Okuma America Corporation

Okuma MTConnect Adapter
Software User Manual

Document No.: S5053-03-23

Revision History

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OKUMA MTConnect Adapter
User Manual

1. Introduction

1.1 Purpose

The purpose of this document is to provide the instruction of installing and operating Okuma MTConnect Adapter. It also provides information on how to repair, and uninstall this software.

1.2 Scope

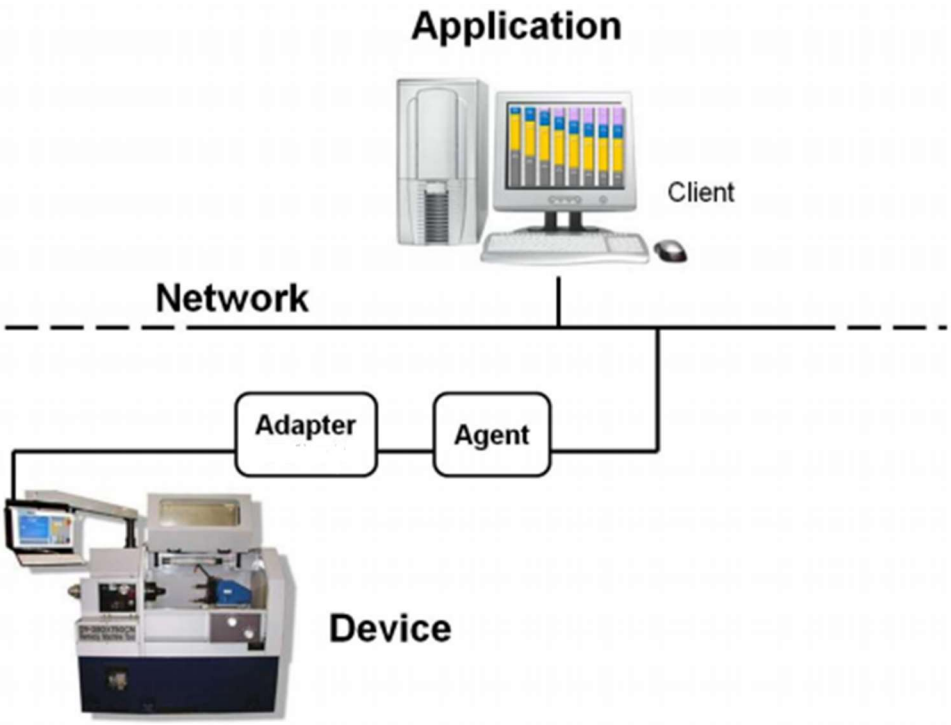
This manual will cover the installation, operation and troubleshooting for Okuma MTConnect Adapter running on OSP P100II/P200/P300 controls or newer controls and on Windows XP, Windows 7, and Windows 10.

1.3 Definitions, Acronyms and Abbreviations

None

1.4 Overview

The Okuma MTConnect Adapter is an application that is specifically designed to support the communication interfaces between MTConnect Agent and Okuma OSP-P controls.



For OKUMA controls, Adapter and Agent are installed on the control by default. An application resided on the control or on the network can consume information from an agent to perform tasks. Okuma MTConnect Adapter uses THINC-API to obtain machine data as defined in Devices.xml file and sends changed data to MTConnect agent.

1.5 Functions and Configuration

1.5.1 *Function*

- This application will start after NC is started up using Startup service.
- This application allows MTConnect Agent provided by MTConnect.org to collect machine data.
- The system performs the following tasks routinely:
  - ❖ Send changed data to connected Agents

1.6 Scope

Current version of OKUMA MTConnect Adapter only supports OKUMA P100II/P200/P300 controls or higher. This adapter must be used with an agent developed by MTConnect.org and can be download at https://github.com/mtconnect/cppagent

By default, agent is included and installed with OKUMA MTConnect Adapter.

1.7 References

[1] Installation Manual for THINC-API

[2] Installation Manual for Startup Service

[3] MTConnect Agent - https://github.com/mtconnect/cppagent

2. Installation

The following steps in section 2.0 need to be performed in the exact order:

- Installation of THINC API
- Installation of THINC Startup Service
- Installation of OKUMA MTConnect Adapter Software
- Installation of MTConnect Schemas (optional)

Note: All installation must be either installed directly from CD/DVD disks or copied to the local hard drive of the machine.

All security must be handled by end-user to allow the communications between client application, MTConnect agent, and OKUMA MTConnect Adapter.

To ensure that MTConnect Adapter and MTConnect Agent are working properly, it is highly recommended that the verification must be done using the default setting after finish the installation of MTConnect Adapter and all of its dependency application such as Startup Service and THIN-API if applicable. Please follow the section Verifying Agent and Adapter Connectivity for verification

2.1 Installation of THINC-API

This application requires THINC-API having the same version or greater to be installed on machine as specified in the Release Note of MTConnect Adapter.

Refer to THINC-API 'InstallationManual.pdf' provided on THINC-API Installation disk for instructions.

Tip: Try to run THINC-API Demo Application and see if it runs normally to make sure THINC-API is properly installed.

It is always best to install the latest version of THINC-API on the machine if possible.

2.2 Installation of THINC Startup Service

This application requires THINC Startup Service having the same version or greater to be installed on machine as specified in the Release Note of MTConnect Adapter.

Refer to installation manual of Startup Service provided on Installation disk for instructions.

2.3 Installation of Okuma MTConnect Adapter Software

In Windows mode (while NC is starting one needs to press ESC key on the control panel. The Cancel button will be shown on NC HMI screen to allow stopping NC from running. On newer controls, the start-up screen can be cancelled by keep tapping the SHIFT key.), Run the 'Setup.exe' program from the Okuma MTConnect Adapter DVD to install Okuma MTConnect Adapter software. The setup program automatically checks if Microsoft .NET framework 4.0 is installed. If it is not installed, continue to section 2.3.1, otherwise refer to section 2.3.2.

OSP software should not be running during the installation of Okuma MTConnect Adapter or .NET Framework 4.0. During the .NET installation, it will be necessary to reboot multiple times. OSP software launch should be cancelled and the installation media should remain connected during the reboot.

For Windows XP, it must have Service Pack 3 installed in order to support .NET Framework 4.0

This installation can only be installed on Windows XP, Windows 7, and Windows 10.

Note: This setup will check to see if the required version of THINC-API, and Startup Service installed on target machine before installing OKUMA MTConnect Adapter.

2.3.1 *Installation of Microsoft .NET Framework 4.0*

The next dialog will be displayed if Microsoft .NET framework 4.0 is not installed.

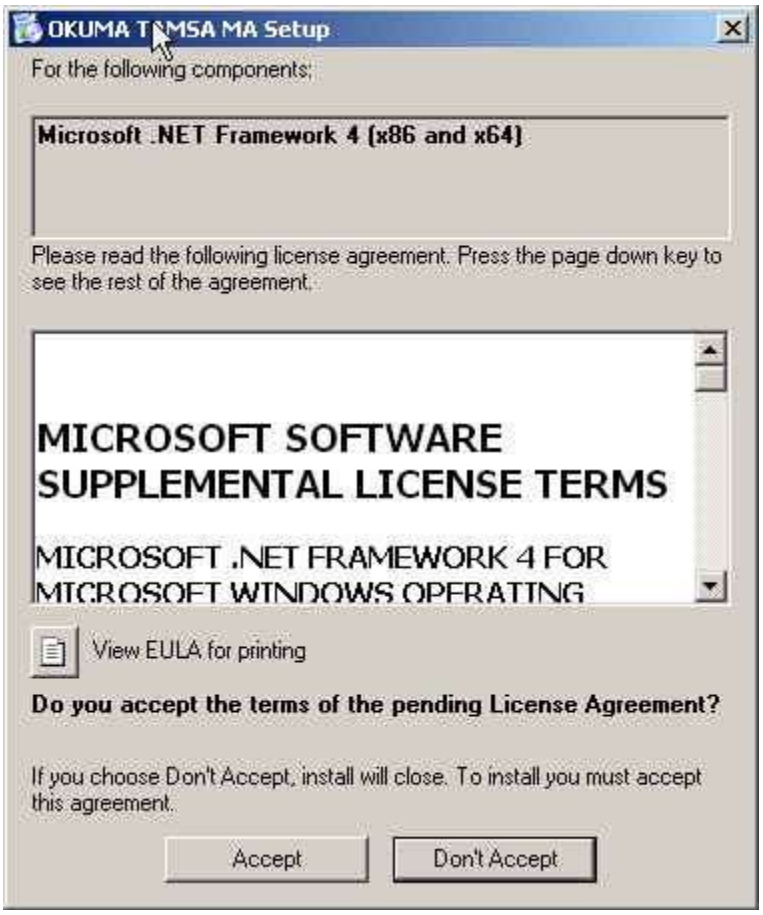


Figure: .NET framework 4.0 license agreement dialog

Click ‘Accept’ to install .NET framework 4.0.

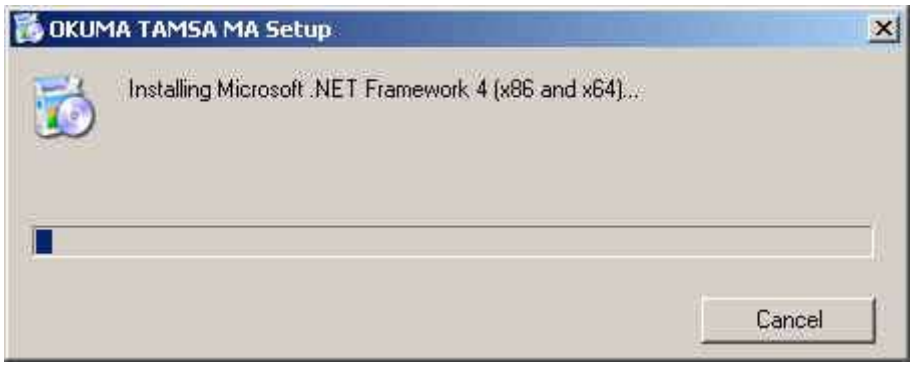


Figure: .NET framework 4.0 installation dialog

If the .NET installation requires rebooting then it needs to reboot the machine to continue the installation again.

2.3.2 *Installation of Okuma MTConnect Adapter Software*

The following dialog will be displayed once all of the required .NET frameworks are installed.

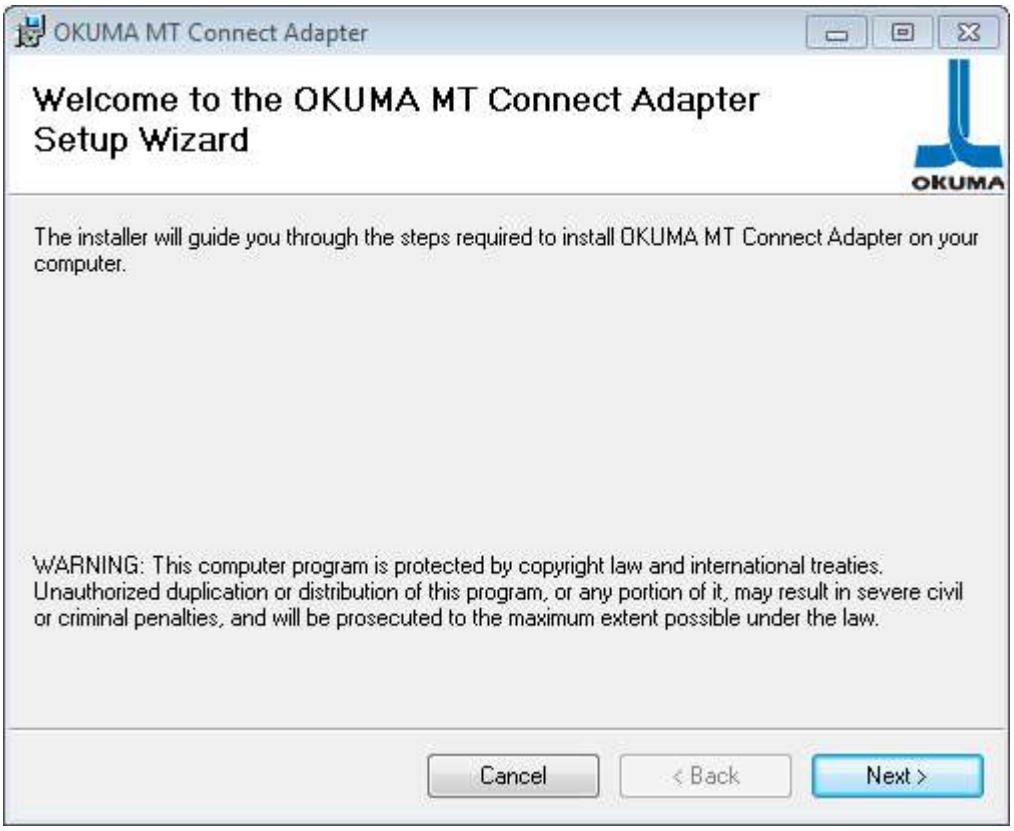


Figure: Installation welcome dialog

Click ‘Next’ to continue.

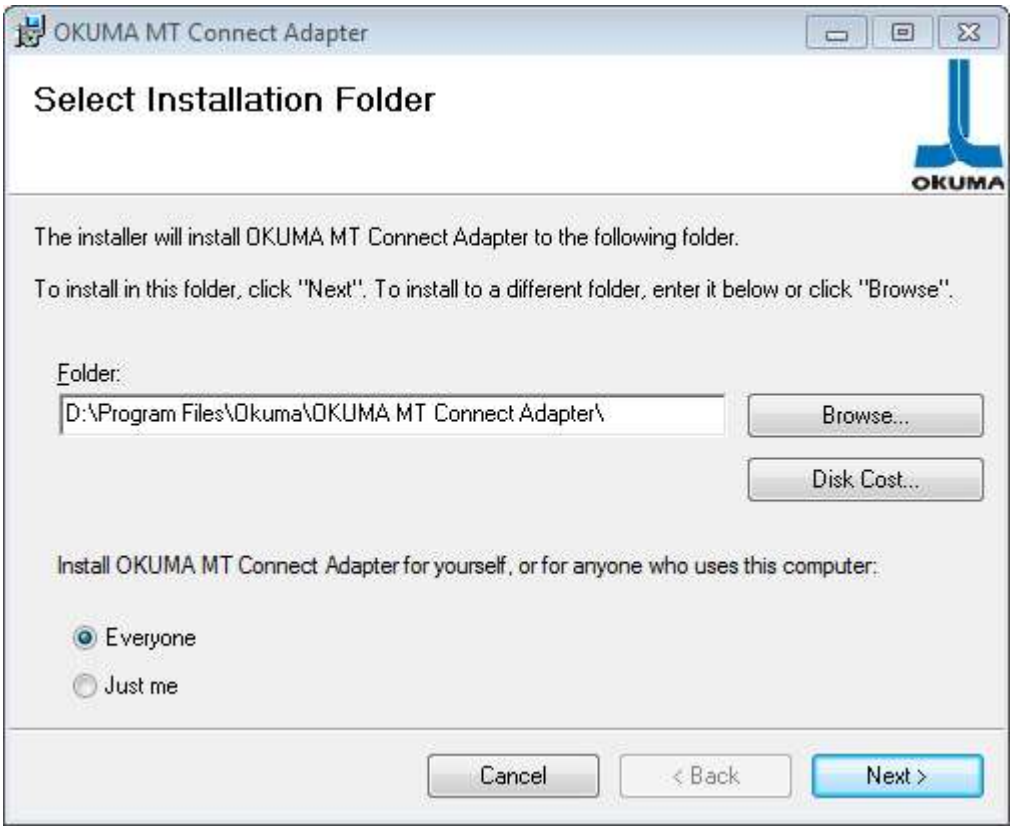


Figure: Installing Application folder

Click ‘Next’ to continue. User can also select a different folder other than the default one to install Okuma MTConnect Adapter Software.

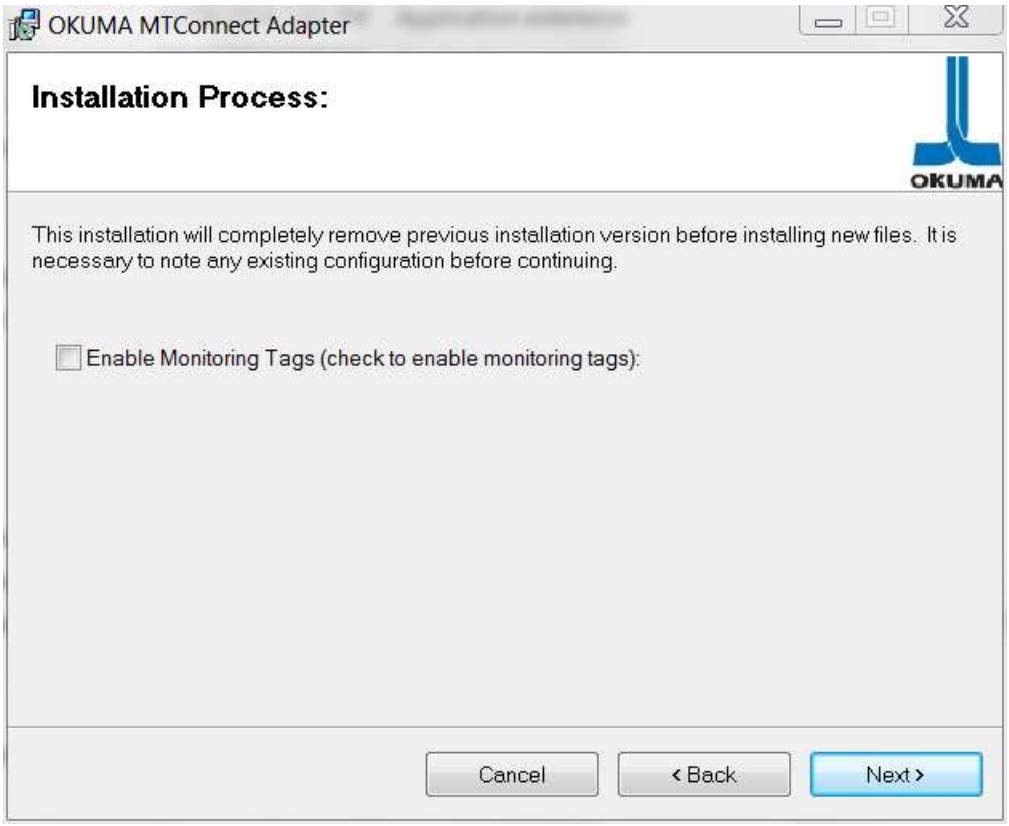


Figure: Installing Process

This dialog to inform user that the installation will completely remove any previous installation version before installing new version. It is necessary to note any custom agent/adapter information such as Adapter Device Name, Port, and Agent port number before proceeding the installation.

By default, all tags will not be monitoring. To enable monitoring tags, it is necessary to check the Enable Monitoring Tag box. It can also be enable or disable in Tags Config. Menu.

Click Next to continue

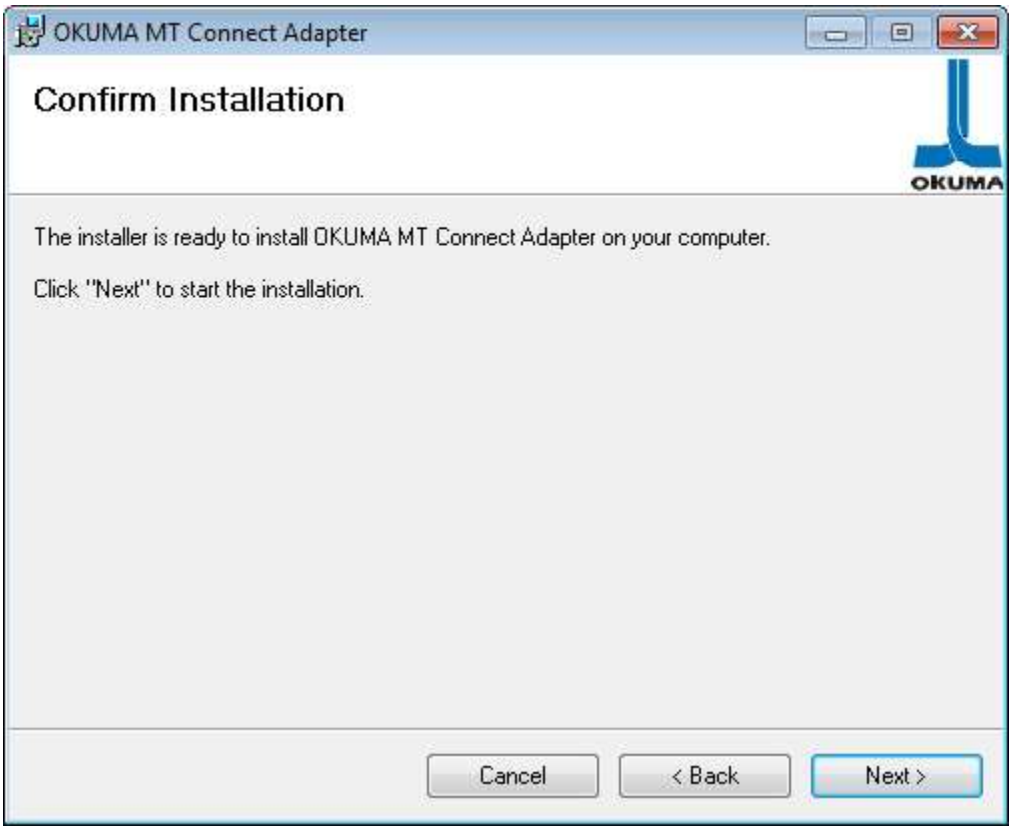


Figure: Confirm Installation

Click ‘Next’ to continue.

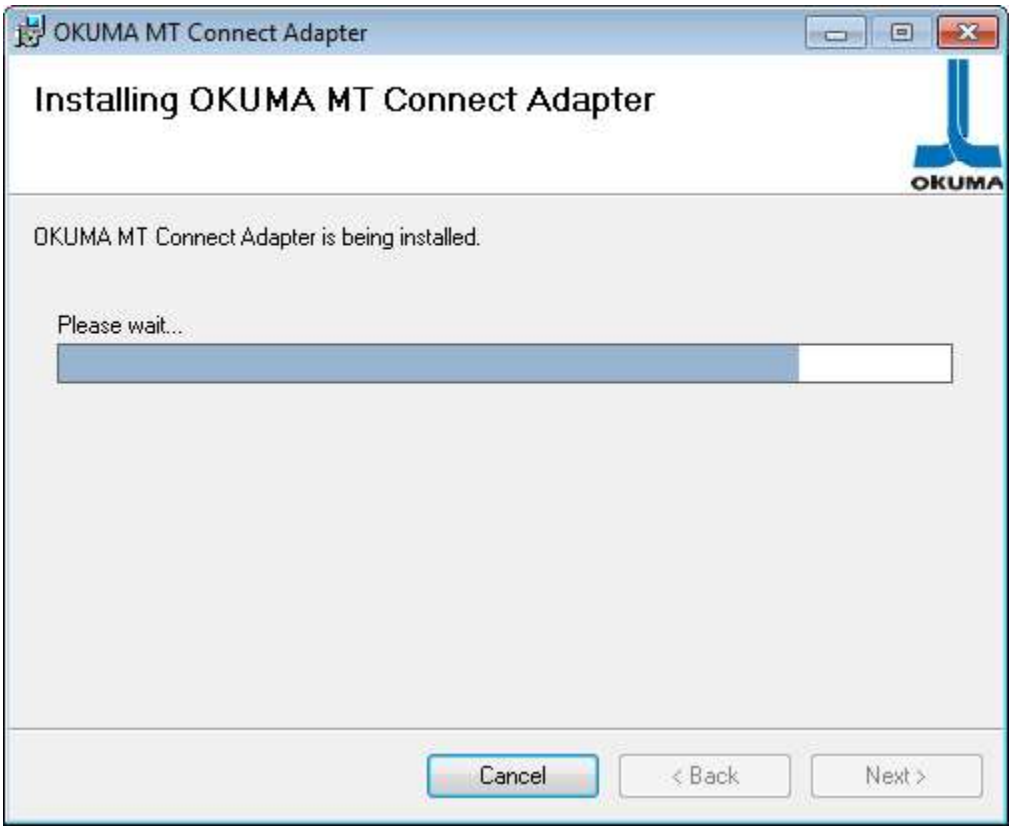


Figure: Installing OKUMA MTConnect Adapter

Application is installing.

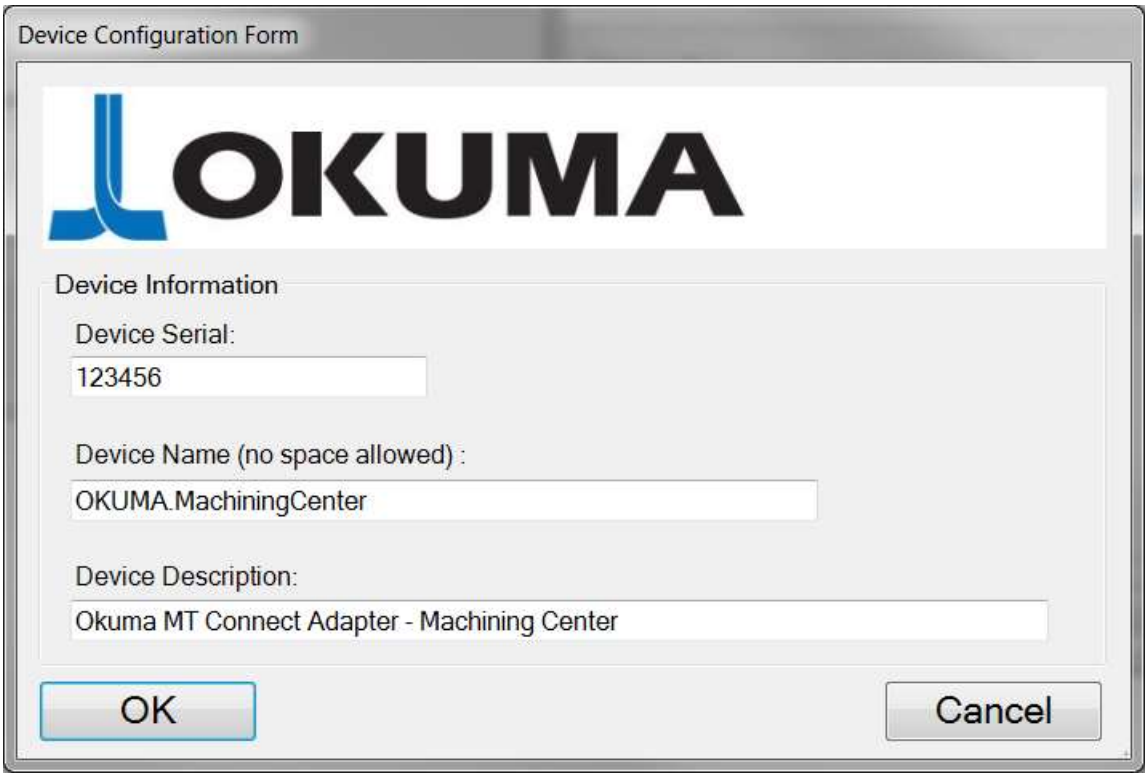


Figure: Device Information

This dialog provides custom setup for Okuma MTConnect Adapter.

1/ Device Information:

- Device Name: Name of machine as specified in Devices.xml once it is configured per machine type. No space is allowed in device name.
- Device Serial Number: Unique machine number
- Device Description: A description of this machine

2/ OK button:

The system will save the current setting and update the device configuration file accordingly.

3/ Cancel Button:

This will cancel current installation.

Click OK to move to next step

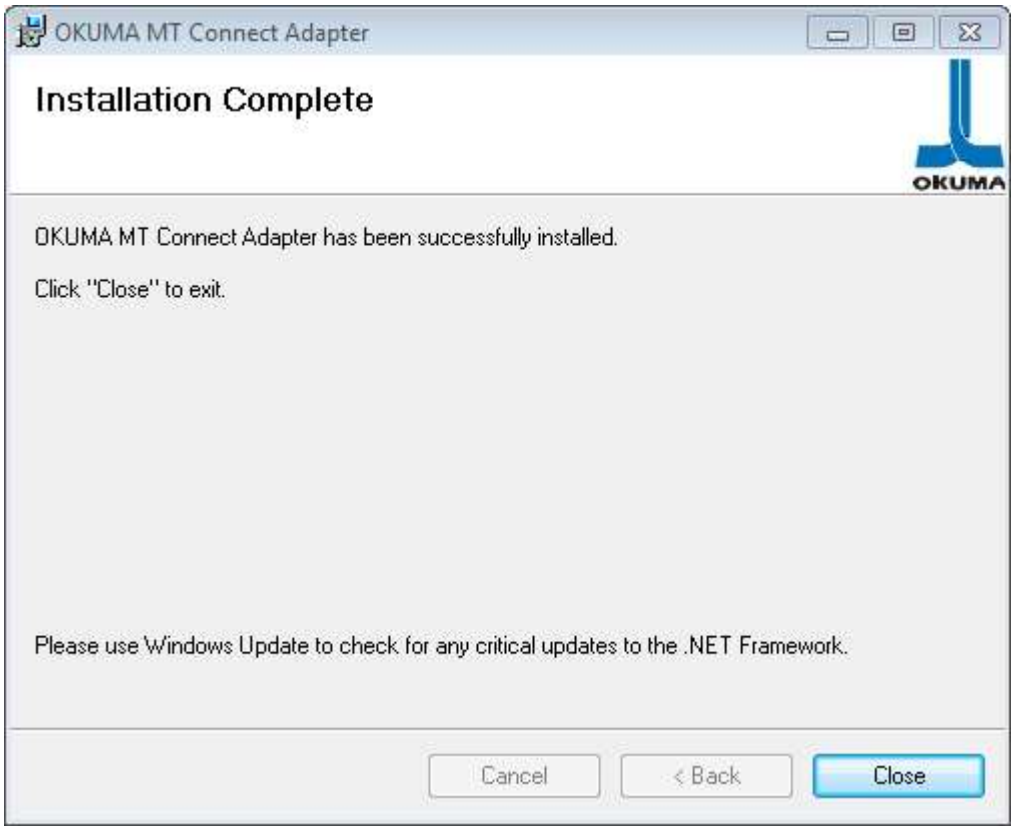
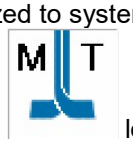


Figure: Installation completed dialog

Click 'Close' to complete the installation.

It is necessary to reboot the machine after this step to complete the installation process.

OKUMA MTConnect Adapter application will be started automatically by THINC Startup Service after NC is completely started. By default, OKUMA MTConnect Adapter will be minimized to system tray after it runs without any error. The application can be shown up by double clicking the OKUMA icon 

located in the lower left corner of screen.

2.4 Installation of MTConnect Schemas (Optional)

There are custom tags defined specifically for OKUMA controls. An extended schema, OkumaStreams_xyz.xsd where xyz is the actual version of MTConnect spec, for streaming data is included with the setup under the Schemas folder where application is installed on target machine.

If stream data output from Agent needs to be validated then the standard and extended schemas files need to be copied to target location where client application needs to check if needed.

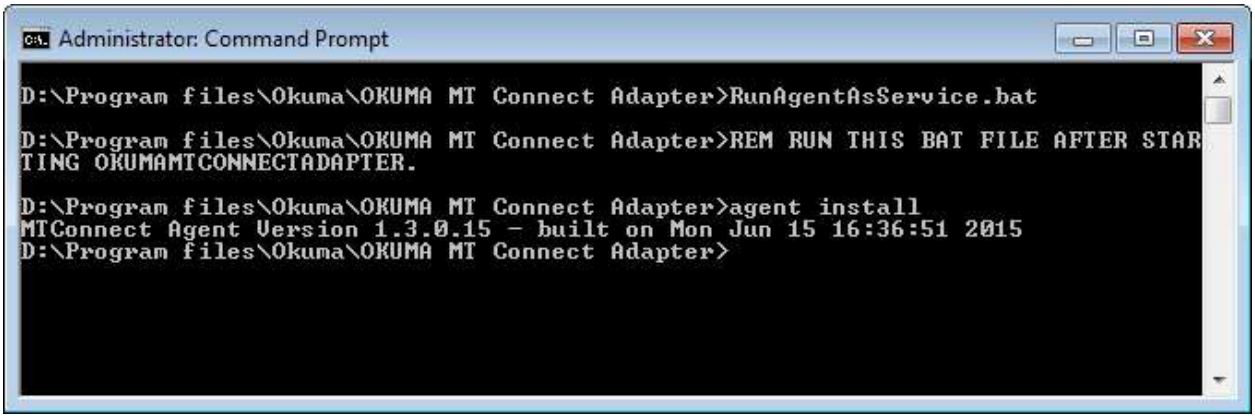
2.5 Installation of Agent on P100II only

For P100II machines, agent must be installed by running the RunAgentAsService.bat file manually.
The file is located in the installation folder, which is normally found in this default installation folder as shown

below:

D:\Program files\Okuma\OKUMA MT Connect Adapter\

For P100II machines, Run the DOS command under administrator account and change to the current installation directory of MTConnect Adapter and execute the RunAgentAsService.bat by typing it in the DOS command prompt as shown below



Refer to Installation and Configuration of MTConnect Agent for more information how to install agent under administrator account on Windows XP.

3. Repair/Uninstall Okuma MTConnect Adapter Software

3.1 Un-install Okuma MTConnect Adapter Software

Start the machine in Windows only mode. Click 'Start' → Settings → 'Control Panel' to launch control panel. Double click 'Add or Remove Programs' in control panel, find the item 'Okuma MTConnect Adapter' and click 'Remove' to uninstall Okuma MTConnect Adapter Software.

Note: Before performing un-installing Okuma MTConnect Adapter application, please shutdown the Okuma MTConnect Adapter application if it is running.

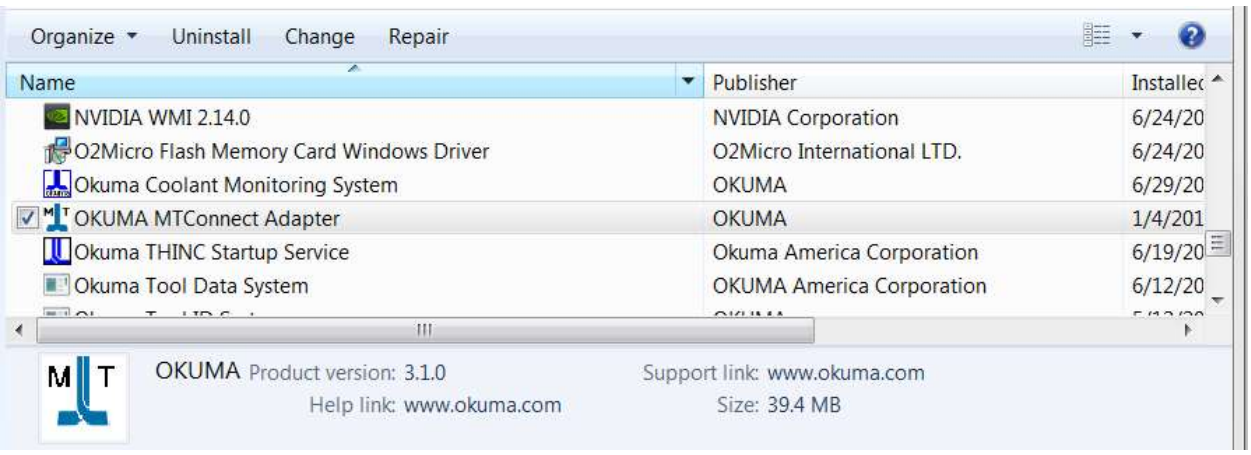


Figure: Uninstall Okuma MTConnect Adapter software dialog

Figure: Uninstall Okuma MTConnect Adapter software confirmation dialog

Click 'Yes' to confirm uninstalling Okuma MTConnect Adapter Software.

4. Installation Files

4.1 Okuma MTConnect Adapter Software

All the files are installed in the installation folder unless otherwise noted, by default, which is 'D:\Program Files\Okuma\Okuma MT Connect Adapter'.

The devices.xml configuration file will be created and configured per machine type and specification by OKUMA MTConnect Adapter. Once it is configured the device is available for communicating with an agent.

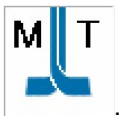
Note: In case of agent running on remote PC, the devices.xml must be manually copied to the target location where agent is running.

5. Usage

5.1 Start Okuma MTConnect Adapter Application

The Okuma MTConnect Adapter Software will be launched automatically by the Start-Up service after NC is started completely.

If user exits the software and wants to launch it again, press 'Ctrl + ⁄⁄' on the operation panel to pop up Start Menu, then click 'Programs' → 'Okuma' → 'Okuma MTConnect Adapter' → 'Okuma MTConnect Adapter Application' to run.

After the application is launched without error, it will be minimized in the system tray and shown as an icon 

. If user performs a double-clicking on the icon or presses 'Show' from the pop-up menu, the main user interface will be displayed.

Note: The detail messages displayed in the main user interface does depend on each machine configuration.

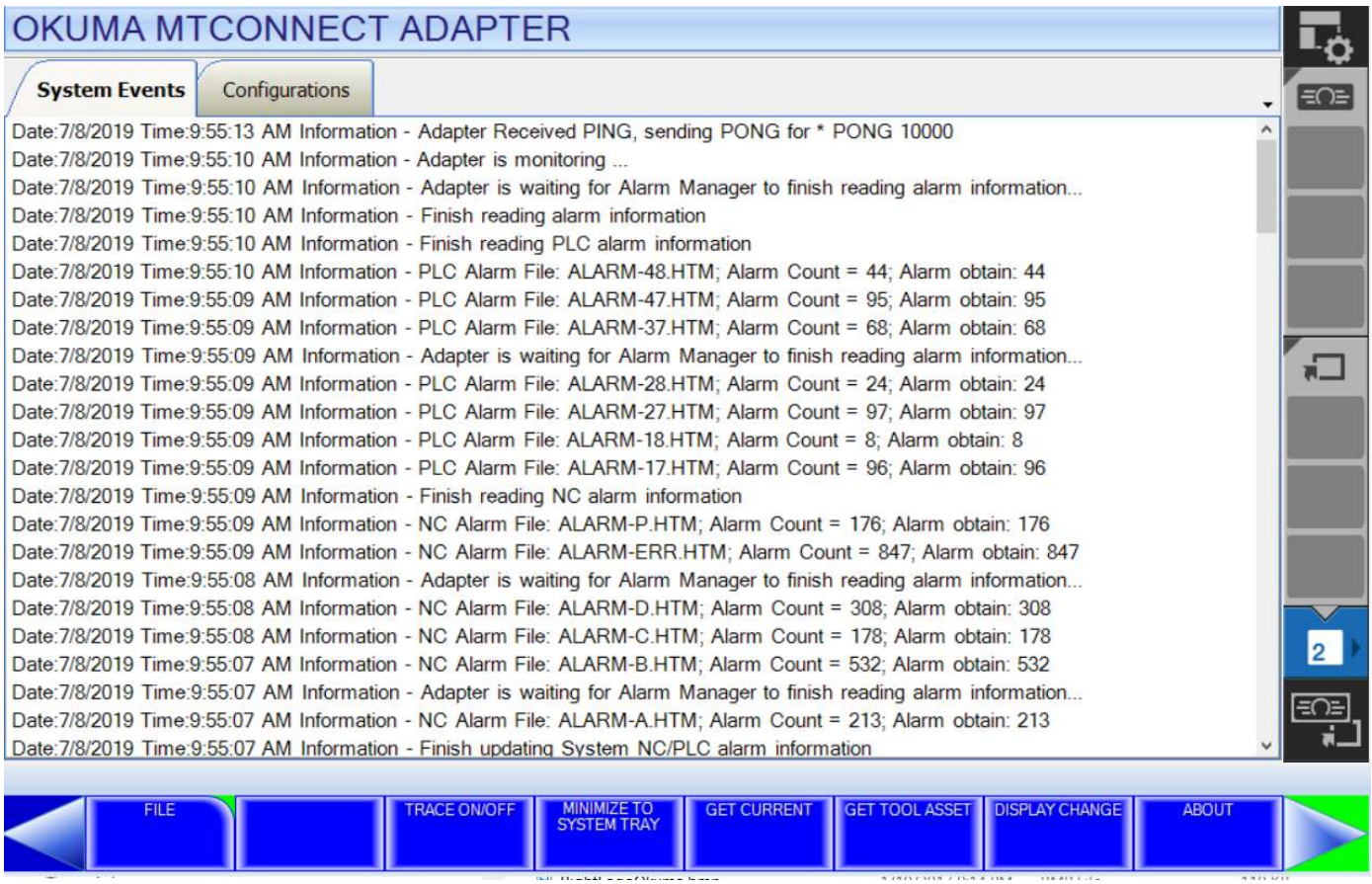


Figure: Okuma MTConnect Adapter Software main user interface

5.2 Exit Okuma MTConnect Adapter Application

When user shuts down the machine, the software will be terminated automatically without user interaction.

Click the button File/Exit will also terminate the software.

In normal operation, only user with administrative right can perform this operation.

5.3 Main User Interface

The main interface mainly contains two tabs:

System Events
Configurations

5.3.1 *System Events*

By default, the system will write event messages to the System Events tab in the descending order such that newest event message will be displayed on the top of the list. If the 'Trace On' menu is checked, all messages will be displayed on the main user interface, otherwise only pre-selected event messages by the system will be displayed.

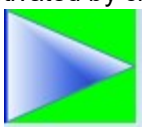
Event messages are categorized into different event types as following:

- Information – Indicate normal event messages. It is in black color.

- Tracing – Indicate tracing event messages when Trace On mode is enabled from menu. It is in blue color.
- Warning – Indicate warning event message. It is in orange color.
- Error – Indicate error event messages when system encounters. Error messages will be forced to display to main GUI and logged. It is in red color.
- Fatal – Indicate critical error event messages when system encounters. Error messages will be forced to display to main GUI and logged. It is in violet color.

By double clicking on the event message in each row, a message box will be displayed contained the message in the current selected row.

Note: Error happened during initializing or applying new system configuration must be resolved in System Configuration.

The System Events tab contains two menu bars as shown below. The menu item can be activated by clicking on it or pressing the correspond F Key from F1 to F9 if applicable. By clicking left or right  triangle on the menu bar, the different menu will be displayed and function accordingly as shown below:

5.3.1.1 File Menu

The ‘File’ menu has one submenu item, which is ‘Exit’.

When the ‘Exit’ menu item is activated, the application will be closed.

5.3.1.2 Clear Events Menu

When the ‘Clear Events’ menu item is activated, all the messages displayed in the client area of the main user interface are cleared.

5.3.1.3 Trace ON/OFF Menu

When the Trace menu is activated, it will toggle the TRACE mode. If Trace is ON tracing message is displayed when data item is changed.

5.3.1.4 System Tray Menu

When the ‘System Tray’ is activated, the main user interface is hidden and the icon for this application is shown in the system tray of windows task bar.

5.3.1.5 Get Current Menu

When the 'Get Current' menu is activated, the system will display a message in the System Events tab. The message contains all current values of all data items currently supported by the device.

Note: Data item might be UNAVAILBLE if it is not configured for monitoring in the Configuration tab.

5.3.1.6 Help Menu

When the 'About' menu item is activated, a dialog is displayed to show the information about this application.

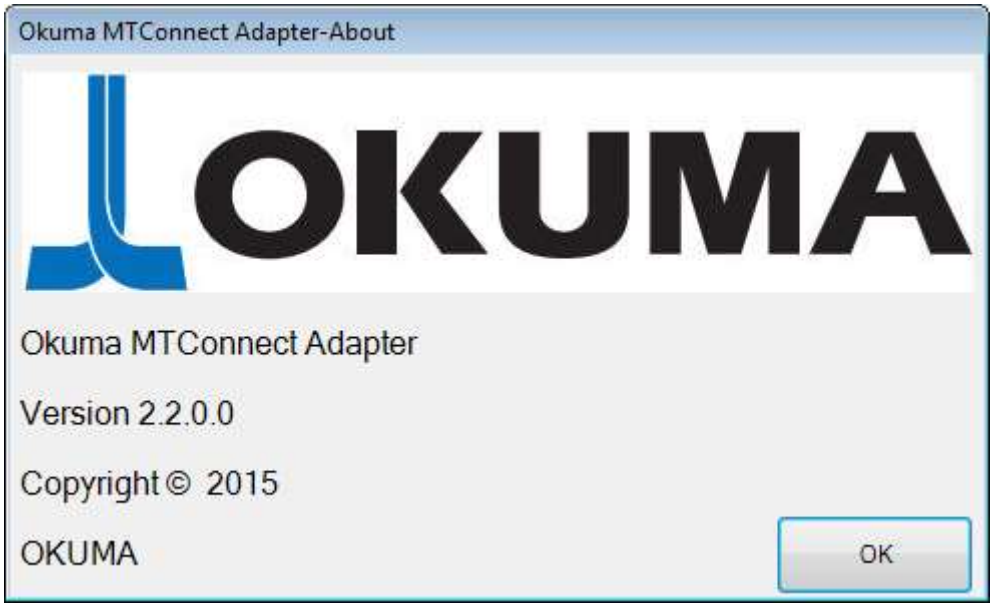


Figure: Okuma MTConnect Adapter About box

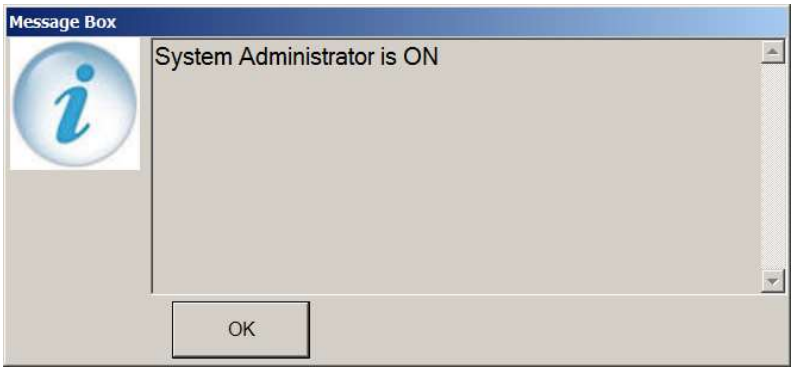
5.3.1.7 Log On

Click on the

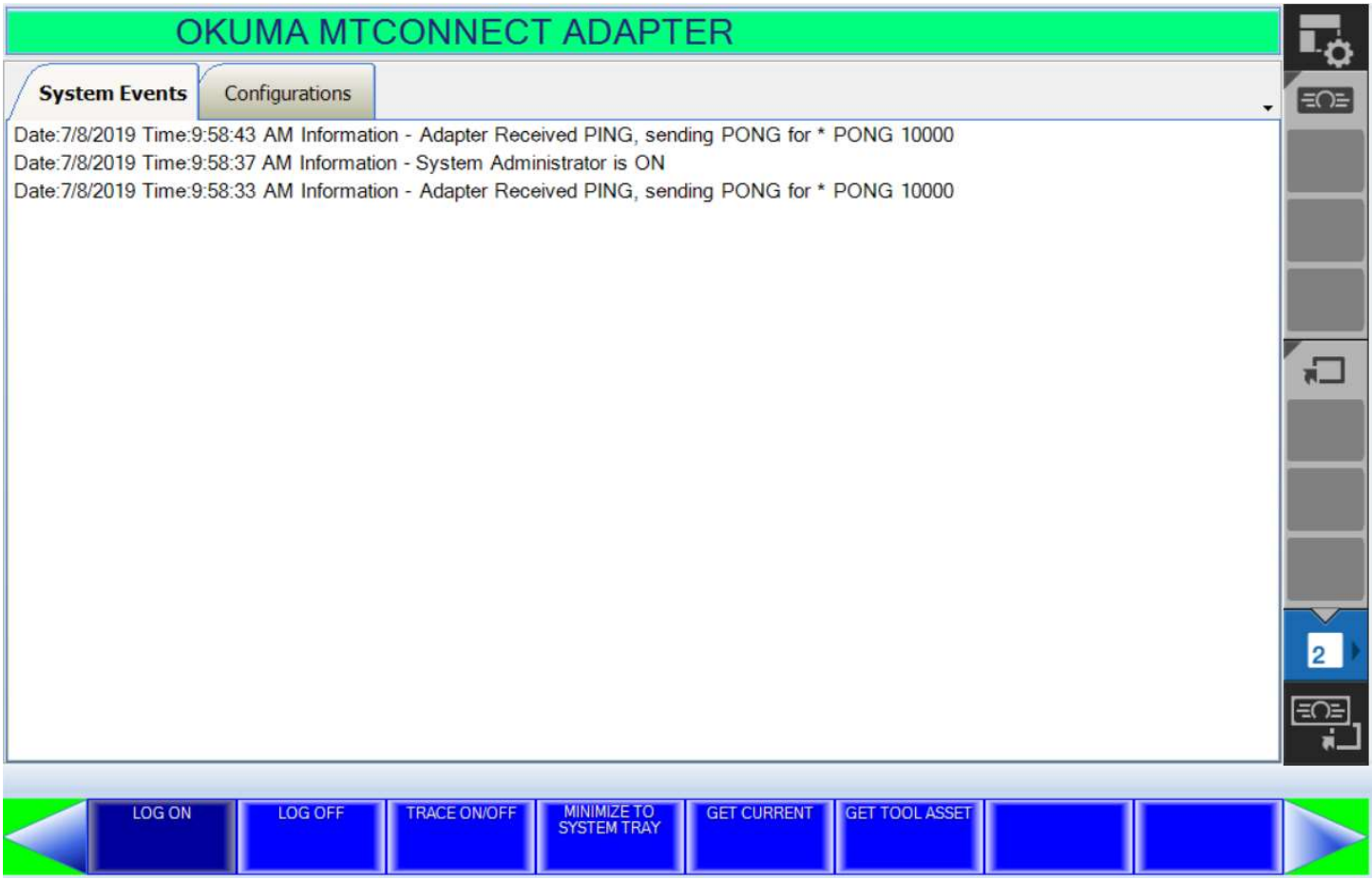
soft key or function key **[F1]** to log into the system as **Administrator-Level** account. From then all users can change any system configuration setting until the user selects to Log OFF. The system will automatically log off after the system has been restarted. The Log On dialog will appear as shown below. Enter **Windows User Name** and **User Password** and click **OK** to log on the system.

- *In normal operation, only user with administrative right can perform this operation*.

The message box will display as shown. Click OK to close the message.



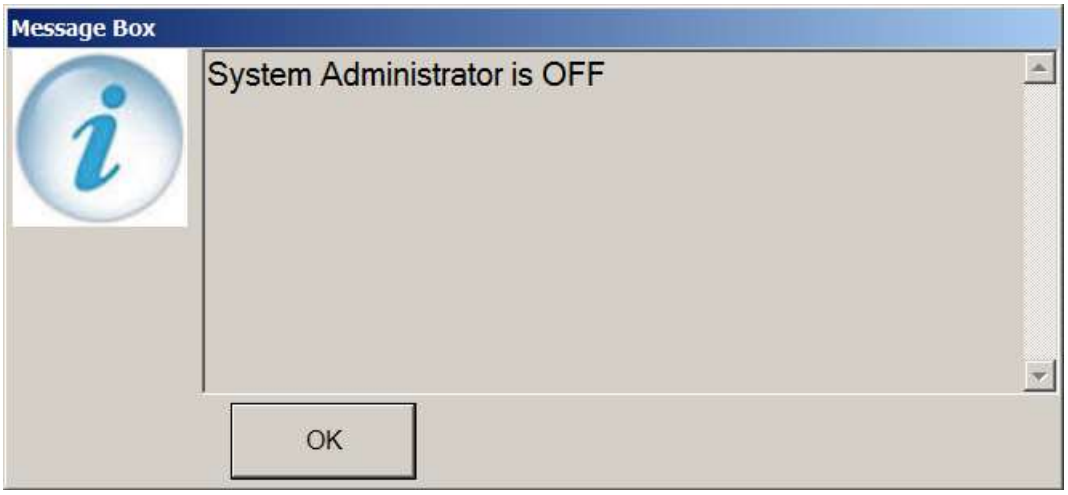
The background color of the title bar of this application will be changed to green color as shown below.

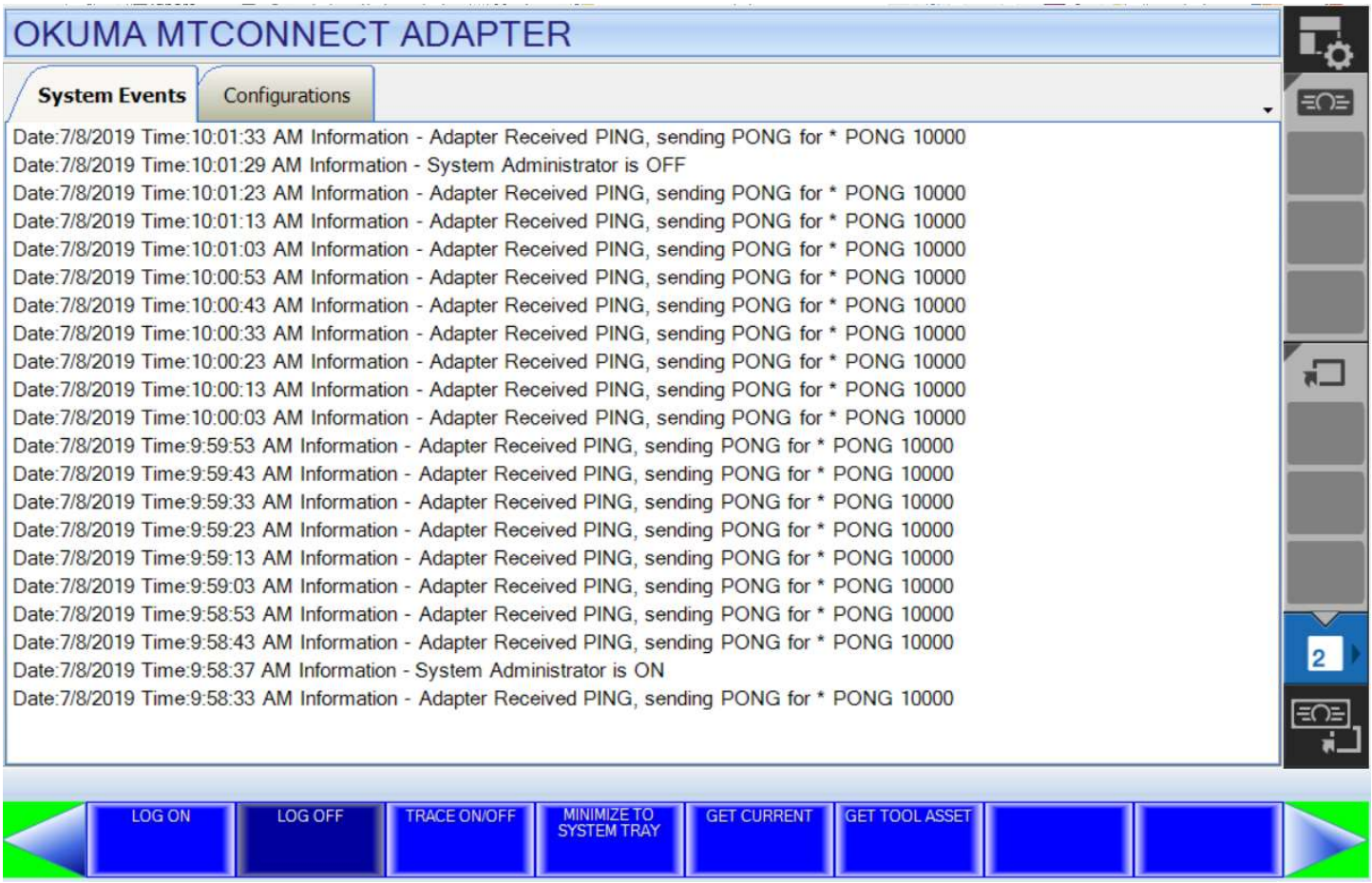


5.3.1.8 Administrative Log Off

Click on the

soft key or function key **[F2]** to log off the **Administrator-Level** account. The message box will display as shown. Click **OK** to close the message.

