



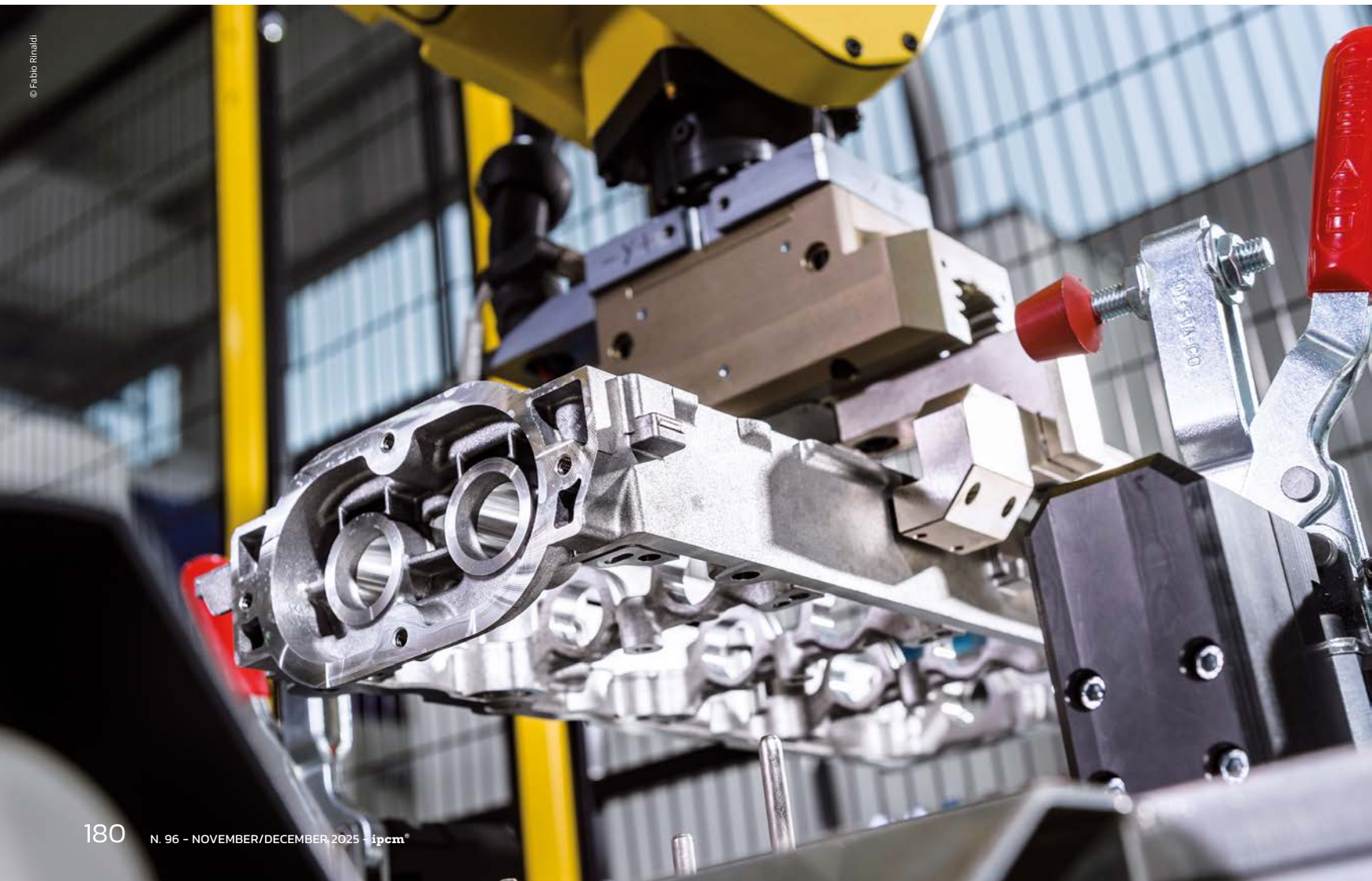
High-performance cleaning at the heart of Endurance's electric conversion efforts

Endurance, a long-standing Italian automotive parts manufacturer, has embarked on a major shift towards electric mobility by investing in automated production technologies, including three state-of-the-art cleaning systems supplied by DBM Tecnologie, not only to achieve high cleaning standards for electric motor components but also to improve operational and maintenance comfort for its workers.

