

COVER STORY

A MECHANICAL DEPARTMENT INTEGRATED WITH **HIGH-EFFICIENCY SHOT BLASTING SYSTEMS:** LTC'S CHOICE TO ENSURE THE DURABILITY OF ITS MAGNETIC CORES

Monica Fumagalli, **ipcm**[®]



A complex product manufactured using diversified production cycles in different plants: magnetic cores are the core business of LTC – Legnano Teknoelectric Company S.p.A., a global leader in the production of these components for a wide range of transformers and reactors. These are in fact the cores of transformers: they consist of electrical or magnetic steel laminations and are the fundamental element around which the primary and secondary electrical windings are arranged, guiding and concentrating the generated magnetic flux.

Various surface treatments can be performed on this type of product. Where required, a layer of insulating and protective paint is applied to the magnetic sheets to prevent oxidation without altering the material's magnetic properties; the ideal paint type, its uniformity, and its controlled thickness are essential to reduce eddy currents and ensure durability. The standard steel metalworking that makes up the frame and core kit, on the other hand, can be galvanised and coated to increase the film's anti-corrosive properties and, therefore, the surface coating's durability. This is where mechanical pre-treatment by shot blasting plays a strategic role, improving coating adhesion and evening out the surfaces, thus ensuring long-term resistance and protection even under harsh operating conditions. For this project, LTC decided to rely on OMSG – Officine Meccaniche San Giorgio S.p.A., located in Villa Cortese (Milan, Italy), a few kilometres from its headquarters, which has been manufacturing shot blasting machines and automatic sandblasting systems since 1961.

**Opening photo: Rendering of a magnetic core.
LTC - Legnano Teknoelectric Company S.p.A.
has been manufacturing magnetic cores for power
transformers since the late 1950s.**

**Overview of Casa LTC: the architectural design for the
renovation of Legnano Teknoelectric Company's headquarters
fully reflects its industrial and electrical culture.**

**Overview of the eight manual welding benches
located near the shot blasting department.**

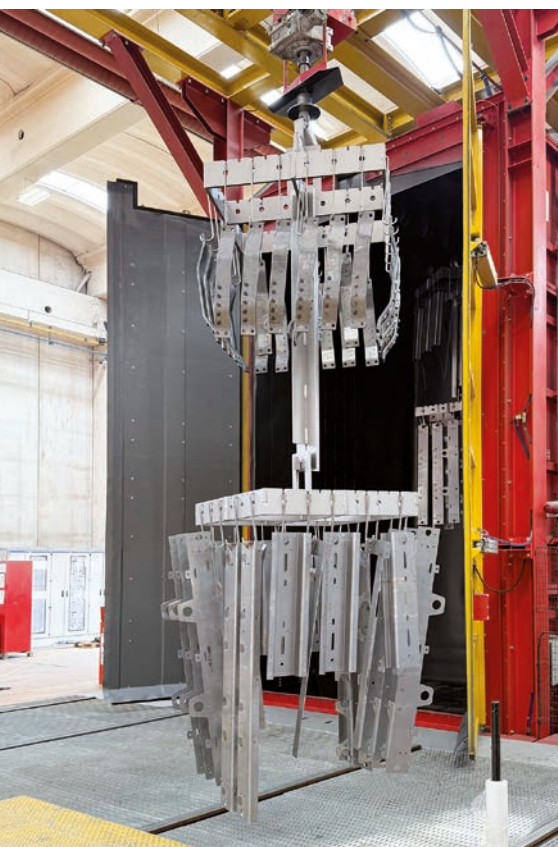


The long-standing partnership between LTC – Legnano Teknoelectric Company S.p.A., which has been manufacturing magnetic cores for power transformers since the late 1950s, and OMSG – Officine Meccaniche San Giorgio S.p.A., a supplier of shot blasting plants, has grown stronger over time and even extended to LTC's production sites abroad.





The CAPRI 30/60 H25 hoist shot blasting machine at the Legnano site and, alongside it, its twin system installed at the Dubai site.



This shot blasting machine is used for medium-sized parts and is equipped with two hoists lifting parts up to 5,000 kg.

