

Sensors

Intelligent devices for the control of wires' tension

The exclusive and pluri-patented technology developed by BTSR International allows keeping metal wires' tension constant during motor winding processes

by Gianandrea Mazzola

CWF2000 devices
in operation and
controlled by PC LINK
WEB COIL software



Electronic sensors and intelligent systems aimed at satisfying the most diversified requirements concerning the wire sliding monitoring, the control of the feeding tension and of all primary quality parameters of all metal wires, used in the manufacturing of motors and coils such as relays, ignition coils, air coils-transducers, sensors, high and low voltage transformers, antennas, resolvers, encoders. We are referring to state-of-the-art technologies and to advanced devices that BTSR International designs, manufactures and makes available on the market, able to generate added value through their use. Like in the case of Minitron, Megatron and

Gigatron, devices for the control of metal wires' tension by BTSR International that can be used for the manufacturing of motors based on implementation process with single insertion winding (stators), needle winding (brushless motors), double winding (armature motors), or segment winding.

The state-of-the-art of the first high load positive feeder

Minitron, Megatron and Gigatron devices are based on the new concept of "dual drive system", able to grant the perfect combination between feeding



control and control of the wire absorbed in the final winding. Integrable also on existing process lines, they give the possibility (BTSR International patent) of programming up to three different values of wire feeding tension, without any interface/connection, to the winding machine, or up to four different values of wire feeding tension during the winding cycle, by using two digital outputs of winding machines. Moreover, communications are provided for with the PLC of EtherCat or Profinet or Ethernet IP or RS485 winding machines.

More in detail, the Minitron version can assure a control tension range up to 5 kg, on wires having a diameter included between 0.08 and 1.038 mm (40 – 18 AWG). With Megatron, the control tension can reach 10 kg, on wires having a diameter included between 0.08 and 1,54 mm (40 – 14.5 AWG).

Gigatron assures instead the control tension up to 20 kg, on wires having diameter ranging from 0.12 to 2.5 mm (37 – 11.2 AWG).

Double closed loop that monitors tension and length of the absorbed wire

The exclusive and multi-patented technology developed by BTSR International allows “certifying” that the produced windings conform to values of tension and length of absorbed wire within determinate ranges, that is to say: Motor Torque and LWA (Length of Wire Absorbed).

Motor Torque and LWA technologies enable the total quality control, through a double closed loop that monitors the wire tension and the constant quantity (length) of absorbed wire, from the wire feeding bobbin to the final coil. In the first closed loop, the Motor Torque function grants the perfect control of the motor torque and then the constant output tension of the wire with whatever input tension peaks or variation. In that way, not only it is possible to avoid a production not in conformity with specific requisites set up, but it is possible to prevent undesired machine downtimes. The wire torque alarm can

MINITRON
used for the
manufacturing of
brushless motors
certified with PC
LINK WEB COIL
software

Tiziano Barea,
president and
managing
director of BTSR
International



FROM THE PROCESS INNOVATION TO THE PRODUCT EXCELLENCE

Designing and developing advanced technological solutions for the wire control in automated industrial processes, so contributing in determinant manner to the increase of efficiency in manufacturing processes and of quality of implemented products. This is the mission pursued by BTSR International, confirmed by the reference ranking held on the market, constantly consolidated through the development of innovative solutions able to anticipate technological requirements and trends, and to meet the changes in course rapidly.

«In an increasingly competitive market – explains the president and managing director, Tiziano Barea – BTSR goes on investing in excellent-level technologies. Our products’ and our processes’ quality is strictly linked also to the technology used for production. Robotization, automation and automated systems of analysis and control of process quality are at the base of the unceasing developments to improve our products’ quality and competitiveness». Know-how, competences and intellectual property have always characterized the company’s growth, with over 500 international patents registered.

«Our growth –Barea adds– has always been based on intense, continuous and constant research and development activities, to which every year about 7-10% of our turnover is allocated».

After over 40 years of activity, how do you imagine BTSR International of the future?

