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Opening photo: The Gestamp plant of Wroclaw, Poland, processes steel components for cars, including commercial vehicle chassis – a field in which the company specialises.



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# Gestamp's New Cathaphoretic Coating Plant Enables 4.0-Oriented Communication

Barbara Pennati **ipcm®**

Today more than ever, the automotive industry is one of the most cross-cutting, lively, and competitive global sectors. Attention to detail and quality plays a crucial role in ensuring that the increasingly demanding and ever-changing market requirements are met. Many players take part in the productive and technological

chain of vehicles that are more than just a consumer good. A new engine for growth in the sector is electric mobility, the new sustainable and efficient transport solution of the future. And precisely the production of components for the Volkswagen group's new electric mobility platform will enable Gestamp Polska to optimise the production

capacity of the cathaphoresis line it installed in 2016.

Gestamp, a Spanish industrial group with over 100 production sites in 21 countries and more than 40,000 employees, has specialised in the design, development, and production of metal car components since 1997. Its high technological profile

has allowed the group to pursue a product diversification strategy in order to strengthen its relationship with customers on its territory, creating a portfolio that includes Body-In-White, chassis and mechanisms (Edscha) processing operations.

ipcm® had the opportunity to visit the Gestamp branch of Wroclaw, Poland, performing cold moulding, welding, cataphoretic coating, and assembly activities on steel components. "Gestamp's Polish plant covers a production area of about 20,000 m². It works mainly with the Volkswagen Group, the PSA Group, and Renault," says Gestamp process engineer Xabier Garmendia (Fig. 1). "Production is divided into three business units devoted to

the moulding, MAG welding, and Body-In-White processing of components for cars and commercial vehicles. Over the years, the Gestamp group has specialised in the co-design, industrialisation and production of chassis: the chassis for the Volkswagen Crafter commercial vehicle, manufactured in the nearby Poznan plant, accounts for about 80% of Gestamp Polska's production volume (ref.

**Opening photo).**"

To cope efficiently with the increasing production volume generated by this component, a cataphoresis plant was installed between the end of 2015 and the beginning of 2016. It was designed and built by Cabycal, a company based in Valencia (Spain) specialising in the design and

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**Figure 1: From left to right, Xabier Garmendia (Gestamp), Enric Boronat (Cabycal), Rafal Rosa (Gestamp), and Sergio Mateo (Cabycal).**

development of complete turnkey coating systems (Fig. 2). Besides chassis, Cabycal's cataphoresis line also coats different versions of other components manufactured in the moulding and MAG welding production units.

**The cataphoresis plant: a highly automated layout**

The plant is equipped with eight bridge cranes and a Power&Free overhead conveyor, with two automatic loading and unloading stations and a manual one (Fig. 3). "One of the most critical aspects presented to Cabycal during the line design phase was the handling of our workpieces," states Xabier Garmendia. "We needed to relieve our operators from the loading and unloading of the chassis, the heaviest components we produce, by automating them."

Cabycal solved the problem by integrating a Power&Free conveyor that splits in two handling lines: a manual one (Fig. 4) for the loading of the smallest and lightest parts on hanging frames and a fully automated

one featuring two robots and elevators. In the loading area, a robot picks up the chassis from the welding line (Fig. 5) and places them on hanging cages (Fig. 6). An elevator (Fig. 7) takes these to a 6-cage overhead storage buffer. From here, a second elevator positions the cages near the transfer

unit (Fig. 8) that hooks them to the bridge crane connected to the cataphoresis line. In the unloading area, a third elevator feeds a second robot, which picks up the coating chassis from the cages. The finishing line consists of 14 pre-treatment tanks, 1 cataphoresis tank,



Figure 2: The cataphoresis plant supplied by Cabycal.

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2 rinsing tanks with ultrafiltered water, and 1 polymerisation oven. “The plant was designed to process steel parts at a maximum speed of 6 metres per minute, adjusted by two driving units,” explains Gestamp process engineer Rafal Rosa. “Once loaded, the workpieces undergo

a pre-treatment that includes as follows: 3 degreasing stages (spraying and hot immersion – Fig. 9), 1 immersion cleaning stage at room temperature, 1 deoxidation phase, 1 hot alkaline neutralisation phase, 2 immersion cleaning stages, 1 activation phase by immersion, 1 phosphating phase by hot immersion, 2 cleaning stages, 1 passivation phase, and 1 immersion cleaning stage with demineralised water.” “After pre-treatment, the components are immersed in the cataphoresis tank where electrodeposition takes place at a temperature of 34-35 °C (Fig. 10). Then, they are subjected to two washing stages with ultrafiltered water and a polymerisation one in the oven for about 30 minutes,” says Rafal Rosa.

#### A 4.0-oriented management interface

The whole plant is managed through an HMI interface enabling to check all the process stages, the pH levels, and the temperature and conductivity values of the tanks. “The operators can supervise the