'Electric revolution: this is how we define the transition from combustion engines to electric motors in the automotive sector. This transformation reached a turning point in 2020 when stricter European CO₂ emission targets came into force, prompting car manufacturers to launch plug-in hybrid and 100% electric models to avoid penalties. At the same time, the pandemic led to an overall decline in vehicle sales; however, the electric sector held steady and began to grow in percentage terms, particularly in Europe and China. Simultaneously, national plans were launched to expand public

charging infrastructure. Italy has also embarked on its own revolution, although somewhat later than other countries. As highlighted by Il Sole 24 Ore in an article published in June 2023¹, this country, with its long tradition in the automotive sector and consolidated expertise in producing high-quality vehicles, has the potential to lead this transition if investments in technological innovation are strengthened.

¹ https://www.econopoly.ilsole24ore.com/2023/06/20/auto-elettriche-italia-evoluzione/?utm_source=chatgpt.com&refresh_ce=1





This is a key factor in promoting the recycling of components, the conversion of SMEs in the supply chain, and the retraining of the workforce. Such conversion is therefore essential to keep pace with a change that involves not only the production chain as a whole but also the mindset of companies with a long tradition in manufacturing parts for combustion engines, such as Endurance Overseas, which specialises precisely in the production of engine and gearbox components. “Without the diversification of our customer portfolio that we began in 2008 and without the conversion to electric mobility that we undertook in 2020,” states Andrea Tarditi, Technical Director of Endurance, “we would probably have followed the decline in production that is characterising, as well as others, Italy’s national car manufacturer and its supply chain.” A long-standing supplier to Fiat (now Stellantis), Endurance launched a development strategy five years ago, based on constant investment in technological solutions, which now enables it to also compete in the electric-oriented automotive sector. A part of that was the installation of three high-performance, high-tech cleaning systems supplied by DBM Tecnologie Srl (Casale sul Sile, Treviso, Italy).

“The electric and hybrid automotive sectors,” Tarditi emphasises, “require extremely high cleaning standards, which pose a significant challenge for two reasons. The first is the customers’ lack of knowledge of the product. Although they have extensive experience in combustion engine mechanics, they are still unprepared for the peculiarities of this new technology and therefore tend to raise the bar in terms of cleanliness requirements for greater safety. The second relates to the greater critical issues arising from any surface residues remaining on components, which can cause serious problems inside the motor, such as electrical short circuits or functional defects.”

From the relation with Fiat to the growth of the Endurance Group

Endurance’s history is closely linked to that of the Turin-based car manufacturer, which guided its development through commercial agreements until at least the first decade of the 2000s. “Our business began in the 1970s with the first factories built between Chivasso and Lombardore (Turin) for foundry and machining operations on



Opening photo: focused on automotive components, Endurance Overseas is the holding company that manages the Group’s operations in the EMEA region.

The TL tunnel cleaning system installed by DBM Tecnologie at the Endurance plant in Lombardore (Turin).

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The display for controlling the cleaning phases and the manipulator at the unloading station for cleaned parts.

components intended for the automotive and agricultural industries,” says Tarditi. “Following the agreement between Fiat and General Motors in 2000 and the subsequent opening up of the American and German markets, we began supplying Opel plants in Germany. From that moment on, our development projects took on an international dimension. This prompted us to structure our company accordingly, adapting to the regulations and working methods of the automotive industry. In addition to ISO 9000 quality certification, we also obtained specific certifications for the sector, such as IATF.”

In a phase of strategic stalemate, it was once again the national car manufacturer that outlined the next step through further economic agreements. “At that time, Fiat and GM entered into an agreement with Tata Motors to develop plants in India dedicated to the production of Fiat engines and gearboxes for Tata vehicles. Fiat involved us in that project, asking us to establish partnerships with local suppliers, including Endurance Technologies, which operates in India and has a production structure similar to ours. After five years of fruitful collaboration, Endurance Technologies acquired 100% of our ownership in 2010.”

