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Opening photo: The components of the cataphoresis plant.



FOCUS ON TECHNOLOGY

Cataphoresis: advanced solutions for maximum functional and design quality

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High skills and proven technical know-how lead to important production results in terms of efficiency and quality. While this may seem obvious, it should not be underestimated that the path to be taken in order to reach an excellent industrial quality level includes process and development engineering, perseverance, experience gained on the field and the selection of the professional partners.

This is the case of Cataforesi Srl, a cathophoretic coating contractor based in Mantello (in the province of Sondrio, Italy) and established in 2008 as a branch of a powder coating contractor with the aim of meeting, in particular, the requirements of the automotive market: just-in-time deliveries and, above all, coatings with a high aesthetic and functional quality level as well as extreme corrosion resistance. After using a

second-hand cataphoresis plant completely renovated for its needs for a few years, Cataforesi Srl has equipped itself with a totally new, cutting-edge system, which is now enabling it to make the most of the skills and experience gained over the years to achieve even better results, more efficiently (**Ref. opening photo**). In order to reach this goal, the firm has turned, among other partners, to Verind S.p.A., a company based in Rodano (Milan, Italy) belonging to the German group Dürr Systems A.G. and specialising in automotive industrial coating technologies. Its innovative solution, including new ediVer electrodiagnosis cells, which allow to replace a damaged membrane without changing the entire structure, has guaranteed to Cataforesi Srl greater efficiency and productivity.



Figure 1: From left to right, Jessica Valsecchi, Gianluca Marastoni and Renato Saruggeri.

“ Since the clients asked for high quality products with excellent corrosion resistance properties, we subjected our components to cataphoretic treatments”

company, initially in order to get a greater autonomy for the treatment processes, by leaving the suppliers. Then they were able to seize the opportunities offered by the market and decided to accept also contracting jobs.

Integrated cataphoresis and powder coating processes: the prerequisite for the highest quality

Cataforesi Srl’s past and present are closely linked to DAFER Srl, a Mantello-based powder coating contractor and to INVER-PRESS Srl, a leading company for the moulded parts production in the automotive and appliance fields, based in Valmadrera (Lecco, Italy). After years of cooperative work, Rocco Pedri and Gianpaolo Mossini, the respective owners, decided to found the Cataforesi Srl



Figure 2: The pre-treatment tanks of the new cataphoresis plant.



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Figure 3: The Power & Free conveyor was provided by Futura Convogliatori Aerei from Robecco Pavese (PV, Italy).

The production process of DAFER Srl was completely reorganised in 1994 with the installation of the most innovative technologies on the market. This led the firm to become a point of reference in the coating field for the most important companies operating at the national and international level. Its powder coating plants treat medium-small as well as large components for several industries, such as cycles and motorcycles, household products, hardware, furniture, automotive, corrosion protection, engineering, bathroom furniture and appliances.

DAFER's strength is its ability to offer customised solutions. With the use of a chromium-free nanotechnology multi-metal universal passivating product for its pre-treatment operations, the company has also improved by 20% the corrosion protection performance of its coating process, with a significant reduction of its environmental impact.

In 2008, in order to meet the market needs and with the desire to offer a more complete and faster service to his customers, it was decided to insource the cataphoresis process with the ambition to take it to new heights of quality. "Initially, DAFER's activity focused on the field of service area construction, with the coating and silk-screen printing of tanks and petrol pumps for customers such as Agip and Esso," says Pedri, the founder of DAFER Srl and co-founder of Cataforesi Srl. "Since the clients asked for high quality products with excellent corrosion resistance properties, we subjected our components to cataphoretic treatments at the premises of our partner companies. We decided to insource this process when we started exploring other markets, especially the automotive one, where orders must be satisfied just-in-time: such requirement would not have always been met, if we had continued to rely on third parties. Moreover, this sector has very high demands in terms of corrosion resistance and aesthetic finish. That is why we needed to combine to our extensive knowledge of powder coating with top-level cataphoresis know-how."



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Figure 4: In the foreground, the skid with the 8-inch ultrafiltration membranes installed.

The simultaneous increase in the number of customers requiring both treatments, cataphoresis and powder coating, has therefore convinced Pedri to insource this operation by opening a new company that deals exclusively with contracting cataphoresis, Cataforesi Srl.

The establishment and development of a business

The new company specialises in the processing of metals with black cataphoresis. Thanks to a cutting-edge coating system and the use of high-quality products, it is able to reach a very high quality level on both small and large-sized components, adapting its process to the specifications provided by each customer. Initially, the company bought a second-hand cataphoresis plant in order to take the first steps and learn more about the process. “The machine had been completely revised and integrated with the replacement of the dialysis cells,” so Renato Saruggeri, Sales Manager at Verind S.p.A., which also contributed to the renovation of the second-hand system (Fig. 1).

