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The show room of OMR Spa's headquarters in Remedello (Brescia, Italy) displays the wide range of components for industrial, commercial, and off-road vehicles produced by the company.



FOCUS ON TECHNOLOGY

SPECIAL PaintExpo

A Digitised Cathaphoresis+Powder Coating Plant Like a Tailored Suit for OMR Spa, a Manufacturer of Excellence in the Industrial Vehicle Sector

Alessia Venturi **ipcm®**

Compact design, production versatility, loading and unloading ergonomics, operating cost reduction, consumption minimisation, and high productivity combined with digitalisation, predictive maintenance, and full traceability of coated parts: these are the main features of the cataphoresis+powder coating line that Trasmetal Spa (Milan) supplied to an Italian manufacturer of excellence in the commercial, industrial, and off-road vehicle sector: OMR Spa (Remedello, Brescia).

“Coating plants are not plug-and-play systems. They are designed like a tailored suit: it takes ten to twelve months before they fit a customer’s production needs perfectly. But when they do, they become the main added value of its production flow.”

These are the words of Ruggero Ceriali, the CEO of OMR Spa (Remedello, Brescia, Italy), one of the main European manufacturers of components for commercial, industrial, agricultural, and earthmoving vehicles. This firm believes that coating accounts for 10-15% of its

products’ added value. Indeed, it has just completed the industrialisation phase of a new cataphoresis+powder coating line designed and supplied by Trasmetal Spa (Milan, Italy), a company with over fifty year of experience in the creation of customised coating systems for the automotive, aluminium, household appliances, and general industry sectors.

OMR Spa was established in the 1970s as a small craft carpenter’s shop. Over time, it has become a benchmark

company in the production of steel components for industrial, commercial, and off-road vehicles. Nowadays, with 500 employees, a covered surface of over 70,000 m², and a turnover of about 104 million Euros in 2019, OMR has an almost fully vertically integrated production and it is able to turn raw steel into end products almost without relying on any contractor.

“We deal with eleven different production processes in-house, such as laser cutting, welding, bending, machining, and coating,” explains Ruggero Ceriali.



A bird's eye view of the plant designed by Trasmetal from its loading and unloading areas.

"The other feature that makes OMR unique are its back-up solutions for each department and plant: this enables us to guarantee business continuity in any situation. We applied the same approach to our coating plant, too. With the installation of the new line, we have not dismantled our previous plant, bought fifteen years ago: we decided to use it as a support system to further increase our production capacity and treatment quality degree."

