

CIMCO MDC-Max User Guide

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1. References

Ref1	MDC-Max Configuration Manual
Ref2	DNC-Max User Guide
Ref3	NC-Base User Guide
Ref4	MDC-Max Android Tablet Setup Guide
Ref5	
Ref6	

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2. Introduction

CIMCO MDC-Max is a real-time software machine tool data collection system that gives you instant reports and charts about your shop floor productivity. MDC-Max makes your decisions easy as they will be based on accurate data collected from your machine tools.

In today's complex and competitive global markets, it is more important than ever to maximize effective use of manufacturing equipment. CIMCO MDC-Max provides powerful machine data collection and analysis capabilities to make this task easier and gives you real-time reports including Overall Equipment Effectiveness (OEE).

All of this can be achieved without having to place a PC next to each machine tool - all the data can be collected by cable, wireless, or Ethernet (network) to be stored centrally, even if you have multiple workshops to monitor.

MDC-Max analyzes the data it collects and presents a variety of statistics and reports. This information can be directed to smartphones, tablets and TV-screens for real-time monitoring of your production. Since MDC-Max is a networked solution that stores data on a central server you can monitor production from multiple locations and access the data from anywhere.

MDC-Max integrates with the latest version of the most trusted CNC-Communication software on the market - CIMCO DNC-Max and CIMCO NC-Base. MDC-Max can thus be integrated with all the NC equipment, which can be handled by CIMCO DNC-Max in new or existing plants and with the complete CNC program management solution in the CIMCO NC-Base product.

2. Overall Equipment Efficiency (OEE)

If you want to:

- raise productivity of your NC factory?
- set goals and measure actual performance?
- enable people to respond faster to problems?
- identify bottlenecks in the current manufacturing process?
- Use existing machines efficiently

then MDC-Max can help you to improve **OEE = Availability * Quality * Performance** by monitoring:

Availability

- Percentage of time the machine is ready to produce, working properly, and not amid changeovers or adjustments
- Events that stop production
- $(\text{Scheduled Time} - \text{Stop Time}) / \text{Scheduled Time}$
- $\text{Available Time} / \text{Scheduled Time}$

Quality

- Ratio of good output compared to actual output
- Alarms which gives clues to problem areas in manufacturing process
- Issues handling times

- Operator skill level

Performance

- Total Output / Planned Output
- $(\text{Ideal Cycle Time} * \text{Total Output}) / \text{Available Time}$
- Operator interventions
- Tools usage

3. Reports, graphs, real-time display

With the build-in report functions you can easily display your data to enable you to explore down to the appropriate level to see exactly what is happening with your production schedules.

- Cycle Time per Part (min, max and average)
- Number of parts per shift / operator
- Number of scrapped parts
- Machine downtime
- Scheduled maintenance
- Unscheduled maintenance
- Setup Time per part
- Operator effectiveness
- Overall Equipment Effectiveness (OEE)
- Real-time Machine Display (see which machines are running at a glance)

4. Installation

To install MDC-Max follow the instructions below.

4.1 Locate installation files

On the CIMCO Homepage www.cimco.com press “CNC Software and Solutions”, “LEARN MORE”.

Press MDC-MAX, “Download”.

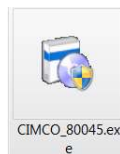
On CIMCO SOFTWARE press “Download”

Please insert your name and email to register your download and press “DOWNLOAD”

Press [Download CIMCO Software 8.x.x \(x MB\)](#) storing the downloaded files at your local disc at :
Computer / Local Disk (C:) / Users / Cimco / Downloads / CIMCO_800XX.exe, where XX is the revision number.

4.2 Run installation program

Start the installation program by clicking on CIMCO_800XX.exe program on your computer:



4.3 Select components

Now follow the instructions on the screen. If this is your first installation, you should select the server installation. If DNC-Max and NC-Base are already installed and configured, then select MDC-Max only.

If you have purchased a license for CIMCO Edit, or wish to install an evaluation version of CIMCO Edit, you should also select CIMCO Edit from the list.

4.4 Copying your key file

If you do not have a key file and wish to install an evaluation version, just proceed to the next step.

If you have received a key file, it should be copied to the MDCMax8 directory after the installation is completed.

If you have installed both MDC-Max and CIMCO Edit, the key file must be copied to the CIMCOEdit8 directory too.

4.5 Installing DNC-Max and NC-Base

Before MDC-Max can run, DNC-Max (the Machines communication platform) must be installed and configured. The DNC-Max and NC-Base (the database for all CIMCO software) installation and configuration is described in Ref2: DNC-Max User Guide and Ref3: NC-Base User Guide.

Please complete the setup of DNC-Max and NC-Base before proceeding to configuration of MDC-Max.

5. Enterprise- and Factory IT set-up

This section describes which factory set-up parameters must be considered to integrate MDC-Max.

IT topics like geographical distribution of the enterprise, data security policy, backup and restore, network topology, electromagnetic environment on sites, flow of the production in the NC factory.

5.1 Geographical distribution of the Enterprise

If more geographically separated NC Factories will be monitored in the same way by MDC-Max, it may be considered to have database and communication servers (DNC-Max Servers) installation on each site, especially for sites where the machines are not accessible from a network.



DNC-Max Network Solution
with Ethernet Serial Port Server

MDC-Max client must be available for the Operator

For enterprise reporting purposes, it may be practical that reports are built in the same way for more factories. The setup of these reports must then be copied to all factory reports setup.

5.2 Data security policy

For production data security including backup and restore, the integration of the Database (NS-Base Server) and Communication server (DNC-Max server) should be considered.

Database and Communication Server can be placed on the Enterprise network accessible from all enterprise levels. This assures the same production data security as data security at enterprise level.

Database and Communication Servers can be placed on the Enterprise network and on a shop floor network physically separated from the Enterprise network, enabling controlled Enterprise access and free shop floor access, which constitutes a more secure network setup.

MDC-Max can also be setup as a single server system with access only from the server to machines on the factory floor. In this case backup / restore and enterprise reporting must be managed locally.

5.3 Groups of NC machines

Machines may – for single operator use or sequential operations plan reasons – be grouped in cells

A sequence of operations on one job / work order may cause machines to be grouped in cells. One cell may be monitored by only one operator. The MDC-Max real time displays and operator feedback

can be configured to monitor automatic- and manual events from a cell of machines with real time displays on one or more operator screens.

6.MDC host computer requirements

Operating systems

- Windows Vista, 7, 8, 8.1 and 10 are supported.
- Windows Server 2008 / 2008 R2, and Server 2012 /2012 R2 are supported.
- 32 bit and 64 bit versions supported.

Mobile requirements

- CIMCO DNC-Max and MDC-Max Web Clients require a mobile device with internet browser.
- CIMCO MDC-Max Pocket PC client requires Pocket PC 2002 or newer.

PC hardware requirements

- 1.5GHz. Intel or AMD Processor
- 1 GB RAM
- 750 MB free harddisk space
- Open GL compatible graphics card required for backplot option in CIMCO Edit
- Monitor with minimum resolution of 1024 x 768 pixels

The MDC computer must at least contain (or have access to) the following software:

- MDC-Max Client
- DNC-Max Client
- PDF
- Access to NC-Base
- Access to DNC-Max Server

7. Configuration of MDC-Max to your factory

MDC-Max can be configured to monitor any CN factory setup. Most configurations are related to your actual factory setup, Machines build in interfaces, network setup etc. Configuring MDC-Max (and DNC-Max for communications) is described in Ref1: MDC-Max Configuration Manual.

Configuration of the MDC Client is essentially up to you to choose. You can monitor and store all the signals, which are available on the interface to each machine. The signals, which are necessary to generate the chosen OEE reports and Operator screens have to be configured (in the DNC Client).

