "jobs".
   - The use case records all values that are available on the data bus of the SINUMERIK control system.
   - The data defined and recorded in this way is stored in SINUMERIK Edge and preprocessed after completion of the specified operation.
   - The data are evaluated using the "Six-Sigma" statistical procedure or a user-defined algorithm.
     - The result is saved in a report.
     - The result is reported back to the control in a global user variable (GUD).
   - Using the "Direct Monitoring" function, you can analyze intermediate data (data that are almost in real time) of an active monitoring job.
   - Using the "Measuring cycle" function, you can monitor workpiece-related measurements integrated in the machine, which are performed based on SINUMERIK measuring cycles.

The user receives an MQTT notification if a new result is available and can be requested using REST API.

Based on the result, the user can decide whether the processed operation was good or bad in terms of quality. For this assessment, limits are defined beforehand by reference processing.

Note

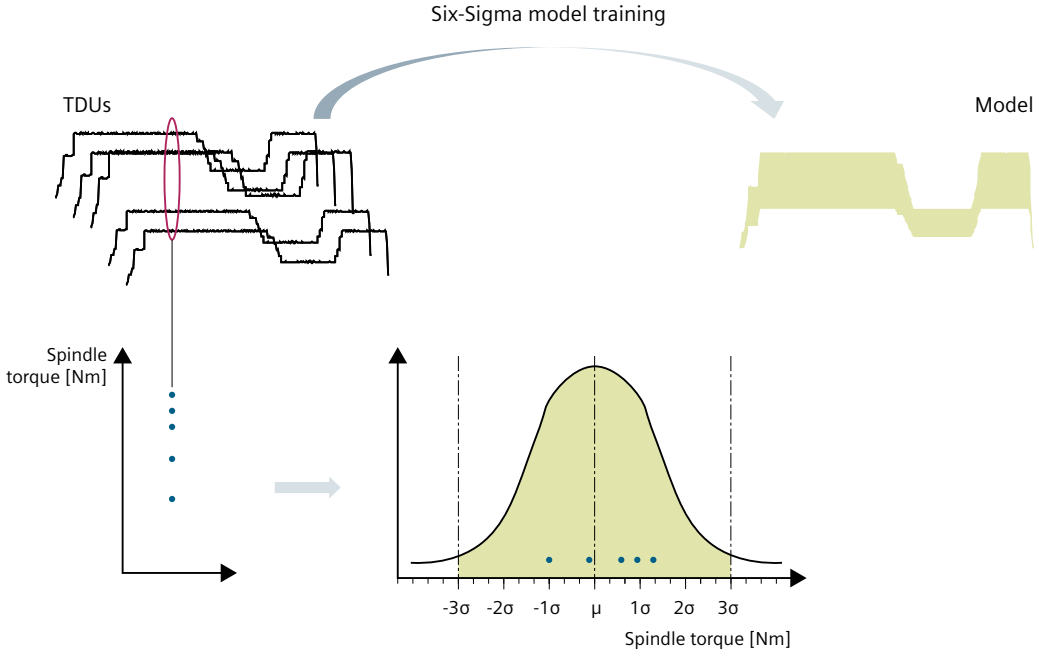
"Six-Sigma" procedure

"Six-Sigma" is a statistical procedure used in quality assurance.

Creating a model

In order to detect a processing procedure anomaly (operation good or bad) during production, the processing procedure must be analyzed beforehand:

1. Record (capture) the machining process data using Analyze MyWorkpiece /Capture.
2. Create a model:
   - Import the Capture data from Analyze MyWorkpiece /Capture
   - Using triggers, split-up the data into individual operations.
     The process data for an operation is called TDU (Training Data Unit).
   - Create training data sets from Capture data.
     Several TDUs for the same operation are combined in training data sets.
   - Train the model based on the training data set.
     Assuming that the data in the training data set have a Gaussian (standard) distribution, expected value μ and the standard deviation σ can be derived for every data point. If 6σ is defined as the maximum permitted deviation, a model can be calculated using the "Six-Sigma" method from the TDUs.
3. Assign the model a monitoring job.



Operator control structure

Analyze MyWorkpiece /Monitor contains the following functions:

- Import Capture Data (Page 27)
  - Import machining process data from Analyze MyWorkpiece /Capture as basis for training the model
- Create Training Data Unit Sets (Page 33)
  - Create a training data set from Capture data as basis for the model training
- Train Models (Page 45)
  - Create a model based on training data sets
- Manage Monitoring Jobs (Page 59)
  - Manage job configurations
- Analyze Monitoring Results (Page 69)
  - View and manage result reports
- Configure Settings
  You make these settings once after installing Analyze MyWorkpiece /Monitor - or while operational under "Configure Settings", e.g. under "Data retention rules".
  You can find more information on data retention rules in Chapter Managing memory space (Page 22).
  More information about user settings is provided in the
  SINUMERIK Edge Installation Manual, Analyze MyWorkpiece /Monitor.
- User-defined algorithm (Page 79)
- Direct Monitoring (Page 89)
- Measurement cycle (Page 97)

3.2 Users and rights

To access the Analyze MyWorkpiece /Monitor application, a local user on the SINUMERIK Edge must be assigned to the user group listed below. To do this, the system administrator for the SINUMERIK Edge device creates the user group, and creates one or several users, who are assigned to this user group.

More information about the user group is provided in the
Installation Manual SINUMERIK Edge, Analyze MyWorkpiece /Monitor.

User group

The following user group is available for Analyze MyWorkpiece /Monitor:

User group	Authorizations
amwmonitor	Access to all functions of Analyze MyWorkpiece /Monitor.

3.3 Starting Analyze MyWorkpiece /Monitor

Analyze MyWorkpiece /Monitor is started by entering an URL in the browser.
After successfully logging in, the home page is called with an overview of all functions.

Requirement

- SINUMERIK Edge has been configured and commissioned.
- To create models in Analyze MyWorkpiece /Monitor, machining process data recorded using Analyze MyWorkpiece /Capture must be available.

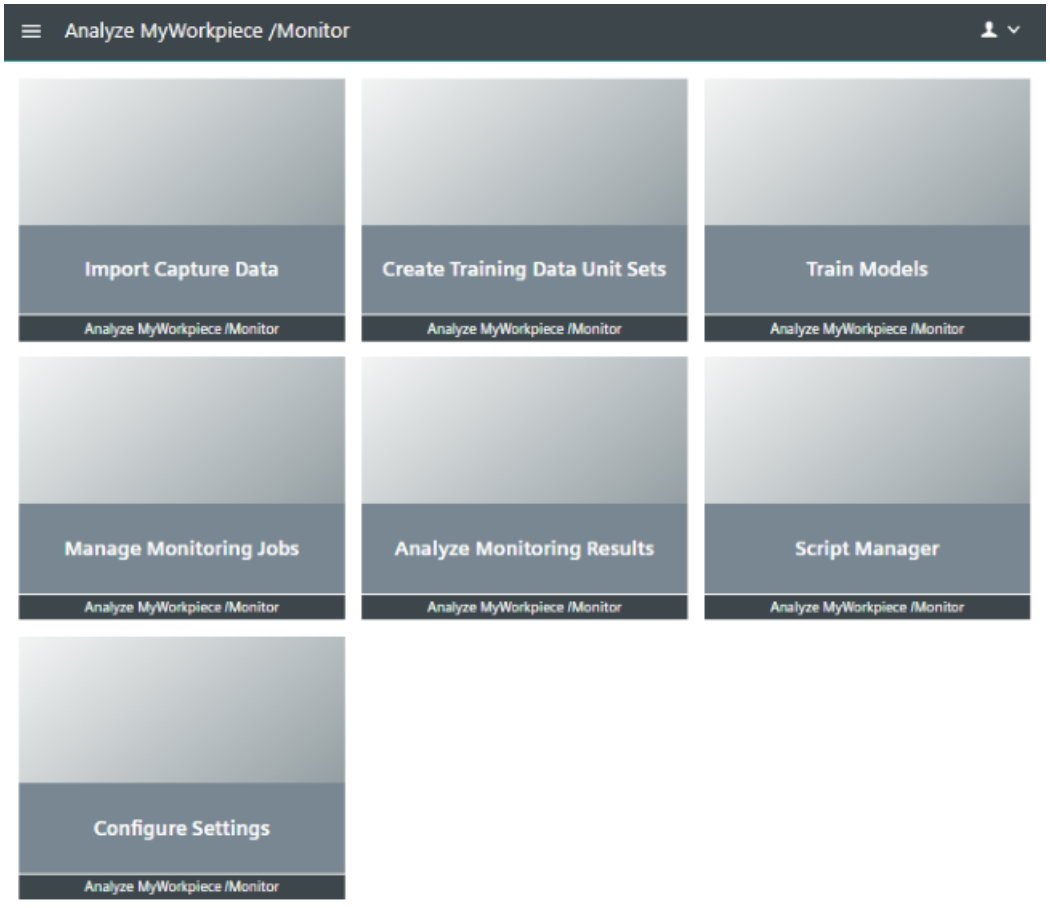
More information

You can obtain the following information in the menu, in the upper left-hand corner:

Information	Description
Software from third-party suppliers	Contains information about the license terms of the third-party software used.
Readme	Contains the latest changes that are not listed in the user manual and constraints.
User Manual	This User Manual.
Version number	Version number of Analyze MyWorkpiece /Monitor.

Procedure

1. Enter the following address in the browser:
   `https://<ip-address-of-edgebox>:5443/amwmonitor`
   The login page is displayed.
2. Enter your Analyze MyWorkpiece /Monitor user name and password.
   Information on users and the user group can be found in the section: Users and rights (Page 17).
3. Click the "Login" button.
   The home page opens.



3.4 Change password

Change your password at regular intervals.

Procedure

1. Open the drop-down list at the top right in the title bar.

2. Click "Change Password".
   You are redirected to the "miniweb" administration environment.
3. Change the password.

More information about changing the password is provided in the Industrial Edge User Documentation.

3.5 Switch language

The user interface is available in the following languages:

- English
- German

Procedure

1. Open the drop-down list at the top right in the title bar.

2. Click on your chosen language.
   The user interface is displayed in the required language.

3.6 Sign out

If you want to exit Analyze MyWorkpiece /Monitor, then sign out on the SINUMERIK Edge administration page.

Procedure

1. Open the drop-down list at the top right in the title bar.

2. Select "Logout".
   You are transferred to the SINUMERIK Edge administration page.
3. On the SINUMERIK Edge administration page, select "Logout".

3.7 Filtering data

On overview pages, Analyze MyWorkpiece /Monitor provides the option of reducing the amount of data that is displayed using the filter function.

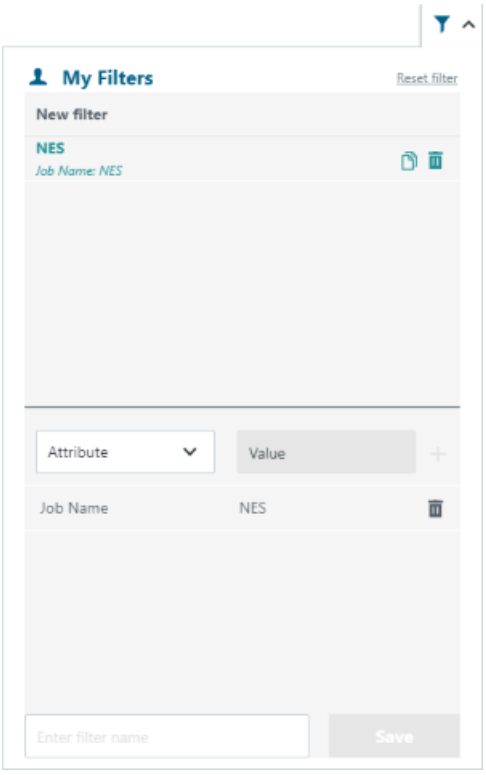
Symbols

The following symbols are taken into account when filtering:

Symbol	Description
	Opens the "My Filters" menu.
	Copies the selected filter to the "My Filters" list.
	Deletes the selected filter criterion from the current filter. Deletes the corresponding filter from the "My Filters" list.
	Adds additional criteria to the current filter.
	Closes the "My Filters" menu.

Procedure

1. Click the "Filter" symbol.
   The "My Filters" menu opens and various filter dialogs are listed corresponding to the tasks.
2. Select a filter from the "My Filters" list.
   - OR -
   Define a new filter.
3. To do this, select the filter criterion from the "Attribute" drop-down list.
4. In the "Value" field, enter the exact text or the number being searched for and in the full length.
   Placeholders are not supported.
5. Add the filter criterion for the current filter using the "+" character.
   Remove the corresponding filter criterion using the "Delete" symbol.
6. If you wish to save the filter for reuse:
   - Enter a filter name.
   - Click on "Save".
     The filter is displayed in the "My Filters" list.
7. Click on "Reset filter" to redisplay all of the data.



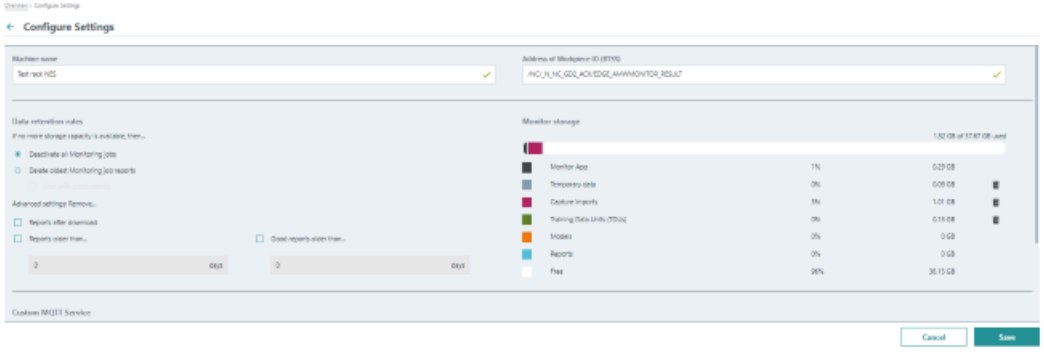
3.8 Managing memory space

In the user settings, Analyze MyWorkpiece /Monitor provides the option of freeing-up memory space.

Procedure

1. On the home page, click on "Configure Settings".

2. Page "Configure Settings" opens.
   - Under "Data retention rules" in the left-hand area, you can define rules for managing the memory space; this is automatically run in the background in order to continuously ensure smooth operation.
   - You can define how the system should respond if memory capacity is no longer available:
     If you activate option "Deactivate all monitoring jobs", all active monitoring jobs are terminated and data is no longer recorded.
     If you activate option "Delete oldest monitoring results", then the oldest reports are deleted. If you also activate the suboption, reports with positive results are deleted before the old reports with negative results.
   - Under "Advanced settings: Remove..." you can define when reports are deleted with a fine granularity:
     You can define that reports are deleted once they have been successfully downloaded.
     You can define that reports are deleted independent of the result once they are older than "x" days.
     You can define that reports with a positive result are deleted after "x" days.
   - Memory space utilization is displayed under "Monitor storage" in the right-hand area.
   - To permanently delete all data belonging to a category (temporary data, job reports, ...), click on the "Delete" symbol at the end of the corresponding line.



3.9 Managing MQTT service

In the user settings, Analyze MyWorkpiece /Monitor provides the option of configuring an MQ TT connection.

Notifications (MQTT notifications) can then be sent to an MQTT broker to inform MQTT clients that a monitoring job has been completed and a report is available that can be downloaded.

For each completed monitoring job, Analyze MyWorkpiece /Monitor sends an MQTT notification to the configured MQTT broker, which contains a download link for the report that has been generated, the corresponding monitoring results and additional information regarding the completed monitoring job.

The MQTT interface can be used as alternative to REST API - or in conjunction with REST API - to obtain monitoring results and to avoid unnecessary REST queries.

You can find additional general information on the MQTT protocol here: MQTT.org (https://mqtt.org/)

Note

- The MQTT client authentication with user name and password must be activated in the MQTT broker configuration to check the client identity.
- User name and password are transferred to the MQTT broker in plain text as no data transfer encryption is used for MQTT communication.

Requirement

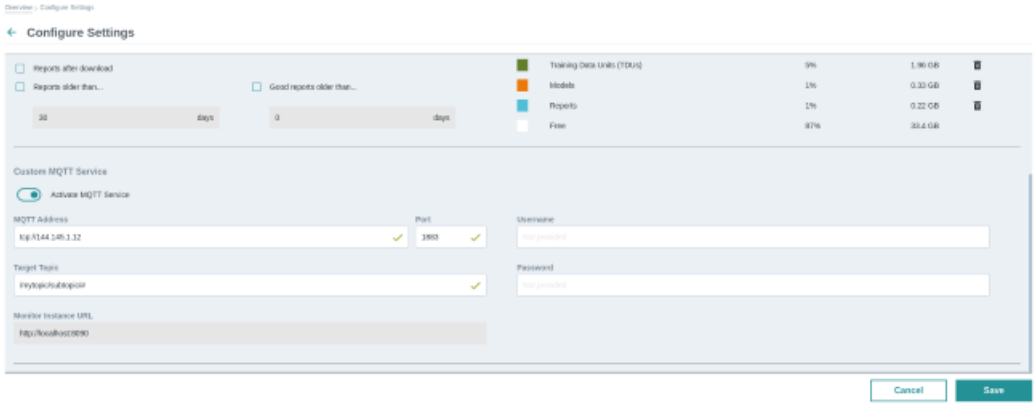
An MQTT server (MQTT broker) was set up, which can be accessed from SINUMERIK Edge (on the factory network side).

Procedure

1. On the home page, click on "Configure Settings".

2. Page "Configure Settings" opens.

3. Click on "Activate MQTT service" and populate the following text boxes:
   - Network address of the MQTT broker and port: IP address and port of your MQTT server (protocol prefix "tcp://" is required)
   - Target topic: The name of the MQTT topic that is used to publish MQTT notifications (case sensitive)
   - User name and password: for authentication on your MQTT server



4. To save the configuration, click on "Save".
   Analyze MyWorkpiece /Monitor starts by sending MQTT notifications if the configuration was correctly configured.

Import Capture Data

4

4.1 Overview

To create or train a model, first import the machining process data, which was recorded/traced using Analyze MyWorkpiece /Capture.

Requirement

- Analyze MyWorkpiece /Capture or Analyze MyWorkpiece /Capture for Analysis must be installed on the same Edgebox.
- Recording files created with Analyze MyWorkpiece /Capture are available.