«BTSR was born in 1979 as start-up –Barea

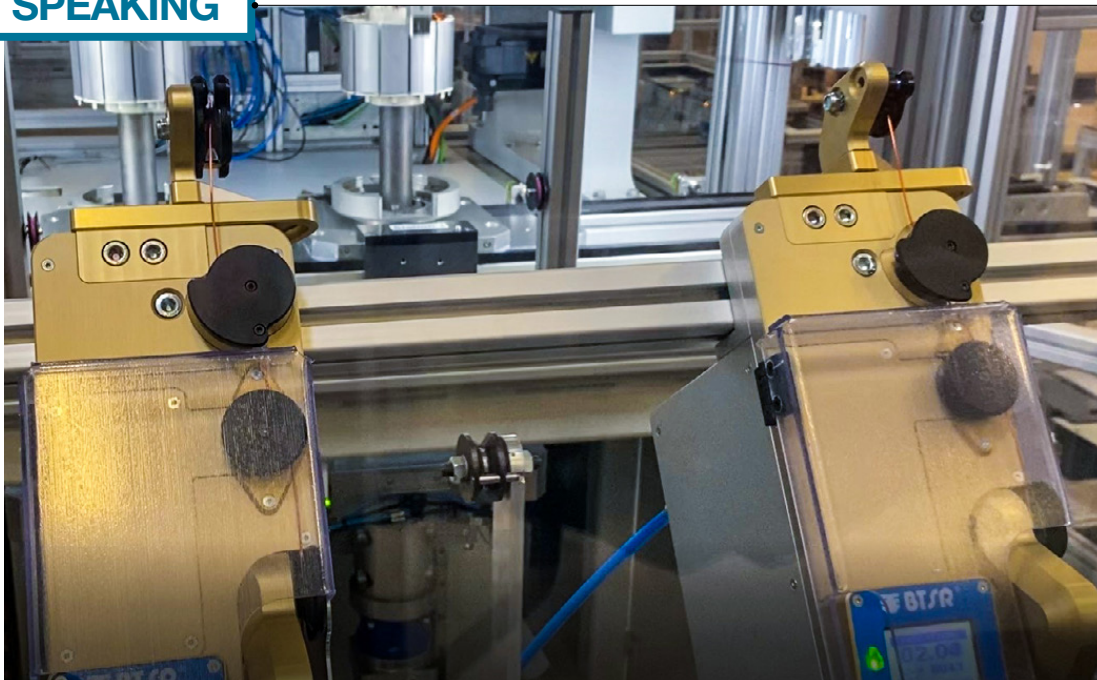
ends– with the idea of innovating. Hence the first patent ideated in 1981.

Today BTSR operates in manifold sectors where the thread wire of the business remains innovating.

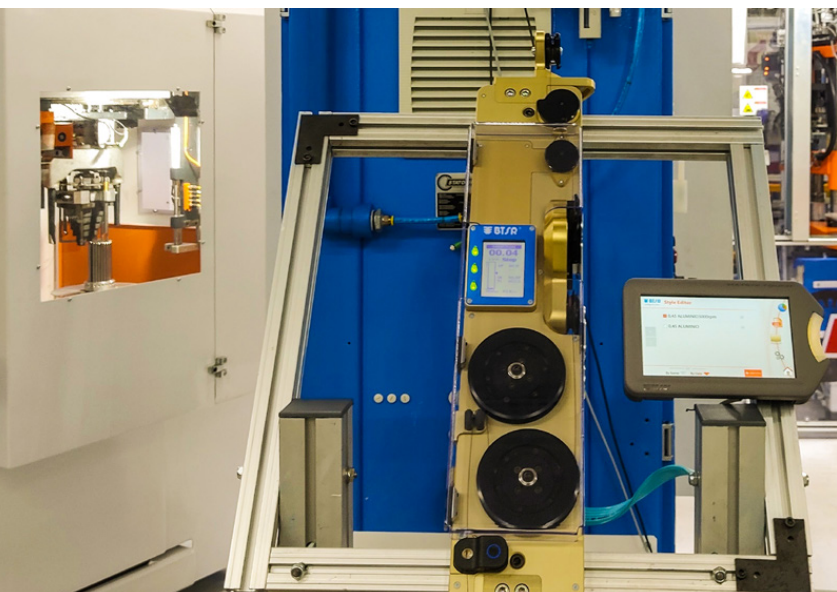
The company’s future is certainly linked with the continuous technological development and with the corporate philosophy of selling ideas that turn into projects and become successful products».

TECHNICALLY SPEAKING

MEGATRON
devices used for
the production of
brushless motors



MINITRON in operation on
a flyer machine– insertion
winding for stators



be fully programmed in torque and time percentage, so stopping the process in the event of any anomaly.