Example: Above the OEE – Availability parameter “Percentage of time the machine is ready to produce” is chosen. To get this parameter you need the “start cycle” and “cycle stop” signal from all machines. A MDC timer to measure time between the two and a MDC counter to add all cycle times during a working day must be setup. At last a MDC report on the counter value as percentage of the working day must be setup

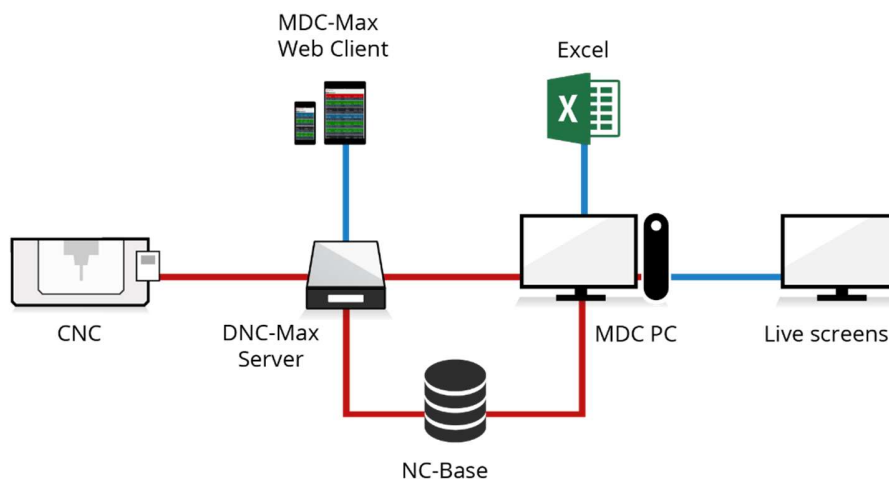


Figure: The general dataflow in an MDC-Max installation.

The factory setup, which impacts MDC-Max installation is:

- Machines interface type and protocol e.g. Serial RS232, Ethernet, FTP
- Machine interface units e.g. Cimco MDC Unit, Serial interface, Barcode reader, Workstation
- Access from MDC Server to machines: Direct with RS232 (switch), Network access via separate LAN, Network access with Enterprise network, Network access with access to VAN (internet), Wireless network access

The factory setup, which impacts MDC-Max software configuration is:

- Setup of ports to above Machines interfaces
- Setup of NC Base – database for MDC data
- Setup of DNC Server – communication to your actual machines
- Setup of MDC Client – monitoring, operator communication and reporting
- Setup of MDC Web Client – if applicable

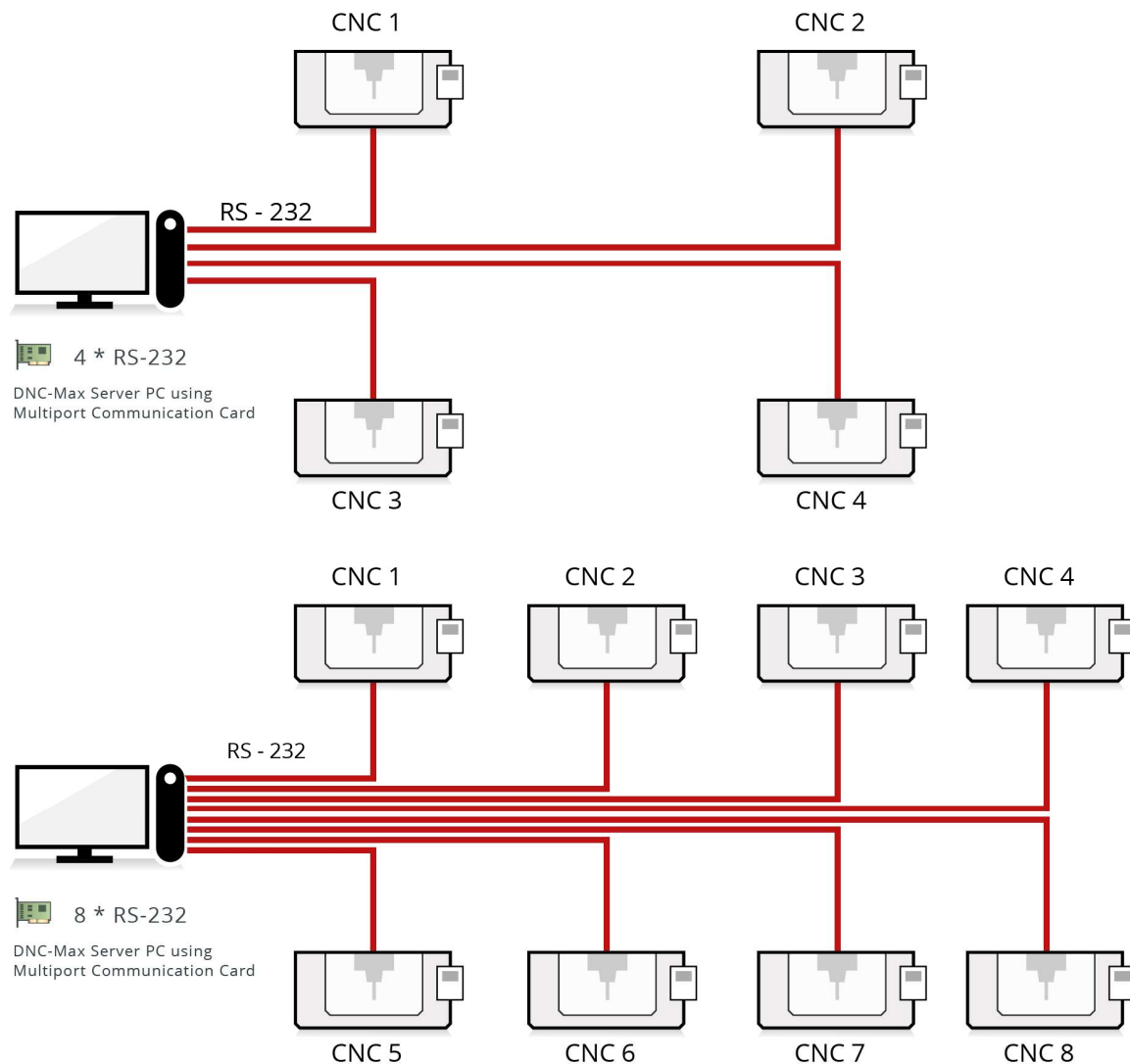


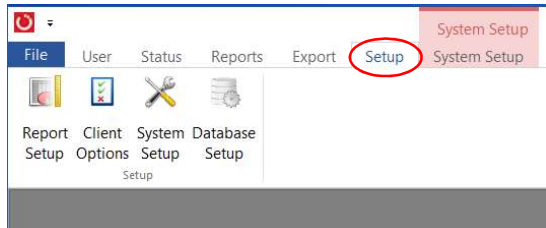
Figure: Single server solution with serial connection

MDC-Max Web Client

The MDC-Max Client can be used on all mobile units and touch screen PCs for displaying real-time machine status, entering job information and registering downtime reason codes with CIMCO MDC-Max. This is not only convenient for the operator, but also a cost-efficient alternative to having client PCs or bar code readers installed at each machine.

8.MDC-Max Client overview

The administrator client is the primary interface to setup MDC-Max Client:



Setup tab - Client Options:

Selection of MDC-Max Client appearance, language, Report directory, User/operator login, Operator display types, selection of machines for operator screens.

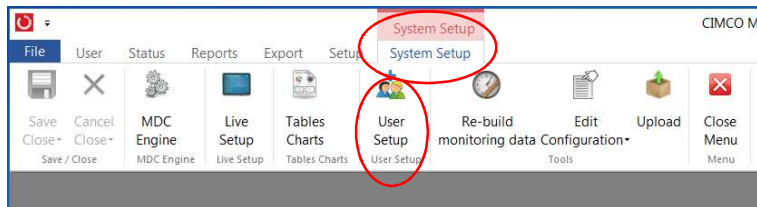
Setup tab – Report setup:

Definition of build in reports

Setup tab – Database Setup:

NC-Base Server name and access definition, Backup and recovery definition, Deletion of old monitoring data,

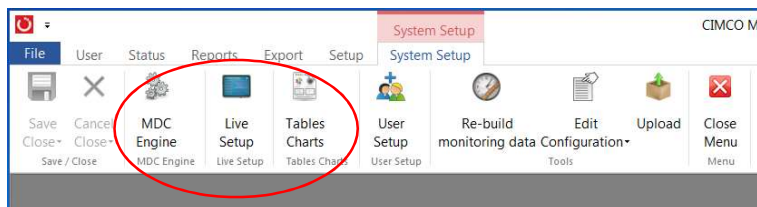
Setup tab – System Setup:



System Setup tab – User Setup:

MDC-Max user groups (typically Operators, Floor management, Administrator) and user identification, permissions and contact information. MDC-Max User Groups allocation of Status screens, tables, graphs, logs and report types.

MDC-Max Client - Technical setup



The technical setup of MDC-Max Client to your actual Enterprise, factory and machines needs is described in Ref1: MDC-Max Configuration Manual.

9.MDC-Max Machine monitoring

This section describes daily life functionality of MDC-Max after it was installed and configured specifically for your site(s).

