Some of the parts treated by Oxicolor Srl, a specialist in aluminium surface treatments for almost fifty years.

Highly Automated Weighing and Powder Unit Cleaning Systems Reduce Paint Consumption and Increase Production Output

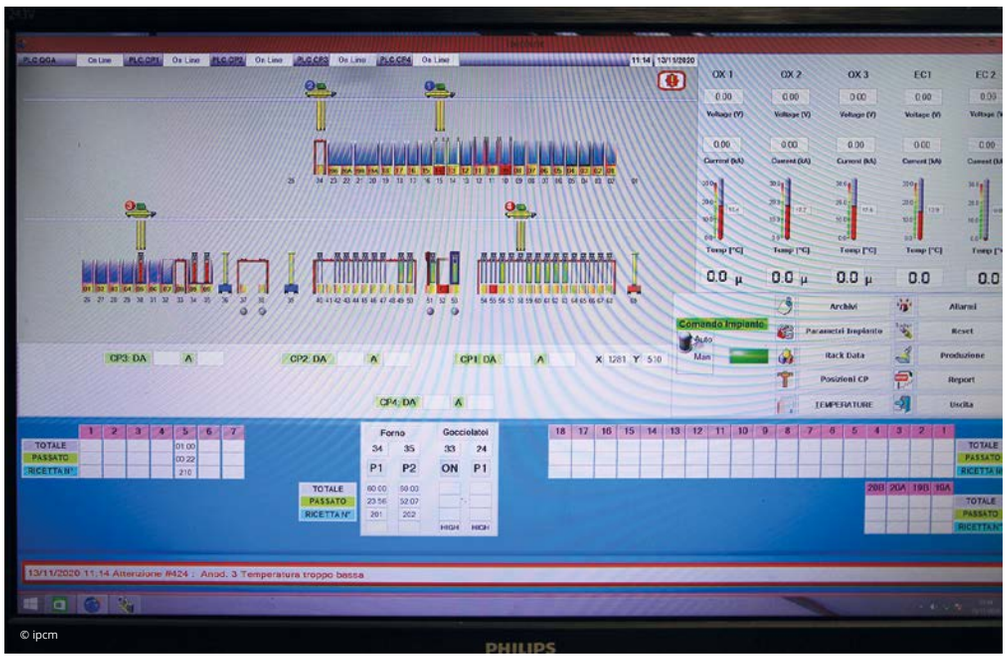
Monica Fumagalli ipcm®

Oxicolor, a company specialising in the anodising and powder coating of aluminium since 1974, uses around 250 kg of powders per day. In order to optimise paint consumption in its paint shop, it has chosen the complete application system offered by Wagner (Valmadrera, Lecco, Italy).

In an economic climate where rising raw material prices heavily affect paint production and, therefore, the costs beared by end users, using the most appropriate equipment to ensure maximum savings in coating application is a strategic advantage. This is also the opinion of Luca Malfatti, the owner of Oxicolor Srl (Mezzolombardo, Trento, Italy), a company that has been specialising in aluminium surface treatment processes for almost fifty years and that consumes 250 kg of powder coatings daily.

"Careful production management is also based on the attention paid to the smallest details in our systems' concepts," he states. "We have been treating aluminium as a contractor for the window, door, furniture, and curtain wall sectors since 1974. However, nowadays, the experience gained over time alone is not enough to make us competitive, as markets and stakeholders change their requirements very quickly. Having a production system in our plant that features the latest technologies in terms of equipment and devices and that is managed

The storage buffer in the anodising and pre-treatment department.



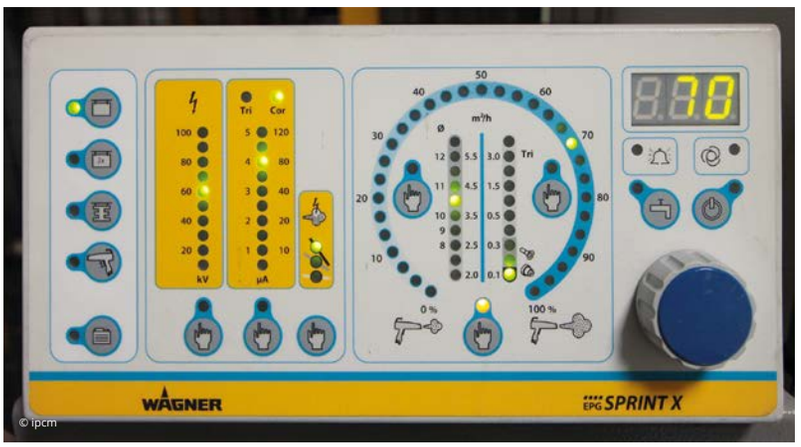
The control PLC manages operations in the oxidation and pre-treatment tanks.