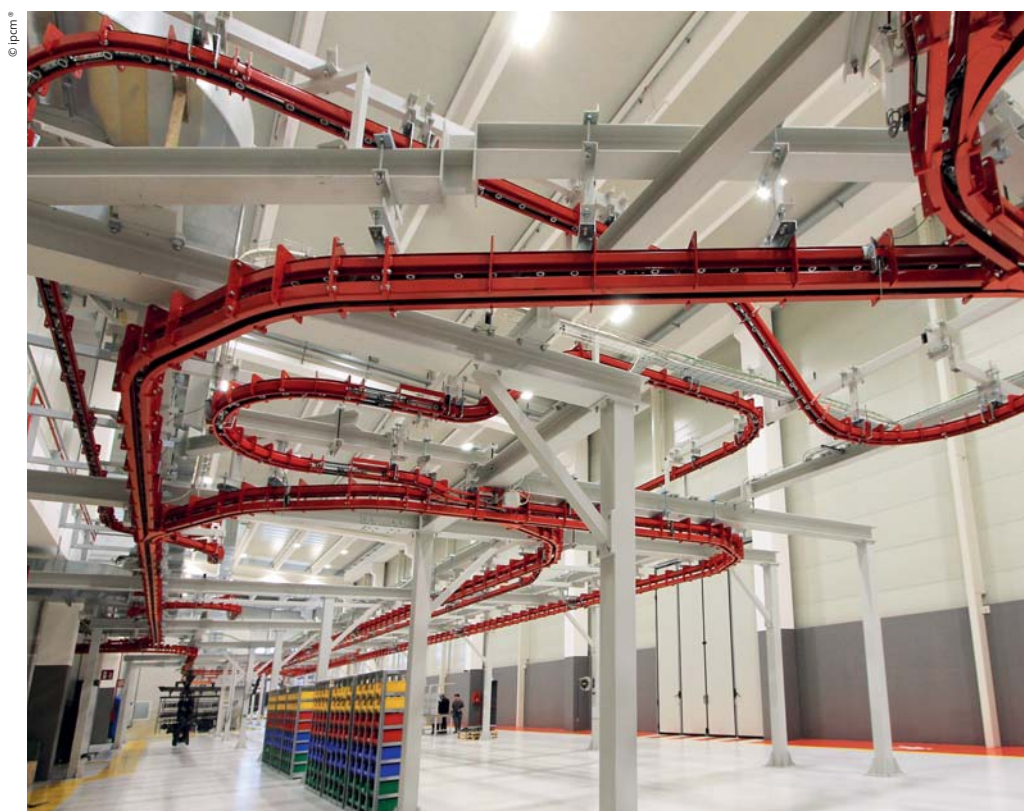
The vertical integration of its production and the back-up solutions available for all processes have made OMR an invaluable partner for the players of the European industrial vehicle sector: Iveco, Daimler, and Volvo in the lorry field, New Holland in the tractor one, and CNH Industrial, Caterpillar, and Komatsu in the earthmoving machine one. "The reasons behind the investment made with Trasmatal for our new coating line were both economic and technical," indicates Ceriali. "Quite simply, we needed to increase our production capacity and, above all, improve the quality of our products. The plant installed fifteen years ago had several defects due to our total inexperience in the finishing field: with the new one, we corrected all the problems we had encountered in those fifteen years of work. Moreover, we wanted a plant that enabled us to coat in-line and with a continuous flow by performing both cathaphoresis and powder application operations."

Digitalisation, automation, and versatility: the characteristics of the new line

The installation of the cathaphoresis+powder coating plant supplied by Trasmatal began in December 2018 and ended in June 2019. The new line design was based on the concepts of compactness, production versatility, loading and unloading ergonomics, operating and maintenance



The storage buffers near the loading station.

