

Bosch Group innovation in the production processes of the Maserati MC20

The world's first car with 100% of its tightenings monitored electronically thanks to Bosch Rexroth systems

- Bosch Rexroth contributes to the connectivity of the Maserati MC20 Industry 4.0 production line
- Bosch Rexroth guarantees state-of-the-art technological standards with 100% of electronic tightenings
- Bosch supplies electronic engine control unit, electric power steering belt drive servo unit, and ultrasonic sensors

Bosch Rexroth, a Bosch Group company and a leader in automation technologies for the industrial world, is Maserati's partner for the development of the MC20's Industry 4.0 production line at the historic Maserati headquarters in Modena.

Bosch Group has been pioneering this new industrial revolution for over 10 years. Bosch believes that the factory of the future will be adaptable, connected, and flexible, and over time it has become a leading provider and a leading user of Industry 4.0, not only testing this modern form of manufacturing in its own plants, but also bringing proven solutions to the market. According to this vision, rather than have people adapt to machines, they turned things around. The products actively involve themselves in their manufacturing, navigate themselves through the production process, and communicate with humans and machines. Machines and robots are constantly reconfiguring themselves. Autonomous transport vehicles deliver components, sophisticated robotic systems pick up workpieces and sort them, assistance systems support workers, and artificial intelligence takes over quality control. In Bosch plants, there are now over 120,000 machines and over 250,000 devices such as integrated cameras or robots connected.

The Maserati 4.0 line: configurable and flexible thanks to Rexroth nutrunners

The MC20 production line is an example of connected industry, meaning that the data generated at the line's various processing stations, and by the different operations, are collected, stored, and analysed. Bosch Rexroth operator workstations equipped with NEXO cordless nutrunners have responded to this requirement of connectivity and transparency in production, helping overcome major quality and technical challenges.

The NEXO by Bosch Rexroth is a cordless nutrunner with a built-in controller, through which the screw fastening activities can be monitored throughout the entire production process. In terms of Industry 4.0, it's capable of storing and sending all the data and fastening curves over a wireless connection. The NEXO offers secure fastening, easy installation, and excellent flexibility for

production activities. It can be used at multiple levels, such as in manual mode, through which the operator can choose the programme or task to be performed via the integrated keypad or barcode reader. In automatic mode, on the other hand, it is the station controller that transmits the programme or task to the nutrunner.

The NEXO's intuitive programming requires only basic training, thus reducing the time required, as well as any possible errors. The NEXO-equipped assembly station features a software guidance system for the operator. This solution provides a visual step-by-step depiction of the assembly instructions, thus assisting the operators throughout the various sequences, and preventing any errors or defects. The operator guidance system provides detailed instructions for selecting the right part: the required bolts, the correct sleeve or insert, the precise tightening position, the specified torque, the proper tightening tool, the correct work programme and sequence. If the operator's view of the monitor is obstructed, such as when performing activities inside the bodywork, the display can provide assistance by showing the necessary information directly on the nutrunner itself.

Continuity of production and complete connectivity thanks to electronically controlled tightening operations

A total of 63 stations with NEXO nutrunners have been installed on the Maserati MC20 line: 8 on the engine line, and 55 on the assembly line, all perfectly integrated into the production software. This means that the machines' processes and statuses can be viewed at any time, which in turn means fewer errors and fewer oversights during the production process. The operator guidance system also reduces the amount of reworking required, prevents delays, and minimises assembly defects, thus improving output quality.

The MC20 supercar is the world's first car with 100% of its tightenings electronically monitored thanks to Bosch Rexroth systems.

"The engine assembly area conveys the precise purpose of our partnership with Bosch Rexroth", says Jonata Azzali, Head of Maserati's Engine Lab. "For example, thanks to the Rexroth tightening system, which has been fully integrated with the production software (MES), we're able to reconfigure each individual nutrunner's performance based on the specific production requirements."

The guarantee of efficient productivity has also been achieved thanks to the extraordinary adaptability of Rexroth's software solutions, which have maintained all the tailored aspects of Maserati's industrial production. This flexibility translates into the customisation of each car produced and the consequent reconfiguration of the line, without any excessive engineering efforts or added stress for the operators themselves.

"We look for three specific characteristics in our partners, which are the following: flexibility, special configurations, and quality assurance", says Salvatore Cinquegrana, the MC20 Assembly team leader at Maserati: characteristics which Bosch Rexroth has fully demonstrated. "Flexibility is important in order to allow the cars to be 100% customised, and the special in-line solutions serve to render the MC20's production special", Cinquegrana continues.

“We have been guided during each step of this project by a sole watchword: tailor-made production”, says Alessandro de Franceschi, EU Sales Engineer at Bosch Rexroth. “We’ve achieved maximum productivity and flexibility on the lines thanks to our NEXO tightening systems’ high level of technology. This has ensured Maserati’s ability to bring together the sporty nature of the MC20 and the luxury class to which it belongs on the company’s own production lines. On this basis, we were able to apply total quality control to the entire car: an essential requirement for a supercar of this calibre”.

Bosch technologies on board the Maserati MC20

The collaboration between Bosch and Maserati goes beyond the production processes and continues on board the car. Bosch supplies electronic engine control unit (ECU), electric power steering belt drive servo unit (EPSapa), and ultrasonic sensors.

In particular, the 3-liter V6 engine is equipped with a Bosch electronic engine control unit to ensure maximum performance. The ECU also allows the Maserati MC20 to reduce its fuel consumption, thereby limiting its emissions.

The Bosch EPSapa controls and assists the vehicle steering, offering an excellent steering feel and precise handling. It also provides additional security in case of a failure, ensuring a reduction in emissions and consumptions compared to a hydraulic power steering.

Finally, the 8 ultrasonic sensors located on the vehicle’s front and rear bumpers assist the driver during parking manoeuvres. Thanks to the Park Pilot ultrasound technology, the system detects obstacles during the manoeuvre, and emits an audible signal to alert the driver if the vehicle is getting close to them.