CIMCO MDC-Max is fully integrated with CIMCO DNC-Max and CIMCO NC-Base giving you a complete DNC, document gathering, and Machine Data Collection system from one supplier.

9.1 Startup of MDC-Max monitoring

The prerequisite for MDC-Max monitoring is, that MDC-Max can communicate to the relevant machines and can store the collected data in a database for reporting purposes.

Cimco NC-Base

The data collected by MDC-Max can be analyzed immediately by the NC-Base module to produce graphs and charts showing you exactly what is happening with your production schedules. NC-Base also allows you to store any documents related to a particular job. These can be drawings, photographs of machine setups, tool lists, operation sheets, CNC programs, etc. This makes finding any information about a particular job extremely easy.

NC-Base runs as a server in the background of the NC-Base host computer, which can be connected to the Enterprise network, local factory network or on a single server computer connected directly to the machines. When configured, NC-Base Server starts automatically, when the host computer is started.

Cimco DNC-Max Server

The DNC-Max Server is the DNC engine responsible for all communications-related activities. DNC-Max Server communicates with NC-Base for CNC program management, and with MDC-Max for machine data collection and shop floor monitoring.

DNC-Max Server runs as a server in the background of the DNC-Max host computer, which can be connected to the Enterprise network or local factory network or on a single server computer connected directly to the machines. When configured, NC-Base Server starts automatically, when the host computer is started.

Cimco MDC-Max

MDC-Max is the software responsible for collecting all the machine tool data passing through DNC-Max

Every time the machining cycle or the parts counter signal is detected by the DNC-Max Server, a code is sent to the MDC-Max software. Because of the variety of types of machine controls the monitored signals may vary depending on customer requirements. These codes are recorded in real-time on the computer system and can be displayed immediately in a graphical format. If a machine is not in production for any reason the operator can scan a barcode to let the MDC-Max system know why the machine has stopped. Typical barcodes would be for the following reasons: Waiting for Setter, Waiting for Maintenance, Waiting for Tooling, Waiting for Material, etc. As MDC-Max records all this

information you can then produce reports to see how much production time has been lost due to such interruptions.

9.1.1 Start of MDC-Max usage

When you are an MDC-Max user, a MDC-Max Client is installed on your computer.

This icon will be present on your computer's desktop:

Click the icon to start MDC-Max.



Often 3 MDC-Max user groups are defined:

- “User” of real-time reports called Status screens, that show the status of the selected machines in your NC factory. You can also generate reports from historical data as User
- As “Operator” you can use the Operator screen, which typically includes:
 - o a list of machines monitored by MDC-Max,
 - o Operator Login / logoff buttons,
 - o buttons for entry of operator input to MDC-Max e.g. reasons for NC machine stops
 - o status fields e.g. machine alarms, operator notifications etc.
- An “Administrator” is able to change the MDC-Max configuration including
 - o Add, change, or remove Users and their authorization to view data
 - o Setup and change the monitoring configuration as described in Ref 1: MDC-Max Configuration Manual

User groups and their privileges are defined by the customer's MDC-Max administrator.

The MDC-Max Web Client access can be defined by an administrator:

1. Connect to the relevant DNC-Max Server in the DNC-Max Client – “Setup” – “Select server” menu
2. Enable “MDC-Max Web client” in DNC-Max Client – “Setup” – “Server configuration” – “Web Clients” menu
3. Setup “Username” and “Password” in the menu
4. Set Port number to 8001 in the menu.
5. Restart the DNC-Max Server (see point 1). When changes are accepted by clicking “OK”, DNC-Max suggests restart.

The User can now log into the MDC-Max Web Client by inserting following address in a Web browser's address field:

[HTTP://<IP address from point 1 above>:8001/](http://<IP address from point 1 above>:8001/)



9.1.2 User Login

Users from defined User groups can log in using the correct password:

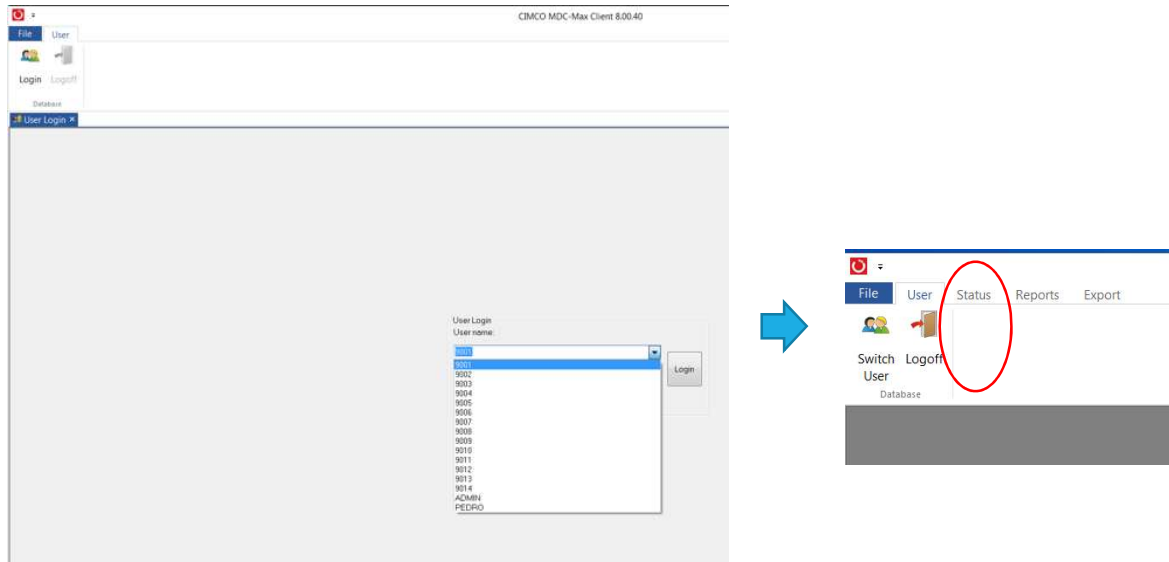
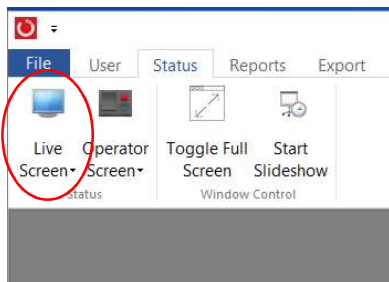


Figure: Operator with ID 9001 logged in-to MDC-Max Client on PC

Status tab

The Status tab is used for real time display of the status of the machines defined in MDC-Max.

Status consists of monitored parameters sent automatically by the machines and the manual status sent by the Operator – both via the connections from the machines to MDC-Max.



Status can be presented on the Live Screen (see below).

Manual status inputs can be sent from the Operator Screen

9.1.3 Live screen

The Live Screen shows the real-time status of the selected machines in your factory, hence you can select the machines, that are interesting for each MDC-Max (Web) Client installed. The following description is an example of how a typical Live Screen can be setup. This is subject to change by the MDC-Max administrator. You can have more Live Screens setup for different user groups.

Here the Live Screen shows the machine name (**HMC-204**) in a colored bar with

Green = Running and **Red** = Stopped.

The running Program ID (**541-4674**) is shown as well as the Operator name (**Marv**). The time spent in this cycle (**00:15**) and Planned Cycle Time (**03:50**).

The bar under the Machine status bar shows some calculated values, which extend beyond the current program on this machine: **HMC-204** has been in the “**Cycle**” mode for **0:14:00** during the last shift and has been **stopped** for **0:08:16**. It has **produced 6 good parts, no faulty ones**. The current **OEE values** (detailed and calculated values) are shown in respectively Avail, Perf, Job, Q, and Job OEE.

At the end of each bar the alarm status from each machine can alert an operator or the support team of an unmanned machine. Alarms can be filtered to show only critical alarms.

The screenshot shows the CIMCO MDC-Max Client 8.00.40 interface. It features a menu bar (File, User, Status, Reports, Export) and a toolbar with icons for Live Screen, Operator Screen, Toggle Full Screen, Start Screen, and Slideshow. Below the toolbar, there are two rows of machine status information. Each row includes a 'Real Time' indicator, machine name, program number, operator name, this/last cycle times, planned cycle time, and various performance metrics. Buttons for 'FeedHold' and 'Alarm' are also present.

