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Opening photo: Aliplast Poland extrudes, anodises and powder coats aluminium profiles for architecture.



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Aliplast: The choice of a Vertical Coating System for Aluminium Profiles in the Pursuit of Maximum Productivity and Quality

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In all our magazines with a special insert on the finishing of aluminium profiles, intended either for metal architecture applications or for the car and transport industry, the question has arisen as to whether it is more convenient, efficient, and economical to choose a vertical or a horizontal coating system (ref. Opening photo). Aliplast Poland, like many other extruding firms presented on the pages of ipcm®, chose not to choose and to equip its production plant with both vertical and horizontal lines, thus exploiting the process peculiarities of both. With its last investment in a latest generation vertical line designed and installed by SAT (Verona, Italy), dating back to the beginning of 2019, Aliplast raised the number of its coating lines to four, including two horizontal and two vertical ones; the first vertical system, installed in 2011, had been designed by SAT, too.

Aliplast: long-standing expertise in the extrusion and coating of architectural aluminium

Aliplast is one of the European market leaders in the development, marketing, and distribution of high quality



It is more convenient, efficient, and economical to choose a vertical or a horizontal coating system. Aliplast Poland chose not to choose and to equip its production plant with both vertical and horizontal lines”

aluminium systems for windows, doors, sliding elements, curtain walls, and roofing systems. Aliplast Poland (Lublin) was created in 2002 and it belongs to the well-known CORIALIS Group, established in Lokeren (Belgium) in 1984. With time, the Group has made substantial investments in various companies in France (Profile System), UK (Smart Systems), and Serbia (Aliplast Serbia, a subsidiary established two

years ago to enable the company to penetrate the Southern European market with a warehouse, a dedicated office and a horizontal powder coating line). Aliplast’s strategic objective is to increase the comfort and architectural value of buildings through high quality, effective, and customised aluminium systems designed in collaboration with the R&D, marketing, and distribution departments of the various companies belonging to the Group. In 2009, Aliplast Poland moved to its current building in Lublin with the aim of reducing its time-to-market and logistics costs by integrating its whole production flow under one roof. Since 2011, when it installed its first press, the company has also included the subsidiary firm Aliplast Extrusion. “Aliplast Poland’s strategy is to provide high quality profiles with a lead time of just four days, including thermal bridge assembly, CNC machining, and coating. This is the key to our growth,” states Director of Operation Rafal Podlaski (Fig. 1). “And the proof that this is the right strategy is the huge increase in production volumes we have witnessed in the last few years. That is why we needed to install a new high-productivity coating line. After eight



Figure 1: Rafal Podlaski with Alessia Venturi.



Figure 2: Profiles hung onto the anodising line.



Figure 3: The anodising installation.



Figure 4: The sublimation system.



Figure 5: One of the two horizontal painting installation used by Aliplast.

years of experience with a SAT vertical plant, we decided to buy a second one that included all the latest plant innovations developed by this Italian company and was even more powerful than the previous one.”

“Aliplast Poland currently has an extrusion department with three presses, a machining area, four powder coating lines, an anodising line (Figs. 2 and 3) and a sublimation machine for the wood effect decoration (Fig. 4). Our first horizontal line was installed in 2009 and it enabled us to be very flexible and treat profiles, sheets, and accessories with one system (Fig. 5). The first vertical line was installed two years later to have a high productivity plant to devote to profiles alone (Fig. 6); we chose the Italian company SAT as our partner. In 2015, we decided that it was necessary to allocate all our die-cast aluminium coating to a compact horizontal line with a dedicated pre-treatment cycle. On the one hand, a large industrial line was not efficient enough for finishing small workpieces; on the other hand, die-cast aluminium requires a different chemical treatment than extrusions, in order to obtain high quality coatings,” adds Podlaski.

