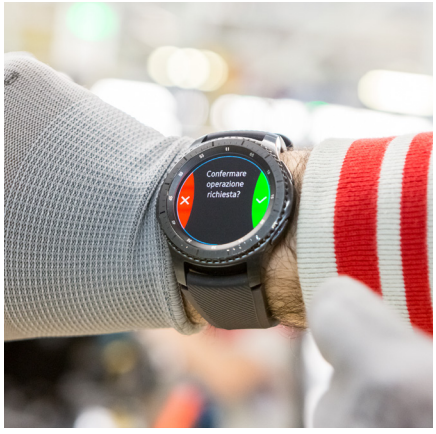
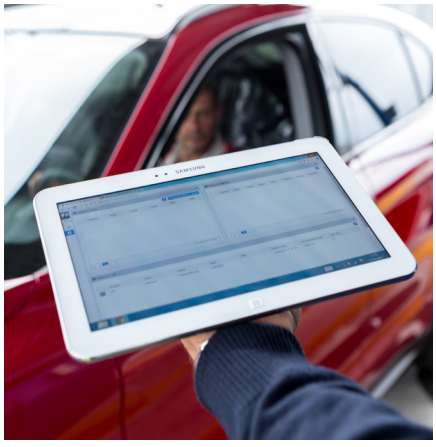
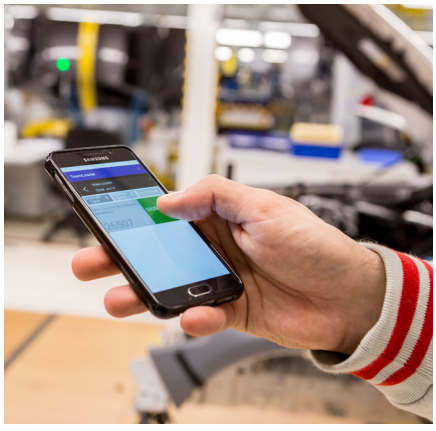
FCA 4.0: smart manufacturing for smart product







Operators during the assembly stage have direct access to real time manufacturing data through wearable devices

Mobility is now at the centre of a highly disruptive technological revolution. Today, the ability to compete is the domain of those who are capable in the short and medium-term not just of reinventing their products to address new customer experience paradigms, but also of conceiving new ways of producing them.

Automakers need to innovate in ways that are both revolutionary and responsible. Being revolutionary means further accelerating the innovation process by opening it up to new contributors and agents of change such as employees, customers and external partners.

At the same time, that process must be responsible, guided by the concept of a circular economy where flexible manufacturing systems allow a more intelligent use of materials, resources can be tracked and re-used, rather than just consumed.

FCA is already creating the right conditions and environment for this new era of innovation, digitalisation and automation. The formula for the future is called industry 4.0 (i4.0), and FCA is already there with its company-specific 'combination of things'.

The ability to deliver innovative, high-quality cars depends on the ability to 'think premium' for customers while 'building premium' with workers across vehicle segments. Information technology plays a key role in this progressive transformation of work processes, by:

- optimising collaboration and integration between humans and technology;
- maximising the added value we can glean from data and information gathered through the many thousands of actions required to produce a complex product like a car;
- advancing the adoption of cybersecurity standards for connected systems;
- accelerating the paradigm shift in terms of worker skills and mindset.

FCA has recently implemented a new approach to manufacturing through the redesign of plants as 'digital factories' based on the integrated modular factory model. A completely new Information and Communication Technology (ICT) infrastructure, developed with different technological partners, known as the New Plant Landscape (NPL) has already been deployed at major FCA plants worldwide. NPL employs advanced ICT solutions to help achieve high standards of quality in manufacturing and assembly processes through rapid decision-making at all levels of the value chain.

The increased digitalisation of FCA plant workstations reinforces the concept that collaboration between humans and technology can unlock opportunities in terms of efficiencies, ergonomics, quality and the empowerment of employees.

For more than 10 years, FCA has leveraged these opportunities through the implementation of World Class Manufacturing (WCM) at FCA plants worldwide. WCM represents the foundation of this progressive transition to a smart modular factory model. It provides FCA-specific language for deployment of the i4.0 concepts of lean, smart and digital production.