Functions and data

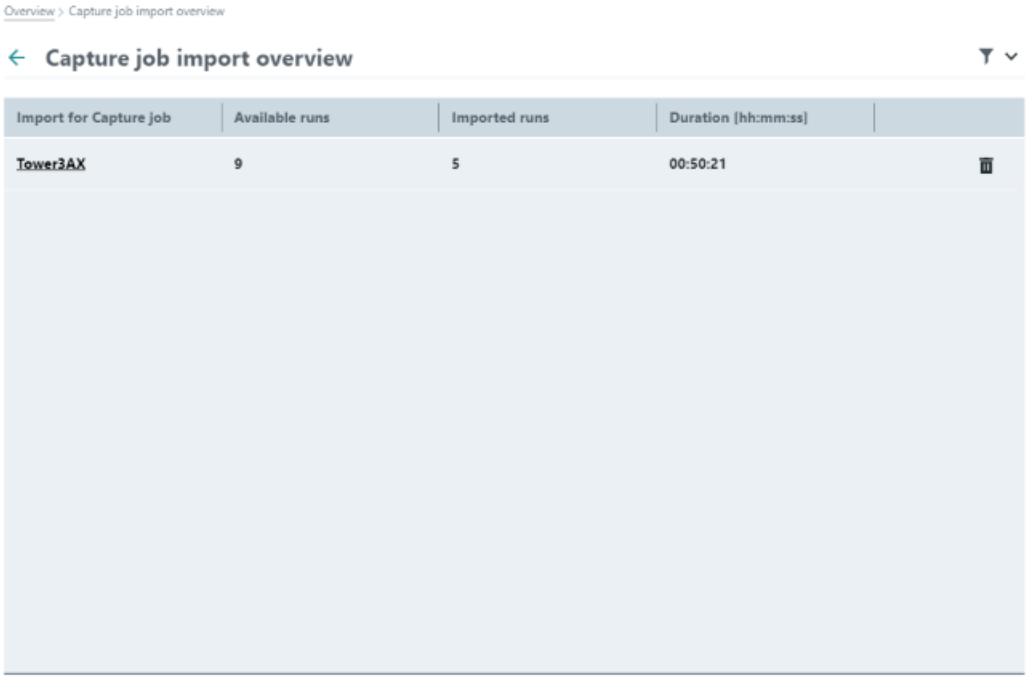
The following functions and data are available:

Function/data	Description
	Navigates to the previous page.
	Filters the list of Capture jobs
Import for Capture job	Capture job name The name is assigned by the Analyze MyWorkpiece /Capture application
Available runs	Number of data sets available on this machine that can be imported.
Imported runs	Number of data sets that have already been imported.
Duration [hh:mm:ss]	Data volume that was imported as complete duration in the format [Hours:Minutes:Seconds].
	Deletes the imported data of the Capture job in Analyze MyWorkpiece /Monitor The data is not deleted from Analyze MyWorkpiece /Capture. This symbol is only available if Capture Job Runs were imported.

Procedure

1. Click the "Import Capture Data" button on the home page.

2. The "Capture Job Import Overview" page opens and displays an overview of the machining process data available for import and the already imported machining process data.
   - Click on the column header to sort data sets in either ascending or descending order in a column.
   - To reduce the number of data sets listed, click on the "Filter" symbol.
     More information is provided in Chapter: Filtering data (Page 20).
   - You can import a new run of a Capture job.
     More information is provided in Chapter: Importing records of a Capture job (Page 29)
   - You can delete imported runs of a Capture job.
     The deleted data remain available in Analyze MyWorkpiece /Capture for a subsequent re-import, assuming that they were not deleted directly beforehand in Capture.
     More information is provided in Chapter: Deleting the record of a Capture job (Page 31).
   - You can determine the cause as to why an import was unsuccessful.
     More information is provided in Chapter: Determining why an import was not successful (Page 31).



4.2 Importing records of a Capture job

Every Capture job contains one or several runs that you can import.

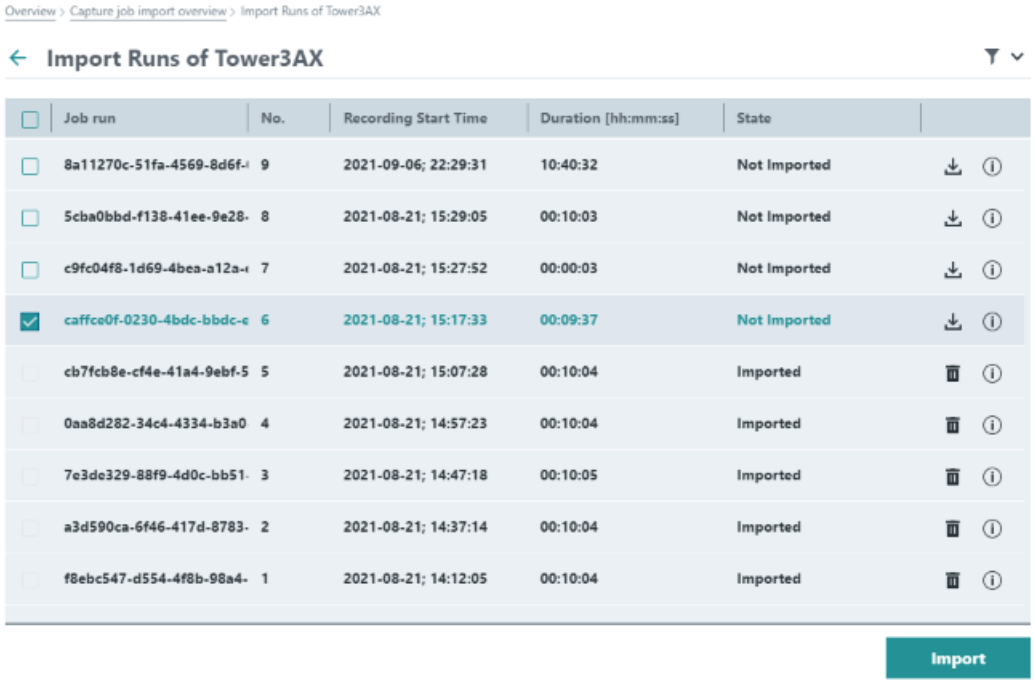
Functions and data

The following functions and data are available:

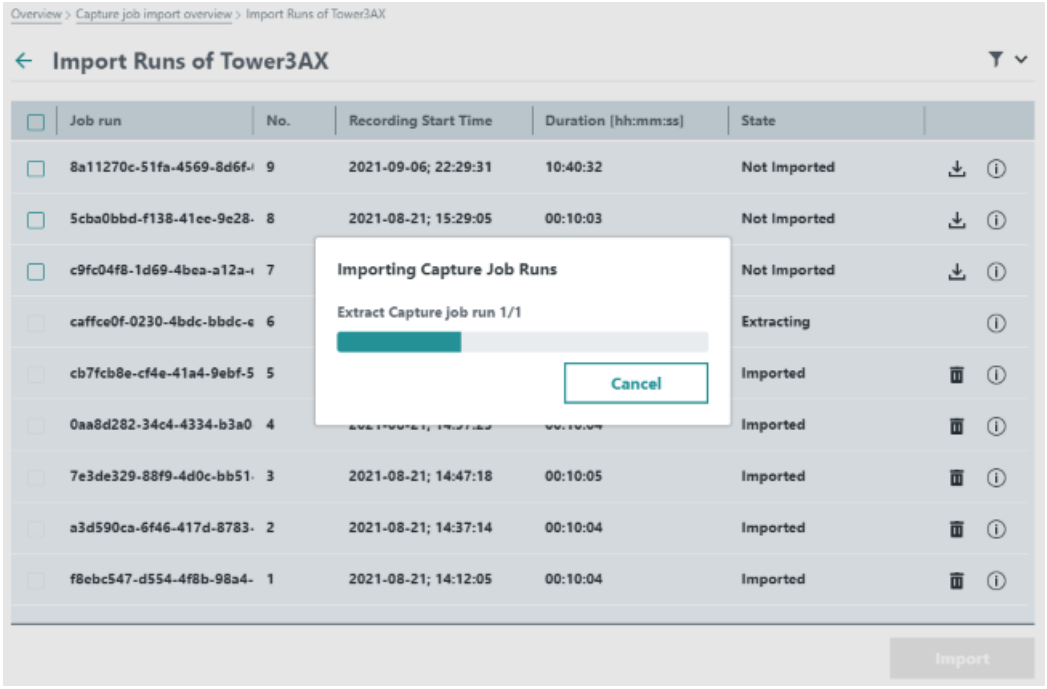
Functions/data	Description
☐	Check box to select a run. All runs are selected if you activate the check box in the column header.
Job run	Name of the run As default setting, the time stamp of the recording is used as name.
No.	Run number.
Time at the start of recording	Displays the time at the start of recording [Year-Month-Day;Hour:Minute:Second]
Duration [hh:mm:ss]	Length of the recording in the format [Hour:Minute:Second].
Status	Shows the import status: • Not imported • Import running ... <Progress>% • Imported: • Import failed
⬇	Starts the import. This symbol is only available if the status is "Not Imported".
✕	Cancels the active import. This symbol is only available if the status is "Importing...x%".
🗑	Deletes the run of the Capture job from Analyze MyWorkpiece /Monitor. The data is not deleted in Analyze MyWorkpiece /Capture. This symbol is only available for imported data sets.
ⓘ	Displays detailed information about the run.

Procedure

1. Click on the name of the required Capture job on page "Capture Job Import Overview".
2. Page "Import runs of <Name of the Capture job>" opens, and displays all runs of the selected Capture job and its associated parameters.
   - Click on the column header to sort runs in either ascending or descending order in a column.
   - To import an individual run:
     Click on the "Import" symbol in the required line.
     The import progress is displayed in column "Status".
   - You can cancel the active import by clicking on the "Cancel" symbol.
     You obtain a security message that you can confirm or cancel.



3. To import several runs:
   - Activate the check box by the required run.
   - Click on the "Import" button.
     Message "Import Capture Job Runs" opens and indicates the progress of the import.
   - Click on "Cancel" to cancel the import operation.
     You obtain a security message that you can confirm or cancel.



4.3 Deleting the record of a Capture job

Every Capture job contains one or several runs. You have the option of deleting runs that are no longer required, assuming that these were not deleted in Capture.
The deleted data is available for subsequent re-import into Analyze MyWorkpiece /Capture.

Procedure

1. Click on the name of the required Capture job on page "Import Capture Data".
   Page "Import runs of <Name of the Capture job>" opens, and displays all runs of the selected Capture job and its associated parameters.
2. To delete a run, click on the "Delete" symbol in the required line.
   A security message is displayed.
   To confirm the message, click on "Delete"

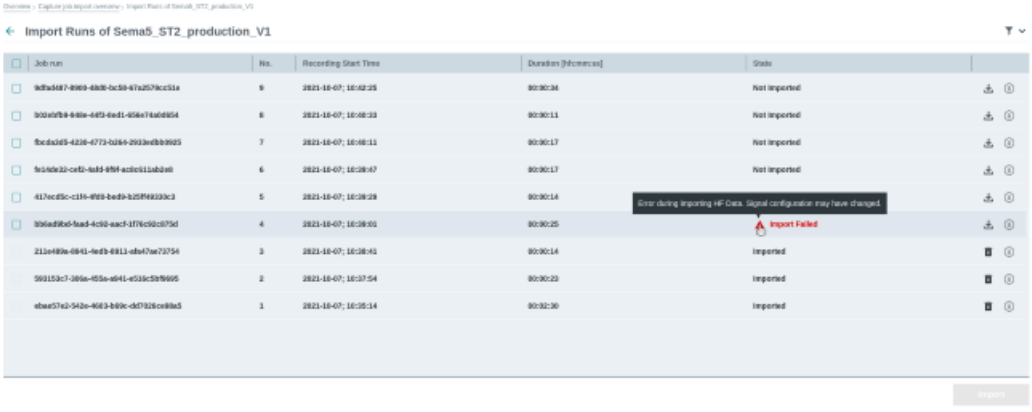
4.4 Determining why an import was not successful

You can determine the cause of the error if a capture job run was not able to be imported.

Procedure

1. Page "Import Runs of <name of the capture job>" is open, and displays all runs of the selected capture job and its associated parameters.
   For a run with unsuccessful import, a red triangle and "Import Failed" are displayed in the "State" column.
2. Move the mouse over the red triangle to determine the cause of the error.
   The possible error is displayed in a tooltip.
   The following error types exist:
   - Error when importing HF data. The signal configuration may have changed.
   - Error when importing HF events.
   - Error when importing LF data. The LF data format may have changed.
   - No ZIP file available.
   - Corrupted ZIP file.

   The following error message is displayed in the tooltip if the cause of the error was not able to be determined:
   - The error source cannot be identified.



Create Training Data Unit Sets

5

5.1 Overview

You require the appropriate training data sets to create or train a model.

A training data set corresponds to an operation while machining a workpiece, and contains the necessary process data. To be able to train a model, you require several training data sets of the same operation.

Requirement

- The machining process data of the Capture job were imported.
- The training data sets were generated using the "Create Training Data Unit Sets" application.

Functions and data

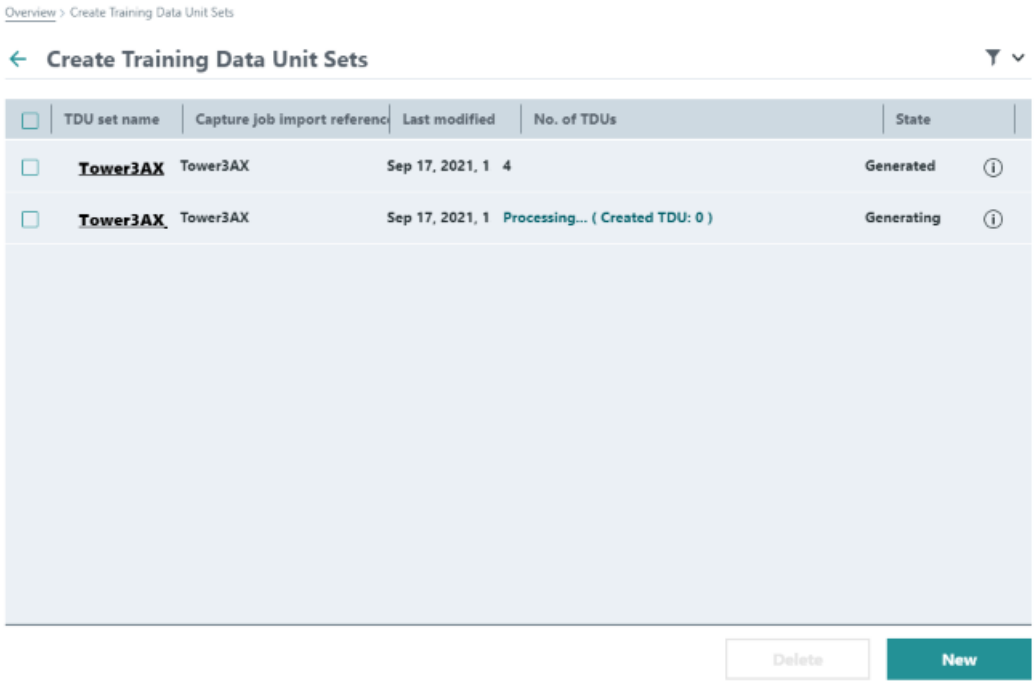
The following functions and data are available:

Functions/data	Description
	Navigates to the previous page.
	Filters the list of data sets
	Check box to select a training data set All data sets are selected if you activate the check box in the column header.
Name of the TDU set	Name of the training data set (**T**raining **D**ata **U**nit)
Capture job import reference	Name of the Capture job whose machining process data was imported.
Last modified	Date and time of the last change.
Number of TDUs	Number of TDUs (**T**raining **D**ata **U**nit) in the TDU set. The progress is displayed while creating the TDUs.
Status	Displays the status of the training data set. • Generated • Generate
	Indicates that new recording data of a machining process is available after the training data set was created.
	Cancels the active creation process This symbol is only available during the creation process.
	Deletes the training data set.
	Copies the training data set.
	Displays detailed information about the training data set.

Procedure

1. On the home page, click on "Create Training Data Unit Sets".

2. Page "Create Training Data Unit Sets" opens and displays all training data sets.
   - Click on the column header to sort data sets in either ascending or descending order in a column.
   - To reduce the number of data sets listed, click on symbol "Filters".
     More information is provided in Chapter: Filtering data (Page 20)
     .
   - You can display additional details about a training data set.
     More information is provided in Chapter: Displaying details (Page 35).
   - You can create a new training data set and change the parameters of an existing training data set.
     More information is provided in Chapter: Creating/configuring training data sets (Page 36)
   - You can select or edit runs of a Capture job.
     More information is provided in Chapter: Creating training data sets (Page 41)
   - You can copy individual training data sets.
     More information is provided in Chapter: Copy training data sets (Page 42).
   - You can delete individual or several training data sets.
     More information is provided in Chapter: Deleting a training data set (Page 43)



Note

"G0" motion is ignored

Command "G0" (rapid traverse) is used in part programs in the SINUMERIK control to traverse axes as quickly as possible to a specific position. This allows machining time to be reduced in production environments. Rapid traverse is only used for motion where no stock removal takes place (no chips), for example, when changing tools.

When creating training data sets, "G0" sections of the process data are ignored. As a consequence, data that is not relevant for downstream monitoring is filtered out.

5.2 Displaying details

You have the option of displaying more information about a training data set.

Functions

Function	Description
ⓘ	Displays detailed information about the training data set, e.g.: • Settings of the start trigger • Settings of the stop trigger

Procedure

1. Select the required training data set from the overview.
2. In the last column, click on the "i" symbol.
   A tooltip opens, and displays the appropriate data.

5.3 Creating/configuring training data sets

You have the option of creating a new training data set or changing an existing training data set.

