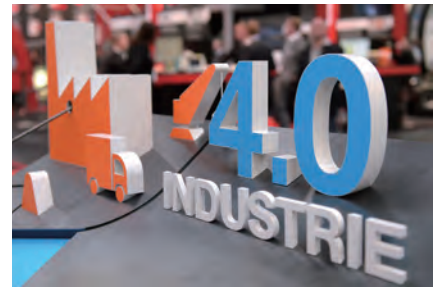


Will We Have an Industry 4.0 for Fastener Manufacture?

by Marco A. Guerritore, Editor-in-Chief of "Italian Fasteners" Magazine



The term "Industry 4.0" would appear to have been officially used for the first time in 2011, by a group of business people, politicians and academics at the international fair for IT and communication technology in Hannover, Germany. But the question is: "What lies behind this strange title of "Industry 4.0" and what does the mysterious number 4.0 actually mean?" To answer this, we must take one or perhaps two steps back in time.

In ancient times, man's labour was mainly dependent on his own strength and, in some circumstances, on cooperation from tamed animals such as the ox, donkey, horse and others. Therefore work was principally a matter of physical strength, without any help from autonomous machines.

It was 1784 before humanity took its first step towards the era of industrialisation, with the appearance of the first steam machines and a method that exploited the force of water. As a consequence, man's work became a little less physical and a bit more technological. This was the start of the first industrial era, known as 1.0. Then, in 1870, with the spreading of electricity and all its consequences and with the advent of the internal combustion engine that stimulated and encouraged the use of oil as a new source of energy and, above all, with the division of labour and therefore the introduction of the assembly line, industrial humanity took another step forward into the future. Delegated in part to machinery, work became increasingly less tiring from a physical point of view, and therefore increasingly more mental.

The principle of industrial production was consolidated and the concept of organisation of work was formed and established, bringing with it a shift into a new production phase: 2.0.

The seventies then saw the birth of information technology. This scientific revolution was to affect the entire production process, introducing and strengthening the idea of automation, which then also expanded into the service sector. Work underwent a complete transformation: the physical effort of labour was considerably reduced, with the element of specialisation taking over. In factories, a decrease in the number of workers went hand in hand with an increase in productivity due to two principles: production automation and optimisation of how work was organised. Completely new company systems and management methods started to be adopted. As the digital era took hold, industry entered the world of electronics, in other words its third evolutionary phase, the so-called level 3.0.

The start date for the fourth industrial revolution has not yet been officially set, probably because the phenomenon is still in its initial evolutionary phase and has yet to find its correct configuration. The concept of "Industry 4.0" came about with the association of two basic principles: "Automation and Integration".

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The predominant role in this new industrial era is mainly played by the idea of integration. One example is sufficient to explain this: in the future, my increasingly smarter phone will be able to inform the factory of its imminent end of life and, based on the data it receives, the factory will automatically prepare a new phone, which will be delivered to me in time, already programmed with my personal settings.

Communication will continue to strengthen between intelligent products in the IoT (Internet of Things) and the intelligent machines that manufacture them. The effects of the fourth industrial revolution will definitely take humanity into an era of unthinkable changes, whose consequences have as yet to be identified.

But what will be the fallout in employment terms of this automation in production? Researchers and experts are attempting to understand how work will change, what the new professions will be and which jobs are destined to disappear.

According to recent research by the World Economic Forum, over the next five years digitalisation will cause approximately 7 million jobs to be lost worldwide, but it will also create about 2 million new ones. The result is however decidedly negative. But dubious statistical forecasts aside, what we must consider is that the new industrial era will overturn the balance as we know it: labour will have increasingly less bearing on production costs. It will be more and more difficult for unqualified workers to find jobs. The third world will no longer be as appetising for industrial investment. There will definitely be an abundance of jobs with no-one to fill them. A huge effort of innovation will therefore be necessary, in order to avoid a recession of unprecedented proportions, together with imagination in the most innate sense of work and distribution of wealth.

Taking a glance back in time, we could surmise that man, with all his continual efforts to evolve, has simply turned what used to be prevalently physical work into an occupation characterised by mental stress.

"Industry 4.0" today is however a reality that involves the main industrialised countries, which see in it a new direction to follow in order to make their production increasingly more competitive and efficient.

Italy has developed a "National Industry 4.0 Plan", which has 4 strategic directives:

- **Innovative investment:** stimulating private investment in adoption of enabling technologies in "Industry 4.0" and increasing the amount spent on research, development and innovation.
- **Enabling infrastructures:** ensuring suitable network infrastructures, guaranteeing data security and protection, collaborating on the definition of international interoperability standards.
- **Competences and Research:** creating competences and stimulating research through tailor-made training courses.
- **Awareness and Governance:** raising awareness, potential and applications of Industry 4.0 and guaranteeing public-private governance for achievement of set objectives.

A recent, albeit timid, recovery in demand and simultaneous ageing of production systems, with an average age of 13 years, have proven to be providential factors for introduction of the “Industrial 4.0 Plan”.

Tax benefits offering super-amortisation of 120% and hyper-amortisation of 140% have helped investments to pick up, not just in terms of replacements but also in connective technologies.

