



# **MDC-MAX**

## Automated Excel Reports Setup Guide

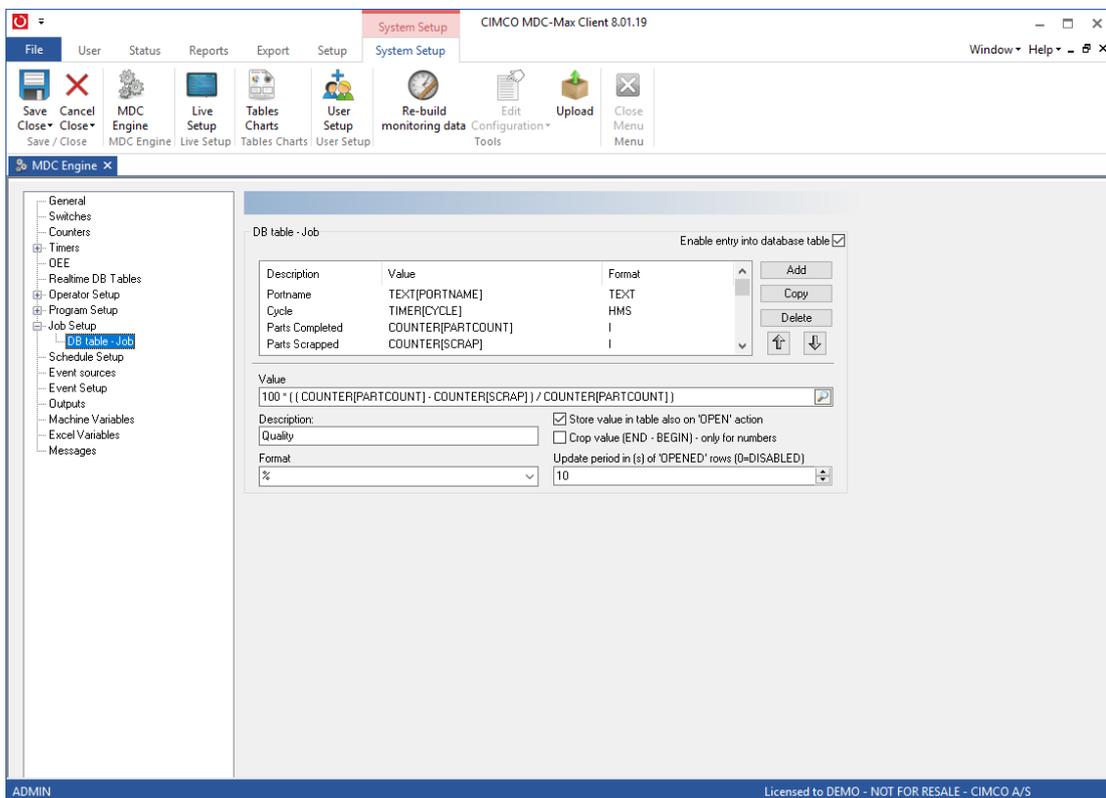
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# Configure database fields in MDC-Max

Before your MDC data can be imported into Excel it must first be made accessible. By default, MDC-Max has three *mdc database* tables where our data can be stored and queried from; *monitorjob*, *monitoroperator* and *monitorprogram*. For each of these tables, it can be configured what fields they include and thereby what data is available for import into Excel.

For this guide we will use the table *monitorjob* and the following steps describe how to add fields/data to this table in MDC-Max.

1. Open the MDC-Max PC Client and log in with a user that is authorized to make changes to the MDC Engine.
2. Select the Setup tab and click the System Setup button to reveal the System Setup tab. In the System Setup tab, click the button MDC Engine.
3. In the menu tree, select DB table - Job under Job Setup. This is where the *monitorjob* table is configured.



4. The list in DB table - Job shows all the fields that are made available in the *monitorjob* table. Use the Add button to add more fields to the table as needed.

# Import MDC data into Excel

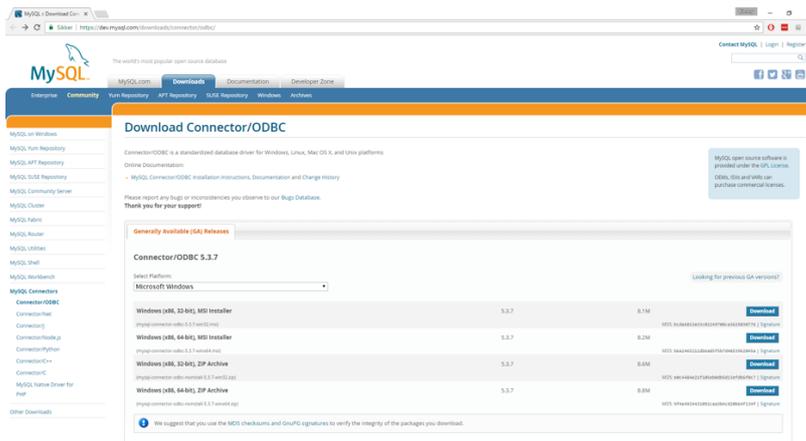
To create reports with graphs and charts using Excel, you first need to import the MDC data from the MDC database located on the CIMCO Database Server. Since Excel do not have built-in functions for connecting to MySQL based databases, you need to download and install an ODBC driver, which will handle the data connection between the database and Excel.

This section will walk you through how to download, install and configure the MySQL Connector/ODBC driver required to import data from the MDC database to a spreadsheet in Excel. The MySQL Connector/ODBC is the name for the family of MySQL ODBC drivers that provide access to a MySQL database using the industry standard Open Database Connectivity (ODBC) API. It is a standardized database driver for Windows, Linux, Mac OSX, and Unix platforms.

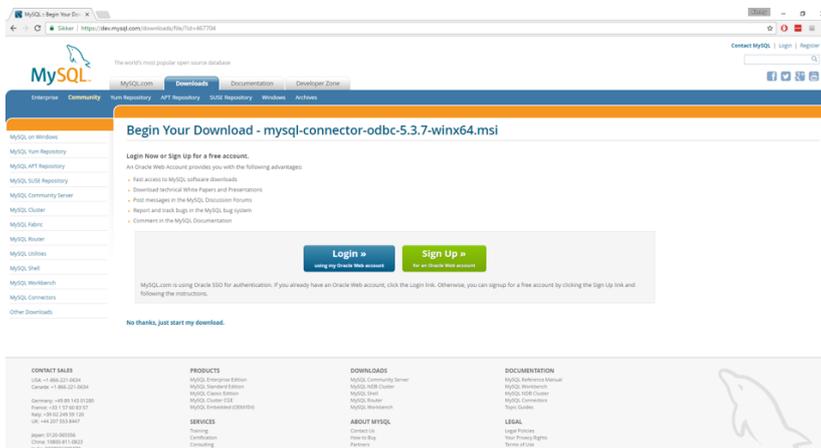
## 1. Download and install the MySQL Connector/ODBC driver