Machine	Program	Operator	This/Last Cycle	Planned Cycle Time	FeedHold	Alarm
HMC-204	541-4674	Marv	00:15	03:50	Running	Alarm
In Cycle this Shift: 0:14:00 Parts Produced: 6 Job Running Time: 0:48:57 Stopped this Shift: 0:08:16 Scrapped Parts: 0 Job OEE: 88% Avail.: 97% Perf.: 91% Q.: 100%						
HMC-518	543-4666	Wallace	03:51	03:50	Breakdown	Alarm
In Cycle this Shift: 0:15:24 Parts Produced: 10 Job Running Time: 1:03:07 Stopped this Shift: 0:06:52 Scrapped Parts: 0 Job OEE: 84% Avail.: 89% Perf.: 94% Q.: 100%						

9.1.4 Operator Screen:

The Operator of a NC machine may be present at the control of the machine or may be responsible for a cell of machines. Correspondingly, the Operator can act directly to a problem, that is holding up production on the machine.

MDC-Max is configured to collect a number of events (e.g. Cycle start, Cycle stop) through the available interface on the NC Machine. These events are sent and registered automatically. Some events cannot be detected automatically and have to be sent manually to MDC-Max (e.g. Operator ID, the reason for Cycle stop, Job/Order number). The way to enter these manual status inputs depends on the interface to the machine:

9.1.5 Bar Code Reader (BCR)

A BCR can be connected to the existing machine serial interface by the second serial connector on the MDC-Box. The Operator is able to scan his/her ID as well as the Reason code for downtime to be sent to MDC-Max along with the Machine ID and other automatic status codes.

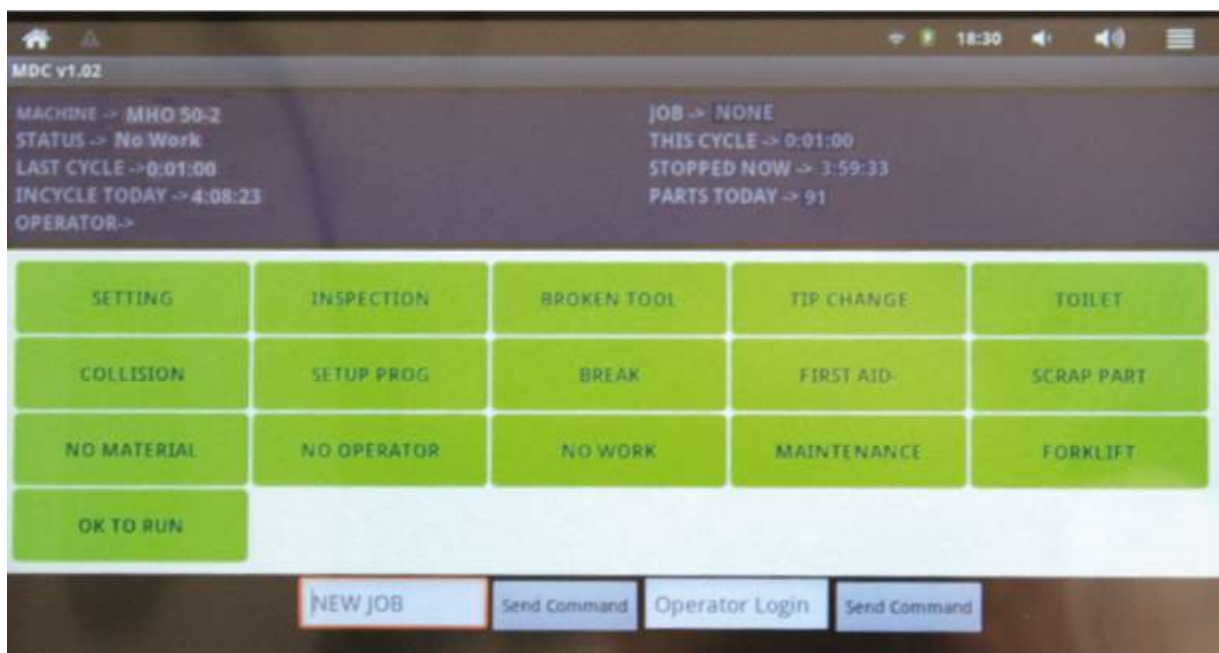
Printed Bar Codes of Operator ID and Reason codes must of course be present at the relevant machine.

9.1.6 Tablet solution

Today tablets are an exciting and relatively inexpensive alternative to using barcode readers or touch screen PCs for displaying real-time machine status, entering job information and registering downtime reason codes with CIMCO MDC-Max. A CIMCO MDC App running on an Android SuperPad tablet with 10" touch screen mounted above the machine control is an inexpensive alternative described in Ref. 4



The CIMCO MDC App interface is divided into three sections:



Status Area

Displays the current status of the machine (up to 10 items) and typically shows the machine *name*, current *job*, machine *status*, cycle *time* and number of *parts*. These data are for information display only and can be configured at install time. The data are updated in real time from CIMCO MDC-Max.

Reason Code Area

Displays up to 25 static buttons each with a downtime reason code. These buttons are tapped by the user when the machine stops and will change the current machine status (displayed in the Status Area).

Input Area

This area can have up to four input boxes which are used to enter the Job Number, Part Number, Operator names, or Op Number. The user taps the input box and uses an on-screen keyboard to enter the data.

9.1.7 Status tab - Operator Screen

If the Operator can access a MDC-Max PC, the manual inputs can be entered directly on the MDC-Max Operator screen or on MDC-Max Web Client (an example is shown below). The Operator Screen can be configured for each machine (type) and show relevant status information.

The Operator screen (in this example) includes a list of machines selected for monitoring.

The Operator Log In button is used to identify the Operator. The time of Log in is registered. Operator Log Off button clears the field “Operator” on the Operator screen.

The screenshot displays the MDC-Max Operator Screen interface. At the top, a green banner indicates the machine is "Running". On the left, a list of machines is shown: HMC-204, HMC-518, VMC-48, VMC-70, and VMC-86. The main area contains several buttons: "Operator Log In", "Operator Log Off", "Report Downtime" (highlighted with a red rectangle), "OK to Run", and "Job Finished". On the right, a form displays machine details: Machine (HMC-204), Job (541-4674), Operator (Marv), Running Time (0:56:15), New Job (empty field), and No. of Scrapped Parts (0).

Figure: Operator Screen

The Report Downtime-button is configured to only work when the machine is not in running mode (green). Then by click on Report Downtime the following sub-screen appears:

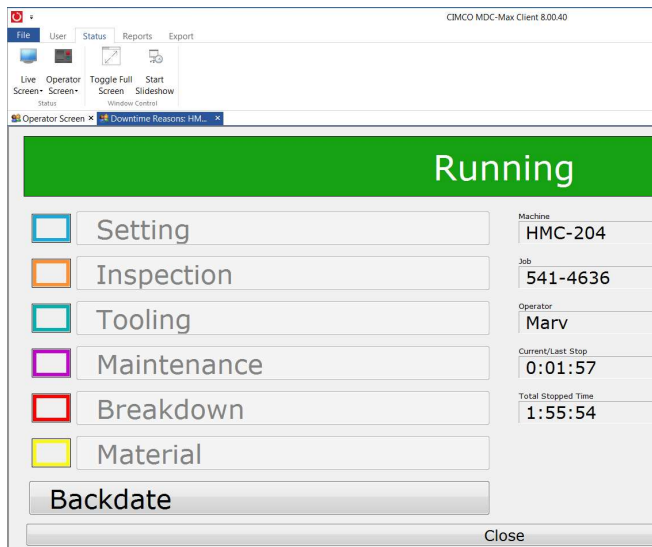


Figure: Operator Screen, Report Downtime sub-screen

If for example the Inspection button is pressed, the sub-screen is closed and the view returns to the main Operator screen:

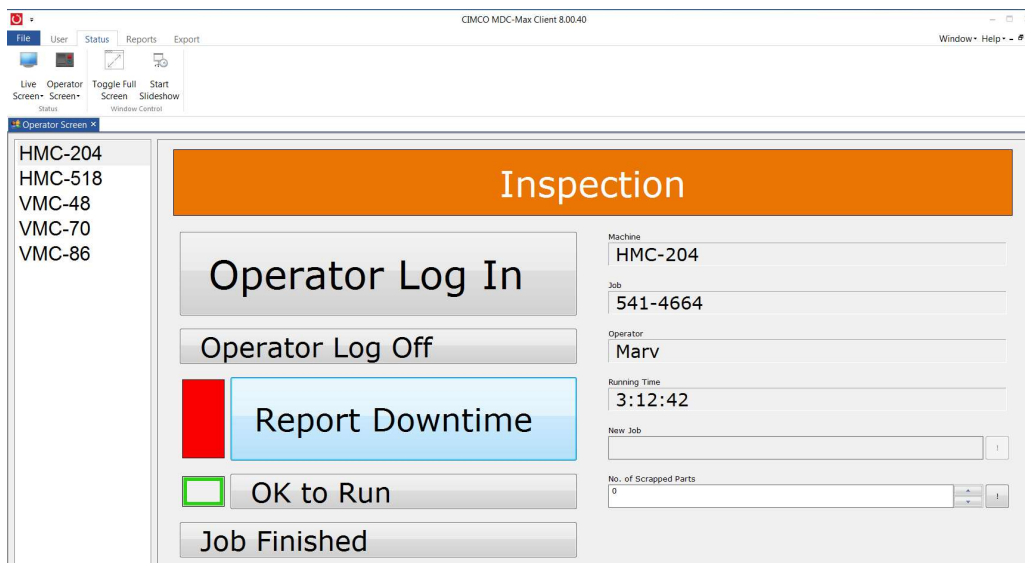


Figure: Inspection reported by Operator as reason for stop

Inspection state is shown on the Operator screen and Report Downtime indicates (red), that the machine is stopped.