Functions and data

The following functions and data are available:

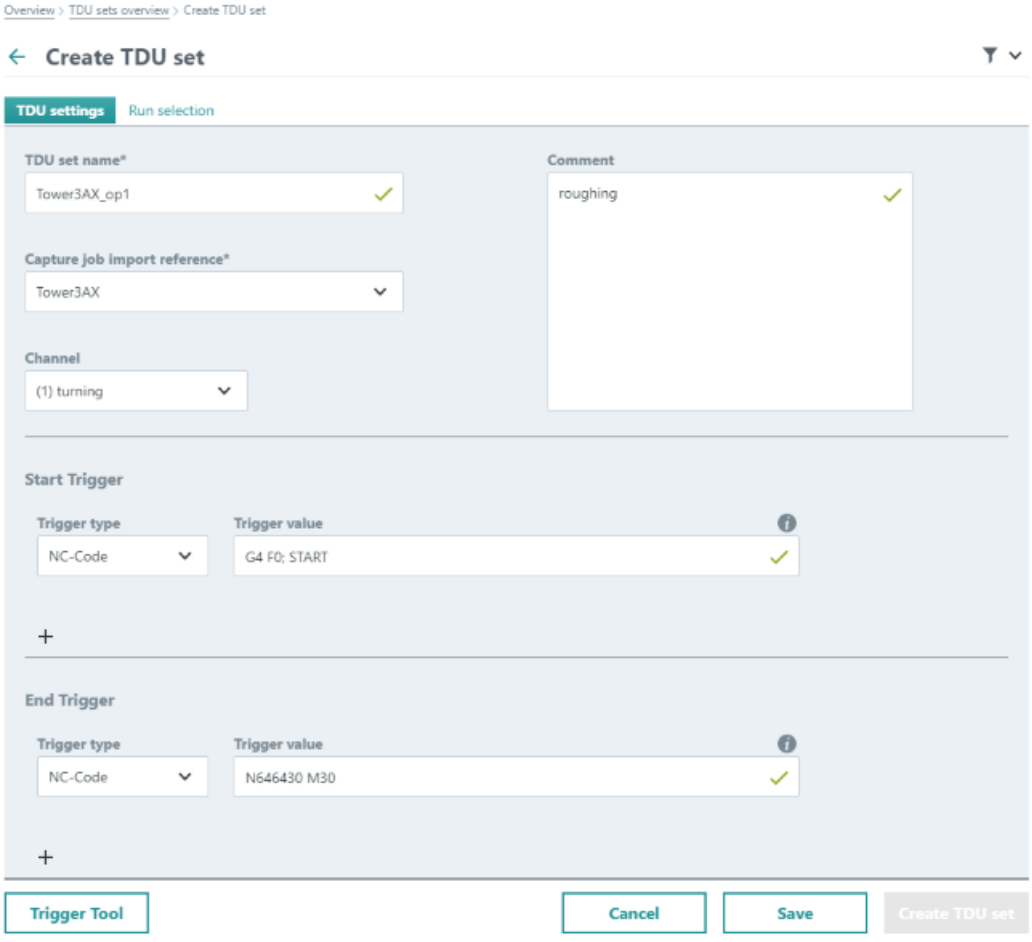
Functions/data	Description
Name of the TDU set*	Text box for entering the name of the training data set.
Capture job import reference*	Selects the Capture job, whose imported machining process data should be used to create a training data set.
Channel	Selects the channel to be monitored.
Comment	Text box to enter additional comments.
Start Trigger Stop Trigger	Areas to define triggers that mark the start or end of the operation for which training data sets are created. Every trigger is defined using the trigger type and the associated value.
Trigger type	Select one of the following trigger types: • NC code - complete NC program line or part of a line • Tool ID - identification number of the tool used to execute the machining operation. Corresponds to field "ActiveTool" in an "HFBlockEvent" of an Analyze MyWorkpiece /Capture recording. • Seek offset - NC program line number • Program name • Call Stack Level - subprogram level number • BTSS (OPI) - SINUMERIK operator panel interface (can only be selected in conjunction with the trigger type)
Trigger value	Text box to enter the trigger value. The following placeholders are permissible: • "*" for one or several arbitrary characters An additional text box for the BTSS (OPI) variable address is displayed if you select trigger type "BTSS (OPI)".
	Shows detailed information on the start and stop trigger in a tooltip.

Functions/data	Description
+	Adds an additional trigger. If several triggers are defined for the start or the end, then the triggers are logically AND'ed.
🗑	Deletes the trigger.

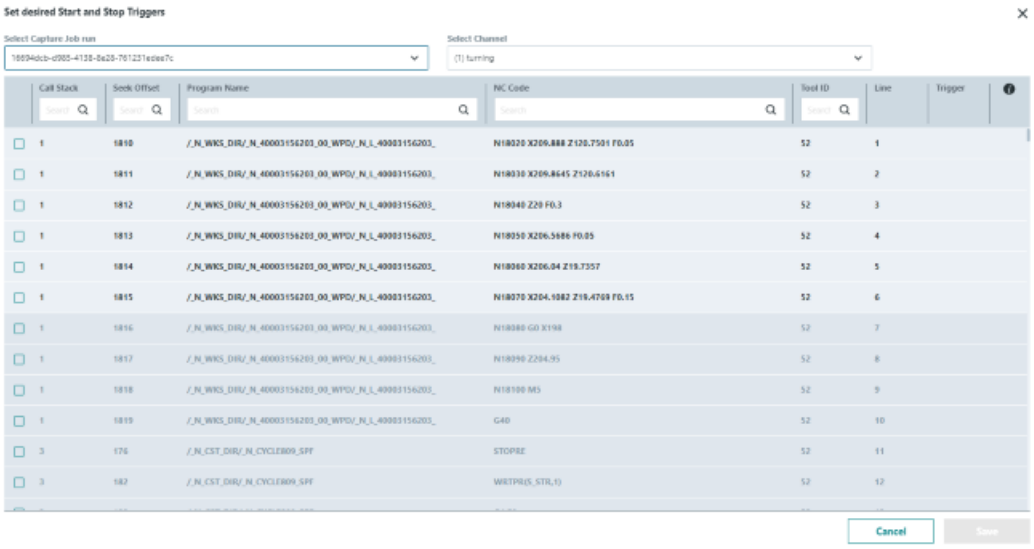
* The text boxes marked with an asterisk are mandatory and must be completed.

Procedure

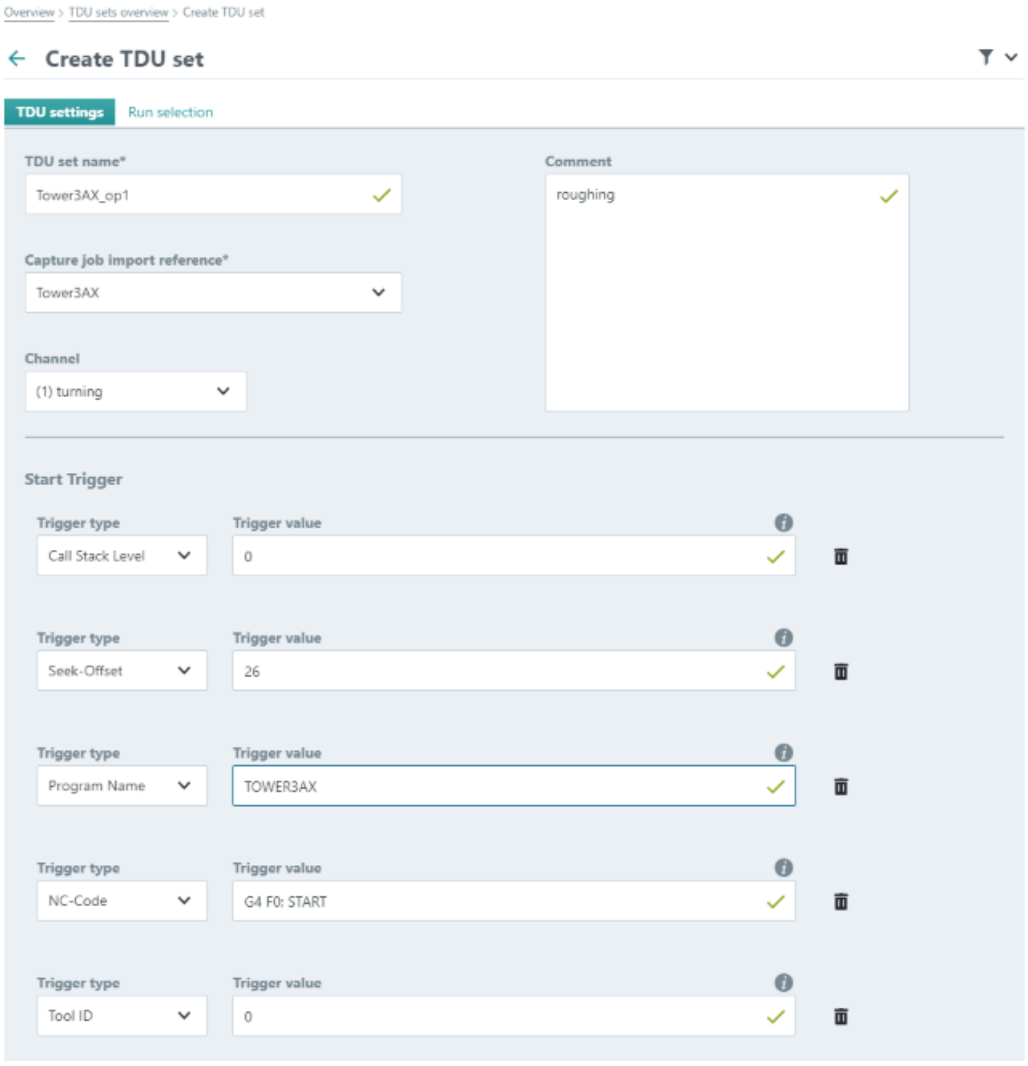
1. On page "TDU sets overview" click on the name of the required training data set.
   - OR -
   Click on "New".
2. Page "Configure TDU set" > Tab "TDU settings" opens.
   – Enter the general parameters of the training data set.

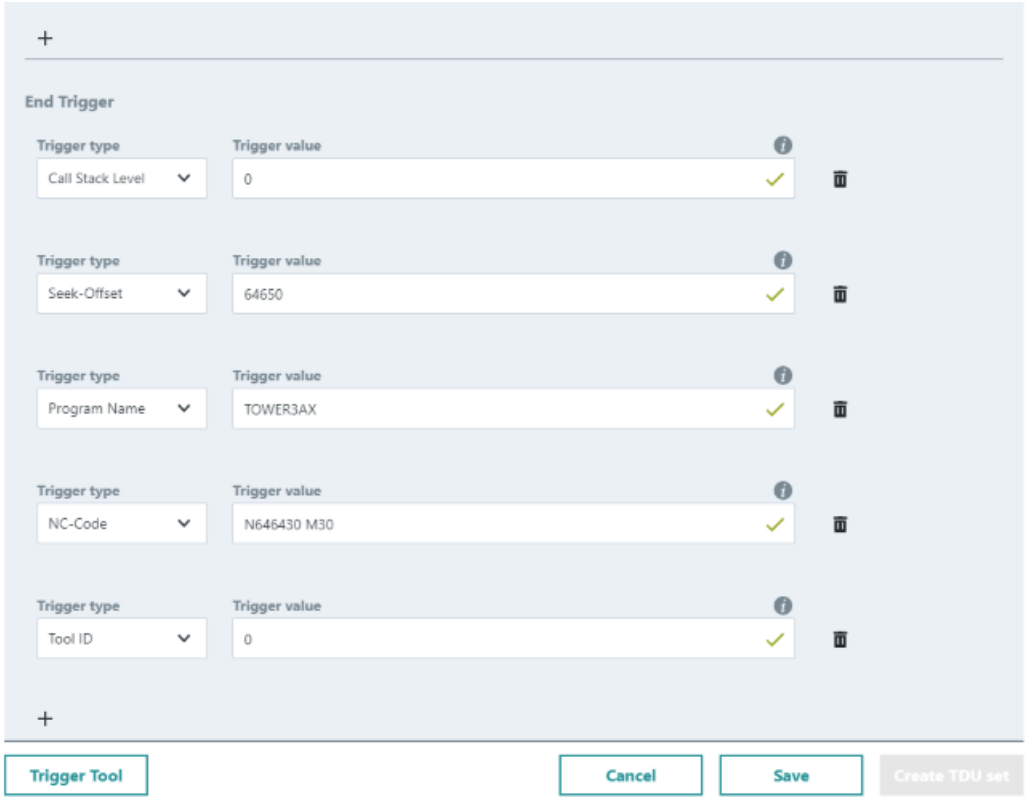


3. Manually define the start and stop triggers.
   - OR -
   Allow the system to help you define the trigger.
   - Click on "Trigger Tool".
     In order that the button is active, you must first define "Capture Job Import Reference*".
     Page "Set desired Start and Stop Triggers" opens.
   - When required, change the default data in the drop-down lists "Select Capture Job Run" and "Select Channel".
   - Define the start trigger and the stop trigger.
     Select one of the listed values.
     Define whether it involves a start trigger or a stop trigger.
     Define which criteria should be used for the specific trigger.
     Confirm the selection.
   - Click on the "i" symbol. The NC code that was transferred to SINUMERIK Edge is displayed in a tooltip.



4. Once you have entered and selected all the data click on "Save".


Overview > TDU sets overview > Create TDU set
Create TDU set
TDU settings
Run selection
TDU set name*
Tower3AX_op1
Comment
roughing
Capture job import reference*
Tower3AX
Channel
(1) turning
Start Trigger
Trigger type
Call Stack Level
Trigger value
0
Trigger type
Seek-Offset
Trigger value
26
Trigger type
Program Name
Trigger value
TOWER3AX
Trigger type
NC-Code
Trigger value
G4 F0: START
Trigger type
Tool ID
Trigger value
0



5.4 Selecting records of a Capture job

One or several imported recordings of a Capture job can be used as basis when creating a training data set

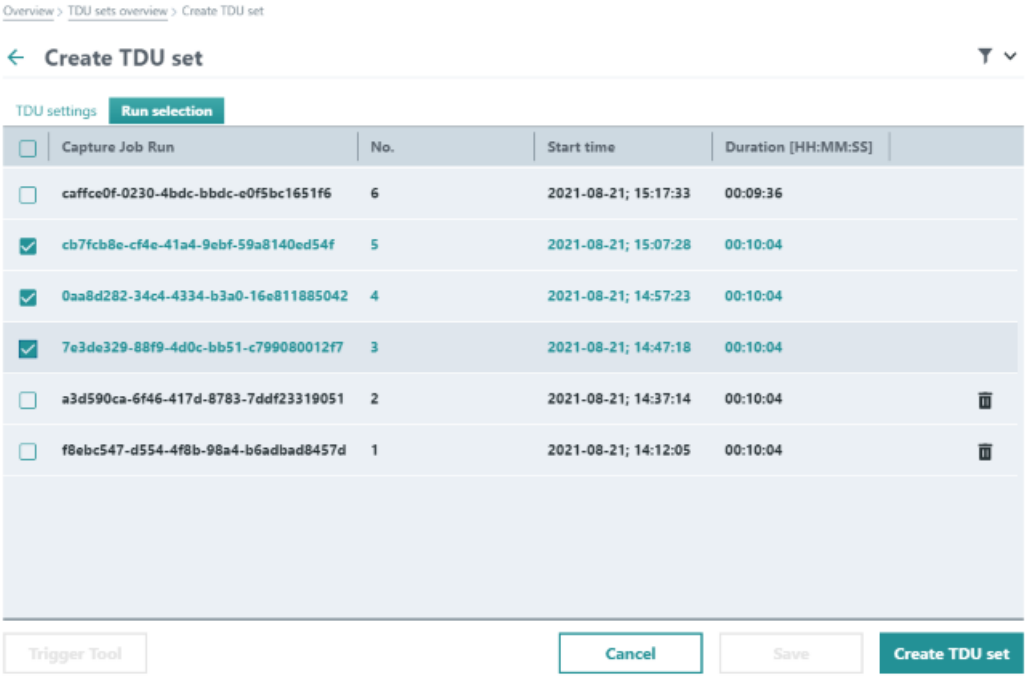
Functions and data

The following functions and data are available:

Functions/data	Description
☐	Check box to select a run. All runs are selected if you activate the check box in the column header.
Capture Job Run	Name of the Capture job data set. As default setting, the time stamp of the recording is used as name.
No.	Run number.
Start time	The execution start time in the format [Year-Month-Day; Hour:Minute:Second].
Duration [HH:MM:SS]	Length of the recording in the format [Hour:Minute:Second].

Procedure

1. On page "Create TDU set", open tab "Run selection".
2. Activate the check box by the required "Capture Job Run" from the TDUs that should be created.
3. Click on "Create TDU set".



5.5 Creating training data sets

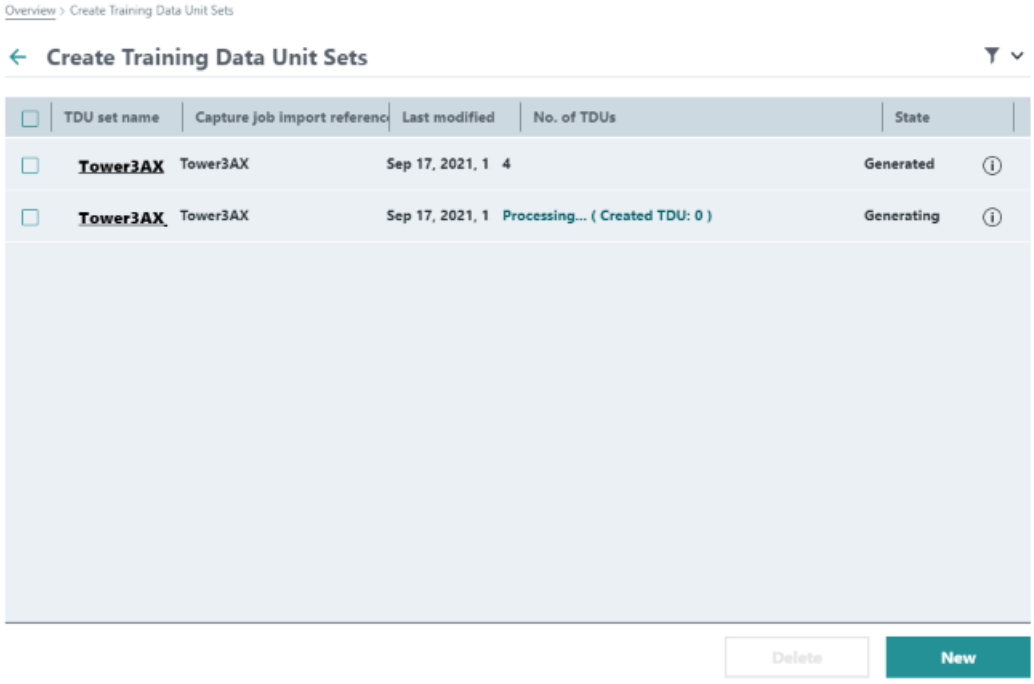
Training Data Units (TDUs) are the extracted process data referred to the defined operations from the recording data of Analyze MyWorkpiece /Capture. Operations are defined by start and stop triggers.

Requirements

- All of the parameters required were entered on page "Create TDU set" > Tab "TDU settings". Start and stop triggers were defined: Creating/configuring training data sets (Page 36)
- Recordings/runs of a Capture job were selected on page "Create TDU set", > tab "Run selection": Selecting records of a Capture job (Page 40).

Procedure

1. On page "Create Training Data Unit Sets" click on "New".
2. Page "Create Training Data Unit Sets" reopens.
   Progress is shown in column "No. of TDUs".
   Click on symbol "x" to cancel the creation process.
3. The number of TDUs created is displayed once machining has been completed.
   The status switches to "Generated".



5.6 Copy training data sets

You have the option of copying existing training data sets.