With the entry of a young CEO, Massimo Venuti, the company changed direction and diversified its customer portfolio, no longer focusing solely on Fiat and General Motors but also targeting major European OEMs. “The goal was to win their trust by proving the technical and qualitative performance of our components. We thus managed to become a supplier to Renault, PSA, Daimler, BMW, Volkswagen, and Audi, which was a great fortune for us. In hindsight, considering the advent of the electric revolution, I think that if we had not diversified back then, we would have been forced to downsize.” The support of the Indian owners provided a significant boost, and today, with seven production plants distributed throughout northern Italy, from Basso Canavese to Rovereto, and two in Germany, the Endurance Group continues to expand. “With a view to vertical integration, in May this year, we acquired a company specialising in industrial automation to further reduce the time needed to make offers and increase our competitiveness. We are focusing heavily on automation, as the impact of labour on part costs is becoming increasingly significant.”

The electric transition

The projects launched over the last three years reflect the profound disruption brought about by electric, hybrid, and plug-in motors in the automotive sector. “Until 2020, we heavily specialised in components for traction systems for petrol and diesel engine cars and gearboxes,” says Tarditi.



The LST series rotary table cleaning system at the site of Chivasso (Turin).



“The electric revolution required a significant conversion effort, with a 90-million Euro investment plan for infrastructure, warehouse expansion, increased production capacity in our foundries and mechanical departments, and the acquisition of new companies. We have integrated our foundries and machining departments with seven new product lines. We had to recalibrate our plants to make them more suitable for the electric and hybrid sector, and with a lot of hard work, we have managed to generate 50% of our turnover from this expanded sector (BEV-HEV-PHEV) since 2020.”

The production cycle begins with aluminium ingots melted in the company's foundries to obtain die-castings, which are then moulded in robotic cells. The workpieces extracted from the presses are cooled with air or water, depending on their type, shape, and cycle time. Excess metal attached to the sprue is then cut off and deburred before shot blasting is performed with various types of shot depending on specific requirements. Afterwards, the parts are subjected to machining using an emulsion coolant-lubricant and then cleaned. The cycle ends with assembly and packaging, with functional checks, final visual inspections, and traceability checks performed on each component in between. “High production throughput,” emphasises Tarditi, “calls for reduced cleaning times. To ensure consistent results, we have invested in new, technologically advanced systems that can maintain stable levels during three daily shifts, equivalent to approximately 120 hours of cleaning per week. Most of our customers are manufacturers of electric and internal

combustion motors, as well as manual and automatic transmissions, all of which have delicate fuel circuits: even the slightest contamination can cause clogging. All parts must be cleaned in accordance with their specific designs, which include precise gravimetric and morphological specifications.”

The plants supplied by DBM Tecnologie TL tunnel cleaning system (Lombardore site)

The partnership between Endurance and DBM Tecnologie began in 2024, following the company's acquisition of an order for 800,000 units per year for the Volkswagen-Audi Group's new generation of Pure Electric motors, to be produced at the Lombardore site. “We needed a relatively simple plant solution for this new project,” explains Tarditi. “As per our policy, we had selected two other suppliers, but after visiting DBM's headquarters and assessing, also through audits, the soundness of its design and production operations and the reliability of its after-sales assistance, we decided to place our trust in its team.” “For the Lombardore site, we designed and installed a TL series tunnel cleaning system,” says Alessandro Costa Laia from DBM's technical sales department. “All plants in this series are compact in size, yet they guarantee excellent cleaning results, even on complex components. Thanks to centring devices, targeted high-pressure jets (up to 40 bar), silenced blow-off systems, loading and unloading manipulators, effective cleaning can be achieved both between phases, as in this case, and at



The LST system incorporates the same design principles as the tunnel installed in Lombardore, including the loading/unloading manipulator.



A motor component cleaned in the LST system's chamber.

the end of the cycle. The result is a level of automation that is difficult to achieve with traditional lines.” The plant, which features a horseshoe layout, was designed for cleaning simple parts, such as brackets or motor mounts, which do not require fine cleaning. After drying, the components are sent directly to the control chamber for leak testing. “The main difficulty was obtaining perfectly clean, dry, and cooled surfaces to reach a stable temperature before the parts enter the control chamber,” Costa Laia points out. “We worked intensively during the design phase to achieve the results required by Endurance, also drawing on its experience and know-how in the cleaning of mechanical components. We implemented some technical adjustments suggested by its team, which improved the machine’s accessibility and ease of use for operators and maintenance, as well as optimising the configuration of the human-machine interface.”

