





A New Application Technology with a 3D Part Scanning System and a Dynamic Reciprocator to Optimise the Production Time and Quality Level of Complex Products

Monica Fumagalli **ipcm**[®]

“Innovation” is a recurring term when talking about manufacturing. Nowadays, for a company, innovating means to equip itself with interconnected production systems managed through a perfect interaction between man and machine and, therefore, through the operator’s deep understanding of the new devices’ features. However, in practice, what does it mean for operators to radically change their work concept, and for companies to train professionals to manage their activities in a completely different way? Especially for small and medium-sized companies, there are concerns not only about the installation time of a new plant or device, and therefore of downtime, but also, and perhaps above all, about the time needed to adequately train their staff to use the new system. The development of user-friendly and easy-to-understand operating systems is therefore a decisive element for the choice of innovative machines and products. Here below, we present the case study of a coating contractor, Verniciatura Bianchi Pier Guido & C. This has been



Figure 1: From right to left: Pier Guido and Alberto Bianchi, the owners of Verniciatura Bianchi.

“Especially for small and medium-sized companies, there are concerns not only about the installation time of a new plant or device, and therefore of downtime, but also, and perhaps above all, about the time needed to adequately train their staff to use the new system. The development of user-friendly and easy-to-understand operating systems is therefore a decisive element for the choice of innovative machines and products.”

the first company in Italy to install a new powder coating system developed by Gema Europe. Through close cooperation with Gema’s technical staff and thanks to the experience of its operators applied on last generation devices, the company has been able to optimise its production times while maintaining a high finishing quality level, even for very complex-shaped workpieces (ref. Opening photo).

A high variety of different products and applications

Verniciatura Bianchi was established in Montodine (Cremona) in 1977. It started as a liquid coating contractor for products characterised by different shapes, materials, and types, and then expanded its business up to the implementation of a powder coating plant. “We now treat the most diverse products,” states owner Alberto Bianchi (Fig. 1), “mainly from the heavy carpentry, mechanics, and electromechanics sectors. We coat products in carbon steel and, more rarely, aluminium and stainless steel. We treat components whose dimensions range from the smallest

Opening photo: Examples of products powder coated by Verniciatura Bianchi.

MASKING SOLUTIONS FOR EVERY SURFACE TREATMENT

EUROMASK[®]

MOULDED PRODUCTS
SILICONE and EPDM made

TAPES
in PET, Vinyl, PI,
Creped Paper, Aluminium ...

HOOKS
for painting and weld
STEEL and IRON made

DIE-CUTS
Standard and Bespoke
on tape with liner

KNIFE CUTTING
with Silicone sheets,
Rubber, Foam ...

SPECIALS
solutions for every masking
problem

**"WE SOLVE
EVERY MASKING
PROBLEM"**

FINISHING GROUP srl

v.le A.DeGasperi, 31 - 20020 Lainate - Milano -
tel. +39 02 9678 0055 - fax +39 02 9678 2993
info@euromask-shop.com
www.euromask-shop.com



Figure 2: Verniciatura Bianchi coats a large number of boxed sections.

to the largest sizes (Fig. 2). That is why we have equipped our plant to make the production flow as quick and flexible as possible: the main bottleneck of companies like ours is the high number of colour changes required and of different part shapes treated."

Plant equipment

The coating line is equipped with two pre-treatment systems. The first one is a 5-stage pre-treatment tunnel installed in 2014 and linked to both one of the two liquid application booths (devoted to small components) and the powder application plant (Fig. 3). Its stages are as follows: phosphodegreasing, cleaning with mains water, cleaning with demineralised water, nanotechnology process, and final rinsing with demineralised water. On the other hand, larger components are treated with a 2-stage static pre-treatment plant performing a phosphodegreasing stage with more aggressive chemical products and a rinsing stage. Besides the static booth for the application of liquid coatings on small workpieces (1 x 1 x 1 m, Fig. 4), there is a second booth devoted to large-sized components (6 x 2 x 2.5 m).



Figure 3: Workpieces entering the 5-stage pre-treatment tunnel.



Figure 4: The liquid application stage in the static booth.

“As for the powder application,” says Bianchi, “we use epoxy-polyester paints for products intended for indoor use and polyesters for outdoor components, with a percentage ratio of 65:35. In most cases, these are one-coat systems; only 20% of our products require two coats, i.e. base coat and finish. Our previous powder plant, also provided by Gema, worked optimally for eighteen years. In August 2018, it was replaced by the new booth, equipped with an innovative application system. Our choice was motivated by the need to optimise our production flow and to innovate a department that was using an outdated technology.”



Figure 5: A detail of the 3D part scanning device.

Characteristics of the new application technology

“One of the problems that Verniciatura Bianchi asked us to solve during the design phase of their new powder coating booth,” says Gema Europe Sales Manager Gianluigi Baroni, “was that the line speed was slowed down by the presence of workpieces with complex shapes and variable dimensions. The manual touch-

“WE SOLVE EVERY MASKING PROBLEM”

COME AND VISIT US AT


FIERE di PARMA
28/30 marzo 2019
MECSPE
 TECNOLOGIE PER L'INNOVAZIONE - INDUSTRIE 4.0

DISCOVER THE NEWS FROM **EUROMASK®**

FINISHING GROUP srl

hall **2**
stand **D 14**



www.euromask-shop.com

EUROMASK®



Figure 6: The dynamic reciprocator in function.

ups required to perfect the coating of complex elements such as boxed sections and frames resulted in a loss of production efficiency. Therefore, Gema's team developed a solution based on the combination of a 3D laser scanning system, placed at the entrance of the booth, with a dynamic reciprocator equipped with 6 guns, which was able to reduce manual retouching operations by 40%.