The MySQL Connector/ODBC driver can be downloaded from [mysql.com](https://dev.mysql.com/downloads/connector/odbc/) at this url:  
<https://dev.mysql.com/downloads/connector/odbc/>

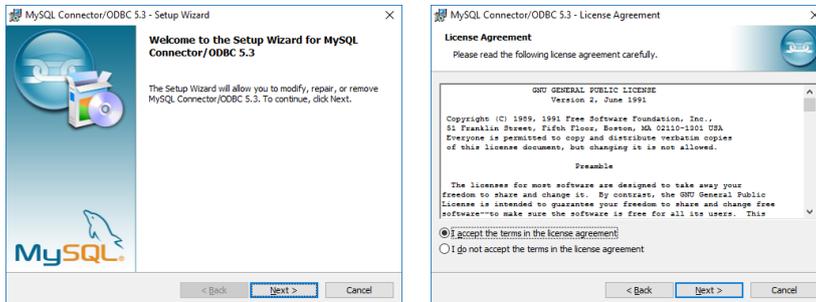
1. Fill out the form on the page to get a list of installers for your version of Windows. Identify the Windows MSI Installer that corresponds with your version of Windows and click the Download button.



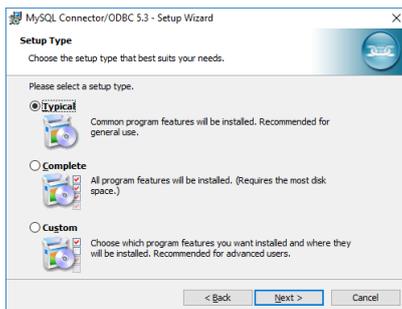
2. On the next page called "Begin Your Download", scroll to the bottom of the page and click the link "No thanks, just start my download." to skip the login and signup process. This will start the download.



3. Locate the downloaded file on your computer and run it. This will start the MySQL Connector/ODBC Setup Wizard.
4. Click next on the first screen. On the next screen, read and (if you agree) accept the License Agreement - then click next.



5. On the screen "Setup Type", choose Typical and click the Next button. Alternatively, choose Custom, if you need to change the destination folder or need to customize the installer in other ways.



6. On the next screen, verify your settings and click the Install button to start the installation process.
7. Once the installation has completed, click the Finish button to close the installer.

## 2. Configure data sources

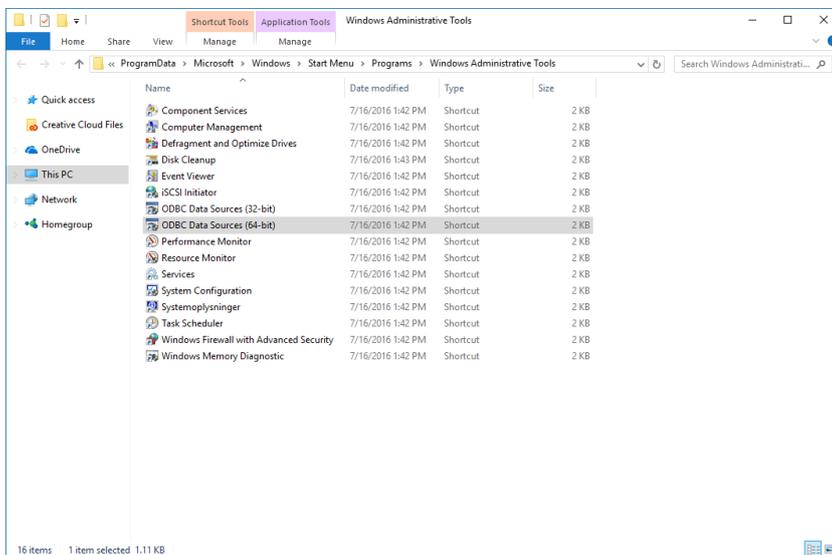
To import data from the MDC database located on the CIMCO Database Server, we need to create a so-called data source. A data source associates a particular ODBC driver with the data to be accessed through that driver.

To setup or configure existing data sources, open the ODBC Data Sources as shown in the following steps.

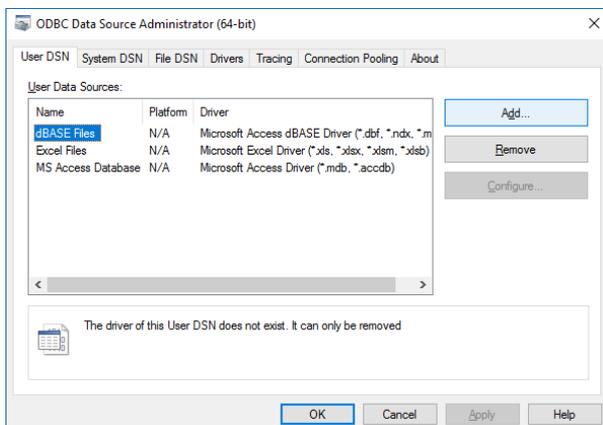
1. In Windows 10, open the search dialog by clicking the search icon in the taskbar. Search for "ODBC" and select either the ODBC Data Sources (32-bit) or ODBC Data Sources (64-bit) depending on what version of the ODBC driver you installed (32 or 64-bit). It is important that the versions match since, otherwise, connections will not work.

Alternatively, the ODBC Data Sources files can be located at:

C:\ProgramData\Microsoft\Windows\Start Menu\Programs\Administrative Tools



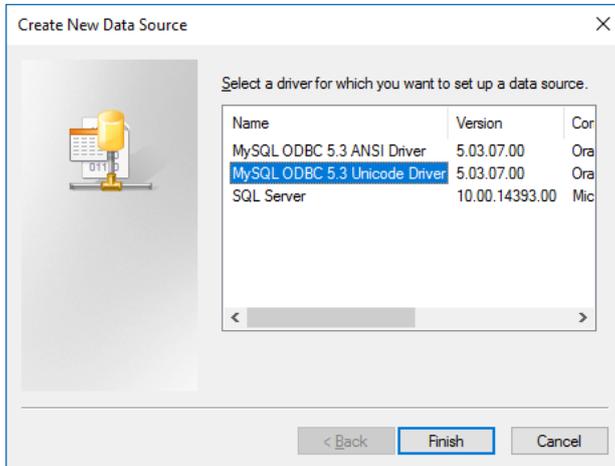
2. Running the ODBC Data Sources will open a window called ODBC Data Source Administrator. This window contains several tabs such as User DSN, System DSN and File DSN. To add a new data source, select the User DSN tab and click the big Add button at the right side of the window.



