

## 1. Challenger companies

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## 2. Challenge

How can the holistic integration of the operating data of machines in production plants be achieved?

## 3. Possible applicable solutions

- Sensor and Internet of Things solutions
- Data Intelligence
- Machine learning: pattern analysis and smart prediction of failures in critical elements
- Intelligent automation

## 4. Background:

The SMEs that embrace this challenge – despite dealing with specific circumstances and showing different degrees of digitalisation in their production process – all agree on the need **to optimise the connectivity and global integration of the manufacturing data collected in their plants**. Therefore, their common goal is to evolve towards the “**connected virtual factory**” concept, which leads to better productivity, efficiency and performance of the machinery and decision-making by the workers in question.

Accordingly, adequately **capturing, managing and interpreting the data** from industrial equipment and machinery, and their **global integration in the manufacturing process**, will enable **the plant production cycles to be optimised**.

To this end, the participating SMEs can be seen to have interrelated needs, but at different levels of complexity and development. On a first level, **there is the global integration of the production information, connecting the data captured by the industrial equipment and machinery, the PLCs and even the ERP systems**.

The second level involves **optimising the data analytics and formulating coordinated predictions** of the functioning and coordination of equipment and machinery. This is for those companies with **connected production lines**, but which aspire to achieve **better collection, processing and correlation of the data from different machines and equipment**. In order to thus achieve greater efficiency in production (both in terms of quality and energy), along with the coordinated integration of the recommendations sent from the machine to the operator through the HMI (Human Machine Interface) of the line.

Finally, **the need for global integration of the existing sensors in the manufacturing area for a systematised and coordinated control of the manufacturing parameters can be seen**.

Thus, the common denominator of the problem areas faced would be “**improving data connectivity and integration of the production plant**”; while the SMEs unanimously point out

that the challenge does not lie in the digitalisation of the factory itself, but rather in the processing **of the high volume of data, in their analysis and interpretation.**

Furthermore, the very integration of the data, taken to be the ability to mesh information technology (IT) with operations technology (OT), continues to be a real barrier and is where the challenge actually arises.

## 5. Sub-challenges and targets

As can be seen from the above context, there are two challenges linked to factory data connectivity and integration:

1. **Improving the integration of data obtained in the manufacturing area:**
  - Connectivity is taken to mean all those elements that encompass the capturing of data from the machines, their integration and their analysis. There is a clear gap not only between the connection with the machines of the manufacturing area and their dialogue with the technical team, but also in their ability to analyse and process that data. Given this situation, the use of connectors will provide a solution to this type of problem areas. An example of such connectors would be the use of HW that allows the integration of the data, their analytics and processing, from the moment that the data are exported until the designated technician receives them.
2. **Improving connectivity using sensors throughout the production process:**
  - Using sensor systems to obtain real information from the different phases of the manufacturing and assembly process, and cross-checking it against the company's conventional management wisdom. Contrasting the real information with "what managers or operators think may occur" often leads to many surprises in terms of productivity, bottlenecks, critical processes, automation capacity, etc.
  - Sensor systems allow new production efficiency lines to be explored (particularly when it is non-serial or semi-serial production, as is the case) and particularly as regards assembly and operations & maintenance.
  - Sensor systems require a robust digital and technological base in order to integrate all the information captured by the sensors and transfer it not to information but to production/management metrics and identifying areas for improvement.
  - The sensors may be of different types: built into the machine (Atten2 type), artificial vision, volumetric or weighing systems, or ones that measure other relevant parameters.