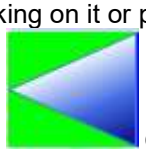
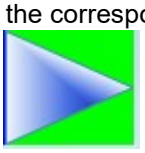


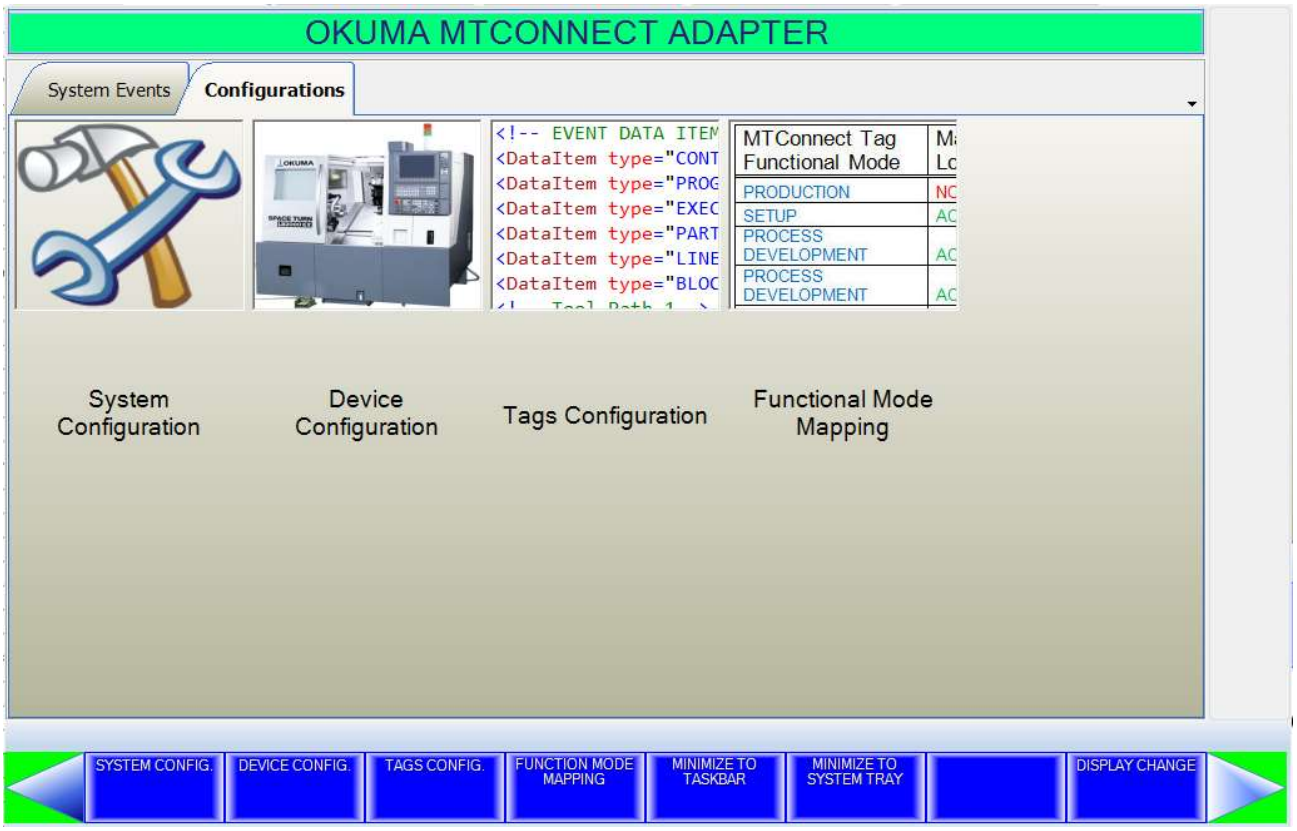


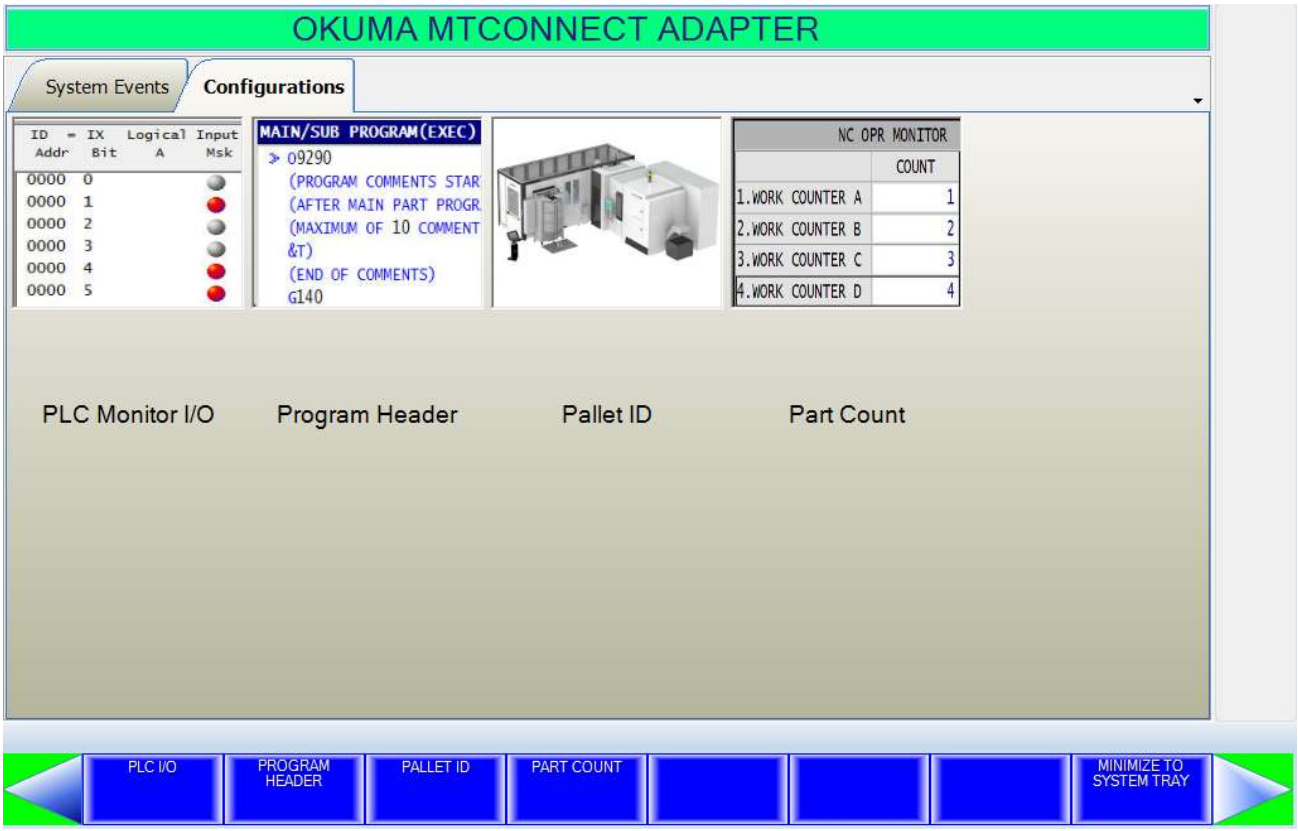
5.3.2 *Configurations*

This tab provides different configurations for the application. The actual number of configuration items will be available based on the version of MTConnect Adapter.

Notes: Any change in the System or Device Configuration might update the Devices.xml file, accordingly and requires updating agent configuration file.

It contains 2 menu bars as shown. The menu item can be activated by clicking on it or pressing the correspond F Key from F1 to F9. F9 is used to advance to next menu if any. By clicking left  or right  triangle on the menu bar, the different menu will be displayed and function accordingly as shown below:

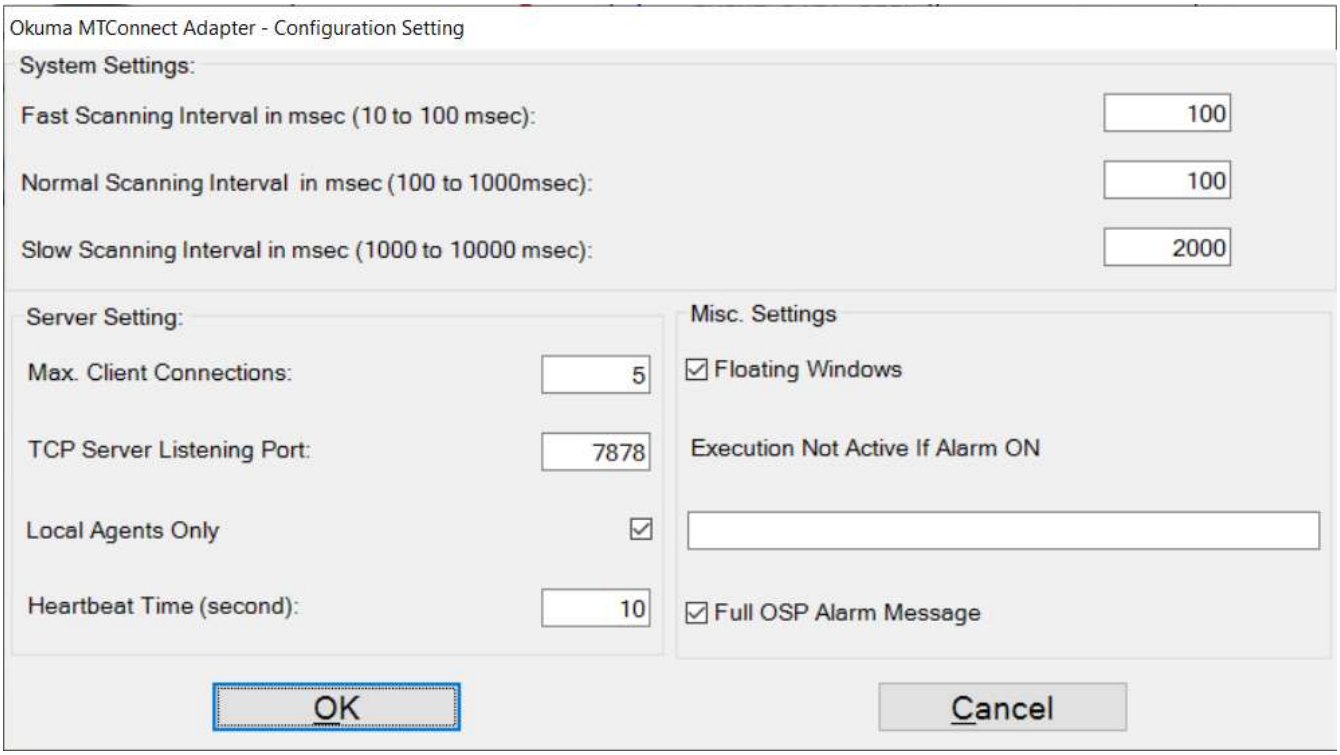

OKUMA MTCONNECT ADAPTER
System Events
Configurations
MTConnect Tag
Functional Mode
PRODUCTION
SETUP
PROCESS DEVELOPMENT
PROCESS DEVELOPMENT
System Configuration
Device Configuration
Tags Configuration
Functional Mode Mapping
SYSTEM CONFIG.
DEVICE CONFIG.
TAGS CONFIG.
FUNCTION MODE MAPPING
MINIMIZE TO TASKBAR
MINIMIZE TO SYSTEM TRAY
DISPLAY CHANGE


OKUMA MTCONNECT ADAPTER
System Events
Configurations
ID Addr
IX Bit
Logical A
Input Msk
MAIN/SUB PROGRAM(EXEC)
09290
(PROGRAM COMMENTS STAR
(AFTER MAIN PART PROGR
(MAXIMUM OF 10 COMMENT
&T)
(END OF COMMENTS)
G140
NC OPR MONITOR
COUNT
1.WORK COUNTER A
2.WORK COUNTER B
3.WORK COUNTER C
4.WORK COUNTER D
PLC Monitor I/O
Program Header
Pallet ID
Part Count
PLC I/O
PROGRAM HEADER
PALLET ID
PART COUNT
MINIMIZE TO SYSTEM TRAY

5.3.2.1 System Config. Menu

This configuration allows user to configure different settings for the application. Upon completion of configuration, the system will try to re-initialize completely with new configuration. It requires an administrative level to perform. The system will verify the input user name and password before allowing user to save the configuration.

In normal operation, only user with administrative right can perform this operation.



- Fast Scanning Interval: The default value is 10 msec for fast scanning interval. Approximately, this is the time between the completions of scanning all tags assigned in this group until the beginning of the next scanning of this group.

  See Set Fast Scanning Interval.

  Note: To achieve better sampling rate for any tag, it would be best to assign ONLY data items into this group that require faster scanning interval than other data items.

  It is highly not recommended that all data items are assigned into this group.

- Normal Scanning Interval: The default value is 100 msec for normal scanning interval. Approximately, this is the time between the completions of scanning all tags assigned in this group until the beginning of the next scanning of this group. See Set Normal Scanning Interval

  Note: It is recommended that all data items having `category="EVENT" or category="CONDITION"` are assigned into this group.

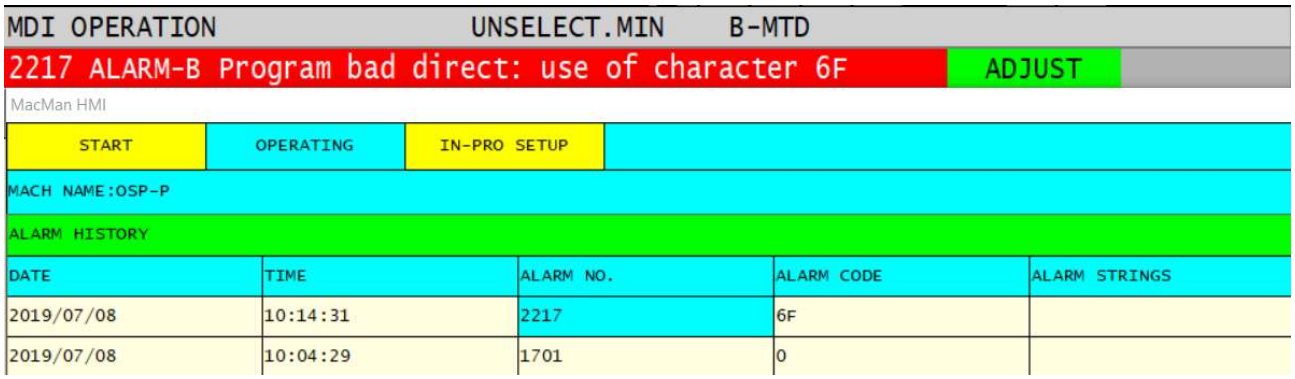
  If Tool Asset is configured to be monitored by the system it will be associated to this group ONLY.

- Slow Scanning Interval: The default value is 1000 msec for slow scanning interval. Approximately, this is the time between the completions of scanning all tags assigned in this group until the beginning of the next scanning of this group. See Set Slow Scanning Interval.
- Note: It is recommended that all data items having `category="SAMPLE"` are assigned into this group.

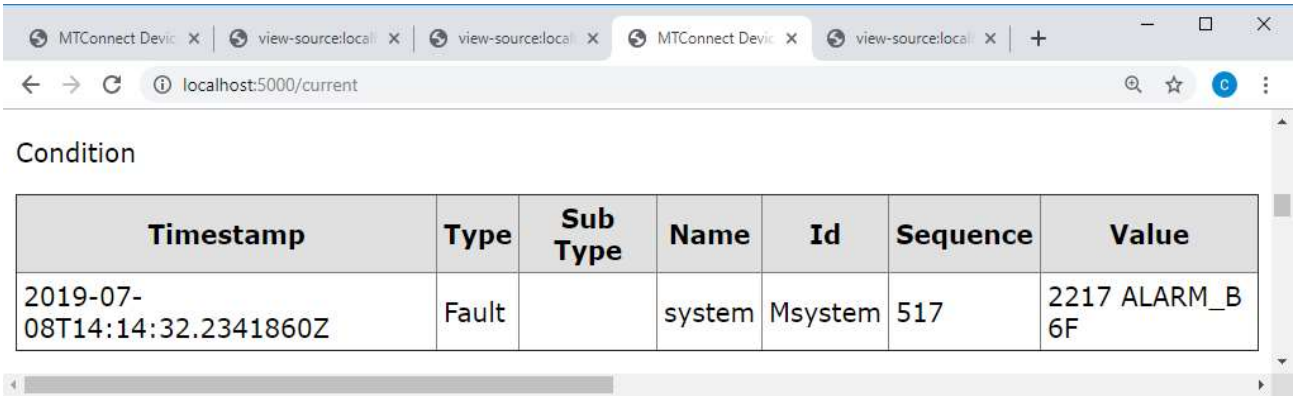
- Max. Client Connections: Number of agents can connect to this Adapter. Default value is 5 agents.
- TCP Server Listening Port: The port number where it is listening for incoming connection of agents. Default value is 7878.
- Local Agents Only: By checking, it only accepts agents running on local machine.
- Heartbeat Time: The numbers of seconds the adapter will send a message back to the connected agent when it received a ping from the connected server.
    - Note: MTConnect Agent or machine must be restarted in order to accept the new value.
- Floating Windows: If it is enabled it will allow the application to freely move around.
- Execution Not Active If Alarm ON: If alarm numbers are entered in this field, Execution state will enter INTERRUPT state if it is currently in ACTIVE state. Otherwise, it is functioning as normal.

  Multiple alarm numbers can be entered into this field and separated by a space.

  Ex: 2224 3322 3723
- Full OSP Alarm Message: If it is enabled the system will send full alarm message to agent. By default, it is not enable and is applicable to all conditions defined in session 8.5 Conditions

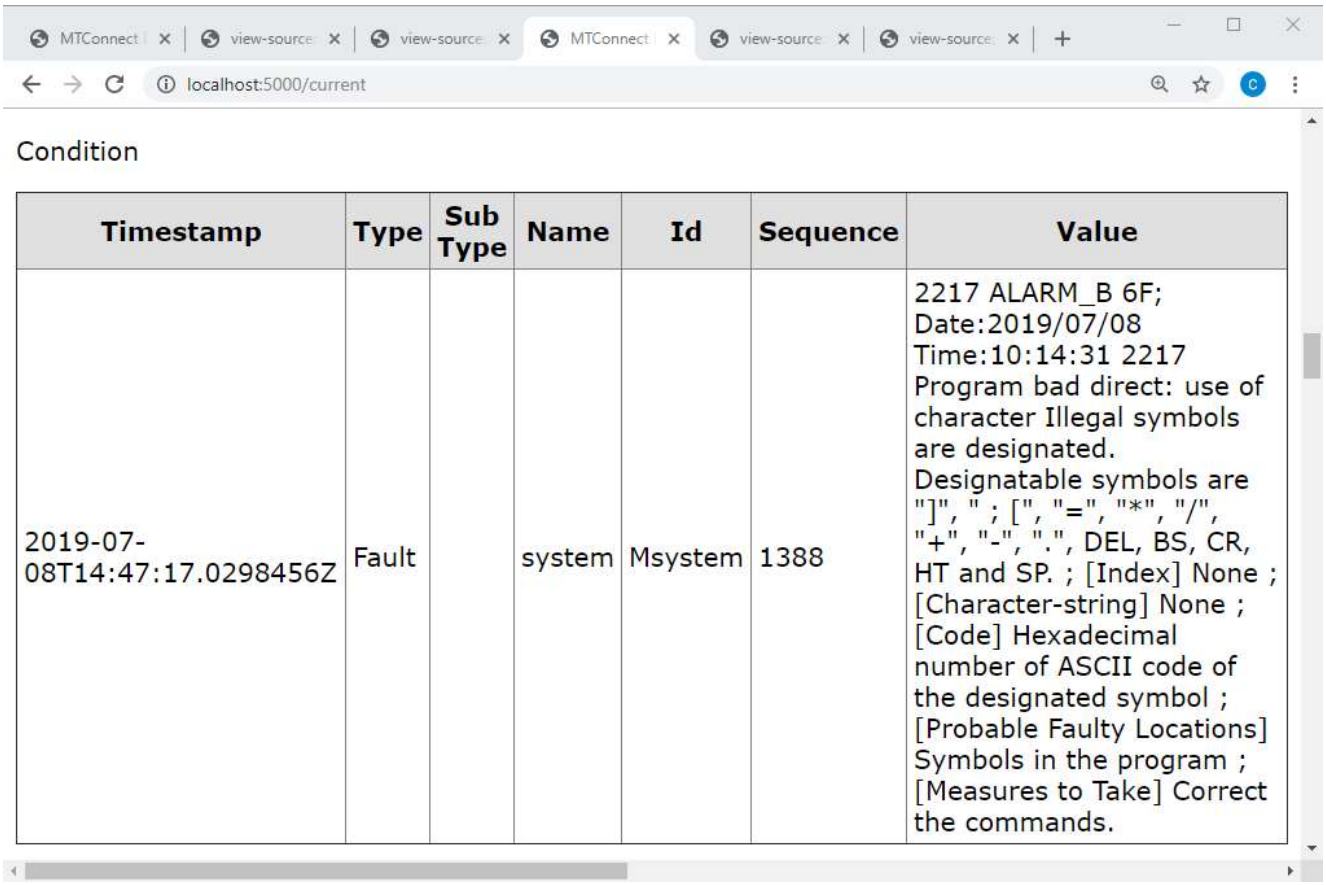


- Default Alarm Message: Alarm number + ALARM Level + (Alarm Code)



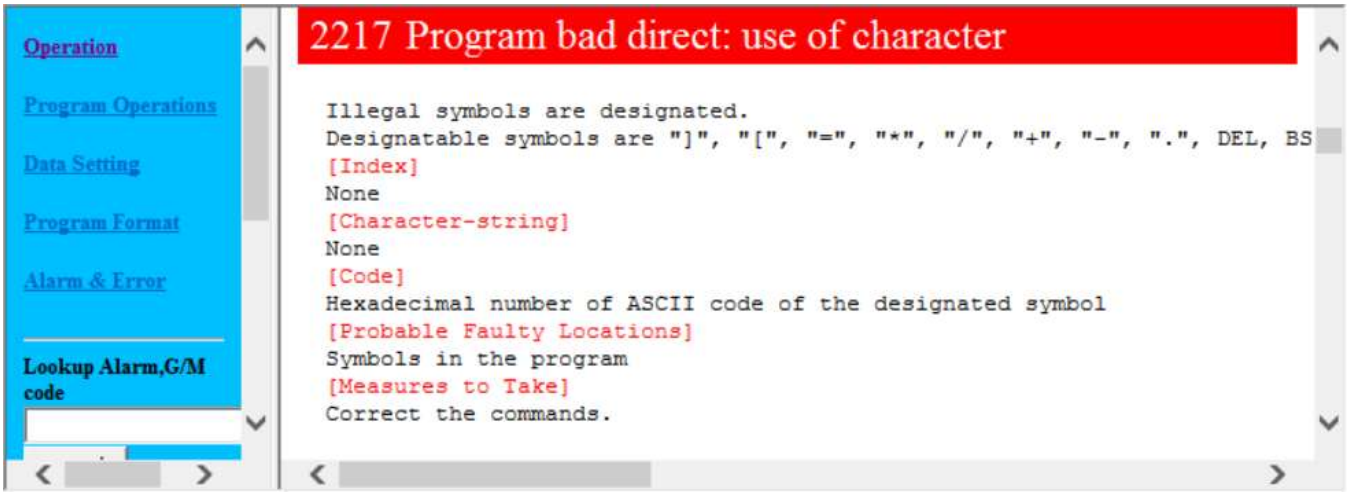
Timestamp	Type	Sub Type	Name	Id	Sequence	Value
2019-07-08T14:14:32.2341860Z	Fault		system	Msystem	517	2217 ALARM_B 6F

- Full OSP Alarm Message: Alarm number + ALARM Level + (Alarm Code) ; Full Alarm Message



Timestamp	Type	Sub Type	Name	Id	Sequence	Value
2019-07-08T14:47:17.0298456Z	Fault		system	Msystem	1388	2217 ALARM_B 6F; Date:2019/07/08 Time:10:14:31 2217 Program bad direct: use of character Illegal symbols are designated. Designatable symbols are "]", " ; [", "=", "*", "/", "+", "-", ".", DEL, BS, CR, HT and SP. ; [Index] None ; [Character-string] None ; [Code] Hexadecimal number of ASCII code of the designated symbol ; [Probable Faulty Locations] Symbols in the program ; [Measures to Take] Correct the commands.

The content of Full OSP Alarm Message is based on alarms stored in the OSP P-Manual folder.



The content of alarm message can support multi-languages.

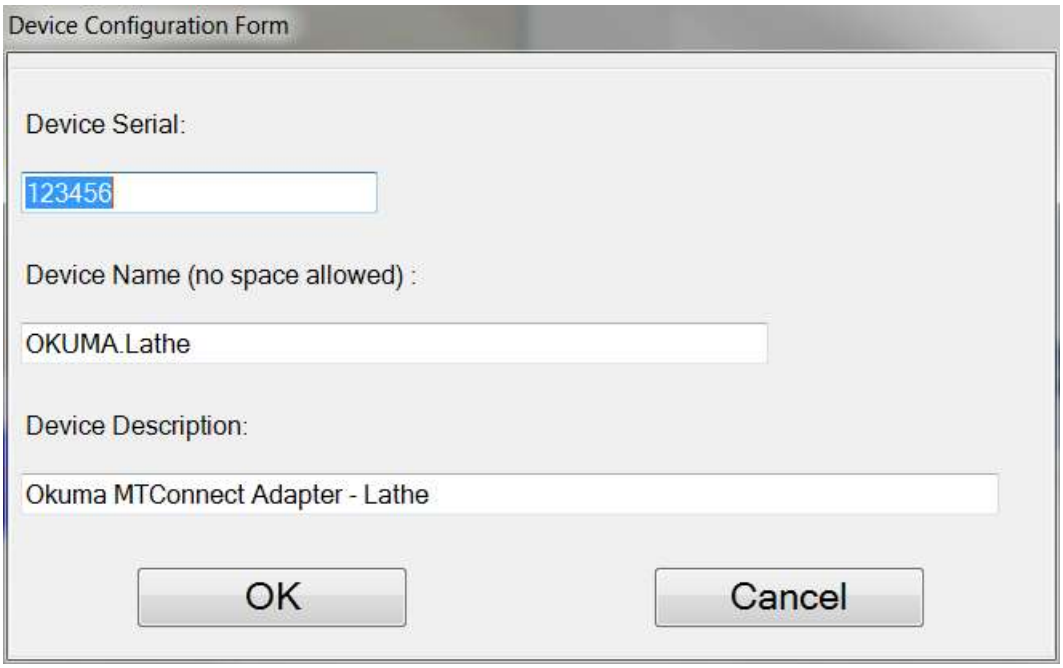
Note: All current agents must connect to the OKUMA MTConnect Adapter again after system configuration is changed.

5.3.2.2 Device Config. Menu

This configuration allows user to set MTConnect device configuration for the application. Upon completion of device

configuration, the system will try to re-initialize completely with new configuration. It requires an administrative level to perform. The system will verify the input user name and password before allowing user to save the configuration.

Note: The system configuration must have been configured first before Device Configuration is allowed. It is based the current Devices.xml configuration file of current machine specification.



This dialog provides custom setup for Okuma MTConnect Adapter.

1/ Device Information:

- Device Name: Name of machine or device name as specified in device.xml.
- Device Serial Number: Unique machine number
- Device Description: A description of this machine

2/ OK button:

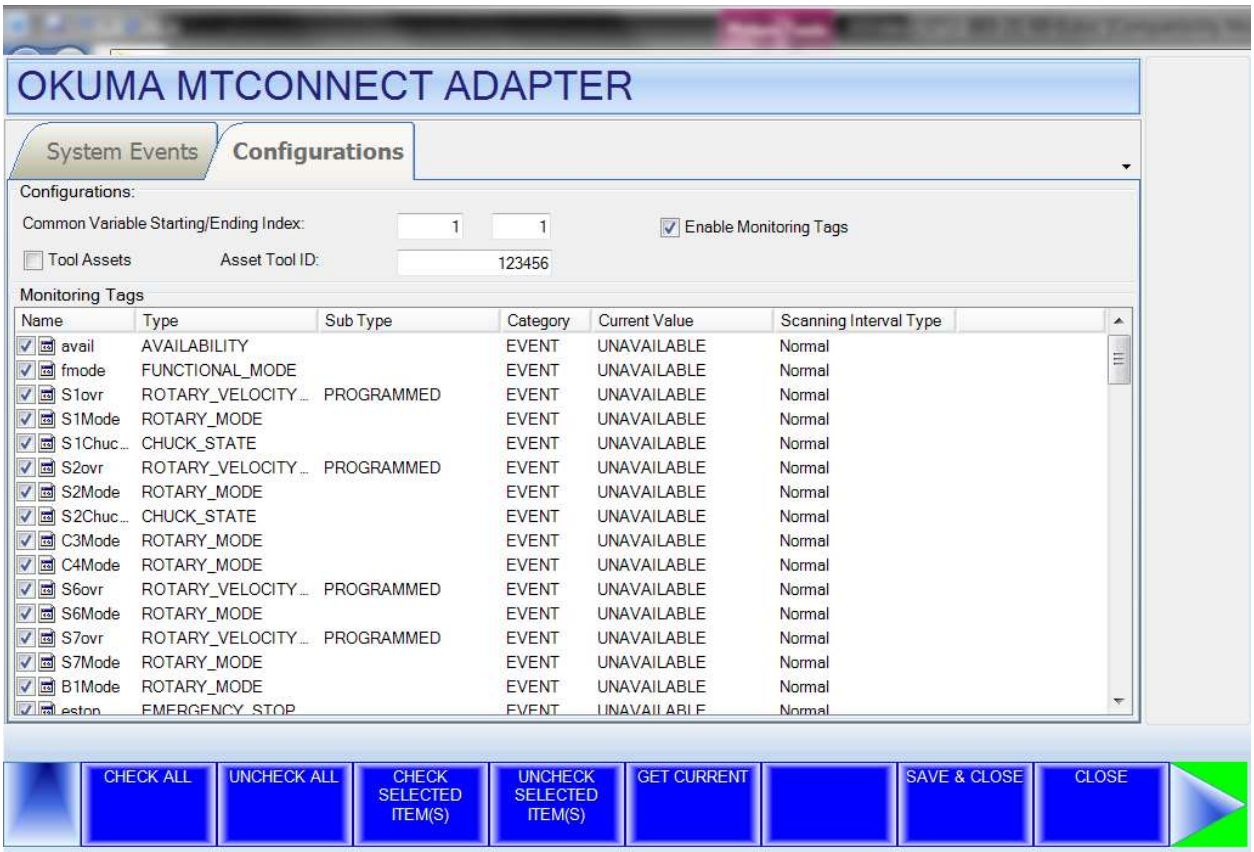
The system will save current setting and update Devices.xml accordingly.
In normal operation, only user with administrative right can perform this operation.

3/ Cancel Button:

This will cancel current operation.

5.3.2.3 Tags Config. Menu

The actual configuration settings will be varied based on the version of MTConnect Adapter.



Note: Clicking the right most of the triangle menu button to advance to the next menu. The actual number of menu items will depend on the version of adapter.

5.3.2.3.1 Common Variable Starting/Ending Index

This configuration allows user to specify the range of common variables to be monitored by the system.
The system can monitor from 1 to 200 common variables. The starting and ending index must be within the valid common variable supported by the control.
Example: Start Index = 800 and Ending Index = 1000

Please see section Common Variables for more information

5.3.2.3.2 Tool Assets

If checked, machine tool data will report to agent as tool assets.
Please see section Tool Assets for more information

5.3.2.3.3 Asset Tool ID

The unique identification number is used to create an asset ID for each tool asset. The same ID will be applied to all tool assets on the machine. It would be best to choose an ID that would not conflict with other tool assets monitoring by the same agent. It can be assigned to any ID or would be best to configure it as the actual machine serial number. It is default to “123456”. It can have up to 32 alphanumeric characters.

Please see section Asset ID for more information

5.3.2.3.4 Monitoring Tags Configuration

This configuration allows user to specify which data items to be monitored or not. By default, all data items are selected or enabled for monitoring.

Any tag is not checked or not monitored will be reported as UNAVAILABLE from agent.

5.3.2.3.4.1 Check All

Check all data items in the list

5.3.2.3.4.2 UnCheck All

UnCheck all data items in the list

5.3.2.3.4.3 Check Selected Item(s)

Check selected data items in the list

5.3.2.3.4.4 UnCheck Selected Item(s)

UnCheck selected data items in the list

5.3.2.3.4.5 Get Current

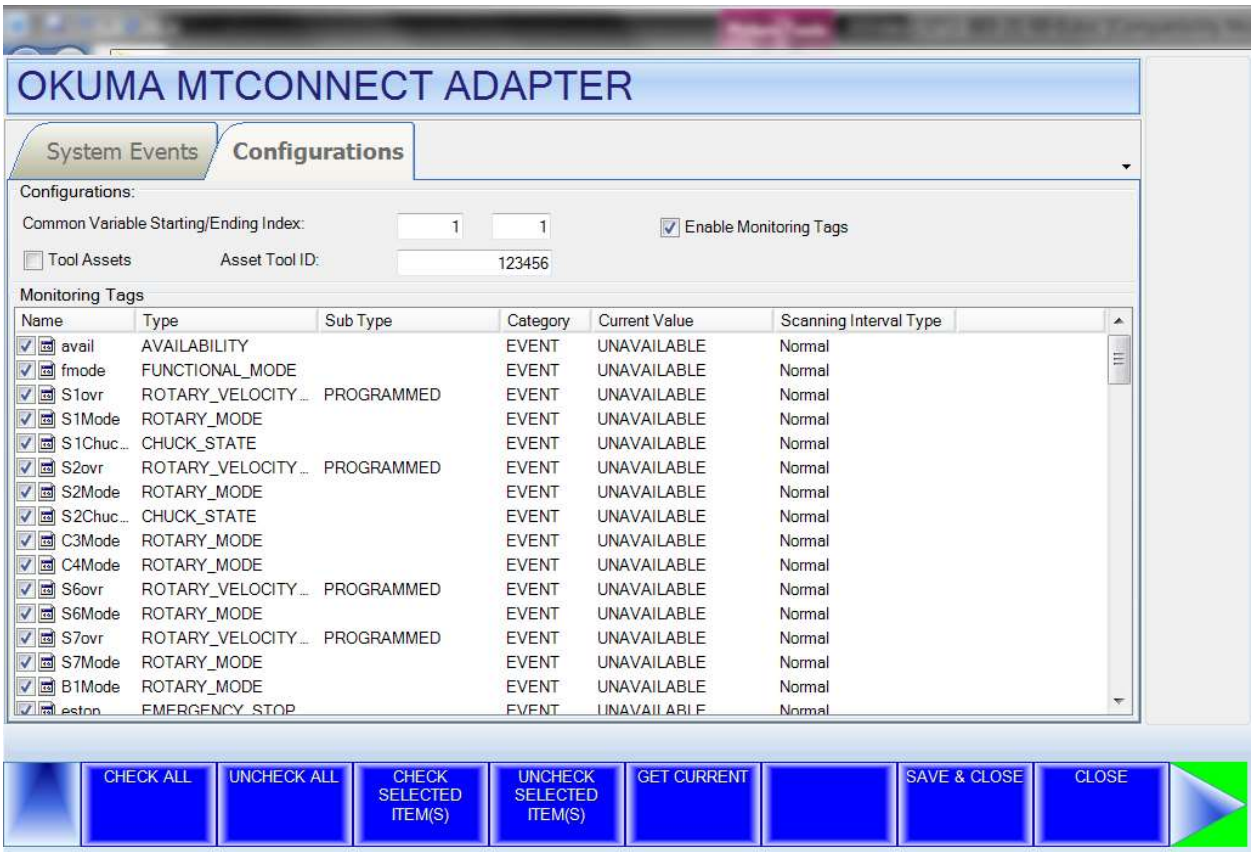
Update value of all data items in the list that are currently monitoring in the system

5.3.2.3.4.6 Save & Close

Save current setting and apply the new setting

5.3.2.3.4.7 Close

Close dialog without saving current setting



Note: Clicking the right most of the triangle menu button to advance to the next menu. The actual number of menu items will depend on the version of adapter.

5.3.2.3.4.8 Check All Events

Check all Event type data items in the list

5.3.2.3.4.9 Check All Samples

Check all Samples type data items in the list

5.3.2.3.4.10 Check All Conditions

Check all Conditions type data items in the list

5.3.2.3.4.11 Check All

Check all data items in the list

5.3.2.3.4.12 UnCheck All

UnCheck all data items in the list

5.3.2.3.4.13 Get Current

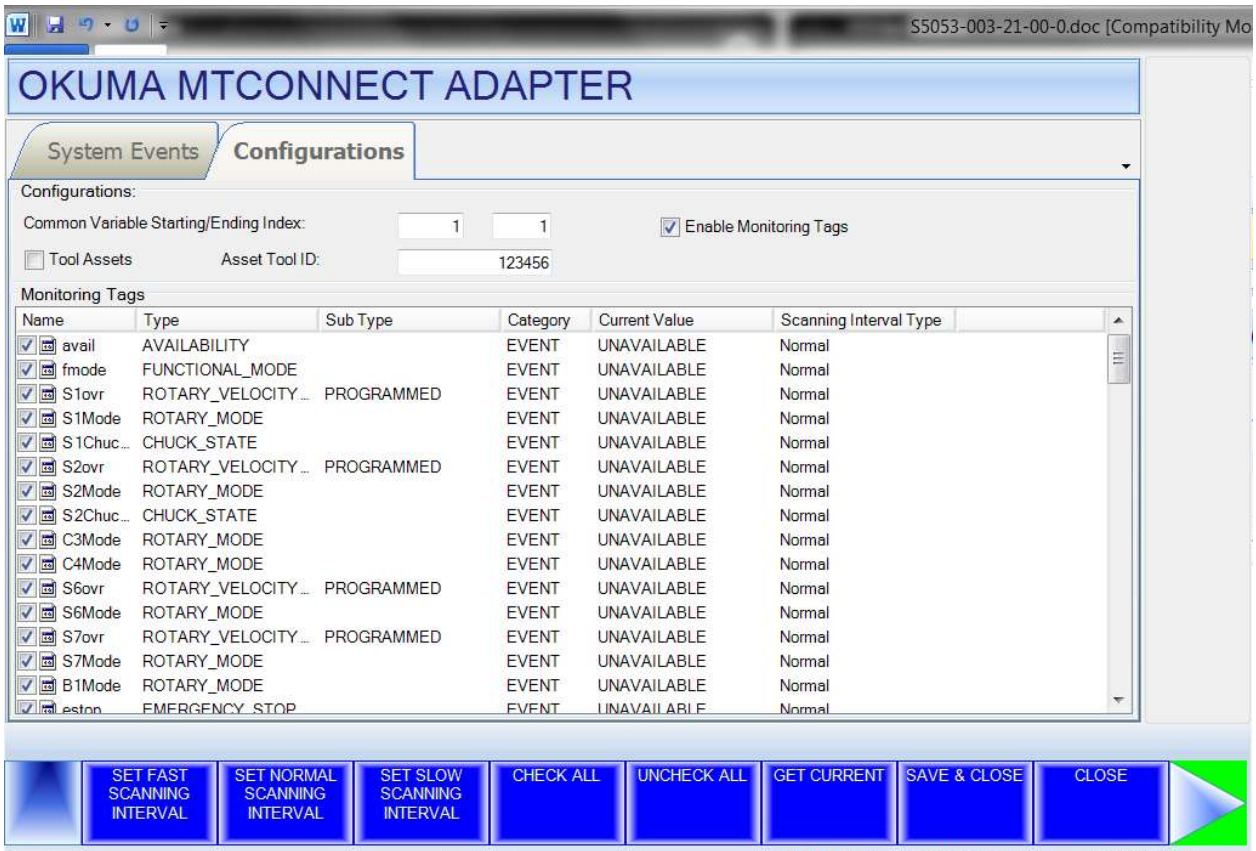
Update value of all data items in the list that are currently monitoring in the system

5.3.2.3.4.14 Save & Close

Save current setting and apply the new setting

5.3.2.3.4.15 Close

Close dialog without saving current setting



5.3.2.3.4.16 Set Fast Scanning Interval

Set all current selected tags on the list to have Scanning Interval Type = Fast. All tags will be scanned at the defined interval as specified in the System Configuration. See System Config. Menu

Note: Part Count and Part Program must be set in the same scanning interval when MacMan is using to report these data items.

5.3.2.3.4.17 Set Normal Scanning Interval

Set all current selected tags on the list to have Scanning Interval Type = Normal. All tags will be scanned at the defined interval as specified in the System Configuration. See System Config. Menu

Note: Part Count and Part Program must be set in the same scanning interval when MacMan is using to report these data items.

5.3.2.3.4.18 Set Slow Scanning Interval

Set all current selected tags on the list to have Scanning Interval Type = Slow. All tags will be scanned at the defined interval as specified in the System Configuration. See System Config. Menu

Note: Part Count and Part Program must be set in the same scanning interval when MacMan is using to report these data items.

Although Part Count and Part Program are possible to be assigned to this scanning group, it is advised to assign

these tags to a scanning group with faster scanning time to get the correct result from machine data.

5.3.2.3.4.19 Check All

Check all data items in the list

5.3.2.3.4.20 UnCheck All

UnCheck all data items in the list

5.3.2.3.4.21 Get Current

Update value of all data items in the list that are currently monitoring in the system

5.3.2.3.4.22 Save & Close

Save current setting and apply the new setting

5.3.2.3.5 Enable Monitoring Tags

To enable monitoring tags listed in the Monitoring Tags, it is necessary to check the Enable Monitoring Tag box.

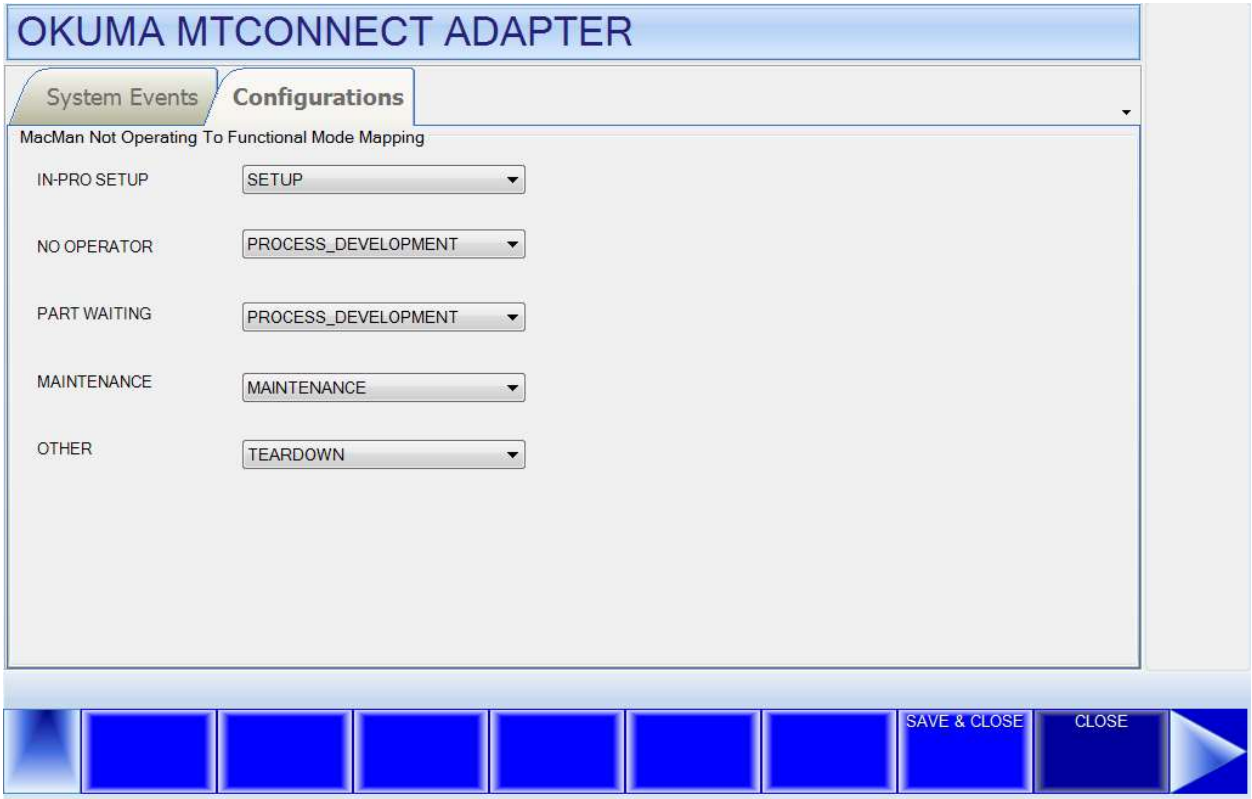
5.3.2.4 Minimize To Taskbar Menu

When this menu item is activated, the main user interface is hidden and the icon for this application is minimized to system task bar.

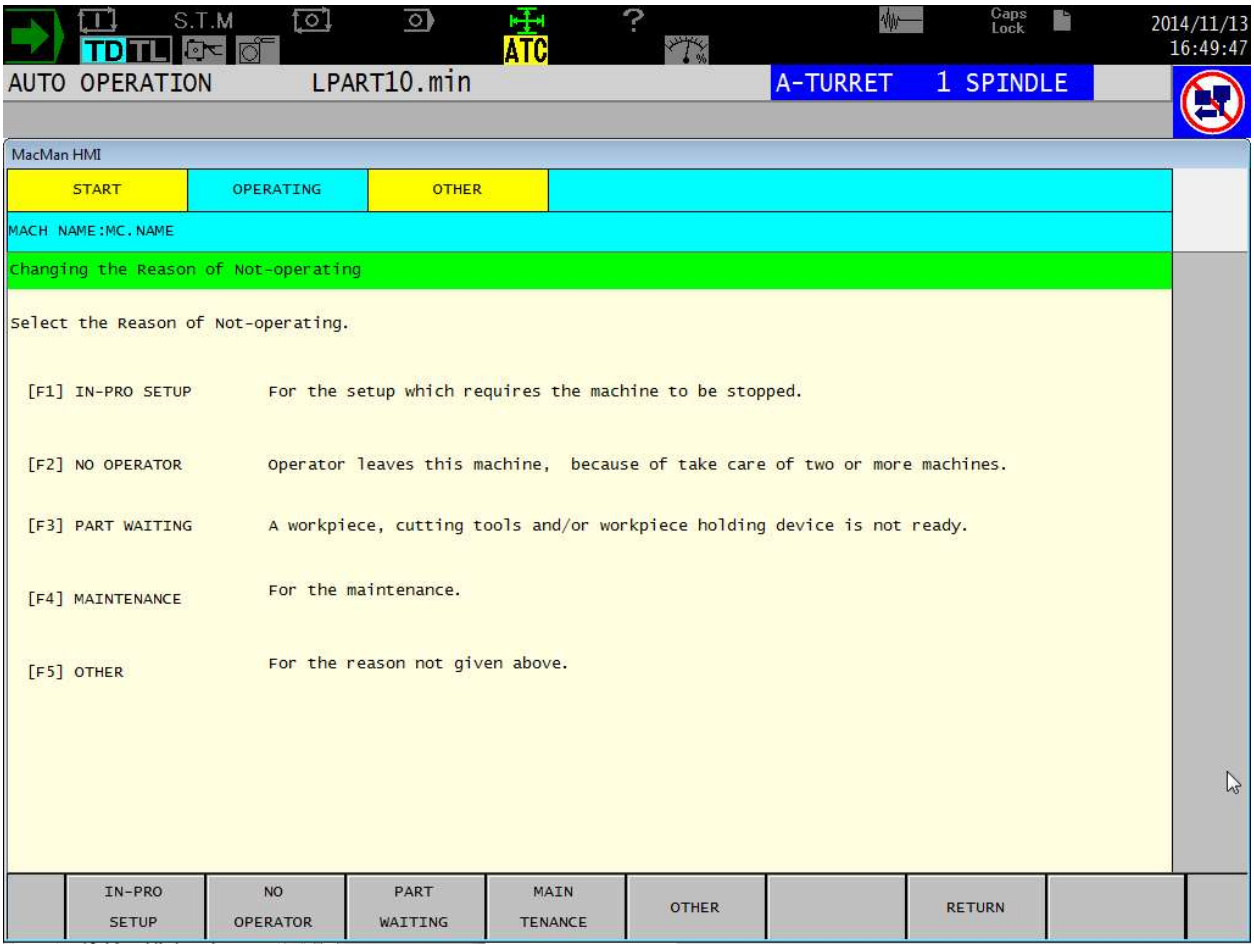
5.3.2.5 Functional Mode Mapping Menu

For MTConnect 1.3 spec only.

Display mapping between MacMan Not Operating mode and MTConnect Functional Mode



When the machine is not operating, it will automatically fall into one of the Not Operating modes currently selected on MacMan Not Operating screen as shown below. Based on the current selection of Not Operating mode on NC-HMI this application will map MacMan Not Operating mode to MTConnect Functional mode as configured in the Functional Mode Mapping dialog above.

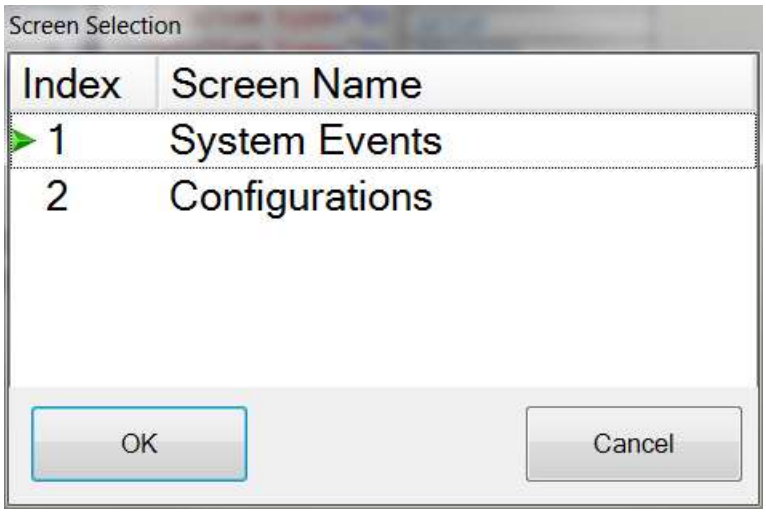


5.3.2.6 System Tray Menu

When this menu item is activated, the main user interface is hidden and the icon for this application is shown in the system tray of windows task bar.

5.3.2.7 Display Change Menu

When this menu is activated, the system will display a dialog that allows user to switch to other tabs



5.3.2.8 PLC Monitor I/O Menu

The system can monitor up to 10 PLC I/O signals. Each can be configured as Input or Ouput signal. If an I/O signal is specified as NONE then it will not be monitored by the system. A valid intput/output address must be specified for monitoring any PLC signal.

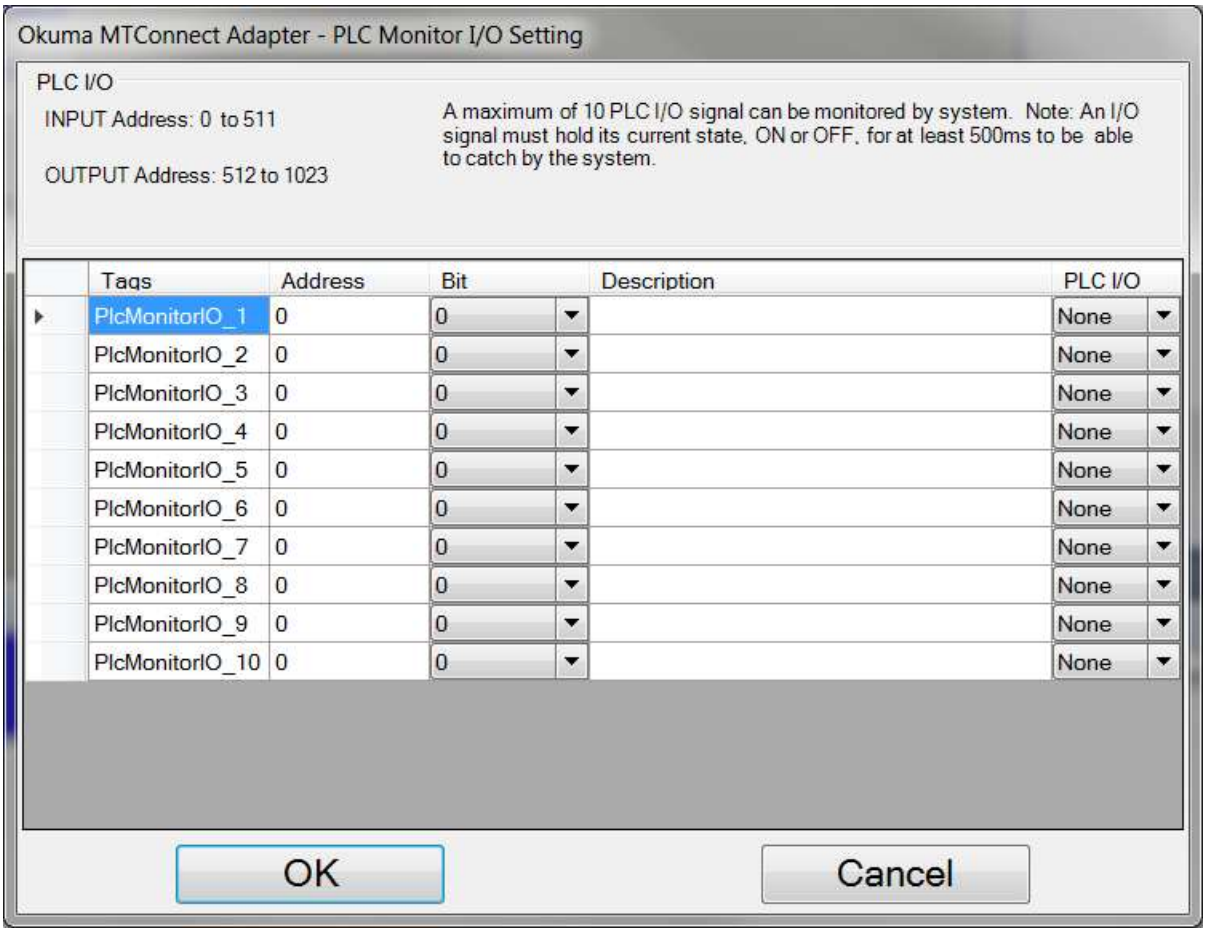
Input Signals:

Address: 0 to 511

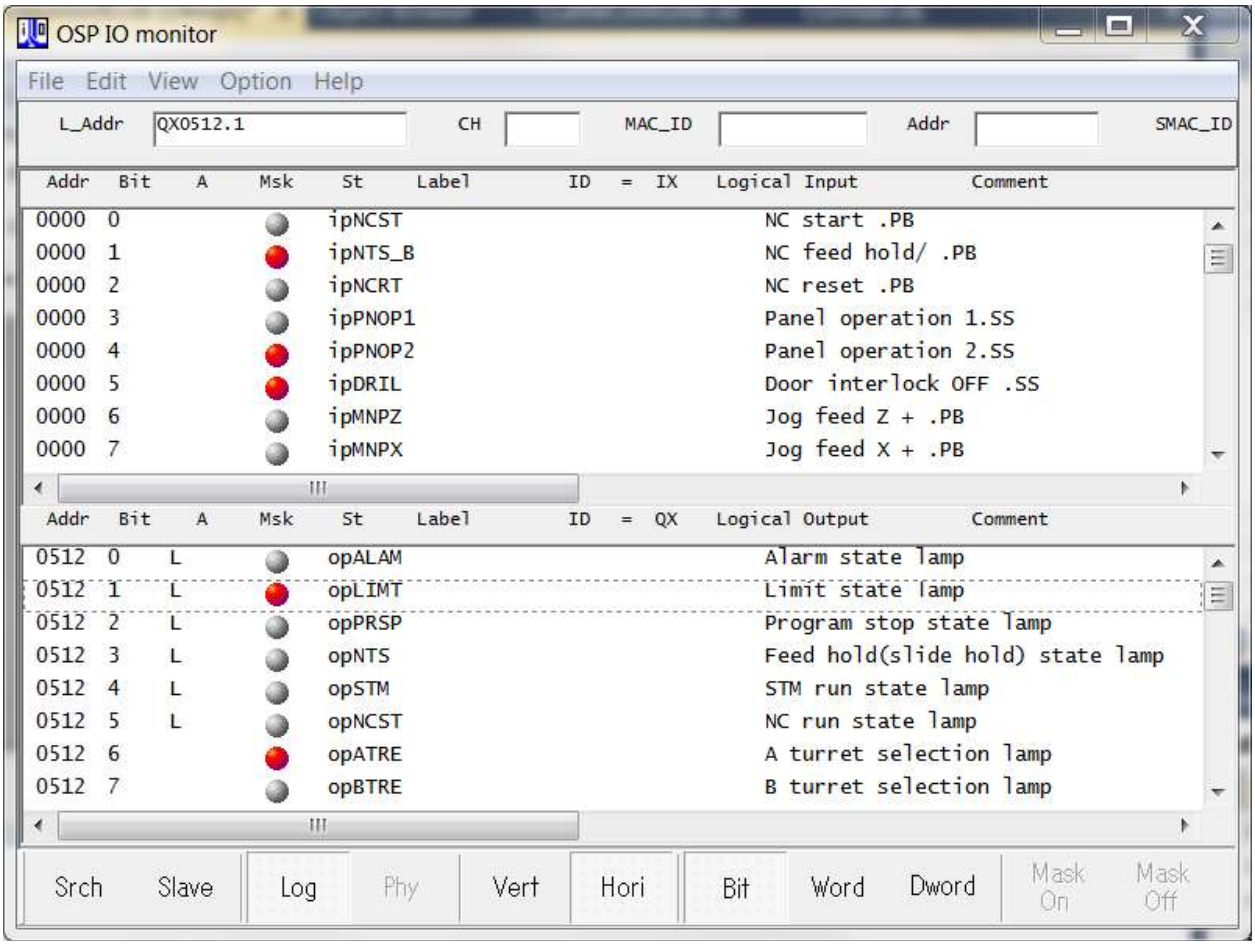
Output Signals:

Address: 512 to 1023

Note: An I/O signal must hold its current state, ON or OFF, for at least 500ms to be able to catch by the system and the signal must be assigned to group that has scanning interval of 100ms or less.