LTC Group: from humble beginnings to industry leadership

The manufacture of magnetic cores has undergone profound changes over time, from the soft iron blocks used in the late nineteenth century to the forged or rolled soft steel that was insulated with paint or oxide in the 1930s, up to the standard magnetic sheet metal that emerged in the 1950s and is still used today in most transformers. It was in that decade, specifically in 1957, that Michele Bertelli began assembling his first small electrical transformers in his kitchen in Legnano (Milan), using steel and copper sheets. By 1960, he was producing one hundred transformers a day. These were the first steps of a company set to experience exponential growth until the turning point in 1992, when it decided to convert its production from transformers to magnetic cores, leveraging the experience gained in designing and manufacturing these products for the local market. "Today, we boast an international presence in over 120 countries," explains Stefano Visentin, Industrial Engineer at the company, "and a leading market position with production sites in Italy, the United Arab Emirates, Taiwan, and soon, Canada, with approximately 1,100 global employees and 12,000 m³/month of processed material." The philosophy of the LTC Group is based on a relentless pursuit of excellence through attention to every detail in the production of high-quality magnetic cores for a wide range of transformers and reactors intended for various applications: power generation, transmission networks (smart grids, HVDC links, high-voltage shunt reactors), distribution (dry and oil applications), traction in the railway sector, and special applications (e.g. data centres, shielding systems, and instrument transformers). The company's strategy is complemented by a strong commitment to clean energy, reflected in LTC's

The Tappeto Rampante® system installed in Legnano and, alongside it, the shot blasting machine with the same characteristics installed in Dubai.



structured path to reduce CO₂ emissions by 30% by 2030 and in its production specifically intended for the clean energy industry. “We manufacture magnetic cores for transformers with all outputs and voltages, all types of cooling systems, and all operating modes,” emphasises Daniele Bertelli, the owner of the company together with his brothers Aurelio and Gianluigi. “However, our focus is on the green energy sector. We supply magnetic cores for transformers for the wind power industry (TSN for onshore and TSF for offshore applications), photovoltaic power plants, hydroelectric plants, cogeneration plants, and biomass plants.”

The global production network

LTC - Legnano Teknoelectric Company S.p.A. is located between the municipalities of Legnano and San Giorgio su Legnano. Its entire range of operations, from the longitudinal cutting of magnetic steel sheets to the production of steel components for the assembly of finished cores for transformers, is carried out in over 60,000 m² of covered facilities. In Italy, the Group has five plants employing 650 people, of which four are devoted to magnetic cores and one to metal components, with a sixth due to start construction next year. In Dubai (United Arab Emirates), LTC operates two plants covering an area of over 30,000 m², which were launched between 2011 and 2012 with the same production structure and, in particular, the same OMSG shot blasting systems used at the Legnano site. The Taiwan site has been operational since July 2023, and a new greenfield plant is under construction in Canada.

THE PHILOSOPHY OF THE LTC GROUP IS BASED ON A RELENTLESS PURSUIT OF EXCELLENCE THROUGH ATTENTION TO EVERY DETAIL IN THE PRODUCTION OF HIGH-QUALITY MAGNETIC CORES FOR A WIDE RANGE OF TRANSFORMERS AND REACTORS INTENDED FOR VARIOUS APPLICATIONS.

This latest strategic investment will ensure maximum technological and organisational control, integrating the lean approach introduced by the Group around fifteen years ago with state-of-the-art machinery.

One of the most significant aspects of this strategy is the principle of keeping production close to customers to ensure reliability and stem competition in different markets. "This is much appreciated by our international customers, from Hitachi to Siemens and General Electric. In addition, our factories operate multi-brand systems coordinated by an MES system connected to all control platforms, providing continuous visibility of production, automated data collection, and real-time reporting. With sites in different geographical areas, we manage scheduling by also considering time zones and ensuring total resource sharing. Being able to show customers our fully integrated cycle aimed at maximum efficiency is critical, and the shot blasting operations we have already insourced and the coating process we intend to insource are preparatory to this goal."

LTC's industrial concept applied to architecture

During our visit, we had the opportunity to enter the company's longest-standing factory (Plant 2), which was developed around the original Bertelli family home and is now divided into five halls,

including one devoted to shot blasting, and Plant 3, which houses the magnetic core machining departments and a new office area. The architectural design of the latter fully reflects LTC's industrial and electrical culture, as Daniele Bertelli explains: "The building is completely clad in a noble material, copper, because one should be able to perceive its importance already while approaching the entrance gate. We do not sell iron products, but rather electrical performance, efficiency, energy savings, quietness, and ecology – all values carried by grain-oriented electrical steel, a special silicon steel that improves the magnetic properties of materials. The copper cladding of this building resembles the external winding of a transformer and represents our history, whereas inside, just like in the heart of a transformer, there are the people who design and manufacture our cores. We also wanted to give it a name other than the traditional 'headquarters': we called it Casa LTC (or 'LTC House') precisely to convey this sense of belonging and familiarity."

