



# Use Case 2

# Automotive



# Presentation



## INTRODUCTION: Automotive

- Context
- Problems
- Solutions



## CREMA: USE CASE II

# Automotive: Solution



Context	Problems	Solutions
<ul style="list-style-type: none"> <li>Large amount of processes</li> </ul>	Unexpected downtimes	Anticipate to the machine errors defining main KPI's and Alarms
<ul style="list-style-type: none"> <li>Different lines</li> </ul>	Data not gathered	Industreweb data collection
<ul style="list-style-type: none"> <li>Variety of products</li> </ul>	High quantities of manuals, data, work instructions difficulties to find information	Support ticketing system
<ul style="list-style-type: none"> <li>Multiple tooling</li> </ul>	Wrong assets. Difficulties to locate assets.	Ubisense sensors and Smart Factory
<ul style="list-style-type: none"> <li>Plants located around the world</li> </ul>	Overall Equipment Effectiveness OEE<1 Quality<1	ODERU Optimization

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## INTRODUCTION: Automotive

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## CREMA: USE CASE II

# Tenneco Pilot Area



- Use Case II simulates the welding of an Exhaust.
- Welding and Test cells present in Tenneco have been modelled in Pilot Area at the Waterton Technology Centre
- Realistic implementation scenario to test key production themes