PLC I/O signals are based on OSP IO Monitor.



5.3.2.9 Program Header Menu

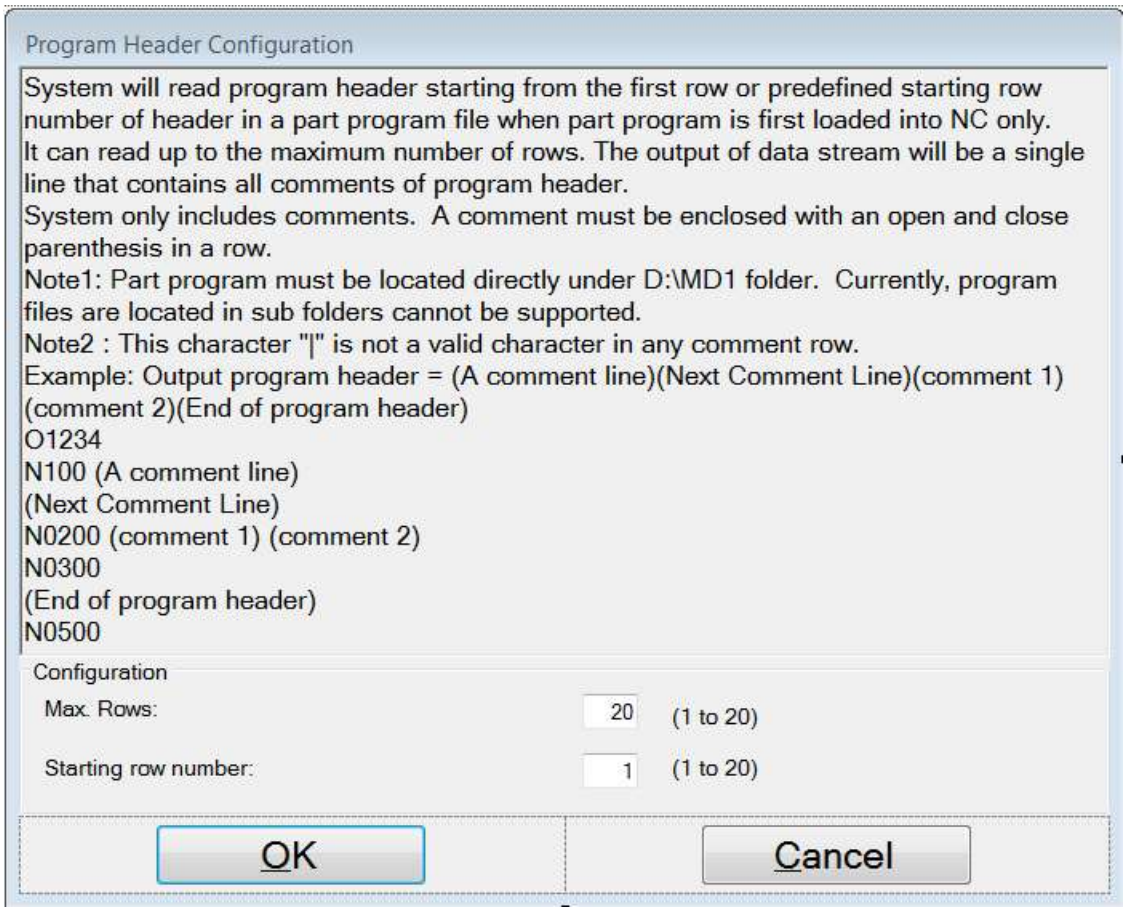
System will read program header starting from the first row or predefined starting row number of header in a part program file when part program is first loaded into NC only.
It can read up to the maximum number of rows. The output of data stream will be a single line that contains all comments of program header.
System only includes comments. A comment must be enclosed with an open and close parenthesis in a row.

Note 1: Part Program must be located directly under D:\MD1 folder only.

Note 2: This character "|" is not a valid character in any comment row.

Example: Output program header = (A comment line)(Next Comment Line)(comment 1) (comment 2)(End of program header)

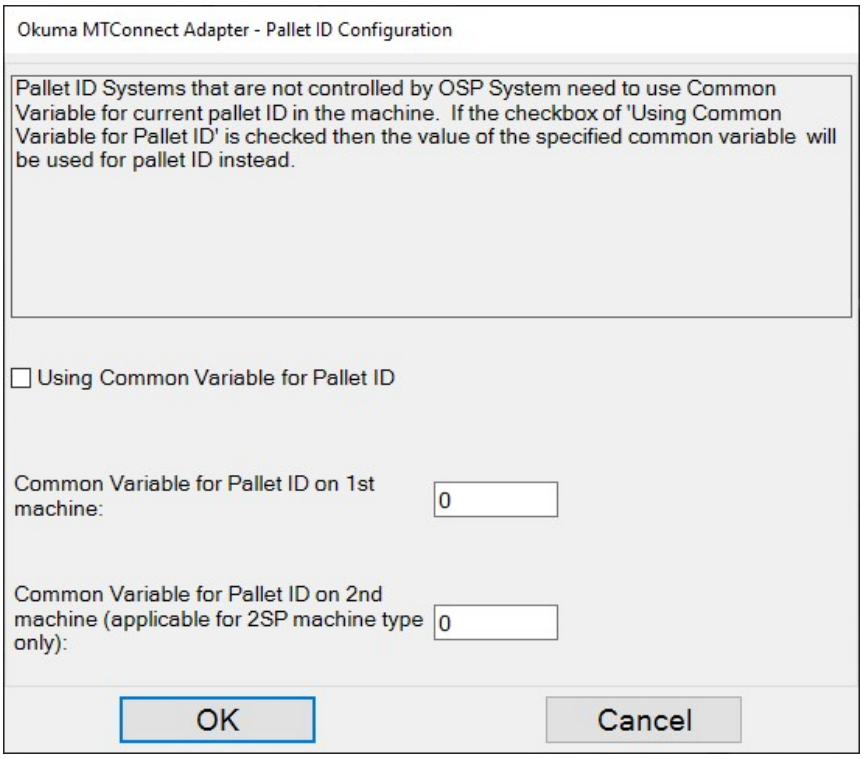
O1234
N100 (A comment line)
(Next Comment Line)
N0200 (comment 1) (comment 2)
N0300
(End of program header)
N0500



5.3.2.10 Pallet ID Menu

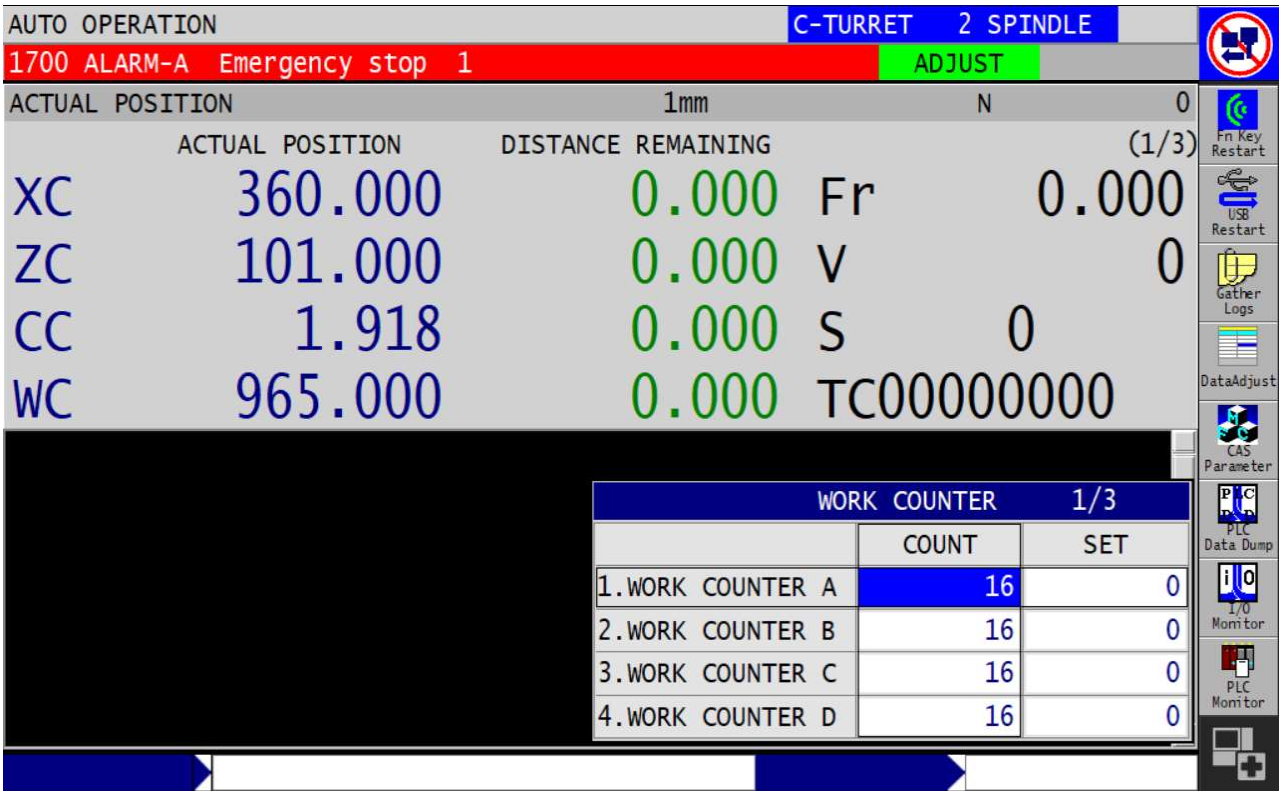
If Pallet ID can be supported by OSP system, Pallet ID data will be provided as is. Besides, the system can provide Pallet ID by using Common Variable number. If '***Using Common Variable for Pallet ID***' is selected, the system will report Pallet ID based on the provided common variable numbers, instead.

Note:
- FMS system must use common variable number to report current Pallet ID inside the machine's cutting area.
- For Grinder, Machining Center, only first machine is using for Pallet ID.
- For Lathe machine equipped with 2 sides, both first and second machine are using for Pallet ID if applicable.
- It will be UNAVAILABLE if OSP system cannot support.



5.3.2.11 Part Count Menu

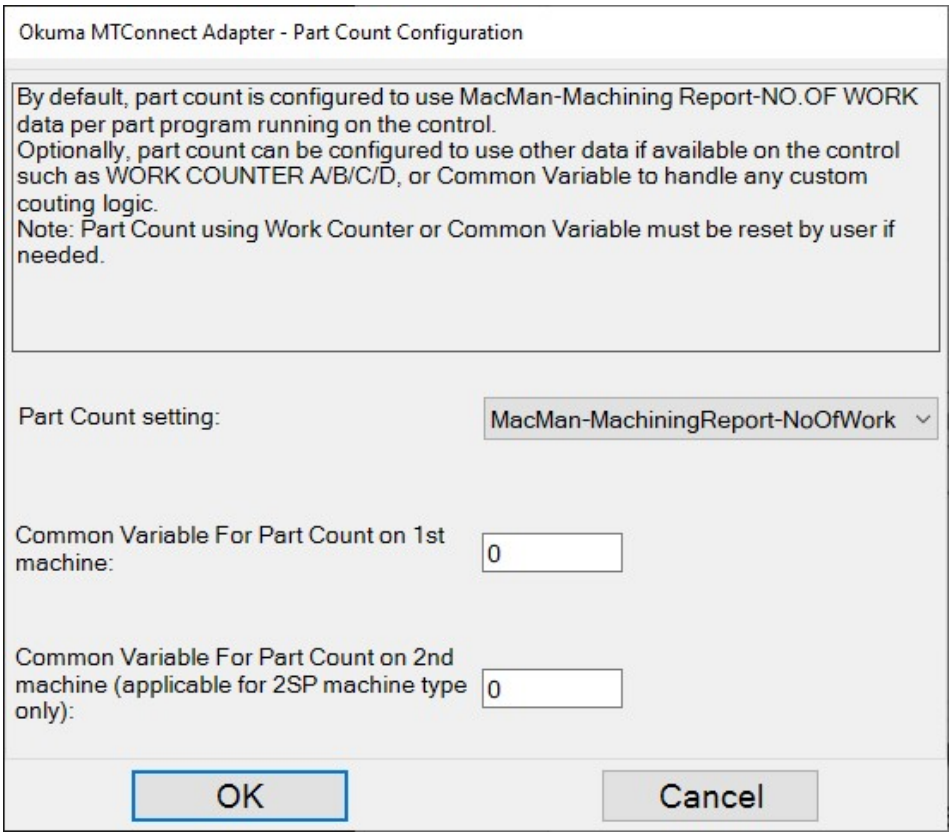
By default, the system will use MacMan –Machining Report NO. OF WORK to obtain the total part count per running part program.
Optionally, it can be set to use Work Counter A/B/C/D as counter for part count if option is enable on NC. The system will report part count based on the current selection of Work Counter. The Work Counter will report part count of all running part programs and can be reset by user if needed.



Besides, Common Variable can be used to create any custom part count logic if needed.

Note:
- For Grinder, Machining Center, only first machine is using for part count.
- For Lathe machine equipped with 2 sides, both first and second machine are using for part count if applicable.

Part Count and Part Program must be set in the same scanning interval when MacMan is using to report these data items.



5.3.3 *Components/Data Items*

The components and data items that can be supported by this adapter are described in the Devices.xml configuration file.

Note: This file is only configured once OKUMA MTConnect Adapter runs without error.

Refer to section MTConnect Tags for more information

5.3.3.1 Data Items

The system will monitor all data items listed in Devices.xml per machine configuration and sends out only the data items having value being changed and being configured for monitoring to the connected agents.

Any agent first connects to the system will receive all data items values.

Notes: All data items listed for all analog/digital input sensors are not controlled by this adapter.
Please refer to the section 8.4 Sensors for more information

5.3.4 *Agent & Adapter Communication*

This adapter will send data to the connected MTConnect agents using socket in a pipe (|) delimited stream according to the descriptions given in the adapter guide by MTConnect.

The agent can be configured to run on the same PC where the adapter running or on a remote PC.

It is up to the end user to configure the agent configuration file and adapter communication channel for local or network connection.

Each time an agent is connected or disconnected there is a message will be displayed in the System Events tab

There are schemas of MTConnect included in the installation folder if needed by client applications. The OSP-P control does not natively include a compatible HTTP application for capturing the agent xml stream.
Any web browser can be used to obtain data outputted from agent.

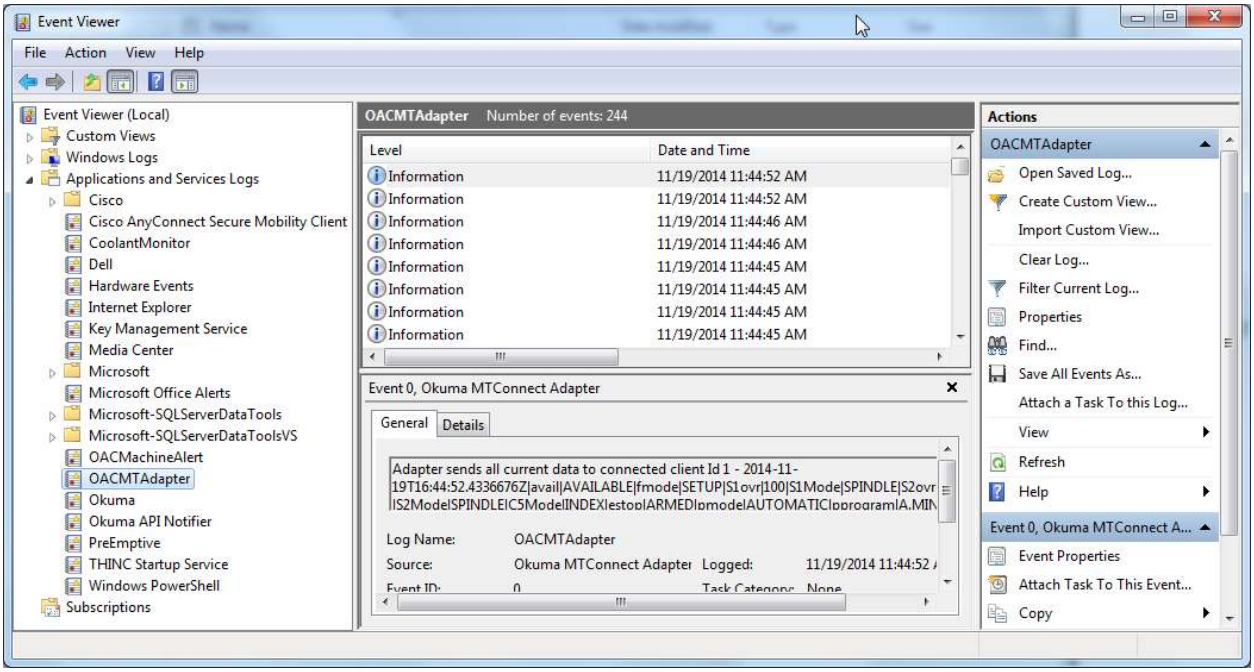
6. Event Log

6.1 Error Event Log

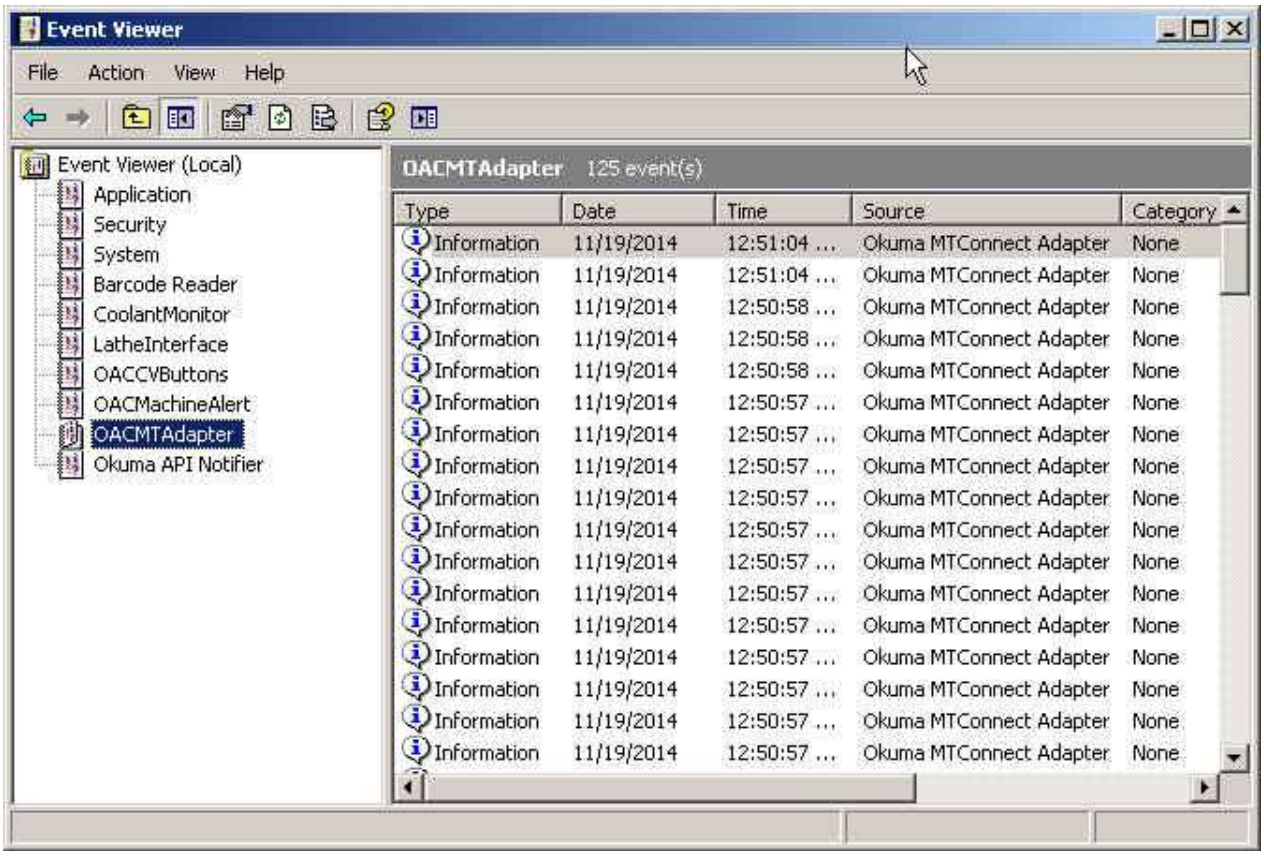
The error information for the application is logged in the Windows event log which user can read from windows system 'Event Viewer'. The source for this event log is 'Okuma MT Connect Adapter'.

To view the event log, press 'Ctrl + ⫽' on the operation panel to pop up Start Menu, then click 'Settings' → 'Control Panel' → 'Administrative Tools' → 'Event Viewer' to launch windows event viewer, click 'OACMTAdapter' under 'Event Viewer (Local)' to see a list of events logged for Okuma MTConnect Adapter application. To see the detail of each event, double click the event item.

Windows 7



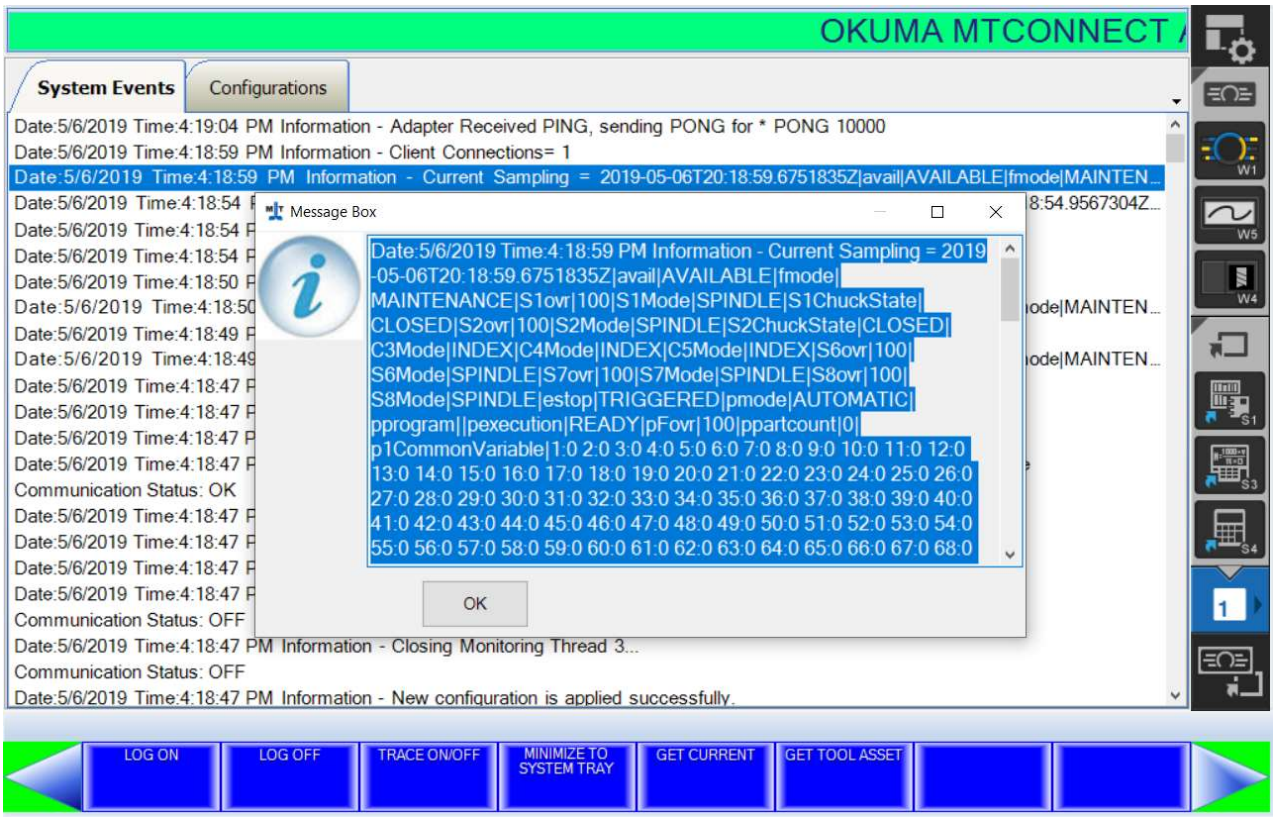
Windows XP



7. Trouble Shooting

By default, the system will write event messages to the main user interface. If the 'Trace On' menu is checked, all messages will be displayed on the main user interface, otherwise only pre-selected event messages by the system will be displayed.

Note: When the Trace On menu is enabled, all process states monitored in the system will be displayed on the event message tab when the states are changed as shown:



7.1 Common Errors

7.1.1 *OKUMA MTConnect Adapter application failed to start correctly*

OKUMA MTConnect Adapter does use THINC-API libraries to collect machine data.

Probable faulty locations:

- Older version of THINC-API is installed on control
- Invalid THINC-API license file for this particular machine serial number
- THINC-API License is expired
- NC is not started or not fully started yet
- OKUMA MTConnect Adapter started before THINC-API is ready
- THINC-API cannot be supported by current version OSP system

Measure to take:

- Install the required or higher version of THINC-API on control
- Install the correct THINC-API disk per machine serial
- Ensure that OKUMA MTConnect Adapter is registered with Startup Service so it can be started after THINC-API is ready.
- Ensure that OSP system can support the required version of THINC-API.

Please refer to section THINC-API and Setup Okuma MTConnect Adapter Software to Startup Automatically for more information

7.1.2 *MTConnect client applications cannot get machine data from running Agent*

7.1.2.1 Incorrect Device Name

Probable faulty locations:

- MTConnect device name is case-sensitive.
- MTConnect device name have been changed in the devices.xml file

Measure to take:

- Check Devices.xml file for correct device name

Refer to section Verifying Agent and Adapter Connectivity for more information

7.1.2.2 Incorrect Port Number

Probable faulty locations:

- By default, agent is running on port 5000
- Agent port number has been changed in agent.cfg file

Measure to take:

- Ensure that client application uses the port number specified in agent.cfg file
- Check network configuration for allowing connection with current setting port number in agent configuration file

Refer to section Installation and Configuration of MTConnect Adapter for more information

7.1.2.3 Network issues

Probable faulty locations:

- Firewall is enabled on remote PC where agent is running

Measure to take:

- Disable Firewall on remote PC

Note: End-user is responsible for setting proper network connection and security to allow exchanging data between entities according to MTConnect specification.

7.1.3 *Unable to perform Device Configuration/Tag Configuration*

In order to perform these configurations, the application must be able to connect to NC. The adapter will create and configure the Devices.xml once it can connect to NC without error on its first run.

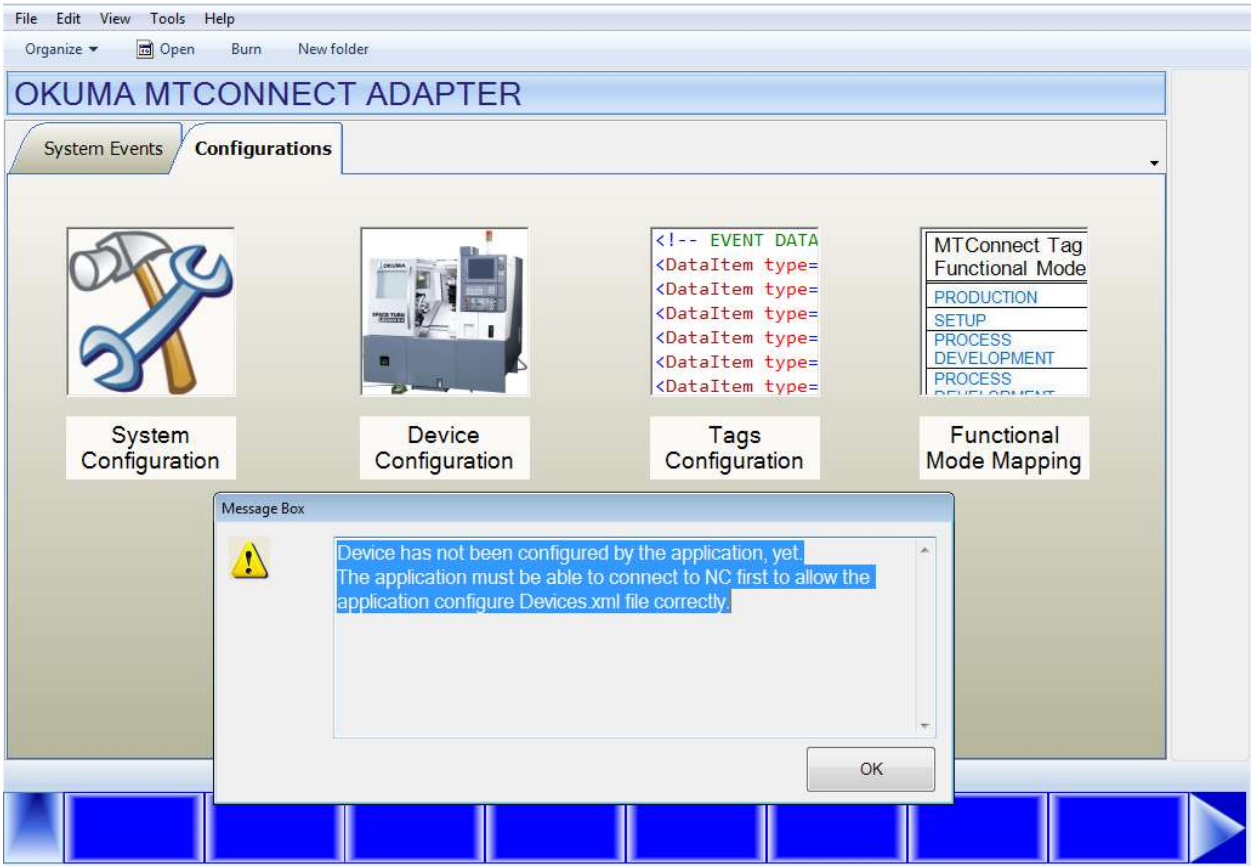
Probable faulty locations:

- Devices.xml file is not available yet due to NC is not running yet
- THINC-API is not installed on target machine or does not run correctly
- NC is not started yet

Measure to take:

- Ensure the required version or higher version of THINC-API is installed on target machine
- Ensure that Startup Service is installed on target machine
- Registered Okuma MTConnect Adapter with Startup Service to allow the adapter to start after NC is fully
- Ensure that adapter runs without error.

Please refer to section THINC-API and Setup Okuma MTConnect Adapter Software to Startup Automatically for more information



7.1.4 *Unable to install MTConnect Agent as Windows Service*

Installing agent as Windows service requires 2 files to be existed. One is agent.cfg for MTConnect Agent application, the other is Devices.xml which is specified in agent.cfg file.
Devices.xml is generated automatically when OKUMA MTConnect Adapter first runs on target machine without error.

Probable faulty locations:

- Devices.xml file does not exist
- Agent.cfg file does not exist
- Required administrator privilege in Windows 7

Measure to take:

- Registered Okuma MTConnect Adapter with Startup Service to allow the adapter to start after NC is fully started so it can generated and configure Devices.xml file correctly.
- Verify if agent configuration has correct device file name such as Devices.xml
- If installing agent in Windows 7, it is necessary to run the bat file named RunAgentAsService.bat under administrator account.

  Refer to section Installation and Configuration of MTConnect Agent for more information

7.1.5 *No communication between running MTConnect agent and OKUMA MTConnect adapter*

Once adapter is running it will listen for incoming connection from agent. Once an agent is connected the adapter will send first initial message to agent and display a message on System Event screen.
If both agent and adapter are running but no data is sending then it probably is the setting in the configuration of agent and adapter is not matched.

Probable faulty locations:

- Adapter port number specified Adapter System configuration
- Adapter port number specified Agent configuration file, agent.cfg

Measure to take:

- Check port number in adapter and agent configuration. Default port number is 7878
- Re-start agent service from Windows Services
- Ensure that adapter is running without error

Refer to section Installation and Configuration of MTConnect Adapter for more information

7.1.6 *OKUMA MTConnect Adapter Not Running*

In order for adapter to run automatically after NC is fully started, it is necessary to register the application with Startup Service.
By default, it is registered with Startup Service during setup.

Probable faulty locations:

- Startup Service is not running
- Adapter is not registered with Startup Service

Measure to take:

- Ensure that THINC-API is running without error.
- Re-start Startup Service
- Register MTConnect Adapter with Startup Service

Refer to section Setup Okuma MTConnect Adapter Software to Startup Automatically for more information

7.1.7 *MTConnect Agent Not Running*

Agent is installed as Windows service by default. It is necessary to re-start the machine to allow agent service to run automatically when Windows is started.
When agent is started the following files must be available:

Devices.xml
Agent.cfg

Probable faulty locations:

- Agent.exe is missing
- Agent.exe is note registered as Windows Service yet
- Devices.xml is missing
- Agent.cfg is missing
- Machine has not been rebooted yet
- Invalid devices.xml file
- Invalid agent.cfg file

Measure to take:

- Ensure that devices.xml can be opened in any web browser without error
- Ensure that agent.cfg is configured with correct syntax. Please see README.pdf for detail information
- Ensure that agent service is configured to start automatically
- Re-install MTConnect Adapter on target machine

Refer to section Installation and Configuration of MTConnect Agent for more information

7.1.8 *Agent reports UNAVAILABLE in all tags*

Initially, agent will report UNAVAILABLE to all tags when it first started. Once agent is running it will try to connect with adapter at the specified host and port number. If adapter is running and agent can connect with it, adapter will first send current value of all tags to the connected agent.

Probable faulty locations:

- Mismatch adapter port number specified in agent.cfg and adapter's system configuration
- Adapter is not running
- Adapter is running but in error state
- Tags are not configured for monitoring by adapter
- Enable Monitoring Tag is not checked
- Agent is installed in different locations

Measure to take:

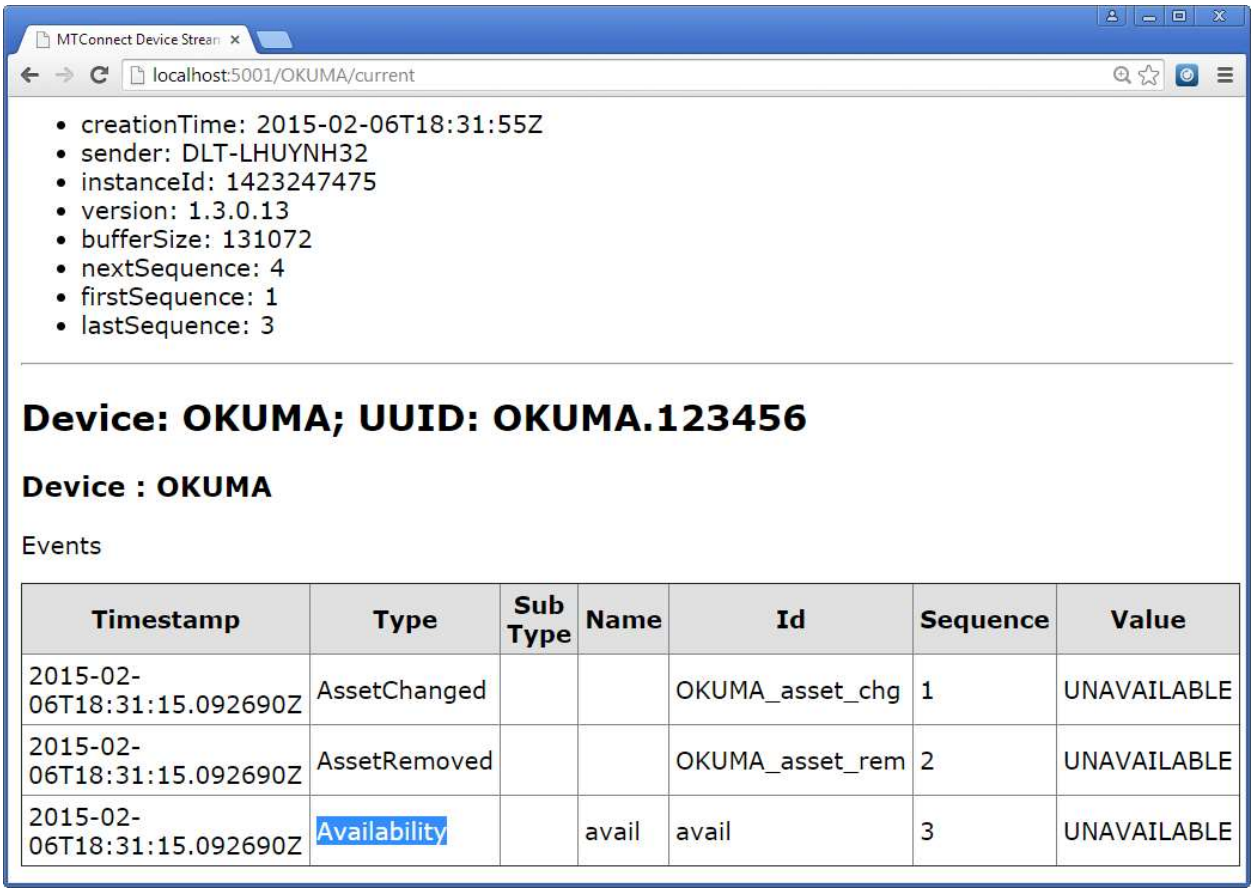
- Check port number in adapter and agent configuration. Default port number is 7878
- Ensure that adapter is running without error
- Ensure tags are configured for monitoring by adapter. Tags are not monitoring will report as UNAVAILABLE.
- Ensure Enable Monitoring Tags box is checked. All tags will be reported as UNAVAILABLE if not checked.
- By default agent is installed in the same folder that MTConnect Adapter is installed. The devices.xml file is updated by MTConnect Adapter once it first runs. Agent will detect the change in devices.xml file and will reload all tags configured for the devices specified in the agent configuration file, agent.cfg. If agent is installed in different locations then the devices.xml file must be manually copied to the folders where agents are running.

Refer to section Tags Config. Menu, Installation and Configuration of MTConnect Adapter, and Verifying Agent and Adapter Connectivity for more information

7.1.9 *Agent reports only **Availability** tag*

After installing adapter and agent, agent service will run automatically when machine is rebooted. Agent reports tags defined in devices.xml file. Initially, the devices.xml will have default tags only and will be configured per machine specification after adapter is running without error. As a result, agent can report default tags only before adapter is running as shown below:

Note: By default, agent will wait for about 5 seconds or so before reloading the devices.xml or agent.cfg file if they are changed.



Probable faulty locations:

- Devices.xml file has not been configured by adapter yet
- Agent is installed in different locations

Measure to take:

- Ensure that adapter is running without error
- By default agent is installed in the same folder that MTConnect Adapter is installed. The devices.xml file is updated by MTConnect Adapter once it first runs. Agent will detect the change in devices.xml file and will reload all tags configured for the devices specified in the agent configuration file, agent.cfg. If agent is installed in different locations then the devices.xml file must be manually copied to the folders where agents are running.

Refer to section Installation and Configuration of MTConnect Adapter and Verifying Agent and Adapter Connectivity for more information

7.1.10 *Agent reports UNAVAILABLE in some tags*

Probable faulty locations:

- Name of tags defined in Devices.xml has been changed
- Tags have been unchecked in the Tags Configuration dialog

Measure to take:

- Ensure tags have been checked in Tags Configuration dialog
- Ensure name of tags displayed in the Tags Configuration dialog are the same in devices.xml

Refer to section Tags Config. Menu for more information
Note: Devices.xml file should not be modified by any application.

7.1.11 *Agent reports no Tool Assets*

Probable faulty locations:

- Tool Assets can only be supported in MTConnect Adapter version 2.1 or above
- Tool Assets is not checked in the Tags Configuration yet
- Tool Life Management option is not supported by OSP system

Measure to take:

- Ensure that MTConnect Adapter version 2.1 or above installed on the target machine
- Ensure Tool Assets is checked in Tags Configuration dialog
- Ensure that Tool Life Management option is active

Refer to section Tags Config. Menu for more information
Refer to section Tool Assets for more information

7.1.12 *Kepware OPC cannot get data from Agent output*

Probable faulty locations:

- Kepware OPC server cannot validate agent's xml output
- Configuration of MTConnect Agent in Kepware OPC server

Measure to take:

- Copy schema files from OKUMA MTConnect folder to Kepware OPC schema's folder
- Ensure that Kepware OPC server can support different version of MTConnect schema: 1.2 or 1.3 spec
- Check Kepware OCP server configuration for correct port and device name matching the device information in OKUMA MTConnect Adapter.

Refer to section Installation of MTConnect Schemas (Optional) for more information

8. MTConnect Tags

All standard and custom tags are listed in the following files per machine type:

Standard Lathe: LatheDevices.xml
Two Sides Lathe: Lathe2SPDevices.xml
Machining Center: MCDevices.xml
Grinder: GrinderDevices.xml

At run time the actual number of tags can be supported per machine specification will be changed and will be stored in Devices.xml file to be consumed by MTConnect agent.

8.1 Functional Mode

Functional Mode will be available based on the version of MTConnect Adapter and only supports MTConnect spec. 1.3 spec.

By default, MacMan Non-Operating modes will be mapped into MTConnect as shown below. It can be changed

as needed.

Lathe:
<DataItem id="Lfmode" name="fmode" category="EVENT" type="FUNCTIONAL_MODE"/>

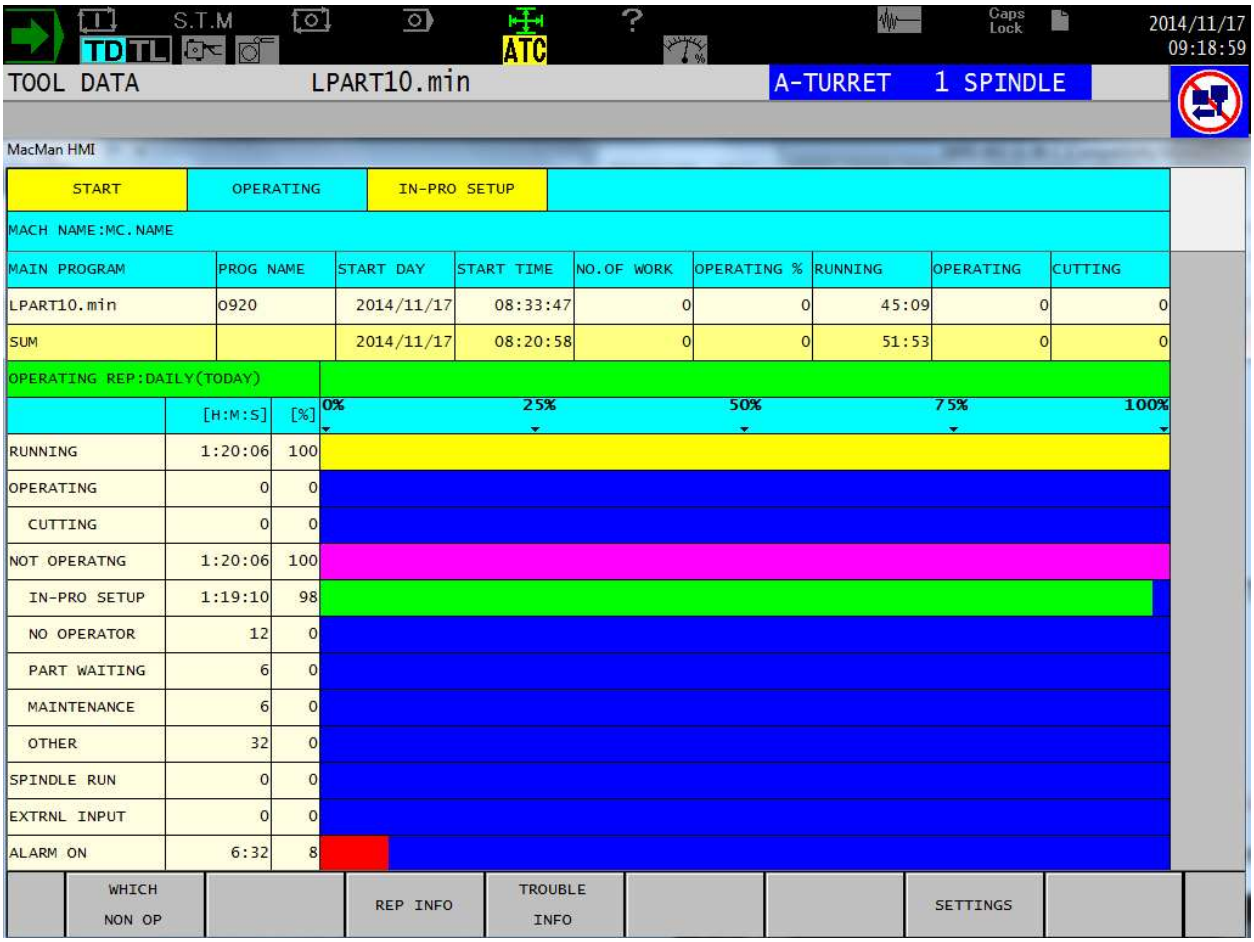
Two sides Lathe:
<DataItem id="L2f1mode" name="f1mode" category="EVENT" type="FUNCTIONAL_MODE"/>
<DataItem id="L2f2mode" name="f2mode" category="EVENT" type="FUNCTIONAL_MODE"/>

Machining Center:
<DataItem id="Mfmode" name="fmode" category="EVENT" type="FUNCTIONAL_MODE"/>

Grinder:
<DataItem id="Gfmode" name="fmode" category="EVENT" type="FUNCTIONAL_MODE"/>

Logic Table:

		MACMAN OPERATING REPORT	
MTConnect Tag Functional Mode	Machine Lock	Operating	Not Operating
PRODUCTION	NOT ACTIVE	ACTIVE	NOT ACTIVE
SETUP	ACTIVE	DON'T CARE	ACTIVE (IN-PRO SETUP)
PROCESS DEVELOPMENT	ACTIVE	DON'T CARE	ACTIVE (NO OPERATOR)
PROCESS DEVELOPMENT	ACTIVE	DON'T CARE	ACTIVE (PART WAITING)
TEAR DOWN	ACTIVE	DON'T CARE	ACTIVE (OTHER)
MAINTENANCE	ACTIVE	DON'T CARE	ACTIVE (MAINTENANCE)
SETUP	NOT ACTIVE	NOT ACTIVE	ACTIVE (IN-PRO SETUP)
PROCESS DEVELOPMENT	NOT ACTIVE	NOT ACTIVE	ACTIVE (NO OPERATOR)
PROCESS DEVELOPMENT	NOT ACTIVE	NOT ACTIVE	ACTIVE (PART WAITING)
TEAR DOWN	NOT ACTIVE	NOT ACTIVE	ACTIVE (OTHER)
MAINTENANCE	NOT ACTIVE	NOT ACTIVE	ACTIVE (MAINTENANCE)



8.2 Extended Tags

The following tags are defined by OKUMA only and will depend on the version of adapter. These extended tags will use OKUMA extended schema for validation.

8.2.1 *Block Number*

8.2.1.1 Machining Center:

It is the current location of running part program.

```
<DataItem type="e:BLOCK_NUMBER" category="EVENT" id="Mp1BlockNumber" name="p1BlockNumber"/>
```

8.2.1.2 Lathe machines

```
<DataItem type="e:BLOCK_NUMBER" category="EVENT" id="Lp1BlockNumber" name="p1BlockNumber"/>
<DataItem type="e:BLOCK_NUMBER" category="EVENT" id="Lp2BlockNumber" name="p2BlockNumber"/>
<DataItem type="e:BLOCK_NUMBER" category="EVENT" id="Lp3BlockNumber" name="p3BlockNumber"/>
```

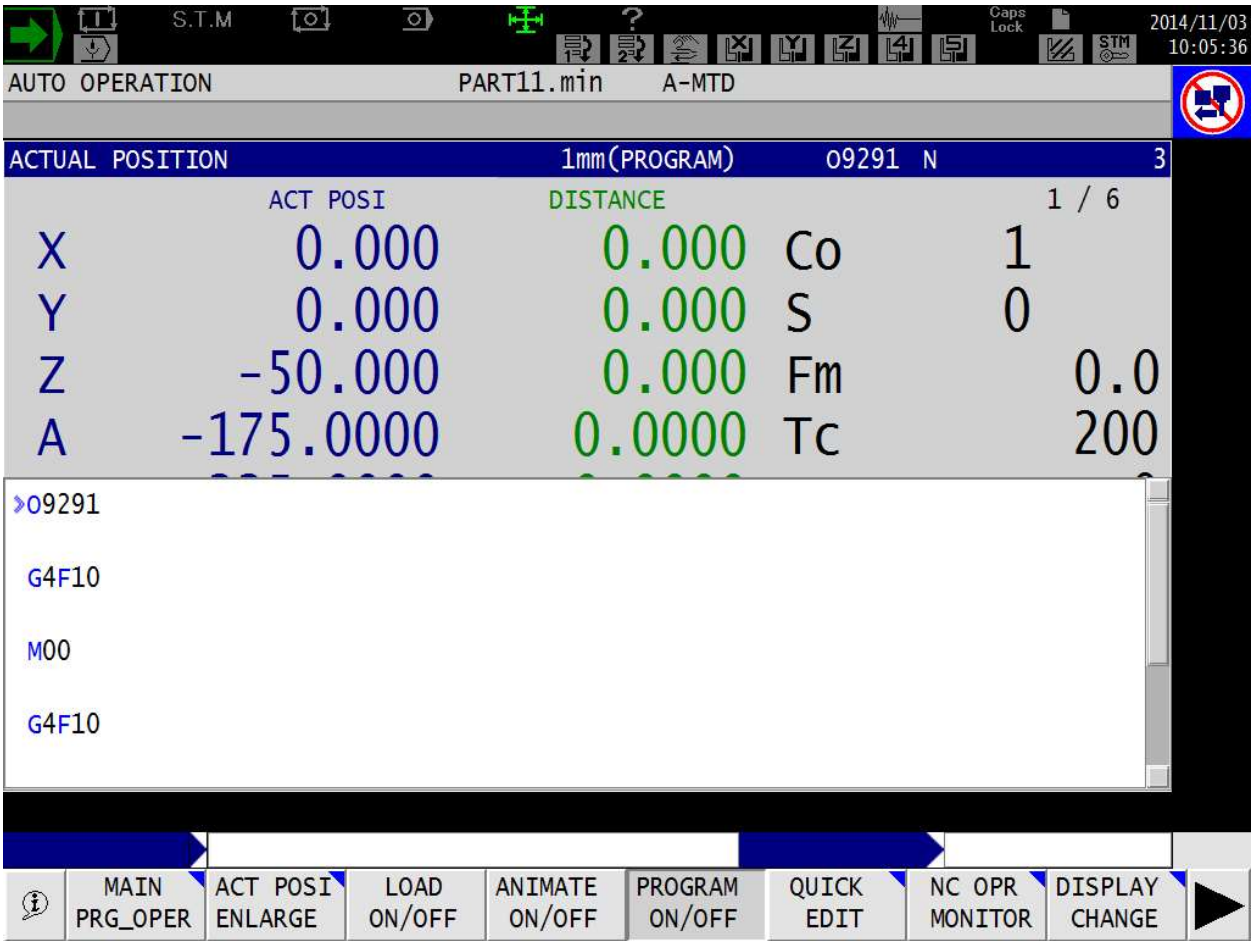
8.2.1.3 Lathe 2SP machines

```
<DataItem type="e:BLOCK_NUMBER" category="EVENT" id="L2p1BlockNumber" name="p1BlockNumber"/>
<DataItem type="e:BLOCK_NUMBER" category="EVENT" id="L2p2BlockNumber" name="p2BlockNumber"/>
```

8.2.1.4 Grinder

```
<DataItem type="e:BLOCK_NUMBER" category="EVENT" id="Gp1BlockNumber" name="p1BlockNumber"/>
```

Current Block number is 3 as shown in the captured image below:



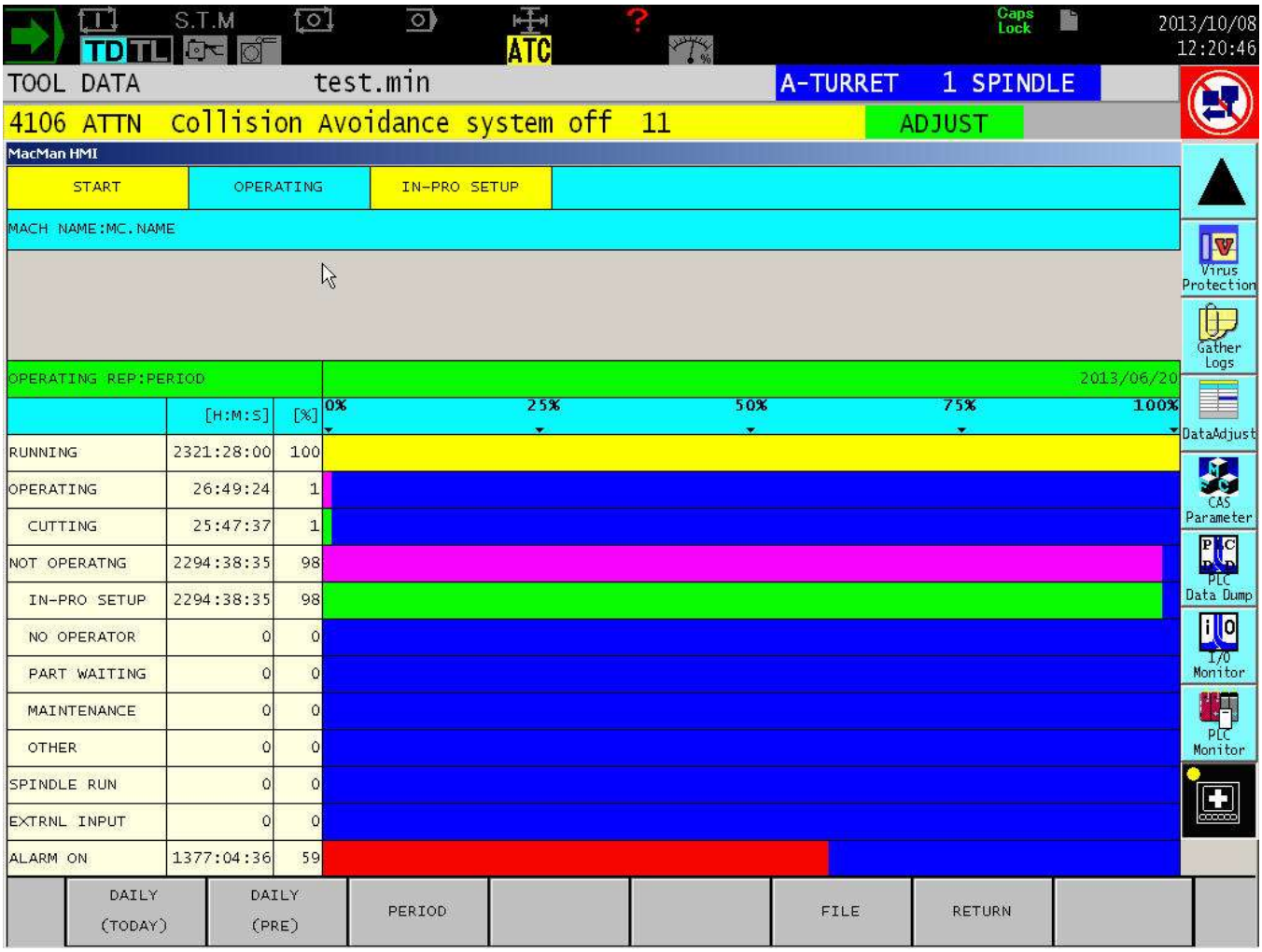
8.2.2 *Period Running/Operating/Cutting/Spindle Run Time*

The accumulated time for total running/operating/cutting/spindle run time will be changed to HH:MM after reaching max value of 9999:59:59 (HH:MM:SS).
The accumulated time will be reset to zero after reaching max value of 999999:59 (HH:MM).