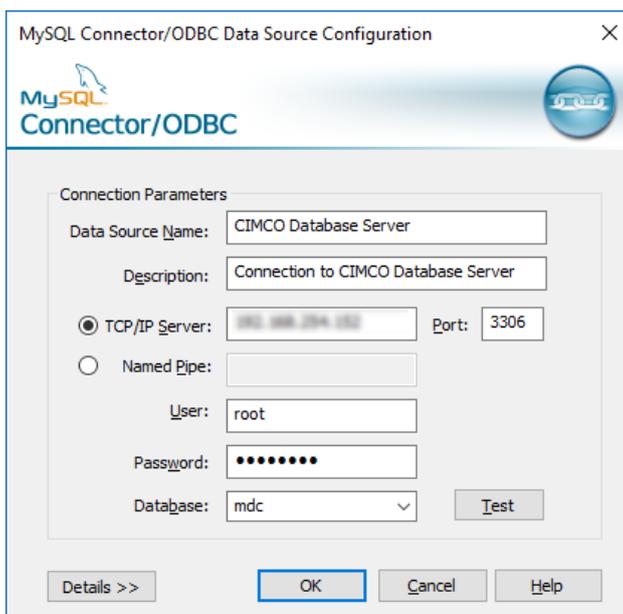
A DSN is short for Data Source Name and can be created as either a User DSN or System DSN. A User DSN is a data source local to a computer and accessible only by the current

user that created the data source. A System DSN is also local to a computer but will be available to all users on a computer.

3. In the Create New Data Source dialog, select the MySQL ODBC 5.3 Unicode Driver and click on the Finish button. This brings up a new dialog called MySQL Connector/ODBC Data Source Configuration.



4. In the Data Source Configuration dialog, fill out the form as follows:



**Database Source Name:**

Provide a name for the data source. Since our data source will be used to connect to the CIMCO Database Server we will name it "CIMCO Database Server".

**Description:**

Provide a description of the data source.

**TCP/IP Server:**

The name or IP address of the CIMCO Database Server that we want to connect to and that contains the MDC database.

- Port:**  
Use the port 3306. If uncertain of the port number, contact your System Administrator.

**User:**

Type in "root" as the database username. If uncertain of the username, contact your System Administrator.

**Password:**

Type in the password for the database server. Again, if uncertain of the password, contact your System Administrator.

**Database:**

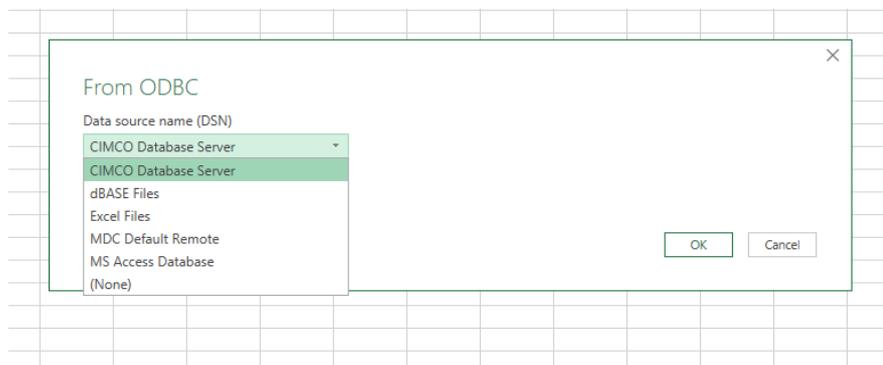
If the previous steps are successful, the Database dropdown will contain all the available databases on the server. Select the mdc database.

- To test the data source, click the Test button to the right of the Databases dropdown. It should say "Connection Successful".
- Close the test dialog and then click the OK button in the Data Source Configuration window. The new data source is now configured and available in the list of User DSNs. Click the OK button to close the ODBC Data Source Administrator.

### 3. Import MDC data

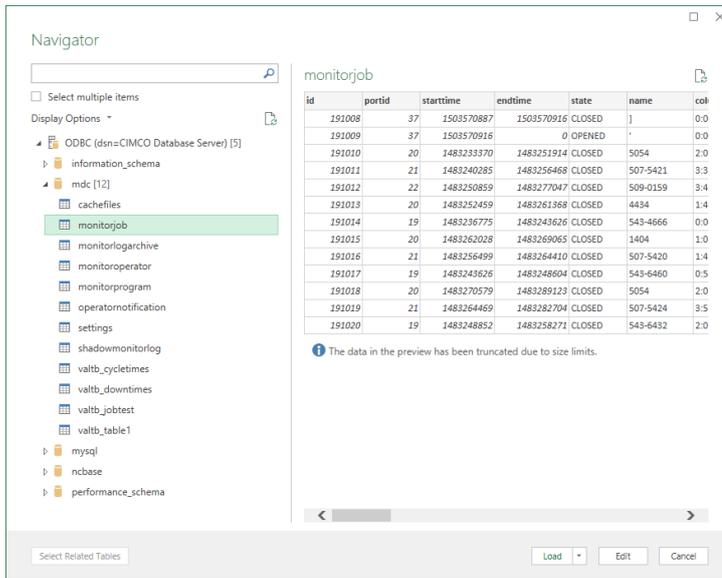
With the data source configured for the CIMCO Database Server, we can now import the data from the MDC database to a spreadsheet in Excel.

- Open Excel and create a blank spreadsheet.
- To import data, select the Data tab, click the button Get Data, then click From Other Sources and select From ODBC. This brings up the From ODBC dialog.



- From the dropdown, select the CIMCO Database Server as the data source name and click the OK button.
- If prompted for a username and password, for the CIMCO Database Server, fill in these and click the Connect button.

- Once Excel has successfully connected to the CIMCO Database Server, the Navigator dialog will appear.

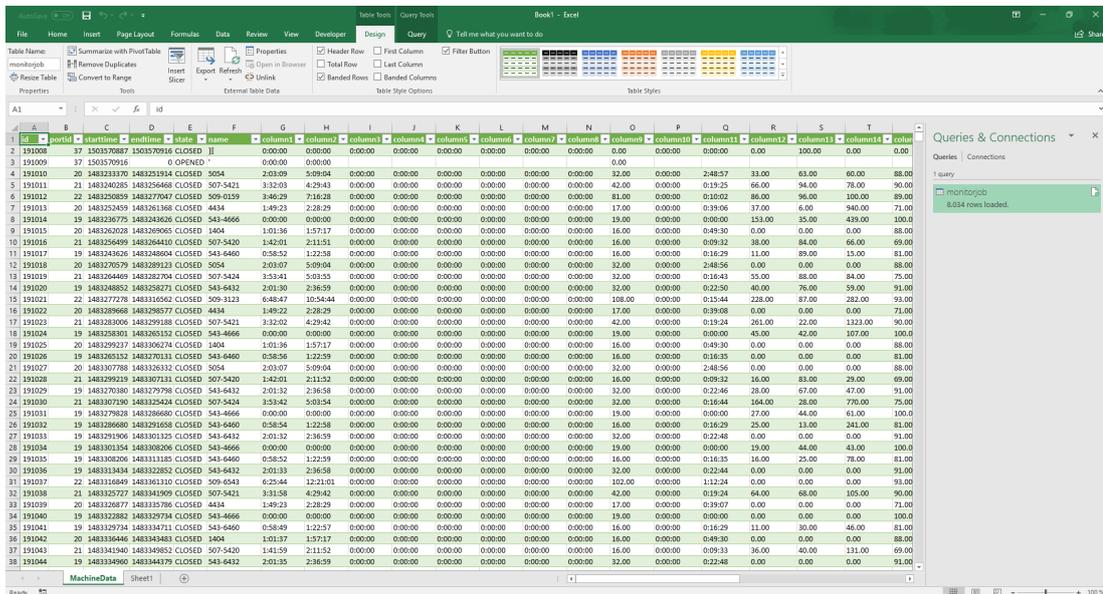


- In the menu tree on left side of the dialog, expand the *mdc database* and click the table *monitorjob*. A preview of the *monitorjob* table will appear on the right.