# Pilot Area



ABB Robot + IW Data collector



Test cell + Siemens S7 PLC



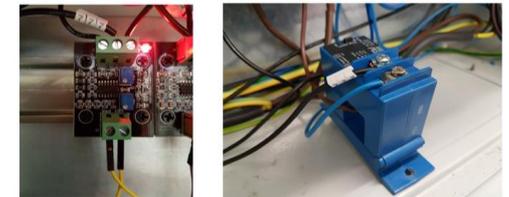
Tool + Components



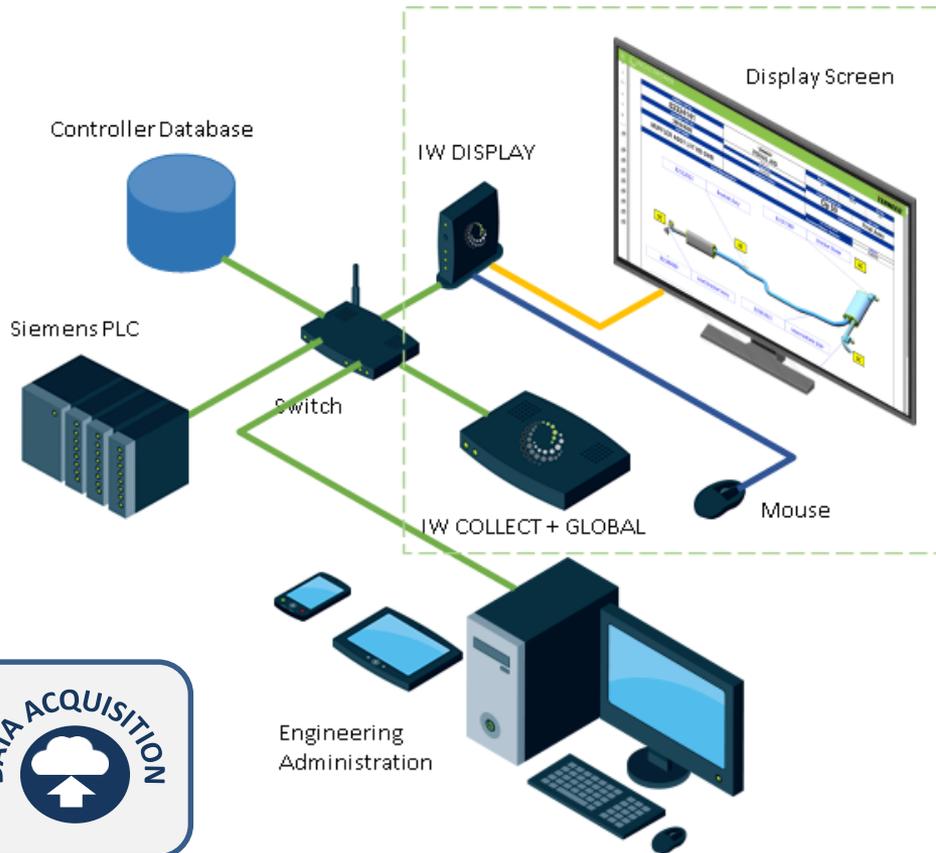
SmartFactory Sensor and tags



Current Converter and Toroidal Hardware Implemented to Capture Welding Current



# Data Collection

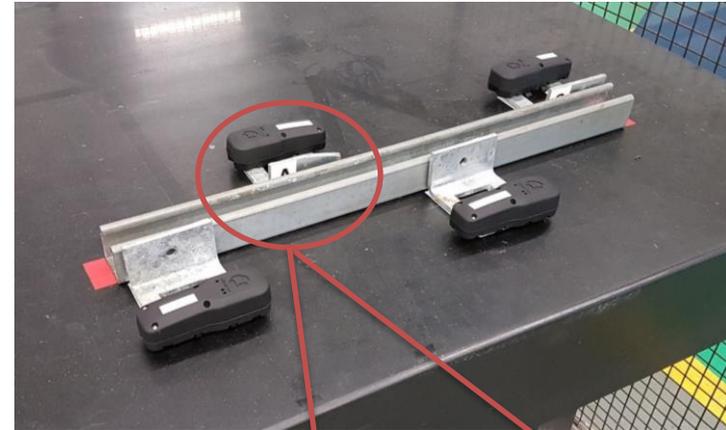


- Data Collection framework
  - Machine
  - Documentation
- Server to collect and manage data, and security
- Thin client to handle local interaction with operators and visualisation

# Tool Tracking



- Smart Factory sensors and tags
- Tool recipe is retrieved from IW
- Actual tools present in Robot welding zone retrieved
- Comparison made between both arrays to determine status
  - CORRECT
  - INCORRECT
  - NOT PRESENT
- Allocate tool with SF and IW



