OPC DAY
FINLAND 2021
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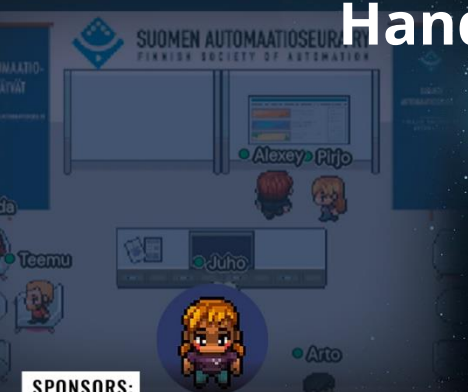
MES Controlled Material Handling over OPC UA in Valio

Pyry Grönholm, Prosys OPC
Lari Lahdensuu, Beckhoff



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Pyry & Lari

Pyry Grönholm
- CEO @ Prosys OPC
- Head of the Material Handling system project team
- Background as a Software Developer
  - Industrial connectivity software development since 1998

Lari Lahdensuu
- Area Sales Manager, Beckhoff Automation Oy
- Responsible for Food & Packaging industry

Valio

- Brand leader and the biggest dairy business in Finland
- Valio's product range includes around 1,000 products
- Valio employs approximately 4,000 professionals in various fields

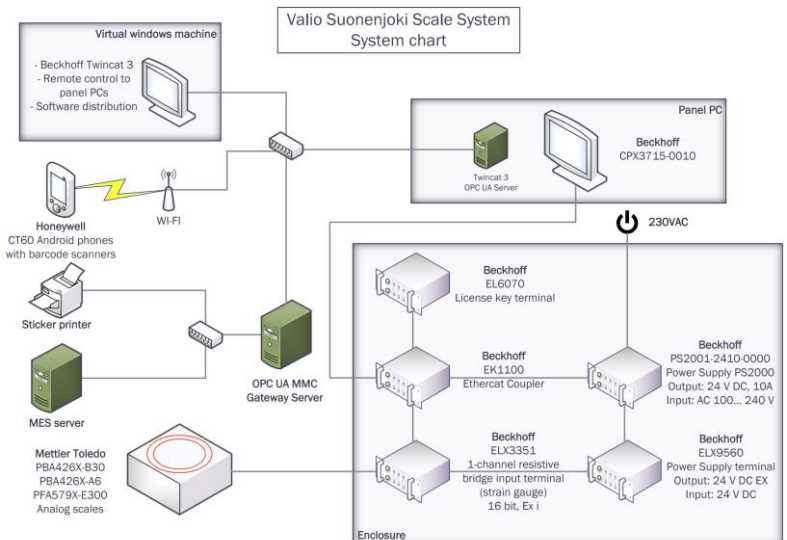
Starting point

- Valio Suonenjoki had a demand for a new raw material handling system
- The primary use cases were
  - Raw material dosages are scaled in the warehouse and respective saldos are removed from the MES system saldos
  - Dosages are loaded to process according to recipe-based operations
  - Each loading operation is updated to the MES system
  - MES integration use OPC UA
- Main requirements were
  - MES orchestrates the scaling and dosing process
  - Operated using ATEX protected handheld devices
  - Scales should have their own displays, which enables scaling without a connection to MES
  - Scaling operations are done in ATEX 2 or 22 areas, so all hardware that is used must be ATEX certified
- Sounds easy – but the reality hit pretty fast

Main challenges in the beginning

- How to find a combination of components that meets the ATEX and OPC UA requirements
  - The vendor of the scales did not have any gateway that could be used
  - All components including fuses had to be ATEX certified and ATEX compliant with each other
  - There was a global lack of components
- Beckhoff offered us a perfect solution for the main components that convered both ATEX certifications and OPC UA capabilities