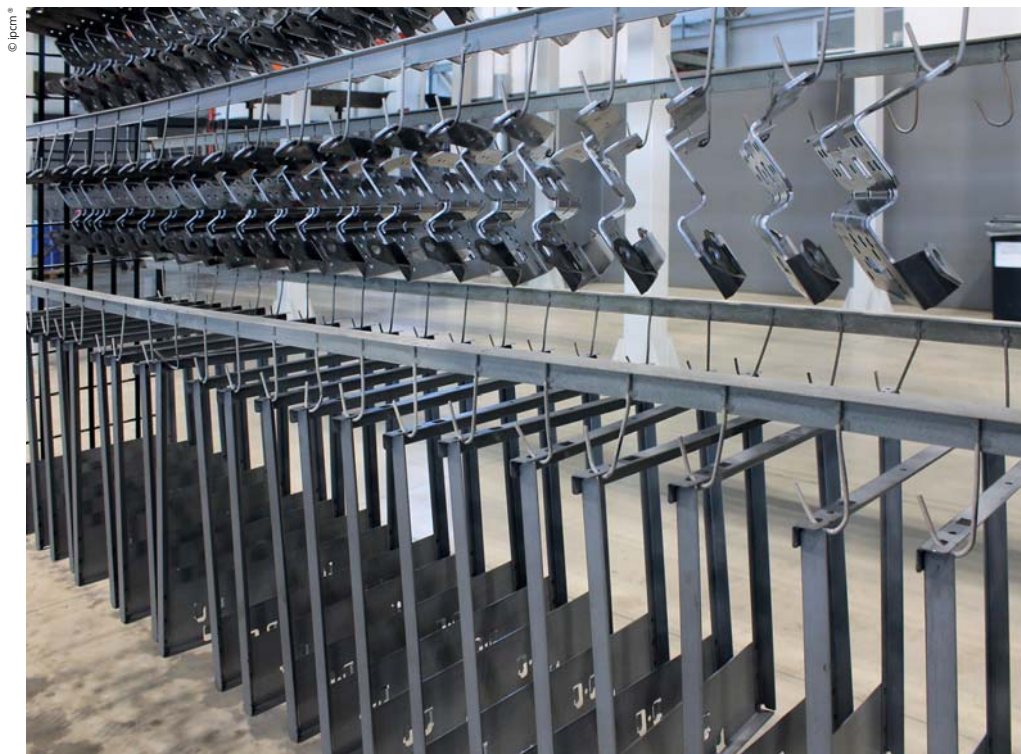


The Conveyors Nord power & free conveyor taking the workpieces to the powder application area.

cost reduction, consumption minimisation, and high productivity combined with digitalisation, predictive maintenance, and full traceability of coated parts. "Trasmetal's project focussed on improving OMR's coating productivity and optimising the loading and unloading phases, thus guaranteeing operational flexibility despite the very high number of different components to be handled," explains Carlo Zucchetti, project manager at Trasmetal. "One of the most challenging aspects was finding the right size for the load bars, now higher and longer than those of the first plant. We opted for the use of one 1500 mm-wide bar or two 600 mm-wide ones. The line was equipped with two loading stations, one for handling heavy components and the second for the lightest ones. The operators can simultaneously load parts

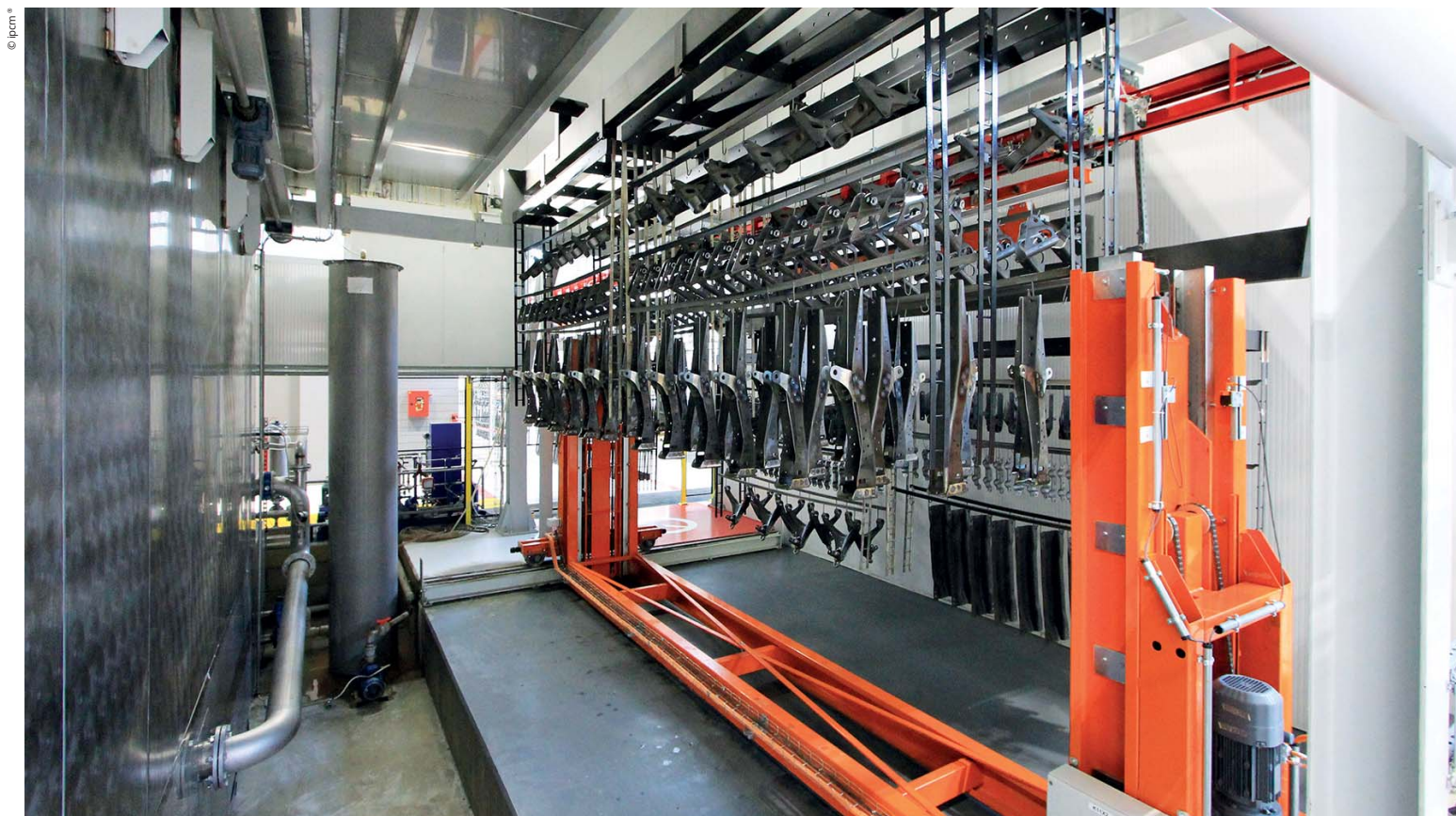
in both of them and then send the bars to the pre-treatment station according to the production order. Before the loading area, there is a workstation for the preparation of the empty load bars with the frames needed to hang the incoming workpieces. The unloading area is equipped with two stations working the same way as the loading ones." The cataphoresis+powder coating line features a power & free conveyor designed by Conveyors Nord (Inzago, Milan, Italy). It does not include any elevator because the plant was designed for ergonomic hanging operations. "The use of storage buffers in both the loading and unloading stations allows managing the load bars during the feeding and return phases, which are functional to