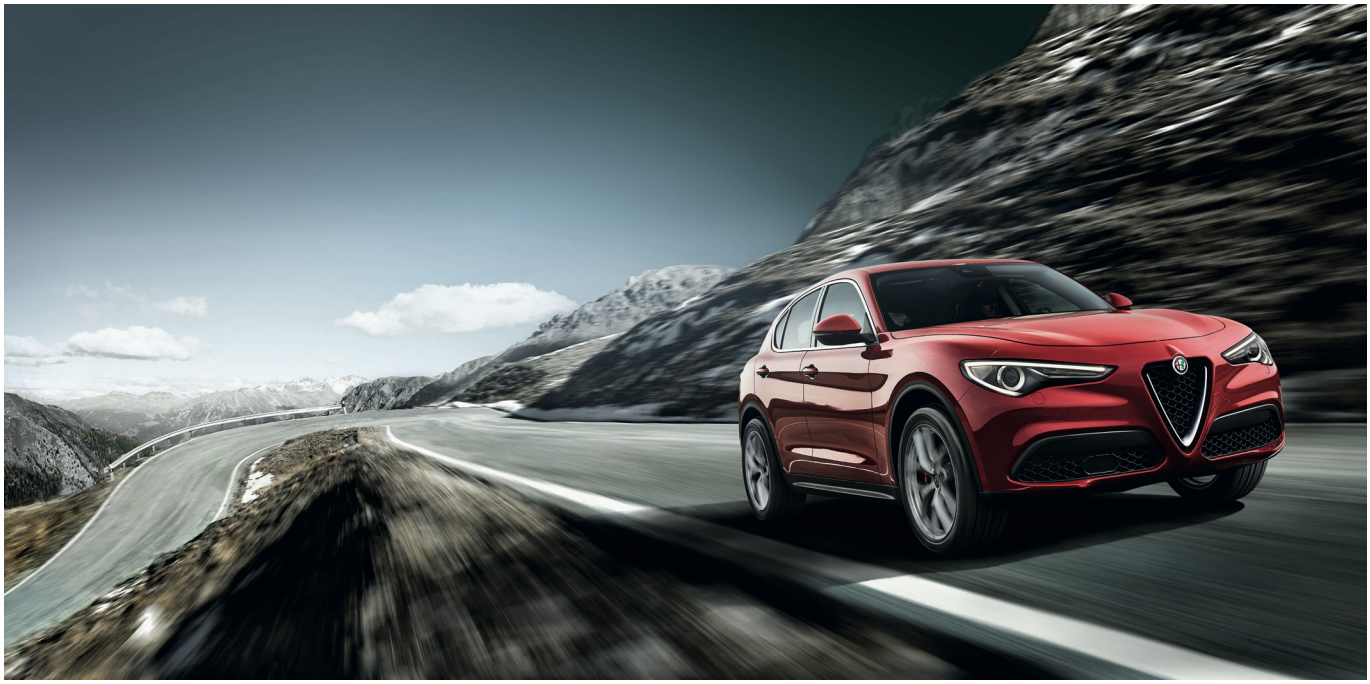
The need for flexible manufacturing is addressed within the i4.0 approach through another technology that FCA uses to create on-demand parts for prototyping: industrial 3D printing, also referred to as Additive Manufacturing.

Compared with conventional manufacturing, where machining is subtractive, meaning that material is gradually removed in shaping a component, this technology shapes them by adding layers of material. 3D printing:

- permits much greater complexity when shaping, opening up new possibilities in areas such as aerodynamic design;
- improves time-to-market, by enhancing speed to production and prototyping;
- significantly reduces material use, waste generation and energy consumption associated with these activities.

'Less is better' is not simply a lifestyle trend that is becoming increasingly relevant for customers – and millennials in particular. It is becoming the central paradigm for the hard manufacturing industry as well.

In recent years, FCA has continued to develop its know-how and technological



Alfa Romeo Stelvio 2017. Manufactured at the FCA plant in Cassino (Italy)

The Alfa Romeo Stelvio shows how FCA applies speed of change to processes and products

capabilities in this area. The Mirafiori plant in Turin, Italy, hosts the FCA Center of Competence for Additive Manufacturing that supports product development from design to testing, with a total of more than 14,000 components produced in 2016. The Center works closely with Italian and international universities and experts to spread the technical know-how globally across the Group.

The adoption of 3D printing is a clear example of an innovation that is revolutionary and sustainable at the same time. This technology was applied for the creation of a few thousand prototype parts during development of the Alfa Romeo Stelvio, manufactured at the Cassino plant, in Italy.

One of FCA's most advanced examples of i4.0 today is the Cassino assembly plant in Italy, where the Alfa Romeo Stelvio and Alfa Romeo Giulia are manufactured. The Cassino plant figures speak for themselves: over 11,000 part numbers, an automation level assured by more than 1,400 robots, and more than 6,000 connected devices, including smartphones and smartwatches that connect the worker to the interconnected experience of manufacturing a vehicle.

The plant offers high standards of efficiency, workforce ergonomics and eco-sustainability. It has sent zero industrial waste to landfill since 2000. It has a zero carbon footprint: 100% of electricity used in industrial processes comes from renewable sources, including on-site solar power generation. The plant also plans to be fully self-sufficient in terms of water usage; through innovations such as dry scrubbing technology, in the paint shop zero water is withdrawn from local resources for industrial purposes.

Supporting sustainable innovation

The Alfa Romeo Stelvio is the most recent example of how we design and build premium value for our customers. The Stelvio represents the positive impact that i4.0 can have on a product. It features a full array of cutting-edge technical solutions such as the world premiere Integrated Brake System (IBS), Autonomous Emergency Braking (AEB) with pedestrian recognition and a full carbon fibre crankshaft. The Stelvio features an outstanding power-to-weight ratio, thanks to the extensive use of ultra-lightweight materials: carbon fibre for the crankshaft and aluminium for hood, doors, fenders, lift gate, engine and suspension.

The Cassino plant and the Alfa Romeo Stelvio illustrate how FCA has conceived and built an i4.0 value chain combining – at the same time – speed of change with processes and products. FCA has transformed the rapid change in technology into an i4.0 business model that connects our plants, our suppliers and our dealers, up to the final customer.

This net of people, processes, products and services allows manufacturing data to be transformed into information, which then generates smart interactions within all elements of the FCA value chain.

We support sustainable innovation through a partnership of man and machine to develop and manufacture mobility solutions for our customers.

Looking toward the future, there are infinite technical connections that can be created and fostered between the people and machines that engineer and manufacture our vehicles, and the end driver. ■

FCA

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