How Cutting-Edge Technologies and Targeted Interventions Have Made Sepal One of the Most Advanced and Flexible Aluminium Processing Companies in Europe

Barbara Pennati ipcm®

For a company performing coating tasks, a high finishing quality level is just as important as a good productivity rate. Production volumes should not be sacrificed in order to reach the best quality possible for a given markets. Another critical parameter to be competitive nowadays is flexibility, in terms not only of types of component treated but also of compliance with specifications. These can vary a lot among different markets, not so much for the requirements as for the processes needed to comply with them.
Sepal Spa (Lograto, Brescia, Italy) is a well-established company in the sector of aluminium extrusion, which has managed to distinguish itself in the field of aluminium profile coating through the installation of some of the most advanced technologies available on the market. The aim was achieving higher quality and finishing levels for their products, combined with high flexibility to meet the demands of different markets as well as high productivity. Established in 1973, in 2014 Sepal insourced its finishing operations through the implementation of a modern coating plant with an in-line flash oxidation system and an anodising plant. These were both supplied by SAT Spa (Verona, Italy), specialising in the design of vertical coating and surface finishing plants for extruded aluminium profiles.
ipcm® visited Sepal's premises in 2015 to report the installation of the first plant in Europe, in terms of both dimensions and production cycle integration, to have industrialised the flash oxidation pre-treatment technology[1], which ensures salt spray resistance values of about 3000 hours and compliance with the Qualicoat Seaside standard without any surface conversion process. Today, as then, Sepal is driven by a will to renew and search for the best quality possible. That is why it has recently made further important investments that led it to consolidate its presence on international markets. Once again, it chose SAT as its technological partner.

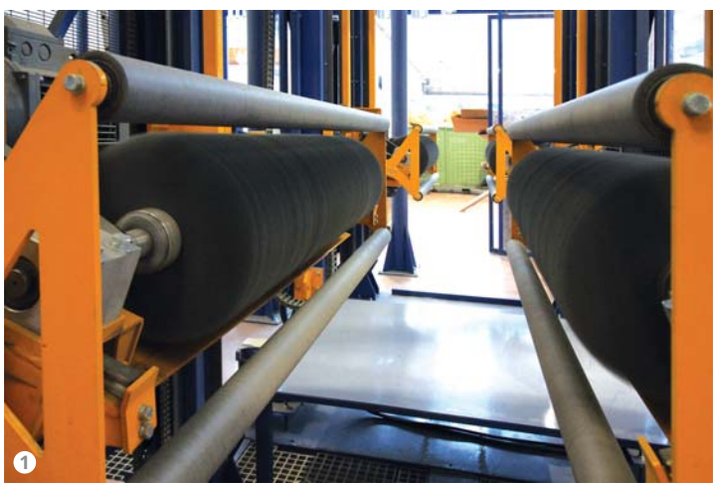

Figure 1: The brushes scratch the profiles' first layer of aluminium to significantly reduce the possibility that surface defects appear after coating.

"Before the latest plant modifications, Sepal always performed a flash oxidation pre-treatment process with the FOX® technology patented by SAT, that is, a very rapid anodic oxidation phase able to improve corrosion resistance. However, a few markets, especially the French one, have very strict specifications in terms of chrome-free conversion," explains Andrea Trevisan, the CEO of SAT. "Therefore, we decided to modify their already-existing plant by integrating an acid attack and chrome-free conversion phase, which enables Sepal to perform both the FOX® and conventional pre-treatments on the same line." In the framework of this important investment, other crucial changes were made for quality purposes, but also to ensure constant productivity and greater versatility of the line.

1 *"The first coating plant in Italy for aluminium profiles with an in-line flash oxidation pre-treatment process"* ipcm®_International Paint&Coating Magazine Vol. VI, No. 31 January-February, pages 46-55

Opening photo: The in-line brushing system added between the loading of profiles and the start of the pre-treatment cycle.

Figure 2: **The coating booths feature 18 guns each.**

In-line brushing machines for optimal surface preparation

One of the main innovations was the addition of an in-line double brushing machine between the loading of profiles and the start of the pre-treatment cycle (**ref. Opening photo**). "Another important change to the plant was the integration of a brushing system to scratch all four sides of the profiles and remove any residues and surface defects created by the extrusion process," says Trevisan. "Normally, with a part of Sepal's production for which a very high surface quality is required, the brushing operation takes place before loading. However, performing this process offline entails high costs in terms of labour and time, and therefore a loss of productivity. That is why, based on Sepal's automation-oriented approach and thanks to our patented system, we installed these in-line brushing machines."

This system is the second one installed by SAT and the first one in Italy, which confirms Sepal's inclination towards technological experimentation. "By scratching the profiles' first layer of aluminium, the brushes eliminate 'stubborn' chips and residues that

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chemical pre-treatment alone can hardly remove. It is an expensive process, but it significantly reduces the possibility that surface defects appear after coating, resulting in waste or expensive rework (**Fig. 1**)," says Trevisan. "The in-line integration of the brushing process also gives an advantage in terms of productivity: once the profiles are loaded, the whole finishing process is performed fully automatically. The same operation carried out offline, moreover, would require the use of one or more machines depending on the volumes to be treated."
"What makes our in-line brushing machines unique and innovative is their patented system to stop the profiles only in the brushing area, thus ensuring a safer, simpler and more consistent process. At the same time, the stop of the workpieces does not affect the speed of the line, because this patented system allows to compensate for the time required with an increase in the movement speed from one station to another," explains Andrea Trevisan. "This is the second brushing system we have installed after the one of Cortizo, a Spanish manufacturer of aluminium profiles."