Procedure

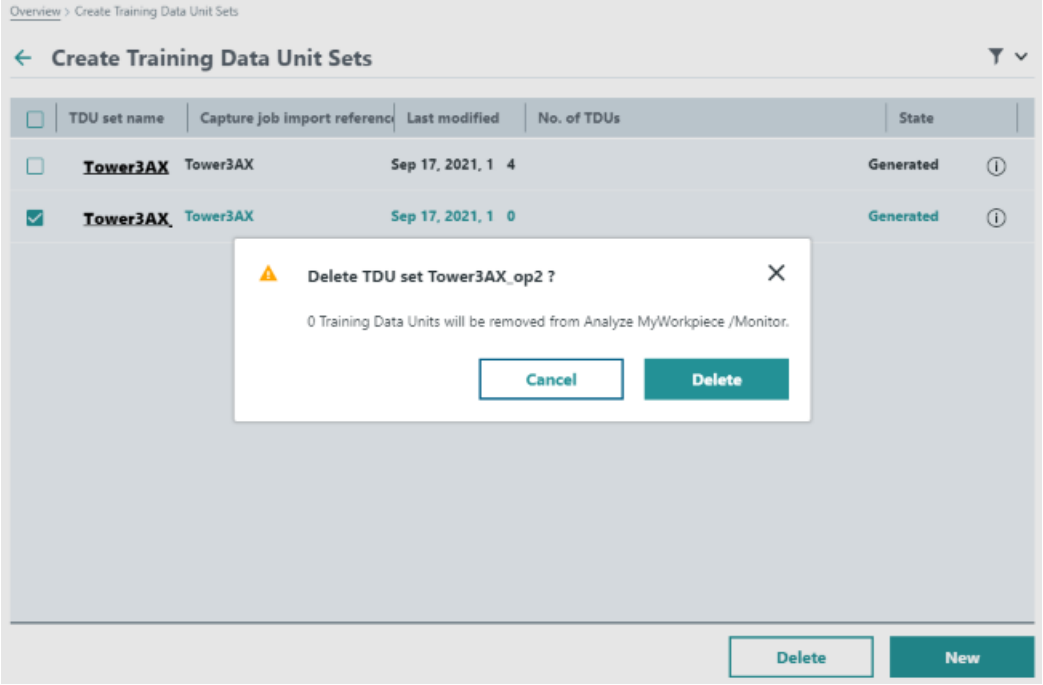
1. Page "Create Training Data Unit Sets" opens and displays all training data sets.
2. To copy a training data set, click on the "Copy" icon in the corresponding line.
   - The new name of the copied training data set comprises the original name and extension "_Copy_<timestamp_in_millis>". "timestamp_in_millis" forms the time stamp for the copy operation.
   - The copied training data set has status "Created" and the training data set settings can now be changed. The name of the TDU set and the Capture Job Import reference cannot be changed.

5.7 Deleting a training data set

You have the option of deleting training data sets that are no longer required.

Procedure

1. Page "Create Training Data Unit Sets" opens and displays all training data sets.
2. To delete an individual training data set, click on the "Delete" symbol in the appropriate line.
   -OR -
   To delete several training data sets:
   - Activate the check box by the required data sets.
   - Click on "Delete".
     You receive a security message as to whether you wish to permanently delete the selected training data sets.
     Click on "Delete" to confirm the query.


Overview > Create Training Data Unit Sets
Create Training Data Unit Sets
TDU set name
Capture job import referenc
Last modified
No. of TDUs
State
Tower3AX
Tower3AX
Sep 17, 2021, 1 4
Generated
Tower3AX_
Tower3AX
Sep 17, 2021, 1 0
Generated
Delete TDU set Tower3AX_op2 ?
0 Training Data Units will be removed from Analyze MyWorkpiece /Monitor.
Cancel
Delete
Delete
New

Train Models

6

6.1 Overview

Before you use a model, train the model using the training data sets that have been created.

Requirement

A training data set (TDU set) was generated for a specific operation.

Functions and data

The following functions and data are available:

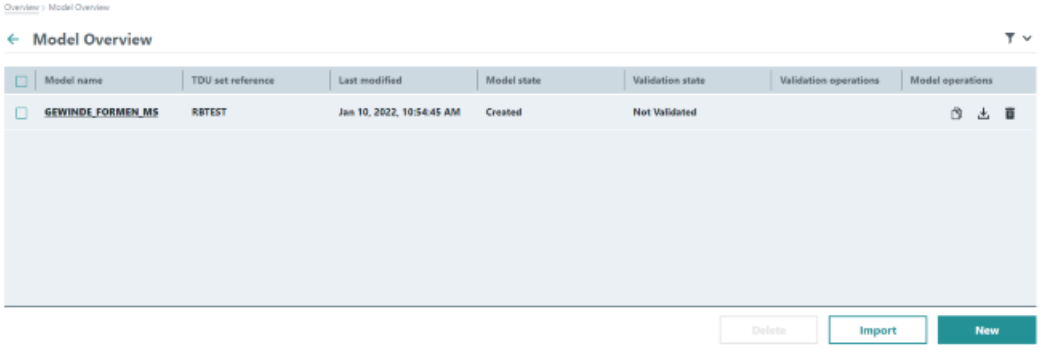
Functions/data	Description
	Navigates to the previous page.
	Filters the list of models.
	Check box to select a model. All data sets are selected if you activate the check box in the column header.
Model reference	Model reference
TDU set reference	Name of the training data set on which the model is based.
	Indicates that after the model was created, the underlying training data set was changed.
Last modified	Date and time of the last change.
Model state	Shows the model state: • Created – the model was created, several settings were made; however, the model was not trained. • Being processed ...<Progress>% - training process is active. • Trained – the model is ready to be used. • Referenced – the model is used by one or several monitoring jobs.
Validation state	Shows the validation state of the model: • Not validated • Validate • Validated
Validation operations	
	Interrupts the active validation operation. This symbol is only available during the validation operation.
	Deletes the validation state.
Model operations	

Functions/data		Description
		Copies the selected model with all settings. This symbol is only available for models with state "Trained" or "Created".
		Exports the model.
		Interrupts the active process. This symbol is only available during the training process.
		Deletes the model

Procedure

1. On the home page, click on "Train models".

2. Page "Model Overview" is opened and lists all of the models.
   - Click on the column header to sort models in either ascending or descending order in a column.
   - To reduce the number of models listed, click on the "Filter" symbol.
     More information is provided in Chapter: Filtering data (Page 20).
   - You can create a new model and edit an existing model.
     More information is provided in Chapter: Creating/configuring a model (Page 47).
   - You can export and import models.
     More information is provided in Chapter: Exporting and importing models (Page 56)
   - You can delete individual and multiple models.
     More information is provided in Chapter: Deleting a model (Page 54)



6.2 Creating/configuring a model

You have the option of creating a new model or changing the configuration of an existing model.

If you change an existing configuration, then you must restart the training process. The previous model is then overwritten.

On page "Model Editor", depending on the state of the model that has been opened, you can edit the following text boxes:

Model state	State of the text boxes
Trained, edited or imported	All text boxes are locked and cannot be edited.
Created	All text boxes can be edited
Copied	Only the text box of the TDU set reference is locked and cannot be edited.

More information is provided in Chapter: Training the model (Page 51).

Functions and data

The following functions and data are available:

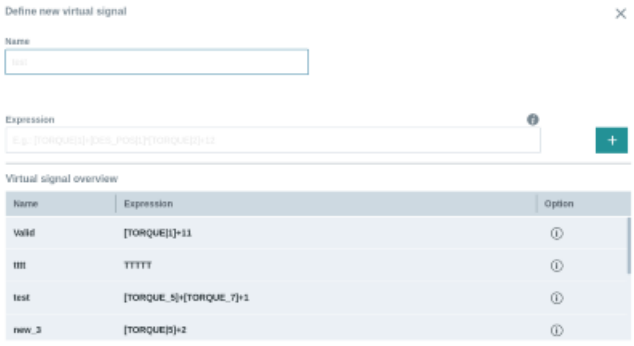
Functions/data	Description
Model reference*	Text box for entering the model reference.
TDU set reference	Selects the training data set that forms the basis for the model.
Method	Selects the training method. The following method is available: • Threshold-based Six-Sigma • Virtual/multiple signal threshold-based Six-Sigma
Comments	Text box to enter additional comments.
Tracking signal	Selects the signal that forms the basis for the model. All available signals from the Analyze MyWorkpiece /Capture recording file are listed. Using button "Virtual signals", you can create new, virtual signals in a separate menu and manage existing virtual signals. Enter a designation under "Name" and a formula for the virtual signal under "Expression". You can combine up to 10 signals using the following operators. '*', '/', '+', '-', '(', and ')' You can also include constants in the form of floating-point numbers in the combination. You can delete a virtual signal if there is no link to an existing monitoring job or model. The virtual signal is then permanently deleted without an acknowledgment window. The "Delete" symbol is deactivated if a virtual signal is linked with a monitoring job or model.

Functions/data	Description
Filter length	Selects the view length of the smoothing filter. The filter smooths the high-frequency signal by filtering out noise from the signal. The filter length can be set to any positive integer number; a filter length of "1" means that the signal is not filtered. Each increase in the value smooths the signal further.
Start Trigger Stop Trigger	Areas to define triggers that mark the start or end of the operation for which training data sets are created. Every trigger is defined using the trigger type and the associated value.
Trigger type	Select one of the following trigger types: • NC code - complete NC program line or part of a line • Tool ID - identification number of the tool used to execute the machining operation. Corresponds to field "ActiveTool" in an "HFBlockEvent" of an Analyze MyWorkpiece /Capture recording. • Seek offset - NC program line number • Program name • Call Stack Level - subprogram level number • BTSS (OPI) - SINUMERIK operator panel interface (can only be selected in conjunction with the trigger type)
Trigger value	Text box to enter the trigger value. The following placeholders are permissible: • "*" for one or several arbitrary characters An additional text box for the BTSS (OPI) variable address is displayed if you select trigger type "BTSS (OPI)".

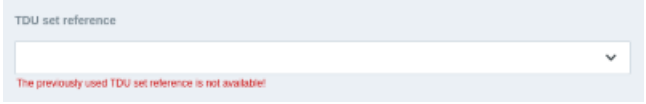
* The text boxes marked with an asterisk are mandatory and must be completed.

Procedure

1. Click on the name of the required model on page "Model Overview".
   - OR -
   Click on "New".
2. Page "Model editor" > Tab "Model settings" opens.
   - Enter the general parameters of the model.
   - Click on "Virtual signals" if you wish to register a signal.
     Enter the "Name" and the "Expression".
     Click on "+".

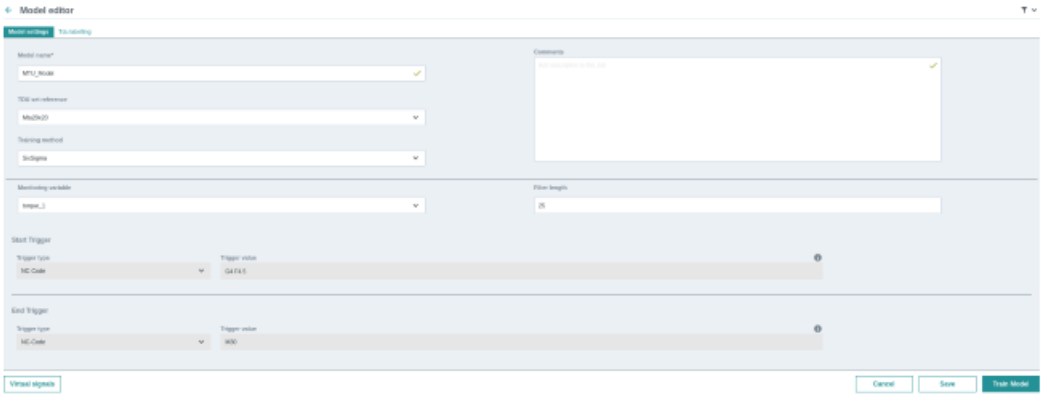


   - If you open an existing model, then the saved parameters of the model are displayed in the text boxes.
   - Select a new TDU set reference if the previous reference is no longer available.



   - After selecting the TDU set reference, the values for the start and stop triggers are automatically set and cannot be changed.
   - The "Save" button becomes active as soon as valid model references have been entered.
   - The "Train model" button becomes active as soon as you have completed each of the text boxes required.
3. Click on "Save".
   - After saving, the model is available on page "Model - Overview", and can be opened for training or for additional changes.
   - After saving, the following message appears in the upper right window area:
     "The model was successfully created"
     - OR -
     "The model was successfully created but could not be saved".

   - OR -
   Click the "Train model" button.
   - You can immediately start to train the model once you have completed all of the text boxes required. It is not necessary to save the model.



6.3 Selecting TDUs

In tab "TDU labelling", select one or several TDUs, e.g. only TDUs for "good" parts, which are used as basis to create the model.

Note

Number of TDUs

You must select at least three TDUs, which are to be used when creating the model, otherwise the "Save" button remains inactive.

Functions and data

The following functions and data are available:

Functions/data	Description
☐	Check box to select a TDU. All TDUs are selected if you activate the check box in the column header.
TDU time stamp	Time stamp of the TDU in the format [Year-Month-Day;Hour:Minute:Second].
Workpiece ID	Identifier for the workpiece.
Duration [HH:MM:SS]	Length of the recording in the format [Hour:Minute:Second].
Path length [mm]	Length of the process operation.
Signal integral	Integral of the absolute value of the monitored HF signal along the path. This value is used to identify possible outlier training data sets. We recommend that only training data sets with similar values for "Signal integral" are used to train a model.
Anomaly(%)	Percentage validation result.
ⓘ	Displays detailed information about the validation result.

Procedure

1. Open tab "TDU labelling" on page "Model editor".
2. Activate the check box by the TDUs, which should be used when creating the model.
3. Click on "Save".
   - OR -
   Click on "Train model" if you have completely filled out tab "Model settings".
   - OR -
   Click on "Cancel" to reject the selection.

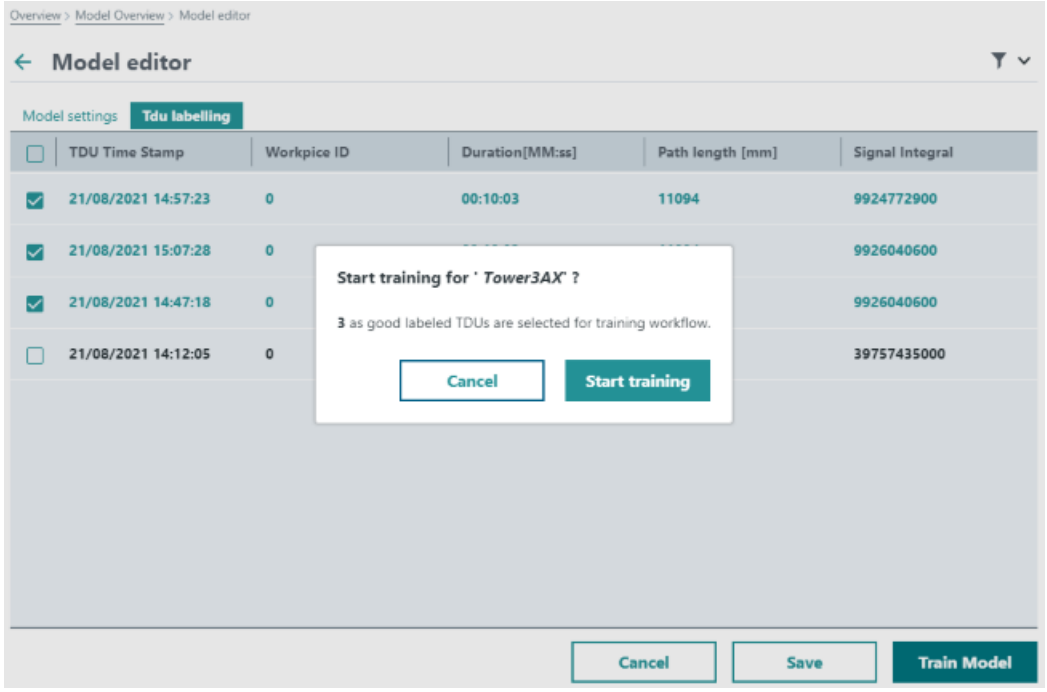
6.4 Training the model

Requirements

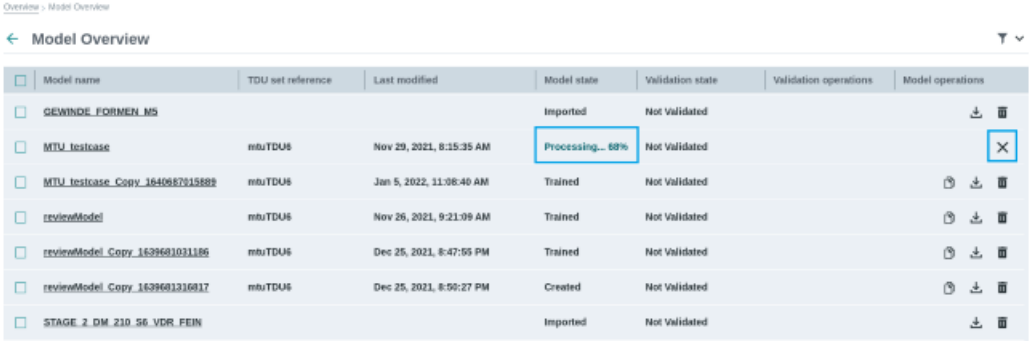
- All of the parameters required were entered: Creating/configuring a model (Page 47)
- Suitable TDUs were selected: Selecting TDUs (Page 50)
- These settings were saved.

Procedure

1. On page "Model editor" > Tab "TDU labelling", click on "Train model".
   - Page "Start training for <Model name>" opens and displays the number of selected TDUs.
   - Click on "Start".
     The training process starts.



2. Page "Model Overview" is re-opened, and shows the model in the "Processing" status.
   Click on the "x" symbol to cancel the training process. Status "Created" is then restored.



3. The status changes to "Trained" if editing is completed without being canceled.
   The result is automatically saved.

6.5 Validating models

You have the option of validating models with status "Trained" using TDUs.

Procedure

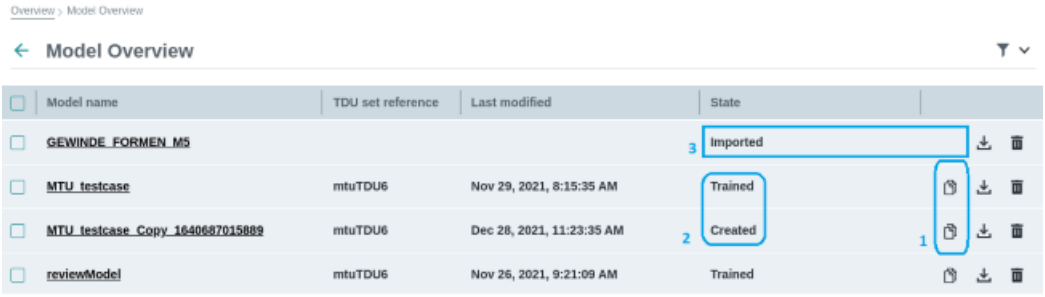
1. Click on the name of the required model with status "Trained" on page "Model Overview".
2. Open tab "TDU labelling" on page "Model editor".
3. Activate the check box in front of the TDUs, which should be used when validating the model.
4. Click on "Check TDUs".
5. Page "Model Overview" is re-opened, and shows the validation status in column "Validation state".
   - Click on the "x" symbol to cancel the validation operation.
   - Click on the "Delete" symbol to delete the validation status.
6. Click on the name of the model with validation status "Validated".
7. Open tab "TDU labelling" on page "Model editor".
   - The validation result is displayed in column "Anomaly(%)" as a percentage.
   - Click on the "i" symbol to obtain additional information (anomaly amount, total samples, labeling).

6.6 Copying a model

You have the option of copying an existing model.

Procedure

1. Page "Model Overview" is opened and lists all of the models.
   - The "Copy" symbol is only available for models with state "Trained" or "Created".
   - Models with state "Imported" or "Processing" cannot be copied.