A detail of one of the tanks for the pre-treatment of aluminium products.

through the most advanced software gives us an automation degree that guarantees not only high quality results, but also a reduction in the products consumed for our surface treatment processes.
The combination of our staff's know-how and our production systems' automation level is what has made Oxicolor a benchmark in its area of expertise. "Our experience is based on almost half a century of activity in the window and door industry," indicates Malfatti. "With the beginning of the new millennium, we started a thorough revamping of our production systems. This was completed in August 2020 with the start-up of the new anodising plant, following that of the coating one, which had reached full operation in January of the same year. In the replacement of our coating system, we were supported by Wagner (Valmadrera, Lecco, Italy), belonging to the international group J. Wagner GmbH, who presented us with a complete application solution that was thought out down to the smallest detail and perfectly suited to Oxicolor's production concept."

Oxicolor: almost half a century of experience in the aluminium industry

Since its foundation, Oxicolor has made continuous progress in terms of process technology, quality research, and professional expertise. "Since the beginning, growth has been steady," confirms Malfatti, "and we have established ourselves as a qualified supplier to designers and manufacturers of windows, doors, and aluminium components for architecture and the industry. In 1999, the ownership of Oxicolor Srl passed from the Bernabè to the Malfatti family, of which I am a member, continuing its aluminium surface treatment activity. Until a few years ago, the production chain of which we are a part worked differently than it does now: we received extruded material from a few wholesalers and, after the required processing and surface treatment operations, we

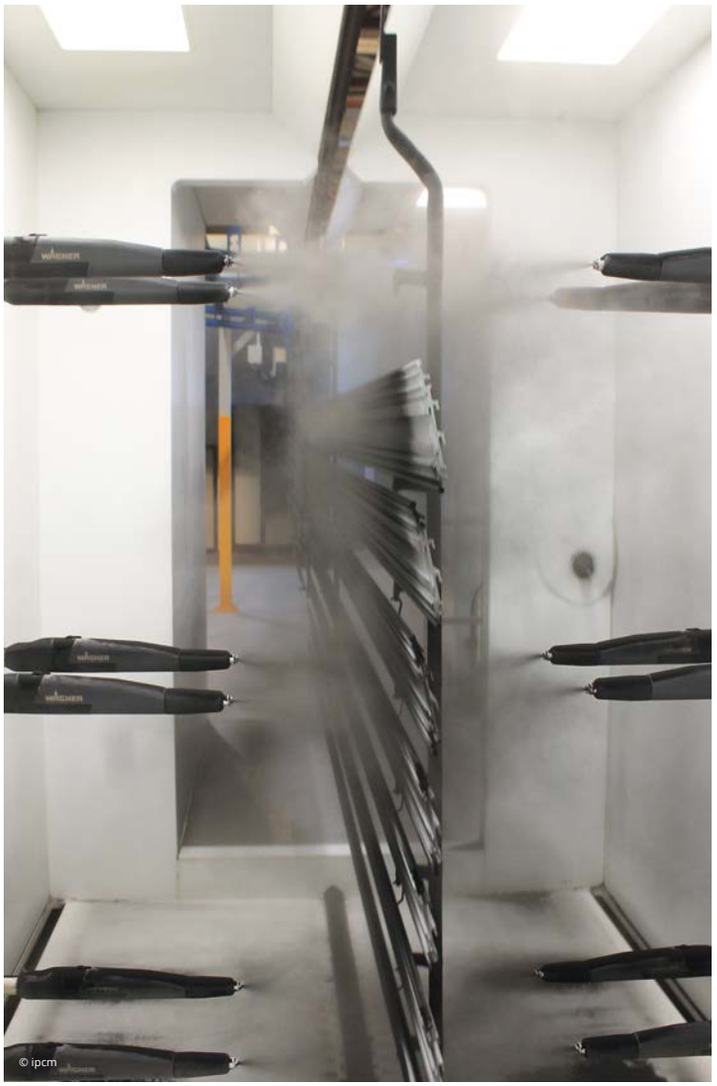


Manual pre-retouching is one of the strategic steps of Oxicolor's coating process. The PLC controlling the manual touch-up phase (on the right) is located close to the operator's workstation.

delivered the parts directly to small window and door manufacturers in our area. Currently, however, more and more wholesalers are insourcing their surface treatment processes in order to be more competitive. This is why we decided to differentiate our business and start serving the furniture and curtain wall sectors. At the same time, this meant that we had to specialise in the treatment of customised parts and metal sheets and panels up to 7 metres long and 2 metres wide."