System architecture



System Layout

MES
-OPC UA
communication

ZONE 2

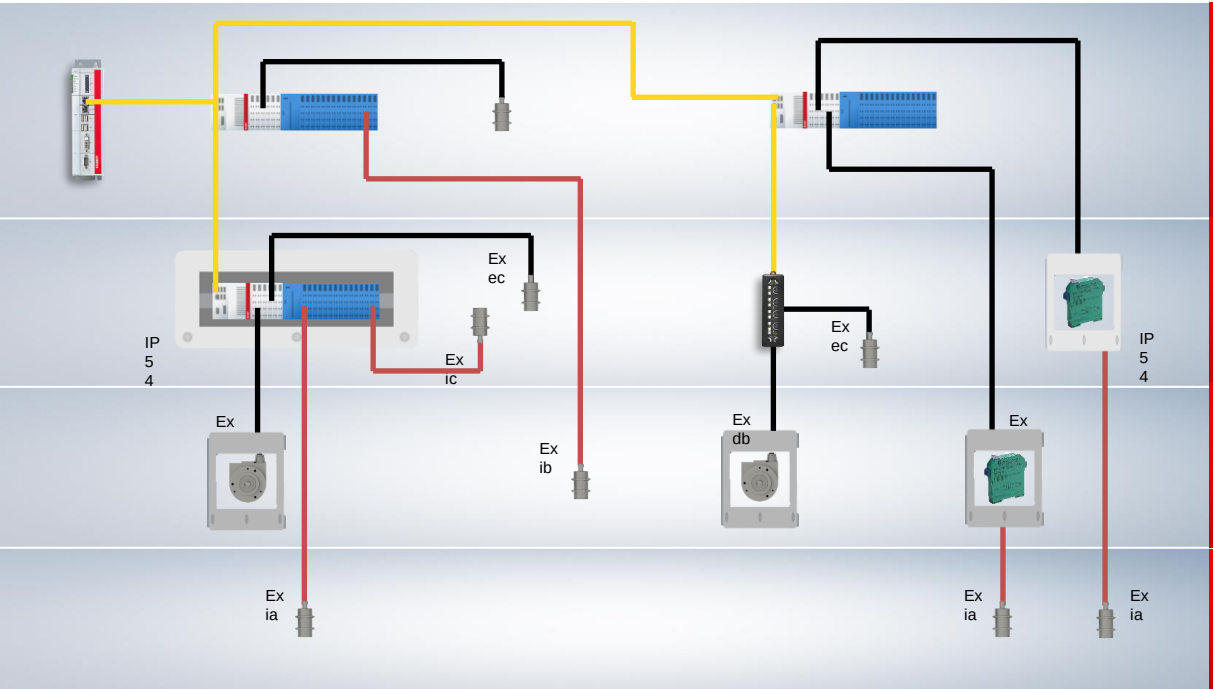
CPX3715-0010 PanelPC 15” ATEX Zone 2/22
-TwinCAT 3 PLC
-TwinCAT 3 PLC HMI
-TwinCAT 3 OPC-UA Server

Enclosure
-PS2001-2410 ATEX power supply
-EK1100 EtherCAT Coupler
-EL6070 license terminal
-ELX9560 ATEX power supply
-ELX3351 ATEX measuring bridge
-ELX9012 ATEX end plate

ZONE 2

ZONE 2/22

Ex ia



Non-hazardous area

Zone 2/22

Zone 1/21

Zone 0/20

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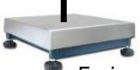


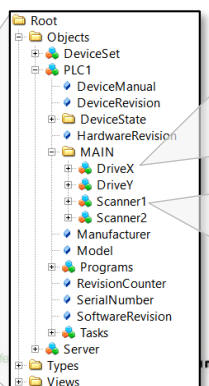
ZONE 2/22

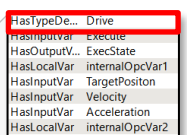
Ex ia

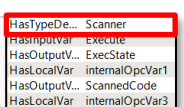
TwinCAT OPC UA Server

- Read/Write access to symbols from TwinCAT realtime
- Sophisticated type system that represents realtime types
- Supports OPC UA security mechanisms
- Supports execution of realtime methods
- Supports all important profiles and mechanisms
  - Data Access
  - Historical Access
  - Alarms & Conditions

```
PROGRAM MAIN
VAR
    Scanner1 : Scanner;
    Scanner2 : Scanner;
    DriveX   : Drive;
    DriveY   : Drive;
END_VAR
```