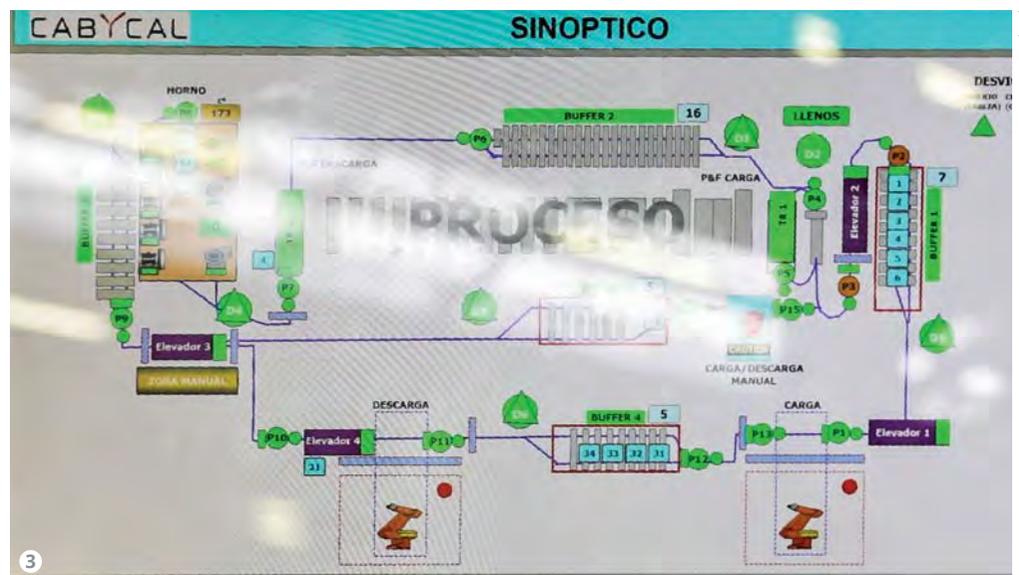


Figure 3: The plant layout.

# Painting robots and turnkey solutions



Figure 4: The manual handling line devoted to small and light workpieces.

status of the line from one PLC. The tanks are equipped with recirculation and filtering pumps and even the pipes feature indicators allowing to detect any pressure drops in their integrated components, such as pumps, heat exchangers, filters, etc.," states Cabycal project engineer Sergio Mateo Teruel. "Chemicals are automatically managed by PLC-monitored volumetric dosing pumps, while an extraction system placed on the bridge crane manages the tank vapours."

"A demineralised water production system (Fig. 11) composed of three filters and pressure regulation devices is connected to some line stations, including the electrodeposition one, to maintain the required quality

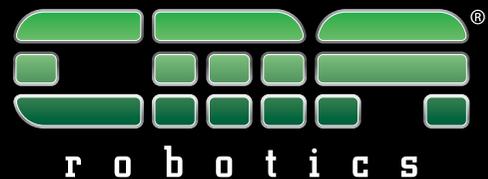
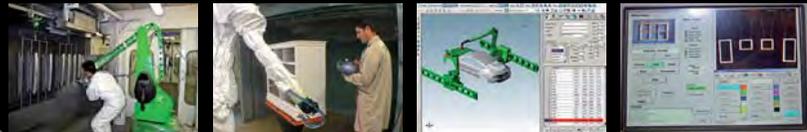


Figure 5: The robot that picks up the chassis from the line.



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Figure 6:  
The hanging cages  
of the automatic  
handling line.

“The whole plant is managed through an HMI interface enabling to check all the process stages, the pH levels, and the temperature and conductivity values of the tanks.”

level of water and ensure consistent coating results. For this purpose, also the temperature of the cataphoresis tank is kept under continuous control; if it raises, the cooling unit activates automatically to bring it under the parameters set in the HMI interface. Moreover, an oscillation system eliminates the bubbles that can be created inside the workpieces, thus preserving the quality of finishes,” says Mateo. “Finally, turbines that generate air currents have been installed at the entrance and exit of the polymerisation oven to prevent heat from dispersing. The walls of the oven were made of insulating panels and internally lined with galvanised sheets for higher yield.”



Figure 7: The elevator that takes the cages to the overhead storage buffer.

“To cope efficiently with the increasing production volume generated by this component, a cataphoresis plant was installed between the end of 2015 and the beginning of 2016. It was designed and built by Cabycal, a company based in Valencia (Spain) specialising in the design and development of complete turnkey coating systems.”

Figure 8:  
In the transfer station, the cages are hooked to the bridge crane that takes them to the cataphoresis line.



“Gestamp needed to relieve the operators from the loading and unloading of the chassis, the heaviest components produced, by automating them. Cabycal solved the problem by integrating a two-rail conveyor that splits in two handling lines: a manual one for the loading of the smallest and lightest parts on hanging frames and a fully automated one featuring two robots and elevators.”



Figure 9: The hot immersion degreasing tank.

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Figure 10: The spray cleaning tank.



Figure 11: The demineralised water production unit.

loaded on each frame and communicate them to the control system; this manages their speed and processing time and optimises their movements, ensuring the parts' traceability at every process stage. Both the coating line and the P&F conveyor are integrated into one electrical panel with a remote assistance service provided by our electrical engineering team."

### Towards a renewed production efficiency

"The cataphoresis pre-treatment and application system is of the latest generation and it integrates all the most innovative concepts of the 4.0 industry," states Enric Boronat. "The whole line can be managed through the HMI system, which allows for flexible programming and ensures constant control of all plant components and compliance with all process parameters. This makes it easier to manage energy consumption and intervene when needed." The advanced features of the line also ensure

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Figure 12: The cataphoresis line is equipped with 8 bridge cranes.

energy efficiency and environmental sustainability, an important aspect for Gestamp, which aims at increasing its production levels in future. "Cabycal has designed four cataphoresis plants for the Gestamp group.

This system has enabled us to optimally cope with the needs generated by the increase in our production volumes. Although the line is currently working on a continuous basis and we are coating more parts than initially planned (we treat about 11,000 frames per year), we have not reached the line's maximum capacity, yet," states Xabier Garmendia. "The volumes generated by the Volkswagen Crafter are increasing again and soon we will also start a new production of about 50/60 thousand workpieces a year, again for the Volkswagen group. For the future, we therefore plan to exploit the line's maximum production capacity and possibly expand it, if needed," says Garmendia. ○