**Please note:**

Select *monitorprogram* or *monitoroperator* instead, if this is where you have configured your mdc data to be stored.

- Click the Load button to import the *monitorjob* table. This will create a new sheet with the imported data.



- For clarity, rename the sheet to *MachineData* by double-clicking the sheet's tab. The tab is located below the sheet.

# Preparation of imported data

Once the data from the *monitorjob* table has been imported and the Excel sheet has been renamed to *MachineData*, the imported data must be modified so it can be properly understood by Excel. Unfortunately, Excel interprets all the imported data as text, so we need to make several changes such as converting time-based data and setting the proper data types.

We do not modify the imported data in the MachineData sheet directly. Instead, we modify the query that Excel uses to fetch the data from the *monitorjob* table. That way, our changes will remain intact when refreshing data from the *mdc database*. So, all the following steps only have to be performed once.

## 1. Time conversion and column formats

With the MachineData sheet active, select the Query tab and then click the Edit button. This brings up Excel's Query Editor, which we will use to modify the database query.

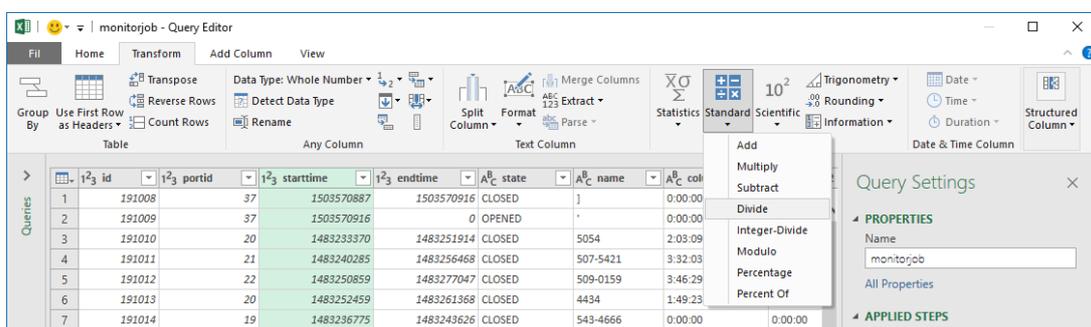
	id	portid	starttime	endtime	state	name	column1	column2
1	191008	37	1503570887	1503570916	CLOSED	j	0:00:00	0:00:00
2	191009	37	1503570916	0	OPENED	.	0:00:00	0:00:00
3	191010	20	1483233370	1483251914	CLOSED	5054	2:03:09	5:09:04
4	191011	21	1483240285	1483256468	CLOSED	507-5421	3:32:03	4:29:43
5	191012	22	1483250859	1483277047	CLOSED	509-0159	3:46:29	7:16:28
6	191013	20	1483252459	1483261368	CLOSED	4434	1:49:23	2:28:29
7	191014	19	1483236775	1483243626	CLOSED	543-4666	0:00:00	0:00:00
8	191015	20	1483262028	1483269065	CLOSED	1404	1:01:36	1:57:17
9	191016	21	1483256499	1483264410	CLOSED	507-5420	1:42:01	2:11:51
10	191017	19	1483243626	1483248604	CLOSED	543-6460	0:58:52	1:22:58
11	191018	20	1483270579	1483289123	CLOSED	5054	2:03:07	5:09:04
12	191019	21	1483264469	1483282704	CLOSED	507-5424	3:53:41	5:03:55
13	191020	19	1483248852	1483258271	CLOSED	543-6432	2:01:30	2:36:59
14	191021	22	1483277278	1483316562	CLOSED	509-3123	6:48:47	10:54:44
15	191022	20	1483289668	1483298577	CLOSED	4434	1:49:22	2:28:29
16	191023	21	1483283006	1483299188	CLOSED	507-5421	3:32:02	4:29:42
17	191024	19	1483258301	1483265152	CLOSED	543-4666	0:00:00	0:00:00
18	191025	20	1483299237	1483306274	CLOSED	1404	1:01:36	1:57:17
19	191026	19	1483265152	1483270131	CLOSED	543-6460	0:58:56	1:22:59
20	191027	20	1483307788	1483326332	CLOSED	5054	2:03:07	5:09:04
21	191028	21	1483299219	1483307131	CLOSED	507-5420	1:42:01	2:11:52
22								

## 1.1. Modify time-based data

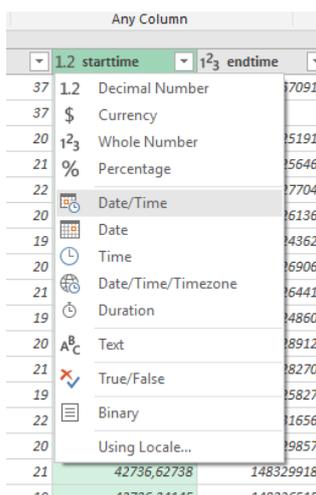
The data in the columns *starttime* and *endtime* is stored as Unix time. Unix time is defined as the number of seconds since midnight (GMT time) on January 1, 1970 - also known as the Unix epoch. Excel, however, does not have built-in functions for working with Unix time, so we need to recalculate the data in these columns manually.

For every Unix time entry, we need to divide by 86400 (to convert to days) and add by 25569 (the number of days between 1 January 1900 and 1 January 1970) - see the following steps.

- 1 First, select all the cells in the *starttime* column by clicking the column heading. This will highlight all the cells.
- 2 Select the Transform tab and click the Standard button. From the dropdown, select Divide and enter the value 86400. Click OK when done.



- 3 Again, with the cells still selected, click the Standard button and select Add. Enter the value 25569 and click OK when done.
- 4 Excel will now be able to properly convert the time data in the *starttime* column when changing the columns data format. In the column's header, click the small icon to the left and select Date/Time from the dropdown menu.



- 5 For *endtime*, please repeat the steps 1 - 4.