All accumulated times are in seconds.

These custom tags are applicable to Lathe, Machining Center, and Grinder machines.

Reference Accumulated Time in MacMan HMI on control:



8.2.2.1 Period Running Time

Total Running Time: Total Length of time for which power supply to the NC has been ON.
(Power ON (RUNNING) = OPERATING + NOT OPERATING)

Machining Center:

```
<DataItem type="ACCUMULATED_TIME" subType="x:TOTAL_RUNNING_TIME" category="SAMPLE" id="Mp1TotalRunningTime"
name="p1TotalRunningTime" />
```

Lathe:

```
<DataItem type="ACCUMULATED_TIME" subType="x:TOTAL_RUNNING_TIME" category="SAMPLE" id="LpTotalRunningTime"
name="pTotalRunningTime" />
```

For 2 sides Lathe:

```
<DataItem  type="ACCUMULATED_TIME" subType="x:TOTAL_RUNNING_TIME" category="SAMPLE" id="L2p1TotalRunningTime"
name="p1TotalRunningTime" />
<DataItem  type="ACCUMULATED_TIME" subType="x:TOTAL_RUNNING_TIME" category="SAMPLE" id="L2p2TotalRunningTime"
name="p2TotalRunningTime" />
```

For Grinder:

```
<DataItem   type="ACCUMULATED_TIME" subType="x:TOTAL_RUNNING_TIME" category="SAMPLE" id="Gp1TotalRunningTime"
name="p1TotalRunningTime" />
```

8.2.2.2 Period Operating Time

Total Operating Time: Total Length of time for which a main program has been executed.
Length of time the main program has been executed in the machine lock mode or dry run mode (NC lathe) is not counted.
(OPERATING = CUTTING + Not cutting)

Machining Center:
```
<DataItem type="ACCUMULATED_TIME" subType="x:TOTAL_OPERATING_TIME" category="SAMPLE" id="Mp1TotalOperatingTime"
name="p1TotalOperatingTime" />
```

Lathe:
```
<DataItem type="ACCUMULATED_TIME" subType="x:TOTAL_OPERATING_TIME" category="SAMPLE" id="LpTotalOperatingTime"
name="pTotalOperatingTime" />
```

Two sides Lathe:
```
<DataItem type="ACCUMULATED_TIME" subType="x:TOTAL_OPERATING_TIME" category="SAMPLE" id="L2p1TotalOperatingTime"
name="p1TotalOperatingTime" />
<DataItem type="ACCUMULATED_TIME" subType="x:TOTAL_OPERATING_TIME" category="SAMPLE" id="L2p2TotalOperatingTime"
name="p2TotalOperatingTime" />
```

Grinder:
```
<DataItem  type="ACCUMULATED_TIME" subType="x:TOTAL_OPERATING_TIME" category="SAMPLE" id="Gp1TotalOperatingTime"
name="p1TotalOperatingTime" />
```

8.2.2.3 Period Cutting Time

Total Cutting Time: Total Length of time for which an axis has been moved at a cutting feedrate.
Length of time an axis has been moved at a cutting feedrate in the machine lock mode or dry run mode (NC lathe) is not counted.

Machining Center:
```
<DataItem type="ACCUMULATED_TIME" subType="x:TOTAL_CUTTING_TIME" category="SAMPLE" id="Mp1TotalCuttingTime"
name="p1TotalCuttingTime" />
```

Lathe:
```
<DataItem  type="ACCUMULATED_TIME" subType="x:TOTAL_CUTTING_TIME" category="SAMPLE" id="LpTotalCuttingTime"
name="pTotalCuttingTime" />
```

Two Sides Lathe:
```
<DataItem  type="ACCUMULATED_TIME" subType="x:TOTAL_CUTTING_TIME" category="SAMPLE" id="L2p1TotalCuttingTime"
name="p1TotalCuttingTime" />

<DataItem  type="ACCUMULATED_TIME" subType="x:TOTAL_CUTTING_TIME" category="SAMPLE" id="L2p2TotalCuttingTime"
name="p2TotalCuttingTime" />
```

Grinder:
```
<DataItem   type="ACCUMULATED_TIME" subType="x:TOTAL_CUTTING_TIME" category="SAMPLE" id="Gp1TotalCuttingTime"
name="p1TotalCuttingTime" />
```

8.2.2.4 Period Spindle Run Time

Total length of time for which the spindle has been rotating is recorded.
Total length of time the spindle has been rotating in the machine lock mode is not recorded.

Machining Center:
```
<DataItem type="ACCUMULATED_TIME" subType="x:TOTAL_SPINDLE_RUN_TIME"
category="SAMPLE" id="Mp1TotalSpindleRunTime" name=" p1TotalSpindleRunTime " />
```

Lathe:

```
<DataItem type="ACCUMULATED_TIME" subType="x:TOTAL_SPINDLE_RUN_TIME"
category="SAMPLE" id="LpTotalSpindleRunTime" name="pTotalSpindleRunTime"/>
```

Two Sides Lathe:
First side (R):

```
<DataItem type="ACCUMULATED_TIME" subType="x:TOTAL_SPINDLE_RUN_TIME"
category="SAMPLE" id="L2p1TotalSpindleRunTime" name=" p1TotalSpindleRunTime " />
```

Second side (L):

```
<DataItem type="ACCUMULATED_TIME" subType="x:TOTAL_SPINDLE_RUN_TIME"
category="SAMPLE" id="L2p2TotalSpindleRunTime" name=" p2TotalSpindleRunTime " />
```

Grinder:

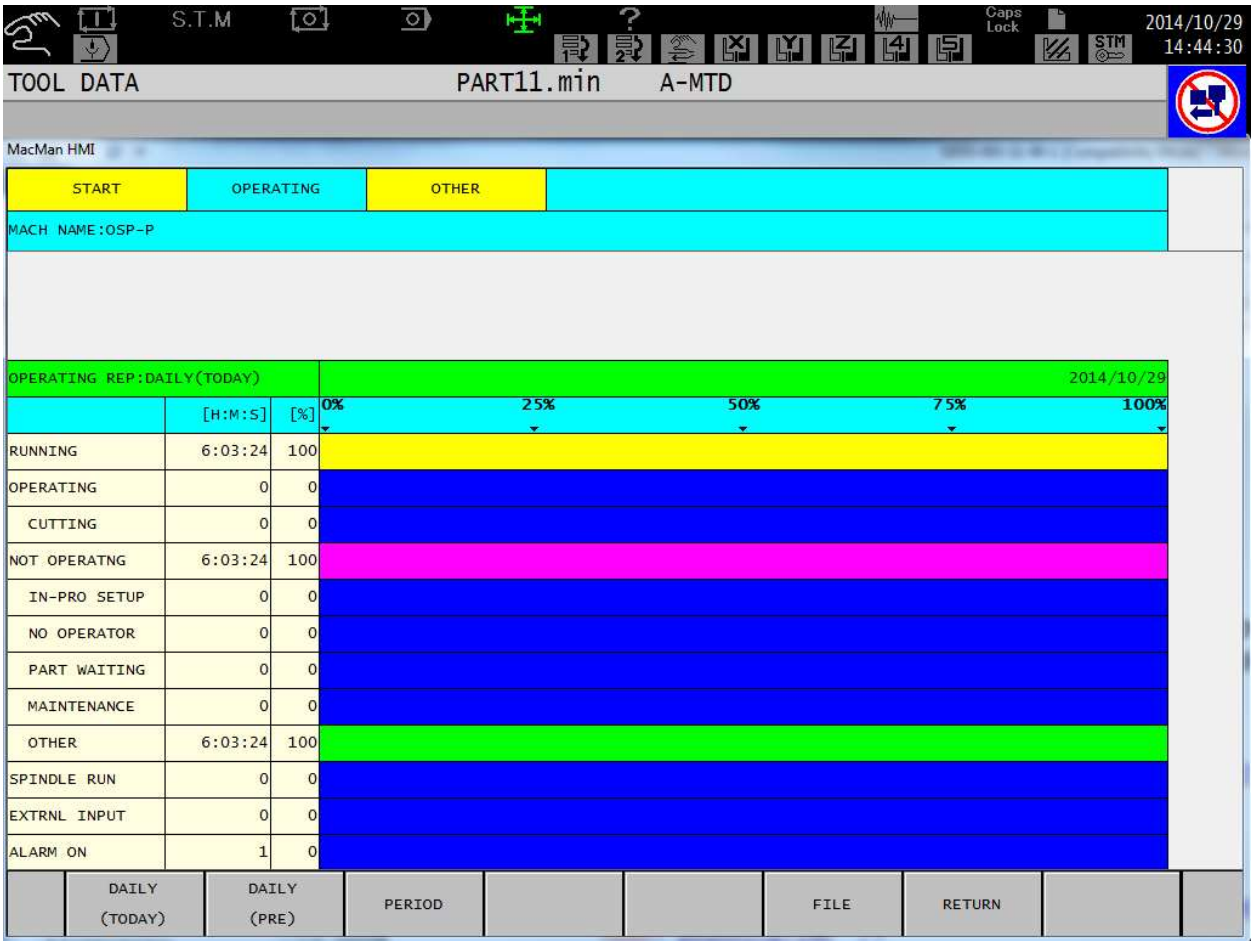
```
<DataItem   type="ACCUMULATED_TIME" subType="x:TOTAL_SPINDLE_RUN_TIME" category="SAMPLE"
id="Gp1TotalSpindleRunTime" name="p1TotalSpindleRunTime" />
```

8.2.3 *Daily Running/Operating/Cutting/Spindle Run Time*

All accumulated times are in seconds.

These custom tags are applicable to both Lathe and Machining Center machines.

Reference Accumulated Time in MacMan HMI on control:



8.2.3.1 Daily Running Time

Daily Running Time: Length of time for which power supply to the NC has been ON.
(Power ON (RUNNING) = OPERATING + NOT OPERATING)

Machining Center:

```
<DataItem type="ACCUMULATED_TIME" subType="x:RUNNING_TIME" category="SAMPLE" id="Mp1RunningTime"
name="p1RunningTime" />
```

Lathe:

```
<DataItem  type="ACCUMULATED_TIME" subType="x:RUNNING_TIME" category="SAMPLE" id="LpRunningTime"
name="pRunningTime" />
```

Two sides Lathe:

```
<DataItem  type="ACCUMULATED_TIME" subType="x:RUNNING_TIME" category="SAMPLE" id="L2p1RunningTime"
name="p1RunningTime" />

<DataItem  type="ACCUMULATED_TIME" subType="x:RUNNING_TIME" category="SAMPLE" id="L2p2RunningTime"
name="p2RunningTime" />
```

Grinder:

```
<DataItem   type="ACCUMULATED_TIME" subType="x:RUNNING_TIME" category="SAMPLE" id="Gp1RunningTime"
name="p1RunningTime" />
```

8.2.3.2 Daily Operating Time

Daily Operating Time: Length of time for which a main program has been executed.
Length of time the main program has been executed in the machine lock mode or dry run mode (NC lathe) is not counted.
(OPERATING = CUTTING + Not cutting)
Machining Center:

```
<DataItem type="ACCUMULATED_TIME" subType="x:OPERATING_TIME" category="SAMPLE" id="Mp1OperatingTime"
name="p1OperatingTime" />
```

Lathe:

```
<DataItem  type="ACCUMULATED_TIME" subType="x:OPERATING_TIME" category="SAMPLE" id="LpOperatingTime"
name="pOperatingTime" />
```

Two Sides Lathe:

```
<DataItem type="ACCUMULATED_TIME" subType="x:OPERATING_TIME" category="SAMPLE" id="L2p1OperatingTime"
name="p1OperatingTime" />

<DataItem type="ACCUMULATED_TIME" subType="x:OPERATING_TIME" category="SAMPLE" id="L2p2OperatingTime"
name="p2OperatingTime" />
```

Grinder:

```
<DataItem   type="ACCUMULATED_TIME" subType="x:OPERATING_TIME" category="SAMPLE" id="Gp1OperatingTime"
name="p1OperatingTime" />
```

8.2.3.3 Daily Cutting Time

Daily Cutting Time: Length of time for which an axis has been moved at a cutting feedrate.
Length of time an axis has been moved at a cutting feedrate in the machine lock mode or dry run mode (NC lathe) is not counted.

Machining Center:

```
<DataItem type="ACCUMULATED_TIME" subType="x:CUTTING_TIME" category="SAMPLE" id="Mp1CuttingTime"
name="p1CuttingTime" />
```

Lathe:
```
<DataItem  type="ACCUMULATED_TIME" subType="x:CUTTING_TIME" category="SAMPLE" id="LpCuttingTime"
name="pCuttingTime" />
```

Two Sides Lathe:
```
<DataItem  type="ACCUMULATED_TIME" subType="x:CUTTING_TIME" category="SAMPLE" id="L2p1CuttingTime"
name="p1CuttingTime" />

<DataItem  type="ACCUMULATED_TIME" subType="x:CUTTING_TIME" category="SAMPLE" id="L2p2CuttingTime"
name="p2CuttingTime" />
```

Grinder:
```
<DataItem   type="ACCUMULATED_TIME" subType="x:CUTTING_TIME" category="SAMPLE" id="Gp1CuttingTime"
name="p1CuttingTime" />
```

8.2.3.4 Daily Spindle Run Time

Length of time for which the spindle has been rotating is recorded.
Length of time the spindle has been rotating in the machine lock mode is not recorded.

Machining Center:
```
<DataItem type="ACCUMULATED_TIME" subType="x:SPINDLE_RUN_TIME"
category="SAMPLE" id="Mp1SpindleRunTime" name="p1SpindleRunTime" />
```

Lathe:
```
<DataItem type="ACCUMULATED_TIME" subType="x:SPINDLE_RUN_TIME"
category="SAMPLE" id="LpSpindleRunTime" name="pSpindleRunTime"/>
```

Two Sides Lathe:
First side (R):
```
<DataItem type="ACCUMULATED_TIME" subType=" x:SPINDLE_RUN_TIME "
category="SAMPLE" id="L2p1SpindleRunTime" name=" p1SpindleRunTime " />
```

Second side (L):
```
<DataItem type="ACCUMULATED_TIME" subType=" x:SPINDLE_RUN_TIME "
category="SAMPLE" id="L2p2SpindleRunTime" name="p2SpindleRunTime" />
```

Grinder:
```
<DataItem   type="ACCUMULATED_TIME" subType="x:SPINDLE_RUN_TIME" category="SAMPLE" id="Gp1SpindleRunTime"
name="p1SpindleRunTime" />
```

8.2.4 *Variables*

The following tags are defined as event and extended (custom) tags and will be available based on the current version of MTConnect Adapter.

8.2.4.1 Common Variables

The value will be a collection of key-value pairs. The number of items will be defined in Tag Configuration screen.

In case of the value of common variable is EMPTY as shown in NC-HMI screen, the actual value reporting to the agent will be x:Infinity where X is the common variable index.

8.2.4.1.1 Machining Center

```
<DataItem  type="e:VARIABLES" subType="x:COMMON" category="EVENT" id="Mp1CommonVariable" name="p1CommonVariable"/>
```

8.2.4.1.2 Single Side Lathe

```
<DataItem  type="e:VARIABLES" subType="x:COMMON" category="EVENT" id="Lp1CommonVariable" name="p1CommonVariable"/>
```

8.2.4.1.3 Two sides Lathe

First machine or R side machine:

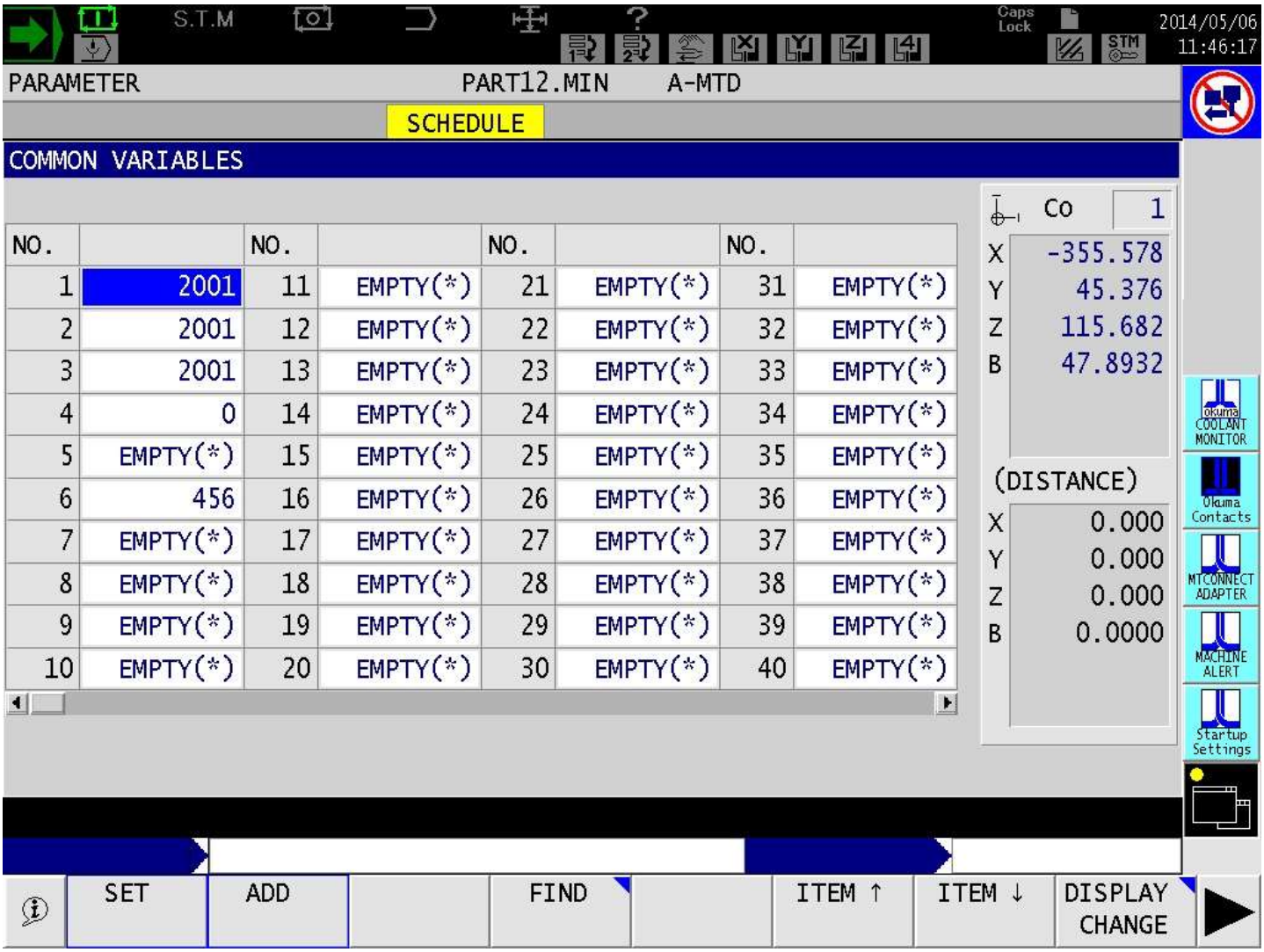
```
<DataItem  type="e:VARIABLES" subType="x:COMMON" category="EVENT" id="L2p1CommonVariable"
name="p1CommonVariable"/>
```

Second machine or L side machine:

```
<DataItem  type="e:VARIABLES" subType="x:COMMON" category="EVENT" id="L2p2CommonVariable"
name="p2CommonVariable"/>
```

8.2.4.1.4 Grinder

```
<DataItem  type="e:VARIABLES" subType="x:COMMON" category="EVENT" id="Gp1CommonVariable" name="p1CommonVariable"/>
```



Sample output from agent for Common Variables with starting index from 1 and ending index at 20:

```
<e:Variables dataItemId="p1CommonVariable" timestamp="2014-06-20T12:12:51.0427812Z" name="p1CommonVariable"
sequence="365" subType="x:COMMON">1:1E-07 2:0 3:0 4:0 5:0 6:0 7:0 8:0 9:0 10:0 11:0 12:0 13:0 14:0 15:0 16:0
17:Infinity 18:0 19:0 20:Infinity</e:Variables>
```

8.2.4.2 Current Workpiece Offset Variables

The current workpiece offset are for X, Y, Z, A, B, and C axis if applicable. It has default unit of millimeter for linear axes such as X, Y, and Z, and degrees for rotary axes such as A, B, and C axis.

8.2.4.2.1 Machining Center

```
<DataItem  type="e:VARIABLES" subType="x:WORKOFFSET_X_AXIS" category="EVENT" id="Mp1WorkOffsetXAxis"
name="p1WorkOffsetXAxis" units="MILLIMETER"/>
<DataItem   type="e:VARIABLES" subType="x:WORKOFFSET_Y_AXIS" category="EVENT" id="Mp1WorkOffsetYAxis"
name="p1WorkOffsetYAxis" units="MILLIMETER"/>
<DataItem   type="e:VARIABLES" subType="x:WORKOFFSET_Z_AXIS" category="EVENT" id="Mp1WorkOffsetZAxis"
name="p1WorkOffsetZAxis" units="MILLIMETER"/>
<DataItem   type="e:VARIABLES" subType="x:WORKOFFSET_A_AXIS" category="EVENT" id="Mp1WorkOffsetAAxis"
name="p1WorkOffsetAAxis" units="DEGREE"/>
<DataItem   type="e:VARIABLES" subType="x:WORKOFFSET_B_AXIS" category="EVENT" id="Mp1WorkOffsetBAxis"
name="p1WorkOffsetBAxis" units="DEGREE"/>
<DataItem   type="e:VARIABLES" subType="x:WORKOFFSET_C_AXIS" category="EVENT" id="Mp1WorkOffsetCAxis"
name="p1WorkOffsetCAxis" units="DEGREE"/>
```

8.2.5 *MacMan*

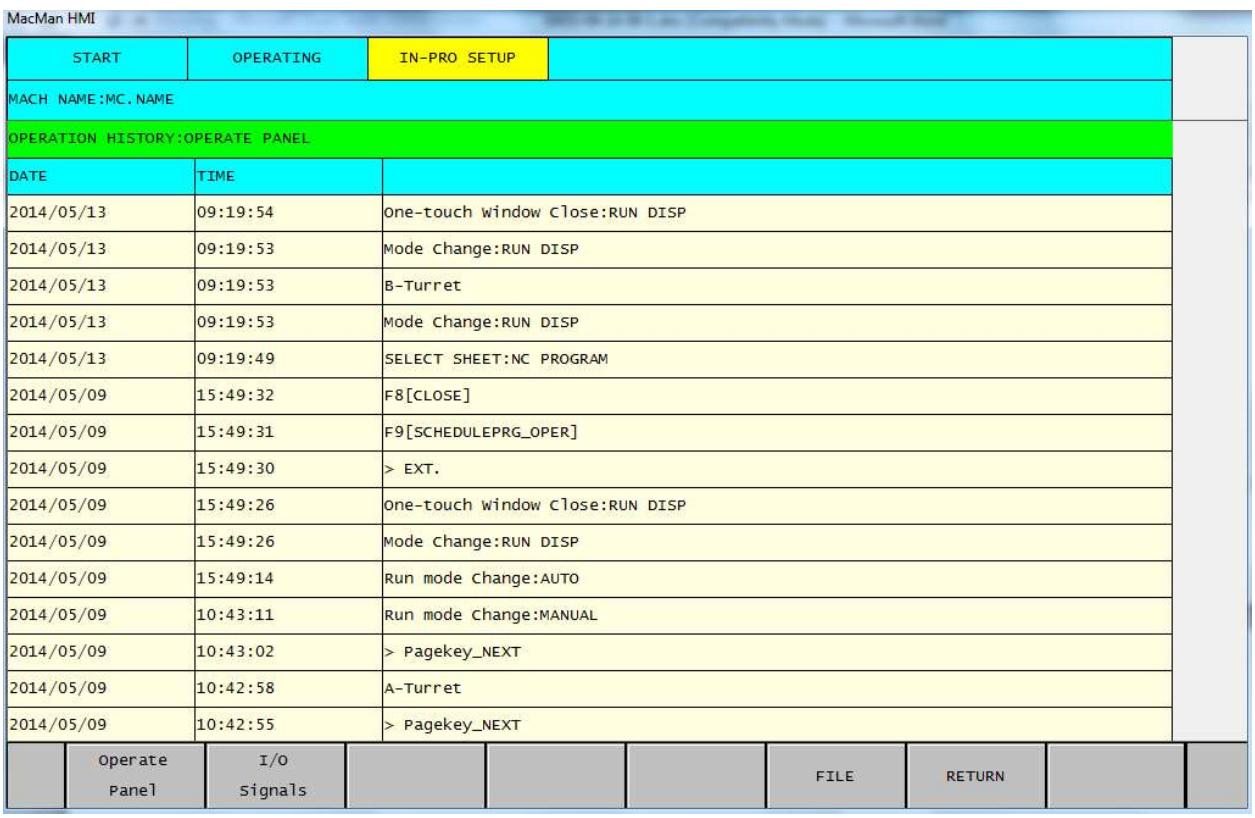
The following tags are defined as event and extended (custom) tags.

8.2.5.1 Panel History

These tags will send out panel history data as it is recorded from MacMan on NC HMI screen as shown. Only one record can be sent out at a time if there are some changes.

Note: MacMan only records while NC HMI has focus. As a result, MacMan will not record any keystroke while other applications are in focus.

All "|" character will be converted to "PIPE" to be supported by MTConnect Agent, currently.



Machining Center:

```
<DataItem type="e:MACMAN" subType="x:PANEL_HISTORY" category="EVENT" id="Mp1MacManPanelHistory"
name="p1MacManPanelHistory"/>
```

Lathe:

```
<DataItem  type="e:MACMAN" subType="x:PANEL_HISTORY" category="EVENT" id="Lp1MacManPanelHistory"
name="p1MacManPanelHistory"/>
```

Two Sides Lathe:

R side machine:

```
<DataItem  type="e:MACMAN" subType="x:PANEL_HISTORY" category="EVENT" id="L2p1MacManPanelHistory"
name="p1MacManPanelHistory"/>
```

L side machine:

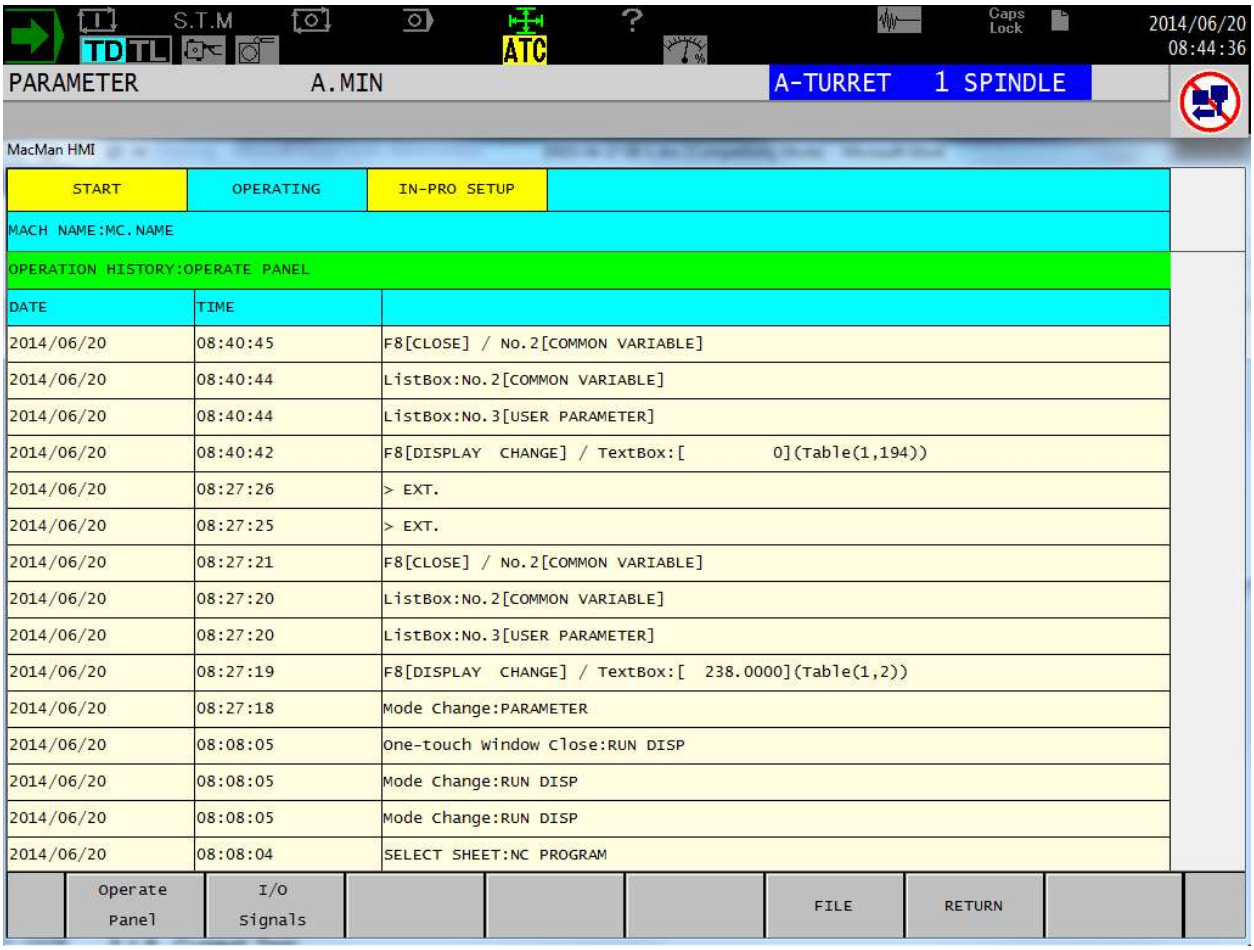
```
<DataItem  type="e:MACMAN" subType="x:PANEL_HISTORY" category="EVENT" id="L2p2MacManPanelHistory"
name="p2MacManPanelHistory"/>
```

Grinder:

```
<DataItem  type="e:MACMAN" subType="x:PANEL_HISTORY" category="EVENT" id="Gp1MacManPanelHistory"
name="p1MacManPanelHistory"/>
```

Sample Output from agent on first side of machine:

```
<e:Macman dataItemId="p1MacManPanelHistory" timestamp="2014-06-20T12:40:48.4996172Z" name="p1MacManPanelHistory"
sequence="2914" subType="x:PANEL_HISTORY">2014/06/20 08:40:45 F8[CLOSE] / No.2[COMMON VARIABLE]</e:Macman>
```



8.2.6 *Machine Operation Panel Signals*

8.2.6.1 Machine Lock

The following tags are custom MTConnect tags. When it is active the tag's value is ON otherwise, it is OFF.

Machining Center:

```
<DataItem type="e:OUTPUT_SIGNAL" subType="x:MACHINE_LOCK" category="EVENT"
id="Mp1MachineOperationPanelOutputMachineLock" name="p1MachineOperationPanelOutputMachineLock"/>
```

Lathe:

```
<DataItem type="e:OUTPUT_SIGNAL" subType="x:MACHINE_LOCK" category="EVENT"
id="Lp1MachineOperationPanelOutputMachineLock" name="p1MachineOperationPanelOutputMachineLock"/>
```

Two Sides Lathe:

R side machine:

```
<DataItem type="e:OUTPUT_SIGNAL" subType="x:MACHINE_LOCK" category="EVENT"
id="L2p1MachineOperationPanelOutputMachineLock" name="p1MachineOperationPanelOutputMachineLock"/>
```

L side machine:

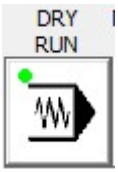
```
<DataItem type="e:OUTPUT_SIGNAL" subType="x:MACHINE_LOCK" category="EVENT"
id="L2p2MachineOperationPanelOutputMachineLock" name="p2MachineOperationPanelOutputMachineLock"/>
```

Grinder:

```
<DataItem type="e:OUTPUT_SIGNAL" subType="x:MACHINE_LOCK" category="EVENT"
id="Gp1MachineOperationPanelOutputMachineLock" name="p1MachineOperationPanelOutputMachineLock"/>
```

8.2.6.2 Dry Run

The following tag is custom MTConnect tag. When it is active the tag's value is ON otherwise, it is OFF.



Machining Center:

```
<DataItem type="e:OUTPUT_SIGNAL" subType="x:DRY_RUN" category="EVENT" id="Mp1MachineOperationPanelOutputDryRun"
name="p1MachineOperationPanelOutputDryRun"/>
```

Lathe:

```
<DataItem type="e:OUTPUT_SIGNAL" subType="x:DRY_RUN" category="EVENT" id="Lp1MachineOperationPanelOutputDryRun"
name="p1MachineOperationPanelOutputDryRun"/>
```

Two Sides Lathe:

R side machine:

```
<DataItem type="e:OUTPUT_SIGNAL" subType="x:DRY_RUN" category="EVENT"
id="L2p1MachineOperationPanelOutputDryRun" name="p1MachineOperationPanelOutputDryRun"/>
```

L side machine:

```
<DataItem type="e:OUTPUT_SIGNAL" subType="x:DRY_RUN" category="EVENT"
id="L2p2MachineOperationPanelOutputDryRun" name="p2MachineOperationPanelOutputDryRun"/>
```

Grinder:

```
<DataItem type="e:OUTPUT_SIGNAL" subType="x:DRY_RUN" category="EVENT" id="Gp1MachineOperationPanelOutputDryRun"
name="p1MachineOperationPanelOutputDryRun"/>
```

8.2.7 *Spindle Surface Speed*

The following tags are custom MTConnect tags. It reports spindle surface speed

8.2.7.1 Lathe

Spindle Surface speed for path 1, 2, 3 related to first spindle

```
<DataItem  type="e:SURFACE_SPEED" subType="x:PATH_1" category="SAMPLE" id="LS1SurfaceSpeedA"
name="S1SurfaceSpeedA" units="MILLIMETER/SECOND"/>
<DataItem  type="e:SURFACE_SPEED" subType="x:PATH_2" category="SAMPLE" id="LS1SurfaceSpeedB"
name="S1SurfaceSpeedB" units="MILLIMETER/SECOND"/>
<DataItem  type="e:SURFACE_SPEED" subType="x:PATH_3" category="SAMPLE" id="LS1SurfaceSpeedC"
name="S1SurfaceSpeedC" units="MILLIMETER/SECOND"/>
```

Spindle Surface speed for path 1, 2, 3 related to second spindle

```
<DataItem  type="e:SURFACE_SPEED" subType="x:PATH_1" category="SAMPLE" id="LS2SurfaceSpeedA"
name="S2SurfaceSpeedA" units="MILLIMETER/SECOND"/>
<DataItem  type="e:SURFACE_SPEED" subType="x:PATH_2" category="SAMPLE" id="LS2SurfaceSpeedB"
name="S2SurfaceSpeedB" units="MILLIMETER/SECOND"/>
```

```
        <DataItem  type="e:SURFACE_SPEED" subType="x:PATH_3" category="SAMPLE" id="LS2SurfaceSpeedC"
name="S2SurfaceSpeedC" units="MILLIMETER/SECOND"/>
```

8.2.7.2 Lathe 2SP Machines

Spindle Surface speed for path 1 related to first spindle of first machine

```
        <DataItem  type="e:SURFACE_SPEED" subType="x:PATH_1" category="SAMPLE" id="L2S1SurfaceSpeedA"
name="S1SurfaceSpeedA" units="MILLIMETER/SECOND"/>
```

Spindle Surface speed for path 2 related to first spindle of second machine

```
        <DataItem  type="e:SURFACE_SPEED" subType="x:PATH_2" category="SAMPLE" id="L2S2SurfaceSpeedA"
name="S2SurfaceSpeedA" units="MILLIMETER/SECOND"/>
```

8.2.8 *Path Feedrate per revolution*

The following tags are custom MTConnect tags. It reports spindle surface speed

8.2.8.1 Lathe

Actual and program path federate per revolution related to Path 1 or H1/A turret

```
<DataItem  type="e:PATH_FEEDRATE_PER_REV" subType="ACTUAL" name="p1Fract" category="SAMPLE" id="Lp1Fract"  />
<DataItem  type="e:PATH_FEEDRATE_PER_REV" subType="PROGRAMMED" name="p1Frcmd" category="SAMPLE" id="Lp1Frcmd"  />
```

Actual and program path federate per revolution related to Path 2 or B turret

```
<DataItem  type="e:PATH_FEEDRATE_PER_REV" subType="ACTUAL" name="p2Fract" category="SAMPLE" id="Lp2Fract" />
<DataItem  type="e:PATH_FEEDRATE_PER_REV" subType="PROGRAMMED" name="p2Frcmd" category="SAMPLE" id="Lp2Frcmd"  />
```

Actual and program path federate per revolution related to Path 3 or C turret on left spindle

```
<DataItem  type="e:PATH_FEEDRATE_PER_REV" subType="ACTUAL" name="p3Fract" category="SAMPLE" id="Lp3Fract" />
<DataItem  type="e:PATH_FEEDRATE_PER_REV" subType="PROGRAMMED" name="p3Frcmd" category="SAMPLE" id="Lp3Frcmd" />
```

Actual and program path federate per revolution related to Path 3 or C turret on right spindle

```
<DataItem  type="e:PATH_FEEDRATE_PER_REV" subType="ACTUAL" name="p3FractR" category="SAMPLE" id="Lp3FractR" />
<DataItem  type="e:PATH_FEEDRATE_PER_REV" subType="PROGRAMMED" name="p3FrcmdR" category="SAMPLE" id="Lp3FrcmdR" />
```

8.2.8.2 Lathe 2SP Machines

Actual and program path federate per revolution related to first spindle of first machine

```
<DataItem  type="PROGRAM_HEADER" name="p1ProgramHeader" category="EVENT" id="L2p1ProgramHeader"/>
<DataItem  type="PALLET_ID" name="p1PalletID" category="EVENT" id="L2p1PalletID"/>
```

Actual and program path federate per revolution related to first spindle of second machine

```
<DataItem  type="e:PATH_FEEDRATE_PER_REV" subType="ACTUAL" name="p2Fract" category="SAMPLE" id="L2p2Fract"  />
<DataItem  type="e:PATH_FEEDRATE_PER_REV" subType="PROGRAMMED" name="p2Frcmd" category="SAMPLE" id="L2p2Frcmd"  />
```

8.2.9 *Analog/Digital Input Sensors*

Please see the Sensor section 8.4 Sensors for more information

8.3 Tool Assets

Tool Asset will be available based on the version of MTConnect Adapter and only supports MTConnect 1.3 spec.

Tool Assets cannot be supported on P100II, all turning machines such as P200L/P300S/P300L controls with special 8 Digits Tool ID option.

For P300S(LP) :
Tool Asset, Current Tool for A/B/C turret, and ToolAssetID tags will not be available when one of the following

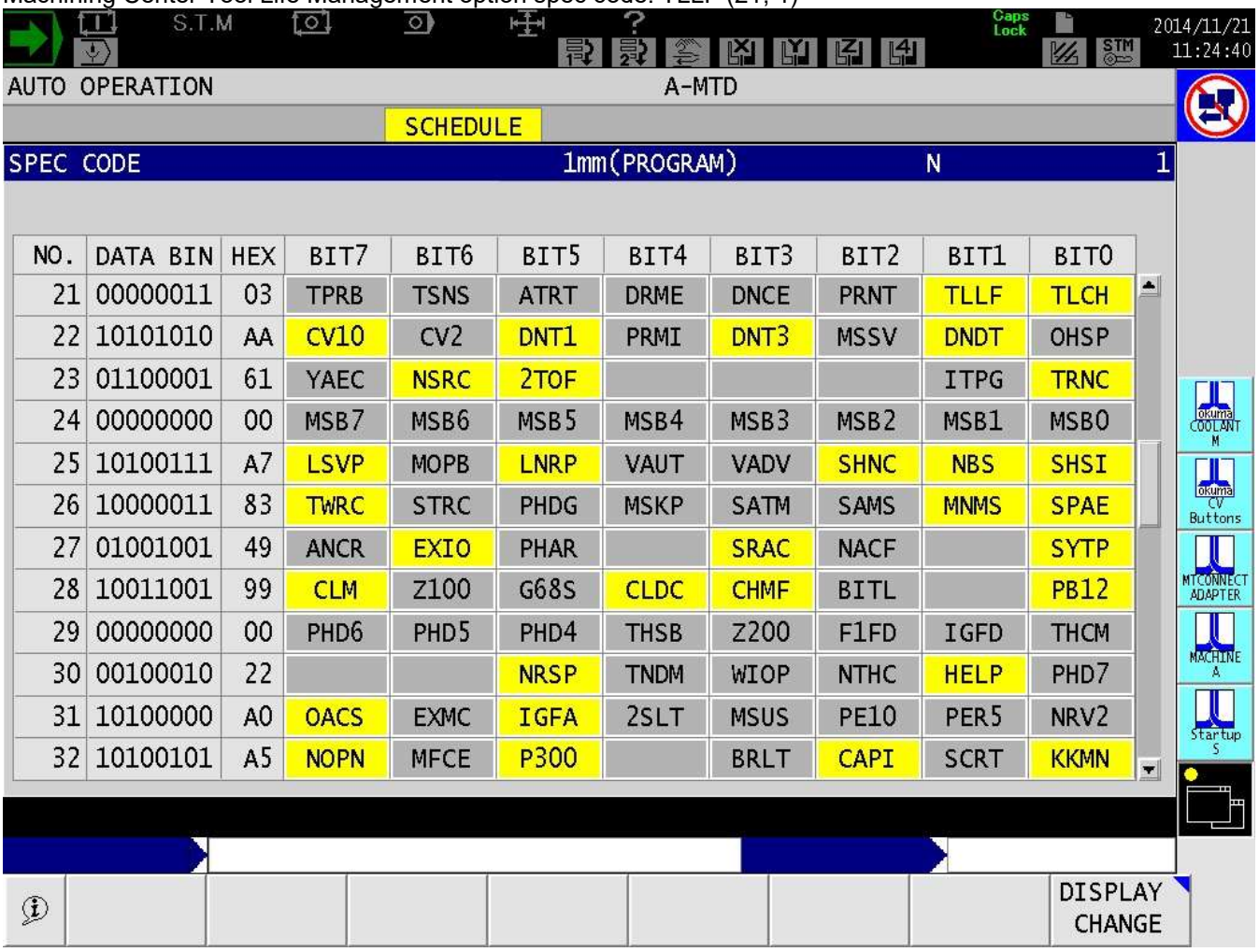
conditions are met:

- Tool ID NC SPEC CODE (32,6) is ON
- TMIM NC SPEC CODE 2 (3,6) is OFF

For P300L:
Tool Asset, Current Tool for A/B/C turret, and ToolAssetID tags will not be available when the specification of LTIM NC SPEC CODE 2 (27,2) is OFF.

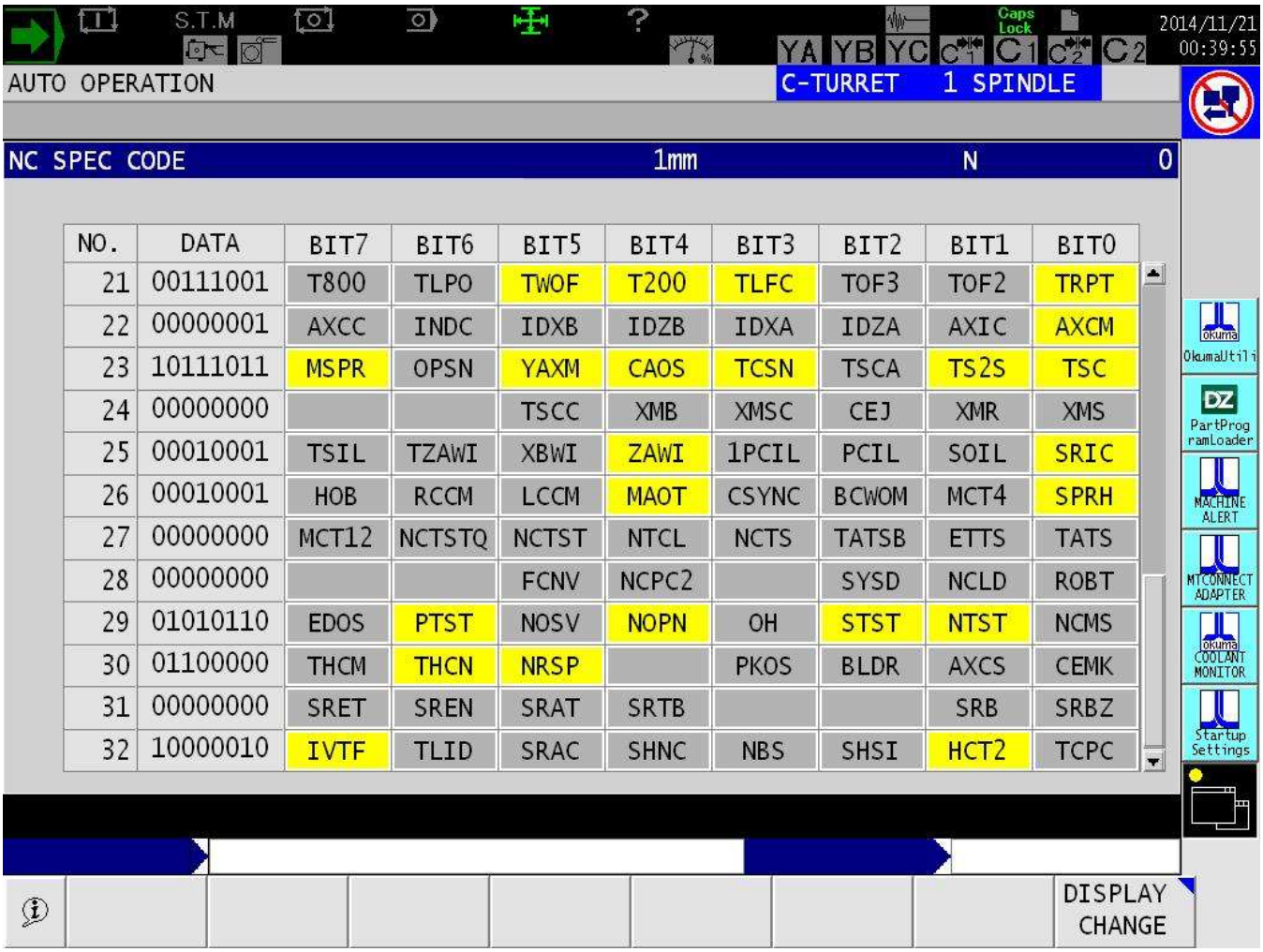
Tool Assets do require Tool Life Management option spec on OSP-P controls to provide Cutting Tool Life information.

Machining Center Tool Life Management option spec code: TLLF (21, 1)



NO.	DATA BIN	HEX	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
21	00000011	03	TPRB	TSNS	ATRT	DRME	DNCE	PRNT	TLLF	TLCH
22	10101010	AA	CV10	CV2	DNT1	PRMI	DNT3	MSSV	DNDT	OHSP
23	01100001	61	YAEC	NSRC	2TOF				ITPG	TRNC
24	00000000	00	MSB7	MSB6	MSB5	MSB4	MSB3	MSB2	MSB1	MSB0
25	10100111	A7	LSVP	MOPB	LNRP	VAUT	VADV	SHNC	NBS	SHSI
26	10000011	83	TWRC	STRC	PHDG	MSKP	SATM	SAMS	MNMS	SPAE
27	01001001	49	ANCR	EXIO	PHAR		SRAC	NACF		SYTP
28	10011001	99	CLM	Z100	G68S	CLDC	CHMF	BITL		PB12
29	00000000	00	PHD6	PHD5	PHD4	THSB	Z200	F1FD	IGFD	THCM
30	00100010	22			NRSP	TNDM	WIOP	NTHC	HELP	PHD7
31	10100000	A0	OACS	EXMC	IGFA	2SLT	MSUS	PE10	PER5	NRV2
32	10100101	A5	NOPN	MFCE	P300		BRLT	CAPI	SCRT	KKMN

Lathe Tool Life Management option spec code: TLFC (21, 3)



NO.	DATA	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
21	00111001	T800	TLPO	TWOF	T200	TLFC	TOF3	TOF2	TRPT
22	00000001	AXCC	INDC	IDXB	IDZB	IDXA	IDZA	AXIC	AXCM
23	10111011	MSPR	OPSN	YAXM	CAOS	TCSN	TSCA	TS2S	TSC
24	00000000			TSCC	XMB	XMSC	CEJ	XMR	XMS
25	00010001	TSIL	TZAWI	XBWI	ZAWI	1PCIL	PCIL	SOIL	SRIC
26	00010001	HOB	RCCM	LCCM	MAOT	CSYNC	BCWOM	MCT4	SPRH
27	00000000	MCT12	NCTSTQ	NCTST	NTCL	NCTS	TATSB	ETTS	TATS
28	00000000			FCNV	NCPC2		SYSD	NCLD	ROBT
29	01010110	EDOS	PTST	NOSV	NOPN	OH	STST	NTST	NCMS
30	01100000	THCM	THCN	NRSP		PKOS	BLDR	AXCS	CEMK
31	00000000	SRET	SREN	SRAT	SRTB			SRB	SRBZ
32	10000010	IVTF	TLID	SRAC	SHNC	NBS	SHSI	HCT2	TCPC

The following tags can be supported in Tool Assets and can be varied per machine/control type:

```
<Assets>
<CuttingTool>
 <CuttingToolLifeCycle>
  <CutterStatus/>
  <ToolLife/>
```

```
    <ProgramToolGroup/>
    <ProgramToolNumber/>
    <Location/>
<CuttingItems>
      <CuttingItem>
        <ItemLife/>
        <x:ItemCutterStatus/>
        <x:ItemProgramToolGroup/>
      </CuttingItem>
     </CuttingItems>
  </CuttingToolLifeCycle>
 </CuttingTool>
 </Assets>
```

The following tags are supported in Tool Assets if Tool Life Management is not available on the control:

```
<Assets>
<CuttingTool>
  <CuttingToolLifeCycle>
    <CutterStatus/>
    <ProgramToolGroup/>
    <ProgramToolNumber/>
    <Location/>
  </CuttingToolLifeCycle>
</CuttingTool>
</Assets>
```

There are extended tags defined specifically for OKUMA machines for multi-edges tool types which are:

```
<x:ItemCutterStatus/>
<x:ItemProgramToolGroup/>
```

A multi-edges tool can have tool life status and program tool group number assigned to each edge.

When pot number specified in Location tag is zero it implies that the tool is currently in the spindle.

Note: The actual number of available tags will be varied for each tool based on control type, machine specification, and tool type as shown below per machine type.

8.3.1 *Asset ID*

Currently, Asset ID will be assigned automatically using Asset Tool ID and tool/station number.
Asset Tool ID is predefined as 123456 for all tool assets, and tool/station number will be varied based on control type, machine spec., and tool type. Asset Tool ID can be changed in the Tag Configuration.

The table below shows how an Asset Id created to ensure a unique asset ID in the entire Tool Assets collection per machine.

Note: It is necessary to use a unique Asset Tool ID per machine if multiple machines are configured to send data to the same agent.

Controls	Asset Id	Attached Tool Number/ Wheel Number	Pot / Location	A Turret - Station No.	B Turret - Station No.	C Turret - Station No.
P200 L	123456.10C	N/A	N/A	N/A	N/A	10
	123456.10B	N/A	N/A	N/A	10	N/A
	123456.10A	N/A	N/A	10	N/A	N/A
P200 M	123456.100	100	1	N/A	N/A	N/A
P200/P300 M (Tool ID Fixed ATC)	123456.1	N/A	1	N/A	N/A	N/A
P200/P300 M (Tool ID Random ATC)	123456.100	100	1	N/A	N/A	N/A
P300 L	123456.502	502	N/A	N/A	N/A	1
	123456.501	501	N/A	N/A	1	N/A
	123456.500	500	N/A	1	N/A	N/A
P300 M	123456.45678	45678	1	N/A	N/A	N/A
P300 S	123456.1001	1001	N/A	N/A	1	N/A
	123456.1000	1000	1	N/A	N/A	N/A
P300 G	123456.1	1	1	N/A	N/A	N/A

On P200 L control, there is no tool number assigned to each station for each turret. Therefore, the station number is used instead of actual tool number for creating an asset ID. A letter is also attached to the asset ID per turret to ensure unique asset ID on all stations. The system will report each station as a tool asset with or without an attached tool.

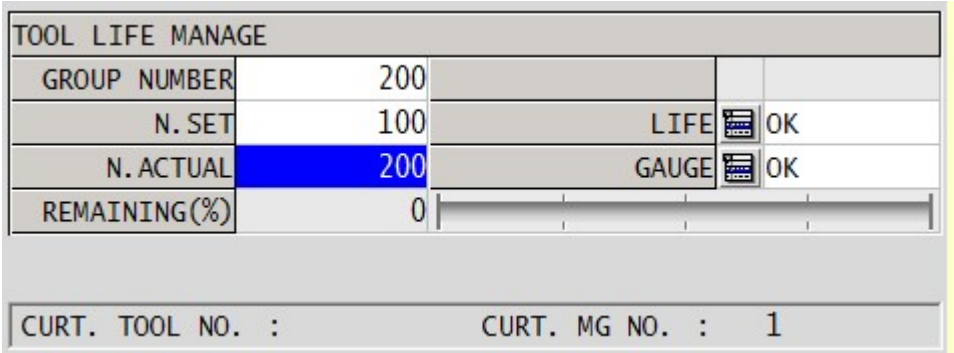
On P300 controls, a tool is created but not attached to a magazine, or turret will not be considered a tool asset. Meanwhile detaching a tool from its location is considered removing a tool asset from machine's tool assets collection.