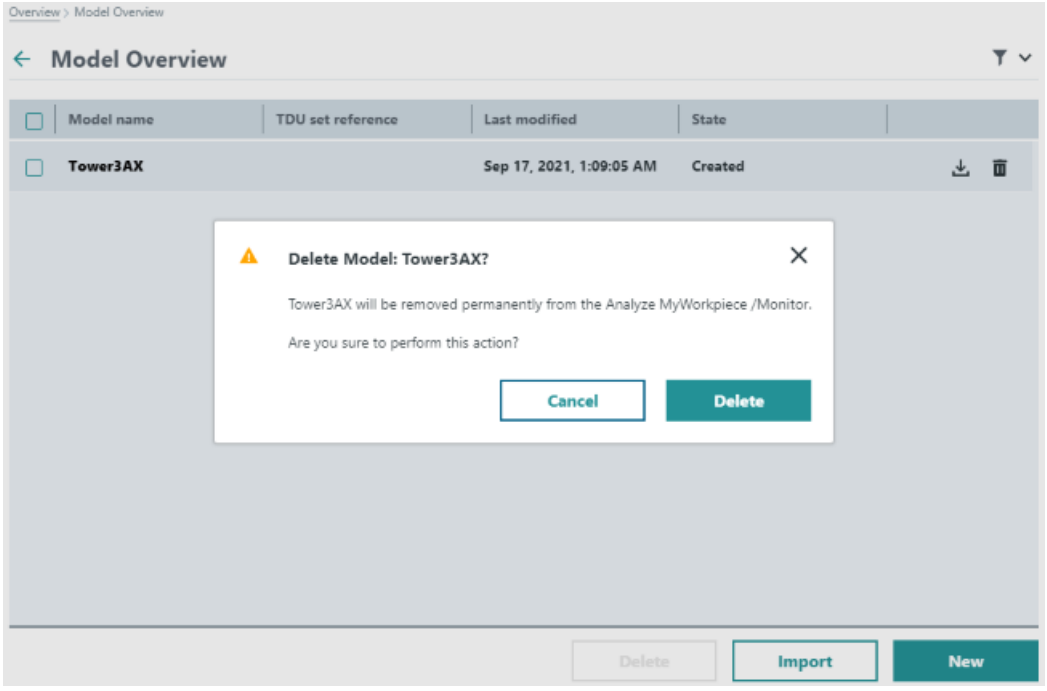
2. Click the "Copy" symbol.
   - The new name of the copied model comprises the original name and extension "_Copy_<timestamp_in_millis>". "timestamp_in_millis" represents the time stamp of the copy operation.
   - The copied model has state "Created" and the model settings can now be changed. The TDU set reference cannot be changed.
3. Change the name of the copied model.

6.7 Deleting a model

You have the option of deleting models that are no longer required.

Procedure

1. Page "Model Overview" is opened and lists all of the models.
2. To delete an individual model, click on the "Delete" symbol in the appropriate line.
   -OR -
   To delete several models:
   - Activate the check box by the required models.
   - Click on "Delete".
     You receive a security message as to whether you wish to permanently delete the selected models.
     Click on "Delete" to confirm the query.



6.8 Exporting and importing models

You use the export and import of models especially to archive and restore the models.
The import of models is used if the model is externally created, for example. The import function is also available when creating a monitoring job.
More information is provided in Chapter: Creating/configuring jobs (Page 61).

Note

Security measures

- Carefully ensure that the transport of exported data is secured by applying suitable technical measures such as encrypted/signed e-mails, encrypted/signed USB flash drives, etc., especially in public areas such as the Internet.
- Store exported data files in the OEM/end customer area in such a way that they are protected from unauthorized access (e.g. on SharePoints, databases, etc. through user management with access data).

Exporting a model

1. On page "Model Overview" click on icon "Export" in column "Model operations"
   The export is started and is displayed in the download directory of your browser.

Importing a model

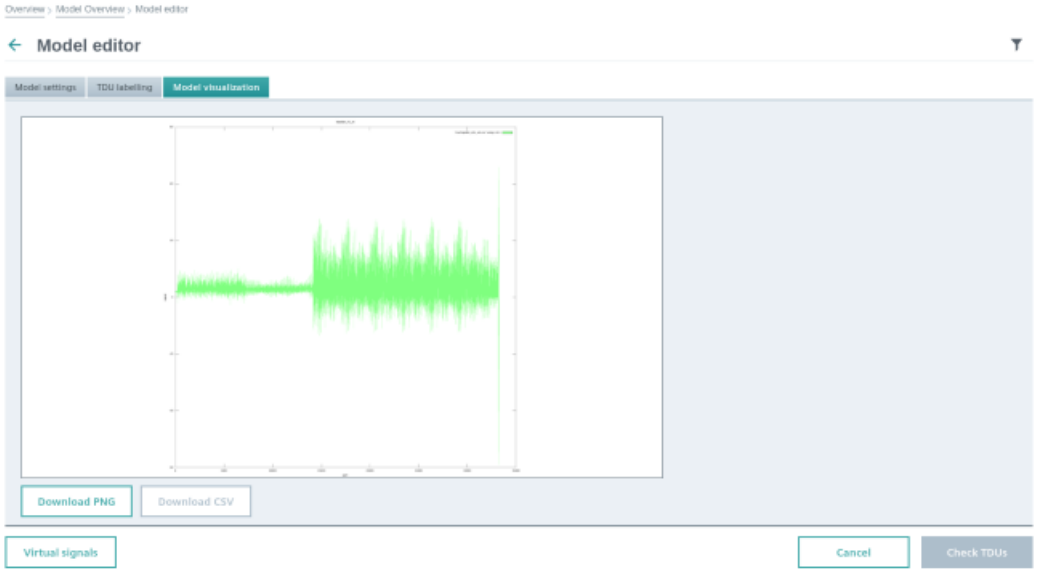
1. On page "Model Overview", click on "Import...".
   The import dialog opens.
2. Open the file selection using button "Directory".
3. Navigate to the directory in which the model is saved.
4. Select the required file.
   Models are saved in the "json" format.
5. Click on "Open"
6. Click on icon "Upload".
   The import is started. The progress is displayed.
7. Click on "OK" to close the import dialog.
   After the model has been imported, its state is displayed on page "Model Overview" as "Created". The model can be immediately used without any additional configuration.

6.9 Visual representation of models

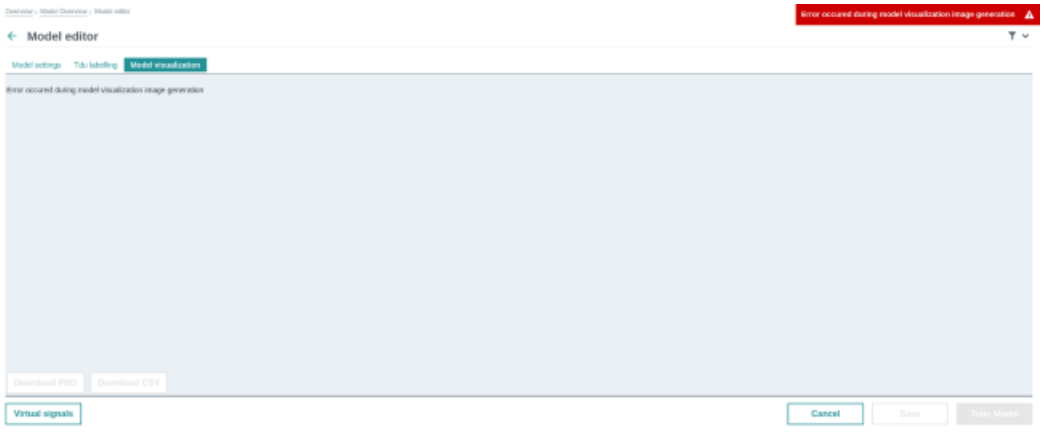
You can graphically represent models.

Procedure

1. Open tab "Model visualization" on page "Model editor".
   - The screen is generated once the model has been created and tab "Model visualization" opened.
   - Click on "Download PNG" or use option "Save screen as..." in your browser to download the screen in the PNG format.
   - Click on "Download CSV" to download a CSV file of the model.



2. If the content cannot be displayed in tab "Model visualization" due to an internal error (server-side Java error or lower-level service error), then an error message is displayed in the tab and in the upper right-hand section of the window.



Manage Monitoring Jobs

7

7.1 Overview

Orders are managed as "jobs". Function "Manage Monitoring Jobs" is available for this specific task.

Functions and data

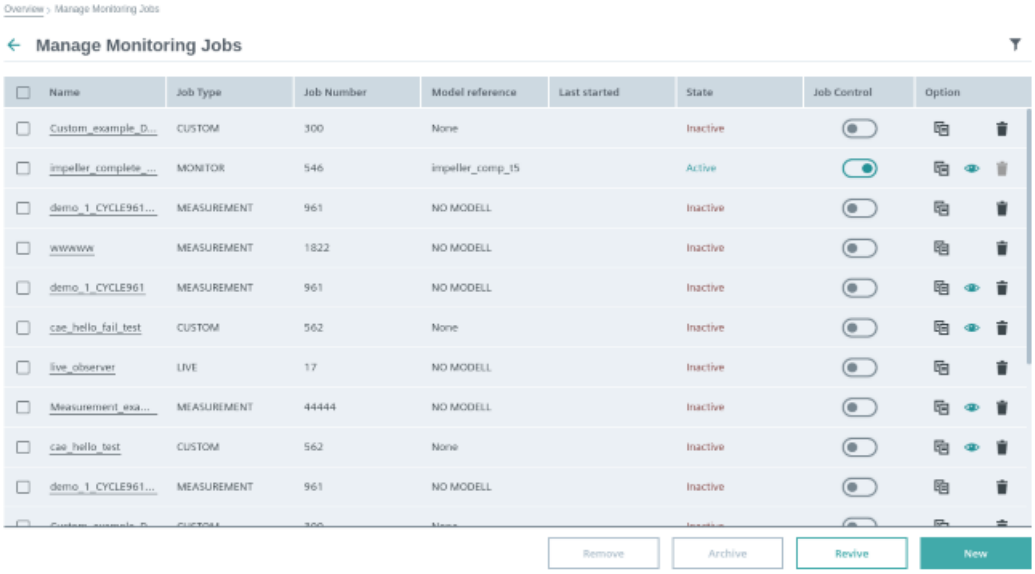
The following functions and data are available:

Functions/data	Description
	Navigates to the previous page.
	Filters the job list.
	Check box to select a monitoring job All monitoring jobs are selected if you activate the check box in the column header.
Name	Name of the job.
Job type	Type of the job: • SIXSIGMA • MEASUREMENT • CUSTOM • LIVE
Job number	Displays the job number.
Model reference	Name of the underlying model.
	Starts/stops an activated job manually.
Last started	Date the job was last activated.
Status	Shows the current status: • Active • Inactive • Processing
Job Control	
	Activates/deactivates a job.
Option	
	Copies a job with all settings; however, not the recorded data.
	Interrupts the active monitoring job.
	Indicates that one or several reports exist.
	Deletes a job with all settings. However, no recorded data is deleted.

Procedure

1. On the home page, click on "Manage Monitoring Jobs".

2. The "Manage Monitoring Jobs" page opens.
   All jobs that have already been created are listed.
   - To sort and display the list in an ascending or descending order in a column, click on the column header.
   - To reduce the number of jobs listed, click on the "Filter" symbol.
     More information is provided in Chapter: Filtering data (Page 20).
   - You can create a new job and edit an existing job.
     More information is provided in Chapter: Creating/configuring jobs (Page 61)
   - You can copy existing jobs.
     More information is provided in Chapter: Copying jobs (Page 65)
   - You can delete jobs in the overview.
     You can find more information in the Chapter: Deleting jobs (Page 66).
   - You can archive and revive the data of all jobs.
     More information is provided in Chapter: Archiving and reviving jobs (Page 66)



7.2 Creating/configuring jobs

On page "Configure Job", edit the settings for a job and define start and end triggers for the monitoring.

Functions and data

The following functions and data are available:

Functions/data	Description
←	Navigates to the previous page.
Monitoring Job name	Name of the job. A maximum of 150 characters is permitted.
Job number	Number of the job. Only positive numbers are allowed.
Channel	Selects the monitored channel.
Job type	Type of the job: • SIXSIGMA • MEASUREMENT More information is provided in Chapter Creating/configuring jobs with a measurement cycle (Page 97). • CUSTOM More information is provided in Chapter Creating/configuring jobs with user-defined algorithm (Page 83). • LIVE More information is provided in Chapter Creating/configuring jobs with Direct Monitoring (Page 89).
Comments	Text box to enter additional comments.
SIXSIGMA - specific configuration	
Model	Model for the machining operation.
Importing	You can import an externally created model by clicking on "Import". Opens the default browser window. Navigate to the directory with the models on your local PC. The files have the "json" format.

Functions/data	Description
Tracking signal	Selects the signal that is monitored and evaluated. All available signals from the Analyze MyWorkpiece /Capture recording file are listed. Using button "Virtual signals", you can create new, virtual signals in a separate menu and manage existing virtual signals. Enter a designation under "Name" and a formula for the virtual signal under "Expression". You can combine up to 10 signals using the following operators. '*', '/', '+', '-', '(', and ')' You can also include constants in the form of floating-point numbers in the combination. You can delete a virtual signal if there is no link to an existing monitoring job or model. The virtual signal is then permanently deleted without an acknowledgment window. The "Delete" symbol is deactivated if a virtual signal is linked with a monitoring job or model.
Monitoring result values (BTSS (OPI)) Variable address	Text box to enter the address and value of an BTSS (OPI) variable when using trigger type "BTSS (OPI)". Entry: `<BTSS (OPI) address>=<BTSS (OPI) value>`, spaces are not permitted. While monitoring the process, additional values can be recorded by specifying the address. You can enter a maximum of 5 addresses/BTSSs (OPIs).
Start Trigger Stop Trigger	Areas to define triggers that mark the start or end of the operation for which the monitoring job is created. Every trigger is defined using the trigger type and the associated value.
Trigger type	Select one of the following trigger types: • NC code - complete NC program line or part of a line • Tool ID - identification number of the tool used to execute the machining operation. Corresponds to field "ActiveTool" in an "HFBlockEvent" of an Analyze MyWorkpiece /Capture recording. • Seek offset - NC program line number • Program name • Call Stack Level - subprogram level number • BTSS (OPI) - SINUMERIK operator panel interface (can only be selected in conjunction with the trigger type)
Trigger value	Text box to enter the trigger value. The following placeholders are permissible: • "*" for one or several arbitrary characters An additional text box for the BTSS (OPI) variable address is displayed if you select trigger type "BTSS (OPI)".

Functions/data	Description
	Adds an additional variable address. - OR - Adds an additional trigger. If several triggers are defined for the start or the end, then the triggers are logically AND'ed.
	Deletes the variable address. - OR - Deletes the trigger.

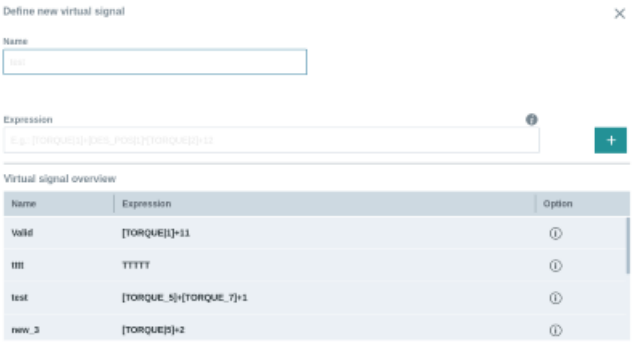
Note

Defining start and end triggers

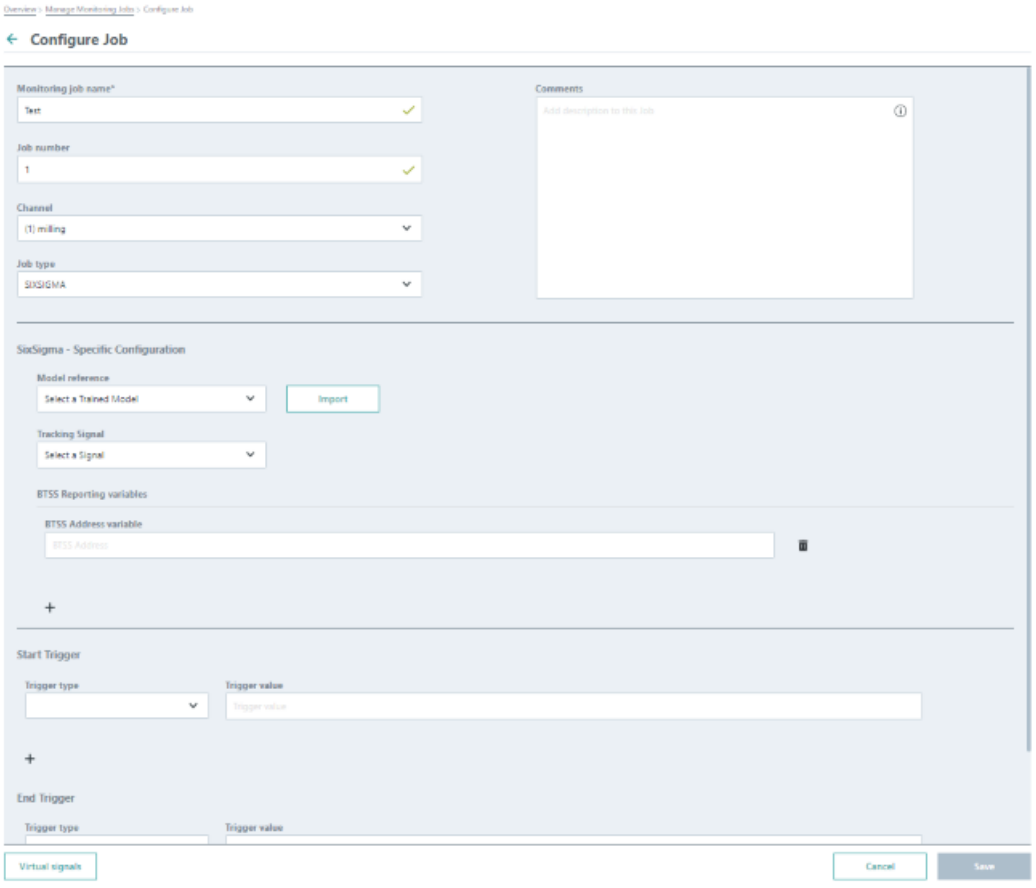
Start and end triggers define the process step to be monitored. Define the trigger that is consistent with the selected model.

Procedure for job type "SIXSIGMA"

1. On page "Manage Monitoring Jobs", click on the name of the required job.
   - OR -
   Click on "New".
2. Page "Configure Job" opens.
   - Enter the general data or select the data from the drop-down lists.
   - Select job type "SIXSIGMA" from the drop-down list.
   - If required, enter a variable address.
   - Define the start and end triggers.
   - Click on "Virtual signals" if you wish to register a signal.
     Enter the "Name" and the "Expression".
     Click on "+".