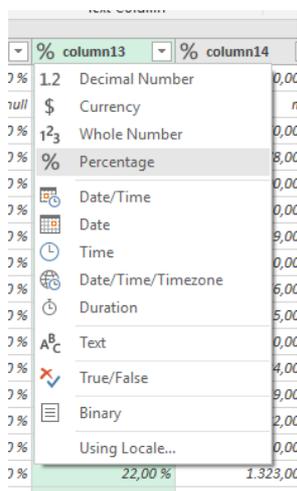
The columns named *Column1*, *Column2*, *Column3*, etc., might also contain time-based data. However, data in these columns is much easier to convert since it is normally stored in the format hh:mm:ss, which Excel knows how to convert properly.

- 6 Identify all the columns that contain time-based data. In each column's header, click the small icon to the left and select Duration from the dropdown menu.

## 1.2. Format remaining columns

For the remaining columns, that do not include text data, we need to specify the proper data type as well. Columns that contain percentages need to be recalculated for Excel to properly interpret them. The data format for other columns can be set directly such as whole numbers.

- 1 For each column that contains percentages, select all the cells in that column, select the Transform tab, click the Standard button and Divide with the value 10000. Click OK when done.
- 2 In the column's header, click the small icon to the left and select Percentage from the dropdown menu. Repeat for all columns with percentages.



- 3 For columns that have whole numbers. In the column's header, click the small icon to the left and select Whole Number from the dropdown menu. Repeat for other columns with whole numbers.

## 1.3. Apply changes and refresh data

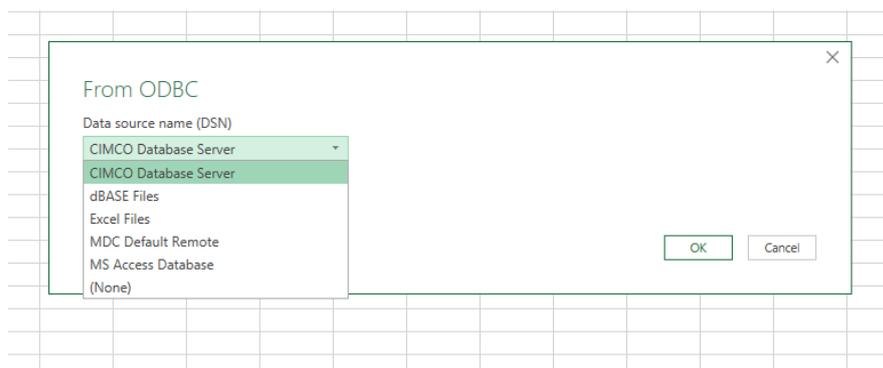
When done, close the Query Editor and select *Keep* when asked to keep the changes. Excel will now update the data in the MachineData sheet and apply the changes we just specified using the Query Editor. Data can be updated at any time by clicking the Refresh button under the Data tab and all the changes will remain intact.

## 2. Include machine names

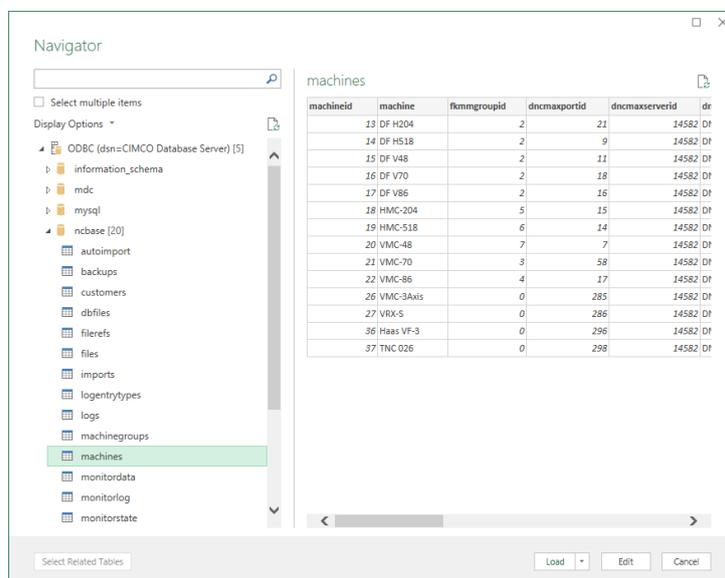
If the data in the MachineData sheet does not contain a machine name column, this is because this information is not stored in the *monitorjob* table in the *mdc database*. In this case, the only column identifying a machine is the Port ID (*portid*), which is not easily understandable when used as an identifier in reports.

The machine name, however, can be queried from the *machines* table in the *ncbase database* and merged with the data in the MachineData sheet. The following steps describe how to do this.

- 1 Select the Data tab and click the button Get Data. From the dropdown, select From Other Sources and click the option From ODBC. This brings up a dialog showing a dropdown with the available data sources.



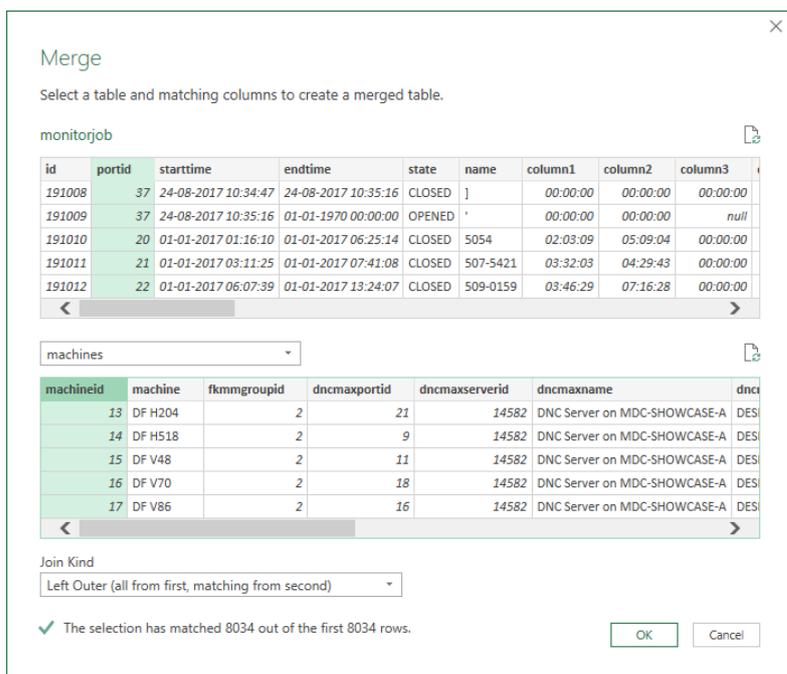
- 2 Choose the CIMCO Database Server and click OK. This brings up the Navigator dialog.
- 3 The Navigator dialog shows all the databases available on the CIMCO Database Server. Expand the *ncbase database*, select the *machines* table and click Load.



- 4 Excel will now create a new sheet with all the data from the *machines* table. For clarity and keeping things ordered, rename the new sheet *Machines*.

We now have two sheets, MachineData and Machines, which both use their own query. It is not possible to simply copy the machine name column to the MachineData sheet, because it will not update properly when refreshing the data. Instead, we need to merge the two queries using Excel's Query Editor.