The OK to run-button is here configured to reset status for all the Downtime reasons. An option is to have a Stop button for each Downtime reason, e.g. Inspection stopped.

The right-hand part of the Operator screen shows some machine status information (Machine, current Job, name of the Operator currently logged in, and Running Time).

New Job ID can be entered when the machine is in stopped state and No. of Scrapped Parts can be entered by the Operator.

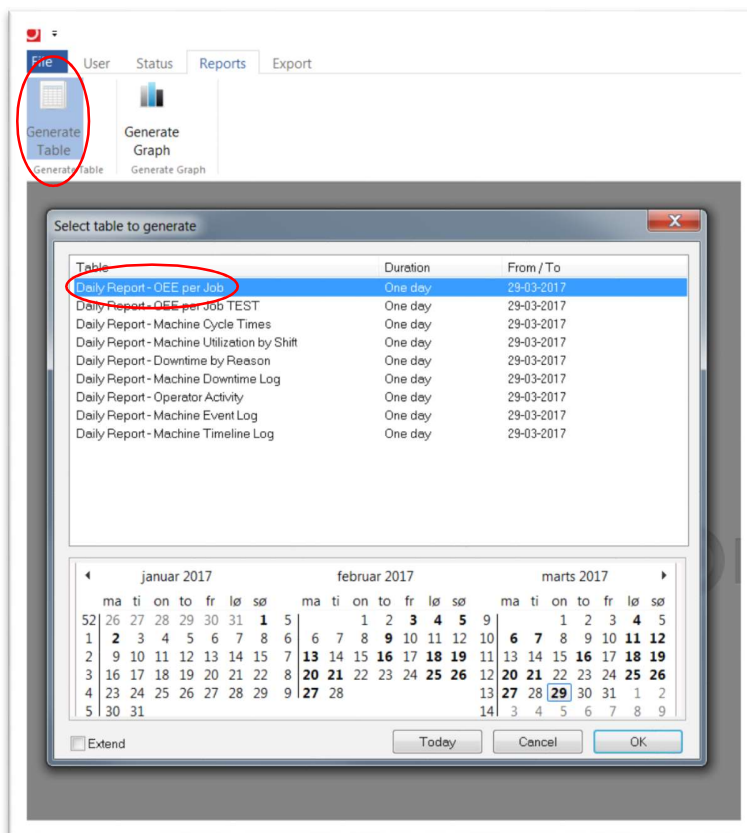
9.1.8 Status tab – Toggle Full Screen

By pressing Toggle Full Screen the Live Screen or Operator Screen occupies the full screen.

Normal MDC-Max Display is obtained by pressing <F11> button.

9.1.9 Reports tab – Generate Table

Click the Reports tab and subsequently the Generate table-button in order to generate the predefined tables listed.



The data in the tables is MDC-Max processed data stored in the database (NC-Base).

In this example, the OEE = Availability * Performance * Quality per Job is calculated on 29. March 2017 for all machines monitored.

Other configurable reports are listed under this report.

The resulting report is shown hereunder.

Figure: Reports generation in MDC-Max

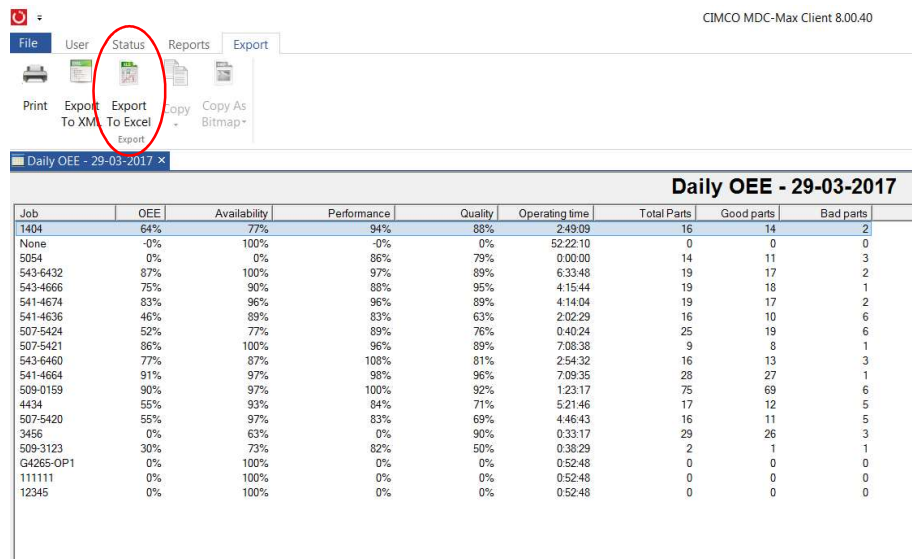


Figure: MDC-Max display: Daily OEE report – 29-03-2017

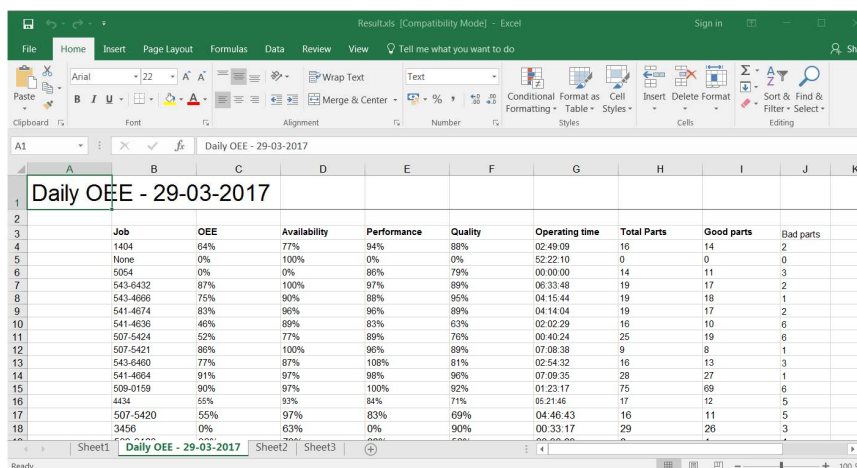
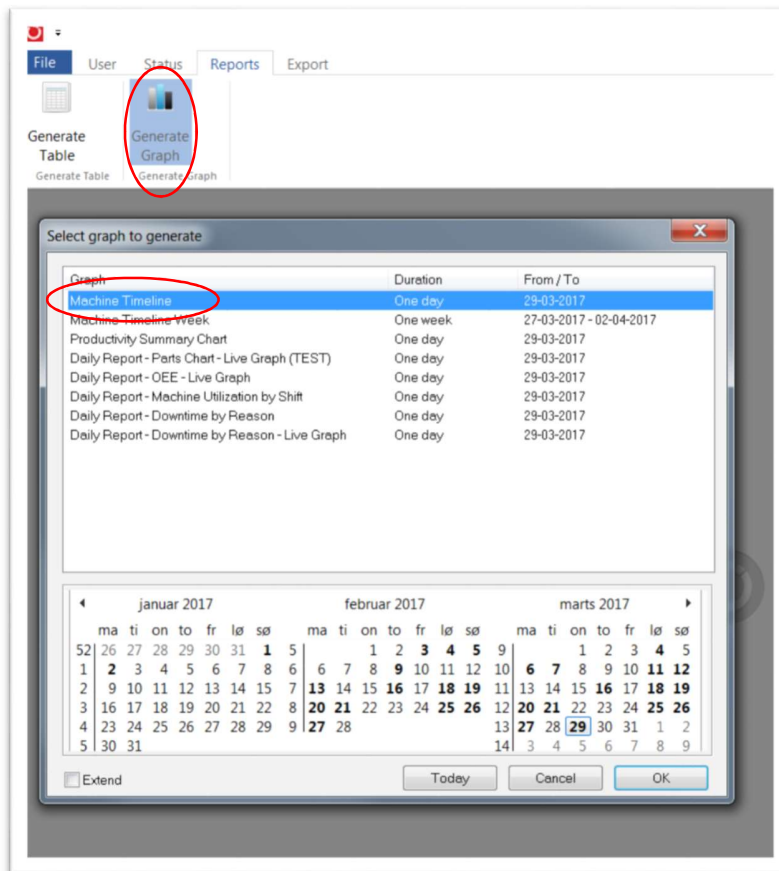


Figure: Exported Excel datasheet: Daily OEE report – 29-03-2017

9.1.10 Reports tab – Generate Graph

Click the Reports tab and subsequently the Generate Graph-button in order to generate the predefined graphs listed.



