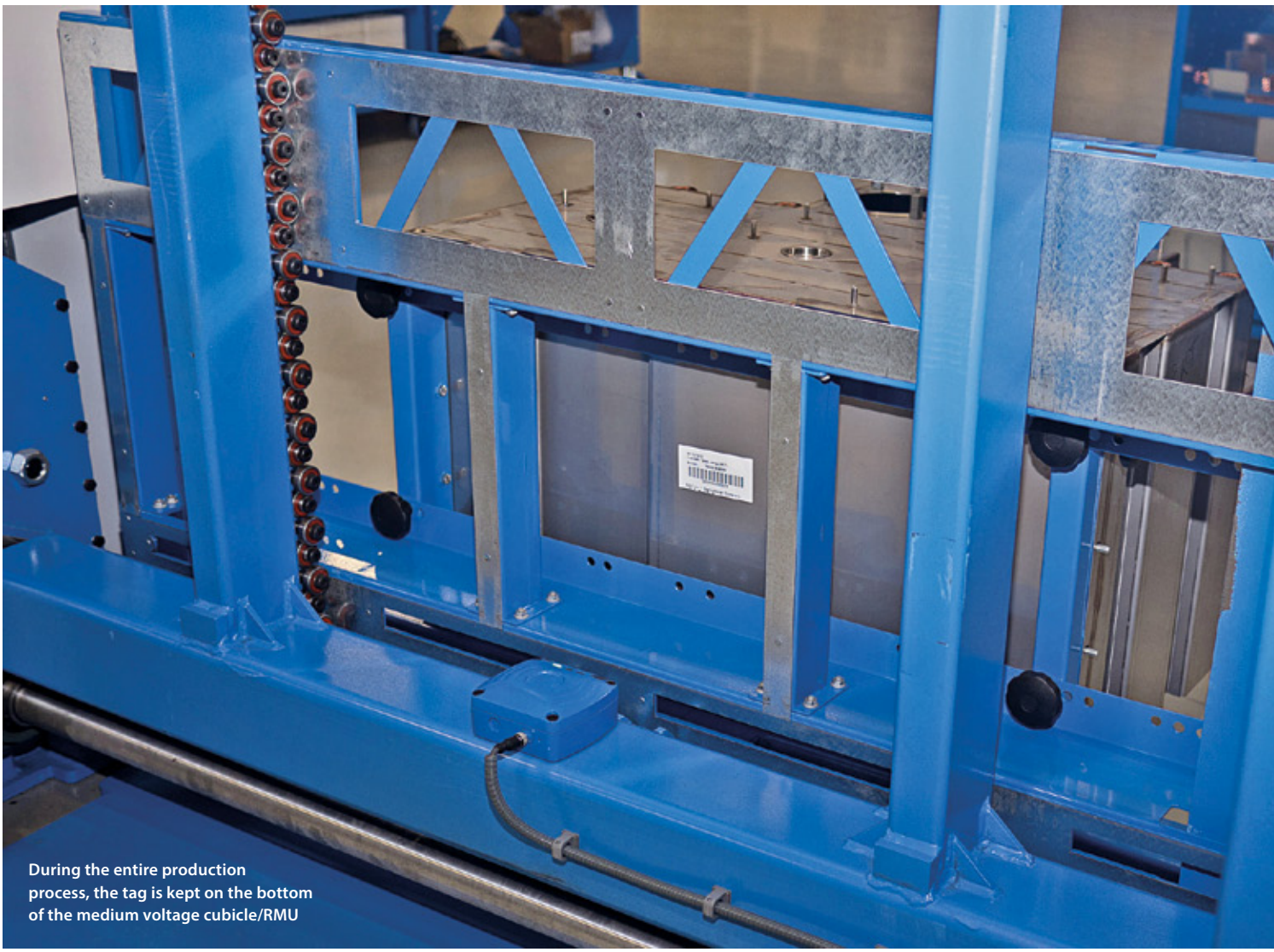


During the entire production process, the tag is kept on the bottom of the medium voltage cubicle/RMU

Transparency at High Voltage

SGC – SwitchGear Company, the Belgian medium-voltage switchgear specialist identifies its RMU ring main unit medium voltage cubicles using 34 UHF read/write heads from Turck

"We are proud of the increased lifespan of our medium voltage cubicles," said Sophie Vandoorne, owner and CEO of SwitchGear Company (SGC), the Belgian manufacturer of medium voltage cubicles. The company develops and produces medium voltage cubicles for indoor and outdoor applications and operates under the motto "Built to last". The devices are used worldwide in electrical switchgear assemblies, medium voltage motors, wind generators and with large consumers, such as in factories, hospitals, in agricultural, horticulture and other application fields. They transform medium voltage from 3 to 36 kV to low voltage from 231, 400 or 690 volts.

The medium voltage cubicles are protected by means of a switch disconnector with integrated fuses or circuit breakers. In the event of a short circuit or

»The greatest benefits of the RFID system are the increased flexibility, the increased safety, the permanent traceability of each production step, as well as the minimum manual operation required.«

Sophie Vandoorne | SwitchGear Company SGC

overvoltage, both ensure that the circuits are disconnected. The "Arc killer" patented by SGC ensures the safety of operating personnel 100%.

Up to a few years ago, SGC primarily focused on the DF-2 modular medium voltage cubicles. Customers combine the different modules, such as transformers, measuring units, switchboards and other components according to their requirements. An arc flame may possibly occur if there is a problem such as a leakage current. This could lead to an explosion in one of the modules, in which case only this one module has to be replaced. As the lifespan of a switchgear assembly is normally more than 30 years, this solution is often the most economical.