   - Click on "Save".
     - OR -
     To reject the entries, click on "Cancel".



3. After saving, the following message appears in the upper right area:
   "The job was successfully created"
   - OR -
   "The job was successfully created but could not be saved".

7.3 Copying jobs

You have the option of copying existing jobs.

Procedure

1. Page "Manage Monitoring Jobs" is opened and lists all of the jobs.
2. To copy a job, click on the "Copy" icon in the corresponding line.
   – The new name of the copied job comprises the original name and extension "_Copy_<timestamp_in_millis>". "timestamp_in_millis" forms the time stamp for the copy operation.
3. Change the name of the copied job and configure the copied job.

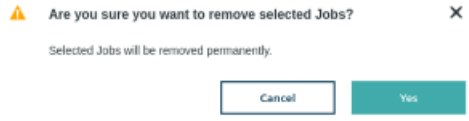
7.4 Deleting jobs

You have the option of deleting jobs that are no longer required.

Recorded process data are not deleted.

Procedure

1. Page "Manage Monitoring Jobs" is opened and lists all of the jobs.
2. To delete an individual job, click on the "Delete" symbol in the appropriate line.
   -OR -
   To delete several jobs:
   – Activate the check box by the required job.
   – Click on "Remove selection"
   – You obtain a security message.
   To clear the selected jobs, click "Yes".
   - OR -
   If you do not want to clear the jobs, click "Cancel".



7.5 Archiving and reviving jobs

You can archive or revive jobs to back up and restore jobs.

Note

Security measures

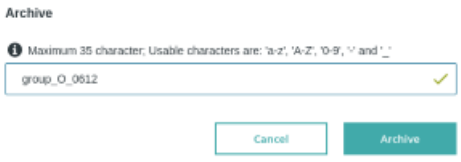
- Carefully ensure that archived data is securely transported by applying suitable technical measures such as encrypted/signed e-mails, encrypted/signed USB flash drives, etc., especially in public areas such as the Internet.
- Store archived data files in the OEM/end customer area in such a way that they are protected from unauthorized access (e.g. on SharePoints, databases, etc. through user administration with access data).

Use case – generating job sets for daily tracking

Workpiece machining using CNC machines can be tailored to specific subprocesses, for example drilling, surface processing and milling. Using Analyze MyWorkpiece /Monitor, these processes can be virtualized and managed. Track your monitoring jobs on overview page "Manage Monitoring Jobs". You can create job sets for your workpieces, and archive on SINUMERIK Edge to save the jobs. The jobs are not locally saved. When required, you can restore these jobs using the "Revive" function. Configuring CNC machines and Analyze MyWorkpiece /Monitor can be executed in parallel for the same workpiece machining.

Archiving jobs

1. On page "Manage Monitoring Jobs" select required jobs.
2. Click on "Archive"
   The "Archive" message is opened.
   – Enter a name for the job to be archived.
   – Click on "Archive".
   - OR -
   To cancel the operation, click on "Cancel".



3. The data of all selected jobs are archived on SINUMERIK Edge.

Reviving jobs

1. On page "Manage Monitoring Jobs", click on "Revive".
2. The "Revive" message is opened.
   – Select the required job from the drop-down list.
   – Click on "Revive".
   - OR -
   To cancel the operation, click on "Cancel".

3. All jobs in the group are restored in the Job Manager.

Analyze Monitoring Results

8

Note

Security measures

- Carefully ensure that the transport of exported data is secured by applying suitable technical measures such as encrypted/signed e-mails, encrypted/signed USB flash drives, etc., especially in public areas such as the Internet.
- Store exported data files in the OEM/end user domains in such a way that they are protected from unauthorized access (e.g. on SharePoints, databases, etc. through user management with access data).

8.1 Overview

The "Analyze Monitoring Results" application displays the process data recorded by the jobs, analysis results (detected anomalies) and process evaluations.

Functions and data

The following functions and data are available:

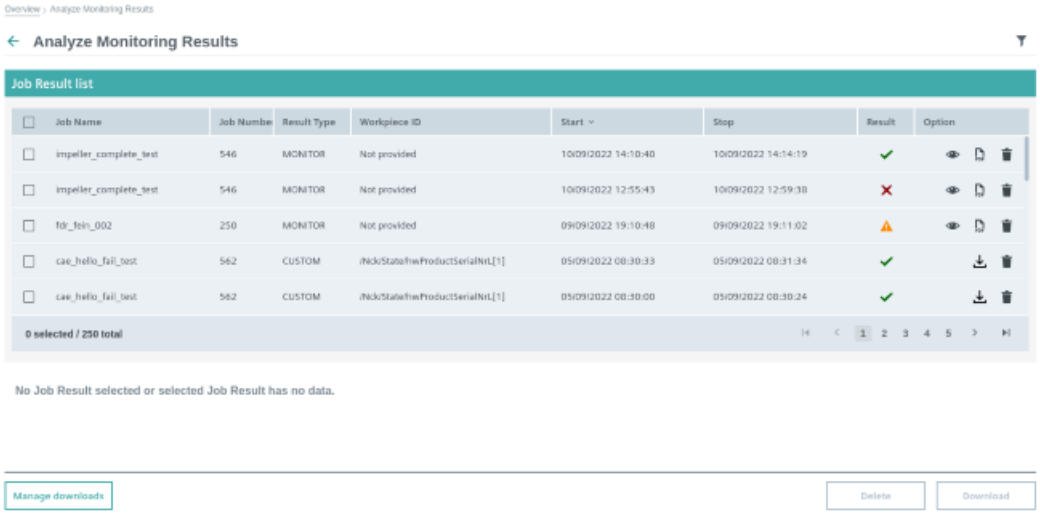
Functions/data	Description
	Navigates to the previous page.
	Filters the job result list.
	Check box to select a job All jobs are selected if you activate the check box in the column header.
Job Name	Name of the job.
Job number	Number of the job.
Result type	Result type depending on the job type: • MONITOR • CUSTOM • MEASUREMENT
Workpiece ID	Identification of the machined workpiece.
Start	Date and time when recording started.
Stop	Date and time when recording ended.
Result	

Functions/data	Description
	**MONITOR and MEASUREMENT:** The measurement is incorrect and deviates from the reference process (anomaly). **CUSTOM:** An error has occurred. Processing of the user-defined algorithm is unsuccessful and was stopped. You receive an error log.
	The measurement was successful and corresponds to the reference process.
	**Only for CUSTOM:** Processing was successful; however, the user-defined algorithm identified problems (e.g. result with anomalies or error when processing).
Option	
	Displays a preview of the job.
	**For CUSTOM and MEASUREMENT** Downloads individual job reports.
	**For MONITOR** Exports the report as PDF.
	Deletes the recorded data. The associated job is not deleted.
Job result graphic	
	Creates an image in the png format for download.
	Zoom with mouse.
	Shift graphic.
	Enlarge view.
	Reduce view.
	Change the size of an image while maintaining the proportions.
	Reset scaled axes.
Job Result Details	
Machine	Shows the job-specific details.
Machine ID	
Workpiece ID	
Job Name	
User-defined variables (e.g. BTSS (OPI))	
Percentage	
Model name	
Stop cause	

Procedure

1. On the home page, click on "Analyze Monitoring Results".

2. Page "Analyze Monitoring Results" > "Job Results" opens.
   All recorded data are listed.
   – To sort and display the list in an ascending or descending order in individual columns, click on the column header.



3. To obtain more information on the required job, click on the "Eye" icon in column "Option". "Job Result Graphic" and "Job Result Details" are opened in the lower section of the page.

4. Additional symbols are available in the upper area for a more detailed assessment. Move the mouse over the graphic to display additional details.

Note

Feedback to the SINUMERIK control

The result of a report is reported back to the SINUMERIK control via an MGUD variable.

- If the result is without anomaly, the job number is returned.
- If the result has an anomaly, a negative job number is returned.

More information about the MGUD variable is provided in the SINUMERIK Edge Installation Manual, Analyze MyWorkpiece /Monitor.

8.2 Downloading or deleting several jobs

You can download several jobs simultaneously as PDFs compressed in a zip file – or delete them.

Note

Restrictions when downloading several jobs

For "CUSTOM" or "MEASUREMENT" job types, up until now you could not simultaneously download several reports. To download individual reports click on the "Download" icon in column "Option".

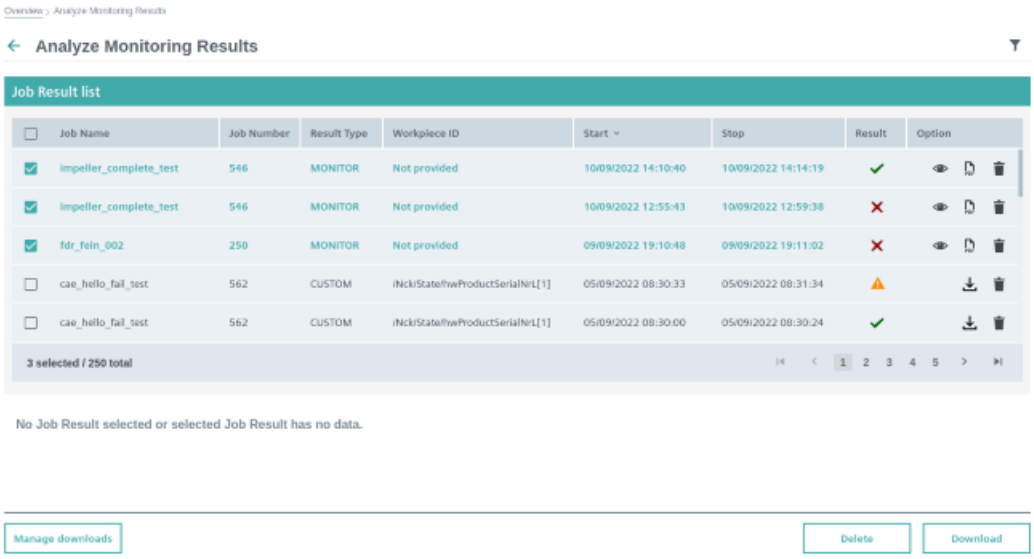
Functions and data

The following functions and data are available:

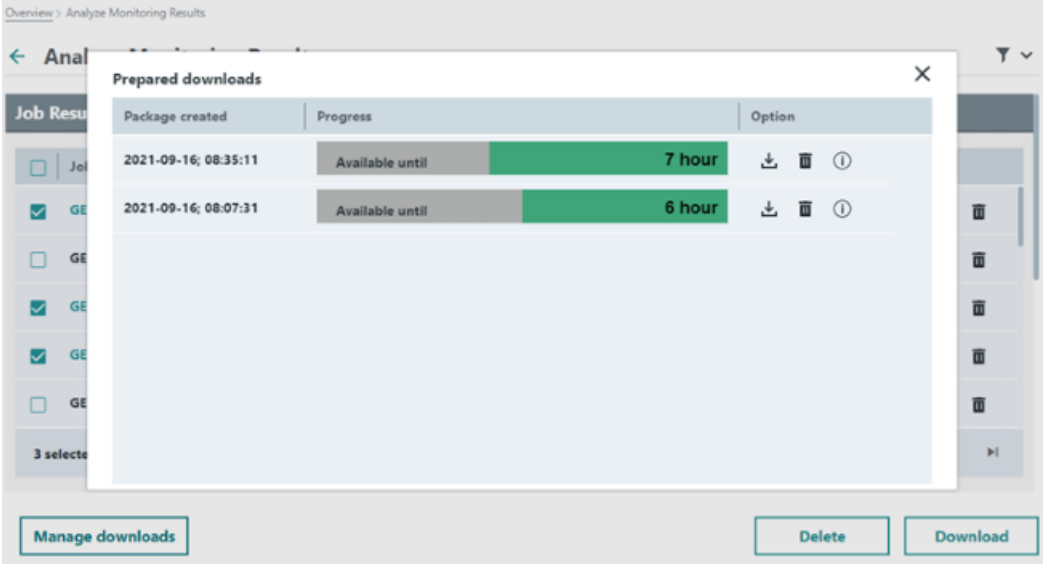
Functions/data	Description
Available downloads	
Archive created	Date and time of the created download package.
Progress	Progress when creating the download package. Indicates when the ZIP file is automatically deleted. The instant in time is defined in the system.
Option	
	Downloads the download package.
	Exports the list of result data as PDF and compresses them in a ZIP file.
	Deletes the download package.
	Displays information about the download package.

Procedure to download several jobs

1. Activate the check box by the required job that you wish to download.
   – Click on "Download".
   – Message "Export package creation started" is displayed in the upper right-hand area.

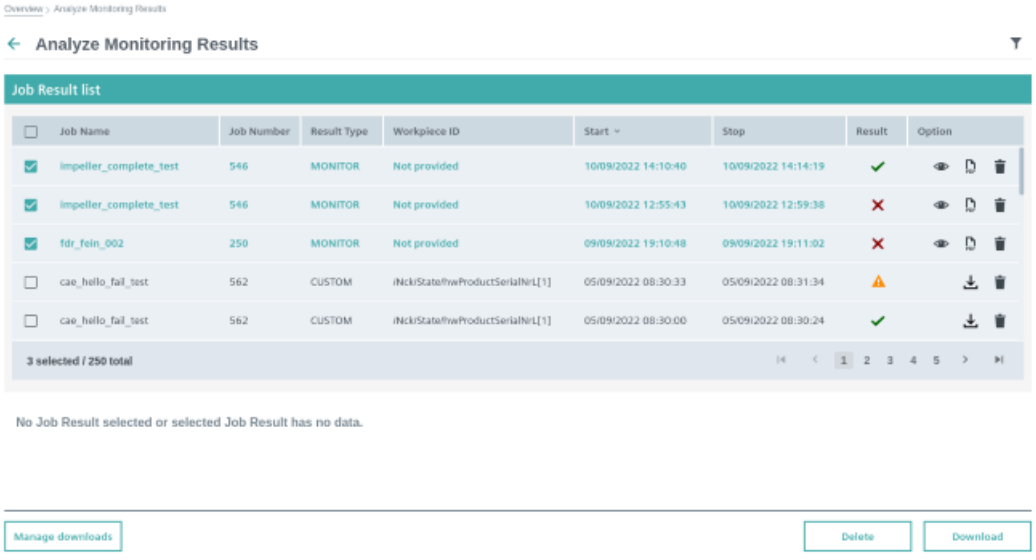


2. The jobs are placed in a zip file.
   To track the progress as this zip file is created, click on "Manage downloads".
   – Message "Available downloads" opens.
   Click on symbol "Download" to download the zip file with the jobs. The download is started immediately.



Procedure when deleting

1. To delete individual jobs, click on the "Delete" symbol in the appropriate line.
   -OR -
2. If you wish to delete several jobs, activate the check box by the required jobs.
   Click on "Delete".
   You obtain a security message that you then confirm.



8.3 Download reports via REST API

You can manage the reports available to you using REST API. You must specify the batch size as the query is issued in batches.

They must be authenticated in order to be able to send the queries to Analyze MyWorkpiece / Monitor. Information on this is provided under Starting Analyze MyWorkpiece /Monitor (Page 18).

Calling the number of available reports

1. Call the following address:
   `https://<ip-address-of-edgebox>:5443/amwmonitor/results/report/export/api/total`
   An integer value is returned. This represents the total number of all available reports.
   Example:
   - **Inquiry:** `https://192.168.0.3:5443/amwmonitor/results/report/export/api/total`
   - **Response:** 2
   - **Meaning:** There are only two available reports on the system.

Call the reports in user-defined batches

1. Call the following address to obtain Meta information on a specific batch:
   `https://<ip-address-of-edgebox>:5443/amwmonitor/results/report/export/api/list`
2. Attach three parameters to the query:
   - `size` - size of a batch
   - `page` - batch index sorted according to time
   - `lang` - language used in the report PDF file
     The saved information is not automatically translated. The language only involves the document label.
3. A JSON array with report information objects in an array sorted according to time is returned. The report object contains the start and end date of the report generation, the name of the monitoring signal, the machine name (if specified by the user), a "good" or "bad" classification and a download link to the raw report data.
   Example:
   - **Inquiry:** `https://192.168.0.3:5443/amwmonitor/results/report/export/api/list?page=1&size=2&lang=de`
   - **Answer:** `[{"jobName": "chiron investigation on G0", "startDate": "2022-01-12T11:06:15.915922Z", "endDate": "2022-01-12T11:06:20.722622Z", "machineName": "Not provided", "signalName": "TORQUE|4", "zipLink":"https://192.168.0.3:5443/amwmonitor/results/report/pdf/RESULT_64366888-239b-4485-90d4-759a7f0348df_2022-01-12T11:06:15.915922Z?lang=de", "goodResult": false }, { "jobName": "chiron investigation on G0", "startDate": "2022-01-12T11:04:56.544242Z", "endDate": "2022-01-12T11:05:01.285821Z", "machineName": "Not provided", "signalName": "TORQUE|4", "zipLink": "https://192.168.0.3:5443/amwmonitor/results/report/pdf/RESULT_64366888-239b-4485-90d4-759a7f0348df_2022-01-12T11:04:56.544242Z?lang=de", "goodResult": false }]`
   - **Meaning:** Each result contains more errors than the tolerance permits and both can be downloaded via the specified links.

Downloading individual reports

1. Call the following address to download a specific report as ZIP file:
   `https://<ip-address-of-edgebox>:5443/amwmonitor/results/report/pdf/<report id>`
   Example:
   - **Inquiry:** `https://192.168.0.3:5443/amwmonitor/results/report/pdf/RESULT_64366888-239b-4485-90d4-759a7f0348df_2022-01-12T11:04:56.544242Z?lang=de`
   - **Response:** application/zip
   - **Content of the response:** The ZIP file contains a PDF file with the report details and a CSV file with the raw data of the report. The CSV file lists the path, the threshold minimum, the threshold maximum, the anomaly decision and the raw signal of the data point.

8.4 Downloading reports via MQTT notification

For each completed monitoring job, Analyze MyWorkpiece /Monitor sends an MQTT notification to the configured MQTT broker. The MQTT notification contains a download link for the report that has been generated, the corresponding monitoring result and additional information regarding the completed monitoring job.

Example:

```
{
  "jobName": "job1",
  "startDate": "2022-01-27T20:33:10.097264Z",
  "endDate": "2022-01-27T20:33:24.540831Z",
  "machineName": "Not provided",
  "signalName": "\"b-torque\"",
  "zipLink": "https://10.113.35.56:5443/amwmonitor/results/
report/pdf/RESULT_5a781cb2-da16-4950-abfb-
a6ccc52ee899_2022-01-27T20:33:10.097264Z?lang=de",
  "zipLink2": "https://10.113.35.56:5443/amwmonitor/results/
report/pdf/RESULT_5a781cb2-da16-4950-abfb-
a6ccc52ee899_2022-01-27T20:33:10.097264Z?lang=en",
  "goodResult": false
}
```

User-defined algorithm

9

9.1 Overview

On page "Configure Job" you have the option of defining a user-defined algorithm. You can implement a basic data grabber, a sliding window or an indicator-based algorithm.

