

Industry 4.0

Qs Group Road to IoT



Who we are ... What we do ...

A group of companies that for **over 40 years** operates internationally in **various industrial sectors** such as: household appliances, automotive, food & beverage, pharmaceutical, chemical, health and mechanical in general.

The Group's **areas of specialization** range from the design and construction of machinery, industrial automation systems and dies, the **development of industrial software** and artificial vision systems, to co-design and product engineering services and after-sales assistance services.

Organization

Founder	Giovanni Porcarelli
Employees	280 between white and blue collars
Turnover	60 Mln Euro
Manufacturing Centres in Italy	Cerreto d'Esi (AN) - 15.000 sqm Fabriano (AN) - 8.000 sqm Abbiategrasso (MI) - 5.000 sqm

Engineering Team

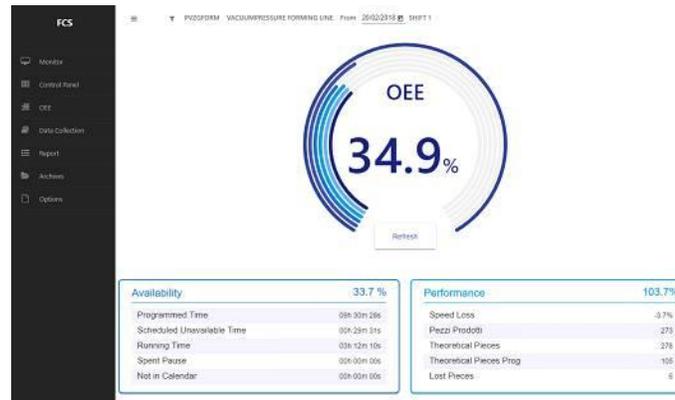
45 Mechanical Designers
10 Electrical Designers
5 Hydraulic Designers
25 Software Designers



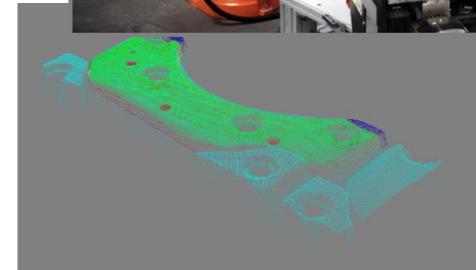
- Sheet Metal Division
- Thermoforming Division
- Polyurethane Division
- Handling and Storage Division
- Assembly and Control Division



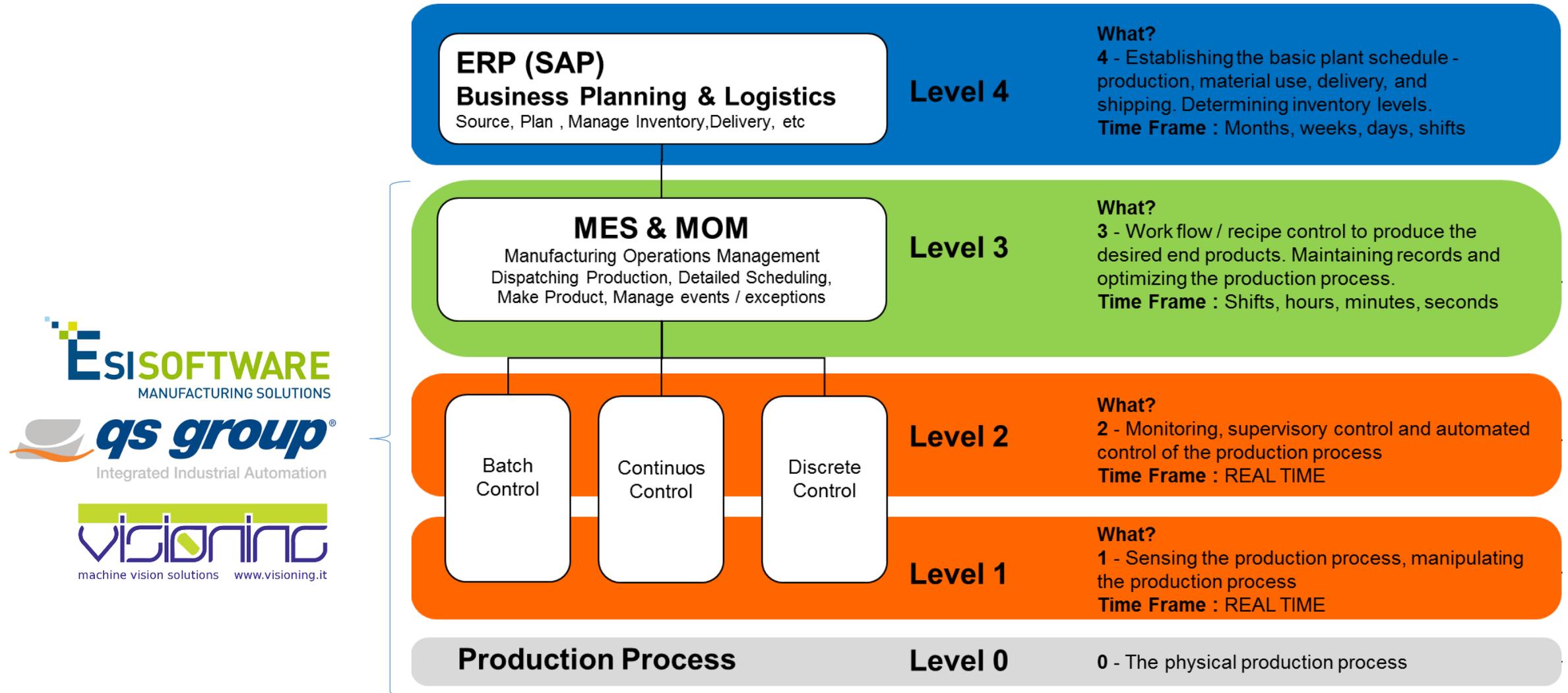
- MES
(Manufacturing Execution System)
- WMS
(Warehouse Management System)
- SCADA
(Supervisory Control And Data Acquisition)
- AIDC
(Automatic Identification and Data Capture)



