

Quick start guide

OEE calculation example

SER0038 - Overall Equipment Efficiency - guide

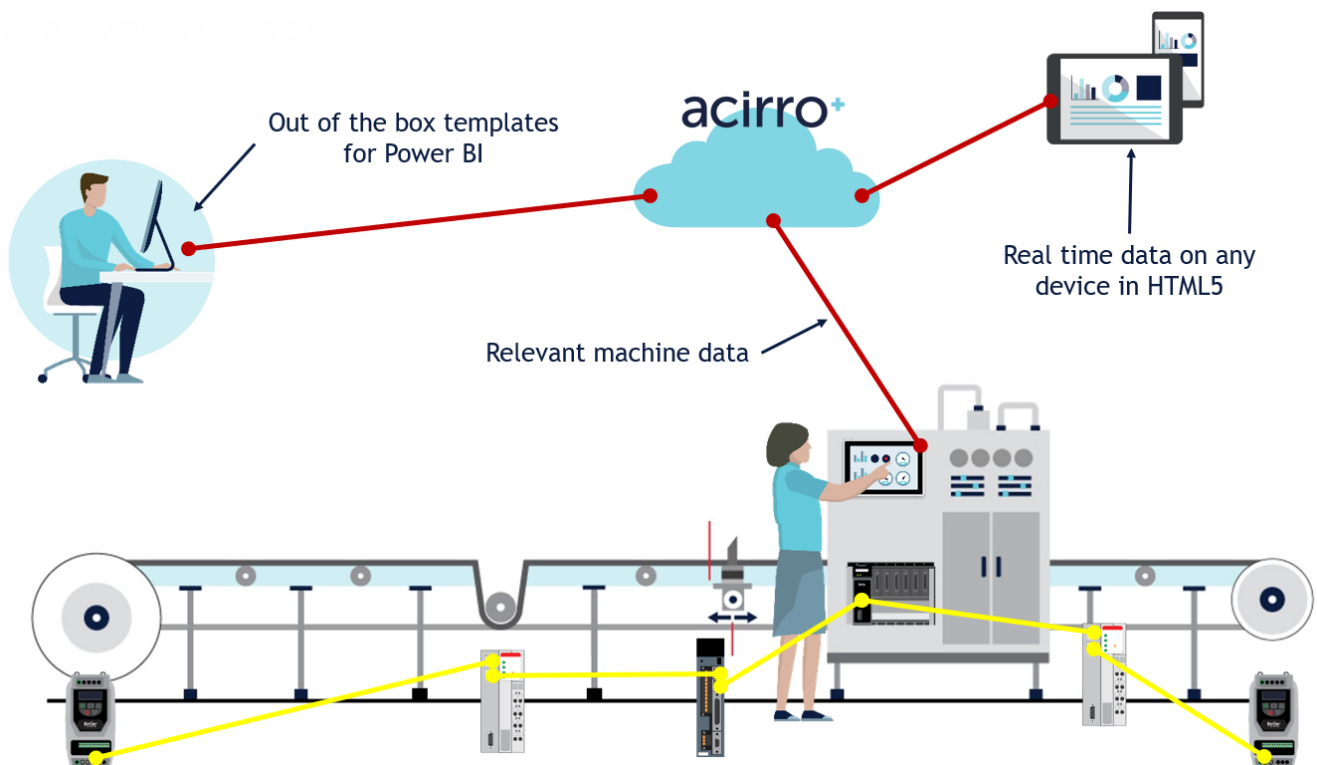


1 Function and area of use

This document explains how to set up an OEE calculation with our cloud solution and use Microsoft Power BI for presenting the data.

This OEE calculation example requires the following steps to be completed:

- Set up the attached CODESYS project with BCS Tools against the appropriate hardware to a Nexto Xpress.
- Set up an X2 panel with the attached iX project.
- Insert the X2 panel in acirro + with a namespace with the same tags as in the iX project.
- Download Power BI Desktop for free.
- Export data from the X2 panel in acirro + to your local computer.
- Open the enclosed Power BI templates in Power BI Desktop and point to the folder where you have the exported data. You can choose to open the attached sample data template (SER0038_ExampleDataOEE.zip). Otherwise, you have to collect data for a few days before you get that much out of the report.



2 About this document

This quick start document should not be considered as a complete manual. It is an aid to be able to start analysing process data from exported csv files from acirro+.