In the context of industrial development in Italy, the fastener sector, which comprises small, medium and large companies, mainly family run, also plays its own specific role.

“Adoption of the Industry 4.0 concept,” says Mr. Stefano Bronzini, engineer and marketing director for ARSER Srl, “is, in my opinion, greatly influenced by a company’s production volumes. The greater the quantity produced, the easier the introduction of digitalisation. The bandwagon effect, often misleading, must be avoided at all costs.”



Jody Brugola, Brugola OEB SpA

The composition of Italian fastener manufacturers as a whole is extremely variegated and therefore not all businesses can adopt state-of-the-art automated and integrated production methods. This is especially true for companies that offer a niche article.

“For a company like mine,” Ms. Laura Missaglia points out, owner of Scob Srl, leading specialists in the production of heat-treated large screws, and manufacturers of small series to design, in other words very special screws, “application of the principle of digital production does not conform with our economics.”

In any case there are also medium-sized businesses in the field of fasteners that are starting to tackle and manufacture the matter of company digitalisation.

One example is Defremm, one of the most important Italian manufacturers of rivets which is starting up a complex, automatic in-house process for IT integration and control of production. Whereas the “Industry 4.0” concept is being adopted in a different way by the big Italian fastener manufacturers.

“It is absolutely indispensable,” stresses **Jody Brugola**, president of OEB, a company that has always claimed quality as added value, “to concretise the idea of “Industry 4.0” because the technologies available today allow for great controls and higher efficiency, at levels never before achieved in this sector.

Companies can in fact guarantee improved productivity thanks to the information from these systems. On our

part, we have been working in this direction for more than two years now and by 2020 we expect to have equipped most of the company with cutting-edge technology and robotics in order to keep pace with competition.”



Paolo Pozzi, Agrati Group

The Fontana Group, leading Italian fastener producer, has a very interesting point of view: “Industry 4.0”, says **Enio Fontana**, Group Chief Executive Officer, “involves different enabling technologies, such as interconnected, rapidly programmable collaborative robots, big data, cloud computing, the Internet of Things (IoT), interconnected machines for production process optimisation, augmented reality to support production processes, and 3D printers.

Of these, Fontana specifies, “Fontana Group has already completed cloud company projects and is currently testing—at the group’s aluminium truss companies— IoT related projects and machine/cloud interconnection for big data analysis”.

A broad, detailed vision of the “Industry 4.0” issue for the fastener sector is also provided by Mr. **Paolo Pozzi**, engineer and Chief Executive Officer at the Agrati Group, who says: “Industry 4.0” combines a wide range of technologies and most of these apply, in particular, to the manufacturing sector.

I believe that the fastener industry, as a part of this sector, has many opportunities for implementation of these technologies and for exploiting their advantages in the future”.



Enio Fontana, Fontana Gruppo

These are the most interesting fields:

- **Product/process development thanks to the virtual industrialisation manufacturing plant.**
- **Control and monitoring of processes and flows thanks to interconnection of machines and plants, use of automated logistics and the IoT (Internet of Things).**
- **Product traceability thanks to active sensors.**
- **Improved manufacturing precision thanks to self-correcting smart machines and augmented reality.**
- **Increased flexibility thanks to additive manufacturing (3D and intelligent Assist Devices).**
- **Integration of maintenance thanks to big data and telemaintenance.**
- **Organisation of work thanks to augmented operators and learning organisation.**

All these technologies will allow for development and production of articles with greater added value, reducing the amount of capital invested. Those who know the fastener industry are aware that this is one of the most significant aspects, together with management of a high number of finished product codes, arising out of the combination of different production cycles obtained thanks to a large amount of production equipment. The challenge is therefore to shift from mass production to mass customisation, with economy of scale effects and localised, flexible units, and from production based on planning and forecast to a dynamic, request-driven production model.

“In Agrati, continues Mr. Pozzi, we have for a while now been defining the new group production model logic using the APS (Agrati Production System) which includes various “Industry 4.0” points and which also entails great standardisation of our plants to help connection and sharing of data and best practices. We are, however, also tackling a series of challenges such as development of new emerging competencies that we initially “acquire” from abroad, but which we are then forced to rapidly integrate, in the same way as the need to guarantee protection and security for data and technologies against potential cyberattacks.

This big change in the industrial paradigm is both a threat and an opportunity and will represent a challenge for business people who, as usual, will have to sense how to implement new technologies and change their business model. The winners, Mr. Pozzi ends by saying, will be those who make the right choices and put them in place before the others”.

Although “Industry 4.0” is a much-discussed question, it is not yet clear exactly what this term means, or what its implications and content are. But digitalisation, as Mr. Pozzi cleverly pointed out, has a weak point, summed up in a single word: security. In the past, those wanting to do harm had to destroy the physical parts in a factory. As “Industry 4.0” takes hold, production processes can be damaged from a distance, by manipulating the production protocol and in this very simple manner, paralyzing the process, not to mention the potential danger caused by the infinite possibilities of virus or just a lengthy blackout. In all these cases, we would find ourselves instantly plunged straight back into the deepest, darkest Middle Ages.

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