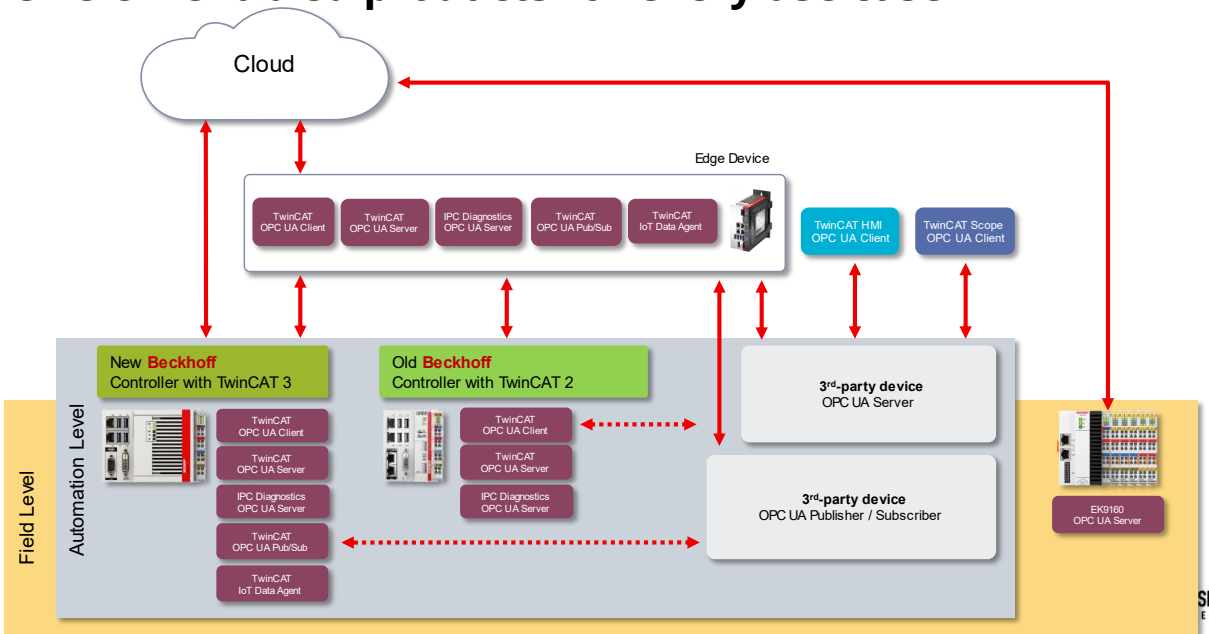






Default type system (IEC61131 PLCopen)

OPC UA enabled products for every use case



Handheld device

Honeywell CT60

- Atex protected handheld bar code scanner
- Android 7.1.1

Custom Application

- Developed by Prosys OPC
- OPC UA Client
- Uses Prosys OPC UA SDK for Java

MES Gateway

Custom application made during the project

- Runs on virtualized Windows Server
- Coded by Prosys OPC using .NET SDK
- Acts as both OPC UA Client and Server
- Orchestrates the transactions between MES, Panel-PC, Handheld device

Lessons learned

- OPC UA is truly multi-environment. We run apps in
  - Embedded
  - Android
  - Windows
- OPC UA method call is a feasible way to create transactional multi device communication
- Beckhoff has very wide range of products feasible for projects in ATEX environment
- Global shortage of components is real at the moment and delivery times can be very long