In the second closed loop the LWA technology ensures instead that the output wire quantity from the device, and then wound, is constant. Such function allows detecting and monitoring: whatever dimensional variation of the winding coil's shapes; a wrong wire size; eventual accumulation of impurities inside the wire guide; damaging of the wire guide; any mechanical variation or friction on contact points after the device (Minitron, Megatron or Gigatron) and consequently of the tension. The same devices allow then monitoring the gradual deterioration of the machine's mechanical parts (wire guide, transmission belts' spindle and so on), besides the wire passage through wire guides with different angles and frictions.

Therefore, Motor Torque and LWA can grant the produced winding is manufactured with parameters conforming to pre-set tolerances. This means a well-de-

POSITIVE FEEDING AT THE SERVICE OF THE ELECTRIC MOTOR IN AUTOMOTIVE

Minitron, Megatron and Gigatron devices by B TSR International find applications in the sector of electric motor manufacturing for the automotive industry, but not only, bringing operational benefits of process and product quality. «Until now – comments Paolo Caviggioli, Sales Manager in B TSR International – the importance of the wire tension control during winding processes has always been underestimated because, actually, suitable tools were not available for succeeding in monitoring and controlling the tension perfectly along the whole wire path.

This new technology allows monitoring and compensating any tension variation that occurs between the feeding bobbin and the insertion point, that is to say the wire-guide tube or Flyer». In case of a tension variation, B TSR International devices intercept the tension variation and can compensate it by modifying in real time the motor torque, then ensuring the wire feeding at constant tension. «Succeeding in controlling and granting the wire tension perfectly – Caviggioli adds – means relying on an important cutting edge. With Minitron, Megatron and Gigatron it is possible to check the raw material's trend, that is to say the wire, in process. We can ensure the raw material will be processed at constant tension. The operational potential of the system will be enhanced by devices' combination with "PC Link Web – Coil" software, through which all process parameters can be controlled in real time. This allows anticipating the vision of eventual problems and at the same time minimizing, or even zeroing, possible rejects, with the certainty that electric motors are manufactured in compliance with also electrical requisites and parameters prefixed in a certain range».