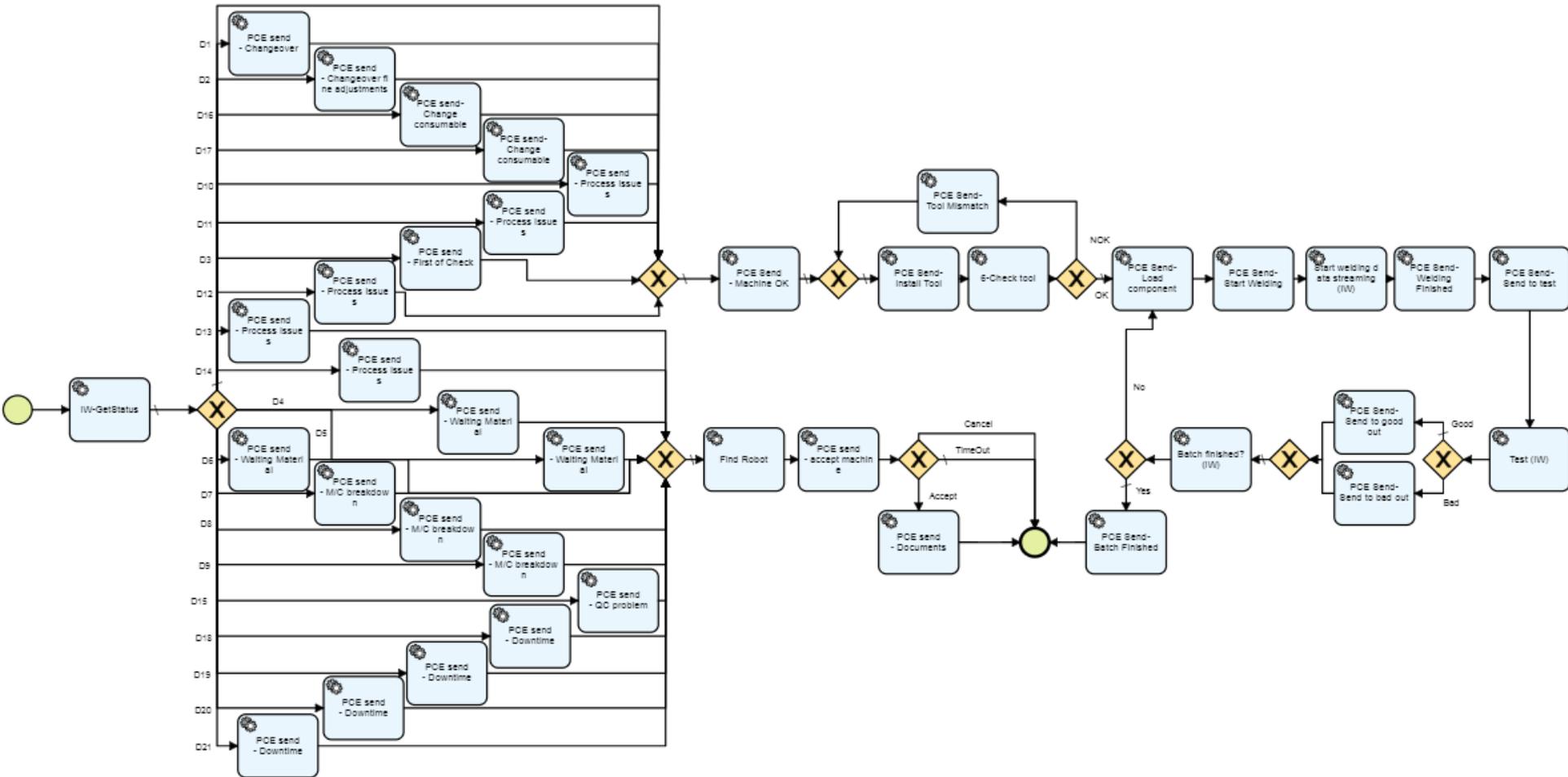
Status: Pending

Tool Recipe

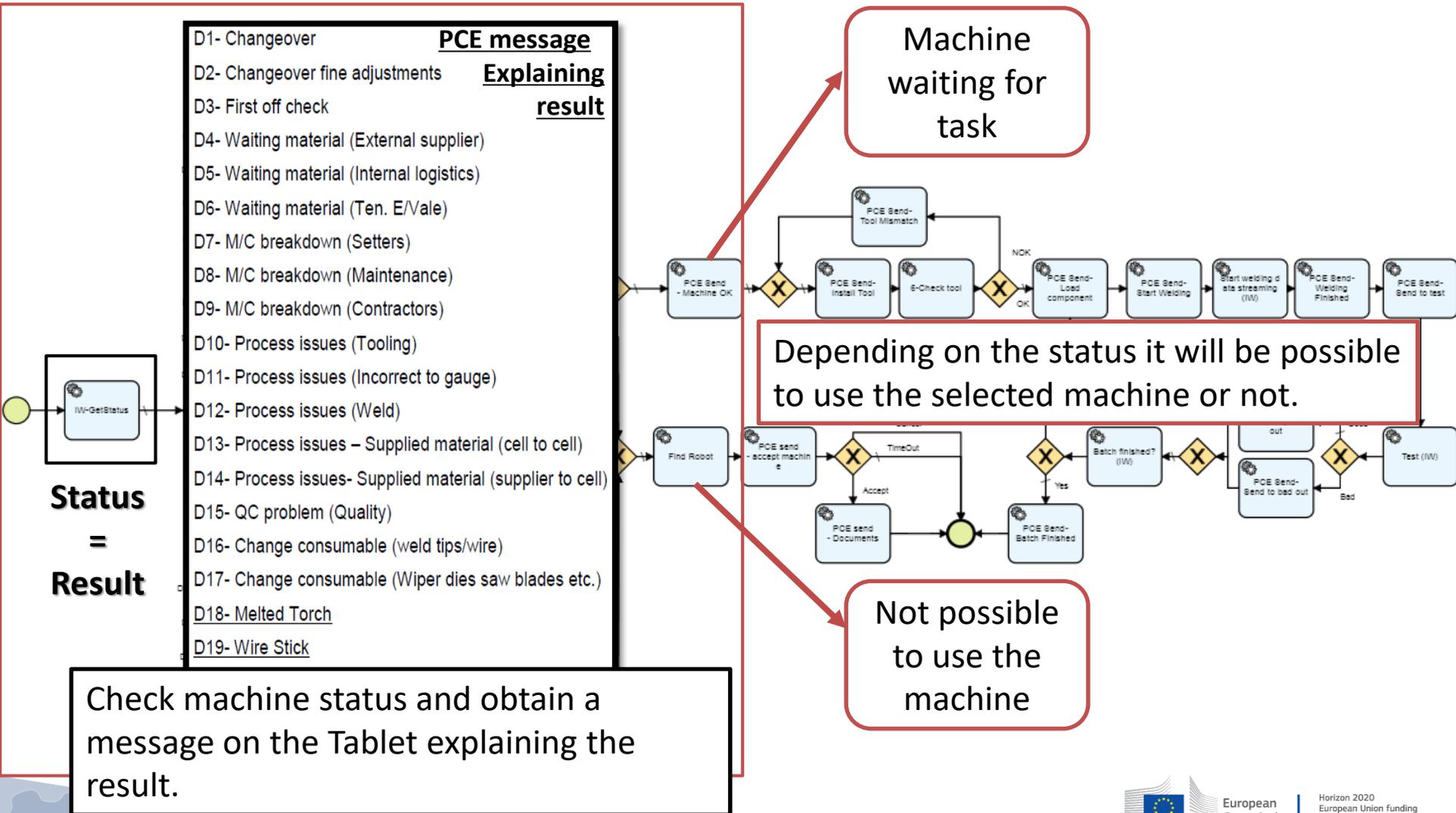
- + D
- + G
- + K
- + Add

IW

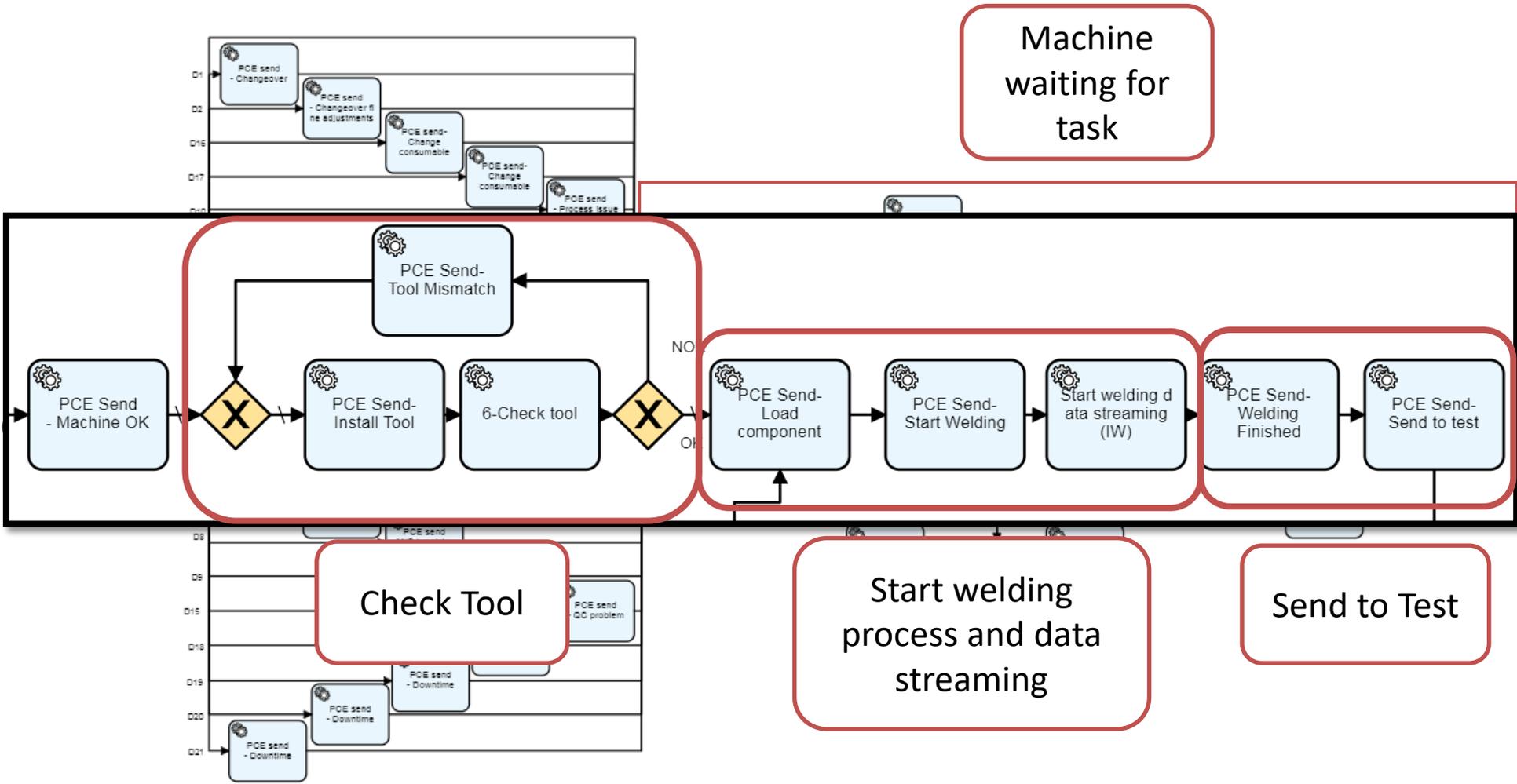
# Process Model UC2



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Machine waiting for task

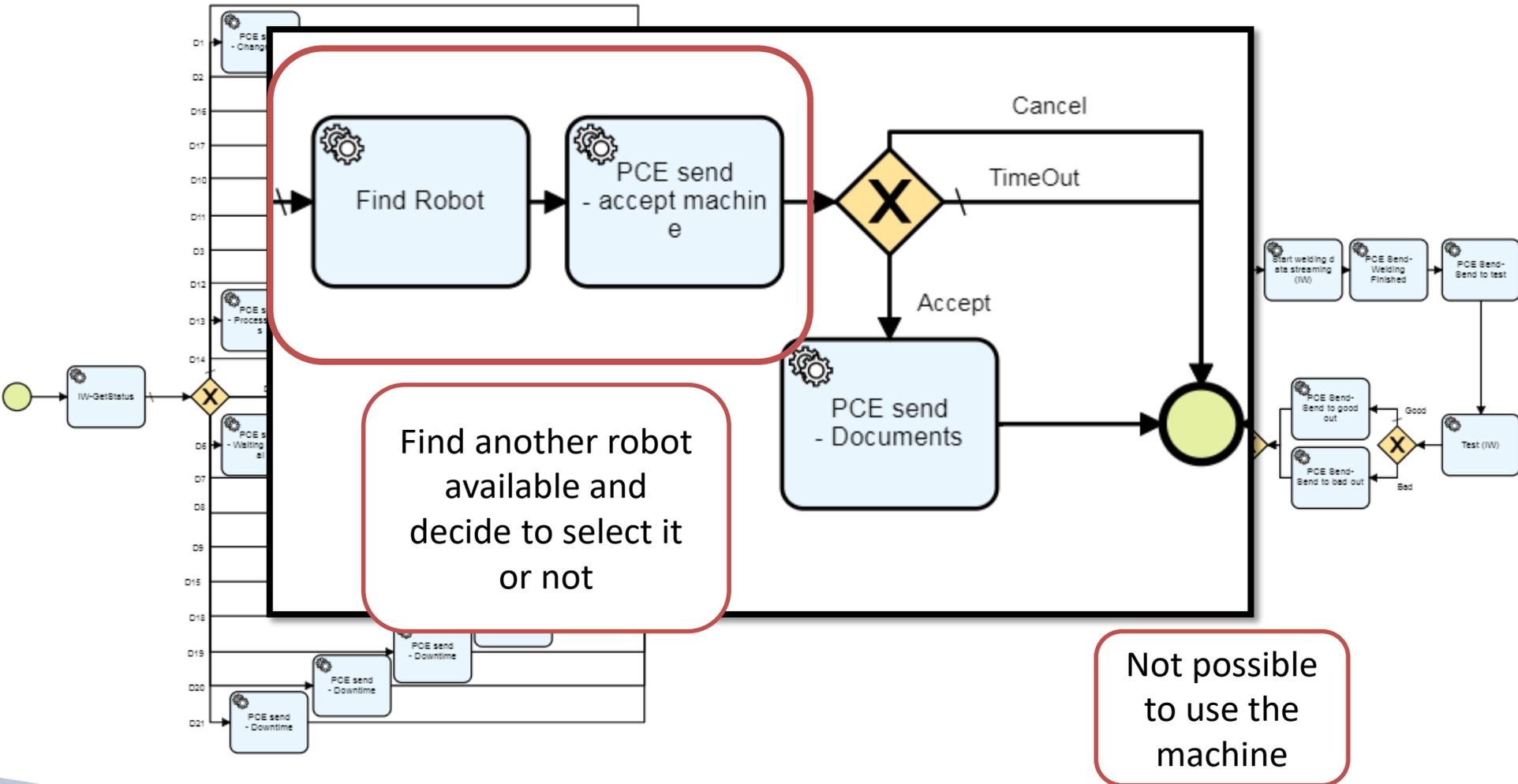
Check Tool

Start welding process and data streaming

Send to Test

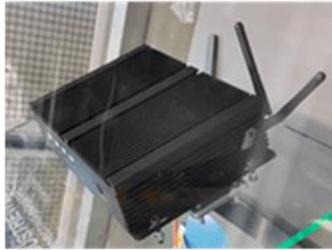