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Use the following hardware, software, drivers and utilities in order to obtain a stable application:

In this document we have used the following software

- BCS Tools v3.31
- iX Developer v2.40 SP5
- acirro+ v1.3, <https://acirroplus.com>
- Power BI Desktop ([February 2021 release or later](#))

Conditions

- CODESYS based controller (Nexto Xpress, X2 / BoX2 control or BoX2 motion)
- acirro+ ready HMI (X2 pro or X2 base v2)
 - In this example we use a Nexto Xpress and an X2 pro 7
- Connected iX Runtime
- Working internet connection
- User must be registered with an organization in acirro+ and have at least a device license SMALL available.
- Power BI Desktop

For further information refer to

- Nexto Xpress - Program example OPC UA server (2020-10-14)
- [Start-up document, OPC UA Server - iX Developer \(KI00312\)](#)
- [acirro+ Getting Started PIEN353](#) (available at HelpOnline)
- [Beijer Electronics knowledge database, HelpOnline](#)

This document and other quick start documents can be obtained from our homepage. Please use the address support.europe@beijerelectronics.com for feedback.

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4 OEE calculation and example data

Availability = Operating Time / Planned Production Time

Performance = (Ideal Cycle Time x Total Pieces) / Operating Time

Quality = Good Pieces / Total Pieces

OEE = Availability x Performance x Quality

Production data	
Shift length	8 hours = 480 minutes
Short breaks	2 x 15 min = 30 minutes
Meal break	1 x min = 30 minutes
Down time	47 minutes
Ideal run rate	60 pieces per minute
Total pieces produced	19 271 pieces
Rejected pieces	423 pieces

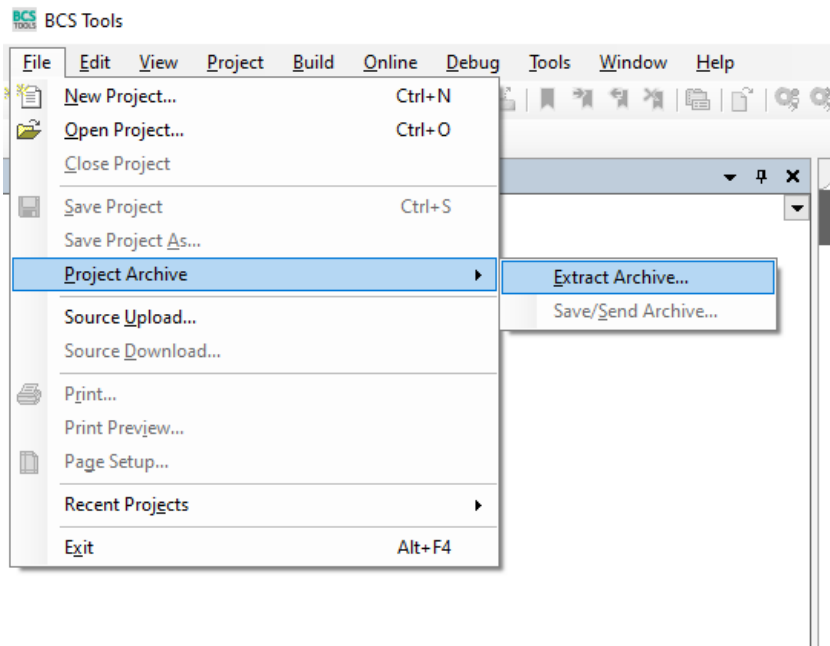
Support variable	Calculation	Calculation data	Result
Planned production time	Shift length-Breaks	480-60 minutes	420 minutes
Operating time	Planned production time-Down time	420-47 minutes	373 minutes
Good pieces	Total pieces produced-rejected pieces	19,274-423 pieces	18,848 pieces
Availability	Operating time / Planned production time	373 / 420 minutes	0.8881 (88.8%)
Performance	(Total pieces / Operating time) / Ideal run rate	(19,271 pieces / 373 minutes) / 60 pieces per minute	0.8611 (86.1%)
Quality	Good pieces / Total pieces	18,848 / 19,271 pieces	0.9780 (97.8%)
Overall equipment Effectiveness	Availability * Performance * Quality	0.8881 * 0.8611 * 0.9780	0.7479 (74.5%)

5 Preparing your editor

The following chapter describes important procedures and settings needed for a well-functioning system.