- 5 Select the MachineData sheet and then select the Query tab. Click the Edit button to bring up the Query Editor.
- 6 In the Query Editor, select the Home tab and click the button Merge Queries to bring up the Merge dialog.
- 7 At the top of the Merge dialog, the *monitorjob* table is shown (primary table) and below it a dropdown containing the tables we can merge with (related tables). Click the dropdown and select *machines*. This will show the *machines* table below the dropdown.

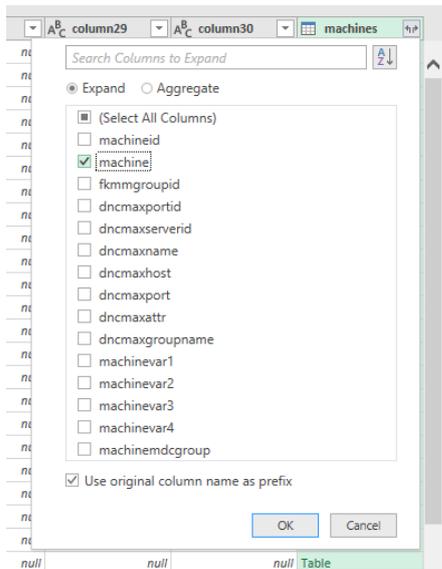


- 8 In the *monitorjob* table, select the column *portid* and in the *machines* table select the column *machineid*. Click OK to merge the tables.

We simply merge the two tables based on the columns *portid* and *machineid*. Since *portid* contains a specific *machineid* for every entry in *monitorjob*, it is possible to create a relationship between these two columns - a many to one relationship. That way, we can prepend all the machine specific data, from the *machines* table, to the end of every entry in the *monitorjob* table and thereby also gain access to the *machinename* column.

- 9 In the MachineData sheet, a new column is now added at the end that contains a Table as data for every entry. To show the machine name, go to the new column's header and click the small icon to the right. In the dropdown, deselect all column names and select *machines* only. The column header is now called *machines.machine* and shows the machine name for each entry.

- 10 For clarity, rename the new column *machinename* and drag the column all the way to the left so it becomes the first column in the table. This makes it much easier to overview.

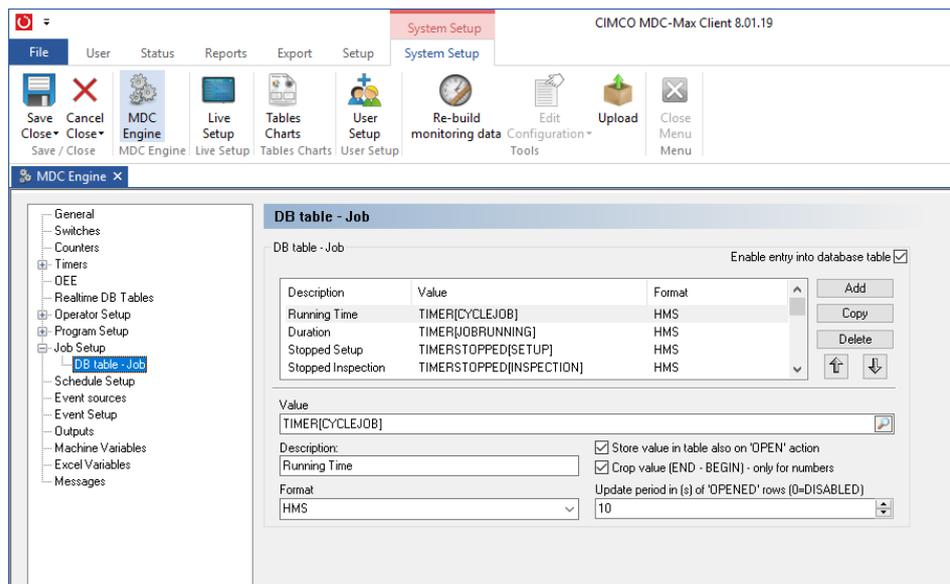


- 11 Close the Query Editor and select *Keep* when asked to keep the changes. Excel will now update the MachineData sheet and include the *machinename* column. Since we modified the query associated with the MachineData sheet, our changes will remain intact when refreshing the data.

### 3. Rename columns for clarity

It is good practice to rename all the columns, in the MachineData sheet, called *Column1*, *Column2*, *Column3*, etc. Otherwise it becomes difficult to discern what data each of these columns represent.

- 1 The actual column names can be found in the MDC-Max PC Client. In the MDC-Max Client, select the Setup tab > System Setup > MDC Engine > Job Setup > Db Table - Job. The first entry in the list (Running Time) corresponds to *Column1*, the second (Duration) corresponds to *Column2*, and so forth.



- 2 In Excel, select the MachineData sheet and then select the Query tab. Click the Edit button to bring up the Query Editor.
- 3 Rename the columns by double clicking the column headers. This process only has to be done once.
- 4 Once all columns are renamed, close the Query Editor and select *Keep* when asked to keep the changes. Excel will now update the MachineData sheet and the columns will have meaningful names.

# Creating reports

Once the data in the MachineData sheet has been prepared, we can use the data to create reports as needed. The types of reports that can be created depends entirely on what data is being collected by MDC-Max and made available in the mdc database.

The following example demonstrates how to create a report showing downtime reasons for all machines. We will then expand the example to only show downtime reasons for a single machine or cell of machines and finally include downtime reasons by machine and operator.

Once you have created your first report you will have a good understanding of how you can easily create other types of reports.

## 1. Downtime reasons for all machines

For reports and charts, we will use Excel's PivotTable and PivotChart functions. PivotTables are highly flexible and can be quickly adjusted depending on how you need to display your data. PivotCharts are based on PivotTables and will automatically update whenever the PivotTables are changed. This means that every time the MachineData sheet is refreshed, all PivotTables and PivotCharts will update automatically to reflect any new data.

For more information about PivotTables see:

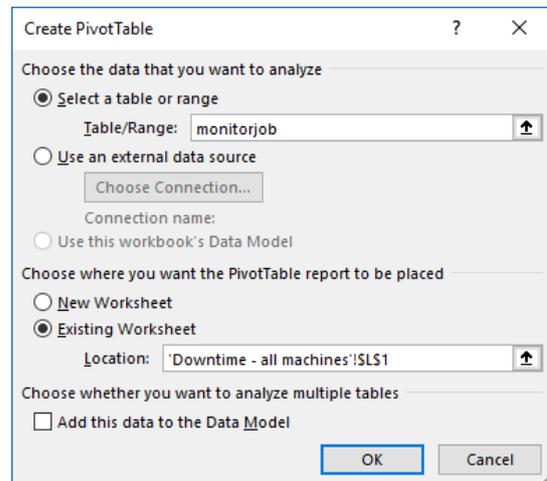
<https://support.office.com/en-us/article/Create-a-PivotTable-to-analyze-worksheet-data-A9A84538-BFE9-40A9-A8E9-F99134456576>

For more information about PivotCharts see:

<https://support.office.com/en-us/article/Create-a-PivotChart-c1b1e057-6990-4c38-b52b-8255538e7b1c>

- 1 To create a PivotTable, first create a new sheet and rename it Downtime - All Machines. Then select the Insert tab and click the PivotTable button to bring up the Create PivotTable dialog.
- 2 In the dialog, enter *monitorjob* in the field Table/Range and click OK.