the loading and unloading ones. This eliminates any waiting time due to bar flow management activities," explains Giuseppe Groppelli, product manager at Conveyors Nord. "The plant also features other storage buffers. Some of them allow cooling the parts down upon leaving the ovens. Others house the load bars leaving the pre-treatment/cataphoresis unit during the tank system emptying operations, typically performed at the end of the day, in order to protect the parts, which are in a delicate phase. Finally, other storage buffers compensate for the variations in the bar flow intensity in some areas of the line, due to the fact that each load bar is matched with a specific cycle and therefore takes a slightly different path than the others.



A loaded bar.

"Trasmetal developed a bar code part management system that identifies each workpiece during loading and shows relevant information on the smart TVs installed along the line: hanging instructions, any masking required after cataphoresis, treatment program, and packaging instructions upon unloading," adds Carlo Zucchetti. "The plant is set up to treat a 5 metre long, 1.5 metre wide, 1.80 metre high load bar every 3 and a half minutes. During loading, the shape control device communicates to the bridge crane linked to the pre-treatment and cataphoresis tanks the number of load bars to be picked up, that is, one or two. With 1500 mm-wide bars, the bridge crane picks up only one of them at a time, whereas in the case of "narrow", 600 mm-wide bars, two of them can be picked up simultaneously.



The bridge crane picks up the load bars to transport them along the pre-treatment and cataphoresis line.



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The exit from the cataphoresis tank.

This helps to optimise the coating process, but also to guarantee a high treatment quality level by avoiding the use of any shielding between parts loaded on an oversized bar."

The pre-treatment tunnel (which uses Chemetall's products) includes 14 stages, including spray and immersion treatment operations, cataphoresis (supplied by Basf), two

rinses with ultrafiltrate, and blow-off before curing. Condoroil Stainless, Trasmetal's partner in this project, supplied the electro dialysis cells for the cataphoresis tank. "Due to the peculiarity of the components treated by OMR, Condoroil provided 'protected cells', that is, equipped with a protective net wrapped around the membrane to safeguard it against accidental impact and damage," explains Condoroil sales manager Alessia Sinigaglia. "The cells are equipped with ion exchange membranes and they are created with a wrapped, welded polymer sheet, featuring low deformability and electrical resistance but long service life and greater current intensity characteristics. With minimum thickness and therefore with limited electrical resistance, this generates little heat, which is the first cause of premature ageing of membranes; moreover, its poor extension prevents any short circuits from

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The cooling station with fresh air insufflation devices in its front part.

contact between the membrane and the electrode.