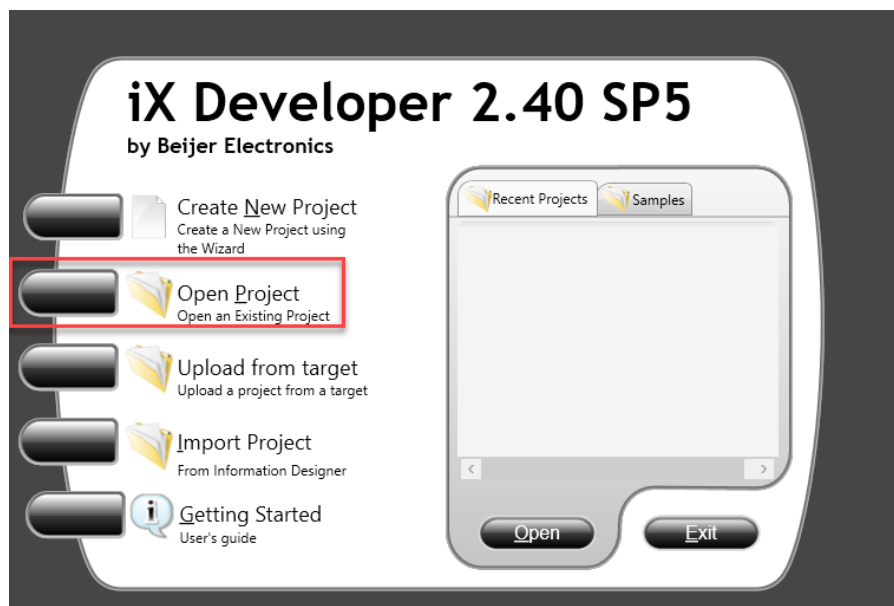
5.1 Open project in BCS Tools

To restore / open the project in BCS Tools use File -> Project archive -> Extract archive. Browse for the Archive file and press "Open".



5.2 Template for iX Developer

Open the iX Developer project from the Smart engineering objects by press "Open" and browse for the file.



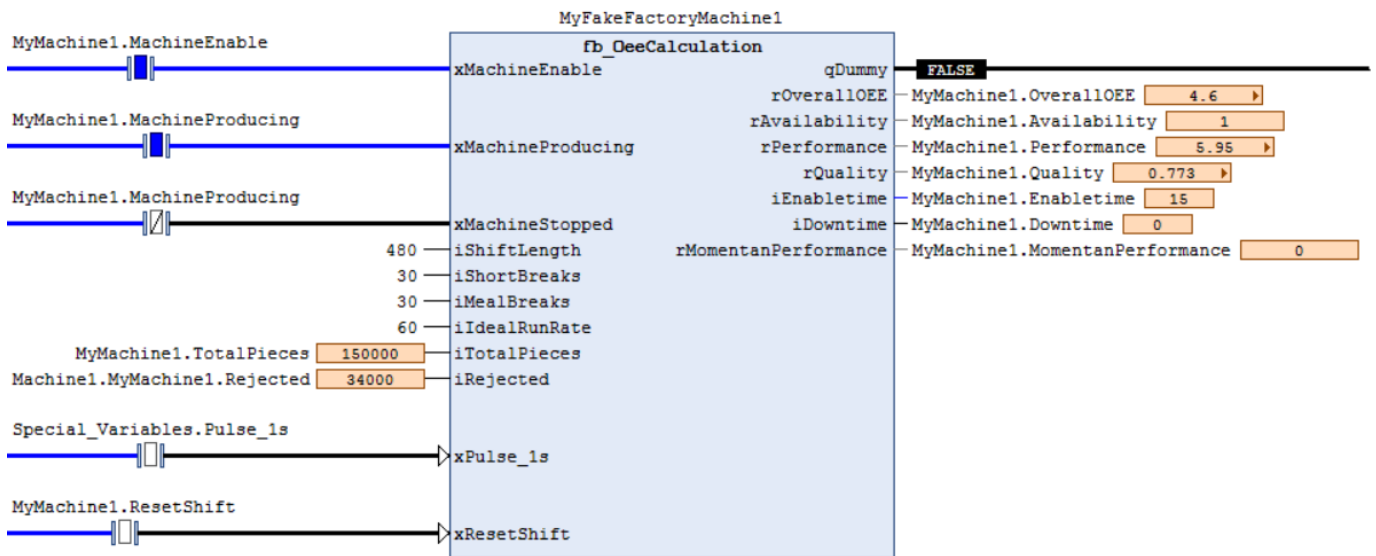
6 Description of function blocks

6.1 fb_OeeCalcualtion

The FB **fb_OeeCalcualtion** is counting the produced and rejected pieces in a machine or production line. The fb calculates the OEE on the whole shift.

The output rMomentanPerformance is calculating performance every minute.

All calculation is done if xMachineEnable is TRUE.