- Cyber-physical system
- 2D/3D Localization
- Inspection System
- Dimensional control
- String Recognition



A Team able to communicate at all levels of ISA 95 (Business, Operations, Control)

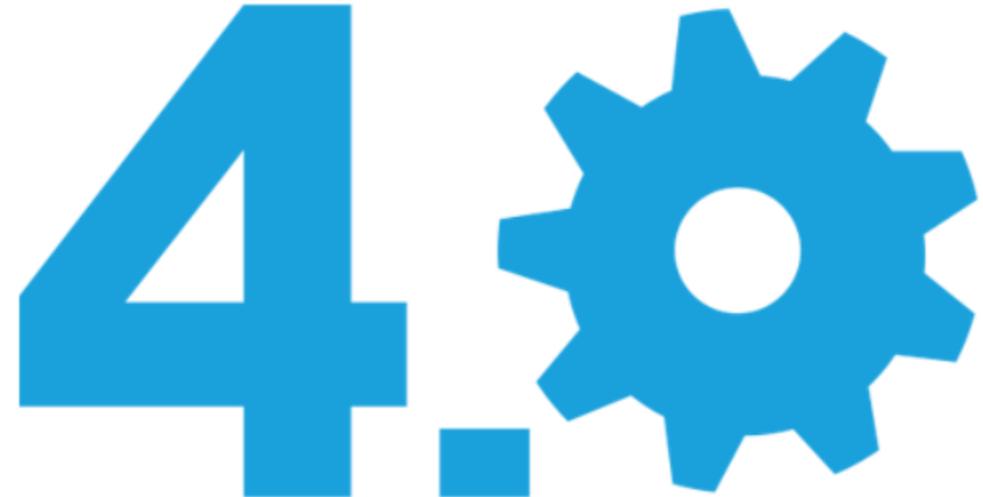


Some References



Why Industry 4.0 ?

- Being competitive
- Continuous Improvement
- Performance Optimization
- Downtime Reduction
- New services to reduce TCO
- After sales services and monitoring
- ...**market's request**



What Market requires

- Zero Errors /Quality improvement
- Manual operation reduction
- IIoT / Big Data Analysis
- Integrated Solutions
- Integrated Supply Chain
- Modelling and Simulation
- Mass Customization
- Zero Heating & Light



Our Pillars

**Cyber-Physical
System**

**Augmented
Reality**

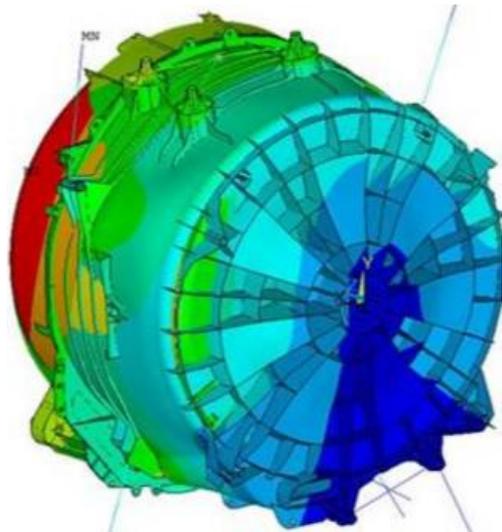
M2M

**Predictive
Maintenance**

**Smart
Assistance**

Case History: Cyber-Physical System

- **Request:**
To automate a manual assembly process for feeding 7 production lines.
The components to be assembled are very similar, so there is a high probability of error.



