

Industry 4.0 Made in Italy:
An Award-Winning Story by Danieli Automation & COPA-DATA.

DIGITIZING THE METALS INDUSTRY



Even before the “Industry 4.0” paradigm was coined at the Hanover Fair in 2011, Danieli Automation’s pioneering work in the digitalization of production processes was confirming the company’s technological leadership in automation systems for the metals industry. It was an intense period of R&D which saw COPA-DATA become involved as a technological partner.

In this article, we explore the concept put forward by Danieli Automation and COPA-DATA at the “Industrial Software and Servitization” scientific conference at the SPS Italia 2017 Fair. It was here that Danieli Automation and COPA-DATA were awarded first prize for the most prestigious presentation.





Figure 1: Operator Assistant (OA): The innovative Multi-Touch operating interface by DIGI&MET, part of the HCI extended metal automation platform named 3Q.

Today, we're all talking about the "Smart Factory" and "Big Data" thanks to their repeated media coverage and the financial incentives offered by local governments. But there are those, like Danieli Automation SpA from Buttrio (UD), who for more than 10 years have been taking on these matters. For Danieli Automation, it is the key competitive force in the metals industry, an industry characterized by a gradual reduction in volumes of steel produced and by the low production efficiency of existing factories.

With the introduction of the "Industry 4.0" paradigm in 2011, Danieli's strategic vision was evident through the three pillars of its own technology platform, namely:

- Centrality of the "Human Factor"
- Increased collection of process data (Industrial IoT)
- Innovative services connected to a Big Data analytics platform

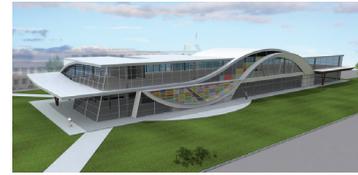
These are the foundations of DIGital platform for the METals industry (DIGI&MET), the innovative services platform created by the Danieli Automation team. Let's consider these pillars in turn.

CENTRALITY OF THE "HUMAN FACTOR"

What distinguishes DIGI&MET most from older control systems is its innovative human-machine interface: the Operator Assistant (OA). By focusing most of the necessary intelligence on the internal automation system, a new approach to controlling the process is made possible; minimizing the number of commands that the operator has to consider and reducing their involvement to a limited number of situations (see Figure 1).

Extensive research into cognitive engineering was carried out by Danieli Automation with the primary aim of reducing the number of unnecessary commands and signals for the operator and to gather as much useful data as possible so it can be used to make on-the-spot decisions.

DANIELI AUTOMATION



DIGI&MET

"Simplifying Metals Complexity"

The challenge of the new globalized market and the current steel market outlook characterized by plant under-utilization are causing metal producers to seek low CapEx investments, aiming at improving the efficiency of the production facilities, the quality of the products, the health and safety of the workers as well as the environmental sustainability. In this scenario, DANIELI has created a new cross-functional business unit named DIGI&MET whose mission consists of developing and implementing new plant design concepts, based on digital innovation, and also new business models based on servitization and outcome economy principles.

http://www.danieli.com/en/innovation/automation/port-fesr-14-20_85.htm

SPS AWARD 2017

Danieli Automation and COPA-DATA won the first prize for the best presentation of the scientific conference "Industrial Software and Servitization" which took place during the SPS/IPC/DRIVES-Fair 2017 in Parma, Italy.

http://www.spsipcdrives.it/public/allegati/ometto_menin_danieliautomation_copadata.pdf

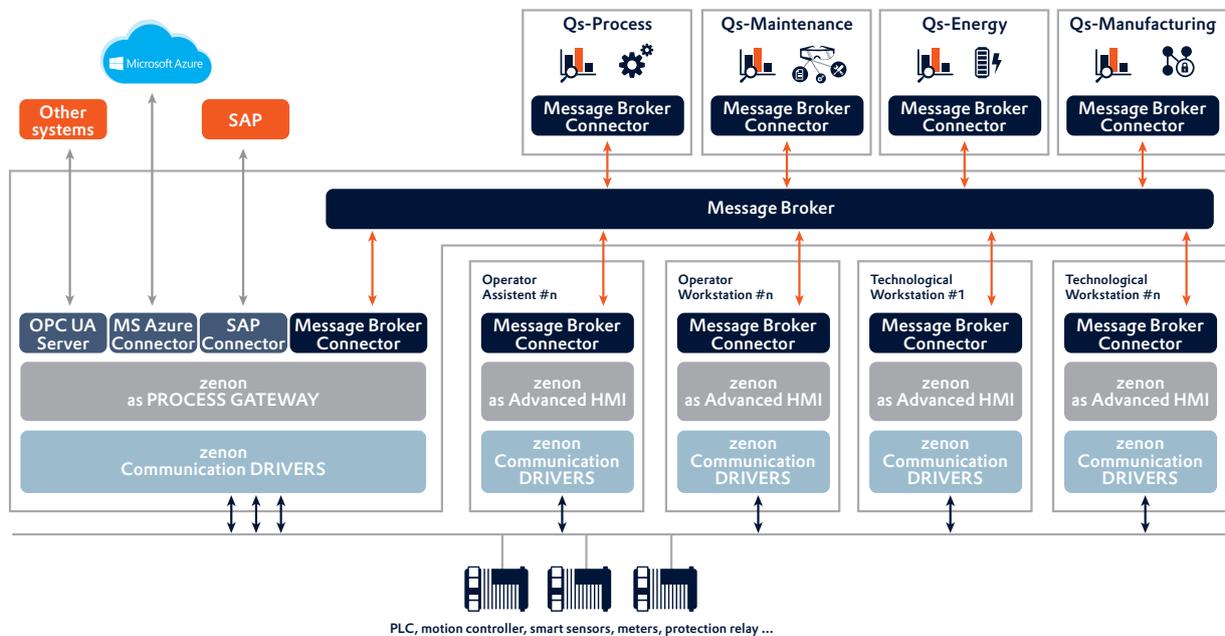


Figure 2: Communication infrastructure: a flow of reliable, secure, high-quality information.