"Whereas in conventional cells the water flow enters the electrode by touching it physically, in Condoroil's ones it flows through a plastic tube closed at the opposite end by a cap, in order to prevent the liquid from returning back to the electrode. In Condoroil's tubular cells, the electrolyte is flushed from above inside the electrode and any excess product leaves the cells by going up from the bottom. In the event of an electrode breakage, this solution eliminates any risk of preferential water flow, resulting in the accumulation of electrolyte in the space between the electrode and the membrane. The advantage for users is that, in case of breakdown, it is not necessary to replace the whole



OMR Spa plant manager Fausto Toninelli (left) with CEO Ruggero Ceriali.



One of the two automatic powder application booths, each equipped with 2 reciprocators and 6 guns per side.



The Gema Opticenter powder management unit with dense phase feed pumps.

component: these cells allow changing only the electrode while maintaining the membrane. Finally, the cells are supplied with their upper part open, in order to guarantee ease of inspection and maintenance."

"Trasmetal located the cataphoresis drying oven and the powder curing one on a mezzanine," says OMR Spa plant manager Fausto Toninelli. "They are both canopy ovens: the workpieces enter them by following a continuous path along the internal conveyor. Once out, the load

bars reach a cooling station with a hot air intake system in the back and fresh air insufflation devices in the front. Afterwards, the bars continue along the main line towards the powder coating booths; however, if the loaded parts only need a cataphoresis treatment, they are diverted along the bypass line and directly taken to the unloading area. The load bars that proceed towards the powder coating booths pass along two conveyor rings with optional stations, such as sanding and

masking. Here, there is another storage buffer that can be used for different purposes, for example to "park" small colour batches to be included in the planning."

"The powder application area consists of two Gema controlled-temperature, controlled-humidity, dust-free pressurised booths," explains Toninelli. "Each of them is equipped with 12 automatic guns and 3 manual touch-up ones, that is, 1 for pre-retouching and 2 for post-retouching operations. We

selected Gema's Optispray dense phase pumps and last generation Opticenter powder management unit, with individual gun control modules. A shape detection bar at the booths' entrance programs the reciprocators and adjusts their stroke height and distance from the treated parts in order not to waste paint. We chose Gema's technology because we had already successfully worked with them: after installation, we have never needed any product assistance. Moreover, we found their dense phase technology very interesting and effective in terms of finishing results.

"On average, we perform five-six colour change operations per day, sometimes up to ten. We apply standard colours, mainly in the grey ranges. We have three main powder suppliers, in compliance with the specifications of our customers, which often even specify their approved products' numbers: OMR, therefore, has a very limited

choice in this regard."