On P300G controls, each wheel is considered as a tool.

8.3.2 *Cutter Status*

The cutter status of a tool depends on the condition of gauge and life status.

Cutter Status	Gauges	Life
AVAILABLE	OK	OK
BROKEN	NG	OK
EXPIRED	OK	NG
BROKEN & EXPIRED	NG	NG



The table below shows cutter status of a multi-edges tool based on status of individual tool edge. Individual item cutter status is also reported per tool and machine type if supported.

```
<x:ItemCutterStatus>
  <Status>EXPIRED</Status>
  <Status>BROKEN</Status>
</x:ItemCutterStatus>
```

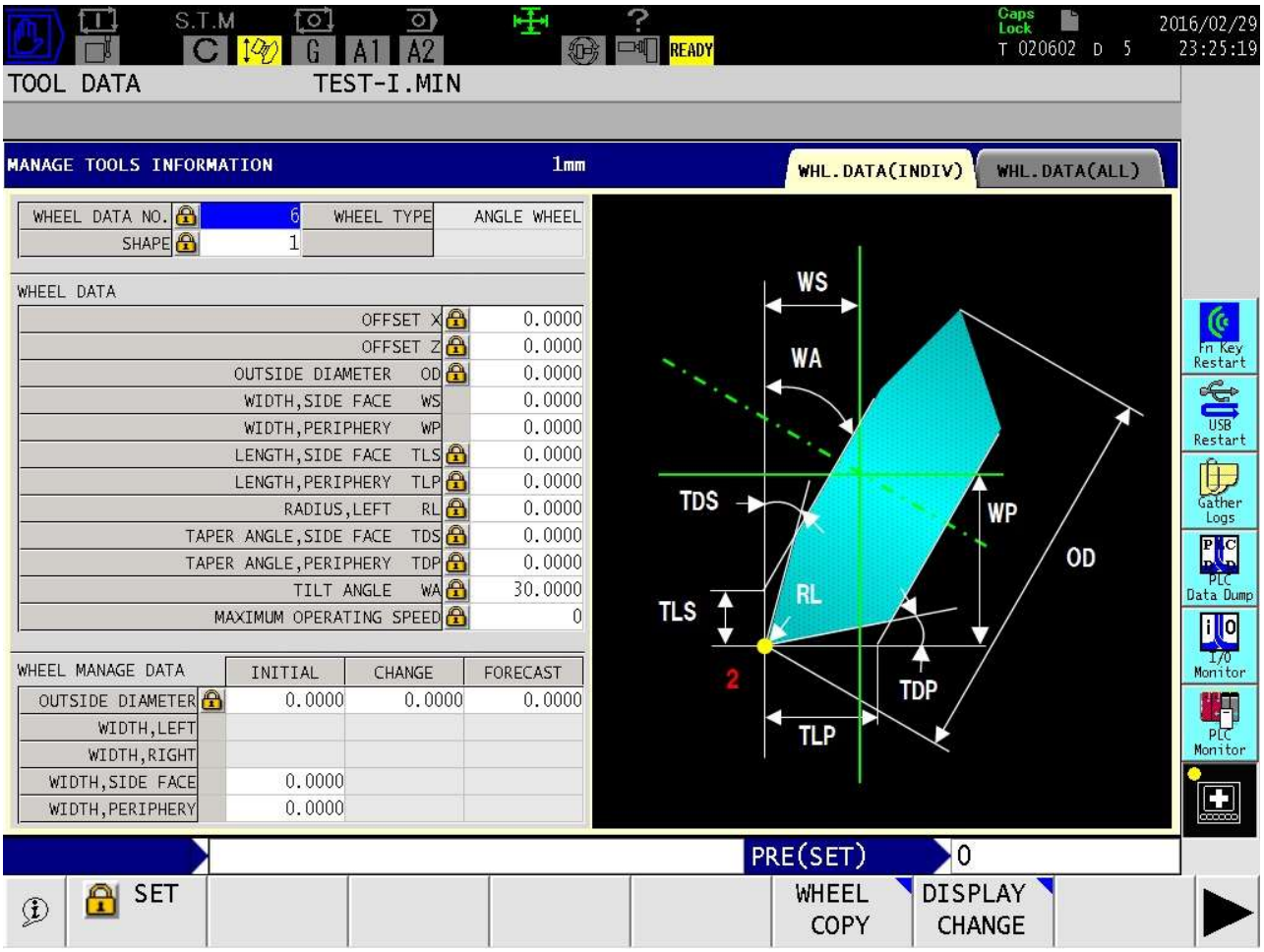
Cutter Status Logic:

Cutter Status	Gauge (OK/NG)	Life (OK/NG)
AVAILABLE	No Broken Edge	No Expired Edge
AVAILABLE	At least one edge is neither broken nor expired.	
BROKEN	All Edges are broken	N/A
EXPIRED	N/A	All Edges are expired
BROKEN & EXPIRED	All edges are either broken or expired	

8.3.2.1 Grinder

Only active tool/wheel number can be checked for its cutter status – AVAILABLE or EXPIRED
Active tool/wheel number will use one of the wheel data numbers and its status is determined as following:

Cutter Status	Wheel No.	Wheel Data	Conditions	Wheel Manage Data
AVAILABLE	ACTIVE	OUTSIDE DIAMETER	>=	OUTSIDE DIAMETER - CHANGE
EXPIRED	ACTIVE	OUTSIDE DIAMETER	<	OUTSIDE DIAMETER - CHANGE
UNKNOWN	NOT ACTIVE	N/A	N/A	N/A



8.3.3 *Output Tool Assets*

http://IPAddress:port/assets

- IPAddress: localhost or IP address of running agent
- Port: Default to port 5000 of running agent. It can be changed in agent.cfg configuration file.

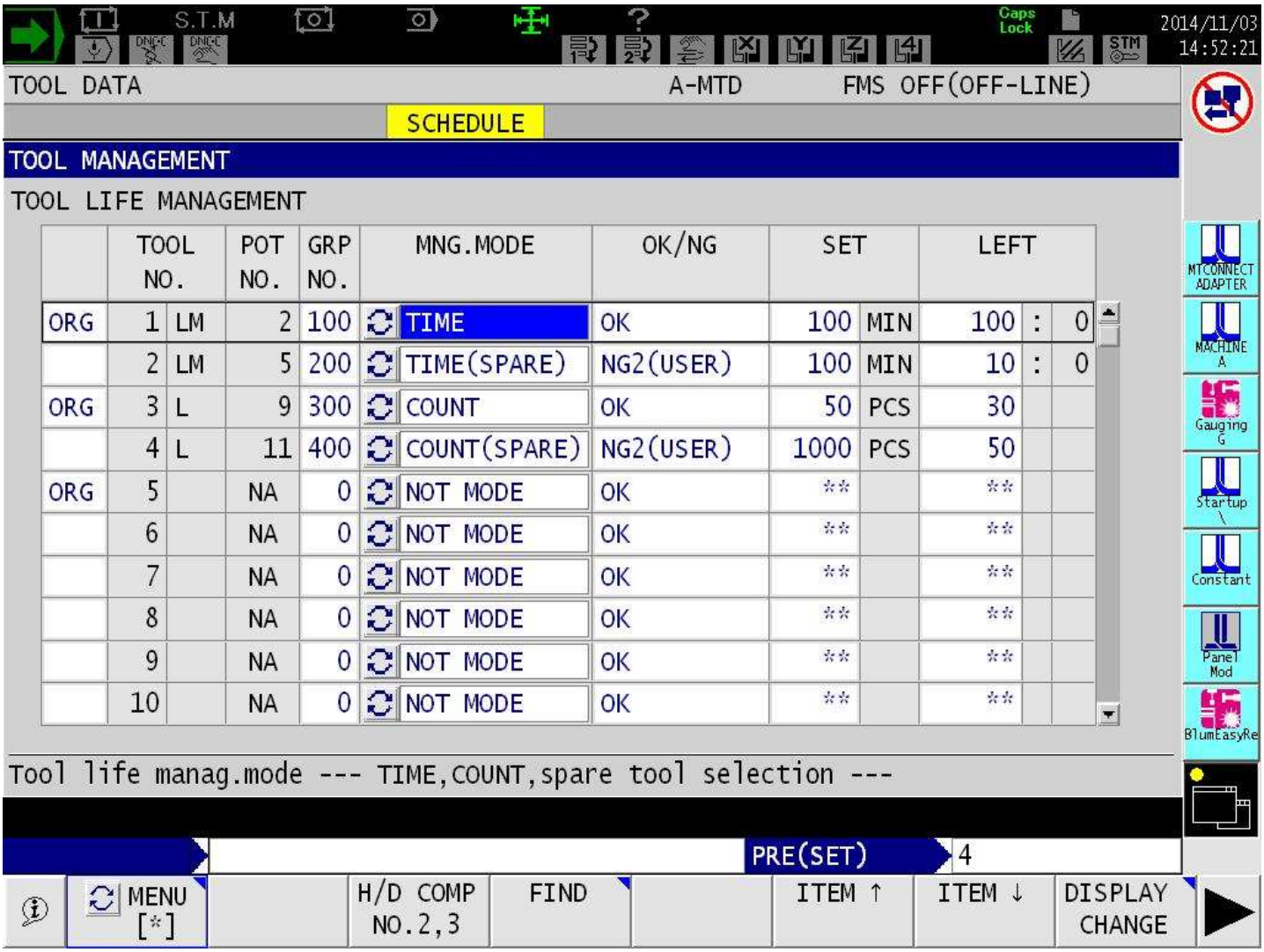
Examples:
http://localhost:5000/assets for getting all machine tool assets

8.3.4 *P200 M*

8.3.4.1 Standard Tool Life Management:


```
<?xml version="1.0" encoding="UTF-8"?>
<MTConnectAssets xmlns:m="urn:mtconnect.org:MTConnectAssets:1.3"
xmlns="urn:mtconnect.org:MTConnectAssets:1.3" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:x="urn:okuma.com:OkumaToolAssets:1.3" xsi:schemaLocation="urn:okuma.com:OkumaToolAssets:1.3
/schemas/OkumaToolAssets_1.3.xsd">
  <Header creationTime="2014-11-03T19:50:46Z" sender="OKUMA-33FEA7808" instanceId="1415044217"
version="1.3.0.9" assetBufferSize="1024" assetCount="4"/>
```

```
  <Assets><CuttingTool serialNumber="1" toolId="XXX" timestamp="2014-11-03T19:48:32.8125000Z"
deviceUuid="OKUMA.MachiningCenter.123456" assetId="XXX.1">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="1" limit="0" type="MINUTES">1</ToolLife>
    <ProgramToolGroup>100</ProgramToolGroup>
    <ProgramToolNumber>1</ProgramToolNumber>
    <Location negativeOverlap="1" positiveOverlap="1" type="POT">2</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="2" toolId="XXX" timestamp="2014-11-03T19:48:51.1093750Z"
deviceUuid="OKUMA.MachiningCenter.123456" assetId="XXX.2">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="1" limit="0" type="MINUTES">0</ToolLife>
    <ProgramToolGroup>200</ProgramToolGroup>
    <ProgramToolNumber>2</ProgramToolNumber>
    <Location negativeOverlap="1" positiveOverlap="1" type="POT">5</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="3" toolId="XXX" timestamp="2014-11-03T19:49:15.6562500Z"
deviceUuid="OKUMA.MachiningCenter.123456" assetId="XXX.3">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="50" limit="0" type="PART_COUNT">30</ToolLife>
    <ProgramToolGroup>300</ProgramToolGroup>
    <ProgramToolNumber>3</ProgramToolNumber>
    <Location negativeOverlap="1" positiveOverlap="1" type="POT">9</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="4" toolId="XXX" timestamp="2014-11-03T19:49:30.5625000Z"
deviceUuid="OKUMA.MachiningCenter.123456" assetId="XXX.4">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="1000" limit="0" type="PART_COUNT">50</ToolLife>
    <ProgramToolGroup>400</ProgramToolGroup>
    <ProgramToolNumber>4</ProgramToolNumber>
    <Location negativeOverlap="1" positiveOverlap="1" type="POT">11</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
</Assets>
</MTConnectAssets>
```



8.3.4.2 Tool Life Management for 8 Digits Tool ID with Random ATC:

By default, the system only reports Program Tool Number as defined by program tool group and serial number of each tool.

For example asset ID: 123456789.10


```
<ProgramToolNumber>679906085566</ProgramToolNumber>
```


where Group No: 67990608
Serial No: 5566


```
<?xml version="1.0" encoding="UTF-8"?>
<MTConnectAssets xmlns:m="urn:mtconnect.org:MTConnectAssets:1.3"
xmlns="urn:mtconnect.org:MTConnectAssets:1.3" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:x="urn:okuma.com:OkumaToolAssets:1.3" xsi:schemaLocation="urn:okuma.com:OkumaToolAssets:1.3
/schemas/OkumaToolAssets_1.3.xsd">
  <Header creationTime="2014-11-05T01:43:58Z" sender="OKUMA-MA600" instanceId="1415003277"
version="1.3.0.9" assetBufferSize="1024" assetCount="18"/>
  <Assets><CuttingTool serialNumber="10" toolId="123456789" timestamp="2014-11-05T01:43:17.7796768Z"
deviceUuid="OKUMA.MachiningCenter.123456" assetId="123456789.10">
  <CuttingToolLifeCycle>
    <CutterStatus>
```

```
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="531" limit="0" type="PART_COUNT">-531</ToolLife>
    <ProgramToolGroup>67990608</ProgramToolGroup>
    <ProgramToolNumber>679906085566</ProgramToolNumber>
    <Location negativeOverlap="1" positiveOverlap="1" type="POT">10</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="8" toolId="123456789" timestamp="2014-11-05T01:43:17.7796768Z"
deviceUuid="OKUMA.MachiningCenter.123456" assetId="123456789.8">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="256" limit="0" type="PART_COUNT">-256</ToolLife>
    <ProgramToolGroup>23351856</ProgramToolGroup>
    <ProgramToolNumber>233518565411</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="POT">8</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="6" toolId="123456789" timestamp="2014-11-05T01:43:17.7796768Z"
deviceUuid="OKUMA.MachiningCenter.123456" assetId="123456789.6">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="749" limit="0" type="MINUTES">-749</ToolLife>
    <ProgramToolGroup>86208600</ProgramToolGroup>
    <ProgramToolNumber>862086003670</ProgramToolNumber>
    <Location negativeOverlap="1" positiveOverlap="1" type="POT">6</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="4" toolId="123456789" timestamp="2014-11-05T01:43:17.7796768Z"
deviceUuid="OKUMA.MachiningCenter.123456" assetId="123456789.4">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="100" limit="0" type="MINUTES">-100</ToolLife>
    <ProgramToolGroup>24987358</ProgramToolGroup>
    <ProgramToolNumber>249873586692</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="POT">4</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="2" toolId="123456789" timestamp="2014-11-05T01:43:17.7796768Z"
deviceUuid="OKUMA.MachiningCenter.123456" assetId="123456789.2">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="890" limit="0" type="PART_COUNT">-890</ToolLife>
    <ProgramToolGroup>13681049</ProgramToolGroup>
    <ProgramToolNumber>136810499154</ProgramToolNumber>
    <Location negativeOverlap="1" positiveOverlap="1" type="POT">2</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
```

```
</MTConnectAssets>
```

TOOL NO.	USE	GROUP NO.	SER. NO.	POT NO.	TOOL NAME	TOOL KIND	CARRIER	STD TOOL	ADJ TOOL
1		NA			NA		NO		
2		13681049	9154	2	2	L	NO		
3		NA			NA		NO		
4		24987358	6692	4	4		NO		
5		NA			NA		NO		
6		86208600	3670	6	6	L	NO		
7		NA			NA		NO		
8		23351856	5411	8	8		NO		
9		NA			NA		NO		
10		67990608	5566	10	10	L	NO		

8.3.4.3 Tool Life Management for 8 Digits Tool ID with Fixed ATC:

By default, the system only reports Program Tool Number as define by program tool group and serial number of each tool.

For example Asset ID: 123456.10


```
<ProgramToolNumber>602229803820</ProgramToolNumber>
```


where Group No: 60222980
Serial No: 3820


```
<?xml version="1.0" encoding="UTF-8"?>
<MTConnectAssets xmlns:m="urn:mtconnect.org:MTConnectAssets:1.3"
xmlns="urn:mtconnect.org:MTConnectAssets:1.3" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:x="urn:okuma.com:OkumaToolAssets:1.3" xsi:schemaLocation="urn:okuma.com:OkumaToolAssets:1.3
/schemas/OkumaToolAssets_1.3.xsd">
  <Header creationTime="2014-11-05T02:12:58Z" sender="OKUMAOK-0SGH2MN" instanceId="1415078532"
version="1.3.0.9" assetBufferSize="1024" assetCount="5"/>
  <Assets>
<CuttingTool serialNumber="10" toolId="123456" timestamp="2014-11-04T07:03:01.8261718Z"
deviceUuid="OKUMA.MachiningCenter.123456" assetId="123456.10">
  <CuttingToolLifeCycle>
```

```
    <CutterStatus>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="120" limit="0" type="PART_COUNT">-120</ToolLife>
    <ProgramToolGroup>60222980</ProgramToolGroup>
    <ProgramToolNumber>602229803820</ProgramToolNumber>
    <Location negativeOverlap="1" positiveOverlap="1" type="POT">10</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="8" toolId="123456" timestamp="2014-11-04T07:03:01.8261718Z"
deviceUuid="OKUMA.MachiningCenter.123456" assetId="123456.8">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="937" limit="0" type="MINUTES">-937</ToolLife>
    <ProgramToolGroup>69086880</ProgramToolGroup>
    <ProgramToolNumber>690868800035</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="POT">8</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="6" toolId="123456" timestamp="2014-11-04T07:03:01.8261718Z"
deviceUuid="OKUMA.MachiningCenter.123456" assetId="123456.6">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="781" limit="0" type="PART_COUNT">-781</ToolLife>
    <ProgramToolGroup>28476066</ProgramToolGroup>
    <ProgramToolNumber>284760668006</ProgramToolNumber>
    <Location negativeOverlap="1" positiveOverlap="1" type="POT">6</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="4" toolId="123456" timestamp="2014-11-04T07:03:01.8261718Z"
deviceUuid="OKUMA.MachiningCenter.123456" assetId="123456.4">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="714" limit="0" type="MINUTES">-714</ToolLife>
    <ProgramToolGroup>55059236</ProgramToolGroup>
    <ProgramToolNumber>550592369609</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="POT">4</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="2" toolId="123456" timestamp="2014-11-04T07:03:01.8261718Z"
deviceUuid="OKUMA.MachiningCenter.123456" assetId="123456.2">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="824" limit="0" type="PART_COUNT">-824</ToolLife>
    <ProgramToolGroup>61696500</ProgramToolGroup>
    <ProgramToolNumber>616965007860</ProgramToolNumber>
    <Location negativeOverlap="1" positiveOverlap="1" type="POT">2</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
```

```
</Assets>
</MTConnectAssets>
```

8.3.5 *P200 L*

8.3.5.1 Standard Tool Life Management and Tool Life Management 2 (optional)


```
<?xml version="1.0" encoding="UTF-8"?>
<MTConnectAssets xmlns:m="urn:mtconnect.org:MTConnectAssets:1.3"
xmlns="urn:mtconnect.org:MTConnectAssets:1.3" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:x="urn:okuma.com:OkumaToolAssets:1.3" xsi:schemaLocation="urn:okuma.com:OkumaToolAssets:1.3
/schemas/OkumaToolAssets_1.3.xsd">
  <Header creationTime="2014-11-05T02:17:51Z" sender="OKUMA-AA24F6A11" instanceId="1415153109"
version="1.3.0.9" assetBufferSize="1024" assetCount="20"/>
  <Assets><CuttingTool serialNumber="100" toolId="123456" timestamp="2014-11-05T02:14:19.9608912Z"
deviceUuid="OKUMA.Lathe.123456" assetId="123456.100">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
```

```
    <ToolLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>0</ProgramToolGroup>
    <ProgramToolNumber>100</ProgramToolNumber>
    <Location negativeOverlap="1" positiveOverlap="1" type="POT">5</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="12B" toolId="123456" timestamp="2014-11-05T02:05:09.419251Z"
deviceUuid="OKUMA.Lathe.123456" assetId="123456.12B">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>EXPIRED</Status>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="12" limit="0" type="PART_COUNT">12</ToolLife>
    <ToolLife countDirection="UP" initial="12" limit="0" type="MINUTES">12</ToolLife>
    <ToolLife countDirection="UP" initial="0.12" limit="0" type="WEAR">0.12</ToolLife>
    <ProgramToolGroup>12</ProgramToolGroup>
    <ProgramToolNumber>12</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">12</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="11B" toolId="123456" timestamp="2014-11-05T02:05:09.419251Z"
deviceUuid="OKUMA.Lathe.123456" assetId="123456.11B">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>EXPIRED</Status>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="11" limit="0" type="PART_COUNT">11</ToolLife>
    <ToolLife countDirection="UP" initial="11" limit="0" type="MINUTES">11</ToolLife>
    <ToolLife countDirection="UP" initial="0.11" limit="0" type="WEAR">0.11</ToolLife>
    <ProgramToolGroup>11</ProgramToolGroup>
    <ProgramToolNumber>11</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">11</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="10B" toolId="123456" timestamp="2014-11-05T02:05:09.419251Z"
deviceUuid="OKUMA.Lathe.123456" assetId="123456.10B">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>EXPIRED</Status>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="10" limit="0" type="PART_COUNT">10</ToolLife>
    <ToolLife countDirection="UP" initial="10" limit="0" type="MINUTES">10</ToolLife>
    <ToolLife countDirection="UP" initial="0.1" limit="0" type="WEAR">0.1</ToolLife>
    <ProgramToolGroup>10</ProgramToolGroup>
    <ProgramToolNumber>10</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">10</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="9B" toolId="123456" timestamp="2014-11-05T02:05:09.419251Z"
deviceUuid="OKUMA.Lathe.123456" assetId="123456.9B">
  <CuttingToolLifeCycle>
    <CutterStatus>
```

```
      <Status>EXPIRED</Status>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="9" limit="0" type="PART_COUNT">9</ToolLife>
    <ToolLife countDirection="UP" initial="9" limit="0" type="MINUTES">9</ToolLife>
    <ToolLife countDirection="UP" initial="0.09" limit="0" type="WEAR">0.09</ToolLife>
    <ProgramToolGroup>9</ProgramToolGroup>
    <ProgramToolNumber>9</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">9</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="8B" toolId="123456" timestamp="2014-11-05T02:05:09.419251Z"
deviceUuid="OKUMA.Lathe.123456" assetId="123456.8B">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>EXPIRED</Status>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="8" limit="0" type="PART_COUNT">8</ToolLife>
    <ToolLife countDirection="UP" initial="8" limit="0" type="MINUTES">8</ToolLife>
    <ToolLife countDirection="UP" initial="0.08" limit="0" type="WEAR">0.08</ToolLife>
    <ProgramToolGroup>8</ProgramToolGroup>
    <ProgramToolNumber>8</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">8</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="7B" toolId="123456" timestamp="2014-11-05T02:05:09.419251Z"
deviceUuid="OKUMA.Lathe.123456" assetId="123456.7B">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>EXPIRED</Status>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="7" limit="0" type="PART_COUNT">7</ToolLife>
    <ToolLife countDirection="UP" initial="7" limit="0" type="MINUTES">7</ToolLife>
    <ToolLife countDirection="UP" initial="0.07" limit="0" type="WEAR">0.07</ToolLife>
    <ProgramToolGroup>7</ProgramToolGroup>
    <ProgramToolNumber>7</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">7</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="6B" toolId="123456" timestamp="2014-11-05T02:05:09.419251Z"
deviceUuid="OKUMA.Lathe.123456" assetId="123456.6B">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>EXPIRED</Status>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="6" limit="0" type="PART_COUNT">6</ToolLife>
    <ToolLife countDirection="UP" initial="6" limit="0" type="MINUTES">6</ToolLife>
    <ToolLife countDirection="UP" initial="0.06" limit="0" type="WEAR">0.06</ToolLife>
    <ProgramToolGroup>6</ProgramToolGroup>
    <ProgramToolNumber>6</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">6</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
```

```
<CuttingTool serialNumber="5B" toolId="123456" timestamp="2014-11-05T02:05:09.419251Z"
deviceUuid="OKUMA.Lathe.123456" assetId="123456.5B">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>EXPIRED</Status>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="5" limit="0" type="PART_COUNT">5</ToolLife>
    <ToolLife countDirection="UP" initial="5" limit="0" type="MINUTES">5</ToolLife>
    <ToolLife countDirection="UP" initial="0.05" limit="0" type="WEAR">0.05</ToolLife>
    <ProgramToolGroup>5</ProgramToolGroup>
    <ProgramToolNumber>5</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">5</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="4B" toolId="123456" timestamp="2014-11-05T02:05:09.419251Z"
deviceUuid="OKUMA.Lathe.123456" assetId="123456.4B">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>EXPIRED</Status>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="4" limit="0" type="PART_COUNT">4</ToolLife>
    <ToolLife countDirection="UP" initial="4" limit="0" type="MINUTES">4</ToolLife>
    <ToolLife countDirection="UP" initial="0.04" limit="0" type="WEAR">0.04</ToolLife>
    <ProgramToolGroup>4</ProgramToolGroup>
    <ProgramToolNumber>4</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">4</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="3B" toolId="123456" timestamp="2014-11-05T02:05:09.419251Z"
deviceUuid="OKUMA.Lathe.123456" assetId="123456.3B">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>EXPIRED</Status>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="3" limit="0" type="PART_COUNT">3</ToolLife>
    <ToolLife countDirection="UP" initial="3" limit="0" type="MINUTES">3</ToolLife>
    <ToolLife countDirection="UP" initial="0.03" limit="0" type="WEAR">0.03</ToolLife>
    <ProgramToolGroup>3</ProgramToolGroup>
    <ProgramToolNumber>3</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">3</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="2B" toolId="123456" timestamp="2014-11-05T02:05:09.419251Z"
deviceUuid="OKUMA.Lathe.123456" assetId="123456.2B">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>EXPIRED</Status>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="2" limit="0" type="PART_COUNT">2</ToolLife>
    <ToolLife countDirection="UP" initial="2" limit="0" type="MINUTES">2</ToolLife>
    <ToolLife countDirection="UP" initial="0.02" limit="0" type="WEAR">0.02</ToolLife>
    <ProgramToolGroup>2</ProgramToolGroup>
    <ProgramToolNumber>2</ProgramToolNumber>
```

```
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">2</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="1B" toolId="123456" timestamp="2014-11-05T02:05:09.419251Z"
deviceUuid="OKUMA.Lathe.123456" assetId="123456.1B">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>EXPIRED</Status>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="1" limit="0" type="PART_COUNT">1</ToolLife>
    <ToolLife countDirection="UP" initial="1" limit="0" type="MINUTES">1</ToolLife>
    <ToolLife countDirection="UP" initial="0.01" limit="0" type="WEAR">0.01</ToolLife>
    <ProgramToolGroup>1</ProgramToolGroup>
    <ProgramToolNumber>1</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">1</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="201" toolId="123456" timestamp="2014-11-05T02:02:32.1731424Z"
deviceUuid="OKUMA.Lathe.123456" assetId="123456.201">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>BROKEN</Status>
      <Status>EXPIRED</Status>
    </CutterStatus>
    <ProgramToolNumber>201</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="POT">1</Location>
    <CuttingItems count="8">
      <CuttingItem indices="1">
        <ItemLife countDirection="UP" initial="0" limit="0" type="PART_COUNT" warning="0">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES" warning="0">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR" warning="0">0</ItemLife>
        <x:ItemCutterStatus><Status>EXPIRED</Status><Status>BROKEN</Status></x:ItemCutterStatus>
        <x:ItemProgramToolGroup>201</x:ItemProgramToolGroup>
      </CuttingItem>
      <CuttingItem indices="2">
        <ItemLife countDirection="UP" initial="0" limit="0" type="PART_COUNT" warning="0">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES" warning="0">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR" warning="0">0</ItemLife>
        <x:ItemCutterStatus><Status>EXPIRED</Status><Status>BROKEN</Status></x:ItemCutterStatus>
        <x:ItemProgramToolGroup>201</x:ItemProgramToolGroup>
      </CuttingItem>
      <CuttingItem indices="3">
        <ItemLife countDirection="UP" initial="0" limit="0" type="PART_COUNT" warning="0">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES" warning="0">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR" warning="0">0</ItemLife>
        <x:ItemCutterStatus><Status>EXPIRED</Status><Status>BROKEN</Status></x:ItemCutterStatus>
        <x:ItemProgramToolGroup>201</x:ItemProgramToolGroup>
      </CuttingItem>
      <CuttingItem indices="4">
        <ItemLife countDirection="UP" initial="0" limit="0" type="PART_COUNT" warning="0">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES" warning="0">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR" warning="0">0</ItemLife>
        <x:ItemCutterStatus><Status>EXPIRED</Status><Status>BROKEN</Status></x:ItemCutterStatus>
        <x:ItemProgramToolGroup>201</x:ItemProgramToolGroup>
      </CuttingItem>
      <CuttingItem indices="5">
```

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      <ItemLife countDirection="UP" initial="0" limit="0" type="PART_COUNT" warning="0">0</ItemLife>
      <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES" warning="0">0</ItemLife>
      <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR" warning="0">0</ItemLife>
      <x:ItemCutterStatus><Status>EXPIRED</Status><Status>BROKEN</Status></x:ItemCutterStatus>
      <x:ItemProgramToolGroup>201</x:ItemProgramToolGroup>
    </CuttingItem>
    <CuttingItem indices="6">
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      <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES" warning="0">0</ItemLife>
      <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR" warning="0">0</ItemLife>
      <x:ItemCutterStatus><Status>EXPIRED</Status><Status>BROKEN</Status></x:ItemCutterStatus>
      <x:ItemProgramToolGroup>201</x:ItemProgramToolGroup>
    </CuttingItem>
    <CuttingItem indices="7">
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      <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES" warning="0">0</ItemLife>
      <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR" warning="0">0</ItemLife>
      <x:ItemCutterStatus><Status>EXPIRED</Status><Status>BROKEN</Status></x:ItemCutterStatus>
      <x:ItemProgramToolGroup>201</x:ItemProgramToolGroup>
    </CuttingItem>
    <CuttingItem indices="8">
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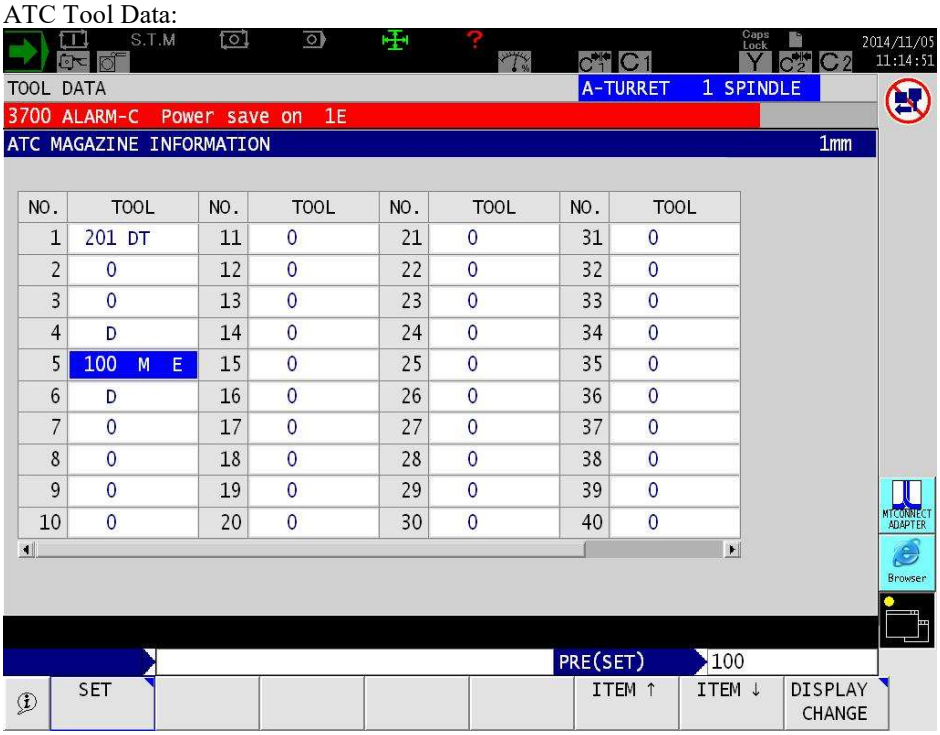
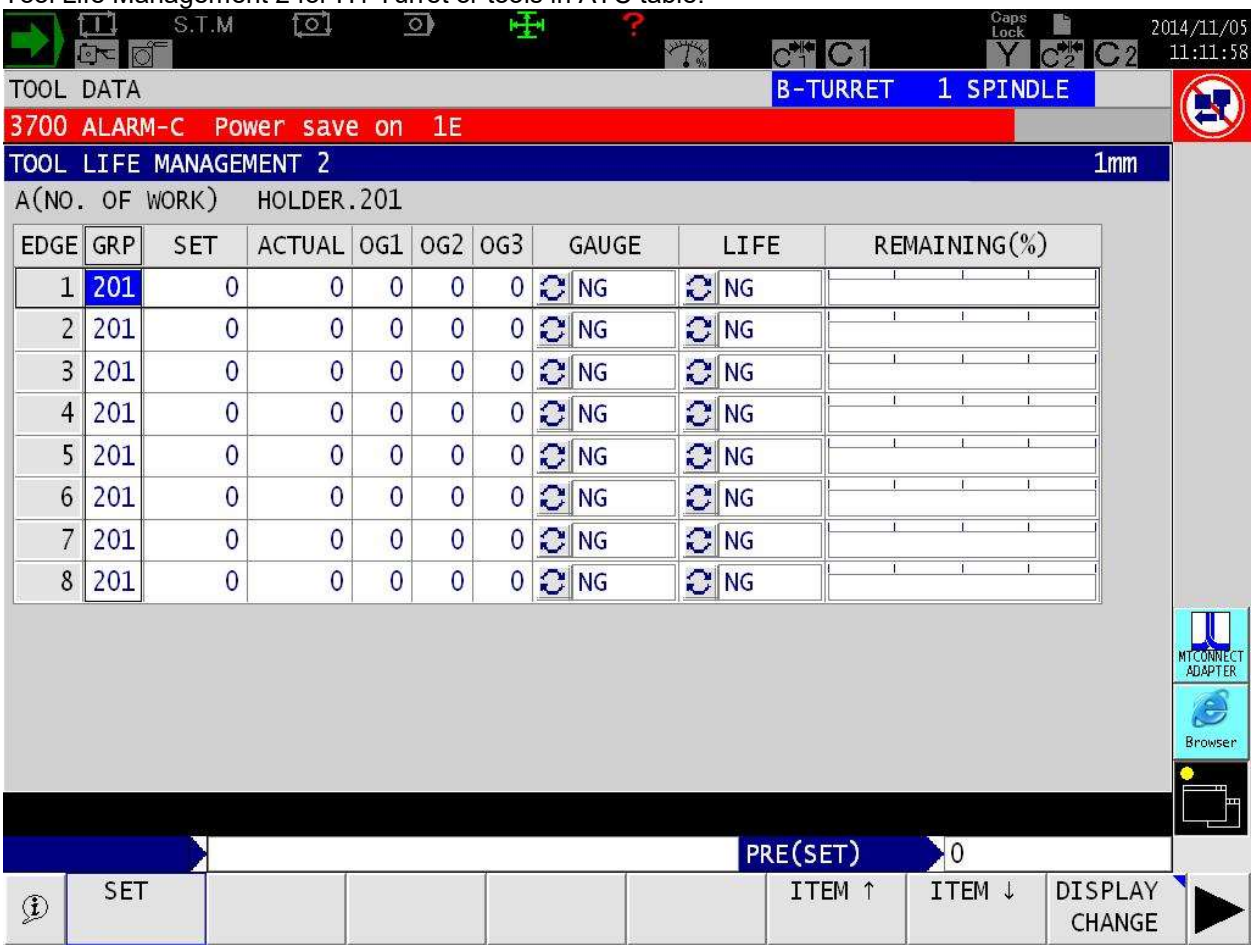
      <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES" warning="0">0</ItemLife>
      <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR" warning="0">0</ItemLife>
      <x:ItemCutterStatus><Status>EXPIRED</Status><Status>BROKEN</Status></x:ItemCutterStatus>
      <x:ItemProgramToolGroup>201</x:ItemProgramToolGroup>
    </CuttingItem>
  </CuttingItems>
 </CuttingToolLifeCycle>
</CuttingTool>
</Assets>
</MTConnectAssets>
```

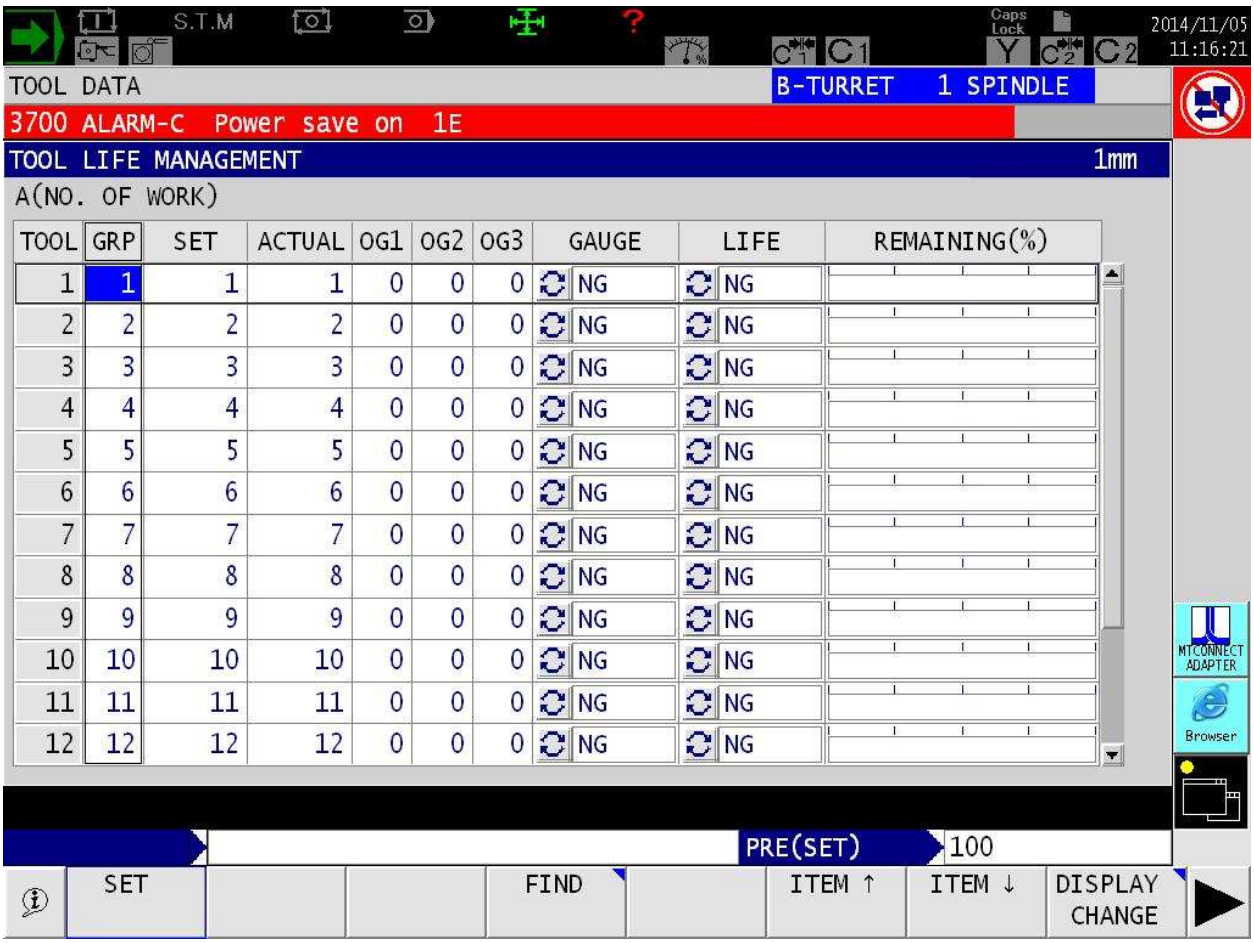

ATC Tool Data:



Tool Life Management 2 for H1 Turret or tools in ATC table:



Standard Tool Life Management for B Turret:



8.3.5.2 Standard Tool Life Management and Double Tooling spec ON:


```
<?xml version="1.0" encoding="UTF-8"?>
<MTConnectAssets xmlns:m="urn:mtconnect.org:MTConnectAssets:1.3"
xmlns="urn:mtconnect.org:MTConnectAssets:1.3" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:x="urn:okuma.com:OkumaToolAssets:1.3" xsi:schemaLocation="urn:okuma.com:OkumaToolAssets:1.3
/schemas/OkumaToolAssets_1.3.xsd">
  <Header creationTime="2004-02-19T12:04:16Z" sender="OKUMA-270F94457" instanceId="1077124937"
version="1.3.0.9" assetBufferSize="1024" assetCount="48"/>
  <Assets><CuttingTool serialNumber="2A" toolId="54321" timestamp="2004-02-19T12:04:03.173726Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.2A">
  <CuttingToolLifeCycle>
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      <Status>EXPIRED</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="200" limit="0" type="PART_COUNT">20</ToolLife>
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    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>2</ProgramToolGroup>
    <ProgramToolNumber>2</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">2</Location>
  </CuttingToolLifeCycle>
```

```
</CuttingTool>
<CuttingTool serialNumber="29A" toolId="54321" timestamp="2004-02-19T12:02:44.310326Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.29A">
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    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="290" limit="0" type="PART_COUNT">29</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>29</ProgramToolGroup>
    <ProgramToolNumber>29</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">9</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="30A" toolId="54321" timestamp="2004-02-19T12:02:25.132750Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.30A">
  <CuttingToolLifeCycle>
    <CutterStatus>
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    </CutterStatus>
    <ToolLife countDirection="UP" initial="300" limit="0" type="PART_COUNT">30</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>30</ProgramToolGroup>
    <ProgramToolNumber>30</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">10</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="31A" toolId="54321" timestamp="2004-02-19T12:02:13.025340Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.31A">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="310" limit="0" type="PART_COUNT">31</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>31</ProgramToolGroup>
    <ProgramToolNumber>31</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">11</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="32A" toolId="54321" timestamp="2004-02-19T12:02:05.784929Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.32A">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="320" limit="0" type="PART_COUNT">32</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>32</ProgramToolGroup>
    <ProgramToolNumber>32</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">12</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
```

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<CuttingTool serialNumber="7A" toolId="54321" timestamp="2004-02-19T12:01:39.346913Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.7A">
  <CuttingToolLifeCycle>
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      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>0</ProgramToolGroup>
    <ProgramToolNumber>7</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">7</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="6A" toolId="54321" timestamp="2004-02-19T12:01:29.703046Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.6A">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>EXPIRED</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="600" limit="0" type="PART_COUNT">60</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>6</ProgramToolGroup>
    <ProgramToolNumber>6</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">6</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="5A" toolId="54321" timestamp="2004-02-19T12:01:27.299590Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.5A">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>BROKEN</Status>
    </CutterStatus>
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    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>5</ProgramToolGroup>
    <ProgramToolNumber>5</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">5</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="3A" toolId="54321" timestamp="2004-02-19T12:01:22.462635Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.3A">
  <CuttingToolLifeCycle>
    <CutterStatus>
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      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="300" limit="0" type="PART_COUNT">30</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>3</ProgramToolGroup>
    <ProgramToolNumber>3</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">3</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
```

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deviceUuid="OKUMA.Lathe.123456" assetId="54321.1A">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="100" limit="0" type="PART_COUNT">10</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>1</ProgramToolGroup>
    <ProgramToolNumber>1</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">1</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="4A" toolId="54321" timestamp="2004-02-19T12:01:00.721372Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.4A">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="400" limit="0" type="PART_COUNT">40</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>4</ProgramToolGroup>
    <ProgramToolNumber>4</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">4</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="28A" toolId="54321" timestamp="2004-02-18T17:23:21.575056Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.28A">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>0</ProgramToolGroup>
    <ProgramToolNumber>28</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">8</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="27A" toolId="54321" timestamp="2004-02-18T17:23:21.575056Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.27A">
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    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>0</ProgramToolGroup>
    <ProgramToolNumber>27</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">7</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
```

```
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deviceUuid="OKUMA.Lathe.123456" assetId="54321.26A">
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    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>0</ProgramToolGroup>
    <ProgramToolNumber>26</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">6</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="25A" toolId="54321" timestamp="2004-02-18T17:23:21.575056Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.25A">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>0</ProgramToolGroup>
    <ProgramToolNumber>25</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">5</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="24A" toolId="54321" timestamp="2004-02-18T17:23:21.575056Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.24A">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>0</ProgramToolGroup>
    <ProgramToolNumber>24</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">4</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="23A" toolId="54321" timestamp="2004-02-18T17:23:21.565041Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.23A">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>0</ProgramToolGroup>
    <ProgramToolNumber>23</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">3</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
```

```
<CuttingTool serialNumber="22A" toolId="54321" timestamp="2004-02-18T17:23:21.565041Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.22A">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>0</ProgramToolGroup>
    <ProgramToolNumber>22</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">2</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="21A" toolId="54321" timestamp="2004-02-18T17:23:21.565041Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.21A">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>0</ProgramToolGroup>
    <ProgramToolNumber>21</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">1</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="12A" toolId="54321" timestamp="2004-02-18T17:23:21.565041Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.12A">
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    <CutterStatus>
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    </CutterStatus>
    <ToolLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>0</ProgramToolGroup>
    <ProgramToolNumber>12</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">12</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="11A" toolId="54321" timestamp="2004-02-18T17:23:21.565041Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.11A">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>0</ProgramToolGroup>
    <ProgramToolNumber>11</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">11</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
```

```
<CuttingTool serialNumber="10A" toolId="54321" timestamp="2004-02-18T17:23:21.565041Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.10A">
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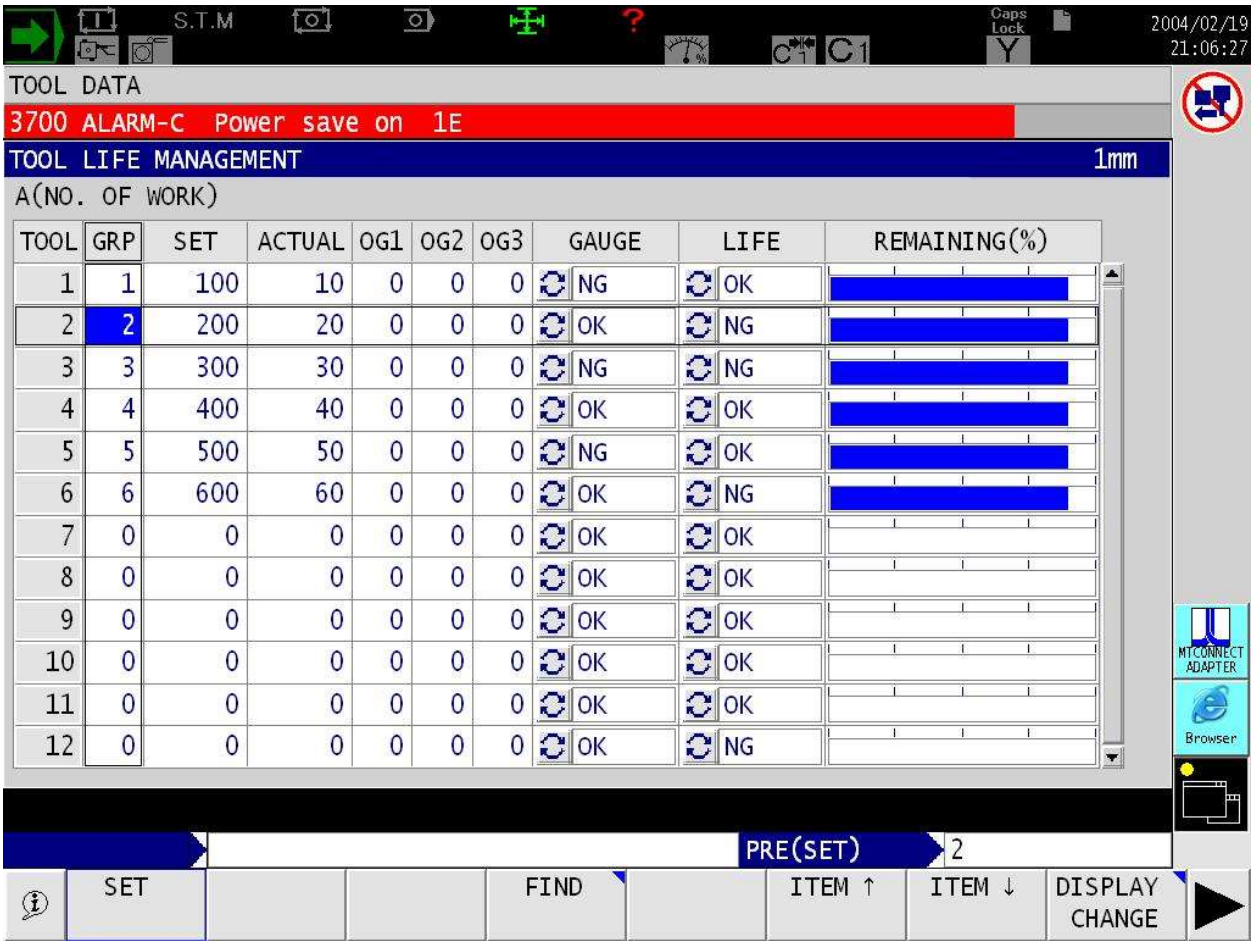
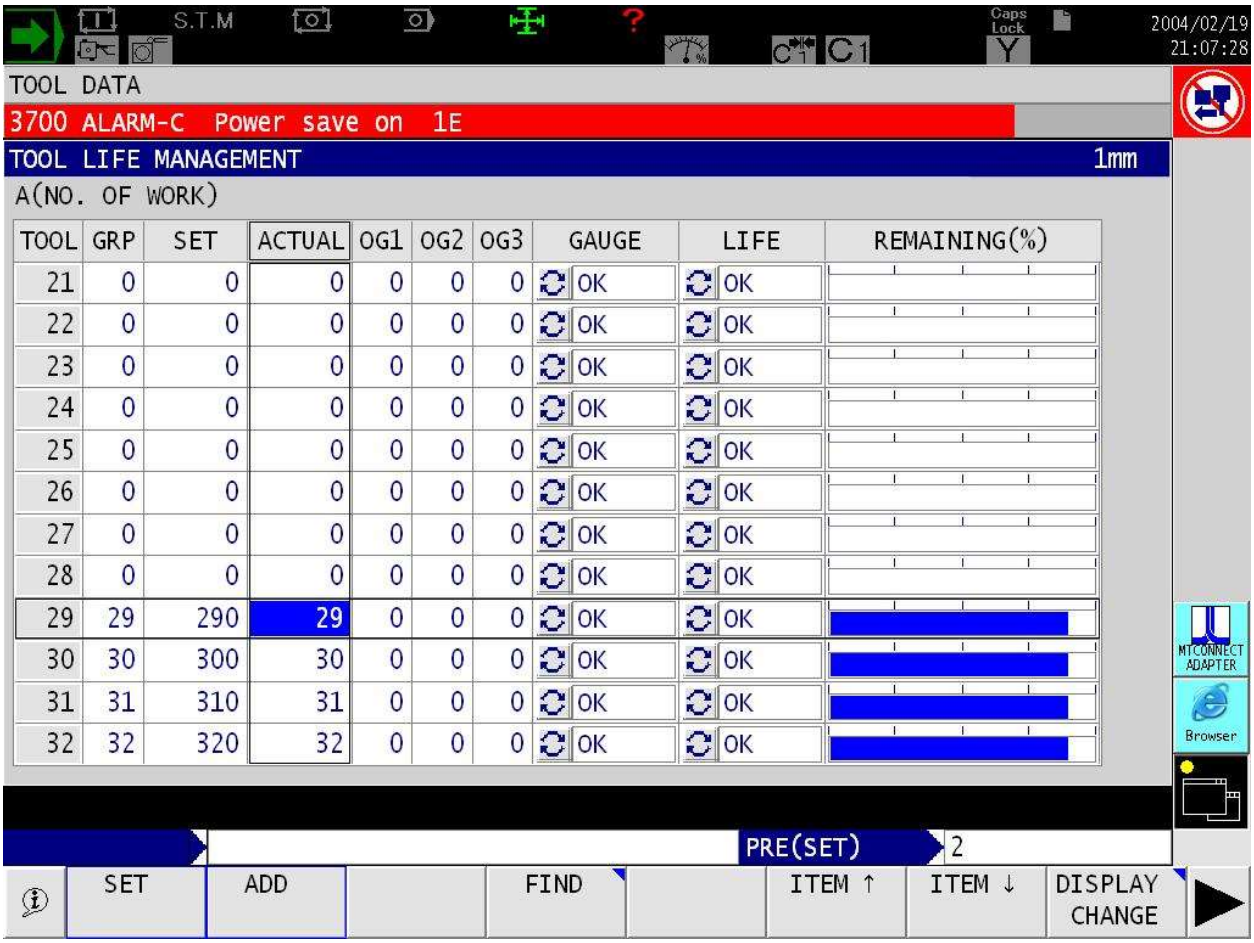
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>0</ProgramToolGroup>
    <ProgramToolNumber>10</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">10</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="9A" toolId="54321" timestamp="2004-02-18T17:23:21.565041Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.9A">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>0</ProgramToolGroup>
    <ProgramToolNumber>9</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">9</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="8A" toolId="54321" timestamp="2004-02-18T17:23:21.565041Z"
deviceUuid="OKUMA.Lathe.123456" assetId="54321.8A">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>0</ProgramToolGroup>
    <ProgramToolNumber>8</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">8</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
</Assets>
</MTConnectAssets>
```


S.T.M
Caps Lock
2004/02/19
21:06:27
TOOL DATA
3700 ALARM-C Power save on 1E
TOOL LIFE MANAGEMENT
1mm
A(NO. OF WORK)
TOOL GRP SET ACTUAL OG1 OG2 OG3 GAUGE LIFE REMAINING(%)
1 1 100 10 0 0 0 NG OK
2 2 200 20 0 0 0 OK NG
3 3 300 30 0 0 0 NG NG
4 4 400 40 0 0 0 OK OK
5 5 500 50 0 0 0 NG OK
6 6 600 60 0 0 0 OK NG
7 0 0 0 0 0 0 OK OK
8 0 0 0 0 0 0 OK OK
9 0 0 0 0 0 0 OK OK
10 0 0 0 0 0 0 OK OK
11 0 0 0 0 0 0 OK OK
12 0 0 0 0 0 0 OK NG
MTCONNECT ADAPTER
Browser
PRE(SET)
2
SET
FIND
ITEM ↑
ITEM ↓
DISPLAY CHANGE



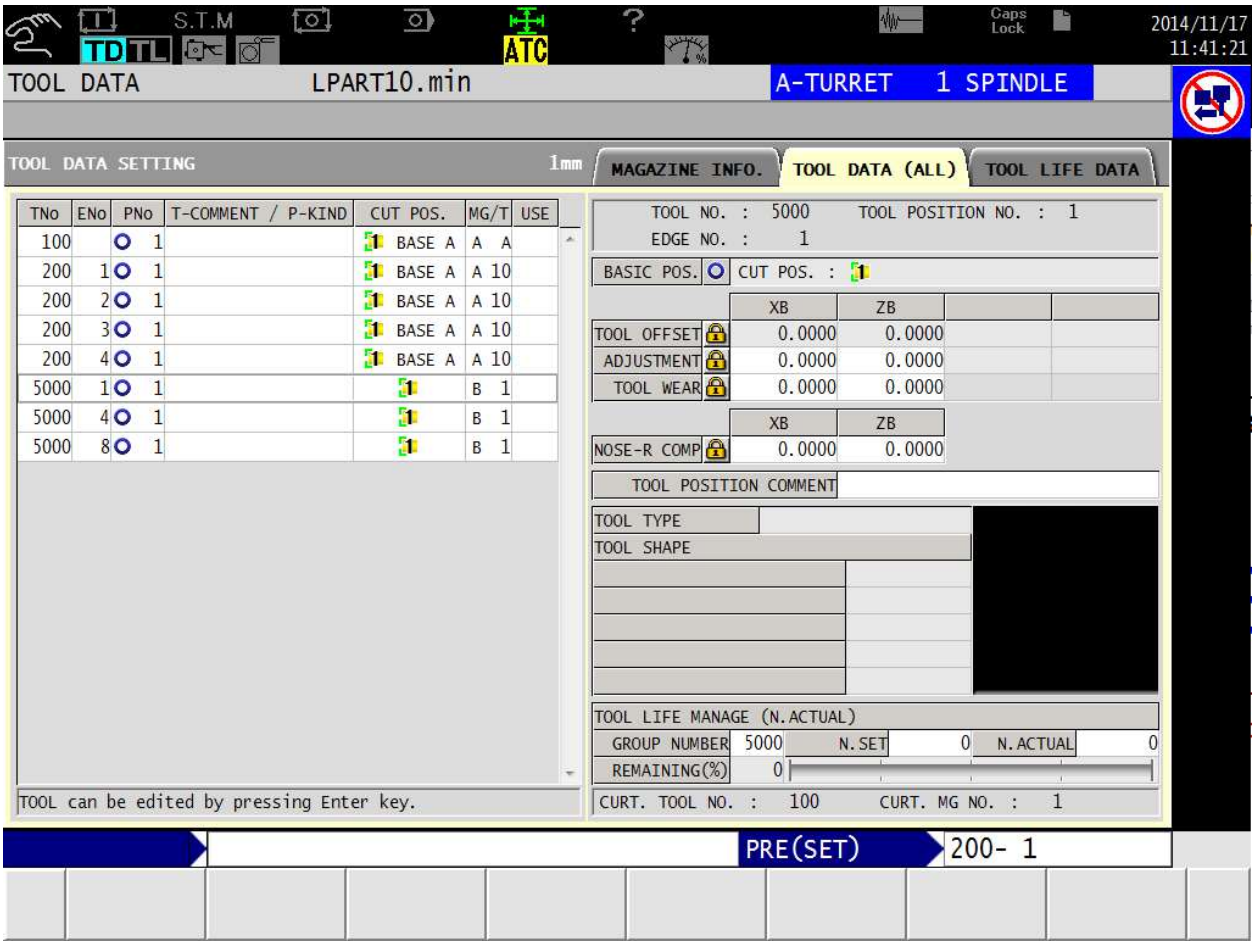
8.3.6 *P300 S(LP)*