A perfectly integrated production system

In the anodising and pre-treatment department, 4 automated overhead travelling cranes – 1 for the warehouse, 2 for the anodising station, and 1 for the pre-treatment line – interact with each other, controlled by a single PLC to facilitate the management of the production flow. "We can thus also manage inline the titanium oxide flash process, as an alternative to the traditional cycle with titanium-based passivation, which is a type of non-chromic pre-treatment, and deliver the pre-treated products directly in front of the coating plant. Oxide flash is one of the most expensive pre-treatment technologies currently available, but it is among the best performing and most durable ones."
The company carries out controlled processes in

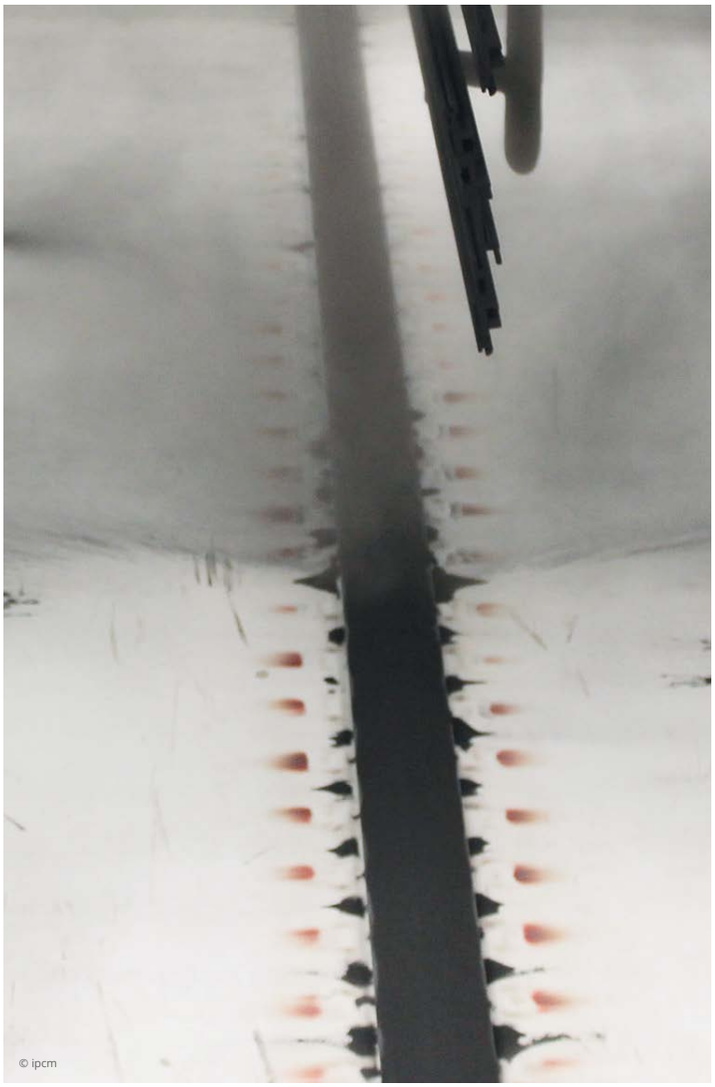


The inside of Wagner's SuperCube coating booth.

compliance with the technical guidelines of European quality labels. "For the architectural sector, our anodising process is QUALANOD certified and our painting process is QUALICOAT certified. In addition, we have recently received the QUALICOAT SEASIDE certification for the anti-corrosive effectiveness of our titanisation cycle."

