Model based control framework for site-wide optimization of data-intensive processes

- Call: H2020-IND-CE-2016-17
- Start/end date: 1st October 2016 – 30th September 2019
- Partners:

Coordinator
Project Case Study

1. The EU/ SPIRE needs
Extension of model based control techniques to the level of plant or site-wide control
Decrease of resource consumption and of use of energy on-site

2. The Project Solution
A multi-scale control methodology will be provided for heterogeneous production environments, both at plant and site level

3. Value to Customers
The MONSOON control methodology aims at reducing use of raw materials, energy, emissions, production times and costs

4. How will this happen?
Development of a data-driven methodology for process optimization, through cross-sectorial collaboration
Methodology evaluated in two manufacturing sites (aluminium and plastic domains)
What are the **key expected sustainability impacts** of MONSOON?

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Baseline</th>
<th>Expected Impact</th>
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</thead>
<tbody>
<tr>
<td>Raw material consumption</td>
<td>A: production of aluminium: 121% of minimum stoichiometric carbon consumption</td>
<td>A: 10-25% improvement of the gap with theoretical minimum</td>
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<td>P: 7K tons of plastic per day, corresponding to a production of 1M sets (capsules + lids)</td>
<td>P: decrease of resource consumption by 10%</td>
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<td>Energy</td>
<td>A: EU smelters use about 13300 kWh for 1 ton of product; current consumption for best operating plants about 190% of theoretical minimum</td>
<td>A: Gain of 1-3%, i.e., 150-450 kWh/t</td>
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<td>P: Electricity consumption for injection moulding: 10247 kWh per day</td>
<td>P: decrease global use energy by 10%</td>
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<td>Emissions</td>
<td>A: CO_{2eq} generated by the aluminium production: 2,1 t CO_2 / t Al</td>
<td>A: 2-5% improvement</td>
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<td>Health and safety</td>
<td>A: process incidents treatments exposes workers to high heat and fumes</td>
<td>A: reduce 30% process incidents and related work risks</td>
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A = Aluminium;  P = Plastic
What **outputs or learning** from MONSOON could have value for other SPIRE projects here?

- **Our methodology is conceived to be usable in different industrial domains, in particular:**
  
  - **A model based development environment** for predictive control algorithms: it will be built during the project and finally made available to be used by other industrial partners
  
  - **IoT Connectors and adapters**: the technologies developed to collect data from and integrate industrial sub-systems, sensors and actuators, could be exploited in other industrial domains
  
  - **Algorithms for data analysis**: the functions to perform predictive control are based one machine/deep learning. The methodologies for such data analysis could be exported and tested in other process industries
"DON'T UNDERESTIMATE THE FORCE OF MONSOON"
DARTH VADER – STAR SPIRE EP.IV
(THE POWER OF DATA)
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