Case History: Cyber-Physical System

- **Solution:**

Integrating an automated assembly station in line (*Cyber-Physical System*)

- **Main characteristics:**

- Integrating Supermarket in line
- Integrating vision systems (*Machine Vision*)
- Integrating RFID in order to implement communication between the assembly station and sub-assembly product (Dynamic Group) (*M2M*)



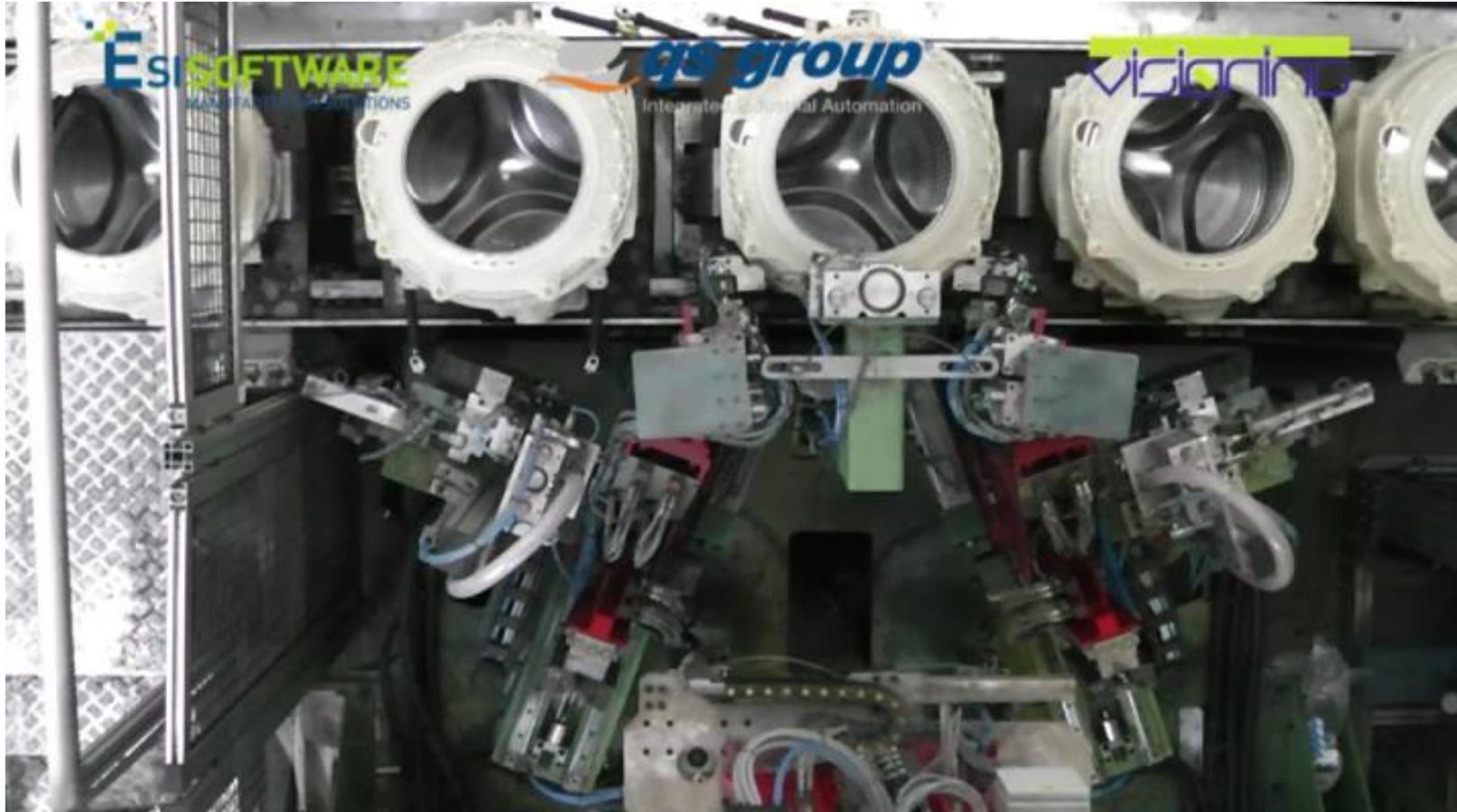
Case History: Cyber-Physical System

Integrated Supermarket in line and Vision system



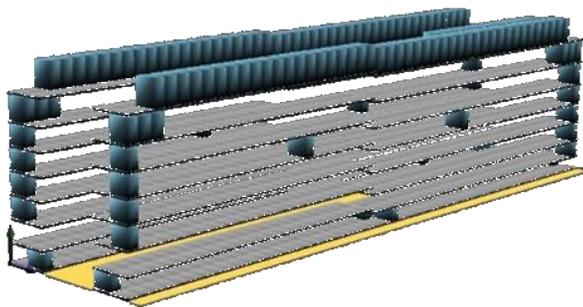
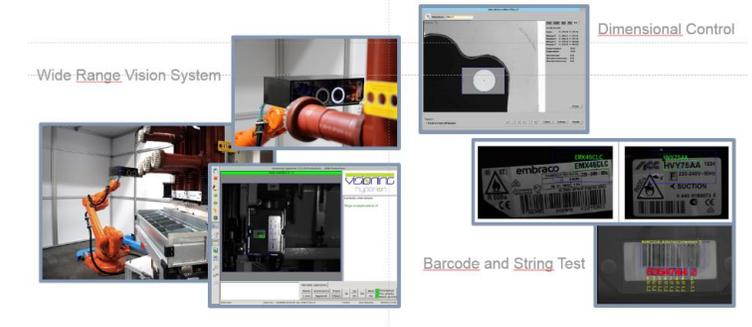
Case History: Cyber-Physical System

M2M – RFID and Automatic Assembling