The data in the graph are MDC-Max processed data stored in the database (NC-Base).

In this example, the Machine status is shown in a timeline on 29. March 2017 for each machine monitored.

Other configurable graphs are listed under this report.

The resulting report is shown hereunder.

Figure: Graphs generation in MDC-Max

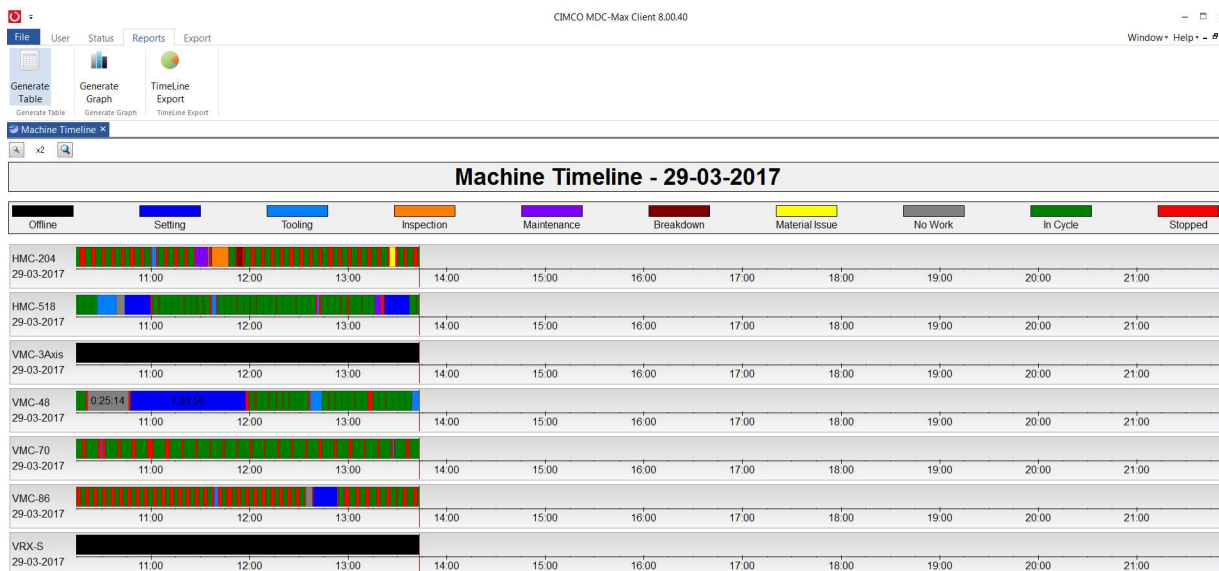


Figure: MDC-Max display: Machine status timeline – 29-03-2017

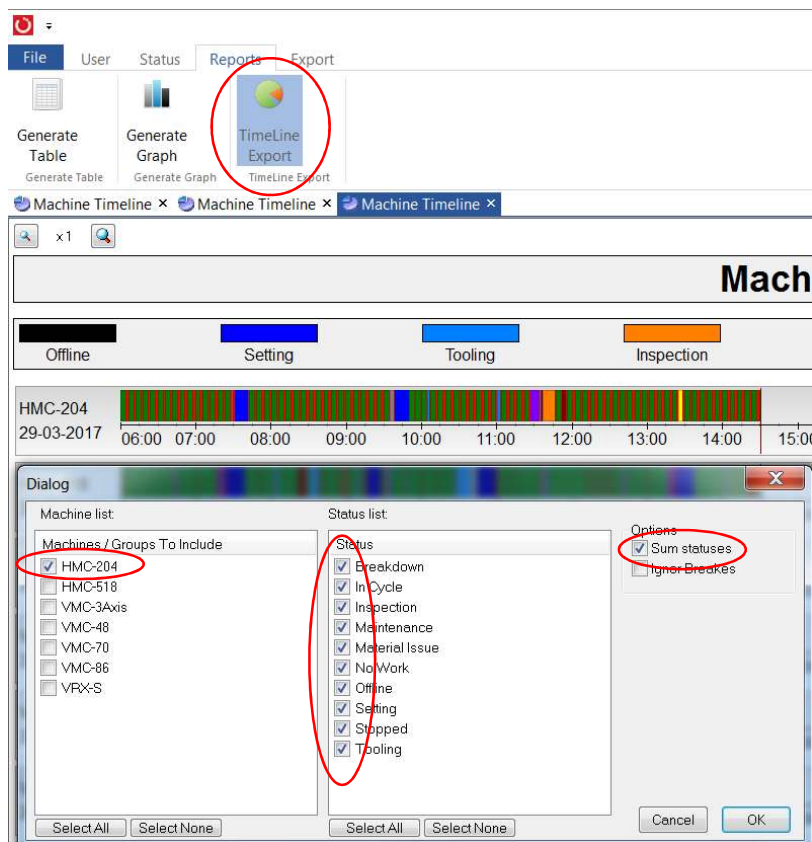


Figure: TimeLine Export: HMC-204 machine in all states 29-03-2017

Machine Timeline - 29-03-2017

HMC-204 8:34:50

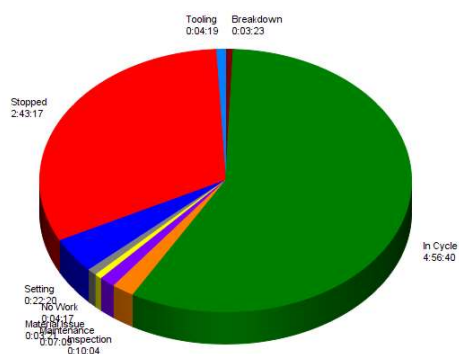


Figure: Machine timeline statistics chart

Productivity Summary Chart - 29-03-2017

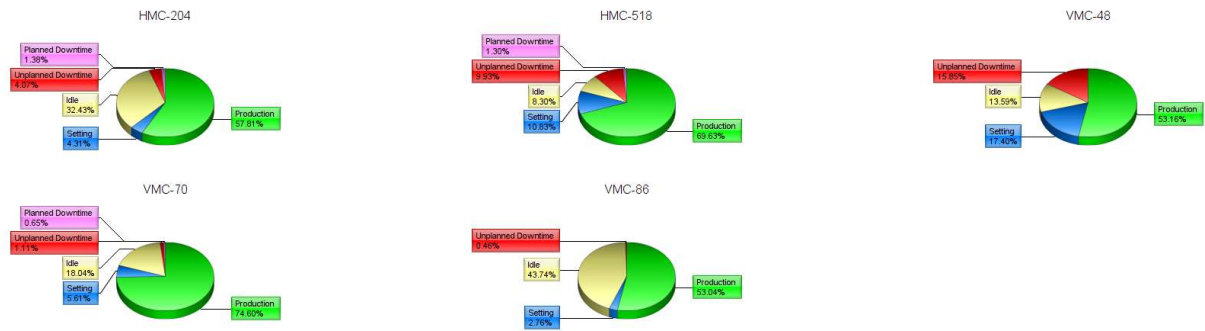


Figure: Productivity summary chart for all machines

9.2 Operator Notifications

In the MDC-Max Client administrators can define various messages for the machine. These messages are then displayed on the Operator Screen of that MDC-Max Client. Typically, the operator notification is used for announcing that the system is under maintenance, but it may also be used for any other kind of information for the operator, like meeting, training ...