Strategic pre-retouching for optimal coatings

A two-rail conveyor picks up the workpieces to be painted from the buffer located between the pre-treatment tanks and the coating plant. The coating line consists of 2 booths, i.e. a SuperCube machine linked to a Wagner SuperCenter EVO powder management unit and a booth recovered from an old line. "99% of our production is handled in the SuperCube booth. We use the second one only in emergencies," notes Malfatti. "Thanks to the two-rail conveyor, we



The lower guns' efficiency is often compromised by the powder extraction system at the booth's bottom: Wagner has developed a side suction system that solves this problem.

have the possibility to send each load bar to either one or the other booth in real time. When a customer presents us with an urgent request for the surface treatment of a small batch of 3 to 5 m2, we avoid stopping the main system and use the second booth. This enables us to meet customer demands without losing productivity." The SuperCube machine is equipped with 2 reciprocators featuring 6 PEAC4 XL guns each, 2 manual pre-retouching stations, and 1 post-retouching station. "We generally favour pre-retouching," says Malfatti, "because accuracy is of the essence, especially in the case of metallic colours. The operator's hand cannot guarantee the same consistency as the automatic application, so we first intervene manually in a direction perpendicular to that of the reciprocator application. Then, automatic application evens out the layer, so that no overlaps or stretches of paint in opposite directions are visible

The new generation SuperCenter EVO powder management unit.

The storage buffer after the curing oven.

on the workpiece at the end of the coating process."

The state-of-the-art powder management unit optimises consumption

"The powder management unit installed," says Marco Spada, Sales Manager of Wagner, "is the latest version of our SuperCenter EVO, updated just recently. Its main innovations are the two load cells housing the virgin powder boxes, which are placed under the loading container, and the fully automatic cleaning system, managed by the powder unit itself and connected to both the booth and the guns."

"The combination of these two aspects – the automatic weighing and cleaning systems – was the decisive reason why we chose Wagner's solution," emphasises Malfatti. "Both the high degree of automation and the completeness of its application concept convinced us. We were looking for a system that was perfectly integrated, efficient in every technological aspect, and thoroughly designed in every detail and Wagner's project was the most complete one."

"Thanks to weight detection, the quality and quantity of powder in the container are constant, as is its feeding flow rate to the booth," states Marco Spada. "We accurately analysed the timing of Oxicolor's colour change operations, which are very frequent, up to 10 per day. In this way, we determined that they needed to perform quick change-overs, which now take about 7 minutes – up to 11 minutes if the tint difference is drastic – and constant cleaning operations."

"With our old line," explains Malfatti, "we used a powder management unit without load cells, but equipped with a pumping device to recover paint. However, we found a problem in the mixing of recovered paint, because, especially in the case of medium to long cycles for the application of metallic coatings, the powder's metallic component was altered in the long run despite the use of bonded paints specially designed for recovery. Thanks to

The inside of the power management unit.

the load cells and the weighing system, we no longer run this risk, precisely because it is possible to quantify the percentage of powder present in the mix and maintain a constant ratio between recovered and virgin powder. This guarantees a high quality output even in the delivery phase."

When details make the difference

"Within such a complex production system, small details make the difference," says Malfatti. "For example, the positioning of the PLC controlling the manual application on board the booth in the retouching area may seem a secondary aspect; however, it actually has a significant impact on the daily work of our operators, who can easily change the guns' parameters while on the job. With our previous system, they had to reach the management unit to make the necessary changes. Therefore, this gives us more control over the operation and greater production efficiency."