However, the market demanded more affordable versions which make no compromise in terms of safety. SGC consequently developed its DR-/DT-6 product series. These compact units combine the different functions of the medium voltage cubicles in one enclosure and are called ring main units (RMU). SGC initially produced the ring main units largely in piece production. However, an automated production line was required as demand increased. Manual operations had to be minimized in order to produce the RMU economically.

Large product variance requires intelligent production

The RMUs are offered in a large number of product variants – from a stand-alone version (combined with different cubicle functions) to an expandable unit, each one with or without the "Arc killer". With manual production, this large range of variants required the maximum degree of care in the production documentation, particularly the tests that the RMUs have to go through during and after production.

To ensure efficient and above all error-free production in spite of the high level of complexity, SGC decided on using an RFID system. This is required to identify each RMU at any time in production with a one-off identification code. Thus all relevant data from the ERP system is linked to this identification code and is available in the production environment.

Patrick De Clercq, responsible product engineer at SGC, soon rejected the possibility of using barcodes to identify the products. He wanted to avoid manual read processes as he ultimately wanted a system that cannot interpret the identification code incorrectly. In the existing environment with many reflecting stainless steel surfaces and changing light conditions, the RFID solution identifies better than optical sensor systems.

Large range through UHF system

The read/write range of up to 70 centimeters that was possible with HF technology was not enough. The dimensions of the cubicles vary so much that a precise position for the tag could not be defined to ensure reliable reading with HF readers. "Furthermore, in the later production stage several products are located on a skid which all have to be recorded," explains De Clercq, regarding his decision to use a UHF system with a larger range. During the project, De Clercq and his team tested the UHF systems of several manufacturers.

QUICK READ

The greater the number of variants that a product has, the more difficult it is to manage the resulting manufacturing complexity. This was also the case for switchgear assembly manufacturers SwitchGear Company. The company therefore uses a UHF RFID system from Turck to track the production of its DR-6 series with its many variants. This increases production efficiency and flexibility whilst guaranteeing 100% quality assurance. For example, the correct data is loaded automatically in test installations, which considerably reduces any possible manual errors. Turck Multiprox also programmed the control of the RFID system on BL20 gateways using Codesys.

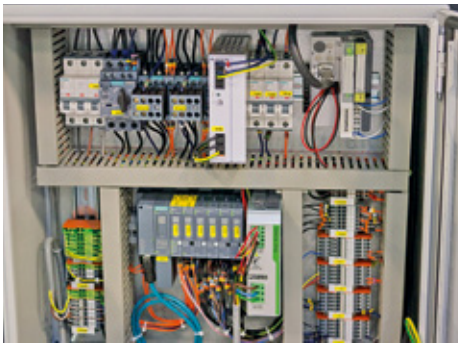
A read/write head also records products when they are checked in and out of the internal warehouse

The UHF system was required to provide a TCP/IP connection in order to establish a link to the company›s ERP system. This system, called DF-One, was programmed for SGC by the in-house IT team and was frequently adapted to changing requirements. At the same time it takes over the tasks of an MRP system for material requirements planning and management.

Although Turck›s UHF reader does not offer an integrated TCP-IP interface, Turck could nevertheless meet this requirement in conjunction with its BL20 RFID interface and I/O system. Furthermore, with the programmable BL20 gateway, Turck is able to offer a solution that takes over the control tasks and can thus operate independently of higher-level systems. The system communicates with the ERP system of SGC via TCP/IP. "We wanted a solution that could also run in stand-alone operation and which only exchanged the necessary information with the ERP system," De Clercq explained. SGC has minimized the risk of a double reading by only permitting the BL20-RFID interface to read one read/write head. Turck Multiprox, the Turck subsidiary in Belgium, supported SGC in the entire project and took over the programming of the system with Codesys.

Using 34 UHF read/write heads, SGC now detects the products in all production stages on the production line. An initial read/write head detects the storing of the raw materials in the fully automated shuttle warehouse. Read/write heads are furthermore installed in each workplace – such as in the assembly section, at the welding robot, at the test stations, or at the leakage testing system. The Q120 or the larger Q175 UHF readers are used, depending on the range required for the particular stations.

The test installation takes the appropriate test parameters for the actual product from the ERP system



Turck's programmable BL20 gateway is not only the interface to the read/write heads, but also controls the system and communicates with the ERP system via TCP/IP

Sophie Vandoorne and Patrick De Clercq

Faster and more reliable function tests

"The greatest benefits of the RFID system are the increased flexibility, the increased safety, the permanent traceability of each production step, as well as the minimum manual operation required," explains Sophie Vandoorne. Before the cubicles are welded, a critical bounce test and a resistance test is carried out since the cubicles are later hermetically sealed. Besides the mechanical tests, various electrical tests have to be documented. Not only is the test result recorded and the subsequent production step released by RFID, but the test system also takes the relevant test parameters for the current product from the ERP system. Compared to previous test processes, in which the parameters were read and set manually, automated testing is safer, faster and thus cheaper.

The new production system is particularly flexible. This therefore enables parts of switchboards to be manufactured in advance and stored in reserve in case there is a shortage of bought-in parts or if other products have to be given a higher priority. The tag itself is created from the ERP system and fitted to the bottom of the semi-finished products. This tag contains a sequence number, which is linked with the unique serial number of the RMU after it has been manufactured and successfully tested.

Outlook

Patrick De Clercq sees even more potential for optimization with the system: "At SGC, we even want in the future to know the time required for each production step, so that we can calculate the costs of the individual steps and manufacture modules more precisely." With additional automation it would be possible to determine quickly from this information which process incurs the highest production costs. Possible sources of error can also be determined more easily. Project engineer De Clercq is very pleased with the result. "We are thinking of installing a similar system in production at Mevoco." The affiliated company Mevoco manufactures components for the medium voltage range at the same location.

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