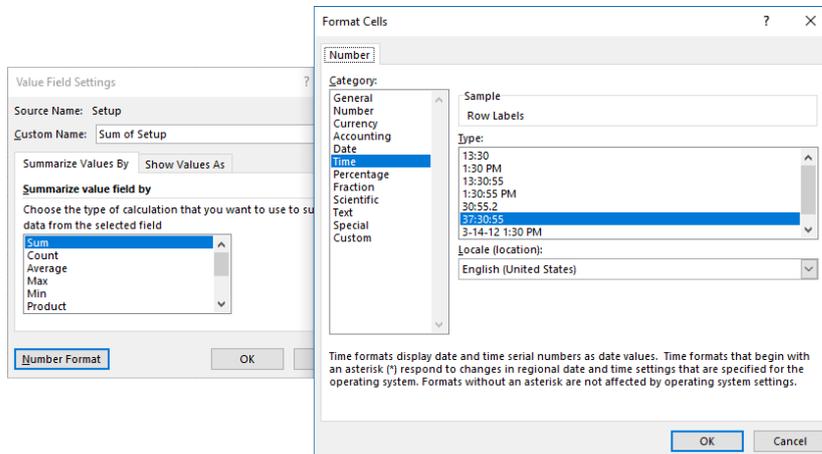
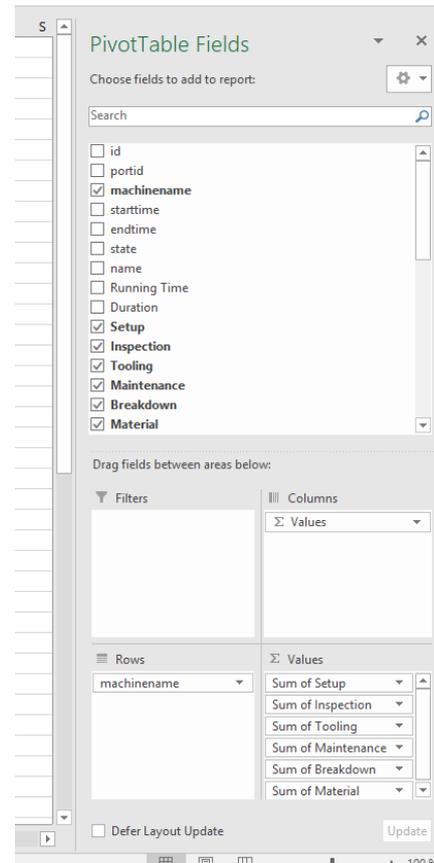
A blank PivotTable will be created in the sheet and the PivotTable Fields dialog will appear on the right side of the screen. This is used to configure the PivotTable.



- 3 To configure the PivotTable to show downtime reasons for all machines, drag the *machinename* column from the list of columns and down to the Rows field.
- 4 Again, from the list of columns, drag all the columns associated with downtime reasons to the Values field. As the columns are dragged into the fields, the PivotTable instantly reflects the changes.

Since we want the accumulated time for each downtime reason, we need to change how the PivotTable displays the columns in the Values field.

- 5 For each column in the Values field, click and select "Value Field Settings" from the dropdown dialog. This brings up the Value Field Settings dialog.
- 6 In the dialog, we can choose the type of calculation we want to use to accumulate the data from the selected column. Since our downtime column contains time-based data we will choose Sum from the selection field and then click the Number format button at the bottom of the dialog.



- 7 In the Format Cells dialog, select Time under Category and set Locale to "English (United States)". Select the format hh:mm:ss (e.g. 11:45:01). Click OK, and OK again to exit both dialogs and apply the changes. Repeat this for every column you have added to the Values field.

The format hh:mm:ss, that we need, is only available under English (United States).

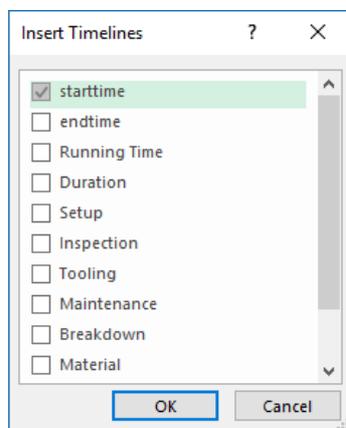
The summed downtime columns will automatically be added to the PivotTable. In the PivotTable Fields dialog, there is also a field called Columns with an entry called  $\Sigma$  Values. This is automatically created to indicate that the columns in the PivotTable are based on the summed columns from the Values field.

Now that the PivotTable has been configured, we can insert a PivotChart to visualize the data in our PivotTable.

- 8 To insert a PivotChart, click the Insert tab and then click the PivotChart button. This brings up the Insert Chart dialog.
- 9 On the left side, choose Columns and then select the Clustered Columns layout. Click OK to insert the PivotChart in the sheet.
- 10 Scale the chart and drag to position it as needed.

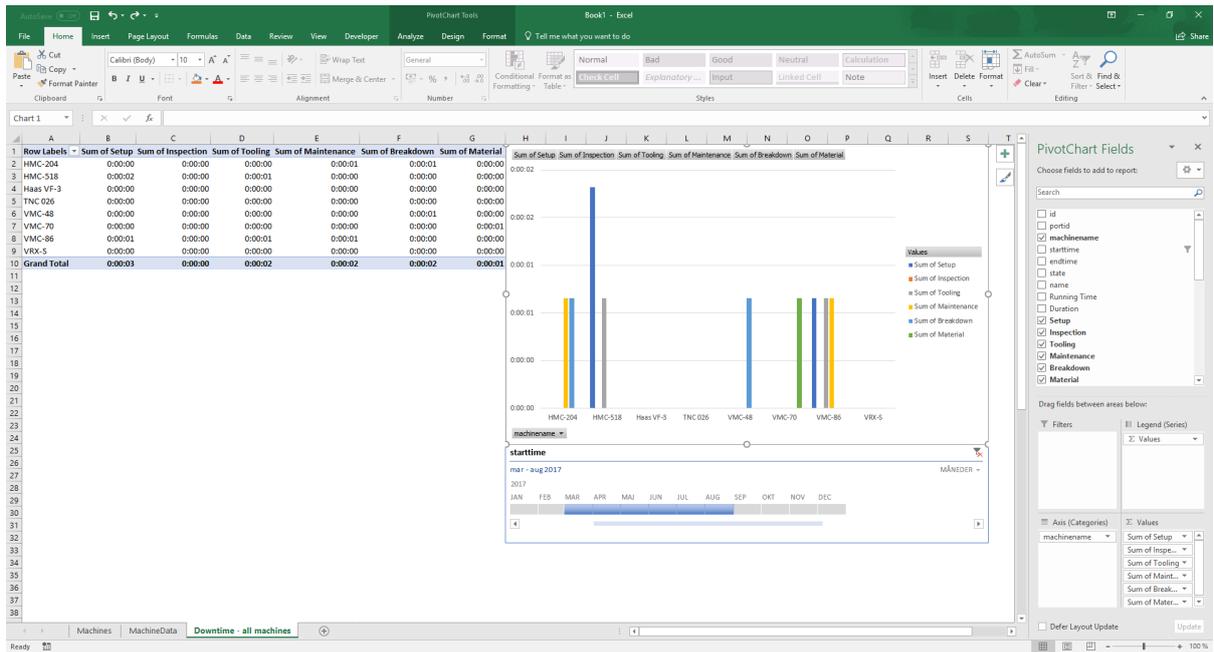
The PivotChart now shows the accumulated time for every downtime reason since the beginning. To filter the time period, we can use a PivotTable Timeline that lets you filter by time, and zoom in on the period you want.