The Custom Algorithm Executor (CAE) specifies the following:

- The raw data coming from the machine in a specific format and a file structure
- The possibility of executing your code with your specific conditions and predefined configurations in a sandbox-similar subsystem (with several restrictions, taking into account the performance and resources of the PC on which your algorithm runs)

Note

You can only test and validate scripts using the CAE. You are responsible in implementing a valid and functioning script, so that CAE can work with raw data.

9.2 Script Manager

9.2.1 Overview

Script packages can be managed in the CAE. Using the "Script Manager" function, you can upload script packages, update the meta-data of an already uploaded script package or remove script packages that are not being used from the system.

Functions and data

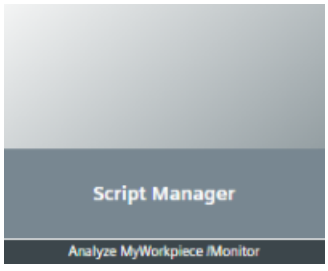
The following functions and data are available:

Functions/data	Description
	Navigates to the previous page.
Name	Name of the script package
Version	Version of the script package
Archive name	Archive name of the script package
Option	
	The configuration has been completed, and the script package is ready for validation
	Closes the validation process by acknowledging the meta-data.

Functions/data	Description
	The script package was validated and can be used.
	The script package is closed and is ready for the next processing step.
	The script package was not able to be validated.
	Displays detailed information about the script package.
	Deletes the script package

Procedure

1. On the home page, click on "Script Manager".



2. Page "Script package manager" opens and displays all of the script packages available.
   - You can upload script packages.
     Click on "New" to upload a new script package.
     - OR -
     Click on "Cancel" to return to the home page.
     More information is provided in Chapter: Script Package uploader (Page 81).
   - You can delete script packages.
     More information is provided in Chapter: Deleting script packages (Page 83).

9.2.2 Script Package uploader

Functions and data

The following functions and data are available:

Functions/data	Description
Upload Archive 	Uploads an archive file. Only valid ZIP files are supported. Other archive formats such as RAR, ARJ and tar are not supported. After a successful upload, the following text boxes are activated.
Name	Name of the script package The data is required for the CAE. Use the same names as for the archive names. This entry is case-sensitive.
Version	Version of the script package The data is not required for the CAE.
Output file postfixes	Output file format from the sandbox environment The data is required for the CAE. You can specify various file formats: • txt • csv • xml • special extensions • Log files For similar file names in your script, only enter the file extension: Example: ".csv, Log.txt" If there are many different file names, enter the complete name: Example: "my.log, result.xml, indicators.txt, robot_processor.csv"
Command line argument(s)	The data is required for the CAE. The format depends on your script. Use standard command line argument(s), for example Linux-based syntax for command line arguments.
Meta information	Additional information on the script package The data is not required for the CAE.

Procedure

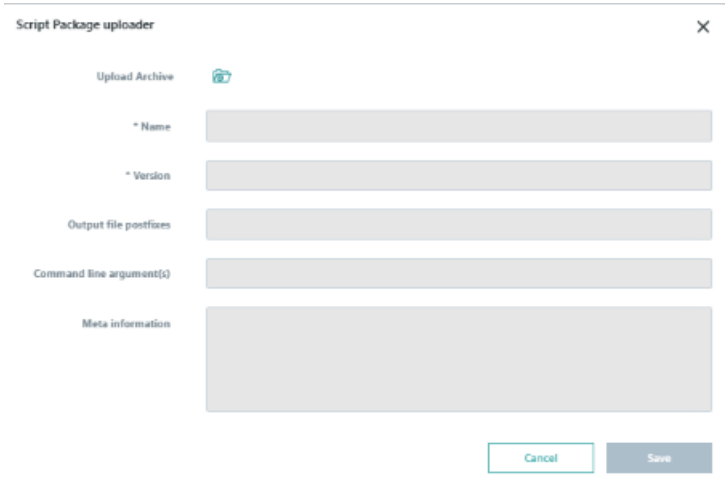
1. On page "Script package manager", click on "New".
2. Page "Script Package uploader" opens.
   – Click on the "Upload Archive" icon and select a ZIP file for upload.
   – The name of the uploaded ZIP file is automatically entered into text box "Name". Do not to change the name.

   Note

   CAE requirement

   The ZIP file must contain a runnable file with the identical name. This entry is case-sensitive.

   – Enter "Output file postfixes" and "Command line argument(s)".
   – When required, enter "Version" and "Meta information".
   – Click on "Save".
   - OR -
   To reject the entries, click on "Cancel".



9.2.3 Validating the script packages

When uploading a script package, a validation process always runs in a sandbox environment, i.e. the validation takes place isolated from the actual system environment.

The following tasks are executed during the validation:

- Basic functions are tested against real data structures
- The memory and CPU utilization level of the script are checked
- The script is checked for malicious, hacker-typical activities
- Memory and work memory utilization are checked with a focus on unexpected memory losses or memory space reservations

You can only use a script package once it has run through all of the validation steps.

When successfully validated, the name of the script package is displayed on page "Configure Job" under "General elements".

9.2.4 Deleting script packages

You have the option of deleting script packages.

Procedure

1. On page "Script package manager" select the required script package and then click on the "Delete" icon in the "Option" column.
2. The script package is permanently deleted. After deletion, a linked job no longer functions.

Note

Lazy Loading

As a result of Lazy Loading of a connection between jobs and scripts, it is possible that the system does not recognize an active configuration of a script package. If you think this has occurred, then delete the script packages.

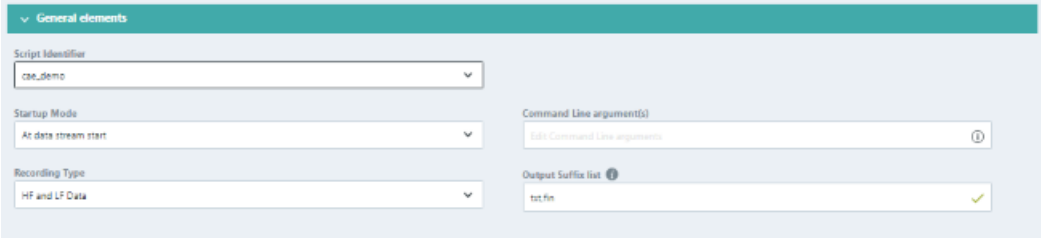
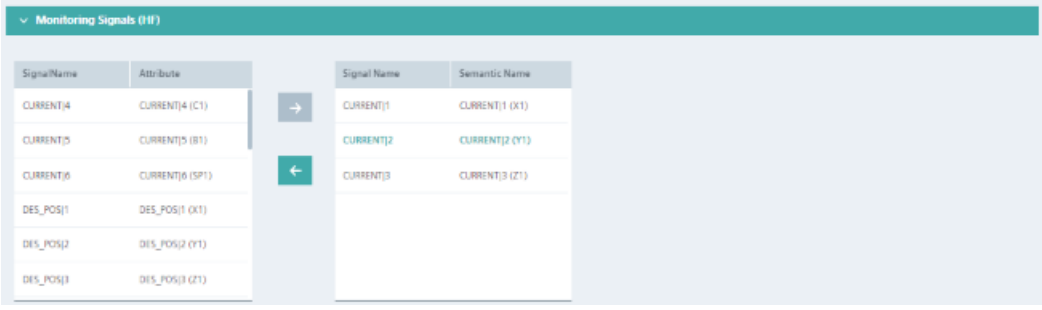
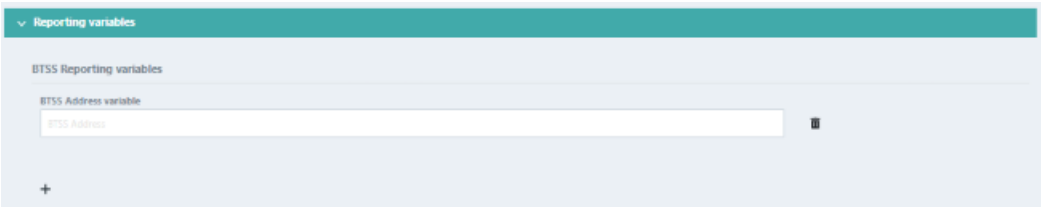
9.3 Creating/configuring jobs with user-defined algorithm

On page "Configure Job", you can create or configure jobs with a user-defined algorithm by selecting the "CUSTOM" job type.

Functions and data

The following functions and data are available:

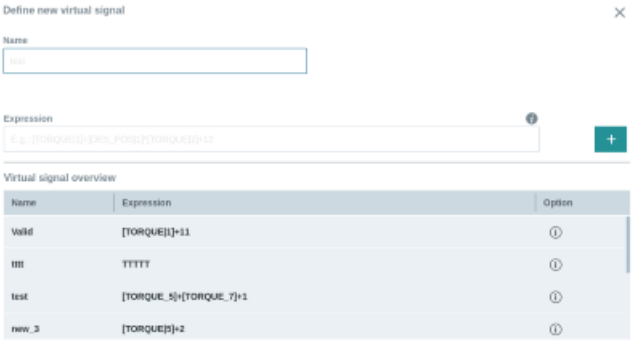
Functions/data	Description
←	Navigates to the previous page.
Monitoring Job name	Name of the job. A maximum of 150 characters is permitted.
Job number	Number of the job. Only positive numbers are allowed.
Channel	Selects the monitored channel.
Job type	Type of job.
Comments	Text box to enter additional comments.
Custom Algorithm - Specific Configuration	
General elements	

Functions/data	Description
	
Script Identifier	Name of the script package.
Startup Mode	Defines when the data for the algorithm are expected: • When the data flow starts • When the data flow stops
Recording Type	Recording Type for the algorithm • Only HF data The algorithm should contain the following files: "hf_data.csv", "hf_event.csv" • Only LF data The algorithm should contain the following files: "lf_data.csv" • HF and LF data The algorithm should contain the following files: "lf_data.csv", "hf_data.csv", "hf_event.csv"
Command line argument(s)	The format depends on your script. Use standard command line argument(s), for example Linux-based syntax for command line argument(s).
Output suffix list	Output file format from the sandbox environment.
Monitoring Signals (HF)	
	
	Available monitoring signals on the left-hand side, and monitoring signals that you selected on the right-hand side.
Monitoring result values	
	

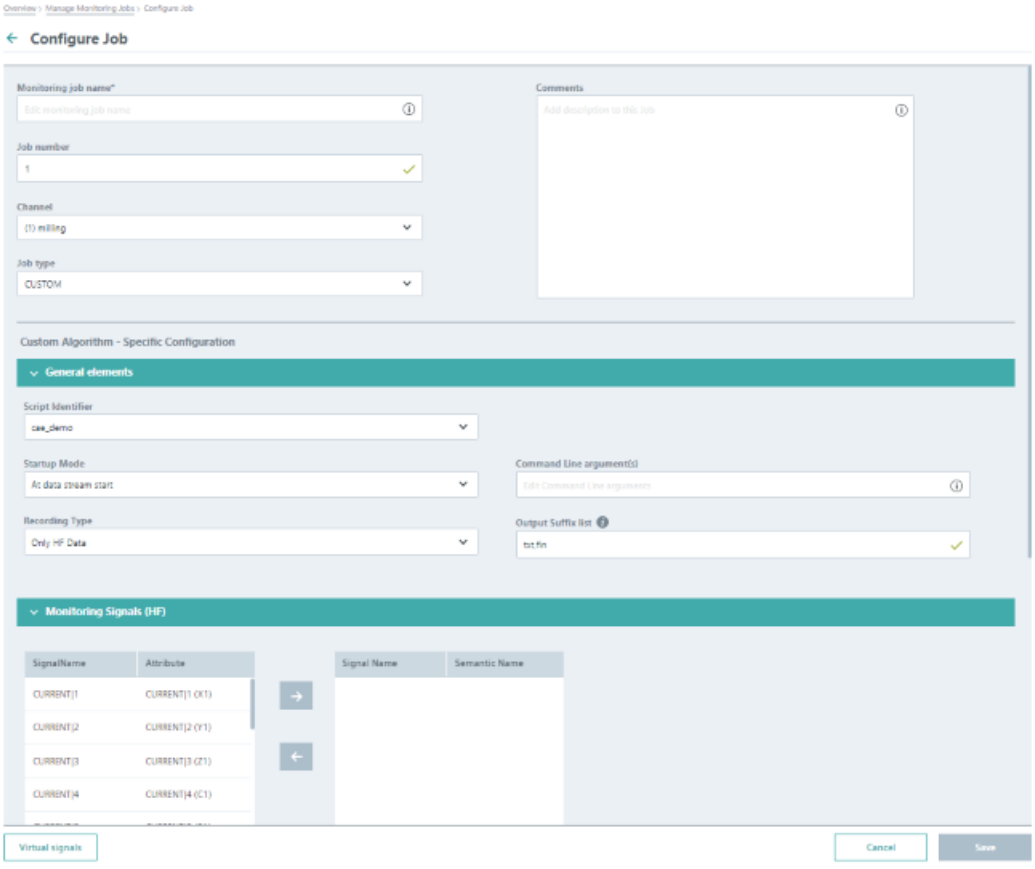
Functions/data	Description
Monitoring result values (BTSS (OPI)) Variable address	Text box to enter the address and value of an BTSS (OPI) variable. Entry: <BTSS (OPI) address>=<BTSS (OPI) value>, spaces are not permitted. While monitoring the process, additional values can be recorded by specifying the address. You can enter a maximum of 5 addresses/BTSSs (OPIs).
Start Trigger End Trigger	Areas to define triggers that mark the start or end of the operation for which the monitoring job is created. Every trigger is defined using the trigger type and the associated value.
Trigger type	Select one of the following trigger types: • NC code - complete NC program line or part of a line • Tool ID - identification number of the tool used to execute the machining operation. Corresponds to field "ActiveTool" in an "HFBlockEvent" of an Analyze MyWorkpiece /Capture recording. • Seek offset - NC program line number • Program name • Call Stack Level - subprogram level number • BTSS (OPI) - SINUMERIK operator panel interface (can only be selected in conjunction with the trigger type)
Trigger value	Text box to enter the trigger value. The following placeholders are permissible: • "*" for one or several arbitrary characters
+	Adds an additional variable address. - OR - Adds an additional trigger. If several triggers are defined for the start or the end, then the triggers are logically AND'ed.
🗑	Deletes the variable address. - OR - Deletes the trigger.

Procedure

1. On page "Manage Monitoring Jobs", click on the name of the required job.
   - OR -
   Click on "New".
2. Page "Configure Job" opens.
   - Enter the general data or select the data from the drop-down lists.
   - Select job type "CUSTOM" from the drop-down list.
   - Enter the data under "General elements".
   - If necessary, enter data under "Monitoring Signals (HF)" and "Monitoring values".
   - Define the start and end triggers.
   - Click on "Virtual signals" if you wish to register a signal.
     Enter the "Name" and the "Expression".
     Click on "+".



– Click on "Save".
- OR -
To reject the entries, click on "Cancel".



3. After saving, the following message appears in the upper right area:
"The job was successfully created"
- OR -
"The job was successfully created but could not be saved".

9.4 Managing jobs with the user-defined algorithm

You can copy, delete, archive and restore jobs using the user-defined algorithm.

You will find more information in the following chapters:

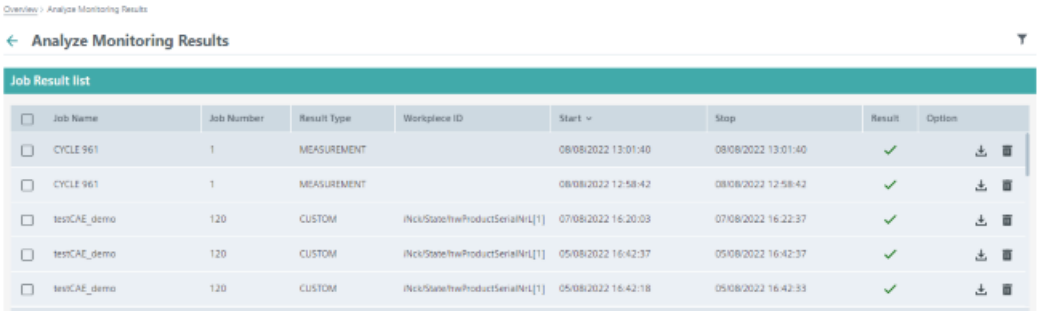
- Overview (Page 59)
- Copying jobs (Page 65)
- Deleting jobs (Page 66)
- Archiving and reviving jobs (Page 66)

9.5 Downloading reports

In the "Analyze Monitoring Results" application, you have the option of downloading reports of individual jobs.

Procedure

1. On the home page, click on "Analyze Monitoring Results".
2. Page "Analyze Monitoring Results" > "Job Results" opens.
   All recorded data are listed.
   – Click on the column header to sort and display the list in an ascending or descending order in individual columns.



3. To download individual job reports click on the "Download" icon in column "Option".

9.6 Example of MQTT messages

```
{
    "jobName": "GEWINDE_FORMEN_M5",
    "startDate": 2022 - 08 - 26T33: 37: 54.187449 + 02: 00[Europe /
Zurich],
    "endDate": 2022 - 08 - 27T13: 37: 54.187449 + 02: 00[Europe /
Zurich],
    "zipLink": "<your_act_link>",
    "resultInfo": "Successful run",
    "scriptName": "m5_gewinde_minmax",
    "machineName": "Heller HF3500 Nr22",
    "workpieceId": "WK 15-016",
    "resultContent": "<your_concrete_content>"
}
```

Direct Monitoring

10

10.1 Overview

Using the "Direct Monitoring" function, you can analyze intermediate data (data that are almost in real time) of an active monitoring job.

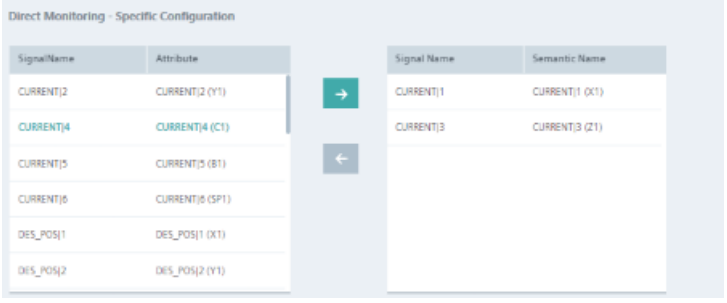
This means that you have the possibility of identifying anomalies during the monitoring, and if required, stopping the monitoring job.

10.2 Creating/configuring jobs with Direct Monitoring

On page "Configure Job", you can create or configure jobs with Direct Monitoring by selecting the "LIVE" job type.