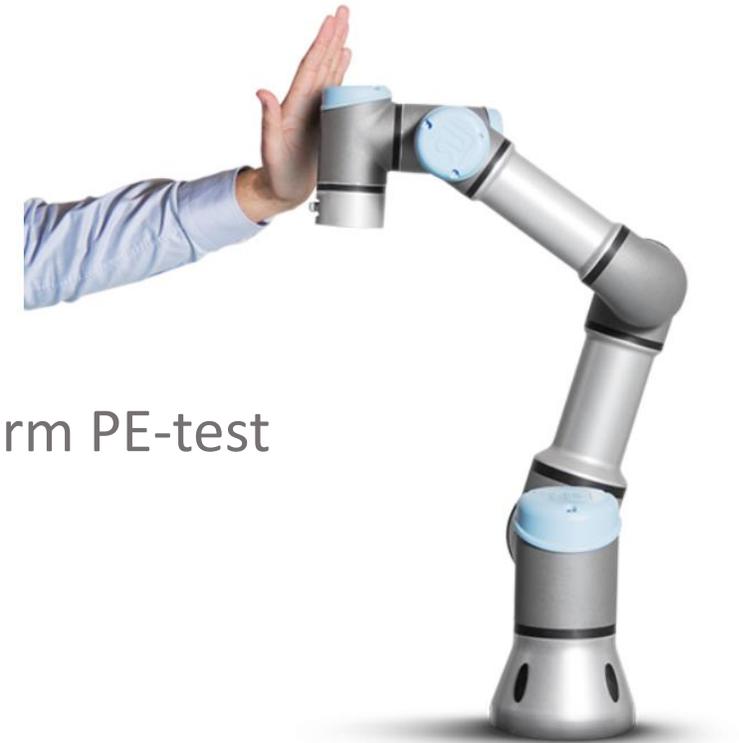
Case History: Cyber-Physical System

- Extension : automatic refilling of counter-weight
- Extension: integration with Automatic Warehouse system
- Extension: integration with MMS (Material Management System)



Case History – One Piece Flow / Mass Customization

- **Focus: manual activities reduction and introducing Mass customization system**
 - ERP / MES Integration
 - Integrating Vision System (*Machine Vision*)
 - Integrating Anthropomorphic Robots for manipulation
 - Automatic Components Fitting and Traceability
 - Collaborative anthropomorphic Robot (COBOT) to perform PE-test