“The plant, ready for production, successfully passed the customer’s

audit checks a few weeks ago,” adds Tarditi. The Volkswagen-Audi delegation carried out a ‘two-day production’ check, i.e., a two-day inspection of the entire production chain for the part, from the foundry to final packaging, verifying our daily production capacity based on their order, the conformity of the design to the application requirements, and the compliance of the cleaned components with their quality specifications. With electrical components, these requirements apply not only to metal processing residues but also to non-metallic ones, such as for seals with tolerances in the order of 5 thousandths of a gram and a maximum contaminant particle size of 600 microns.”

While the cleaning plant for the Lombardore factory was still in the design phase, a new production need arose at Endurance. Since 2014, one of the main parts produced on three identical lines (with an average of 20,000 engines per week) has been a component for the VW 1500 EVO TF6 petrol engine; in 2018, market forecasts indicating a gradual



The TITAN high-pressure cleaning and deburring system.

reduction in demand for combustion engines in favour of electric motors prompted the company to convert one of those three lines to produce components for electric mobility. “However, that prediction proved to be incorrect,” notes Tarditi. “Last year, the customer asked us to increase production of the component intended for combustion engines to 24,000 pieces per week. We therefore had to design a new production line in an area of 3,500 m² in the Chivasso site, comprising fifteen machining systems, two cleaning systems (one performing an intermediate phase, similar to the plant installed in Lombardore, and a second one for the final cleaning stage, designed from scratch), and leak testing systems. For the cleaning operations, we turned once again to DBM Tecno-logie, with a much more complex project this time.” The two new systems were installed in July and September 2025, respectively, and marked a further step forward in the technological collaboration between these two companies.

LST rotary table cleaning system

The second system installed by DBM Tecno-logie for Endurance is an LST model with a rotary table, designed for the precision cleaning of parts arranged in fixed positions. “The LST series rotary table, water-based cleaning plants,” describes Alessandro Costa Laia, “are characterised by high operational flexibility and extensive process customisation options, in terms of both cycle time and type of treatment. They can clean and blow-dry even difficult-to-reach areas and can be easily integrated with internal and automatic handling systems, both for loading/unloading and for any intermediate machining operations. Other key features include the precise positioning of the indexing table, the accurate centring of parts during treatment, and the removal of vapours via a condenser.”

The system incorporates the same design principles as the tunnel installed in Lombardore, including a loading/unloading manipulator, cleaning, rinsing, blow-off, and drying stations with targeted nozzles, and an advanced filtration system. However, during the fine-tuning phase,



it became apparent that some improvements were needed: “We found that some components retained a higher than expected amount of contaminant,” indicates Costa Laia. “In agreement with Endurance, we therefore decided to carry out a technical upgrade of the machine so as not to compromise subsequent operations.” The conveyor now takes the components to the last cleaning system, the most complex and technologically advanced of the three installed by DBM Tecnologie for Endurance.

TITAN high-pressure cleaning and deburring system

DBM Tecnologie’s TITAN series high-pressure deburring and flushing systems are designed to ensure the effective removal of loose burrs and residual chips even in difficult-to-reach surface areas, such as blind or intersecting holes. The working pressure can reach 1000 bar, enabling maximum effectiveness when applied to various materials. The parts to be treated are loaded onto dedicated trays and secured by pneumatic clamping systems that ensure correct positioning.

“In this case,” explains Costa Laia, “deburring is performed by the combined action of rotating cannulas, which penetrate the components and deliver high-pressure water, and two articulated robots programmed to remove the most stubborn particles. The processing equipment, with nozzles made of special high-strength material, is attached to the wrists of the robots, which operate according to programmed work sequences.”

During the design phase, the Endurance team requested a further

technological upgrade, which led to the replacement of the robots with the most powerful models currently available on the market, thus further improving the operational precision and overall durability of the plant.