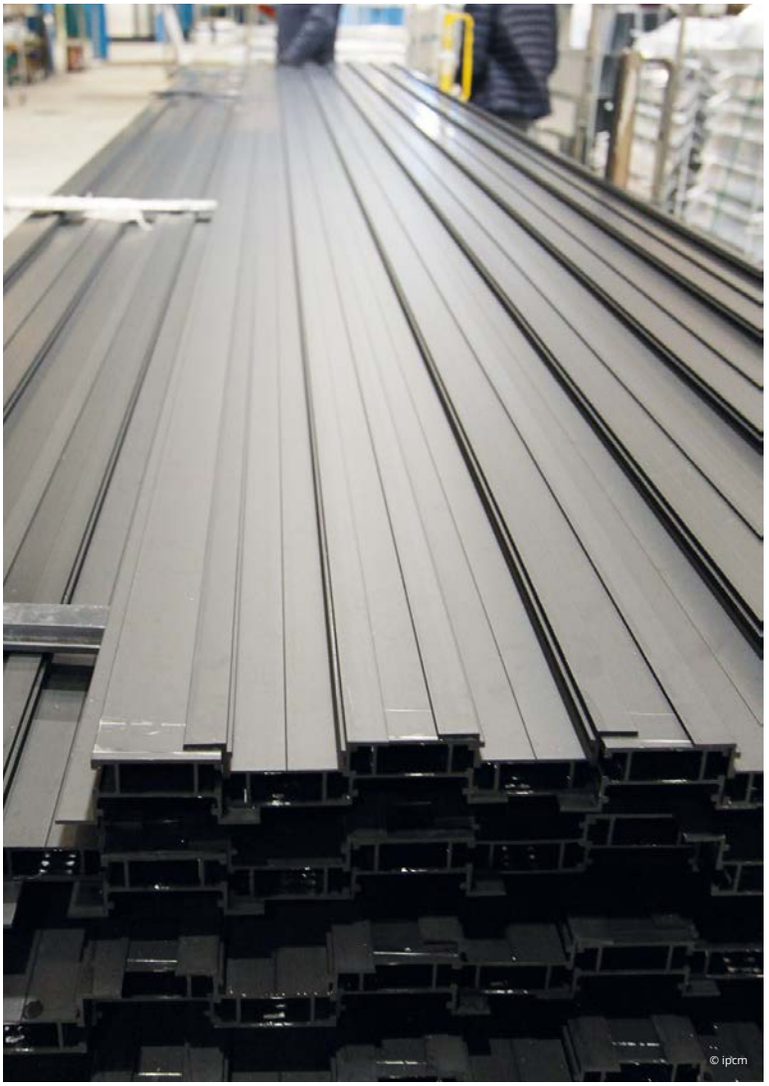
"A further innovative aspect of the SuperCube booth," indicates Spada , "is the suction system located on the side walls instead of in the middle, as in traditional machines. This solution is the result of a detailed research study carried out at Wagner's headquarters in Germany, according to which the area of the booth where the powder is most "torn off" is the central one. In fact, the delivery of the lowest positioned gun, which works close to the booth's bottom, where the suction system is generally positioned, is the most critical one due to the interference of suction in the application phase. That often calls for the subsequent manual touch-up of the lower surface areas of workpieces. This issue has been solved by Wagner's side suction system, which guarantees fluodynamic balance and does not hinder the efficiency of the guns. In this way, it is possible to reduce the number of touch-up operations and, therefore, assign the workforce to other tasks.

"The piping that connects the booth and the recovery cyclone is also one of the most innovative aspects of the new application system: its design includes elbow bends that, thanks to their 90° inclination, enable the powder flow to reach the cyclone directly, without forming any swirls as is usually the case with conventional pipes. This reduces the risk of sedimentation and subsequent corrosion of the pipes' inner walls, thus avoiding periodic maintenance by shot blasting."

"Another detail of this line that I would like to highlight," states Malfatti, "is the positioning of the touch-up platforms outside the booth, which enables to clean the guns for the colour change operation without the need to access it. This improves the ergonomics of the operation and simplifies the retouching area's cleaning phase."

At the end of the coating cycle, the parts enter a hot air curing oven and then they are placed in a final storage buffer. "Thanks to the design of the two-rail conveyor," notes Malfatti, "we have been able to create a storage buffer where the parts can stay longer than average.

The cyclone for powder recovery.



Coated aluminium profiles.

This is important for us because the class 2 or 3 powders that we buy from AkzoNobel, of which we are certified applicators, require higher baking temperatures and therefore longer curing times. Incidentally, we use class 3 powders rarely, usually to meet the AAMA 2605 specifications of the US market, while class QUALICOAT2 powders are increasingly in construction sector's demand."

360° cleaning

"In summary," says Malfatti, "the automatic cleaning process of our SuperCenter EVO has improved our colour change-overs' management. This takes place with 3 pre-set cycles, from the least intense one, if similar colours follow one another, to the most in-depth one, e.g. in the case of a switch from black to white. Thanks to such automation, our operator only has to clean the booth and no longer the powder management unit. The powder removed during these cleaning operations, as well as that collected from the containers and pipes, is also recovered and therefore never reaches the final filter. Previously, we collected 12 big bags of around 700 kg per year in the final filter, now only 8, which means 30% less powder to dispose of. In times like this, characterised by strong fluctuations in the price of raw materials due to the health crisis, we can only be pleased with the application system we have chosen. We are now equipped with all the tools that enable us to maintain our high quality standards in terms of both coating results and surface treatment processes."