Input	Type	Function	Comments
xMachineEnable	BOOL	When xMachineEnable = TRUE the machine available for production and iEnabletime starts counting	Counts in minutes
xMachineProducing	BOOL	Is high when machine is producing	
xMachineStoped	BOOL	Is high when machine is not producing	
iShiftLength	INT	Total length of shift (minutes)	In minutes, default value is 480 minutes = 8 hours
iShortBreaks	INT	Short break in shift (minutes) e.g. 2 x 15 min	In minutes, default value is 30 minutes
iMealBreaks	INT	Planned lunchbreak in shift (minutes)	In minutes, default value is 30 minutes
iIdealRunRate	INT	Target products / minutes	default value is 60
iTotalPieces	UDINT	Total amount of pieces produced	
iRejected	UDINT	Total amount of pieces rejected	
xPulse_1s	BOOL	Secund pulse from the controller	
xResetShift	BOOL	Reset all calculation's in shift, xMachineEnable must FALSE to do a reset	

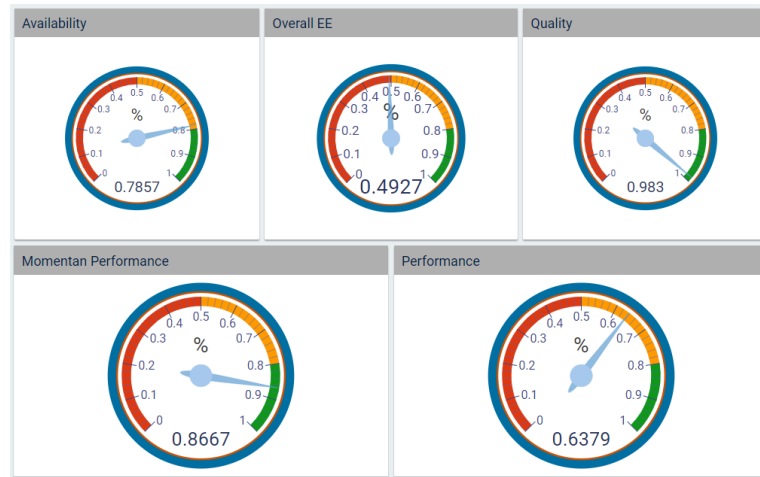
Output	Type	Function	Comments
rOverallOEE	REAL	Overall OEE	

rAvailability	REAL	Availability	
rPerformance	REAL	Performance	
rQuality	REAL	Quality	
iEnabletime	INT	Enable time in Minutes	
iDowntime	INT	Downtime in Minutes	
rMomentanPerformance	REAL	Calculates performance every minute (calculations is done when machine is running)	

7 Set up acirro+ to collect data from the X2 pro panel

This chapter describes how to set up acirro+ to start collecting data from the panel. If you don't have an acirro+ account or device license for process data, please read the acirro+ Getting Started document.

1. Log in to <https://acirroplus.com>
2. Create the following cloud tags in a namespace named OEE or similar (make sure the cloud tags have the exact same names as the corresponding tags in the iX project):
Machine_Availability, Machine_Performance, Machine_Quality, Machine_OverallEE, Machine_OperatingTime, Machine_GoodPieces, Machine_Downtime, Machine_Rejected, Machine_Cause, Machine_MomentanPerformance, Machine_Enabletime, Machine_MachineEnable
 - a. Go to Cloud Tags tab and click *Create Cloud Tag*.
 - b. Type in the namespace name, for example OEE, in the namespace field and press enter. If the namespace already exists, just select it in the dropdown.
 - c. Type in the cloud tag name for the tag to add.
 - d. Set sample interval to 60.
 - e. Check "Store all transmitted values".
 - f. Set transfer multiplier to "x1".
 - g. Press Create. Repeat step 2 for all the cloud tags.
3. Go to Devices tab , click Create Device. Set up the device using the thing id found physically on a label on your panel. Select a proper license and the OEE namespace. Press Create.
4. When the iX project is running on the panel, the data should now be collected in acirro+. It can be verified by clicking on the device row in acirro+, which will show the latest data values.
5. If you want to visualize the live values in a Dashboard it is possible to create a Dashboard towards the namespace within acirro+, selecting the visualization controls of your choice and then publishing the Dashboard.



Example of a live OEE Dashboard created in acirro+ Dashboard Design.

8 Import process data files for analysis in Power BI

1. Export process data from acirro+ as described in [acirro+ Getting Started](#). Make sure to have a folder structure where each unzipped file from acirro+ has its extracted contents in a sub folder named as the zip file.
2. Double-click on the provided template *OEE_acirroplusTemplate.pbix* to open it up in Power BI.
3. Type in the absolute path to the folder where the exported unzipped files are located.
4. If time should be expressed in local time instead of UTC, type in how many hours before or after UTC time that is wanted.
5. Press *Load*. If there is a lot of data it might take some time to import.
6. The OEE report will open up and the data can be analyzed.



Example of OEE Report in Microsoft Power BI Desktop

9 About Beijer Electronics

Beijer Electronics is a multinational, cross-industry innovator that connects people and technologies to optimize processes for business-critical applications. Our offer includes operator communication, automation solutions, digitalization, display solutions and support. As experts in user-friendly software, hardware

and services for the Industrial Internet of Things, we empower you to meet your challenges through leading-edge solutions.

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