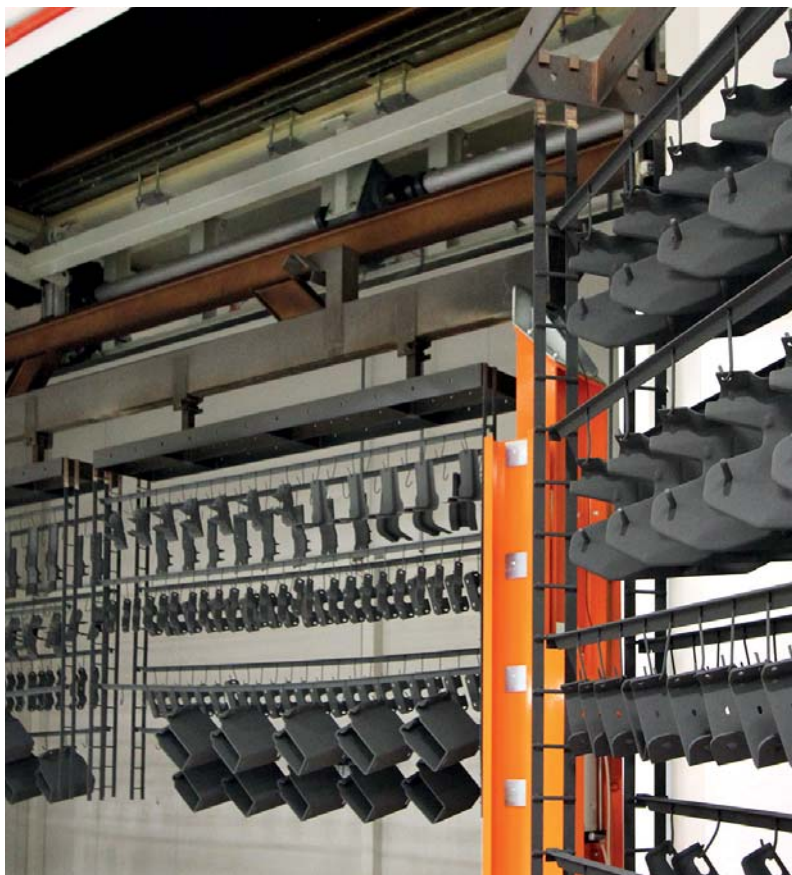
"Trasmetal's plant was also designed by focussing on environmental sustainability. First of all, the firm strived to limit the energy consumption of the drying and curing ovens, which are both vertical canopy systems featuring a separate conveyor with a different pitch than the main one. This prevents any unnecessary heating of the chain, resulting in a waste of energy. Therefore, these ovens consume 10 to 15% less energy than other systems of the same type, on average," says Carlo Zucchetti. "Secondly, Trasmetal integrated its coating plant with a zero-liquid discharge water treatment plant, as OMR operates in an area not connected to public sewage. All waste water is recovered, treated, and recirculated wherever possible, whereas sludge and the evaporation concentrate are disposed of by specialised companies."

Part hanging and hook maintenance strategies

"The bars are loaded differently through the use of specific frames or hooks depending on the incoming workpieces. Frames and hooks were developed based on component families or, in some cases, on individual workpieces.

We build them in-house and we deal with their cleaning in a Ciroldi pyrolytic paint stripping oven combined with a sand blasting system that removes any ashes from pyrolysis," says Fausto Toninelli from OMR Spa. "Paint stripping plays an important role with a continuous flow coating plant like ours, applying powders after cataphoresis.

Whereas the former can stand small paint deposits on hooks without compromising the electrostatic field



Parts entering the vertical canopy oven for powder curing.



The zero-liquid discharge water treatment system and the demineralisation plant.

during spraying, with cataphoresis hooks and frames must be perfectly clean in order to ensure proper electrodeposition. This is why we paint strip our hooks and frames in the Ciroidi oven after every process cycle. In the past, we gained some experience by working with paint stripping contractors using different technologies and we knew that the pyrolytic technology guaranteed the best benefit-cost ratio."

Conclusions

"The new plant has provided us with great space for further economic growth," states Ruggero Ceriali. "The coating line closes the entire production cycle and, therefore, it must keep up with the capacity and productivity of the other departments and plants. Coating used to be a bottleneck for us: we increasingly needed to rely on contractors and many of our customers did not like it. The installation of this new state-of-the-art system was a real success.

After eight months, we are very pleased with it.

"The collaboration with Trasmetal was perfect: we provided them with all design drivers, as we had clear ideas about the type of system we wanted. The plant they designed for us was very interesting both technically and financially and they managed to follow our whole vendor list for components. They provided us with a system tailored to our needs, which took some time to reach full capacity, but now gives us excellent quality results." ●

OptiCenter® OC07

Fastest colour change and stable powder output



Clean, efficient and superior application technology

The OptiCenter OC07 powder management center combines state-of-the-art OptiSpray application pump technology with automatic fresh powder feed for fast and clean color changes. The system is the basis for constant and reproducible coating results and significant powder savings.