```xml
<?xml version="1.0" encoding="UTF-8"?>
<MTConnectAssets xmlns:m="urn:mtconnect.org:MTConnectAssets:1.3"
xmlns="urn:mtconnect.org:MTConnectAssets:1.3" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:x="urn:okuma.com:OkumaToolAssets:1.3" xsi:schemaLocation="urn:okuma.com:OkumaToolAssets:1.3
/schemas/OkumaToolAssets_1.3.xsd">
  <Header creationTime="2014-11-17T16:38:45Z" sender="DLT-LHUYNH32" instanceId="1416242285"
version="1.3.0.9" assetBufferSize="1024" assetCount="3"/>
  <Assets><CuttingTool serialNumber="5000" toolId="9876543210" timestamp="2014-11-17T16:28:05.8760095Z"
deviceUuid="OKUMA.Lathe.123456" assetId="9876543210.5000">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ProgramToolNumber>5000</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">1</Location>
    <CuttingItems count="3">
      <CuttingItem indices="1">
        <ItemLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ItemLife>
        <x:ItemCutterStatus><Status>AVAILABLE</Status></x:ItemCutterStatus>
        <x:ItemProgramToolGroup>0</x:ItemProgramToolGroup>
      </CuttingItem>
```

```
      <CuttingItem indices="4">
        <ItemLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ItemLife>
        <x:ItemCutterStatus><Status>AVAILABLE</Status></x:ItemCutterStatus>
        <x:ItemProgramToolGroup>0</x:ItemProgramToolGroup>
      </CuttingItem>
      <CuttingItem indices="8">
        <ItemLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ItemLife>
        <x:ItemCutterStatus><Status>AVAILABLE</Status></x:ItemCutterStatus>
        <x:ItemProgramToolGroup>0</x:ItemProgramToolGroup>
      </CuttingItem>
    </CuttingItems>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="200" toolId="9876543210" timestamp="2014-11-17T16:28:05.7409960Z"
deviceUuid="OKUMA.Lathe.123456" assetId="9876543210.200">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ProgramToolNumber>200</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="POT">10</Location>
    <CuttingItems count="4">
      <CuttingItem indices="1">
        <ItemLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ItemLife>
        <x:ItemCutterStatus><Status>AVAILABLE</Status></x:ItemCutterStatus>
        <x:ItemProgramToolGroup>0</x:ItemProgramToolGroup>
      </CuttingItem>
      <CuttingItem indices="2">
        <ItemLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ItemLife>
        <x:ItemCutterStatus><Status>AVAILABLE</Status></x:ItemCutterStatus>
        <x:ItemProgramToolGroup>0</x:ItemProgramToolGroup>
      </CuttingItem>
      <CuttingItem indices="3">
        <ItemLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ItemLife>
        <x:ItemCutterStatus><Status>AVAILABLE</Status></x:ItemCutterStatus>
        <x:ItemProgramToolGroup>0</x:ItemProgramToolGroup>
      </CuttingItem>
      <CuttingItem indices="4">
        <ItemLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ItemLife>
        <x:ItemCutterStatus><Status>AVAILABLE</Status></x:ItemCutterStatus>
        <x:ItemProgramToolGroup>0</x:ItemProgramToolGroup>
      </CuttingItem>
    </CuttingItems>
  </CuttingToolLifeCycle>
</CuttingTool>
```

```
<CuttingTool serialNumber="100" toolId="9876543210" timestamp="2014-11-17T16:28:05.7409960Z"
deviceUuid="OKUMA.Lathe.123456" assetId="9876543210.100">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="0" limit="0" type="PART_COUNT">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ToolLife>
    <ToolLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ToolLife>
    <ProgramToolGroup>0</ProgramToolGroup>
    <ProgramToolNumber>100</ProgramToolNumber>
    <Location negativeOverlap="1" positiveOverlap="1" type="POT">0</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
</Assets>
</MTConnectAssets>
```

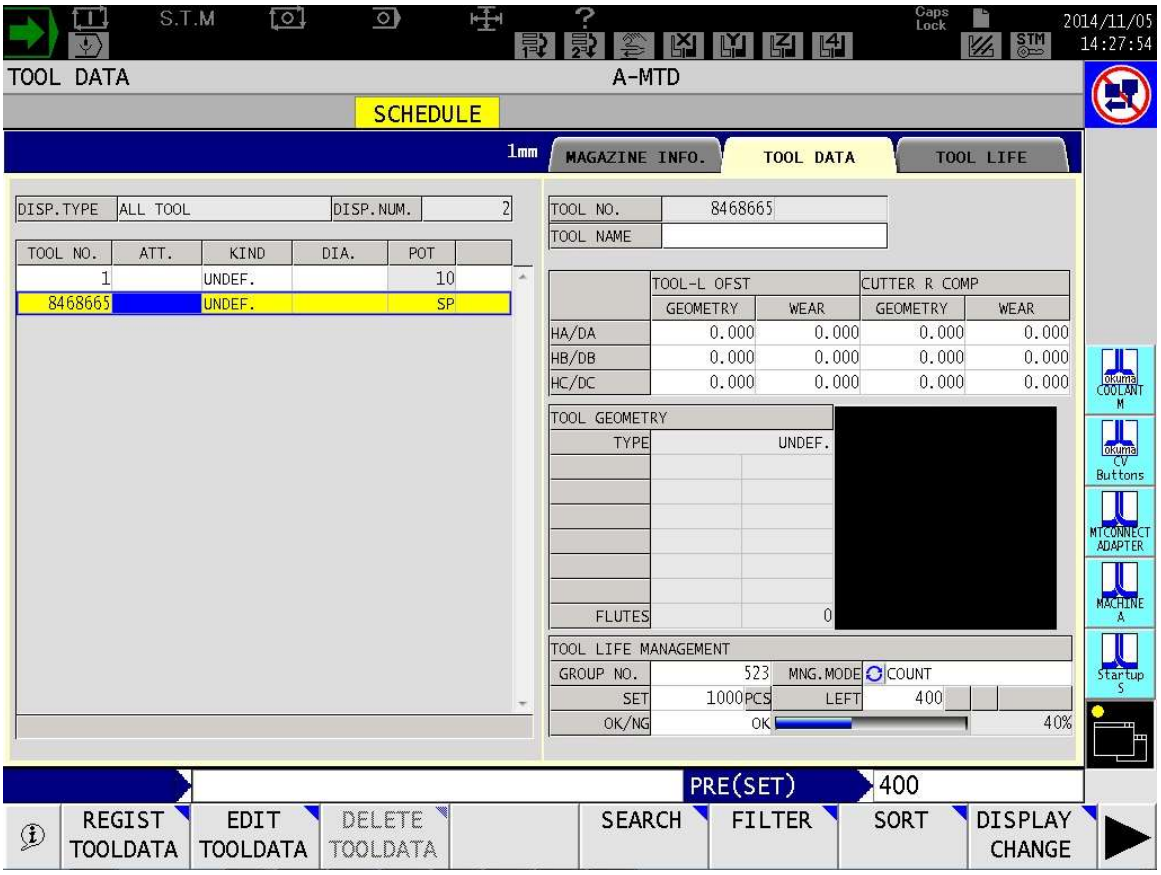

Tool Data:



8.3.7 *P300 S(MP)/ P300M*


```
<?xml version="1.0" encoding="UTF-8"?>
<MTConnectAssets xmlns:m="urn:mtconnect.org:MTConnectAssets:1.3"
xmlns="urn:mtconnect.org:MTConnectAssets:1.3" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:x="urn:okuma.com:OkumaToolAssets:1.3" xsi:schemaLocation="urn:okuma.com:OkumaToolAssets:1.3
/schemas/OkumaToolAssets_1.3.xsd">
  <Header creationTime="2014-11-05T19:26:31Z" sender="OKUMAOK-BD80UIE" instanceId="1415215464"
version="1.3.0.9" assetBufferSize="1024" assetCount="2"/>
  <Assets><CuttingTool serialNumber="1" toolId="123456" timestamp="2014-11-05T19:23:35.6552734Z"
deviceUuid="OKUMA.MachiningCenter.123456" assetId="123456.1">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="100" limit="0" type="MINUTES">20</ToolLife>
    <ProgramToolGroup>100</ProgramToolGroup>
    <ProgramToolNumber>1</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="POT">10</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="8468665" toolId="123456" timestamp="2014-11-05T19:23:35.6552734Z"
deviceUuid="OKUMA.MachiningCenter.123456" assetId="123456.8468665">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="1000" limit="0" type="PART_COUNT">400</ToolLife>
    <ProgramToolGroup>523</ProgramToolGroup>
    <ProgramToolNumber>8468665</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="POT">0</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
</Assets>
</MTConnectAssets>
```

Tool Data:

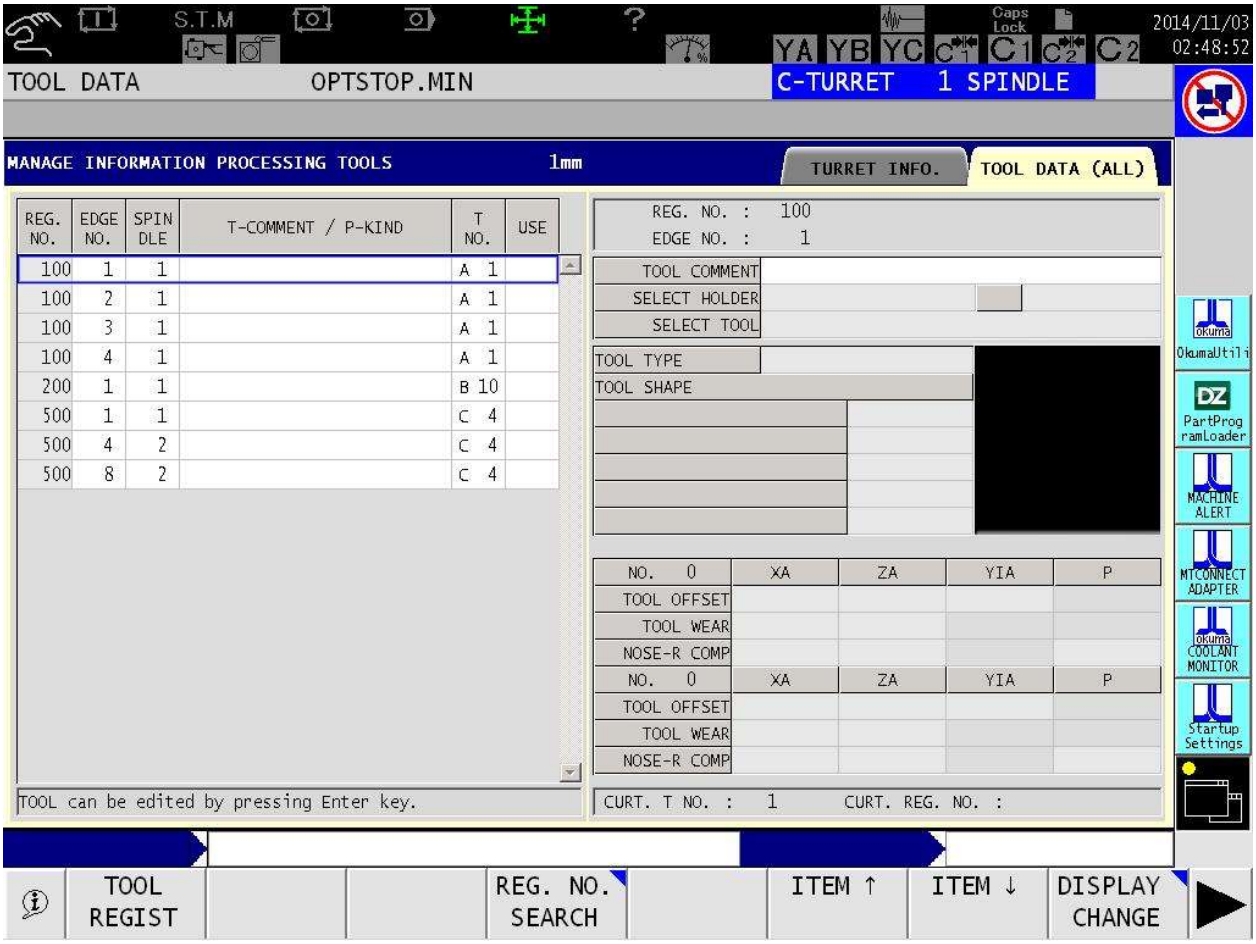


8.3.8 *P300 L*


```xml
<?xml version="1.0" encoding="UTF-8"?>
<MTConnectAssets xmlns:m="urn:mtconnect.org:MTConnectAssets:1.3"
xmlns="urn:mtconnect.org:MTConnectAssets:1.3" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:x="urn:okuma.com:OkumaToolAssets:1.3" xsi:schemaLocation="urn:okuma.com:OkumaToolAssets:1.3
/schemas/OkumaToolAssets_1.3.xsd">
  <Header creationTime="2014-11-04T18:30:53Z" sender="OKUMA-FD4D28845" instanceId="1415030042"
version="1.3.0.9" assetBufferSize="1024" assetCount="3"/>
  <Assets><CuttingTool serialNumber="500" toolId="123456" timestamp="2014-11-03T15:56:27.562500Z"
deviceUuid="OKUMA.Lathe.123456" assetId="123456.500">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>EXPIRED</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="1" limit="0" type="PART_COUNT">1</ToolLife>
    <ToolLife countDirection="UP" initial="1" limit="0" type="MINUTES">1</ToolLife>
    <ToolLife countDirection="UP" initial="0.01" limit="0" type="WEAR">0.01</ToolLife>
    <ProgramToolGroup>1</ProgramToolGroup>
    <ProgramToolNumber>1</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">1</Location>
    <CuttingItems count="3">
      <CuttingItem indices="1"/>
      <CuttingItem indices="4"/>
      <CuttingItem indices="8"/>
    </CuttingItems>
```

```
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="200" toolId="123456" timestamp="2014-11-03T15:56:06.984375Z"
deviceUuid="OKUMA.Lathe.123456" assetId="123456.200">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>EXPIRED</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="1" limit="0" type="PART_COUNT">1</ToolLife>
    <ToolLife countDirection="UP" initial="1" limit="0" type="MINUTES">1</ToolLife>
    <ToolLife countDirection="UP" initial="0.01" limit="0" type="WEAR">0.01</ToolLife>
    <ProgramToolGroup>1</ProgramToolGroup>
    <ProgramToolNumber>1</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">1</Location>
    <CuttingItems count="1">
      <CuttingItem indices="1"/>
    </CuttingItems>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="100" toolId="123456" timestamp="2014-11-03T15:54:02.921875Z"
deviceUuid="OKUMA.Lathe.123456" assetId="123456.100">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>EXPIRED</Status>
      <Status>BROKEN</Status>
    </CutterStatus>
    <ToolLife countDirection="UP" initial="1000" limit="0" type="PART_COUNT">1000</ToolLife>
    <ToolLife countDirection="UP" initial="1" limit="0" type="MINUTES">1</ToolLife>
    <ToolLife countDirection="UP" initial="0.01" limit="0" type="WEAR">0.01</ToolLife>
    <ProgramToolGroup>1</ProgramToolGroup>
    <ProgramToolNumber>1</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="STATION">1</Location>
    <CuttingItems count="4">
      <CuttingItem indices="1"/>
      <CuttingItem indices="2"/>
      <CuttingItem indices="3"/>
      <CuttingItem indices="4"/>
    </CuttingItems>
  </CuttingToolLifeCycle>
</CuttingTool>
</Assets>
</MTConnectAssets>
```

Tool Data:



8.3.9 *P300 G*

Sample Tool Asset output from P300G control that has 4 wheels. Wheel number 1 is active wheel and its cutter status is AVAILABLE. The cutter status of other wheels is UNKNOWN.


```
<?xml version="1.0" encoding="UTF-8"?>
<MTConnectAssets xmlns:m="urn:mtconnect.org:MTConnectAssets:1.3"
xmlns="urn:mtconnect.org:MTConnectAssets:1.3" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:x="urn:okuma.com:OkumaToolAssets:1.3" xsi:schemaLocation="urn:okuma.com:OkumaToolAssets:1.3
/schemas/OkumaToolAssets_1.3.xsd">
  <Header creationTime="2016-09-30T07:38:33Z" sender="OKUMAOK-QG083MA" instanceId="1475221108"
version="1.3.0.17" assetBufferSize="1024" assetCount="4"/>
  <Assets><CuttingTool serialNumber="4" toolId="123456" timestamp="2016-09-30T07:38:07.3623046Z"
deviceUuid="OKUMA.Grinder.123456" assetId="123456.4">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>UNKNOWN</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="0" limit="0" type="WEAR" warning="0">0</ToolLife>
    <ProgramToolNumber>4</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="POT">4</Location>
```

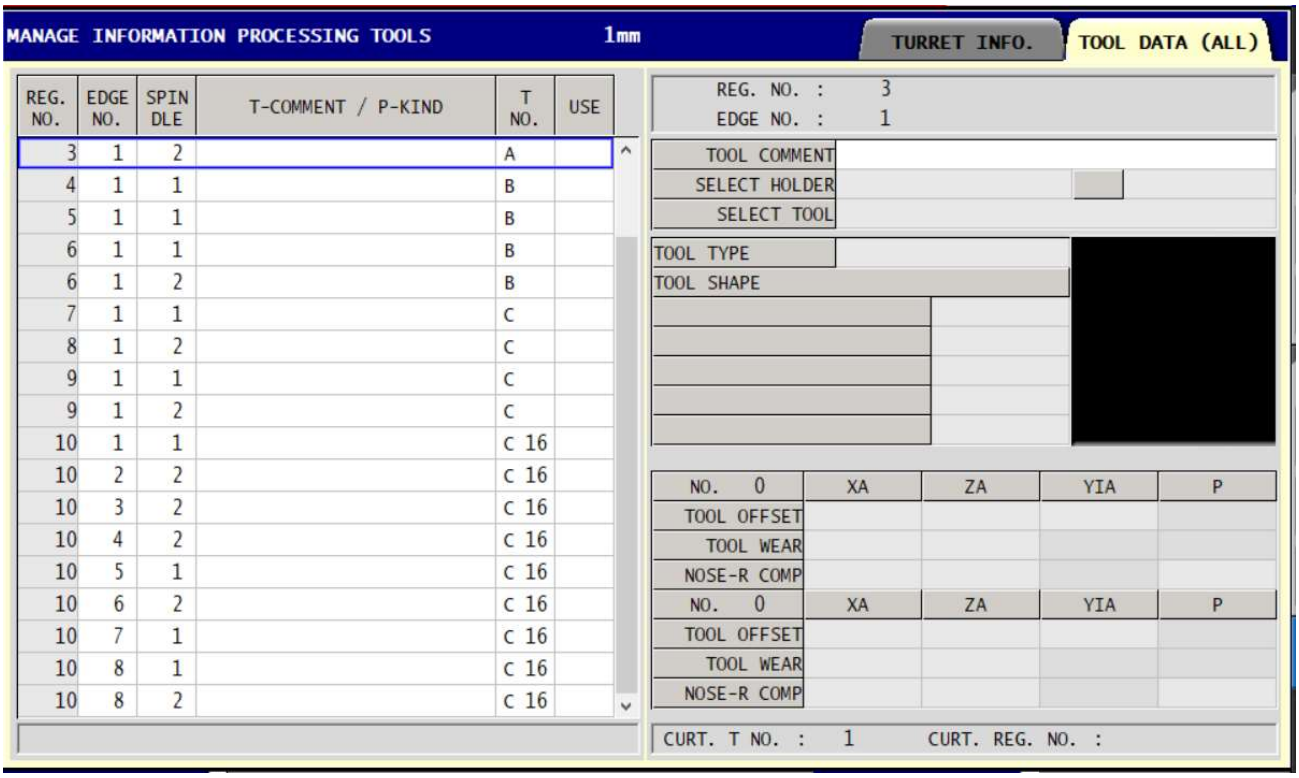
```
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="3" toolId="123456" timestamp="2016-09-30T07:38:07.3623046Z"
deviceUuid="OKUMA.Grinder.123456" assetId="123456.3">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>UNKNOWN</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="0" limit="0" type="WEAR" warning="0">0</ToolLife>
    <ProgramToolNumber>3</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="POT">3</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="2" toolId="123456" timestamp="2016-09-30T07:38:07.3623046Z"
deviceUuid="OKUMA.Grinder.123456" assetId="123456.2">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>UNKNOWN</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="0" limit="0" type="WEAR" warning="0">0</ToolLife>
    <ProgramToolNumber>2</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="POT">2</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
<CuttingTool serialNumber="1" toolId="123456" timestamp="2016-09-30T07:38:07.3623046Z"
deviceUuid="OKUMA.Grinder.123456" assetId="123456.1">
  <CuttingToolLifeCycle>
    <CutterStatus>
      <Status>AVAILABLE</Status>
    </CutterStatus>
    <ToolLife countDirection="DOWN" initial="90" limit="60" type="WEAR" warning="65">80</ToolLife>
    <ProgramToolNumber>1</ProgramToolNumber>
    <Location negativeOverlap="0" positiveOverlap="0" type="POT">1</Location>
  </CuttingToolLifeCycle>
</CuttingTool>
</Assets>
</MTConnectAssets>
```

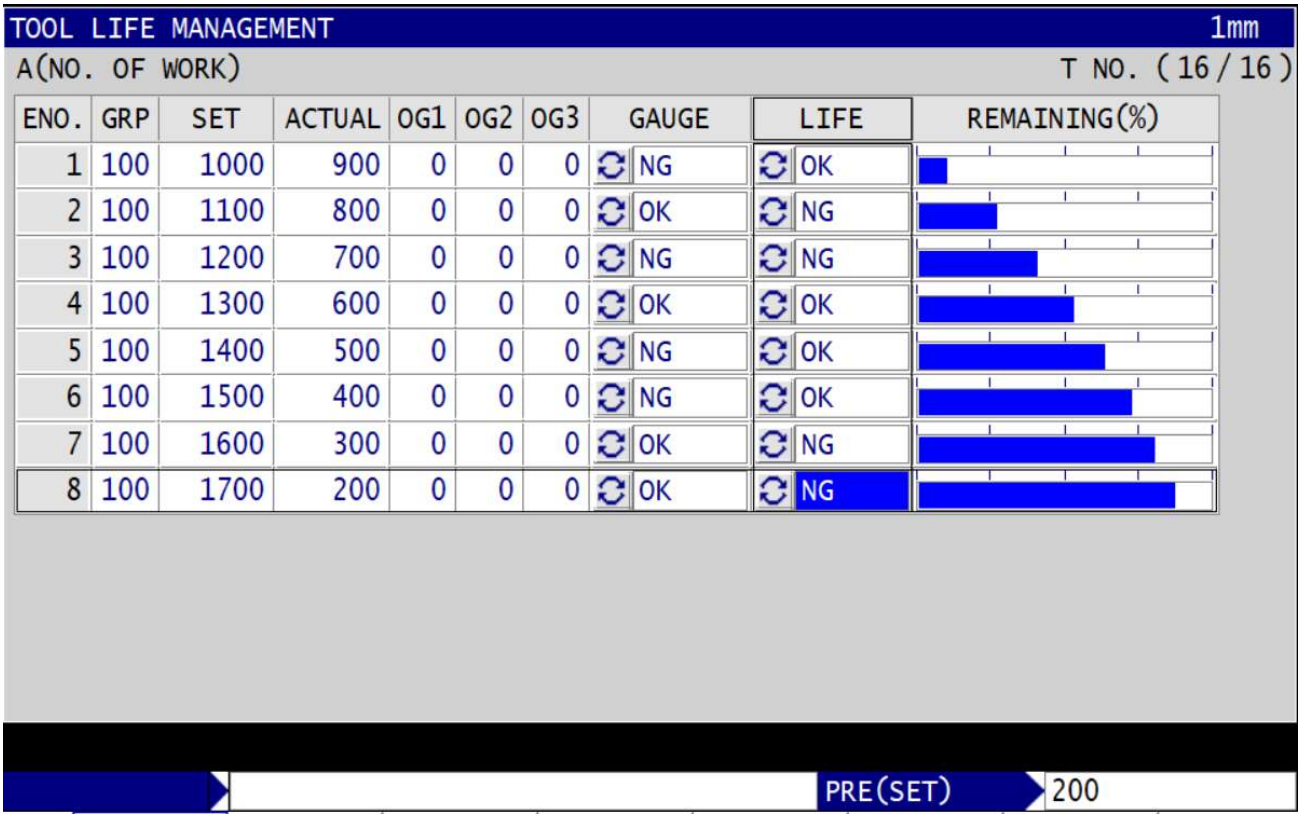
8.3.10 *P300 L Multi-Tool specification*

For P300L machines with Multi-Tool spec (NC Spec Code 2 [24, 7] MLTL = ON), the cutter status of each cutting tool item will depend on the tool life and gauge status on each edge of each tool as shown below.

Example:

Registered tool number 10 having 8 cutting items is inserted into station number 16 of C turret.


MANAGE INFORMATION PROCESSING TOOLS
1mm
TURRET INFO.
TOOL DATA (ALL)
REG. NO. EDGE NO. SPIN DLE T-COMMENT / P-KIND T NO. USE
3 1 2 A
4 1 1 B
5 1 1 B
6 1 1 B
6 1 2 B
7 1 1 C
8 1 2 C
9 1 1 C
9 1 2 C
10 1 1 C 16
10 2 2 C 16
10 3 2 C 16
10 4 2 C 16
10 5 1 C 16
10 6 2 C 16
10 7 1 C 16
10 8 1 C 16
10 8 2 C 16
REG. NO. : 3
EDGE NO. : 1
TOOL COMMENT
SELECT HOLDER
SELECT TOOL
TOOL TYPE
TOOL SHAPE
NO. 0 XA ZA YIA P
TOOL OFFSET
TOOL WEAR
NOSE-R COMP
NO. 0 XA ZA YIA P
TOOL OFFSET
TOOL WEAR
NOSE-R COMP
CURT. T NO. : 1
CURT. REG. NO. :


TOOL LIFE MANAGEMENT
1mm
A(NO. OF WORK)
T NO. (16/16)
ENO. GRP SET ACTUAL OG1 OG2 OG3 GAUGE LIFE REMAINING(%)
1 100 1000 900 0 0 0 NG OK
2 100 1100 800 0 0 0 OK NG
3 100 1200 700 0 0 0 NG NG
4 100 1300 600 0 0 0 OK OK
5 100 1400 500 0 0 0 NG OK
6 100 1500 400 0 0 0 NG OK
7 100 1600 300 0 0 0 OK NG
8 100 1700 200 0 0 0 OK NG
PRE(SET)
200

```
<MTConnectAssets xmlns:m="urn:mtconnect.org:MTConnectAssets:1.3"
xmlns="urn:mtconnect.org:MTConnectAssets:1.3" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:x="urn:okuma.com:OkumaToolAssets:1.3" xsi:schemaLocation="urn:okuma.com:OkumaToolAssets:1.3
/schemas/OkumaToolAssets_1.3.xsd">
  <Header creationTime="2019-05-06T13:39:03Z" sender="DP-LHUYNH" instanceId="1557148088"
version="1.3.0.17" assetBufferSize="1024" assetCount="10"/>
  <Assets>
    <CuttingTool serialNumber="10" toolId="123456" timestamp="2019-05-06T13:38:59.5535430Z"
deviceUuid="OKUMA.123456" assetId="123456.10">
      <CuttingToolLifeCycle>
        <CutterStatus>
          <Status>AVAILABLE</Status>
        </CutterStatus>
        <ProgramToolNumber>16</ProgramToolNumber>
        <Location negativeOverlap="0" positiveOverlap="0" type="STATION">16</Location>
        <CuttingItems count="8">
          <CuttingItem indices="1">
            <ItemLife countDirection="UP" initial="1000" limit="0" type="PART_COUNT">900</ItemLife>
            <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ItemLife>
            <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ItemLife>
            <x:ItemCutterStatus>
              <Status>BROKEN</Status>
            </x:ItemCutterStatus>
            <x:ItemProgramToolGroup>100</x:ItemProgramToolGroup>
          </CuttingItem>
          <CuttingItem indices="2">
            <ItemLife countDirection="UP" initial="1100" limit="0" type="PART_COUNT">800</ItemLife>
            <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ItemLife>
            <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ItemLife>
            <x:ItemCutterStatus>
              <Status>EXPIRED</Status>
            </x:ItemCutterStatus>
            <x:ItemProgramToolGroup>100</x:ItemProgramToolGroup>
          </CuttingItem>
          <CuttingItem indices="3">
            <ItemLife countDirection="UP" initial="1200" limit="0" type="PART_COUNT">700</ItemLife>
            <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ItemLife>
            <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ItemLife>
            <x:ItemCutterStatus>
              <Status>EXPIRED</Status>
              <Status>BROKEN</Status>
            </x:ItemCutterStatus>
            <x:ItemProgramToolGroup>100</x:ItemProgramToolGroup>
          </CuttingItem>
          <CuttingItem indices="4">
            <ItemLife countDirection="UP" initial="1300" limit="0" type="PART_COUNT">600</ItemLife>
            <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ItemLife>
            <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ItemLife>
            <x:ItemCutterStatus>
              <Status>AVAILABLE</Status>
            </x:ItemCutterStatus>
            <x:ItemProgramToolGroup>100</x:ItemProgramToolGroup>
          </CuttingItem>
          <CuttingItem indices="5">
            <ItemLife countDirection="UP" initial="1400" limit="0" type="PART_COUNT">500</ItemLife>
            <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ItemLife>
            <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ItemLife>
```

```
        <x:ItemCutterStatus>
          <Status>BROKEN</Status>
        </x:ItemCutterStatus>
        <x:ItemProgramToolGroup>100</x:ItemProgramToolGroup>
      </CuttingItem>
      <CuttingItem indices="6">
        <ItemLife countDirection="UP" initial="1500" limit="0" type="PART_COUNT">400</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ItemLife>
        <x:ItemCutterStatus>
          <Status>BROKEN</Status>
        </x:ItemCutterStatus>
        <x:ItemProgramToolGroup>100</x:ItemProgramToolGroup>
      </CuttingItem>
      <CuttingItem indices="7">
        <ItemLife countDirection="UP" initial="1600" limit="0" type="PART_COUNT">300</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ItemLife>
        <x:ItemCutterStatus>
          <Status>EXPIRED</Status>
        </x:ItemCutterStatus>
        <x:ItemProgramToolGroup>100</x:ItemProgramToolGroup>
      </CuttingItem>
      <CuttingItem indices="8">
        <ItemLife countDirection="UP" initial="1700" limit="0" type="PART_COUNT">200</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="MINUTES">0</ItemLife>
        <ItemLife countDirection="UP" initial="0" limit="0" type="WEAR">0</ItemLife>
        <x:ItemCutterStatus>
          <Status>EXPIRED</Status>
        </x:ItemCutterStatus>
        <x:ItemProgramToolGroup>100</x:ItemProgramToolGroup>
      </CuttingItem>
    </CuttingItems>
  </CuttingToolLifeCycle>
 </CuttingTool>
</Assets>
</MTConnectAssets>
```


8.4 Sensors

All of analog and digital input sensors defined in the Devices.xml are desgined specifically to work with ***OKUMA Monitoring Control System***. By default, all sensor tags are disable (comment out). All sensors are configured to receive the data from different Adapter. OKUMA Monitoring Control System application will function as an adapter for all of these data items. For more information about this, please refer to the Installation Manual of OKUMA MONITORING CONTROL SYSTEM in section '8. Setup MTConnect for OKUMA Monitoring Control System' on how to setup the Adapter to provide sensor data.

Notes:
- All of these data items will not be listed in Tags Configuration dialog
- All sensors are configured for extended types, by default
- Each sensor must be manually configured and mapped to an actual component or system on the machine if needed

8.4.1 *Default Sensor Data Items*

By default, all data items are configured for generic analog/digital input as shown below. A maximum of 8 units of analog/digital input can be configured.

8.4.1.1 Analog Input sensors

All sensors are identified in the following format for SAMPLE analog input sensors:

sensorAIX_Y where X is sensor unit and Y is sensor channel. Each sensor unit has 8 channels

All sensors are identified in the following format for CONDITION analog input sensors:

sensorAIX_Y_Cond where X is sensor unit and Y is sensor channel. Each sensor unit has 8 channels

8.4.1.1.1 Sample Data Items

```
<DataItems>
<DataItem type="e:ANALOG_INPUT_OUTPUT" id="sensorAI1_1" category="SAMPLE" name="AI1_1" />
<DataItem type="e:ANALOG_INPUT_OUTPUT" id="sensorAI1_2" category="SAMPLE" name="AI1_2" />
  …
</DataItems>
```

8.4.1.1.2 Conditions

```
<DataItems>
  <DataItem type="e:ANALOG_INPUT_OUTPUT" id="sensorAI1_1_Cond" category="CONDITION"
  name="AI1_1_Cond" />
  <DataItem type="e:ANALOG_INPUT_OUTPUT" id="sensorAI1_2_Cond" category="CONDITION"
  name="AI1_2_Cond" />
  …
</DataItems>
```

8.4.1.2 Digital Input sensors

All sensors are identified in the following format for EVENT digital input sensors:

sensorDIX_Y where X is sensor unit and Y is sensor channel. Each sensor unit has 8 channels

All sensors are identified in the following format for CONDITION digital input sensors:

sensorDIX_Y_Cond where X is sensor unit and Y is channel. Each sensor unit has 8 channels

8.4.1.2.1 Event Data Items

```
<DataItems>
<DataItem type="e:INPUT_OUTPUT_SIGNAL" id="sensorDI1_1" category="EVENT" name="DI1_1" />
<DataItem type="e:INPUT_OUTPUT_SIGNAL" id="sensorDI1_2" category="EVENT" name="DI1_2" />
  …
</DataItems>
```

8.4.1.2.2 Conditions

```
<DataItems>
  <DataItem type="e:INPUT_OUTPUT_SIGNAL" id="sensorDI1_1_Cond" category="CONDITION"
  name="DI1_1_Cond" />
  <DataItem type="e:INPUT_OUTPUT_SIGNAL" id="sensorDI1_2_Cond" category="CONDITION"
  name="DI1_2_Cond" />
```

```
    …
  </DataItems>
```

8.4.2 *Specific Sensor Data Items*

Any sensor can be manually mapped to any component or system on the machine. The sensor must be removed from the default configuration above if it mapped to other.

Example of analog/digital input sensors mapped to different components and systems on the machine:

8.4.2.1 Coolant System

The following sensors are reported its data in Coolant System if applicable.

```
<!-- Coolant System sensors -->
      <Coolant id="coolantsystem" name="coolantsystem">
        <DataItems>
          <!-- Coolant concentration level (refractometer)  and condition -->
          <DataItem type="CONCENTRATION" category="CONDITION" id="sensorAI1_1_Cond"
name="AI1_1_Cond" />
                    <DataItem type="CONCENTRATION" id="sensorAI1_1" category="SAMPLE" name="AI1_1"
           units="PERCENT" nativeUnits="PERCENT" />
          <!-- Coolant flow 1 -->
          <DataItem type="FLOW" id="sensorAI1_2" category="SAMPLE" name="AI1_2" units="LITER/SECOND"
nativeUnits="LITER/SECOND" />
          <DataItem type="FLOW" category="CONDITION" id="sensorAI1_2_Cond" name="AI1_2_Cond" />
          <!-- Coolant flow 2 -->
          <DataItem type="FLOW" id="sensorAI1_3" category="SAMPLE" name="AI1_3" units="LITER/SECOND"
nativeUnits="LITER/SECOND" />
          <DataItem type="FLOW" category="CONDITION" id="sensorAI1_3_Cond" name="AI1_3_Cond" />
          <!-- Coolant temperature -->
          <DataItem type="TEMPERATURE" id="sensorAI1_8" category="SAMPLE" name="AI1_8"
units="CELSIUS" nativeUnits="CELSIUS" />
          <DataItem type="TEMPERATURE" category="CONDITION" id="sensorAI1_8_Cond"
name="AI1_8_Cond" />
          <!-- Coolant Level -->
          <DataItem type="e:INPUT_OUTPUT_SIGNAL" id="sensorDI1_2" category="EVENT" name="DI1_2" />
          <DataItem type="e:INPUT_OUTPUT_SIGNAL" category="CONDITION" id="sensorDI1_2_Cond"
name="DI1_2_Cond" />
          <!-- FILL LEVEL OF COOLANT IN PERCENT sensors -->
          <DataItem type="FILL_LEVEL" id="sensorAI1_6" category="SAMPLE" name="AI1_6" units="PERCENT"
nativeUnits="PERCENT" />
          <DataItem type="FILL_LEVEL" category="CONDITION" id="sensorAI1_6_Cond" name="AI1_6_Cond" />
        </DataItems>
 </Coolant>
```

8.4.2.2 Pneumatic System

The following sensors are reported its data in Pneumatic System if applicable.

```
<!-- Pneumatic System sensors -->
<Pneumatic id="pneumaticsystem" name="pneumaticsystem">
  <DataItems>
    <DataItem type="PRESSURE" id="sensorAI1_4" category="SAMPLE" name="AI1_4" units="PASCAL"
nativeUnits="POUND/INCH^2" />
    <DataItem type="PRESSURE" category="CONDITION" id="sensorAI1_4_Cond" name="AI1_4_Cond" />
  </DataItems>
```

```
</Pneumatic>
```

8.4.2.3 Hydraulic System

The following sensors are reported its data in Hydraulic System if applicable.

```
<!-- Hydraulic System sensors -->
<Hydraulic id="hydraulicsystem" name="hydraulicsystem">
  <DataItems>
    <DataItem type="PRESSURE" id="sensorAI1_5" category="SAMPLE" name="AI1_5" units="PASCAL"
nativeUnits="POUND/INCH^2" />
    <DataItem type="PRESSURE" category="CONDITION" id="sensorAI1_5_Cond" name="AI1_5_Cond" />
  </DataItems>
</Hydraulic>
```

8.4.2.4 Lubrication System

The following sensors are reported its data in Hydraulic System if applicable.

```
<!--  Sample Lubrication System sensors -->
<Lubrication id="lubricationsystem" name="lubricationsystem">
   <DataItems>
  <!-- Lube Tank Level -->
  <DataItem type="FILL_LEVEL" id="sensorAI2_1" category="SAMPLE" name="AI2_1" units="PERCENT"
nativeUnits="PERCENT" />
  <DataItem type="FILL_LEVEL" category="CONDITION" id="sensorAI2_1_Cond" name="AI2_1_Cond" />
   </DataItems>
</Lubrication>
```

8.4.2.5 Electrical System

The following sensors are reported its data in Lubrication System if applicable.