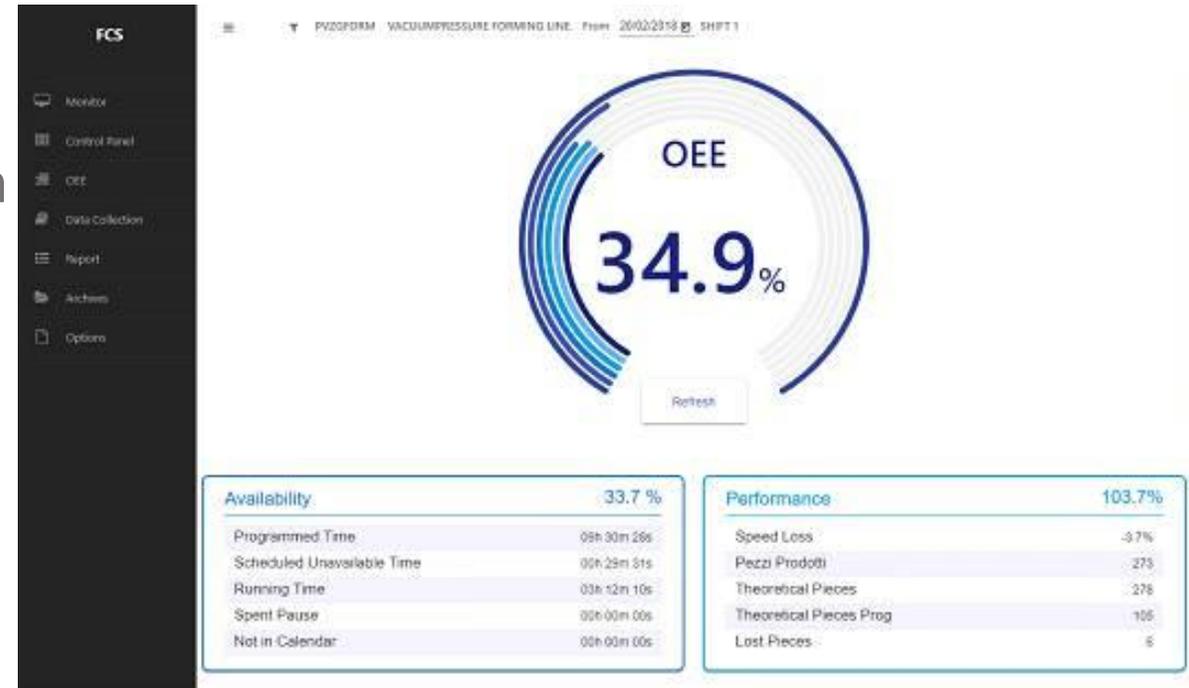
Case History – One Piece Flow / Mass Customization

Automatic Assembly Line



Case History: Smart Assistance

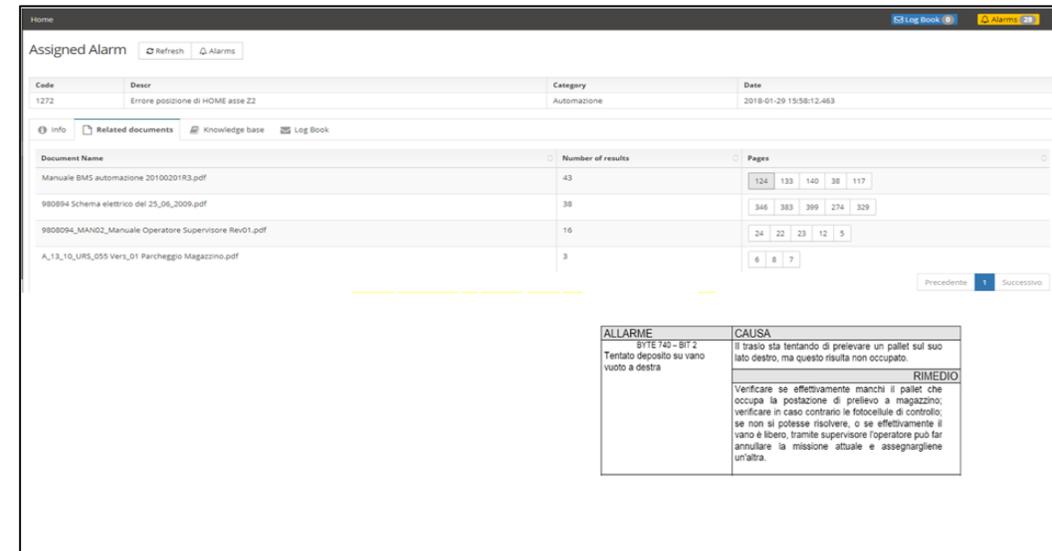
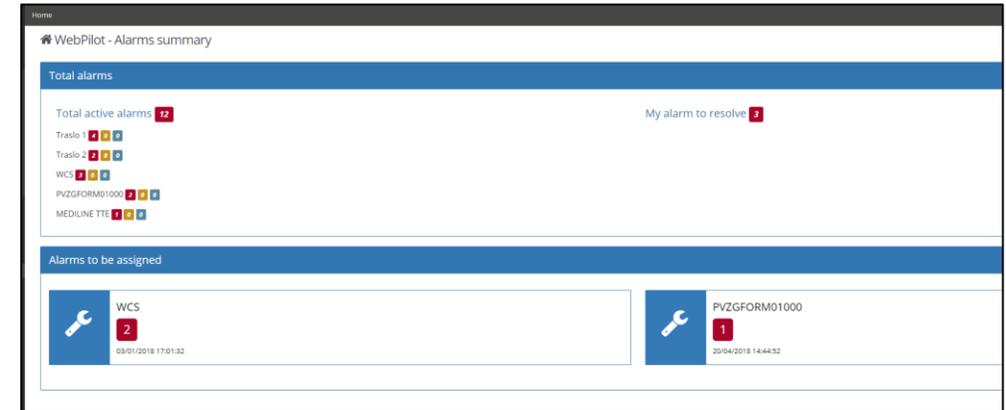
- **Focus: downtime reduction**
 - Know-how digitalization
 - Documents and procedures digitalization
 - Maintenance activities tracking
 - Solutions rating
 - KPI