Figure: Operator notification Setup in Administrator's setup window

Setup:

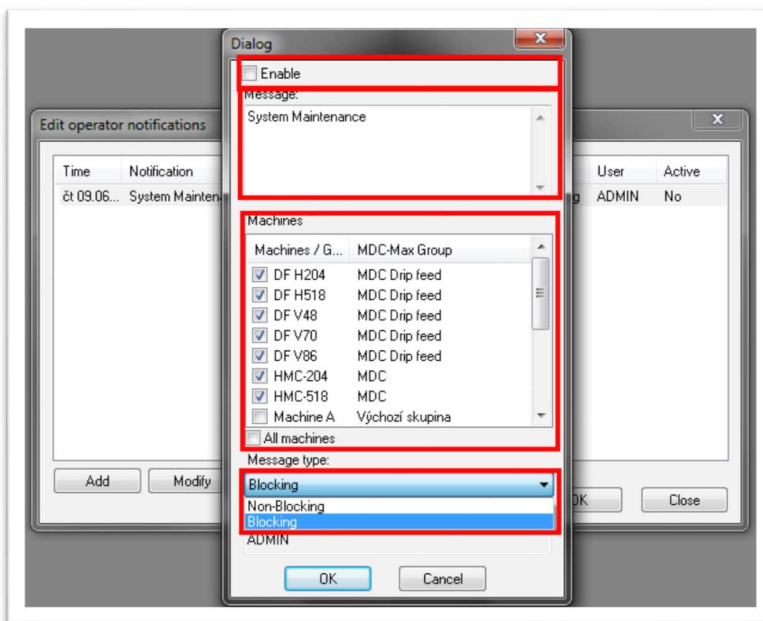


Figure: Operator notification setup dialog

Enable: Set the notification as active.

Message: Messages to be displayed on the operator screen

Machines: Every MDC-Max Client has to be assigned to the machine, then the operator notification is displayed on that MDC-Max Client.

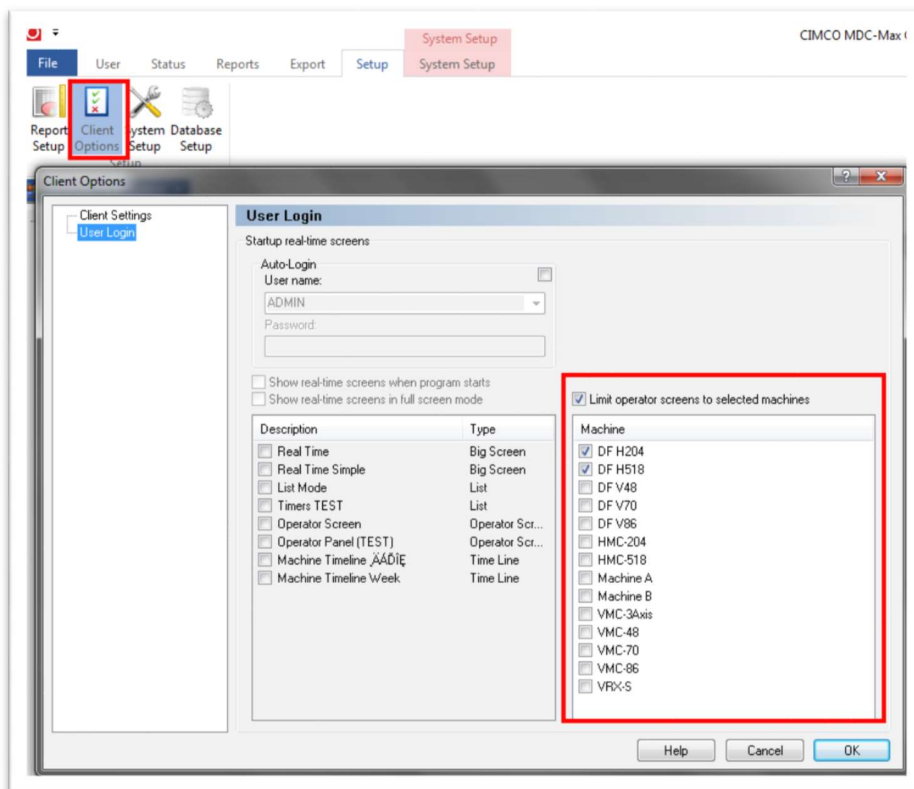


Figure: Assign MDC-Max client to the machine

Message type

- Blocking: The Operator notification tab is blocking all other tabs/functions.
- Non-Blocking: The tab is displayed but is not blocking other functions.

9.3 MDC-Max events - Send SMS

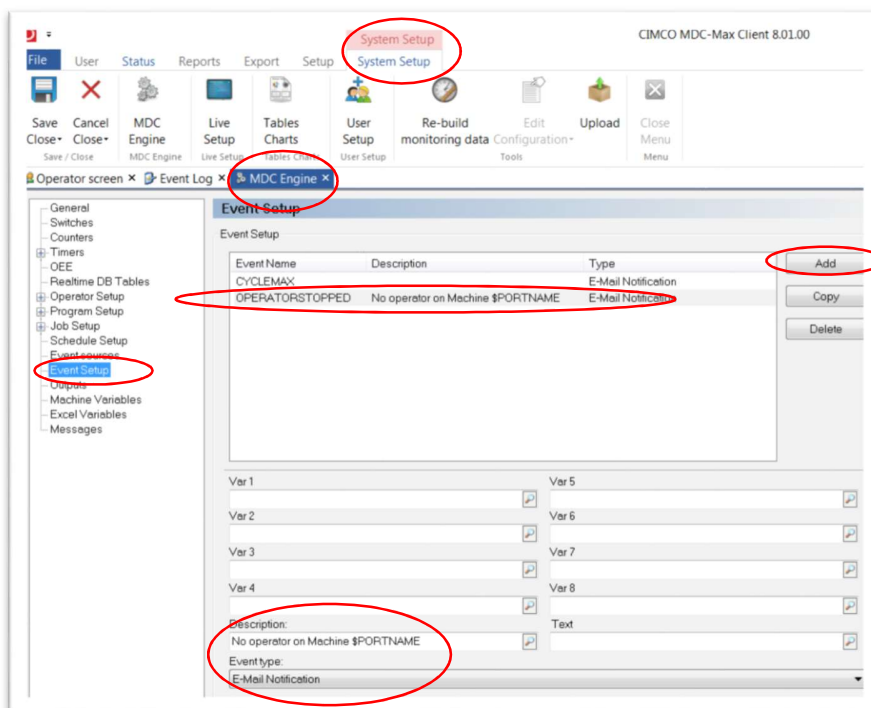
In MDC-Max an administrator can define events and these can be sent to an SMS or email to alert someone that something needs to be looked at. The MDC-Max Events are set up in the MDC-Max client and the Email/SMS settings are set up in the DNC-Max server setup by the DNC-Max Client.

In the following example setup, an Operator is logged on and off on port HMC-204. An SMS is sent to the manager's telephone no. by the modem connected to the COM1-port (not connected here) and the email server on port 25 (not connected here). The result is seen in the System log (last screenshot).

MDC-Max Client - System Setup – MDC Engine - Event Setup

Add Event

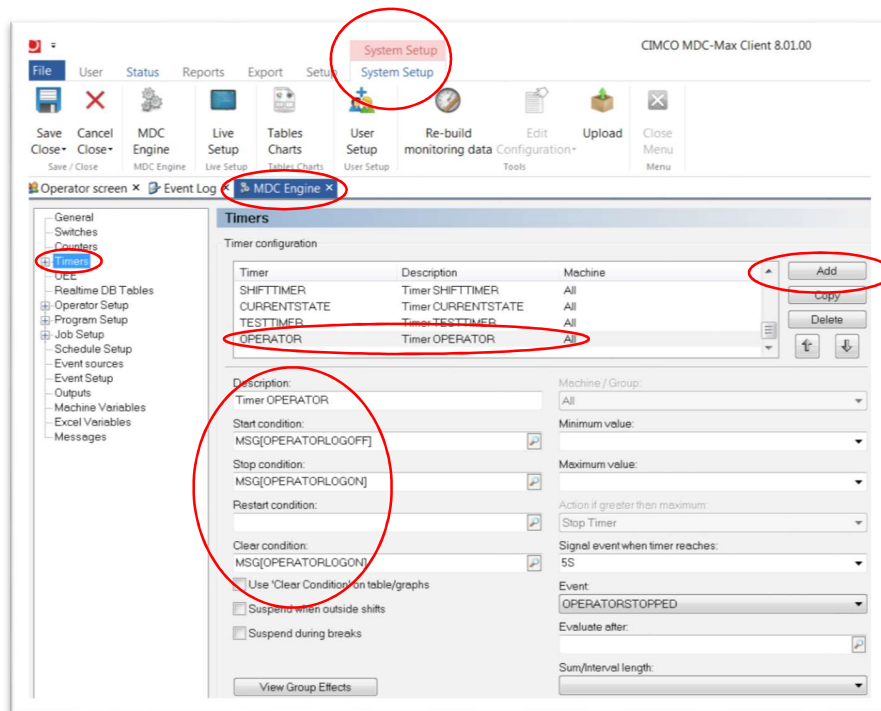
Use the Add button to add events. The description is the text sent in the SMS. Event type can only be set to Email notification.