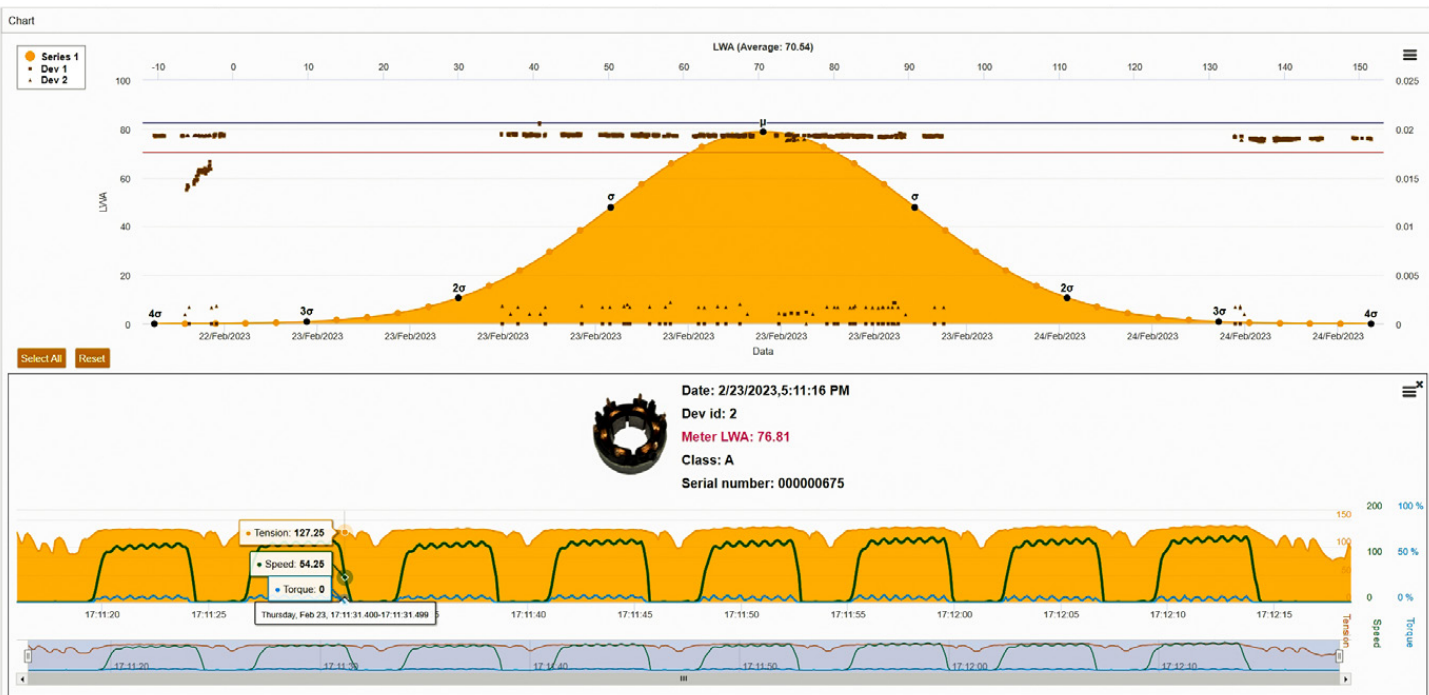
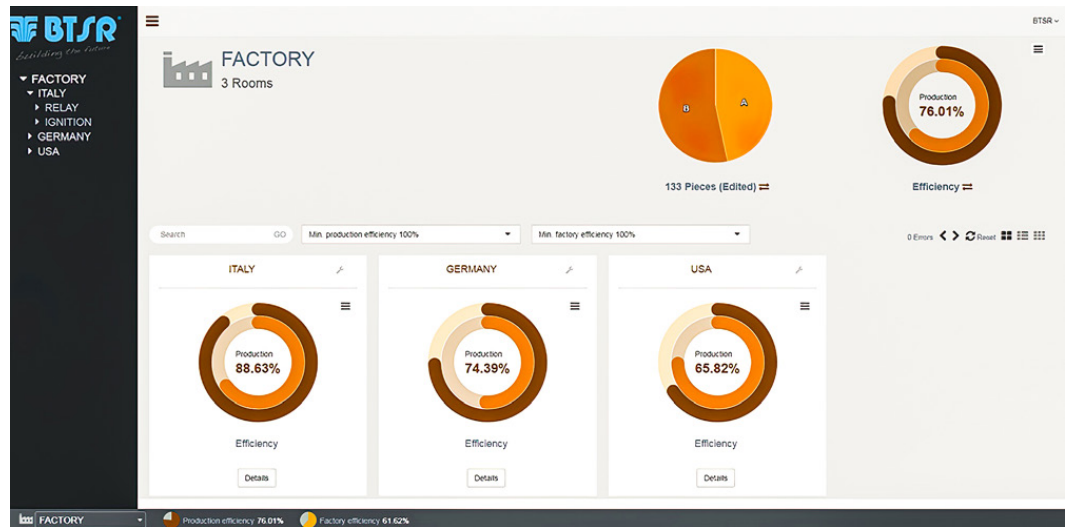
Paolo Caviggioli,
Project Manager in
B TSR International

TECHNICALLY SPEAKING

PC LINK WEB COIL software, efficiency monitoring of factories

(on the top) Sigma Chart, it allows measuring the quality deviation obtained during the winding process in a determinate lapse of time; Log Production Chart in time (it is possible to open the chart below from single points).

(at the bottom) Quality certificate (Production Log of each wound product. It allows visualizing the chart of the wire behaviour during the winding phase, like: tension of the input wire; wire tension during the winding phase; wire speed; exact quantity of wound wire on the final product (LWA)



finned quantity of wire wound on the coil or on the motor, with a constant tension. Further added-value of the process is given, as direct consequence of the constant tension, by the possibility of increasing the winding speed, that is to say augmenting productivity, while granting repeatability, enhancing efficiency and minimizing cycle times, without incurring into failures and/or machine downtimes.

Remote monitoring

Minitron, Megatron or Gigatron devices can be equipped with the powerful "PC LINK WEB – COIL" software, developed by BTSR International itself to facilitate the monitoring of the whole machine fleet in production, to simplify the quality control, besides carrying out forecast analyses and generating and

visualizing reports with various detail levels. The software permits "to certify" each wound product (work tension used during the winding and length of the wire wound on each product).

The result is a certificate of each coil or motor wound, with chart that shows the values of LWA, of tension/speed and of input-torque of each single coil or motor wound, which therefore assures stability.

Data can be visualized in real time not only on touch-screen displays called Matrix Touch Coil (through which it is also possible to programme and to control the same devices), but also from smartphone, tablet or Pc. The "Pc Link Web – Coil" system is in fact based on Web Page technology, which allows entering data via Web through any mobile device, in other words the possibility of monitoring the various manufacturing plants from all over the world.