Case History – Smart Assistance

Main Features

- Alarm notification in real time
- Multi asset configuration
- Multi zone configuration
- Alarm severity management
- Ldap integration for user management
- Notification escalation
- Contextualized document search
- Preview of each page



Case History – Smart Assistance

Digitalization

Scope is to provide to operator all the information:

- Electrical Drawings
- Layout
- 3D Drawings
- User Manual
- Maintenance user
- Image /Video Tutorial
- Check List / Procedure

The screenshot displays the EsiSOFTWARE Manufacturing Solutions web interface. The user is logged in as Luca.Cesari. The main content area shows an "Assigned Alarm" section with a table containing one entry:

Code	Descr	Category	Date
190	Machine in emergency state	MEDILINE TTE	2018-04-03 08:41:24.567

Below the table, there is a "Knowledge base" section with a tabbed interface. The active tab shows a solution for the alarm:

1. Safety relay in the machine has been released (5 stars)

This alarm indicates that the safety relay in the machine has been released. This may happen for various reason as opening a door and/or pressing the emergency button. It also appears when you first start the machine. Use this

Step for solution:

1. Make sure the doors are closed

2. Make sure emergency button has been reset

3. Press the RESET button to reset this alarm

A "+ New Cause and Solution" button is visible at the bottom of the knowledge base section.

Case History – Smart Assistance

Real time 3D

- 3D web virtualization
- Remoted sensor data (on the right)
- Different predefined views

The screenshot displays a 3D virtual model of a warehouse crane. The interface includes a sidebar with navigation options like 'Admin', 'Warehouse', and 'Smart Assistance'. The main area shows the crane model with a 'Sensors real-time' panel on the right. This panel lists various sensor readings and their status (Active/Inactive).

Carrello	
● Posizione carrello	346305.00
Altezza lato SX	
● Controllo altezza 600 mm lato SX:	1
● Controllo altezza 800 mm lato SX:	1
● Controllo altezza 1000 mm lato SX:	1
● Controllo altezza 1200 mm lato SX:	1
Altezza lato DX	
● Controllo altezza 600 mm lato DX:	0
● Controllo altezza 800 mm lato DX:	1
● Controllo altezza 1000 mm lato DX:	1
● Controllo altezza 1200 mm lato DX:	0
Sagoma trasversale	
● 1° controllo sagoma trasversale lato SX:	1
● 2° controllo sagoma trasversale lato SX:	1
● 3° controllo sagoma trasversale lato DX:	0
● 4° controllo sagoma trasversale lato DX:	0
Vano lato DX	
● Controllo vano 1° profondità DX:	1
● Controllo vano 1° profondità da 2° profondità DX:	0
● Controllo vano 2° profondità DX:	0
● Mancato forcolamento 1° profondità DX:	0
● Mancato forcolamento 2° profondità DX:	1
Presenza pallet	
● Presenza pallet a bordo traslo:	1
Vano lato SX	
● Controllo vano 1° profondità SX:	0
● Controllo vano 1° profondità da 2° profondità SX:	0
● Controllo vano 2° profondità SX:	1
● Mancato forcolamento 1° profondità SX:	0
● Mancato forcolamento 2° profondità SX:	1
Forcole	
● Forcole al centro 1° verifica:	1
Nessun sensore selezionato.	

