



Interconnection of a New Production Line in Key Industry 4.0

Inox House S.r.l.

Challenges

- To become Industry 4.0
- Interconnection of new custom machines different from each other and from different suppliers
- Interconnection between production line and company management software
- To historicize the variations of the process parameters
- Having an open platform for future integration of new machinery and sensors

Solution

- Custom software - predecessor of Fabbrica Digitale 4.0

Resources

- iDaq
- Multidriver
- Liliun (—worker DBMS)
- Touch screen PC monitor

The Challenge

Inox House S.r.l., leader in the application of the aluminum induction bottom, **wants to create a new production line** totally integrated into the factory information system according to the **Industry 4.0 model**. The new production line consists of various machines built by different suppliers. Inox House intends to become a **Smart Factory** and take advantage of modern technologies to achieve the following objectives:

- **To minimize setup and configuration times**, automating all the interaction activities with the machines
- **To program the parameters** of each machine according to the items to be produced
- **To historicize the variations of the process parameters** with total **traceability** of the workings
- **To integrate** the work order management with line activities
- **To eliminate the use of paper and human errors** resulting from manual data management
- **Having in real time the status of each machine** in the line and of all the process parameters
- **Having a line supervisor easy to use**, immediately understandable to anyone
- **Having an open platform for the future integration** of new machinery and new sensors to monitor all the signals of interest

The new production line consists of:

- **A set of robotic arms** that automatically feed and direct the pieces to work.
- **Parts preparation line** with a 160 kVA inverter projection welding machine, **supply arms** and **three disk warehouses** to **automate the spot welding of the parts**. The machinery is equipped with a control system of delivered energy to guarantee high quality in the operation, made difficult by the fact of having to join two very different materials such as aluminum and steel.
- **240 KW oven** with **eight different temperature controlled temperature zones** and a 800 mm conveyor belt with variable speed from 500 to 1500 mm/min to create the most suitable thermal curve for the molding process. Particular attention was paid to the relative position of the different heating zones in order to heat the material to the heart.
- **3500 ton screw press** that joins the pieces through the differential sliding of the materials to be joined.
- **System to cool** the parts with inverter fans to optimize the cooling curve, and conveyor belt also at variable speed.
- **Automatic robotized line with 75 Tonn hydraulic press** to calibrate the pieces after molding according to European regulations.

Particular attention was paid to the choice of the screw press, a machine that allows, through a large flywheel, a multi-pronged screw and above all a heavy hammer, to develop large energy values in a very short time, to allow a high performance welding since the materials to be joined interpenetrate each other. This press exerts a force of 3500 tons.



Inox House srl, is a modern and flexible company composed of managers and technical staff with proven multi-year experience in the field of stainless steel processing applied to the household sector and, above all, in the application of the induction bottom on aluminum pans of any type of alloy.

Technologically advanced systems, innovative production processes, expert and qualified personnel, allow the company to guarantee the customer high quality and reliable products.

The main activity is the application of a magnetic induction bottom (full induction) on aluminum pans through both braze welding and impact bonding technology. The automatic molding lines of the products, combine both the productivity and the functionality of the different processes. The "impact bonding" technology (with screw presses up to 3500 tons) allows to obtain a background with welding quality and high non-deformability.