- 11 Select the Insert tab and click the Timeline button to bring up the Insert Timelines dialog.



- 12 Select the *starttime* column to set what column the timeline should be based on and click OK.
- 13 Adjust the timeline to only show data from a specific time period. Scale the timeline and drag to position it as needed.

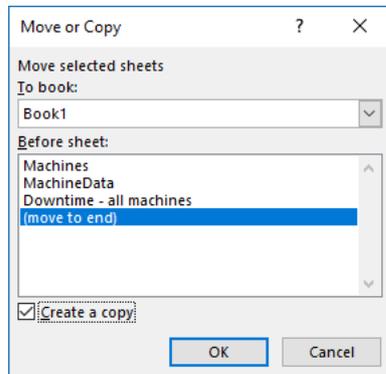
We now have a report that shows the accumulated downtime reasons for each machine and for a specified time period. The report and its elements can easily be further customized as needed.



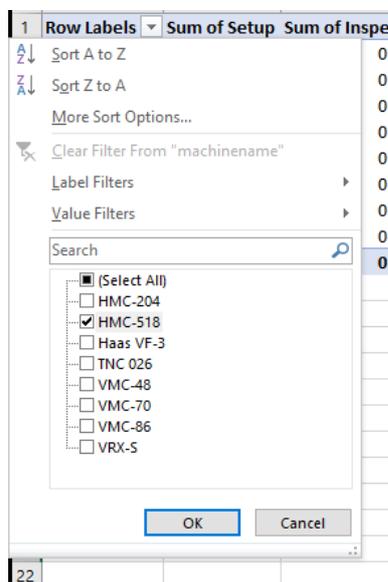
## 2. Downtime reasons for a single machine

From the report, we just created, it is easy to create a new report that only shows data from a single machine.

- 14 Duplicate the sheet Downtime - All Machines by right clicking the sheet tab and selecting Move or Copy from the menu. In the dialog that appears, select (move to end) in the field Before sheet. Check Create a copy and click OK.



- 15 Rename the new sheet to Downtime - MACHINE\_NAME where MACHINE\_NAME is substituted with the name of the machine.
- 16 In the PivotTable, click on the small arrow icon to the right in the Row Labels column. From the dropdown, deselect all machines and select only the machine you want to show. Then click OK.



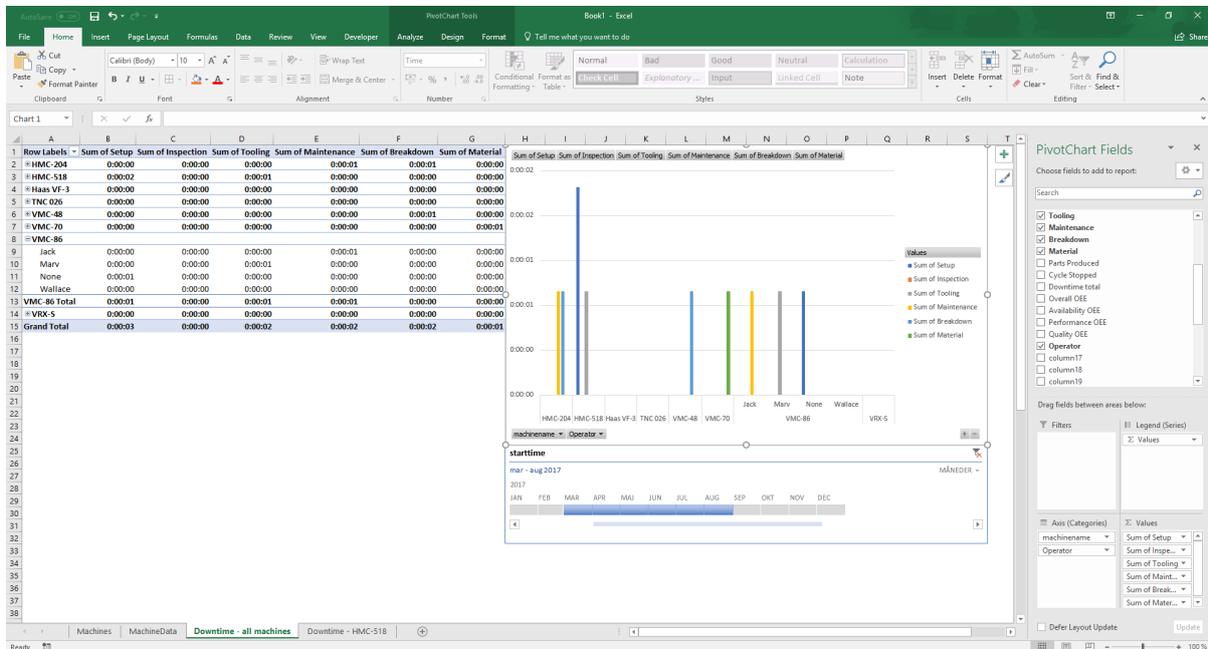
The PivotTable and PivotChart automatically reflects the update and now only shows data from the selected machine.

In this way, a different report (sheet) for every machine can be created in a short amount of time. The PivotTable can even be duplicated within a sheet, so you can have a PivotTable and PivotChart for each machine within the same sheet. Or, you can filter a PivotTable to show the machines in a cell.

### 3. Downtime reasons by machine and operator

If an operator column is available in the MachineData sheet, we can easily expand our downtime report to show downtime reasons by both machine and operator.

- 1 Select the PivotTable. In the PivotTable Fields dialog on the right, drag the column associated with the operator name down below machinename in the Rows field.



The PivotTable will now have nested rows where a machine name can be expanded to show the accumulated downtime reasons for each operator who has worked at the machine. The PivotChart might not be able to show nested data in a meaningful way. In that case, a different type of chart might visualize the data in a better way. This is a matter of personal preference.