"The device placed at the booth's entrance is a smart system using a three-dimensional object recognition laser scanner, which does not only detects the length and height, but also the depth of the workpiece (Fig. 5). Each of the 6 guns located on one side of the booth (Fig. 6) moves independently and, based on the detected shape, it can penetrate inside the product, e.g. in the cavities of electrical panels, while keeping the same distance between its dispensing point and the area to be painted. This facilitates the manual retouching operations, mostly limited to

difficult-to-penetrate edges and subframes, and it provides a thickness consistency level that manual application cannot guarantee (Fig. 7)." There are 3 reciprocators in the powder coating booth: in addition to the dynamic one, there are 2 traditional reciprocators and a robot for coating series of identical products (Fig. 8).



Figure 7: The post-retouching of difficult-to-penetrate areas.

Dynamic reciprocator and robot: two application systems compared

"The main advantage of Gema's new application system compared with the anthropomorphic one," says Bianchi, "is the possibility to manage the entrance of different parts into the booth without being forced to pre-set the application program for the robot self-learning activities, starting from the workpieces' hanging mode to ensure proper spraying. Indeed, with Gema's new technology the components can be hung in any way, since the scanner detects the parts' geometry in real time and the reciprocator adjusts its movement accordingly. Considering that identical products with the same shape only account for 2% of our entire production, this clearly helps optimise our production times."

Advantages of the new powder application system

"After almost twenty years of use of the old coating plant," states Bianchi, "our operators were worried about the implementation of the new system: despite the experience gained over the years, they raised doubts about the



Figure 8: The robot.



Figure 9: The control panel of the powder coating booth.

ease of handling a different process than the one they were used to. However, Gemma's staff was willing to understand our concerns and look for a solution able to reassure us: their system is easy to use, not only in terms of process management but also of cleaning operations. With frequent colour changes (even every 30 minutes), the cleanliness of the system is very important for us. The operator performs this process following each step on the control panel (Fig. 9); if a stage is not performed



Figure 10: A product detail highlighting the high quality level of the coating.

“The Gemma’s system is easy to use, not only in terms of process management but also of cleaning operations. With frequent colour changes (even every 30 minutes), the cleanliness of the system is very important. The operator performs this process following each step on the control panel; if a stage is not performed correctly, it is not possible to proceed to the next one.”

correctly, it is not possible to proceed to the next one. The high simplicity of management has therefore solved our initial doubts. It also saves our coating staff's time, because thanks to the scanner system they no longer have to re-set the spraying programs every time according to the different products on the line.” The high coating quality level has been guaranteed by replacing the old guns with new ones featuring a Venturi system and it has been further improved thanks to the high application efficiency of the dynamic reciprocator (Fig. 10). “The system settings were defined by Gemma to obtain the best coating efficiency based on the conveyor speed, the guns’ application capacity, and the workpiece size: therefore, we can now be certain that the booth is working in the best way possible. Moreover, despite the transition from a 6-gun to an 8-gun system, i.e. 14 guns in total, and despite the greater production capacity, the consumption of powder has not changed: this is a further advantage of our new system (Fig. 11).”

Conclusions

“We are very pleased with our choice,” states Bianchi. “Gemma has always been a guarantee of quality for us, so much so that when we decided to replace our old coating plant we contacted their team directly, without assessing any alternative solution. Thanks to the installed system, we have managed to improve our productivity level for those workpieces that forced us to slow down our line; at the same time, we have simplified the management of the powder application process also for components with which we could maintain a good productivity level, but with the constant presence of an operator. However, what pleased us the most was Gemma’s ability to train our staff quickly: for us, seeing our coating operators happy with the results of their work is an extra incentive to strive for the optimisation of our production processes through technological innovation.”

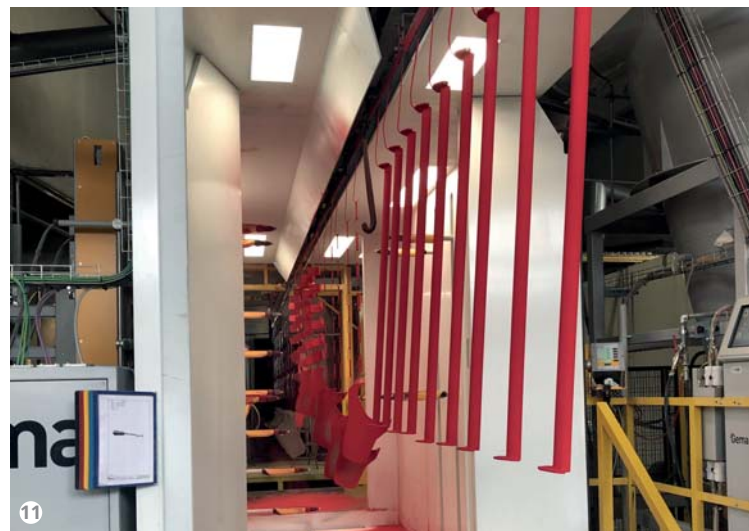


Figure 11: The 14 guns for the application of powder coatings.