```
<!-- Electrical System sensors -->
<Electric id="electricsystem" name="electricsystem">
  <DataItems>
    <DataItem type="POWER_STATE" id="sensorDI1_1" category="EVENT" name="DI1_1" />
    <DataItem type="POWER_STATE" category="CONDITION" id="sensorDI1_1_Cond" name="DI1_1_Cond" />
    <!-- Control Cabinet Temp 1 sensors -->
    <DataItem type="e:INPUT_OUTPUT_SIGNAL" id="sensorDI1_3" category="EVENT" name="DI1_3" />
    <DataItem type="e:INPUT_OUTPUT_SIGNAL" category="CONDITION" id="sensorDI1_3_Cond"
name="DI1_3_Cond" />
    <!-- Control Cabinet Temp 2 sensors -->
    <DataItem type="e:INPUT_OUTPUT_SIGNAL" id="sensorDI1_4" category="EVENT" name="DI1_4" />
    <DataItem type="e:INPUT_OUTPUT_SIGNAL" category="CONDITION" id="sensorDI1_4_Cond"
name="DI1_4_Cond" />
    <!-- Control Cabinet Temp 3 sensors -->
    <DataItem type="TEMPERATURE" id="sensorAI1_7" category="SAMPLE" name="AI1_7" units="CELSIUS"
nativeUnits="CELSIUS" />
    <DataItem type="TEMPERATURE" category="CONDITION" id="sensorAI1_7_Cond" name="AI1_7_Cond" />
  </DataItems>
</Electric>
```

8.5 Conditions

The system will report any alarm condition at the time it is scanned for. In cases of multiple alarm condition happening on the machine, the system will report the first alarm and other alarms occurring after the first one if any. The system will clear all alarms if only when:

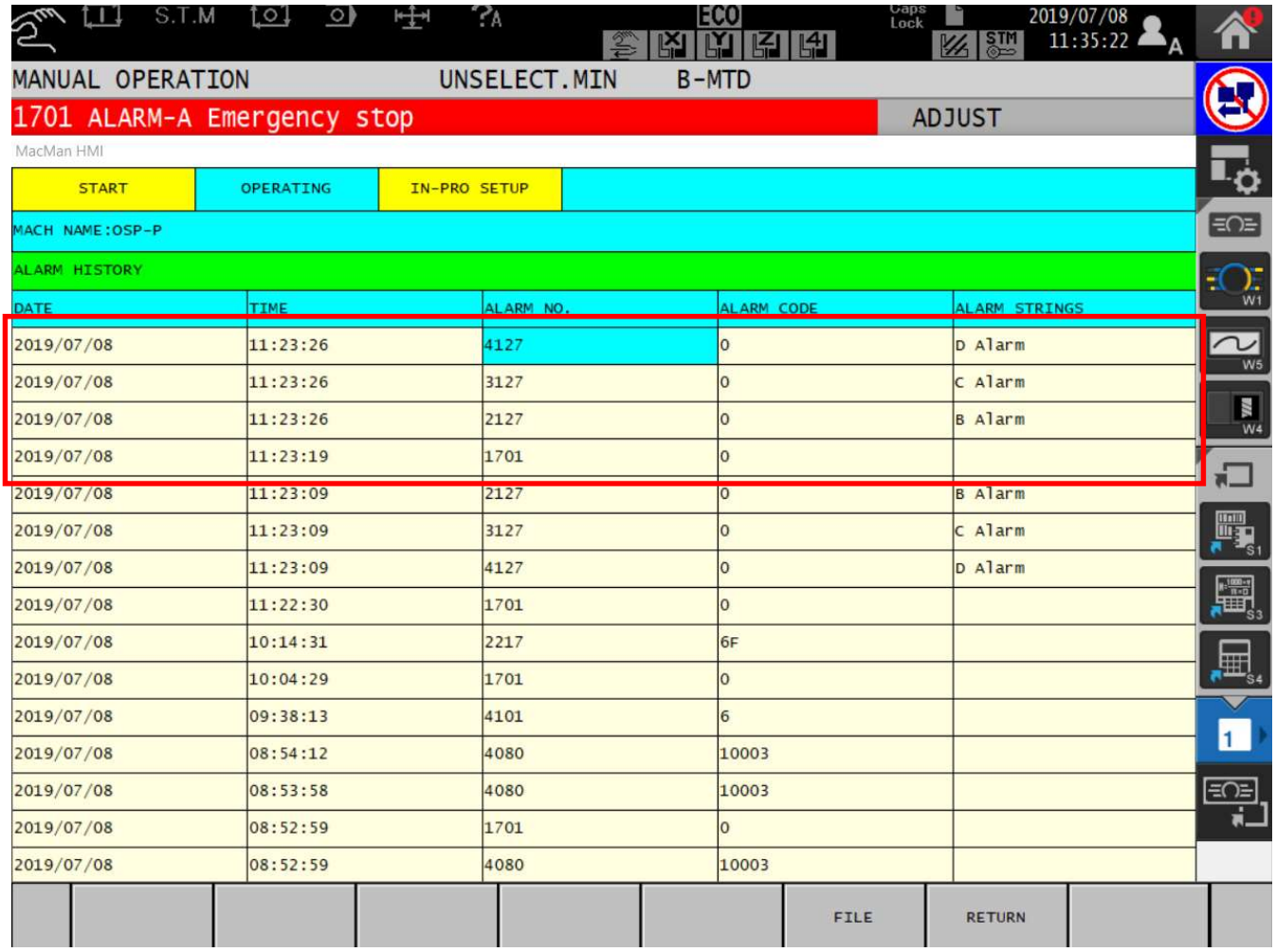
- No current alarm is detected on NC-HMI and no new alarm in MacMan Alarm History
- NC RESET. When NC is reset explicitly or implicitly, one or more alarms will be cleared and one or more will be added to MacMan Alarm History if alarm conditions are still active. As a result, all alarms will be cleared out in the current scanning cycle, and all new alarms will be added in the next scanning cycle if any.

The system uses the current alarm displayed on NC-HMI and MacMan Alarm History for reporting alarm conditions. Normally, the exact alarm number(s) will not be added to MacMan Alarm History list unless NC has been reset explicitly or implicitly.
When one or more the same alarm number(s) are added to MacMan Alarm History, the system detects it as a NC Reset condition if only current alarm is the duplicated alarm or one of the subsequent alarms occurring after the duplicated alarm listed in MacMan Alarm History.
Duplicated alarm will be ignored if it is not detected as a RESET condition on NC.

Note: It highly recommends that all alarm conditions should be assigned to scanning group that has scanning interval 100ms in order to interpret alarm conditions, correctly.

A) When the system is first started, it will only report current alarm condition and any alarms happened after the current alarm number if any.

Ex: The system will report alarm 1701, 2127, 3127, and 4127 when it is first started.



DATE	TIME	ALARM NO.	ALARM CODE	ALARM STRINGS
2019/07/08	11:23:26	4127	0	D Alarm
2019/07/08	11:23:26	3127	0	C Alarm
2019/07/08	11:23:26	2127	0	B Alarm
2019/07/08	11:23:19	1701	0	
2019/07/08	11:23:09	2127	0	B Alarm
2019/07/08	11:23:09	3127	0	C Alarm
2019/07/08	11:23:09	4127	0	D Alarm
2019/07/08	11:22:30	1701	0	
2019/07/08	10:14:31	2217	6F	
2019/07/08	10:04:29	1701	0	
2019/07/08	09:38:13	4101	6	
2019/07/08	08:54:12	4080	10003	
2019/07/08	08:53:58	4080	10003	
2019/07/08	08:52:59	1701	0	
2019/07/08	08:52:59	4080	10003	

MTConnect Device Streams | view-source:localhost:5000/curre

localhost:5000/current

Condition

Timestamp	Type	Sub Type	Name	Id	Sequence	Value
2019-07-08T15:37:16.6714911Z	Fault		system	Msystem	97	1701 ALARM_A; Date:2019/07/08 Time:11:23:19 1701 Emergency stop Emergency stop button is pressed. ; [Index] None ; [Character-string] None ; [Code] None ; [Measures to Take] After removing the cause for which the emergency stop button has been pressed, reset it and then press the CONTROL ON button.
2019-07-08T15:37:16.6714911Z	Fault		system	Msystem	98	2127 ALARM_B B Alarm; Date:2019/07/08 Time:11:23:26 2127 THiNC Alarm An alarm notification was given by the THiNC application. ; [Index] None ; [Character-string] Character string notified by THiNC application ; [Code] None ; [Probable Faulty Locations] Determine from the alarm character string.
2019-07-08T15:37:16.6714911Z	Fault		system	Msystem	99	3127 ALARM_C C Alarm; Date:2019/07/08 Time:11:23:26 3127 THiNC Alarm An alarm notification was given by the THiNC application. ; [Index] None ; [Character-string] Character string notified by THiNC application ; [Code] None ; [Probable Faulty Locations] Determine from the alarm character string.
2019-07-08T15:37:16.6714911Z	Warning		system	Msystem	100	4127 ALARM_D D Alarm; Date:2019/07/08 Time:11:23:26 4127 THiNC Alarm An alarm notification was given by the THiNC application. ; [Index] None ; [Character-string] Character string notified by THiNC application ; [Code] None ; [Probable Faulty Locations] Determine from the alarm character string.

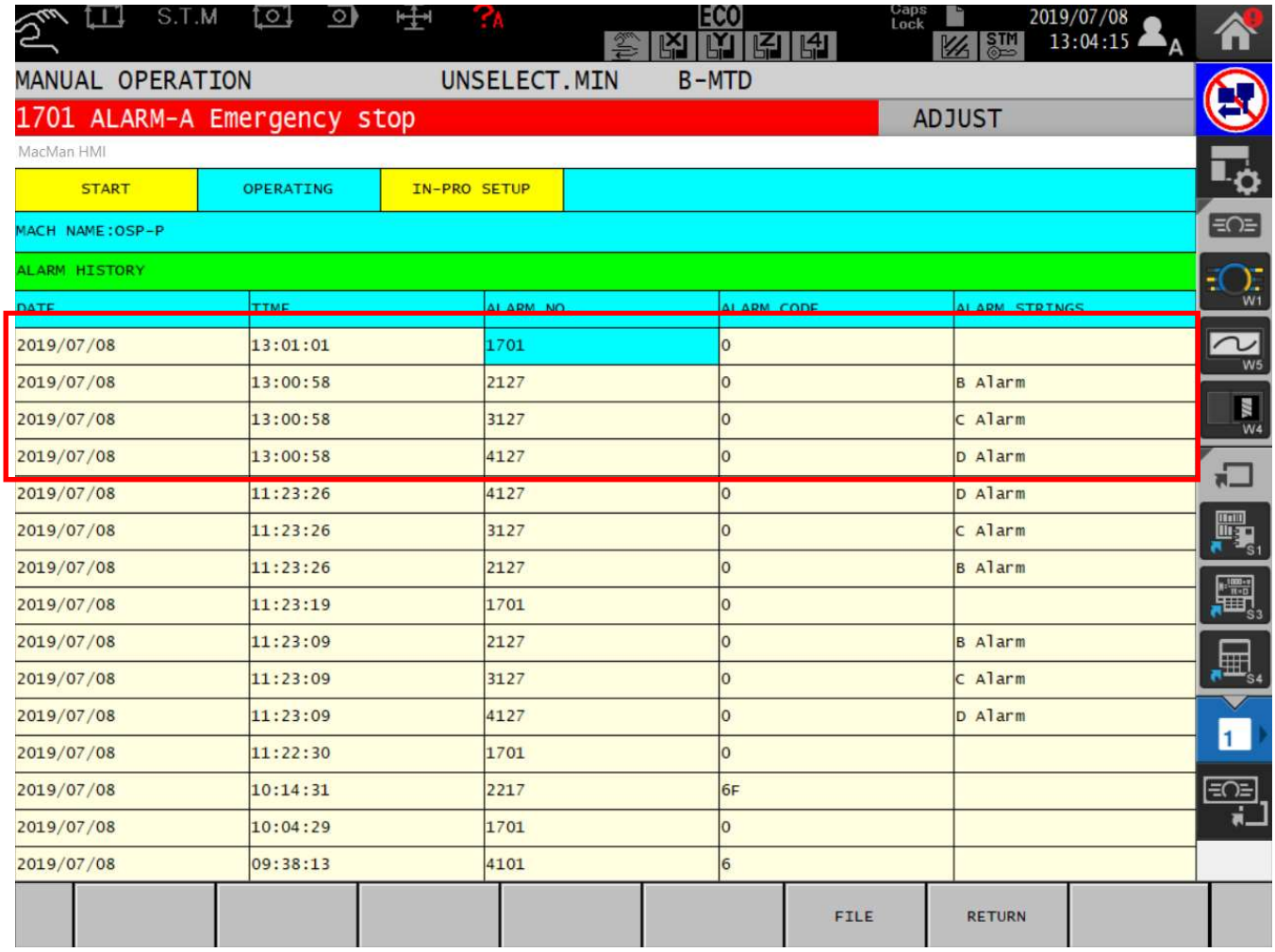
B) Once an alarm is happening on NC the system will continue to report the current alarm and any other alarm conditions if any until there is no current alarm on NC.

MTConnect Device Streams

localhost:5000/current

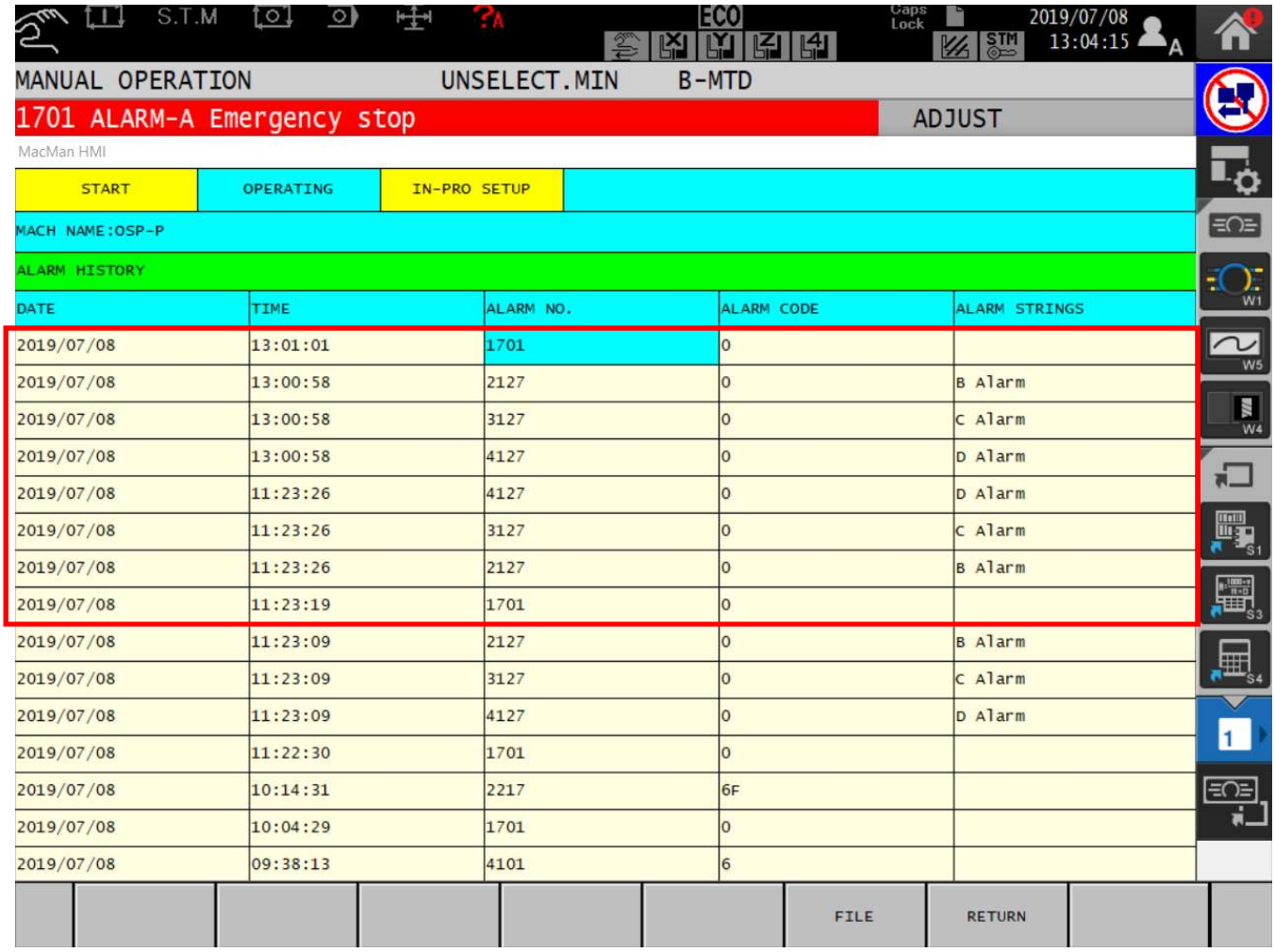
Condition

Timestamp	Type	Sub Type	Name	Id	Sequence	Value
2019-07-08T17:00:59.4321842Z	Warning		system	Msystem	1806	4127 ALARM_D D Alarm; Date:2019/07/08 Time:13:00:58 4127 THiNC Alarm An alarm notification was given by the THiNC application. ; [Index] None ; [Character-string] Character string notified by THiNC application ; [Code] None ; [Probable Faulty Locations] Determine from the alarm character string.
2019-07-08T17:00:59.4321842Z	Fault		system	Msystem	1807	3127 ALARM_C C Alarm; Date:2019/07/08 Time:13:00:58 3127 THiNC Alarm An alarm notification was given by the THiNC application. ; [Index] None ; [Character-string] Character string notified by THiNC application ; [Code] None ; [Probable Faulty Locations] Determine from the alarm character string.
2019-07-08T17:00:59.9188818Z	Fault		system	Msystem	1818	2127 ALARM_B B Alarm; Date:2019/07/08 Time:13:00:58 2127 THiNC Alarm An alarm notification was given by the THiNC application. ; [Index] None ; [Character-string] Character string notified by THiNC application ; [Code] None ; [Probable Faulty Locations] Determine from the alarm character string.
2019-07-08T17:01:02.0402056Z	Fault		system	Msystem	1827	1701 ALARM_A; Date:2019/07/08 Time:13:01:01 1701 Emergency stop Emergency stop button is pressed. ; [Index] None ; [Character-string] None ; [Code] None ; [Measures to Take] After removing the cause for which the emergency stop button has been pressed, reset it and then press the CONTROL ON button.

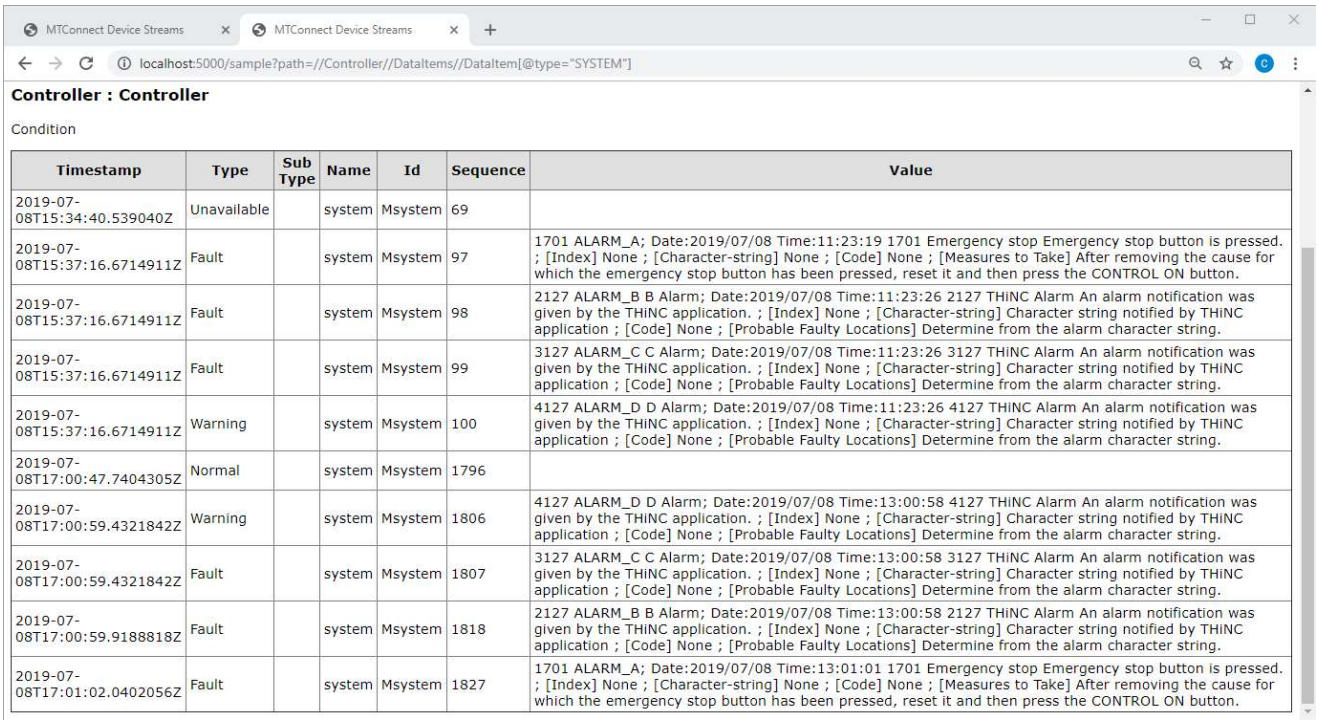


DATE	TIME	ALARM NO.	ALARM CODE	ALARM STRINGS
2019/07/08	13:01:01	1701	0	
2019/07/08	13:00:58	2127	0	B Alarm
2019/07/08	13:00:58	3127	0	C Alarm
2019/07/08	13:00:58	4127	0	D Alarm
2019/07/08	11:23:26	4127	0	D Alarm
2019/07/08	11:23:26	3127	0	C Alarm
2019/07/08	11:23:26	2127	0	B Alarm
2019/07/08	11:23:19	1701	0	
2019/07/08	11:23:09	2127	0	B Alarm
2019/07/08	11:23:09	3127	0	C Alarm
2019/07/08	11:23:09	4127	0	D Alarm
2019/07/08	11:22:30	1701	0	
2019/07/08	10:14:31	2217	6F	
2019/07/08	10:04:29	1701	0	
2019/07/08	09:38:13	4101	6	

C) All alarm conditions from the time the system is first started to the current time is showing below. Notice that there is no alarm at sequence 1796. As a result, all conditions are removed and the system reports normal at that time until it has an alarm again as shown.



DATE	TIME	ALARM NO.	ALARM CODE	ALARM STRINGS
2019/07/08	13:01:01	1701	0	
2019/07/08	13:00:58	2127	0	B Alarm
2019/07/08	13:00:58	3127	0	C Alarm
2019/07/08	13:00:58	4127	0	D Alarm
2019/07/08	11:23:26	4127	0	D Alarm
2019/07/08	11:23:26	3127	0	C Alarm
2019/07/08	11:23:26	2127	0	B Alarm
2019/07/08	11:23:19	1701	0	
2019/07/08	11:23:09	2127	0	B Alarm
2019/07/08	11:23:09	3127	0	C Alarm
2019/07/08	11:23:09	4127	0	D Alarm
2019/07/08	11:22:30	1701	0	
2019/07/08	10:14:31	2217	6F	
2019/07/08	10:04:29	1701	0	
2019/07/08	09:38:13	4101	6	



Timestamp	Type	Sub Type	Name	Id	Sequence	Value
2019-07-08T15:34:40.539040Z	Unavailable		system	Msystem	69	
2019-07-08T15:37:16.6714911Z	Fault		system	Msystem	97	1701 ALARM_A; Date:2019/07/08 Time:11:23:19 1701 Emergency stop Emergency stop button is pressed. ; [Index] None ; [Character-string] None ; [Code] None ; [Measures to Take] After removing the cause for which the emergency stop button has been pressed, reset it and then press the CONTROL ON button.
2019-07-08T15:37:16.6714911Z	Fault		system	Msystem	98	2127 ALARM_B B Alarm; Date:2019/07/08 Time:11:23:26 2127 THINC Alarm An alarm notification was given by the THINC application. ; [Index] None ; [Character-string] Character string notified by THINC application ; [Code] None ; [Probable Faulty Locations] Determine from the alarm character string.
2019-07-08T15:37:16.6714911Z	Fault		system	Msystem	99	3127 ALARM_C C Alarm; Date:2019/07/08 Time:11:23:26 3127 THINC Alarm An alarm notification was given by the THINC application. ; [Index] None ; [Character-string] Character string notified by THINC application ; [Code] None ; [Probable Faulty Locations] Determine from the alarm character string.
2019-07-08T15:37:16.6714911Z	Warning		system	Msystem	100	4127 ALARM_D D Alarm; Date:2019/07/08 Time:11:23:26 4127 THINC Alarm An alarm notification was given by the THINC application. ; [Index] None ; [Character-string] Character string notified by THINC application ; [Code] None ; [Probable Faulty Locations] Determine from the alarm character string.
2019-07-08T17:00:47.7404305Z	Normal		system	Msystem	1796	
2019-07-08T17:00:59.4321842Z	Warning		system	Msystem	1806	4127 ALARM_D D Alarm; Date:2019/07/08 Time:13:00:58 4127 THINC Alarm An alarm notification was given by the THINC application. ; [Index] None ; [Character-string] Character string notified by THINC application ; [Code] None ; [Probable Faulty Locations] Determine from the alarm character string.
2019-07-08T17:00:59.4321842Z	Fault		system	Msystem	1807	3127 ALARM_C C Alarm; Date:2019/07/08 Time:13:00:58 3127 THINC Alarm An alarm notification was given by the THINC application. ; [Index] None ; [Character-string] Character string notified by THINC application ; [Code] None ; [Probable Faulty Locations] Determine from the alarm character string.
2019-07-08T17:00:59.9188818Z	Fault		system	Msystem	1818	2127 ALARM_B B Alarm; Date:2019/07/08 Time:13:00:58 2127 THINC Alarm An alarm notification was given by the THINC application. ; [Index] None ; [Character-string] Character string notified by THINC application ; [Code] None ; [Probable Faulty Locations] Determine from the alarm character string.
2019-07-08T17:01:02.0402056Z	Fault		system	Msystem	1827	1701 ALARM_A; Date:2019/07/08 Time:13:01:01 1701 Emergency stop Emergency stop button is pressed. ; [Index] None ; [Character-string] None ; [Code] None ; [Measures to Take] After removing the cause for which the emergency stop button has been pressed, reset it and then press the CONTROL ON button.

D) NC is reset explicitly or implicitly and E-STOP condition is still active. As a result, all alarm conditions are cleared and the system reports the latest alarm condition as shown

MTConnect Device Streams | MTConnect Device Streams

localhost:5000/sample?path=//Controller//DataItems//DataItem[@type="SYSTEM"]

2019-07-08T17:01:02.0402056Z	Fault		system	Msystem	1827	1701 ALARM_A; Date:2019/07/08 Time:13:01:01 1701 Emergency stop Emergency stop button is pressed. ; [Index] None ; [Character-string] None ; [Code] None ; [Measures to Take] After removing the cause for which the emergency stop button has been pressed, reset it and then press the CONTROL ON button.
2019-07-08T17:44:42.5367412Z	Normal		system	Msystem	2677	
2019-07-08T17:44:43.0034958Z	Fault		system	Msystem	2683	1701 ALARM_A; Date:2019/07/08 Time:13:44:41 1701 Emergency stop Emergency stop button is pressed. ; [Index] None ; [Character-string] None ; [Code] None ; [Measures to Take] After removing the cause for which the emergency stop button has been pressed, reset it and then press the CONTROL ON button.

MANUAL OPERATION UNSELECT.MIN B-MTD

1701 ALARM-A Emergency stop ADJUST

MacMan HMI

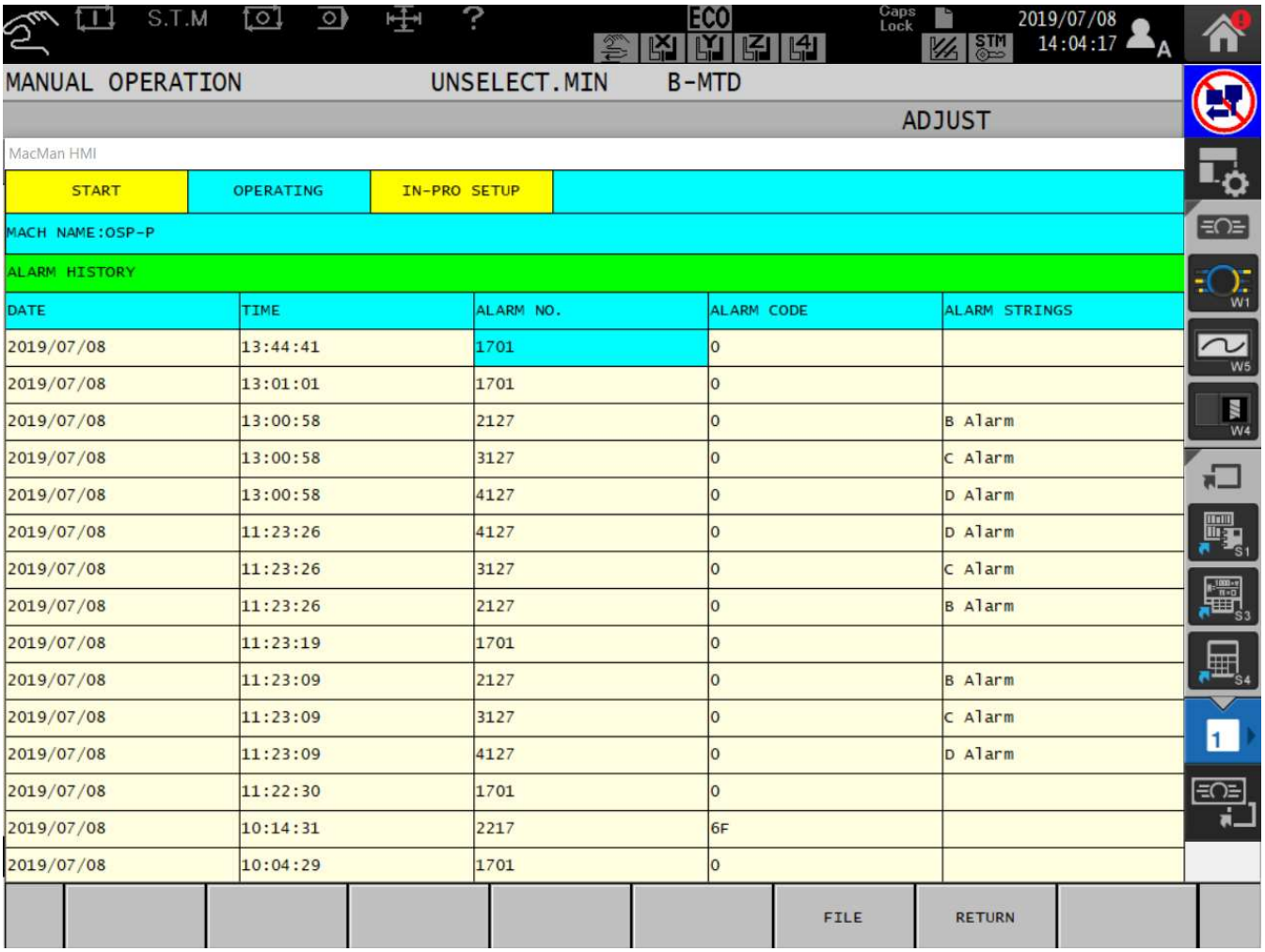
START | OPERATING | IN-PRO SETUP

MACH NAME:OSP-P

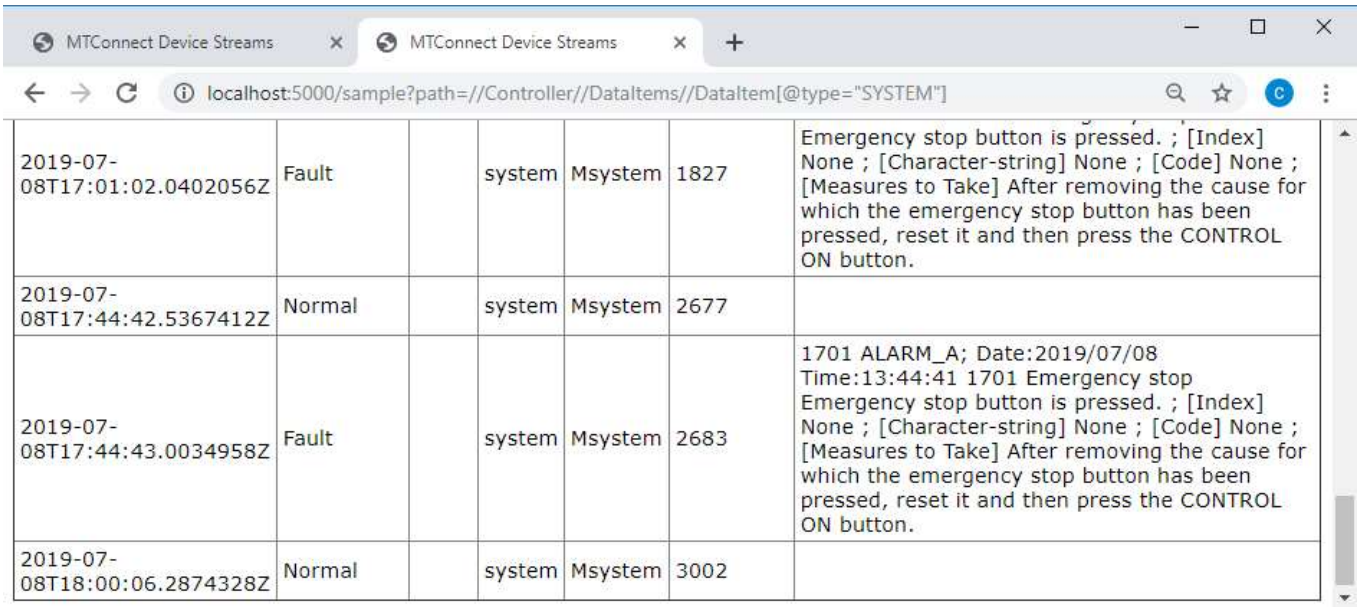
ALARM HISTORY

DATE	TIME	ALARM NO.	ALARM CODE	ALARM STRINGS
2019/07/08	13:44:41	1701	0	
2019/07/08	13:01:01	1701	0	
2019/07/08	13:00:58	2127	0	B Alarm
2019/07/08	13:00:58	3127	0	C Alarm
2019/07/08	13:00:58	4127	0	D Alarm
2019/07/08	11:23:26	4127	0	D Alarm
2019/07/08	11:23:26	3127	0	C Alarm
2019/07/08	11:23:26	2127	0	B Alarm
2019/07/08	11:23:19	1701	0	
2019/07/08	11:23:09	2127	0	B Alarm
2019/07/08	11:23:09	3127	0	C Alarm
2019/07/08	11:23:09	4127	0	D Alarm
2019/07/08	11:22:30	1701	0	
2019/07/08	10:14:31	2217	6F	
2019/07/08	10:04:29	1701	0	

E) No alarm on NC and system reports all normal.



DATE	TIME	ALARM NO.	ALARM CODE	ALARM STRINGS
2019/07/08	13:44:41	1701	0	
2019/07/08	13:01:01	1701	0	
2019/07/08	13:00:58	2127	0	B Alarm
2019/07/08	13:00:58	3127	0	C Alarm
2019/07/08	13:00:58	4127	0	D Alarm
2019/07/08	11:23:26	4127	0	D Alarm
2019/07/08	11:23:26	3127	0	C Alarm
2019/07/08	11:23:26	2127	0	B Alarm
2019/07/08	11:23:19	1701	0	
2019/07/08	11:23:09	2127	0	B Alarm
2019/07/08	11:23:09	3127	0	C Alarm
2019/07/08	11:23:09	4127	0	D Alarm
2019/07/08	11:22:30	1701	0	
2019/07/08	10:14:31	2217	6F	
2019/07/08	10:04:29	1701	0	



2019-07-08T17:01:02.0402056Z	Fault		system	Msystem	1827	Emergency stop button is pressed. ; [Index] None ; [Character-string] None ; [Code] None ; [Measures to Take] After removing the cause for which the emergency stop button has been pressed, reset it and then press the CONTROL ON button.
2019-07-08T17:44:42.5367412Z	Normal		system	Msystem	2677	
2019-07-08T17:44:43.0034958Z	Fault		system	Msystem	2683	1701 ALARM_A; Date:2019/07/08 Time:13:44:41 1701 Emergency stop Emergency stop button is pressed. ; [Index] None ; [Character-string] None ; [Code] None ; [Measures to Take] After removing the cause for which the emergency stop button has been pressed, reset it and then press the CONTROL ON button.
2019-07-08T18:00:06.2874328Z	Normal		system	Msystem	3002	

8.5.1 *Controller Condition*

The following tags are defined for Machining Center, Lathe, Lathe 2SP, and Grinder machine, respectively.

Machining Center:

```
<DataItem category="CONDITION" id="Msystem" name="system" type="SYSTEM"/>
```

Lathe:

```
<DataItem category="CONDITION" id="Lsystem" name="system" type="SYSTEM"/>
```

Lathe 2SP:

```
<DataItem category="CONDITION" id="L2p1ystem" name="system" type="p1SYSTEM"/>
<DataItem category="CONDITION" id="L2p2ystem" name="system" type="p2SYSTEM"/>
```

Grinder:

```
<DataItem category="CONDITION" id="Gsystem" name="system" type="SYSTEM"/>
```

8.5.2 *Systems Condition*

The following tags of System Condition are defined for Machining Center, Lathe, Lathe 2SP, and Grinder machine, respectively.

Notes:

- These data items will have exactly the same alarm message as defined for Controller condition if applicable.
- The ENG subfolder under the C:\OSP-P\P-MANUAL\ is required for all of Systems Condition.

8.5.2.1 Machining Center

```
        <Systems id="MSystems1" name="Systems1">
          <Components>
            <Coolant id="MCoolantSystem1" name="MCoolantSystem1">
              <DataItems>
                <DataItem category="CONDITION" id="MCoolantSystem1_cond"
name="CoolantSystem1_cond" type="SYSTEM"/>
              </DataItems>
            </Coolant>
            <Electric id="MElectricSystem1" name="ElectricSystem1">
              <DataItems>
                <DataItem category="CONDITION" id="MElectricSystem1_cond"
name="ElectricSystem1_cond" type="SYSTEM"/>
              </DataItems>
            </Electric>
            <Hydraulic id="MHydraulicSystem1" name="HydraulicSystem1">
              <DataItems>
                <DataItem category="CONDITION" id="MHydraulicSystem1_cond"
name="HydraulicSystem1_cond" type="SYSTEM"/>
              </DataItems>
            </Hydraulic>
            <Lubrication id="MLubricationSystem1" name="LubricationSystem1">
              <DataItems>
                <DataItem category="CONDITION" id="MLubricationSystem_cond"
name="LubricationSystem1_cond" type="SYSTEM"/>
              </DataItems>
            </Lubrication>
            <Pneumatic id="MPneumaticSystem1" name="PneumaticSystem1">
```

```
                <DataItems>
                  <DataItem category="CONDITION" id="MPneumaticSystem1_cond"
name="PneumaticSystem1_cond" type="SYSTEM"/>
                </DataItems>
              </Pneumatic>
            </Components>
```

8.5.2.2 Lathe

```
<Systems id="LSystems1" name="Systems1">
            <Components>
              <Coolant id="LCoolantSystem1" name="LCoolantSystem1">
                <DataItems>
                  <DataItem category="CONDITION" id="LCoolantSystem1_cond"
name="CoolantSystem1_cond" type="SYSTEM"/>
                </DataItems>
              </Coolant>
              <Electric id="LElectricSystem1" name="ElectricSystem1">
                <DataItems>
                  <DataItem category="CONDITION" id="LElectricSystem1_cond"
name="ElectricSystem1_cond" type="SYSTEM"/>
                </DataItems>
              </Electric>
              <Hydraulic id="LHydraulicSystem1" name="HydraulicSystem1">
                <DataItems>
                  <DataItem category="CONDITION" id="LHydraulicSystem1_cond"
name="HydraulicSystem1_cond" type="SYSTEM"/>
                </DataItems>
              </Hydraulic>
              <Lubrication id="LLubricationSystem1" name="LubricationSystem1">
                <DataItems>
                  <DataItem category="CONDITION" id="LLubricationSystem_cond"
name="LubricationSystem1_cond" type="SYSTEM"/>
                </DataItems>
              </Lubrication>
              <Pneumatic id="LPneumaticSystem1" name="PneumaticSystem1">
                <DataItems>
                  <DataItem category="CONDITION" id="LPneumaticSystem1_cond"
name="PneumaticSystem1_cond" type="SYSTEM"/>
                </DataItems>
              </Pneumatic>
            </Components>
          </Systems>
```

8.5.2.3 Lathe 2SP

8.5.2.3.1 First System or R side of machine

```
<Systems id="LSystems1" name="Systems1">
            <Components>
              <Coolant id="LCoolantSystem1" name="LCoolantSystem1">
                <DataItems>
```

```
                <DataItem category="CONDITION" id="LCoolantSystem1_cond"
name="CoolantSystem1_cond" type="SYSTEM"/>
              </DataItems>
            </Coolant>
            <Electric id="LElectricSystem1" name="ElectricSystem1">
              <DataItems>
                <DataItem category="CONDITION" id="LElectricSystem1_cond"
name="ElectricSystem1_cond" type="SYSTEM"/>
              </DataItems>
            </Electric>
            <Hydraulic id="LHydraulicSystem1" name="HydraulicSystem1">
              <DataItems>
                <DataItem category="CONDITION" id="LHydraulicSystem1_cond"
name="HydraulicSystem1_cond" type="SYSTEM"/>
              </DataItems>
            </Hydraulic>
            <Lubrication id="LLubricationSystem1" name="LubricationSystem1">
              <DataItems>
                <DataItem category="CONDITION" id="LLubricationSystem1_cond"
name="LubricationSystem1_cond" type="SYSTEM"/>
              </DataItems>
            </Lubrication>
            <Pneumatic id="LPneumaticSystem1" name="PneumaticSystem1">
              <DataItems>
                <DataItem category="CONDITION" id="LPneumaticSystem1_cond"
name="PneumaticSystem1_cond" type="SYSTEM"/>
              </DataItems>
            </Pneumatic>
          </Components>
        </Systems>
```

8.5.2.3.2 Second System or L side of machine

```
        <Systems id="LSystems2" name="Systems2">
          <Components>
            <Coolant id="LCoolantSystem2" name="LCoolantSystem2">
              <DataItems>
                <DataItem category="CONDITION" id="LCoolantSystem2_cond"
name="CoolantSystem2_cond" type="SYSTEM"/>
              </DataItems>
            </Coolant>
            <Electric id="LElectricSystem2" name="ElectricSystem2">
              <DataItems>
                <DataItem category="CONDITION" id="LElectricSystem2_cond"
name="ElectricSystem2_cond" type="SYSTEM"/>
              </DataItems>
            </Electric>
            <Hydraulic id="LHydraulicSystem2" name="HydraulicSystem2">
              <DataItems>
                <DataItem category="CONDITION" id="LHydraulicSystem2_cond"
name="HydraulicSystem2_cond" type="SYSTEM"/>
              </DataItems>
            </Hydraulic>
            <Lubrication id="LLubricationSystem2" name="LubricationSystem2">
```

```
                <DataItems>
                  <DataItem category="CONDITION" id="LLubricationSystem2_cond"
name="LubricationSystem2_cond" type="SYSTEM"/>
                </DataItems>
              </Lubrication>
              <Pneumatic id="LPneumaticSystem2" name="PneumaticSystem2">
                <DataItems>
                  <DataItem category="CONDITION" id="LPneumaticSystem2_cond"
name="PneumaticSystem2_cond" type="SYSTEM"/>
                </DataItems>
              </Pneumatic>
            </Components>
          </Systems>
```

8.5.2.4 Grinder

```
          <Systems id="GSystems1" name="Systems1">
            <Components>
              <Coolant id="GCoolantSystem1" name="GCoolantSystem1">
                <DataItems>
                  <DataItem category="CONDITION" id="GCoolantSystem1_cond"
name="CoolantSystem1_cond" type="SYSTEM"/>
                </DataItems>
              </Coolant>
              <Electric id="GElectricSystem1" name="ElectricSystem1">
                <DataItems>
                  <DataItem category="CONDITION" id="GElectricSystem1_cond"
name="ElectricSystem1_cond" type="SYSTEM"/>
                </DataItems>
              </Electric>
              <Hydraulic id="GHydraulicSystem1" name="HydraulicSystem1">
                <DataItems>
                  <DataItem category="CONDITION" id="GHydraulicSystem1_cond"
name="HydraulicSystem1_cond" type="SYSTEM"/>
                </DataItems>
              </Hydraulic>
              <Lubrication id="GLubricationSystem1" name="LubricationSystem1">
                <DataItems>
                  <DataItem category="CONDITION" id="GLubricationSystem_cond"
name="LubricationSystem1_cond" type="SYSTEM"/>
                </DataItems>
              </Lubrication>
              <Pneumatic id="GPneumaticSystem1" name="PneumaticSystem1">
                <DataItems>
                  <DataItem category="CONDITION" id="GPneumaticSystem1_cond"
name="PneumaticSystem1_cond" type="SYSTEM"/>
                </DataItems>
              </Pneumatic>
            </Components>
          </Systems>
```

9. Installation and Configuration of MTConnect Agent

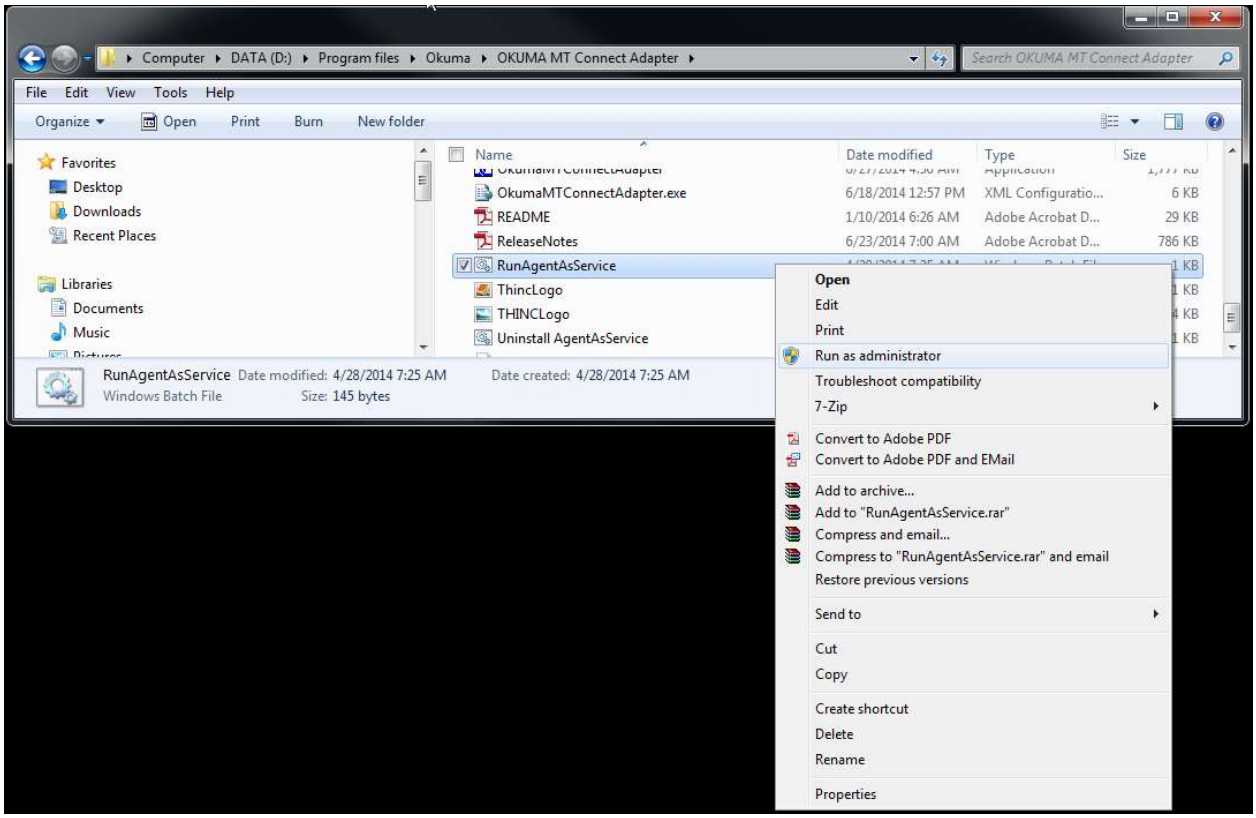
By default, MTConnect Agent is already installed and configured with default values during installation.

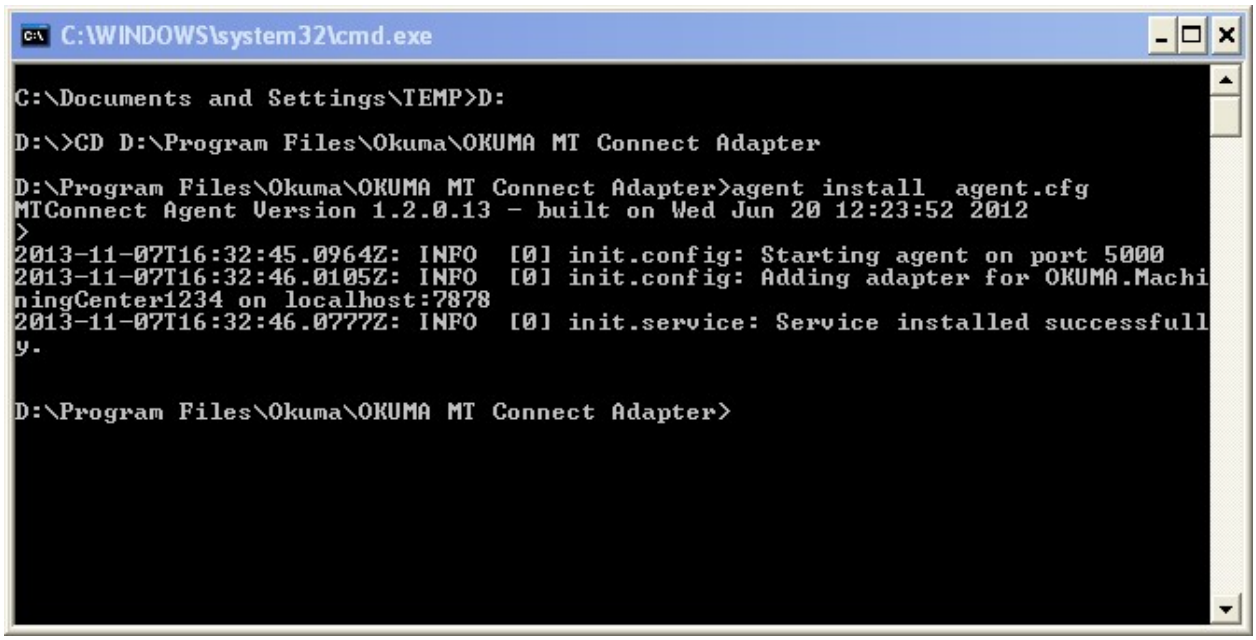
MTConnect Agent, agent.exe, is installed into the same location of OKUMA MTConnect Adapter. It is, however, up to user to decide to run agent on the same or different PC. On either case, the same configuration information in agent.cfg must be used.

9.1 Installation of MTConnect Agent as Service

Manually, it can be quickly installed as Windows Service by running the BAT file named RunAgentAsService.bat at the installation folder on the machine as shown in the captured image below:

Note: It is necessary to run the BAT file named RunAgentAsService.bat under administrator account by selecting the BAT file and running it as administrator as shown in the captured image below.



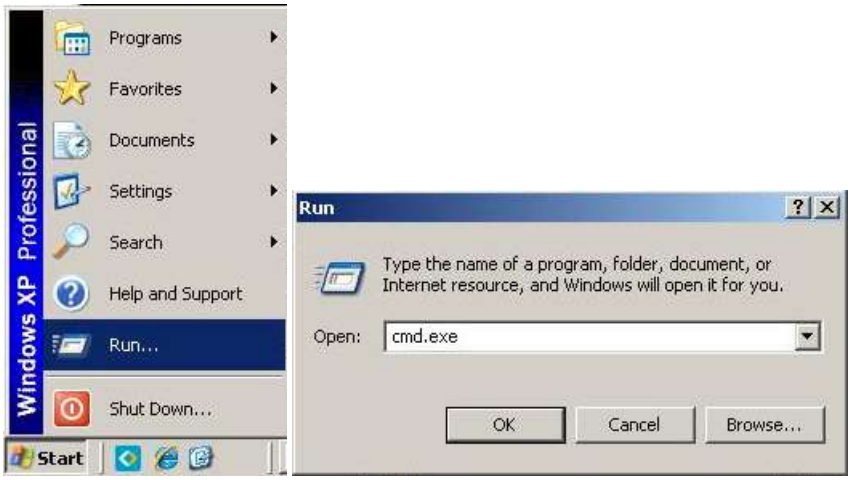


The agent now will run automatically when machine first boots up.

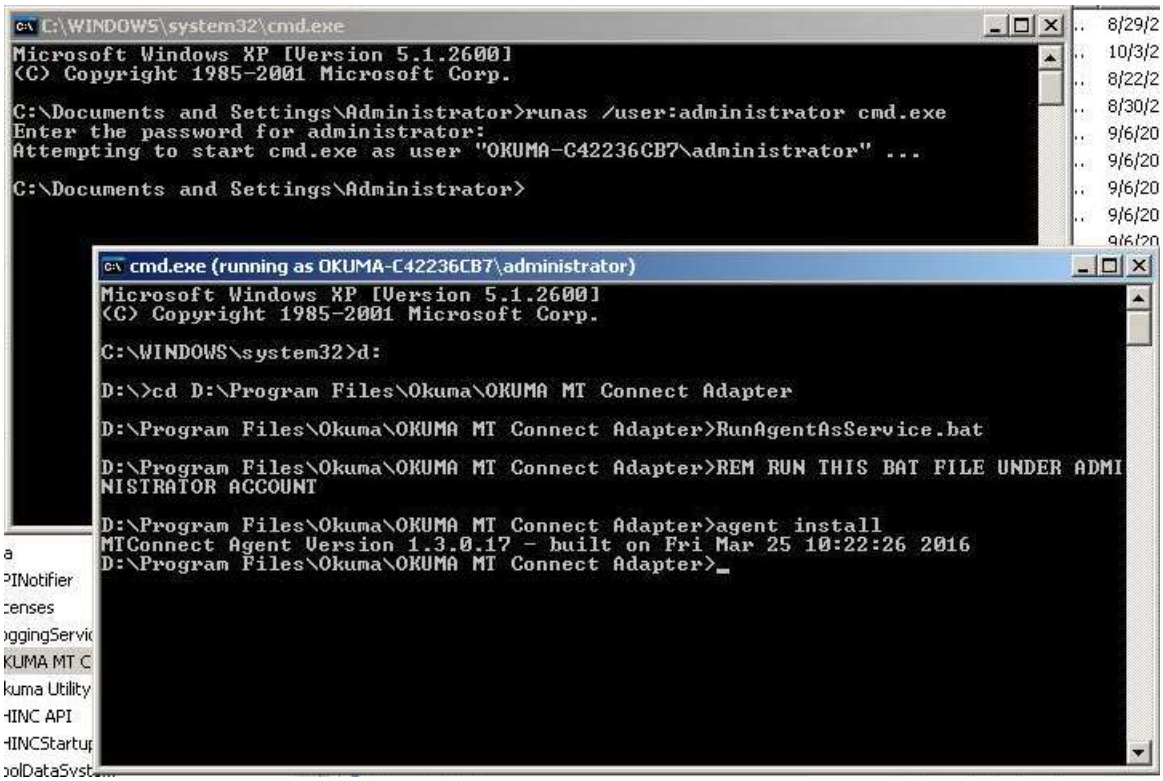
For Windows XP:

To run DOS command prompt under administrator account:

- Enter cmd.exe in Windows Start/Run and click OK button as shown below



- Enter the following lines to enable DOS command prompt to run under administrator account:
  - Runas /user:administrator cmd.exe
  - Enter the password for administrator: enter password for administrator account here
- The system will open a new DOS command prompt that is run under administrator account
- Enter the command lines as shown in the captured image below to change to MTConnect installation folder
  - D:
  - CD “D:\Program files\Okuma\OKUMA MT Connect Adapter”
  - RunAgentAsService.bat



9.2 Un-installation of MTConnect Agent Service

Note: If needed current agent installed in Windows services can be removed by issuing the following command from command prompt or running the bat file named UninstallAgentAsService.bat:

```
agent remove
```

9.3 Configuration of MTConnect Agent

Please refer to the MTConnect Agent installation file named, README.pdf, for further instruction how to configure it to connect to adapter.

The default agent configuration file, named agent.cfg, is installed in the same folder with MTConnect Adapter and having default information as shown below:

```
Devices = Devices.xml
SchemaVersion = 1.3                 # using schema version 1.3
Port=5000                           # default port number for agent
UpcaseDataItemValue = false
MonitorConfigFiles = true           # True = reload devices.xml and agent.cfg if they are changed
MinimumConfigReloadAge = 1          # Number of seconds agent service will wait before performing reload
config files
Adapters
```

```
    {
        OKUMA.Machine.Adapter              # for reference OKUMA machine adapter
        {
            Host = localhost
            Port = 7878            # default port number for OKUMA MTConnect Adapter
        }
    }
....
```

9.3.1 *Agent Running Port*

By default, agent is binding to port 5000 for accepting client requests and connecting to OKUMA MTConnect Adapter at port 7878.

The information can be changed by editing agent.cfg as shown below:

```
Port=5001                          # default port number for agent
```

Agent is now running on port 5001.

Example: http://localhost:5001/current to get current data reported by agent at port 5001

9.3.2 *Adapter Host*

In case of agent is configured to run on remote PC, Adapter 'Host' must be configured to where adapter is running.

For agent running on the same PC as adapter:

```
Host = localhost
```

For agent running on the remote PC:

```
Host = IPAddress
```

Where IPAddress is the IP address of the machine that adapter is running.

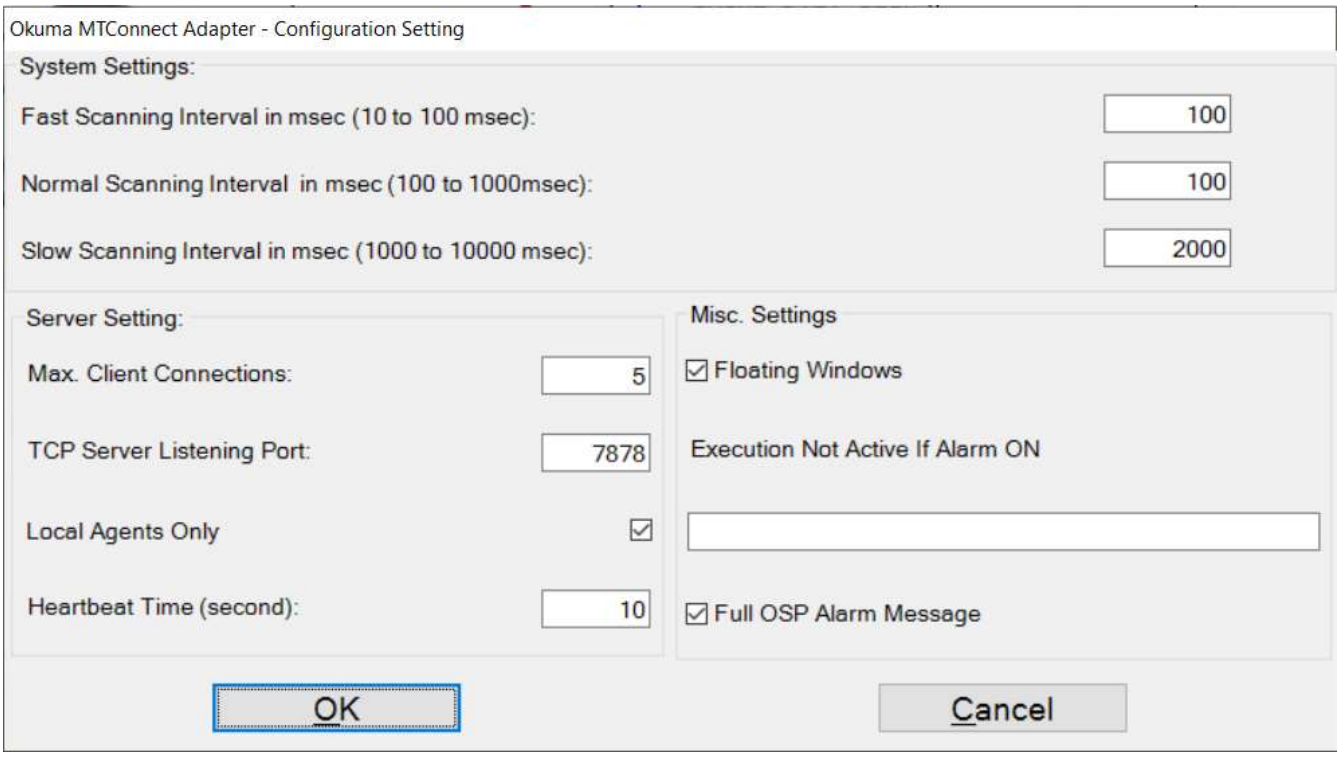
For example:

```
Host = 172.22.50.10
```

9.3.3 *Adapter Running Port*

By default, agent is communicating with adapter at port 7878. If adapter port is changed to different port number then it is necessary to change agent configuration file to the same port number such as port 7979 as shown below:

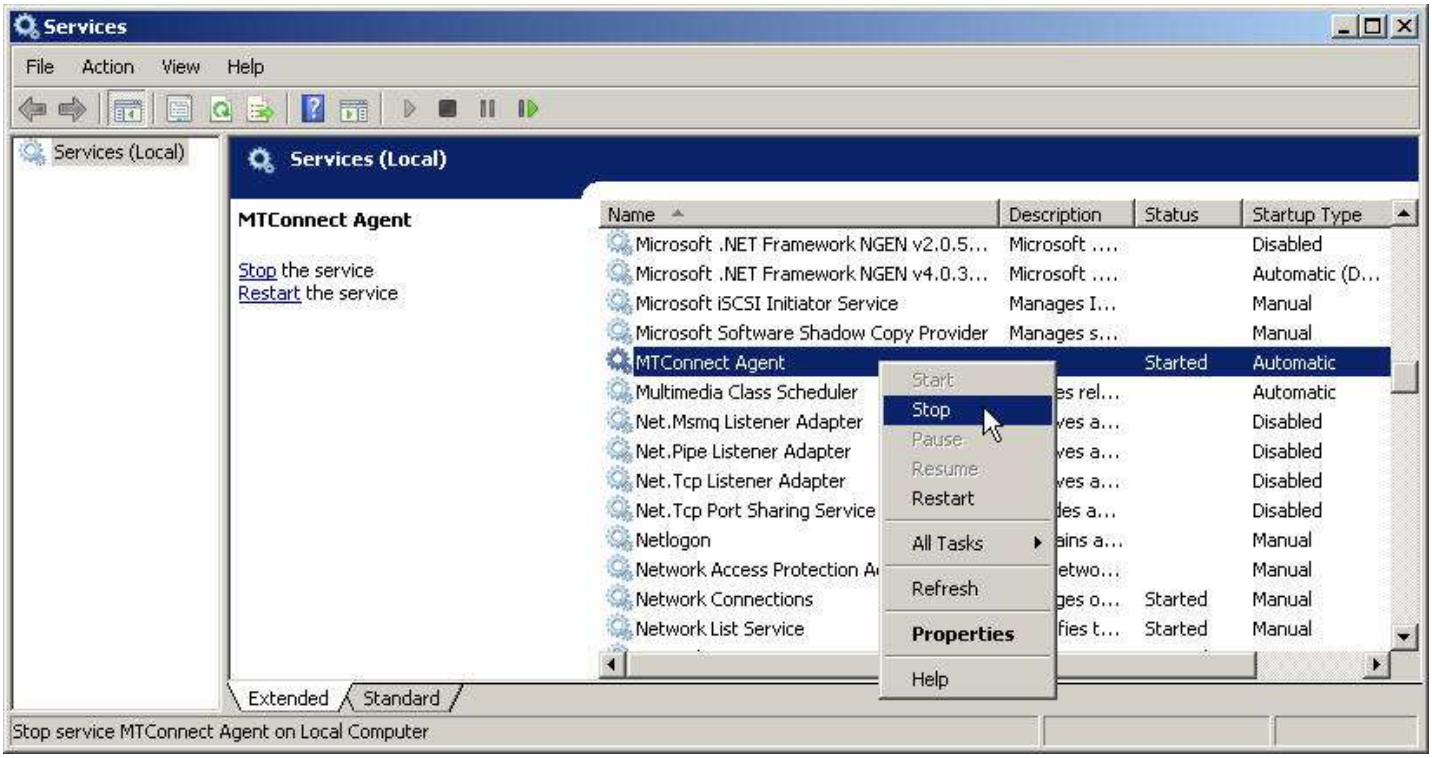
Adapter system configuration setting:

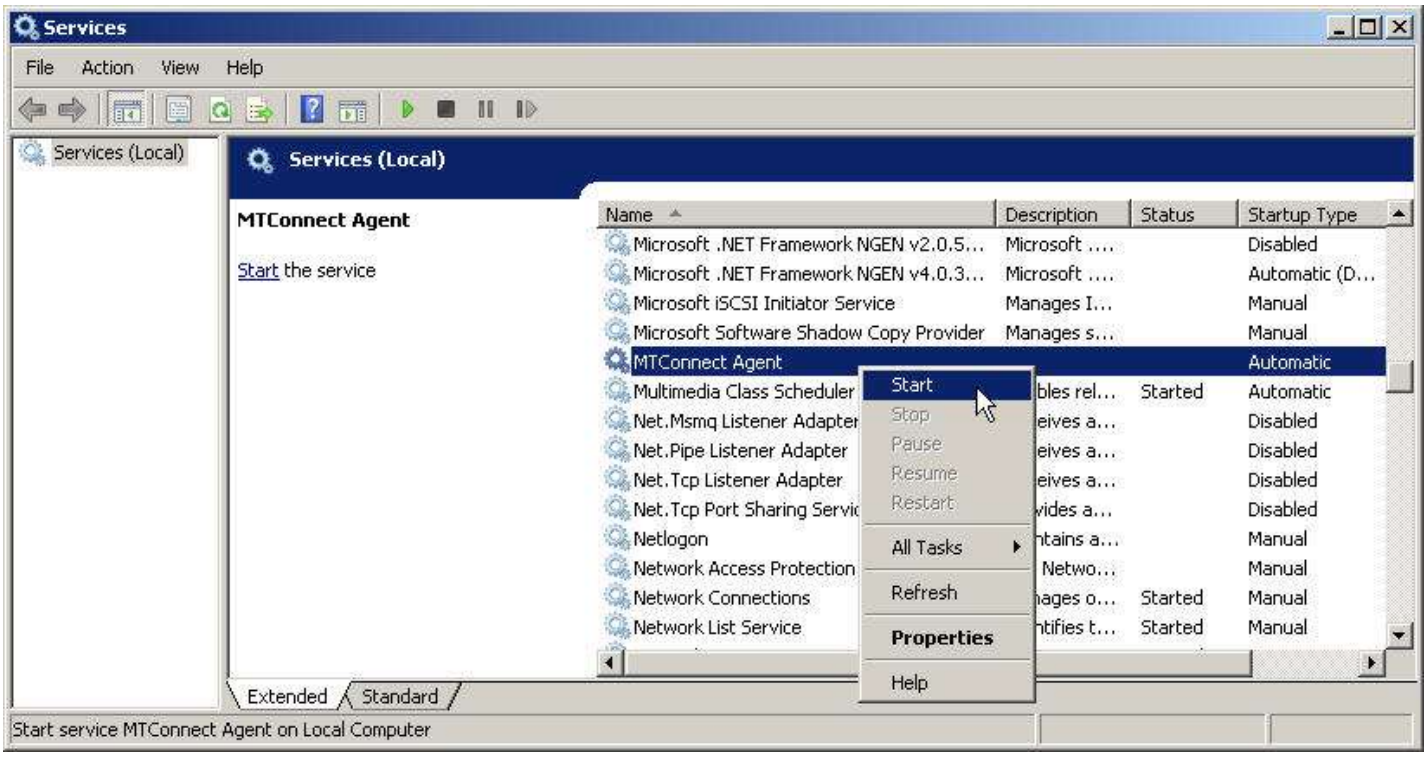


Port = 7879 # default port number for OKUMA MTConnect Adapter

9.3.4 *Start and Stop Agent Service*

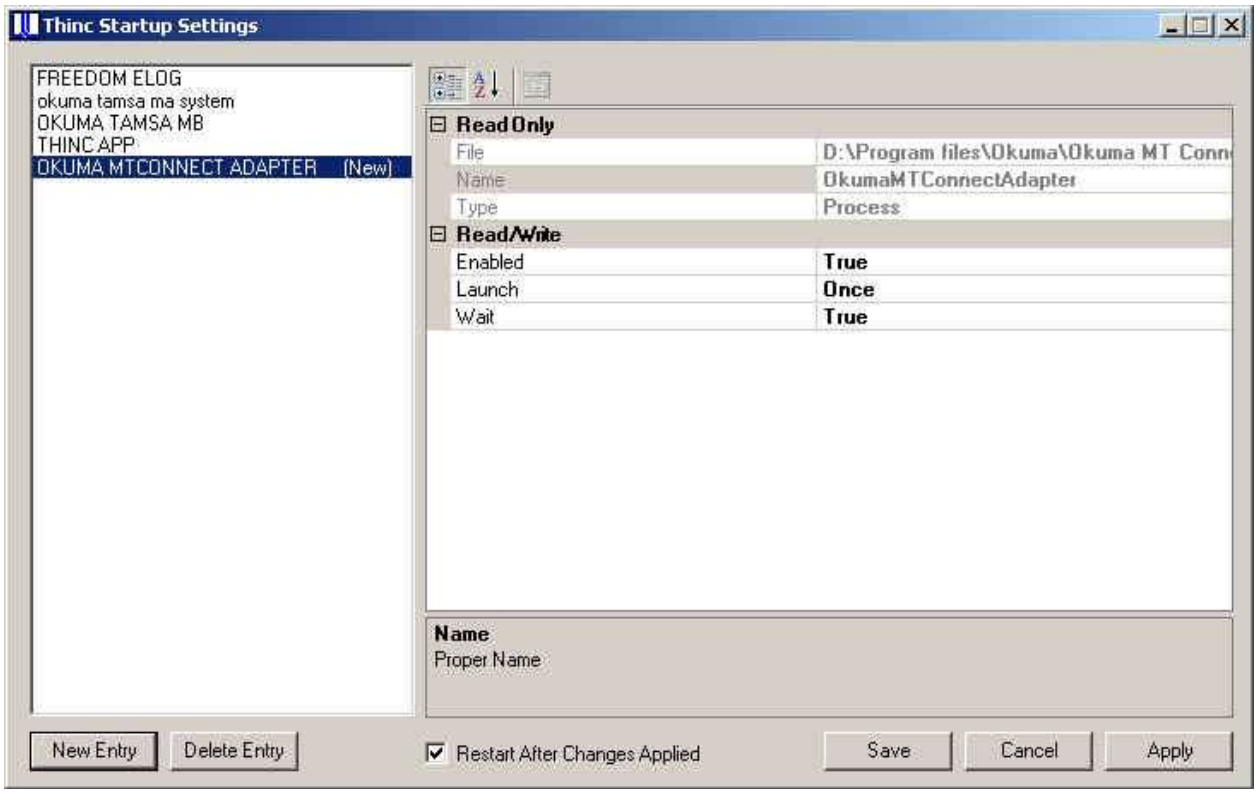
MTConnect Agent is a Windows service that can be started and stopped from Services dialog as shown below





10. Setup Okuma MTConnect Adapter Software to Startup Automatically

By default, OKUMA MTConnect Adapter is automatically registered with Startup Service so it will be run after NC is fully started.



The following steps are only needed if the registration of OKUMA MTConnect Adapter has been removed.

To enable the Okuma MTConnect Adapter Software run automatically when NC OSP system is started, user needs to setup THINC Startup Service properly. Click 'Start' → 'Programs' → 'Okuma' → 'THINC Startup Service' → 'THINC Start Settings' to activate the startup service setup dialog as follows.

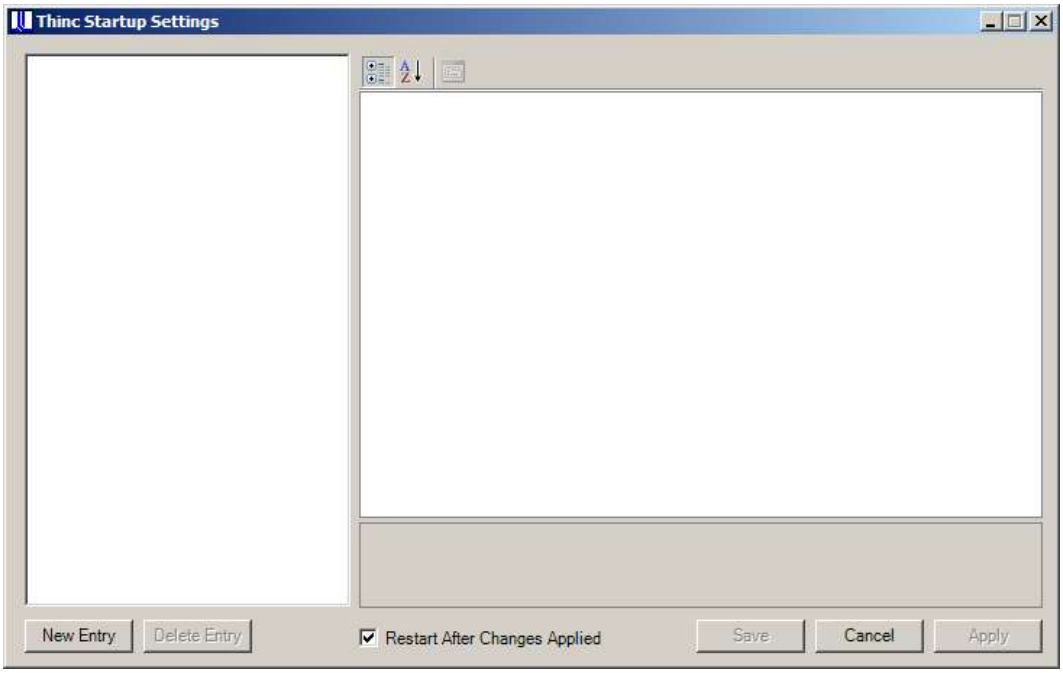


Figure 1 THINC startup settings dialog

Click ‘New Entry’ button at the lower left side of the dialog to add an entry for the Okuma MTConnect Adapter application.

Figure: THINC startup settings add item welcome dialog

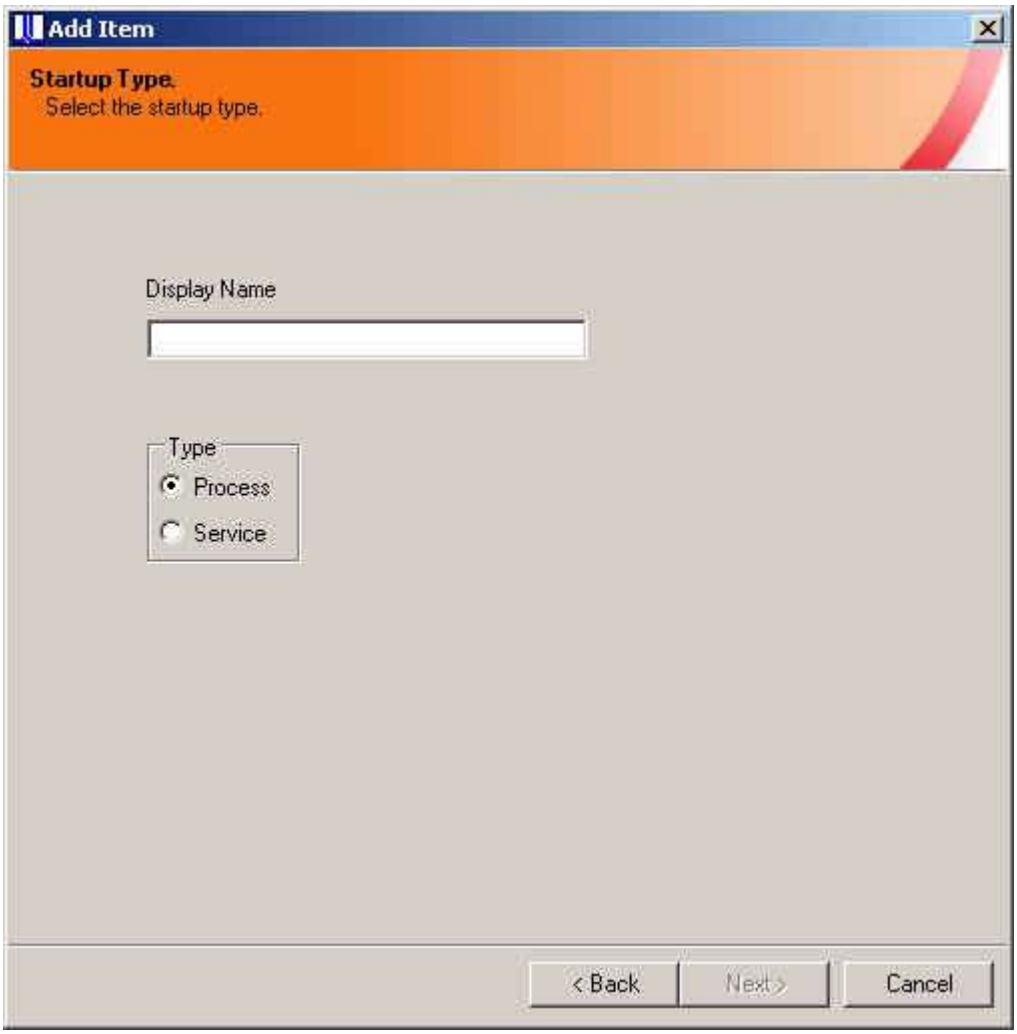


Figure: THINC startup settings add item name dialog

In the ‘Add Item’ welcome window, click ‘Next’ to enter the ‘Startup Type’ selection dialog, enter ‘Okuma MTConnect Adapter’ as display name and select ‘Process’ for the startup type, then click ‘Next’ button and a new dialog will pop up to allow user to browse which application to startup.

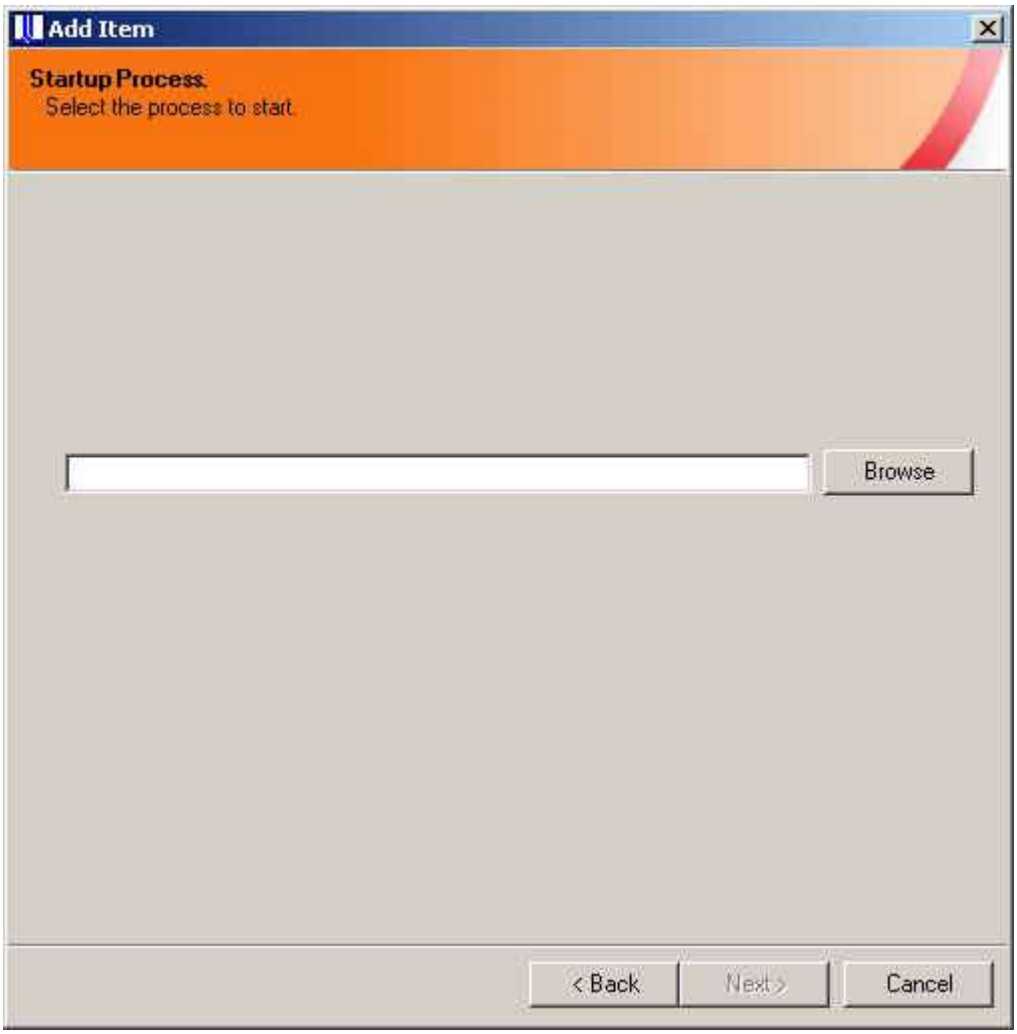


Figure: THINC startup settings add item destination dialog

Click the ‘Browse’ button to select file ‘OkumaMTConnectAdapter.exe’ in the Okuma MTConnect Adapter installation folder (By default, it is ‘D:\Program Files\Okuma\Okuma MT Connect Adapter\’.). Click ‘Next’ to proceed to next ‘Startup Options’ dialog.

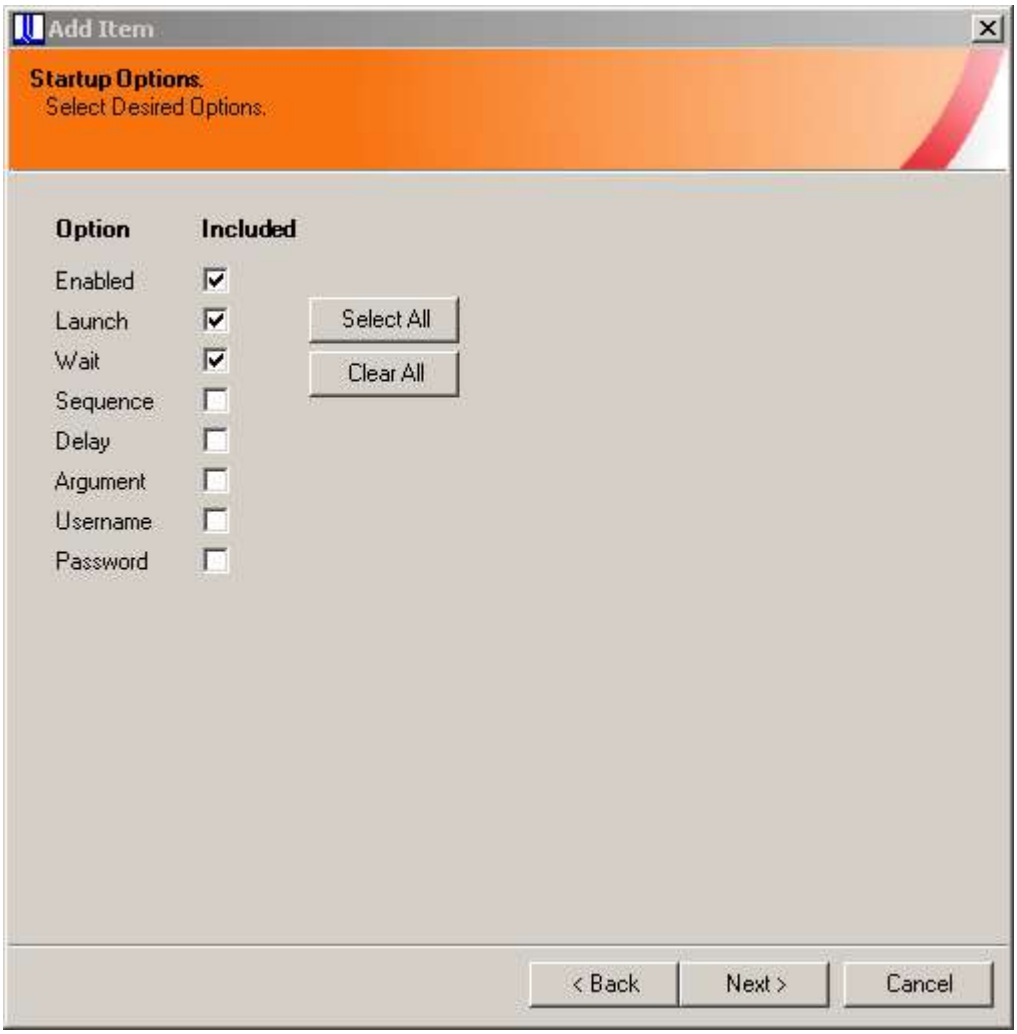
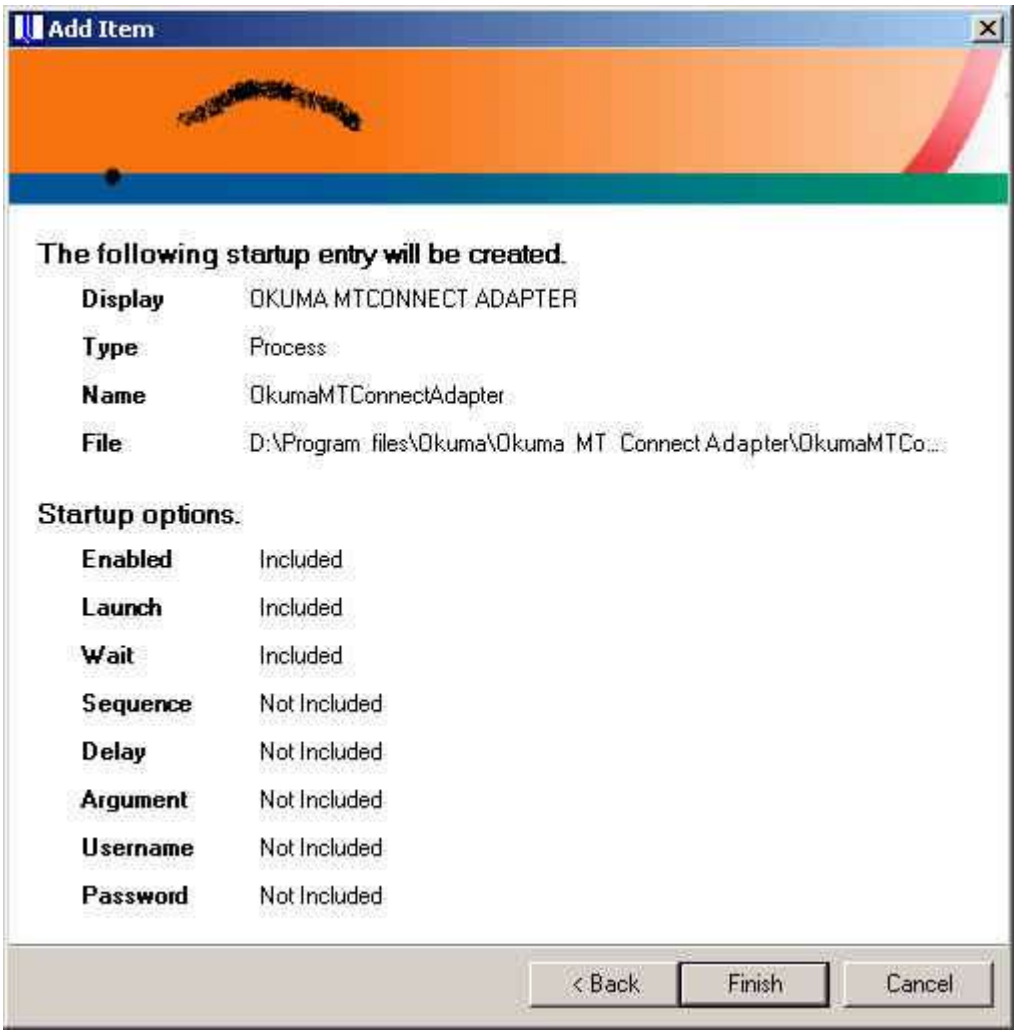


Figure: THINC startup settings add item options dialog

In the ‘Startup Options’ dialog, check ‘Enabled’, ‘Launch’ and ‘Wait’, then click ‘Next’ button to go to next step



Click ‘Finish’ button to finish the setup for Okuma MTConnect Adapter Software.

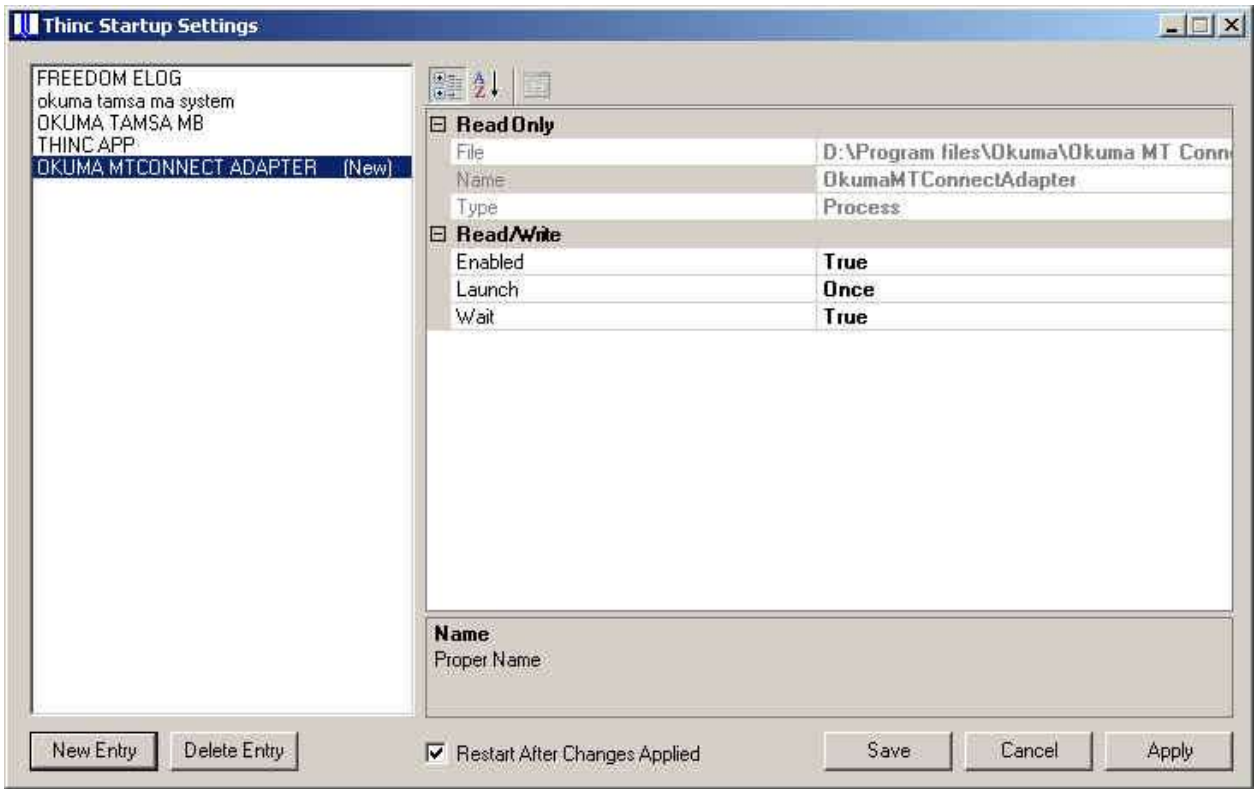


Figure: THINC startup settings add item completed dialog

Click 'Save' to save the settings and exit the setup process. The Okuma MTConnect Adapter Software should be launched automatically after the NC OSP system is started.

Note: User needs to restart the machine to ensure that the startup service works properly.

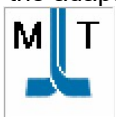
11. Verifying Agent and Adapter Connectivity

The following steps are to check if:

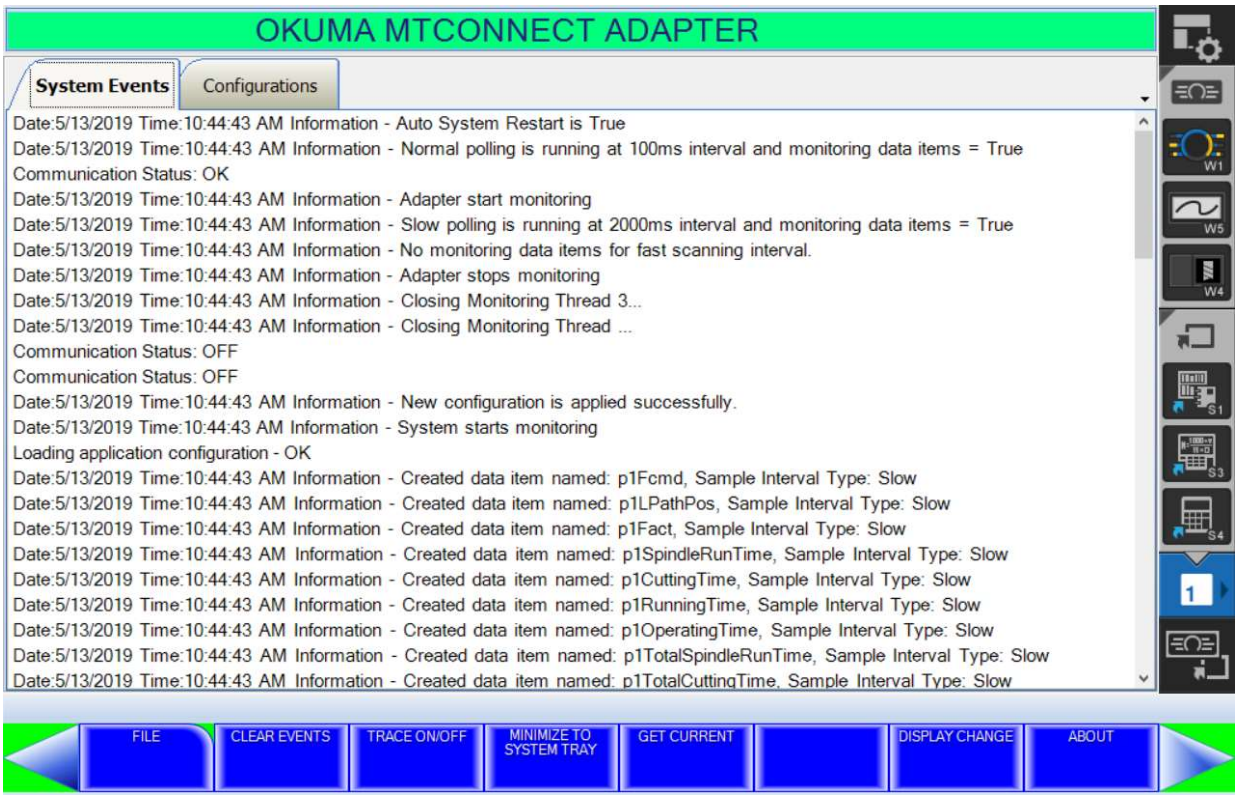
- Adapter runs without error.
- Adapter can get machine data
- Agent can communicate with adapter
- MTConnect data can be obtained from agent

Assuming that MTConnect Adapter is installed and the 'Enable Monitoring Tags' checkbox has been checked during the installation process and machine has been restarted. If 'Enable Monitoring Tags' checkbox is not checked then it can be set in the Tags Configuration dialog. Please see the Tags Config. Menu

11.1 OKUMA MTConnect Adapter

Once the adapter is running, it is normally minimized to system tray. It can be shown by double clicking the OKUMA icon  in the system tray located on the lower left corner of the screen. The main application will show as seen below.

If OKUMA MTConnect adapter is running without error, the system is ready for accepting agent connections.

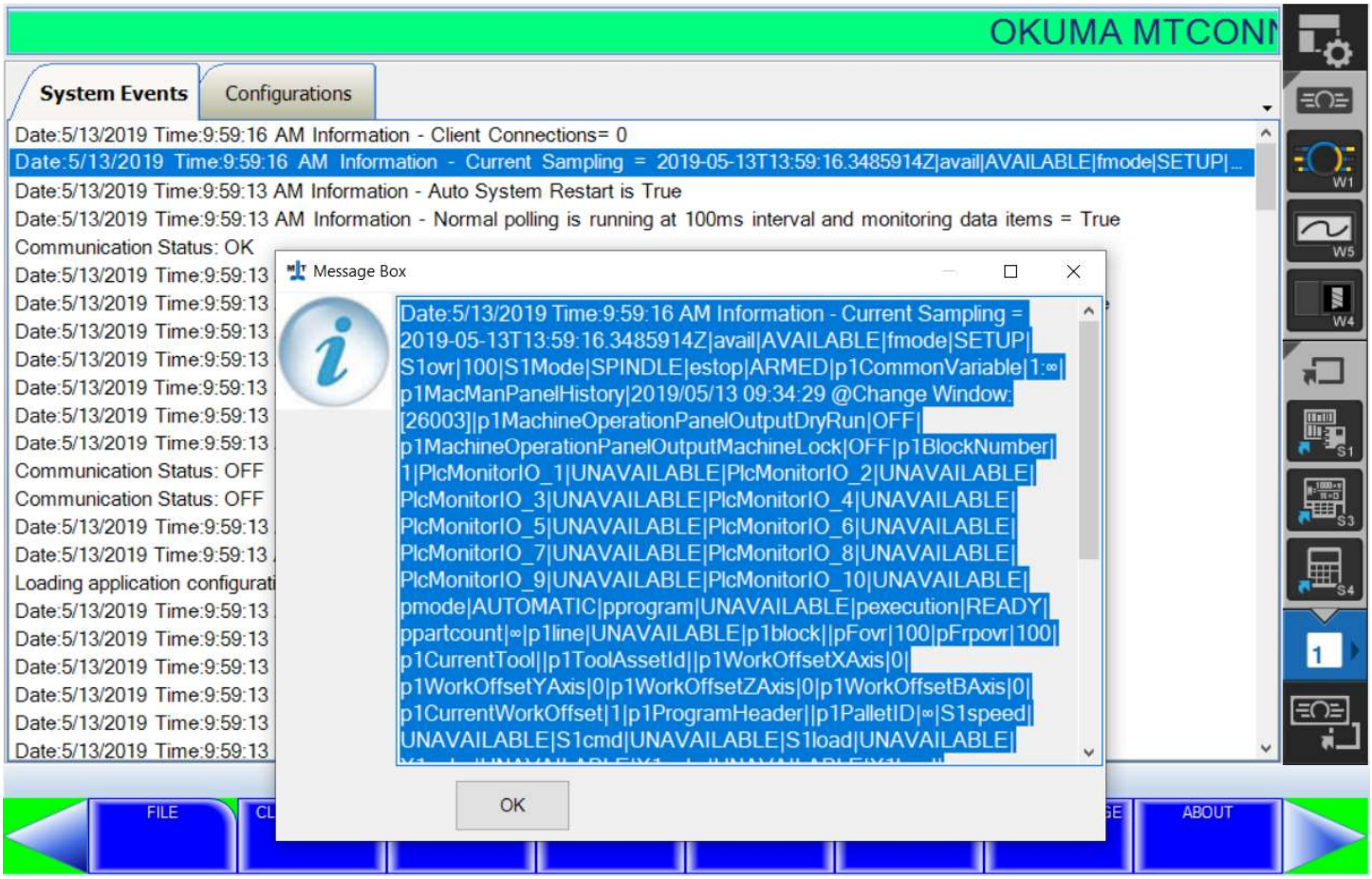


11.2 Obtaining Current Monitoring Machine Data

OKUMA MTConnect Adapter is using THINC-API for obtaining machine data. By clicking the 'Get Current' from menu bar, the system will get current monitoring data and display a message under System Events screen. A detail message is shown in the message box by double clicking on the '*Current Sampling*' message in the System Events.

If there is no error message in the System Events tab as shown below then Adapter can communicate with machine.

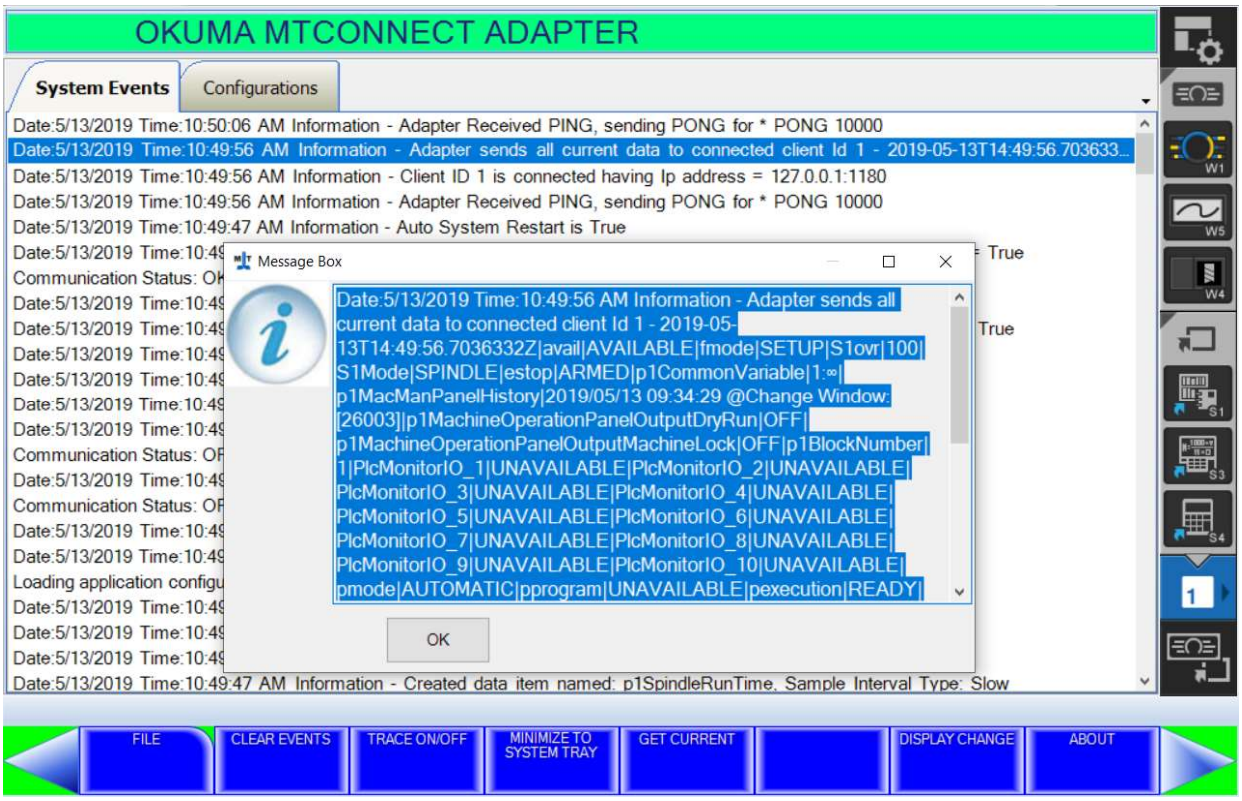
It also shows the number of client connections that are currently connected with the adapter. If no agent is connected with adapter a zero will be shown.



11.3 Agent and Adapter Connectivity

When an MTConnect agent runs and first connects to the adapter, a message will be displayed in the System Events. Adapter will sent an initial message of the current monitoring data to the connected agent.

Note: Double clicking on the System Event message to have a detail message displaying on a message box.
For more information on setting up agent to run on local machine please refer to section Installing MTConnect Agent



11.4 MTConnect Data

Once agent is running and connecting to adapter, current monitoring machine data can be getting by issuing the following command from a web browser for getting current data or device information in the following format:

http://IPAddress:port/DeviceName/MTConnectCommand

- IPAddress: localhost or IP address of computer running agent
- Port: Default to port 5000 of running agent. It can be changed in agent.cfg configuration file.
- Device Name: *A case-sensitive of device name* specified in the Devices.xml file or adapter device information
- MTConnect Command: A valid MTConnect Command such as 'current' to get current monitoring machine data.

Examples:

http://localhost:5000/OKUMA.MachiningCenter/current for getting monitoring machine data
http://localhost:5000/OKUMA.MachiningCenter/probe for getting device information

Device information:

http://localhost:5000/OKUMA.MachiningCenter/probe MTConnect Device Streams

File Edit View Favorites Tools Help

- creationTime: 2015-02-05T16:21:00Z
- sender: DLT-LHUYNH32
- instanceId: 1423152919
- version: 1.3.0.13
- assetBufferSize: 1024
- assetCount: 0
- bufferSize: 131072

Device: OKUMA.MachiningCenter; UUID: OKUMA.MachiningCenter.123456

- manufacturer: OKUMA
- serialNumber: 123456
- Okuma MT Connect Adapter - Machining Center

Category	Type	Sub Type	Id	Name	Units	Native Units	Representation	Sample Rate	Native Scale	Statistic
EVENT	AVAILABILITY		Mavail	avail						
EVENT	FUNCTIONAL_MODE		Mfmode	fmode						
EVENT	ASSET_CHANGED		OKUMA.MachiningCenter.123456_asset_chg							
EVENT	ASSET_REMOVED		OKUMA.MachiningCenter.123456_asset_rem							

- **Axes: Axes ()**
  - **Rotary: C (S)**

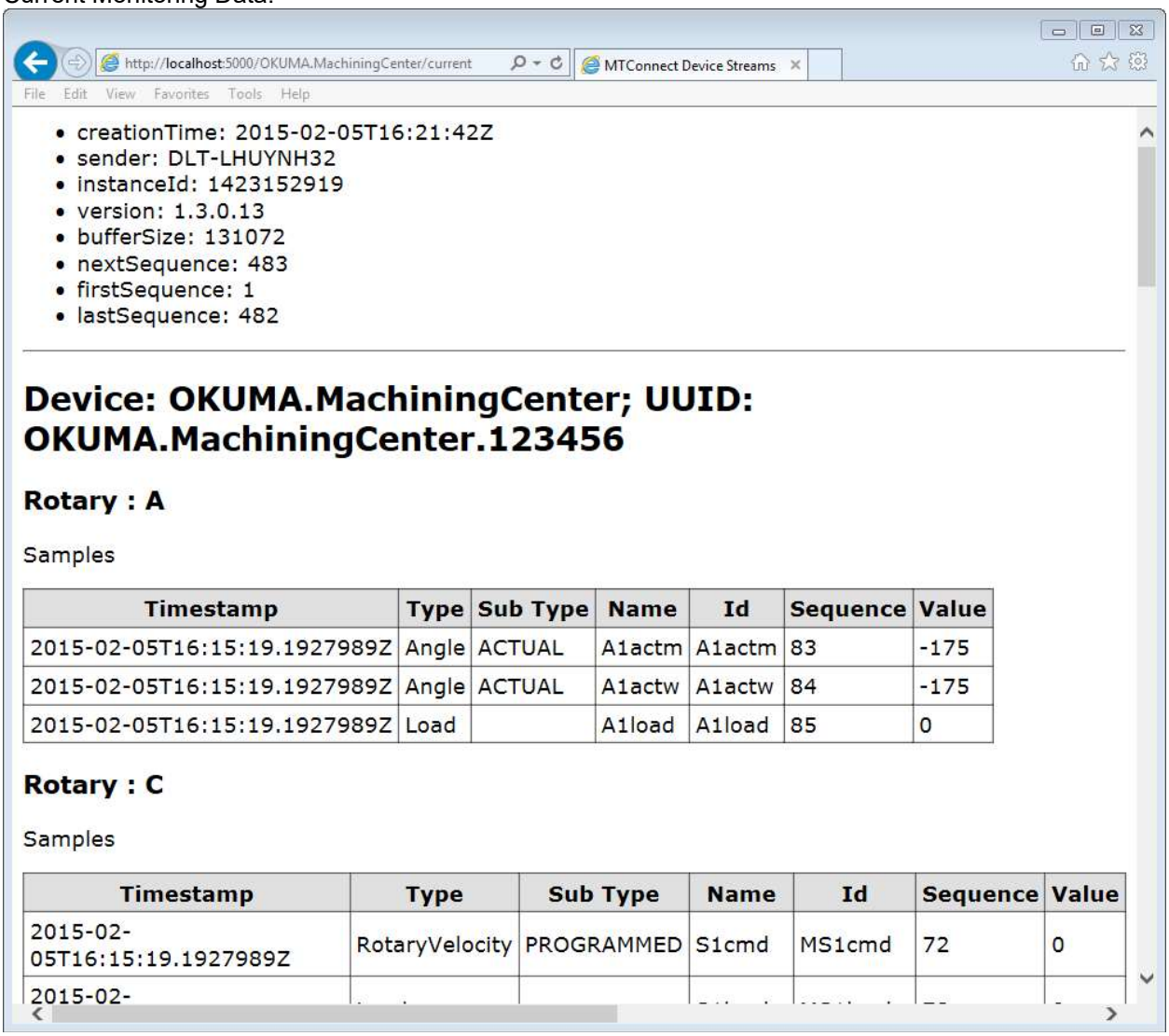
Category	Type	Sub Type	Id	Name	Units	Native Units	Representatio
SAMPLE	ROTARY_VELOCITY	ACTUAL	MS1speed	S1speed	REVOLUTION/MINUTE	REVOLUTION/MINUTE	
SAMPLE	ROTARY_VELOCITY	PROGRAMMED	MS1cmd	S1cmd	REVOLUTION/MINUTE	REVOLUTION/MINUTE	
EVENT	ROTARY_VELOCITY_OVERRIDE	PROGRAMMED	MS1ovr	S1ovr	PERCENT	PERCENT	
SAMPLE	LOAD		MS1load	S1load	PERCENT	PERCENT	
EVENT	ROTARY_MODE		MS1Mode	S1Mode			

  - **Linear: X ()**

Category	Type	Sub Type	Id	Name	Units	Native Units	Representation	Sample Rate	Native Scale	Statistic
SAMPLE	POSITION	ACTUAL	MX1actm	X1actm	MILLIMETER	MILLIMETER				
SAMPLE	POSITION	ACTUAL	MX1actw	X1actw	MILLIMETER	MILLIMETER				
SAMPLE	LOAD		MX1load	X1load	PERCENT	PERCENT				

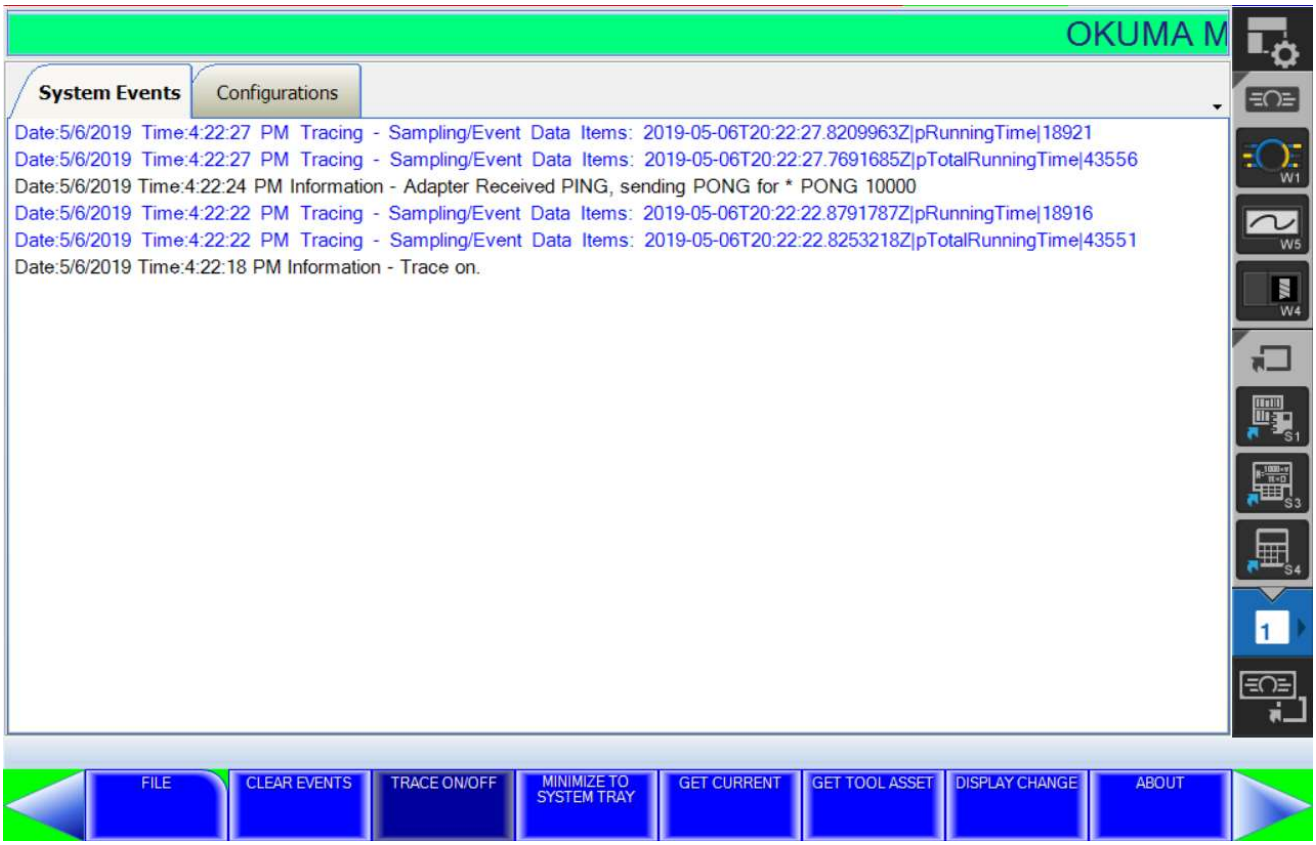
  - **Linear: Y ()**

Current Monitoring Data:



By turning the Trace ON from menu bar, any change of current monitoring data by adapter will be displayed on the System Events screen for verifying purpose. There is also a message displaying heartbeat (PING PONG

message) to connected agents for every pre-determined number of seconds for checking connectivity.



Any web browser can be functioned as an MTConnect client application to obtain machine data from an MTConnect agent.
If machine data can be obtained from the web browser with an MTConnect Agent then MTConnect Adapter and MTConnect Agent are configured and running correctly.

12. THINC-API

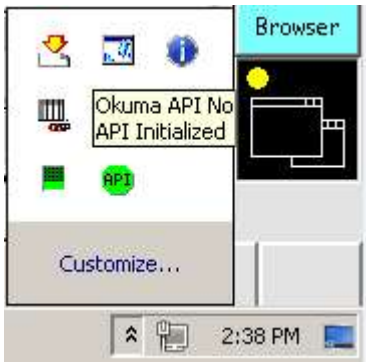
12.1 Running Statuses

After NC is fully started, THINC-API Notifier Status should have a green icon displayed at the lower right corner of the screen as shown below:

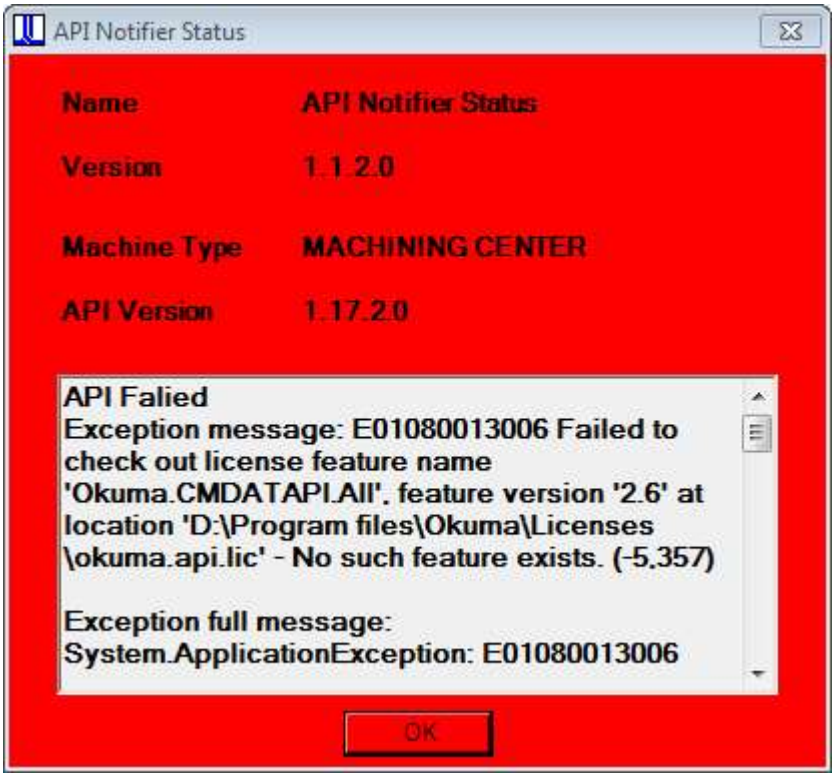
Windows XP:

Windows 7:

Note: The API icon status can only be supported on Windows 7 if THINC-API installed on target has a version 1.17.1.0 or greater.



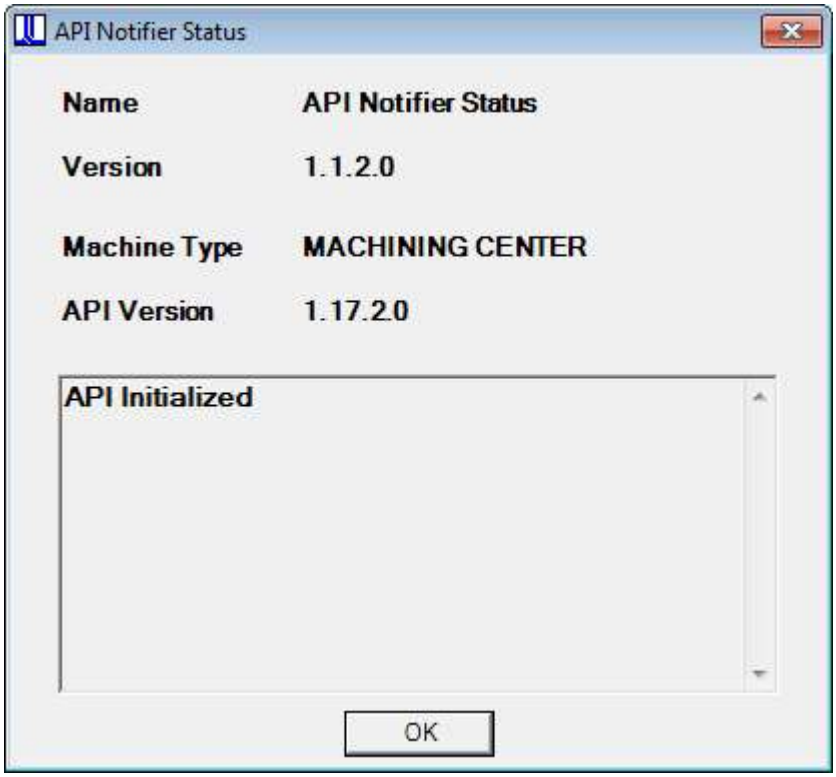
If the color of icon is red, THINC-API has encountered an error state. By clicking on the API icon, a dialog will display and show detail error message as shown in the captured image below:



Please contact OKUMA distributor for further assistant on THINC-API error.

12.2 Version

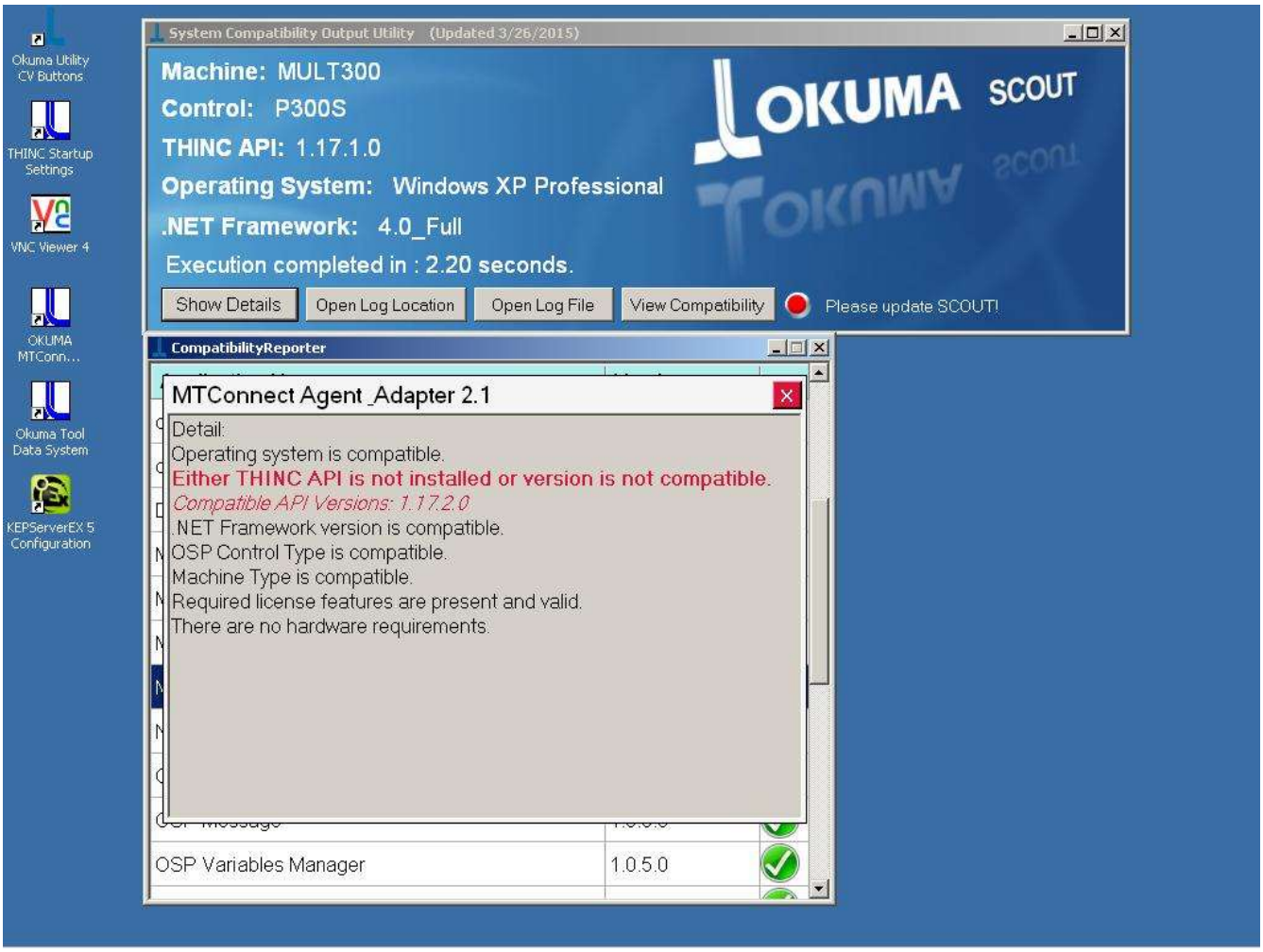
The version of THINC-API can be checked by clicking on the API icon. A dialog will be displayed and showing API version number.



13. SCOUT

To quickly check if the machine can be compatible with any verison of MTConnect Adapter, SCOUT application can be downloading from https://www.myokuma.com/scout page and runs on the control. SCOUT will identify if certain version of MTConnect Adapter can be installed the target machine or not. A green check icon is OK to install the program on the target machine. A red check icon is not compatible and requires update of other program.

Double-clicking on the application to get more information about what not compatible with current installation:


System Compatibility Output Utility (Updated 3/26/2015)
Machine: MULT300
Control: P300S
THINC API: 1.17.1.0
Operating System: Windows XP Professional
.NET Framework: 4.0_Full
Execution completed in : 2.20 seconds.
OKUMA SCOUT
Show Details
Open Log Location
Open Log File
View Compatibility
Please update SCOUT!
CompatibilityReporter
MTConnect Agent _Adapter 2.1
Detail:
Operating system is compatible.
Either THINC API is not installed or version is not compatible.
Compatible API Versions: 1.17.2.0
.NET Framework version is compatible.
OSP Control Type is compatible.
Machine Type is compatible.
Required license features are present and valid.
There are no hardware requirements.
OSP Variables Manager
1.0.5.0
Okuma Utility CV Buttons
THINC Startup Settings
VNC Viewer 4
OKUMA MTConn...
Okuma Tool Data System
KEPServerEX 5 Configuration