The investment for integrating the cataphoretic coating process proved to be a success under different points of view. Afterwards, the increase in the number of customers from the automotive sector and the consequent need to increase its production capacity have led Cataforesi Srl to invest in a new cataphoresis plant. Thanks to the enormous wealth of knowledge acquired with the first system, the firm had a very clear vision of its needs and the results it wanted to achieve. For the new plant design, it has relied on an engineering company with which it has collaborated in the choice of the various components, including a new immersion pre-treatment plant (Fig. 2) and a new two-rail conveyor supplied by Futura Convogliatori Aerei (Fig. 3).





Figure 5: All the main parts of the cataphoresis plant are mounted on two skids.



Figure 6: The cataphoresis tank.

A new generation plant

Thanks to the innovative know-how in the field and the positive previous collaboration, Verind S.p.A. has been chosen for the provision of some basic components of the cataphoresis plant, such as the recycling pumps and the ultrafiltration unit. The goal was to meet the most stringent requirements of the major international OEMs of the automotive sector (**Fig. 4**).

“The cataphoresis system consists of two skids equipped to handle the entire process (**Fig. 5**),” Saruggeri says. “The first one includes the coating recycling pumps and their related components for the filtration of the coating bath. In fact, the content of the tank, for a total of 13 cubic metres of volume, is recycled, filtered and conditioned with a plate heat exchanger (**Fig. 6**); moreover, the tank is heated to maintain a constant temperature of 30.5 °C. The second skid, on the other hand, integrates the ultrafiltration unit. Two 8 inch-membranes with a disposable container have been installed; the nominal plant capacity is 1500 litres/hour, expandable to 2250 litres/hour. This skid also hosts the cleaning system (permeate recovery and recycling) and the flushing section used for the cooling of the pumps’ mechanical components. There is also a section of the anolyte feeding and management system, which feeds all the

“**They are new tube-shaped closed cells named ediVer (electro dialysis cells Verind), developed with the latest technology”**



Figure 7: The new ediVer cell (electro dialysis cells Verind).

dialysis cells. There are 16 cells installed (diameter of the active membrane: 2-inch), supplemented by 2 exposed ones. They are new tube-shaped closed cells named ediVer (electro dialysis cells Verind), developed with the latest technology, which allows to replace only the damaged membrane without the need to change the entire structure, thus ensuring maximum efficiency and quality (**Fig. 7**).”

The anode-cathode ratio is 1:8. Every bath enables to coat about 50 m² of surface with high thickness paints. The two skids, the whole cataphoresis tank system and the oven are managed and controlled by an integrated supervisory system. Upstream of the cataphoresis process, the workpieces are subjected to a pre-treatment process with a Chemetall solution. “Our 14-stage pre-treatment includes an alkaline degreasing phase followed by two rinses, a pickling phase, two further rinses, an activation phase, a phosphating process with zinc salts, one rinse with fresh water, one rinse with demineralised water, a nanotechnology passivation phase and one last rinse with demineralised water,” Cataforesi Srl’s Production and Quality Manager Gianluca Marastoni says (**Fig. 8**). Downstream of the cataphoresis process, on the other hand, the parts enter two washing tanks with a cascade recycling



Figure 8: The loading bars are automatically transferred from the conveyor to the bridge crane used for the pre-treatment and cataphoresis tanks.

Figure 9: The end result is of the highest quality.

system fed by the ultrafiltration unit, and afterwards a washing ramp using pure ultrafiltrate. “Before entering the oven, the components remain in a pre-heating chamber for 4 to 8 minutes and then they are subjected to a blow-off operation,” Marastoni says. “The pre-heating is required to avoid any problems arising from the dripping, which may cause defectiveness: by pre-heating the parts at a low temperature, the water evaporation is achieved, thus avoiding a thermal shock to the subsequently applied coating. We have been able to take this precaution aimed at maximum quality and process improvement thanks to the experience gained with the previous system (Fig. 9).”

When the parts exit the oven, they are unloaded. At the end of the cycle, 60% of production is delivered to the customers, while the remaining part is sent to DAFER to be powder coated.

Quality: present and future

The cataphoresis plant, in operation since April 2015, has far exceeded the expectations and goals set by Cataforesi Srl. “We wanted a system that would enable us to produce at full capacity for one shift with the highest coating quality,” Pedri states. “Now, thanks to strong demand, we are working on two working shifts. And the quality of our cataphoretic coatings is confirmed not only by the trust of our customers, which rely on us for both their

functional performance and their aesthetic qualities, but also by the approval we got for the whole process from some of the most important international car brands. Indeed, thanks to the quality level that we have been able to reach, 90% of our production is now intended for the automotive industry.” “We focus on a flexible service, timely deliveries, a direct and transparent relationship with our customers, and also continuous investments,” Marastoni says. “For example, a second powder coating plant is expected to come into operation in August 2017 at DAFER’s premises”. ●

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