# Process Model UC2



Not possible to use the machine

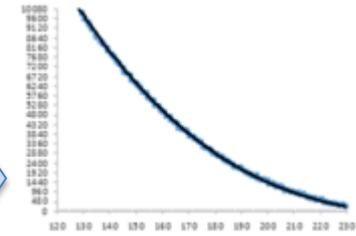
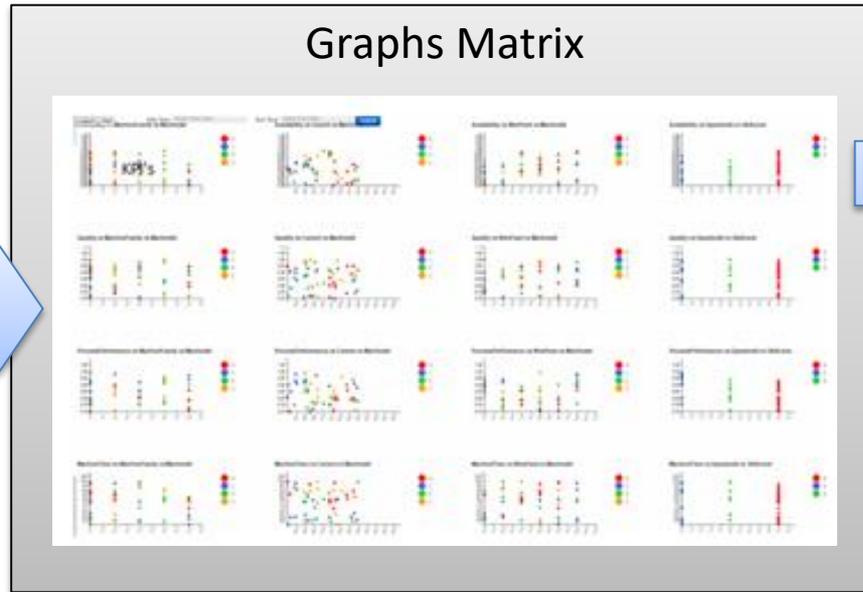
# Data Analytics



INDUSTREWEB 4.0  
CONNECTING INDUSTRY

Data Structure

- Asset Attributes
- KPI's



Get Formulas



Modify COP



Optimise



- Collect and monitor assets data (KPI's vs. asset attributes)
- Get formulas for the optimisation
- Optimise parameters to get best outputs

# Monitoring and Alarming



- Low\_OEE (Overall Equipment Effectiveness)

- Low\_OEE\_warning

- OEE result between low and critical threshold

- Critical\_low\_OEE

- OEE lower than critical threshold

- Quality

- Low\_Quality\_warning

- Quality result between low and critical threshold

- Critical\_low\_Quality

- Quality lower than critical threshold

- Machine Stoppage

- Machine starved

- Test failed

The screenshot displays the 'Create new rule' form in the CREMA system. The rule is named 'Test\_failed' and is associated with process instance 10987. The conditions are defined as 'Location = GOODS\_OUT' AND 'test = FALSE'. Below the form, the 'Alarms' section shows a table of active alarms. The 'Test\_failed' alarm is highlighted, and a detailed view of this alarm is shown below the table.