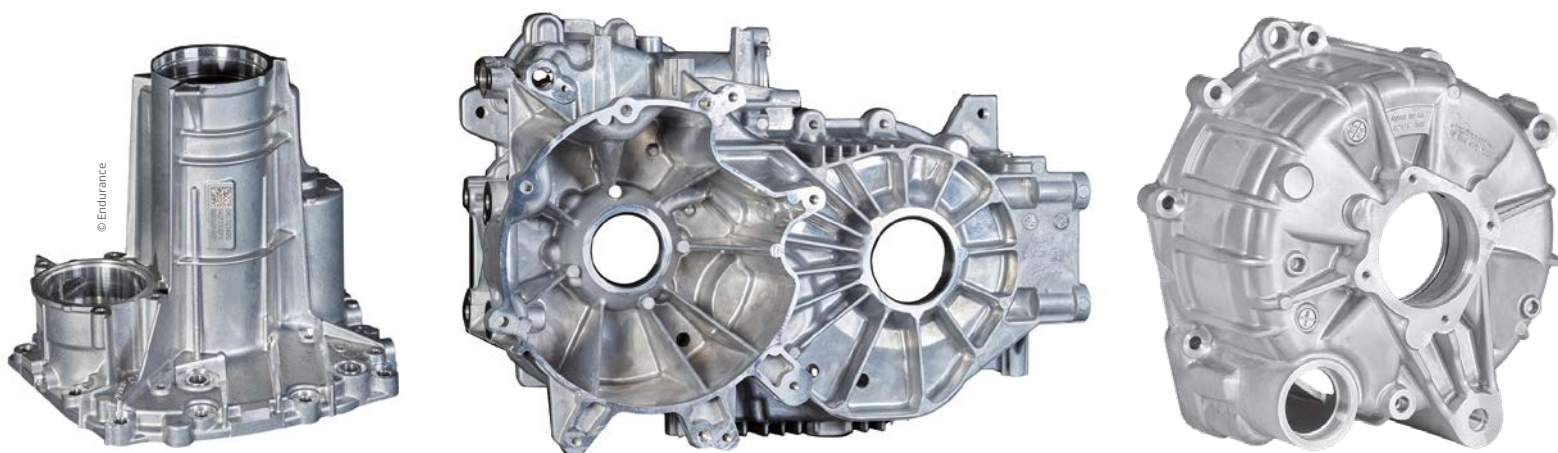
Conclusions

Andrea Tarditi highlights the aspects that most impressed him about the partnership with DBM Tecnologie: “One of the elements I appreciated most is its internal structure, characterised by a strong practical component: in other words, those who design the systems are also able to personally oversee the installation and testing phases, responding in real time to customer requests and queries, and continuing to provide support even after production has started. This is not a given for all suppliers.”

Another strength is the thoroughness with which the DBM team approaches not only the selection of the most effective technology but also the design of ancillary technical features. “A significant example,” adds Tarditi, “is the soundproofing of the plant, achieved by insulating the entire structure and not just specific areas. This company has managed to give us something different from what we were used to: cleaning plants that are not only efficient and comfortable but also pleasing to the eye and ear.”

“We are proud,” adds Costa Laia, “to have met the expectations of a company like Endurance, whose experience in cleaning has allowed us to expand our design expertise even further.”

Tarditi concludes by emphasising that “for Endurance, every new project is a challenge but also an opportunity for growth. We do not



Most components are intended for electric motors and transmissions, which feature particularly sensitive circuits in which even minimal contamination can cause duct blockages.



From left to right: Alessandro Costa Laia from DBM Technologie, Andrea Tarditi from Endurance, Martina Stucchi from ipcm®, and Francesco Bardi from Endurance's Lombardore plant.

simply manufacture components: we transform our customers' designs to make each part even more efficient. The secret is to never take anything for granted: even when a process works, it does not mean it will forever. This is why we continue to invest in technology and people. We have recently been informed of plans to increase the production of components for electric motors, which will double their volumes. This will also mean doubling our number of lines and cleaning systems – for which we will continue to rely on DBM.”

Although, based on the data available, the hopes expressed in the Il Sole 24 Ore article cited at the beginning of this report remain largely unfulfilled, as Italy continues to rank among the lowest in European markets in terms of electric mobility penetration, there are nevertheless companies in the

supply chain, such as Endurance, which are moving decisively towards the mobility of the future thanks to a forward-looking industrial vision and constant investment in innovation. ▶



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