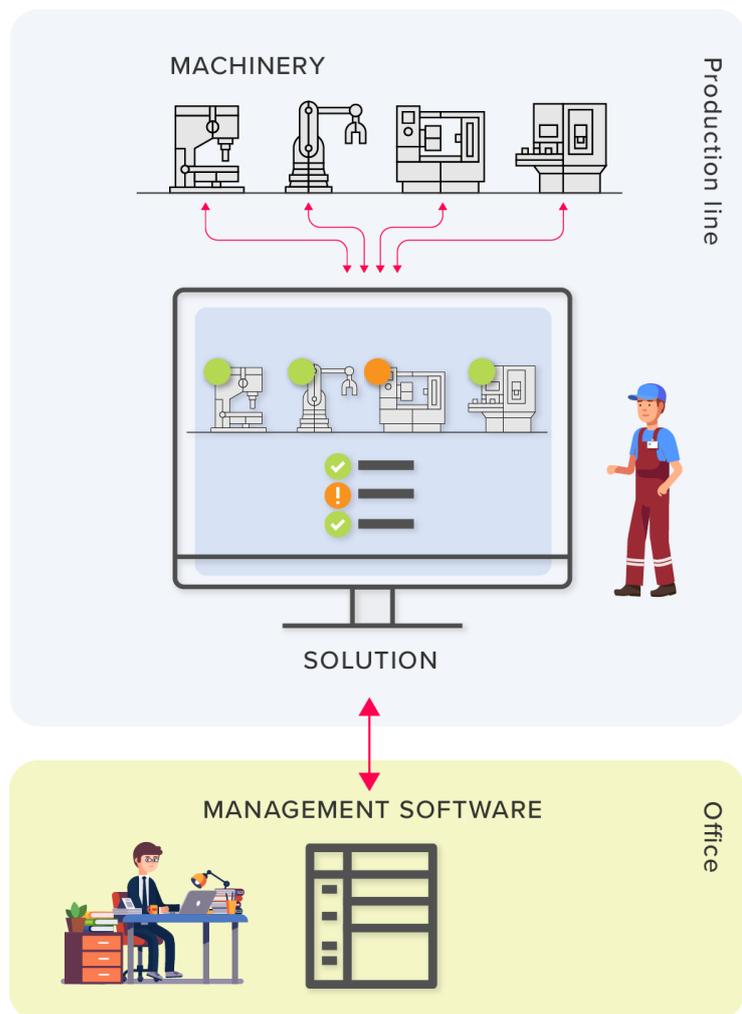
The experience gained in recent years has allowed the development of processes that allow the weldability of the magnetic steel base on different types of aluminum alloys and different types of products: from die cast, to the piece in gravity cast, to the one in squeeze cast until printed and coined.

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Solution

To achieve the goals of Inox House, T4SM has designed a **solution capable to communicate with all PLCs and computers of the various machines in the line**. It was created a **data exchange module with the company management system** to allow managers to have control of production and above all of the process in a simple and effective way. **The supervision system interface has been designed side by side with the client**, creating several intermediate versions to understand the pros and cons of each proposal, up to the final version that allows production managers **to see the important production and process data in a clear and immediate way**.



The developed software constantly monitors the configuration parameters of the production line, since any small setting error significantly changes the final result of the operation. This therefore means:

1. **Ensuring product quality and drastically reducing waste**, optimizing production;
2. **Ensuring the correct functioning and setting of the machinery**, thus avoiding serious losses due to damage caused by incorrect setting;
3. **Having all the parameters set under control** and track any changes made by expert technicians.



TOOLS for SMART MINDS (T4SM) is a system integrator that develops software solutions for manufacturing companies.

T4SM is Alliance Partner of National Instruments and the development team consists of Certified LabVIEW Architects (CLA) who have long experience in LV Real-Time Programming and LV-FPGA.

T4SM designs from scratch to high-quality solutions easily integrable with third-party products, which help customers to shorten time-to-market of their systems.

T4SM uses the AGILE methodology for the development of software projects and the co-design of applications with immediate benefits for customers, helping them to gain a competitive advantage over competitors.

For technical support and product information:

www.toolsforsmartminds.com

TOOLS for SMART MINDS
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Brescia (Italy)

Benefits and Results

Thanks to the T4SM solution all the pre-established objectives have been achieved. The main benefits experienced by Inox House are in particular:

- **Business interconnection:** management and machinery exchange data thanks to the developed software
- **Total and real-time view of the production line:** through the software interface you can have a clear and total view of the general production and of each single machine, being able to see alarms, warnings, and the data that interests the most.
- **Government incentives** for the adoption of Industry 4.0 technologies
- **Reduction of errors and time** and consequent **increase in productivity**
- **Automatic tracking of all process data** for a history to be consulted
- **Automatic tracking of all production data** and integration with the company management software
- **Sending the article and the number of pieces to be produced** to each machine, directly from the **interface**.

For **Inox House** and **T4SM**, adopting the **Industry 4.0 model** means working **in a simpler, faster way, reducing errors and running costs**, and monitoring a production process with many setting variables, being **more efficient and competitive** to respond to new market challenges. Both in economic terms, but above all in terms of **quality**, being the product destined for a medium-high market segment where **the attention to the energy efficiency of the piece is important**.



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Customer's Final Comment

"I'm very satisfied with the realization of this new production line that fully achieves the objectives and expectations I set in the design phase.

In particular I'm extremely happy with the collaboration with T4SM, both with Mr. Vivante, and with all the staff, because, in addition to a precise and timely availability, they have shown a remarkable technical and design expertise proposing unexpected innovative solutions.

Furthermore, the attention in coordinating the various suppliers was very useful and very precious to me. I rarely came across a supplier who solicited the customer. Surely in the future it will be very useful for me to collaborate on implementing a process control in other departments of the company."

Alberto Bugatti — Founder — Inox House