Functions and data

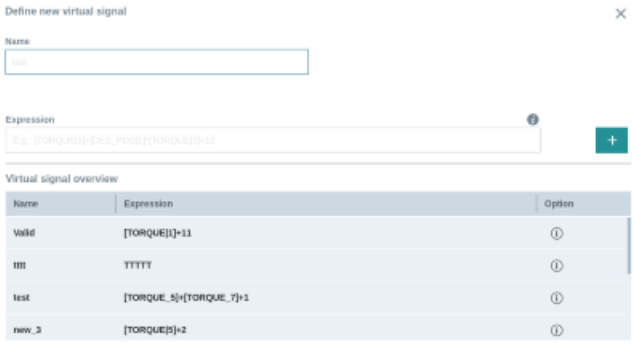
The following functions and data are available:

Functions/data	Description
←	Navigates to the previous page.
Monitoring Job name	Name of the job. A maximum of 150 characters is permitted.
Job number	Number of the job. Only positive numbers are allowed.
Channel	Selects the monitored channel.
Job type	Type of job.
Comments	Text box to enter additional comments.
Direct Monitoring - Specific Configuration	
	
	Available monitoring signals on the left-hand side, and monitoring signals that you selected on the right-hand side.

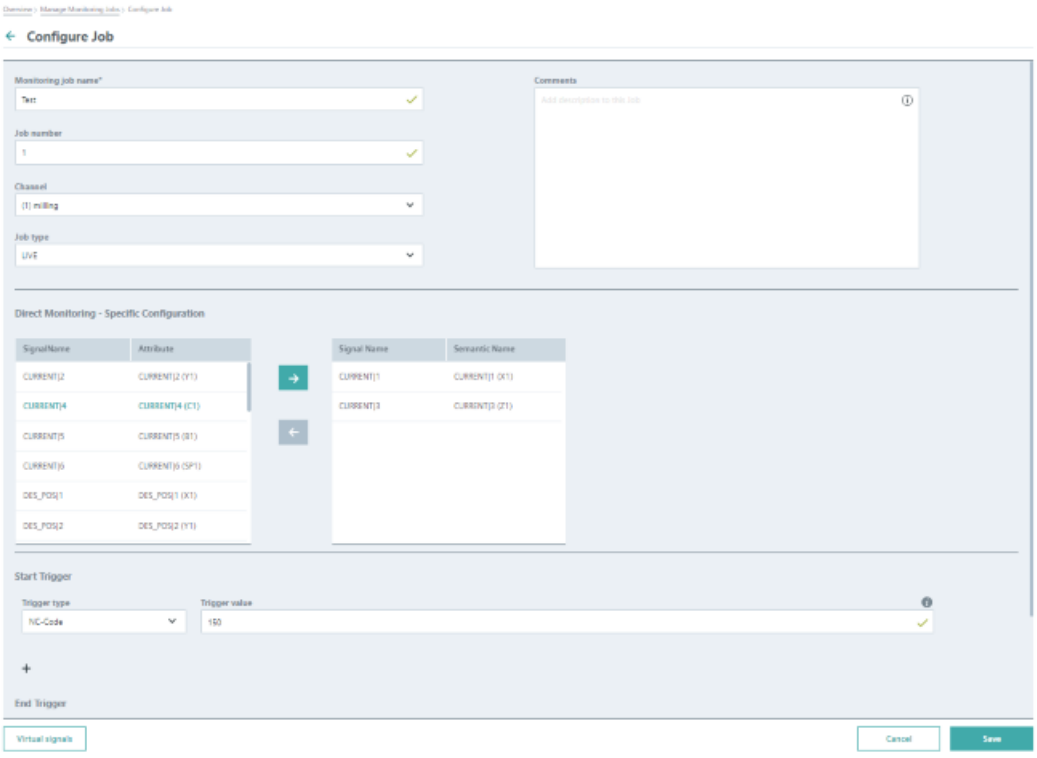
Functions/data	Description
Start Trigger End Trigger	Areas to define triggers that mark the start or end of the operation for which the monitoring job is created. Every trigger is defined using the trigger type and the associated value.
Trigger type	Select one of the following trigger types: • NC code - complete NC program line or part of a line • Tool ID - identification number of the tool used to execute the machining operation. Corresponds to field "ActiveTool" in an "HFBlockEvent" of an Analyze MyWorkpiece /Capture recording. • Seek offset - NC program line number • Program name • Call Stack Level - subprogram level number • BTSS (OPI) - SINUMERIK operator panel interface (can only be selected in conjunction with the trigger type)
Trigger value	Text box to enter the trigger value. The following placeholders are permissible: • "*" for one or several arbitrary characters
	Adds an additional trigger. If several triggers are defined for the start or the end, then the triggers are logically AND'ed.
	Deletes the trigger.

Procedure

1. On page "Manage Monitoring Jobs", click on the name of the required job.
   - OR -
   Click on "New".
2. Page "Configure Job" opens.
   - Enter the general data or select the data from the drop-down lists.
   - Select job type "LIVE" from the drop-down list.
   - Select monitoring signals.
   - Define the start and end triggers.
   - Click on "Virtual signals" if you wish to register a signal.
     Enter the "Name" and the "Expression".
     Click on "+".



– Click on "Save".
  - OR -
  To reject the entries, click on "Cancel".



3. After saving, the following message appears in the upper right area:
   "The job was successfully created"
   - OR -
   "The job was successfully created but could not be saved".

10.3 Activating and connecting jobs with Direct Monitoring

Functions and data

The following functions and data are available:

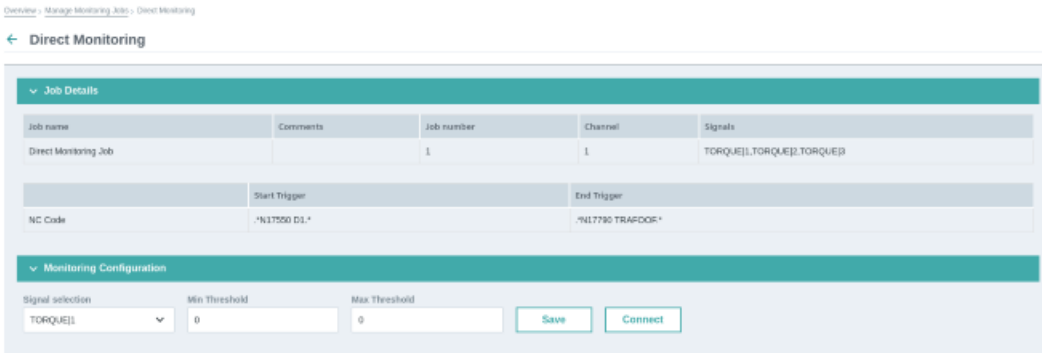
Functions/data	Description
←	Navigates to the previous page.
Page "Managing Monitoring Jobs"	
Job Control	
	Activates/deactivates a job.
Option	
	Opens page "Direct Monitoring". The icon is only available for activated jobs.

Functions/data	Description
Page "Direct Monitoring"	
Job Details	Displays the parameters configured for the job with Direct Monitoring: • Monitoring Job name • Comments • Job number • Channel • Signals • Start Trigger • Stop Trigger
Monitoring Configuration	Make the following settings: • Signal selection • Specify the min threshold • Specify the max threshold

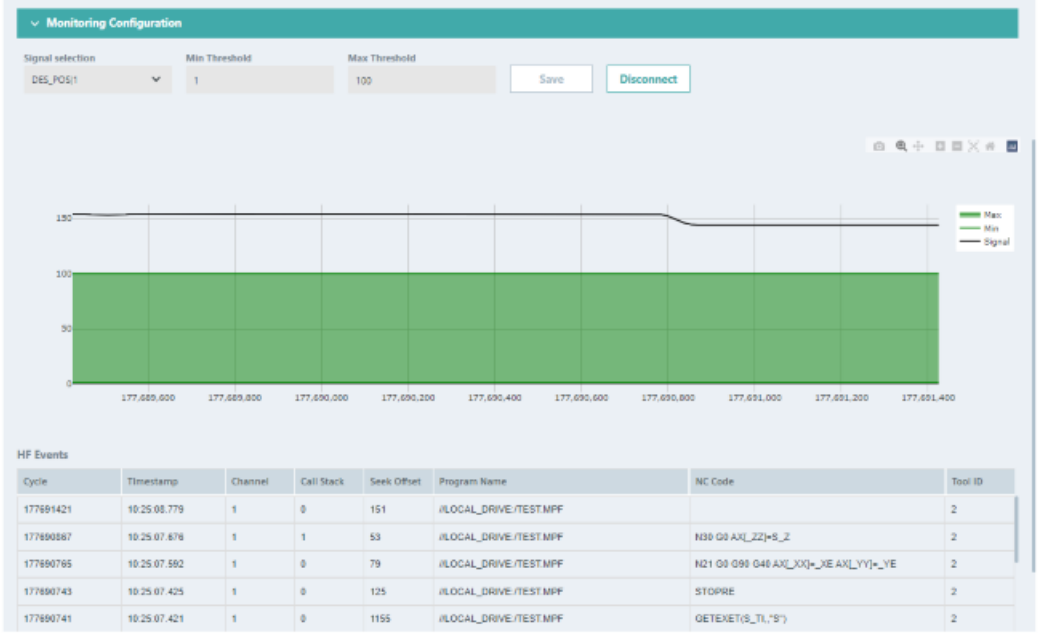
Procedure

1. To activate the job, on page "Manage Monitoring Job", shift the slider in the line with the required job with Direct Monitoring to the right.
2. The job is activated, and the "Magnifying glass" icon is available in the "Option" column.
3. Click on the "Magnifying glass" icon.

4. Page "Direct Monitoring" opens.
   - The previously configured parameters are displayed under "Job Details".
   - Under "Monitoring Configuration", select a signal from the drop-down list and enter a min and max threshold.
   - Click on "Save" to save the thresholds for the selected signal. The saved values are displayed if you reselect the signal in the future.
   - To visualize the received job data, click on "Connect".



5. Under "Monitoring Configuration", a diagram is displayed with the signal data and a table with the HF events.
   - A diagram is not displayed if no data are available for the job.
   - Click on "Disconnect" to stop calling up the job data. The diagram and the table are then no longer updated.
   - Once the connection has been disconnected, a new connection can be established using the "Connect" button.



Use cases

Use case 1:

You activate a monitoring job, but on page "Direct Monitoring" you do not click on "Connect".

The application automatically processes the job data. However, only the last 5000 data points are stored.

When you click on "Connect", initially the last 5000 data points are displayed followed by the new data that have been received.

Use case 2:

You activate a monitoring job, and on page "Direct Monitoring" you click on "Connect".

The application not only saves the last data points, but all available data are immediately displayed.

10.4 Managing jobs with Direct Monitoring

Using direct monitoring, you can copy, delete or archive and restore jobs.

You will find more information in the following chapters:

- Overview (Page 59)
- Copying jobs (Page 65)
- Deleting jobs (Page 66)
- Archiving and reviving jobs (Page 66)

Measurement cycle 11

11.1 Overview

Using Analyze MyWorkpiece /Monitor, you can monitor workpiece-related measurements integrated in the machine, which are performed based on SINUMERIK measuring cycles.

Measuring cycles are general subroutines designed to solve specific measuring tasks.

You can find more information about measurement cycles and measuring functions under: SINUMERIK ONE measuring cycles (https://support.industry.siemens.com/cs/document/109812239/sinumerik-one-measuring-cycles?dti=0&lc=en-US)

Depending on the monitoring job configuration, measuring operations are monitored, the measurement results after a measurement called up from the connected SINUMERIK control and monitoring reports with the results of the measurement created.

Note

Analyze MyWorkpiece /Monitor does not support all combinations of measuring cycles.

11.2 Creating/configuring jobs with a measurement cycle

On page "Configure Job", you can create or configure jobs with a measurement cycle by selecting the "MEASUREMENT" job type.

Functions and data

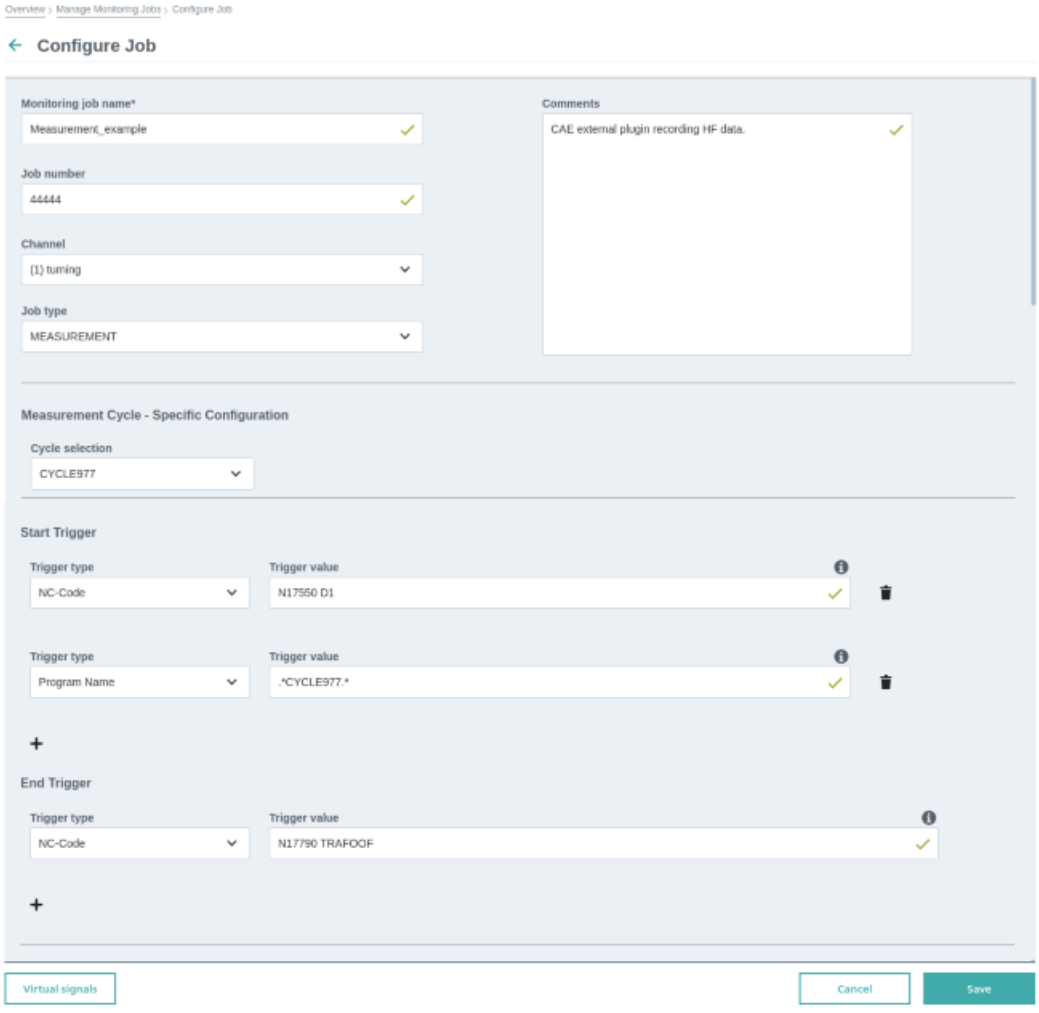
The following functions and data are available:

Functions/data	Description
←	Navigates to the previous page.
Monitoring Job name	Name of the job. A maximum of 150 characters is permitted.
Job number	Number of the job. Only positive numbers are allowed.
Channel	Selects the monitored channel.
Job type	Type of job.
Comments	Text box to enter additional comments.
Measurement Cycle - Specific Configuration	
Cycle selection	Select the measurement cycle.
Start Trigger Stop Trigger	Areas to define triggers that mark the start or end of the operation for which the monitoring job is created. Every trigger is defined using the trigger type and the associated value.

Functions/data	Description
Trigger type	Select one of the following trigger types: • NC code - complete NC program line or part of a line • Tool ID - identification number of the tool used to execute the machining operation. Corresponds to field "ActiveTool" in an "HFBlockEvent" of an Analyze MyWorkpiece /Capture recording. • Seek offset - NC program line number • Program name • Call Stack Level - subprogram level number • BTSS (OPI) - SINUMERIK operator panel interface (can only be selected in conjunction with the trigger type)
Trigger value	Text box to enter the trigger value. The following placeholders are permissible: • "*" for one or several arbitrary characters
+	Adds an additional variable address. - OR - Adds an additional trigger. If several triggers are defined for the start or the end, then the triggers are logically AND'ed.
🗑	Deletes the variable address. - OR - Deletes the trigger.

Core statement

1. On page "Manage Monitoring Jobs", click on the name of the required job.
   - OR -
   Click on "New".
2. Page "Configure Job" opens.
   - Enter the general data or select the data from the drop-down lists.
   - Select job type "MEASUREMENT" from the drop-down list.
   - Select a measurement cycle. Start and end triggers are automatically configured based on the cycle selection.
     You can edit and expand the trigger configuration.
   - Click on "Save".
     - OR -
     To reject the entries, click on "Cancel".



3. After saving, the following message appears in the upper right area:
   "The job was successfully created"
   - OR -
   "The job was successfully created but could not be saved".

11.3 Managing jobs with measurement cycle

Using measuring cycle, you can copy, delete or archive and restore jobs.

You will find more information in the following chapters:

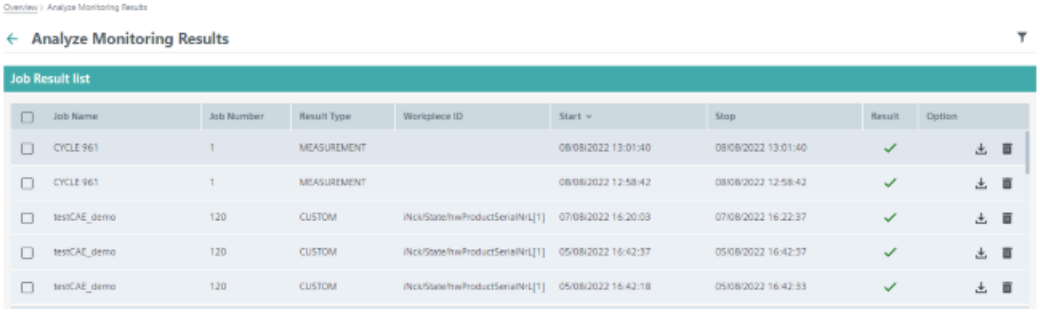
- Overview (Page 59)
- Copying jobs (Page 65)
- Deleting jobs (Page 66)
- Archiving and reviving jobs (Page 66)

11.4 Downloading reports

In the "Analyze Monitoring Results" application, you have the option of downloading reports of individual jobs.

Procedure

1. On the home page, click on "Analyze Monitoring Results".
2. Page "Analyze Monitoring Results" > "Job Results" opens.
   All recorded data are listed.
   – Click on the column header to sort and display the list in an ascending or descending order in individual columns.



3. To download individual job reports click on the "Download" icon in column "Option".

11.5 Example of MQTT messages

```
{
    "jobName": "Cycle961",
    "startDate": 2022 - 08 - 27T13: 37: 54.187449 + 02: 00[Europe /
Zurich],
    "endDate": 2022 - 08 - 29T13: 37: 54.187449 + 02: 00[Europe /
Zurich],
    "zipLink": "<your_act_link>",
    "machineName": "Heller HF3500 Nr22",
    "workpieceId": "WK 15-016",
    "reportContent": ["<your_content_line1>",
"<your_content_line2>", "<your_content_line3>"]
}
```

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