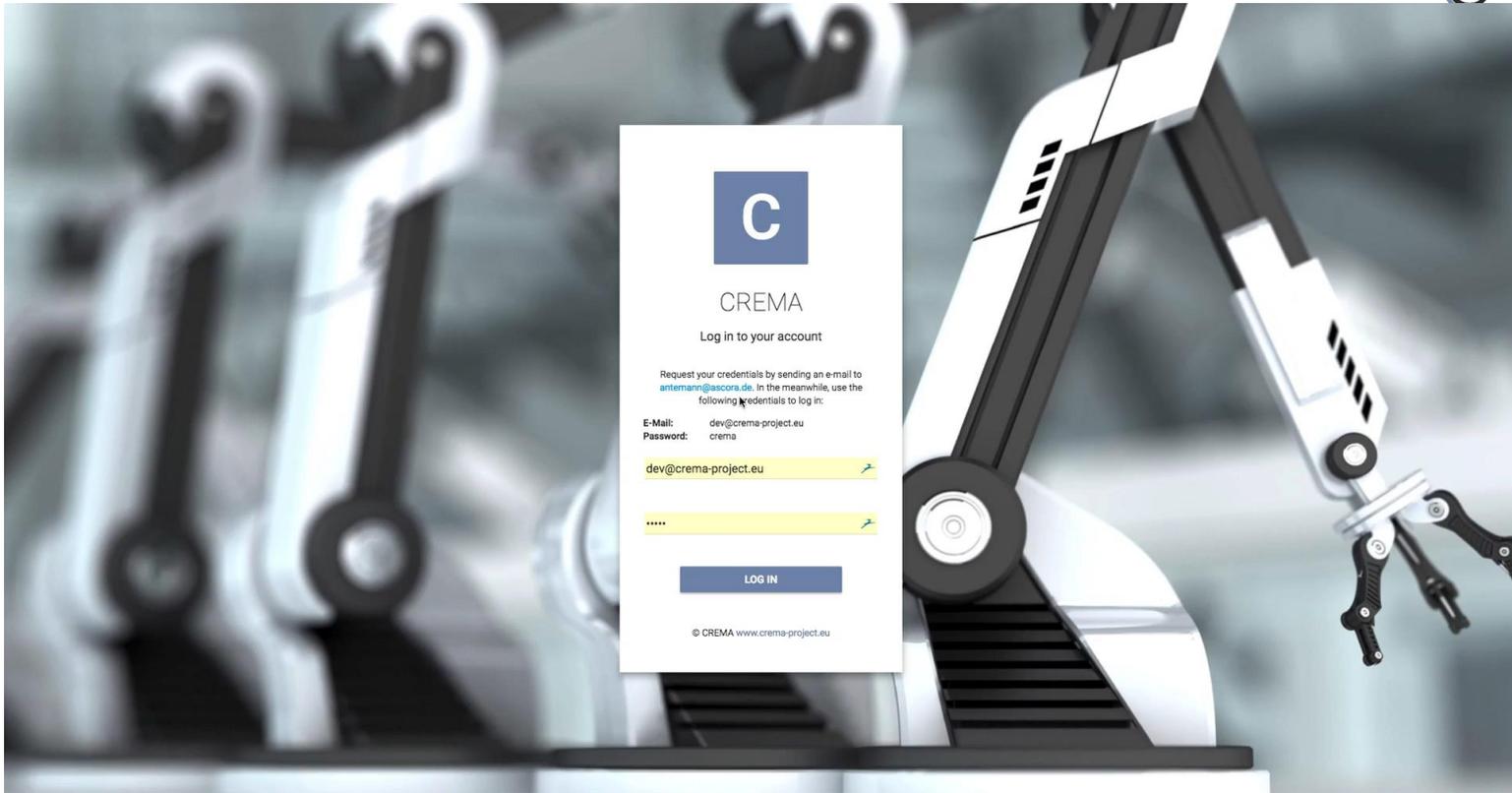
Name	Category	Process ID	Product ID	Date (Start)	Date (End)	Active	Info	Maintain
Test_failed	Critical	10987	Product4	2017-01-12 11:40:21	2017-01-12 11:40:21	✓	🔍	MAINTAIN
Low_Quality_warning	Warning	10354	Product9	2016-12-27 10:40:13	2016-12-27 10:51:45	✗	🔍	MAINTAIN
Low_OEE_warning	Warning	10987	Product4	2016-12-23 21:23:01	2016-12-23 21:23:01	✗	🔍	MAINTAIN
Test_failed	Critical	10987	Product4	2016-12-23 21:23:01	2016-12-23 21:23:01	✗	🔍	MAINTAIN
Critical_Low_Quality	Critical	10987	Product4	2016-12-23 21:23:01	2016-12-23 21:23:01	✗	🔍	MAINTAIN

**Test\_failed**

- Timestamp: 1478688021000
- ID: Product4
- Action: Enter
- ObjectName: Product14
- Customer: Tenneco
- Model: Exhaust

Serial: 2411198429111984  
Location: 50 055821/4.469936  
Test: FALSE  
Weld: FALSE  
Quality: FALSE  
LocalLocation: GOODS\_OUT

# Tikki System



- Operator receives messages about machine problems occurred when he/she was not working with that machine and the instructions followed to solve them



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