Case History: Integrated Supply Chain

Objectives:

- Create an integrated supply chain system to manage the order and receiving of packaging materials.
- Pallet shipment optimization
- Warehouse areas optimization
- Reduction of acceptance activities
- NO MIX-UP



Case History: Integrated Supply Chain

- **Solution:**

Introduction of RFID technology

- **Main characteristics:**

- Identification of boxes and pallets with *RFID LABEL*
- Integration between packaging line with palletizing system (*M2M*)
- Installation and integration of *RFID GATE*



Case History: Integrated Supply Chain

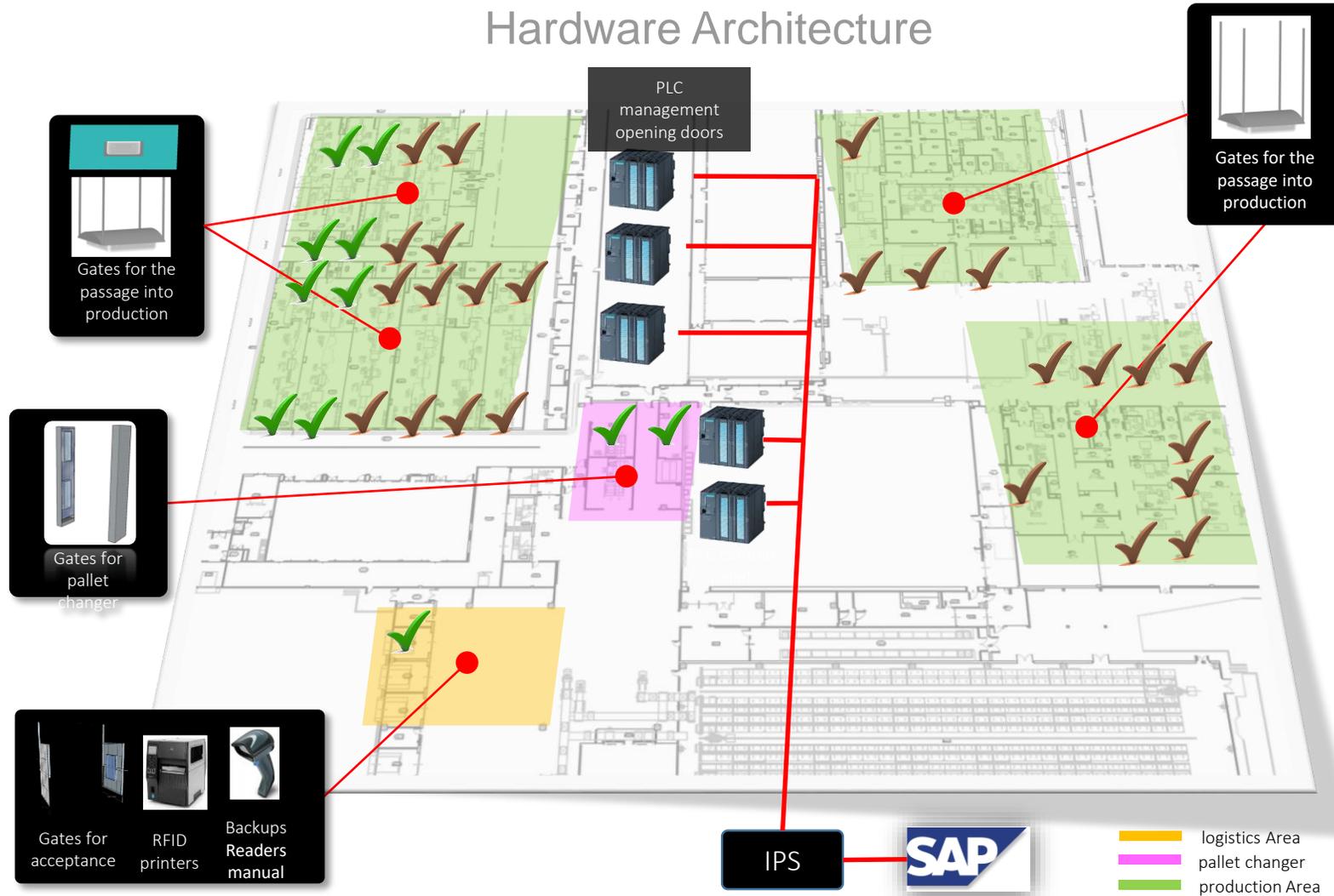
Main Activities

- Material flow analysis / data
- RFID tag selection
- Selection of antennas
- Reader selection and RFID device
- Execution of field tests for reading tests
- Engineering gates
- Electromechanical installation
- Qualification