The OA therefore becomes the cornerstone of the control center. This innovative tool is tasked with helping the operator during production by simplifying the complexity. It provides updates and requests their input when necessary through simple, easy-to-understand questions.

INCREASED COLLECTION OF PROCESS DATA (INDUSTRIAL IOT)

The communications infrastructure has a strategic role to play in DIGI&MET. Services using data act as the service providers for information processing. All providers can communicate with each other via a connection to the central message broker. In this context, the zenon Process Gateway is the main communication bus for Danieli Automation 3Q automation platform. It collects data from the field and sends them in structured messages as and when requested. It also handles connections to ERP systems, like SAP, or cloud infrastructures, such as MS Azure, to achieve OT-IT-IoT integration (see Figure 2).

Using zenon Process Gateway, a high number of communication drivers are available to interface with devices from different manufacturers and existing infrastructure.

Nevertheless, simply connecting is not enough. A bi-directional flow of reliable, high-quality data must be guaranteed. The data must be “atomically” legible within the field in order to coherently feed the descriptive process

models. And an adequate update speed must be guaranteed, particularly for Online Analytical Processing (OLAP) applications.

CONFIGURABILITY OF THE PLATFORM

All plants are individual. Multiple technicians can work in teams on projects that require months of work. These challenges make ease of engineering key. A flexibly configurable environment backed up by automated standard procedures is necessary to guarantee a higher quality of work and reduce engineering time.

CYBER-SECURITY BY DESIGN

Information security must be an integral part of the software development phase. For this, the following factors are considered: segregation of legacy protocols, encryption of cloud-based communication, security zone separation, and a Defense in Depth strategy in accordance with IEC 62443.¹

INNOVATIVE SERVICES CONNECTED TO A BIG DATA ANALYTICS PLATFORM

Now we come to how data gathering is managed. How can we transform data into useful information? How can we build knowledge? How can we combine this new knowledge with user experience of the device to improve overall performance?

¹ IEC 62443 Brings Increased Security to Automation; Information Unlimited Issue #30 https://issuu.com/copa-data/docs/iu30_en/22?e=2527195/48491672

These are the tasks performed by the DIGI&MET industrial analytics applications. The four modules now available on the platform are:

- **Qs-Manufacturing:** to coordinate and optimize the supply-chain processes which handle the life-cycle of a customer order.
- **Qs-Process:** to enhance the quality and efficiency of the technological processes.
- **Qs-Maintenance:** to increase the efficiency and reliability of the equipment using condition monitoring and predictive maintenance.
- **Qs-Energy:** to optimize energy and media usage by monitoring and controlling relative consumption.

TOWARDS AN OUTCOME ECONOMY

The technology platform is backed up by an innovative business model. Better awareness of how devices are functioning, through data collection, allows for an objective metric of performance indicators.

Thanks to this new awareness, it is possible to modify the commercial model, moving away from traditional sales towards service provision. This can be paid on the basis of services agreed (productivity, quality, energy efficiency, etc.), in line with the “outcome economy” model.²

This new approach benefits the end client in terms of reducing CAPEX and OPEX, as well as delivering an all-round improvement in device, machine, and, therefore, factory efficiency.

The supplier can guarantee the provision of agreed services while enjoying long-term contracts and a better understanding of the equipment – offering potential for business growth.

AN OPPORTUNITY AND A CHALLENGE

Without a doubt, the Fourth Industrial Revolution represents an opportunity for Italian businesses. Some of the concepts discussed here are already up and running, but there is still a lot to do in the field of Big Data analytics. We need people with new, specific qualifications – and this is the challenge for our universities. We need forward-thinking business people and leaders who can see beyond financial metrics and who are ready to consider a paradigm shift. We need a broadband infrastructure able to sustain the steadily increasing data traffic. Then there are the key issues of cyber-security and confidentiality of information. These are some of the challenges facing the entire Italian system – and many other systems too.

Allow us one final suggestion, a word of warning to everyone involved in this revolution: our fellow humans and our overall wellbeing should always be at the heart of our innovations.

We need a technological revolution coupled with a renewed sense of humanity.

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INDUSTRY MANAGER



MARCO OMETTO

Executive Vice President
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Marco Ometto spent eight years in software programming and electrical systems for a leading manufacturer before joining Danieli Automation in 1994. At Danieli, his focus has primarily been on the metals industry – ranging from MES, process control, and the design and development of automation systems, in addition to international development roles focused on India, Thailand, and Vietnam. In 2013, he led Danieli Automation's research activities, establishing Danieli Automation Research Center (DARC), before heading up the company digitization process. Since 2016 he has been in his current role.



GIUSEPPE MENIN

Industry Manager
COPA-DATA Italy
Giuseppe Menin began his career in the mechatronic sector at the end of the 80s. He worked in different technical roles. As a project manager, he coordinated several R&D projects for the automation and monitoring of machines. In 2004, he joined COPA-DATA as an area manager. Since then he has taken on digitization projects for customers such as Terna and RFI. Currently, Giuseppe is in the position of Industry Manager for Italy, focusing on business development in the Energy & Infrastructure, Pharmaceutical and F&B sectors. He is also covering various topics related to Industry 4.0.

² Source: World Economic Forum Report 2015
Industrial Internet of Things: Unleashing the Potential of Connected Products and Services <http://reports.weforum.org/industrial-internet-of-things/3-convergence-on-the-outcome-economy/>