Setup Timer (OPERATORSTOPPED)

MDC-Max Client – System setup - MDC Engine - Timers

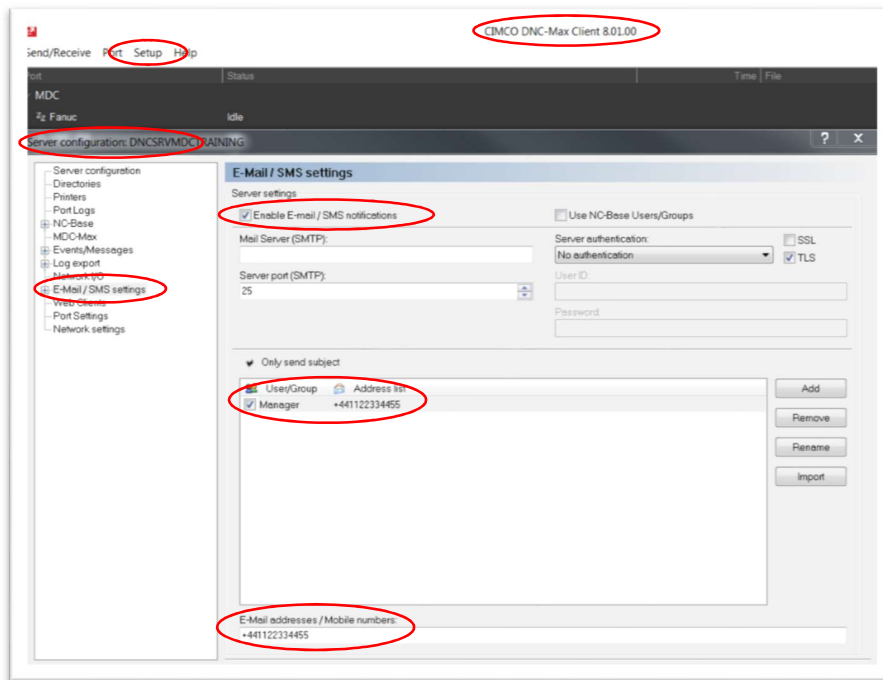
Set when the Event OPERATOR should be triggered. In this example, the event Operator will be triggered when the Timer OPERATOR reaches 5 seconds.



Enable Email/SMS settings

DNC-Max Client – Setup - Configure Server - Email/SMS settings

Enable Email/SMS. Add users and set mobile numbers that SMS should be sent to.

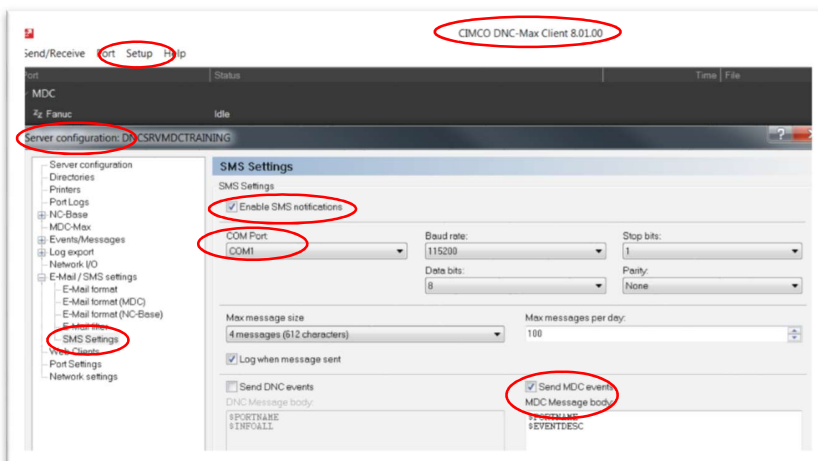


Enable SMS settings

DNC-Max Client – Setup - Server configuration - Email/SMS settings - SMS Settings

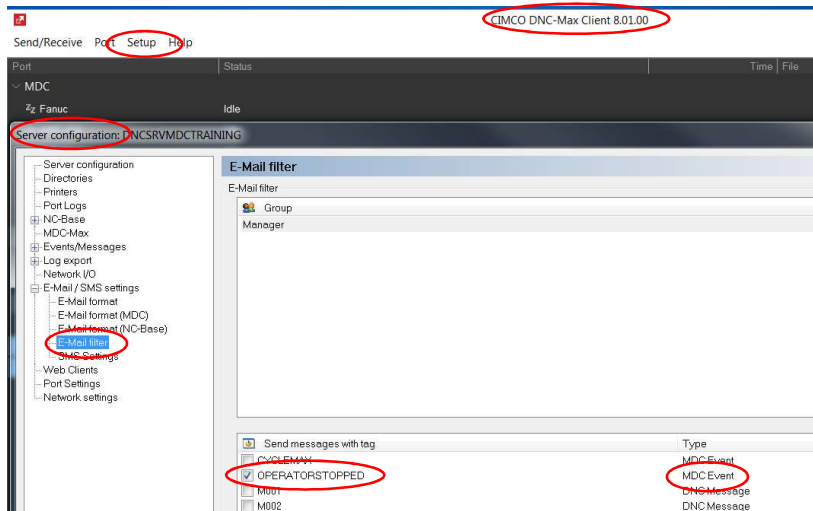
Enable SMS notifications and set the Com port that SMS modem is connected to.

Check if MDC Events and/or DNC events should be sent via SMS.



DNC-Max server - server configuration - Email/SMS setting - Email filter

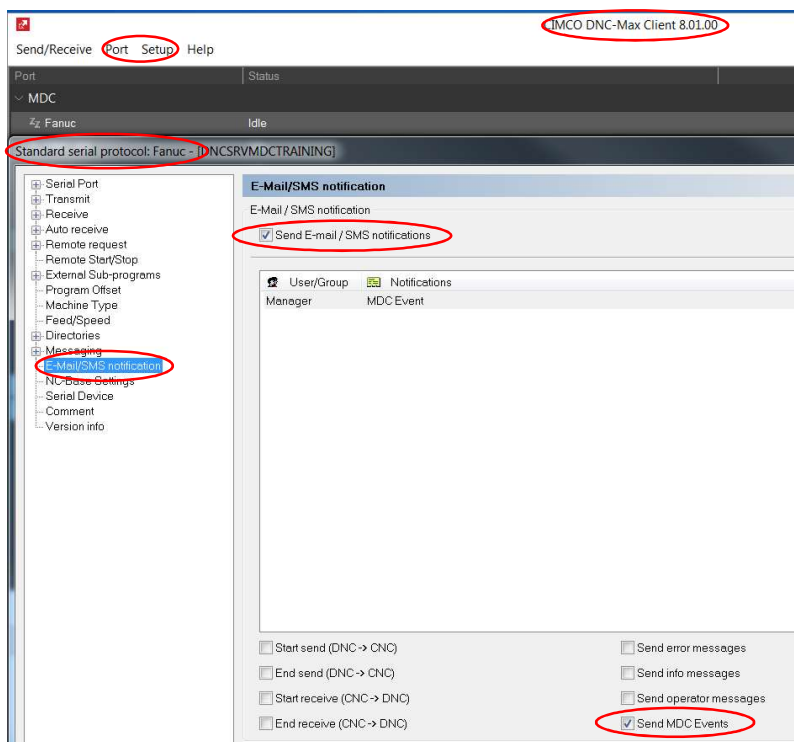
Select which MDC events you want to be sent to the User



DNC-Max client - Port configuration - Email/SMS notification

For each port/machine you can set which events are sent.

Use the Global change check box if you want all ports to send MDC Events



In this example an Operator is logged on and off on port HMC-204.

The Server log – viewed on the DNC-Max Client – shows “No operator on Machine HMC-204” sent by SMS.