The revamping of the coating booths

The third plant modification involved the coating booths and it was aimed at increasing their productivity and quality levels. "Sepal's plant includes two powder coating booths: the one dating back to 2014 is equipped with Venturi injectors, whereas the one added in 2015 features Gema dense phase pumps, a dispensing technology that ensures significant paint saving and better adhesion," states Trevisan. "In order to further improve their performance, we increased the number of guns from 12 to 18 in the second booth, so that they both have the same number of guns (**Fig. 2**), and we retrofitted the first booth's multiple controls to simplify its operation. Moreover, the oldest booth was replaced with a new V-shaped one, patented by SAT (**Fig. 3**).
Originally, the line had been conceived to rotate the profiles; now, with these two

Figure 3: **One of the two V-shaped booths, patented by SAT.**

Figure 4: **Sepal can manage both the booth and the guns with one control panel.**

new generation booths, this is no longer necessary," says Trevisan. "Finally, we installed a software for the vision system, able to interact with the Gema powder management unit and in particular with the control system OptiControl CM22. This enables Sepal to manage both the booth and the guns with one control panel (**Fig. 4**)."

A 25-micron oxidation tank

"Besides implementing a chrome-free pre-treatment, which has given Sepal greater versatility, we also improved their anodic oxidation system," says Trevisan. "This plant is completely automatic and able to handle profiles up to 8 metres. The initial project provided for the installation of three 16,000-amperes tanks to obtain thicknesses between 10 and 16 microns with a standard oxidation process. However, we also created the space for another tank, which we equipped with a 20,000-ampere rectifier in December 2017, when the revamping project started. This provides 25-micron oxide layers, as requested in particular in the United Kingdom."

"This type of oxidation is very difficult to obtain because it requires the right balance between the time spent in the tank and the acidity degree, so that the surface is not damaged due to excessive exposure. However, it ensures extremely durable and resistant products and it has allowed Sepal to improve the productivity of its line, as well as meeting the quality requirements of international markets," states Trevisan.

In-line hook stripping process

Performing all the coating phases in-line is a significant advantage: it enables to reduce handling and labour and it increases economic efficiency. That is why SAT also equipped Sepal's plant with a hook stripper supplied by Alit (San Bonifacio, Verona), which eliminates the need to remove the hooks from the conveyor and send them to a stripping contractor (**Fig. 5**). The system consists of a tank for the paint stripping product positioned between the unloading and loading stations. On their way from one station to another, the hooks are immersed in the stripping tank while still hanging on the chain. After about 3 minutes, they are cleaned from any paint accumulation that can affect electrostatic generation during application.

Performance and aesthetics 4.0

"In 2015, Sepal was the first factory in Italy to employ the FOX® pre-treatment on all its products; their line could work at a speed of 1-1.2 m per minute. With the implementation of a chrome-free pre-treatment process, the line can now work at a higher speed, up to 1.8 m per minute. Combined with the two coating booths featuring 18 guns each, the modified unloading system that automatically wraps the profiles in packages, and the hook stripping system that has allowed to insource this operation, this has given Sepal extreme versatility and production speed," states Andrea Trevisan.

"Finally, the reproducibility of process phases through the automation and interconnection of the production flow has contributed to ensure very high production and quality standards."

"The example of Sepal proves that remarkable advantages in terms of both aesthetics and finishing quality can be obtained through targeted interventions and small investments on the already existing plants, modified quickly and without stopping production by taking advantage of summer breaks and holidays," says Andrea Trevisan.

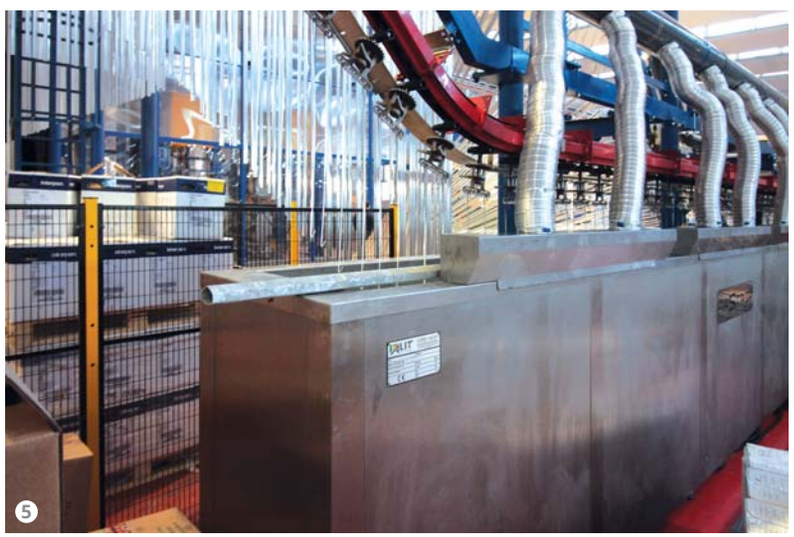

Figure 5: **Alit's hook stripper.**