Strategic shot blasting for kit preparation

In Plant 2, the preparation of the structural framework and kits takes place. The buildings of this plant also house a technologically advanced mechanical workshop and a department dedicated to component welding. The metalworking operations include laser or plasma cutting of flat sheets in medium-carbon steel. "We

From left to right:

The LAUCO 2010/8 roller conveyor shot blasting machine installed at the Legnano site.

The roller conveyor system installed at the Dubai site for shot blasting sheets up to 18 m in length.

The dimensions and weight of the treated magnetic cores range from 50 kg to 200 tonnes, whereas metalwork structures account for about 10% of the total weight handled, on average.



perform shot blasting with three automatic systems, selected according to the size of the workpieces, before and after welding,” explains Lorenzo Mendicino, the Plant Manager of Plant 2. “The first phase serves to remove oxide and scale after cutting and aims to avoid contaminating the emulsified water used in the machines. The second phase, on the other hand, is performed after welding and prepares the surfaces for the subsequent galvanising and/or coating operations (which we outsource) by improving the adhesion of the protective layer. Another important process is the rounding of edges using dedicated automated systems, an essential detail in our sector, as rounded edges are considered an indicator of quality. Indeed, our goal is to maintain the highest possible level of quality to offer the best product on the market.” The cleaner the surfaces, the greater the coating adhesion, a determining factor for durability, especially for components intended for harsh conditions, such as marine corrosion or direct exposure to atmospheric agents.

Plasma cutting, used for thick steel sheets, requires a subsequent cleaning phase, carried out primarily with an OMSG LAUCO 2010/8 roller shot blasting machine. The use of this equipment ensures higher processing quality for the downstream operations.

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LTC's shot blasting machine fleet

"We have supplied LTC with three shot blasting plants at this site and three identical plants at the Dubai site," illustrates Enzo Dell'Orto, the CEO of OMSG. "These are a CAPRI 30/60 H25 hoist shot blasting machine, an SG6 H2 Tappeto Rampante® steel belt tumblast shot blasting machine (both installed in 2019), and a LAUCO 2010/8 roller conveyor shot blasting machine installed in 2023."

In more detail, the CAPRI system is equipped with two hoists that lift parts up to 5,000 kg. It uses seven turbines, each with a power of 11 kW, to shot blast components with a maximum diameter of 3,000 mm and a height of up to 6,000 mm, which are rotated within its chamber.

The Tappeto Rampante® steel belt tumblast shot blasting machine has a 600-dm³ capacity and a maximum throughput of 2,000 kg, and it is designed for treating small parts. "Its peculiarities," notes Dell'Orto, "include the two-cylinder hydraulic skip loader and the part unloading system using a vibrating channel."

The LAUCO 2010/8 roller conveyor system, parallel to the plasma cutting machine, has a 2,000 mm-wide and 1,000 mm-high shot blasting section, eight 11-kW turbines, and 9-metre inlet and outlet roller conveyors. It is also equipped with a brushing and blow-off unit at the outlet to remove any abrasive residues from the parts. "We also design all our plants in accordance with Industry 4.0 parameters," states Dell'Orto.

Conclusions

Bertelli emphasises: "We were so pleased with the performance of the OMSG systems that, when it came to duplicating our production system at the site in Dubai, we requested the same set of shot blasting machines. This confirms the attention we devote to every detail of LTC products, from their cases to their systems' heart, the magnetic core."

Today, Legnano Teknoelectric Company is experiencing unprecedented growth, with orders already scheduled until 2026. "This has never happened before in our history. It proves we are working in the right direction. We also have numerous projects underway or in the start-up phase to further boost our production, and they will most likely involve our partner OMSG once again – whose geographical proximity to our location is undoubtedly a further added value to our long-standing collaboration," concludes the owner of LTC. ■



From left to right: LTC owner Daniele Bertelli, OMSG CEO Enzo dell'Orto, and Stefano Visentin from LTC in front of one of the three Berlin Wall pieces on display outside Plant 3.

"WE WERE SO PLEASED WITH THE PERFORMANCE OF THE OMSG SYSTEMS THAT, WHEN IT CAME TO DUPLICATING OUR PRODUCTION SYSTEM AT THE SITE IN DUBAI, WE REQUESTED THE SAME SET OF SHOT BLASTING MACHINES. THIS CONFIRMS THE ATTENTION WE DEVOTE TO EVERY DETAIL OF LTC PRODUCTS, FROM THEIR CASES TO THEIR SYSTEMS' HEART, THE MAGNETIC CORE."