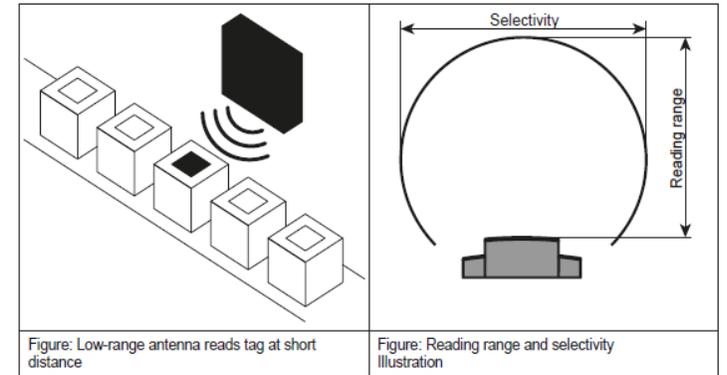
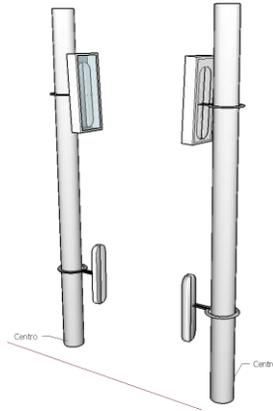
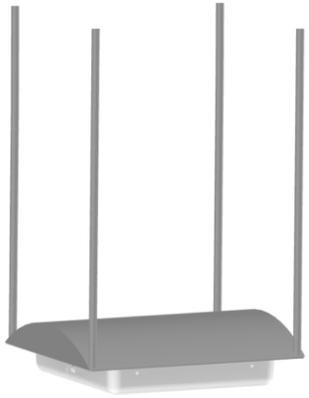
Case History: Integrated Supply Chain

Hardware Architecture



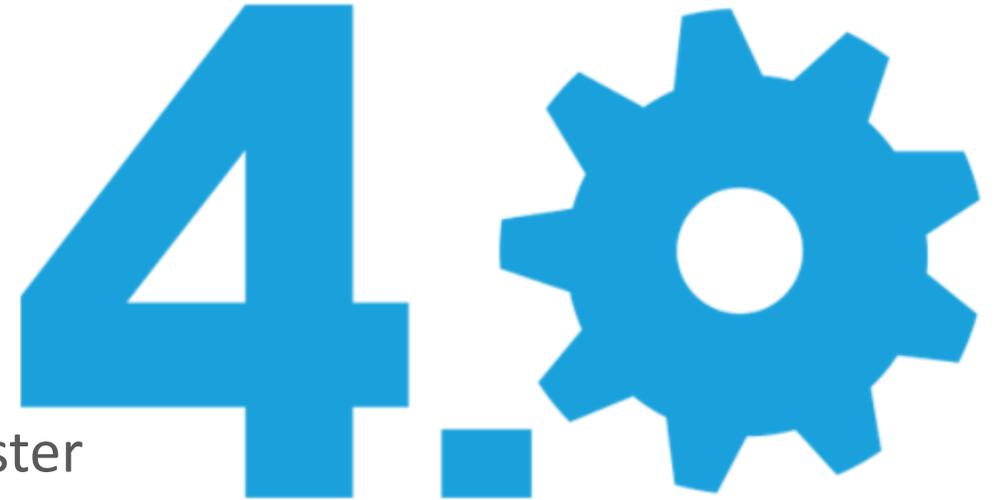
Case History: Integrated Supply Chain

Concepts and Realizations



Conclusions

- Industry 4.0 as an opportunity:
 - Internal : new skills and challenges
 - External: products innovation
 - IT/OT convergence as mission
- New technologies to know better and to act faster
- Servitization....opportunities or new challenges?



Next Steps

- Predictive Maintenance
- Digital Twin

Thank you!