“We have used our first vertical line intensively for eight years, on two shifts a day: last year alone, it coated 2.2 million m² of aluminium. Thanks to the extensive expertise gained with it, we perfectly knew what aspects were to be improved and what system choices were not to be repeated. Therefore, when we turned to SAT again for the installation of a second vertical coating line, we actively collaborated with their designers to make it specifically tailored to our needs. At the same time, SAT’s technology had evolved, too, as proved by their new V-shaped booths and the measures taken in the construction of the drying oven to avoid stagnation of pre-treatment liquids.”

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Figure 6: The first vertical coating line installed back in 2011.

The start of the project

Before making the new investment, Aliplast Poland carried out a small revamping operation to increase the efficiency of the already-existing vertical coating line. “We had to increase the conveyor’s speed to handle the increase in production while waiting for the new line,” explains Rafal Podlaski. “We expanded the drying unit and added a burner to support the original boiler. In this way, we increased the line speed from 1.3 to 1.7 m/min.; in terms of coated aluminium, this resulted in an increase in our daily production by 560-600 m². Meanwhile, together with SAT, we were carrying out the customised, advanced project of a second line, which would have enabled us to further increase our coating capacity and keep up with sales.



Figure 7: The dosing modules of the pre-treatment tanks of the new vertical installation.

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Figure 8: The pre-treatment tunnel is divided into two parts: the initial steps and the alkaline etching process occur on one side, while the acid-based Oxsilan conversion steps are performed on the opposite side.

The first critical issue faced by SAT was the height of the building that was to house the line. Since our production organisation requires that all our painting systems be grouped in the same building to facilitate the work of line and quality controllers, SAT had only 10 to 11 meters of height available below the beam, and not 12 as necessary. The pre-treatment cycle was also improved. The supplier remained Chemetall, but the new line performs a more intensive acid-alkaline process, suitable to meet the demands of the French market; the objective, in fact, was to devote this line



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to the production of profiles for the entire European market. Moreover, whereas the other lines use a titanium/zirconium-based passivation cycle, the surface conversion operation on this new line is done with the Oxsilan technology, highly efficient and with wider tolerances (Fig. 7).”

Technical solutions

The pre-treatment tunnel is unique, because it is divided into two parts (Fig. 8): the initial steps and the alkaline etching process occur on one side, while the acid-based Oxsilan conversion steps are performed on the opposite side.

The conveyor runs for about 1.5 metres out of the tunnel to cover the junction curve between the two parts. In order to improve operating conditions, SAT grouped all heat sources in the same area of the plant, whereas, on the previous line, the application booths manned by operators were located right in the two ovens' heat zones. The conveyor is longer than normal in the section between the pre-treatment and drying stations, in order to facilitate mechanical water drainage from the workpieces and, therefore, the subsequent drying phase. The application booths are SAT's new generation, V-shaped booths (Fig. 9). "In the old U-shaped booths, much kinetic spraying force was needed for optimal coverage and penetration,



Figure 9: The enclosed area containing the two application booth of the new installation.

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because the profiles exposed one face at a time toward the group of guns. In these V-shaped booths, however, the guns are arranged on both profile sides, the powder cloud is very soft, and the parts pass through the plant without the need to rotate (Fig. 10),” observes Rafal Podlaski. “Suction was also improved, as the V-shaped booth’s ducts are located behind the guns, so that overspray suction also contributes to paint the profiles.” Aliplast Poland’s coating booths are equipped with Gema OptiSpray dense phase pumps. “We had already



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replaced the original Venturi injector technology installed on the old line with dense phase pumps – first in one booth and then in the other, in order to compare the qualitative and operational results. I believe that the dense phase spraying process is more stable,” says Podlaski. “The powder speed in the feed tubes is ten times lower; therefore, the coating does not degrade before reaching the nozzle, as there is no air to destroy its particles. By using less kinetic and more electrostatic force, the dense phase also guarantees better penetration in difficult-to-reach areas and Faraday cages (Fig. 11).”



Figure 10: In the V-shaped booths the guns are arranged on both profile sides.



Figure 11: Aliplast Poland's coating booths are equipped with GEMA OptiSpray dense phase pumps.



Figure 12: The touch screen for the complete management of the plant.

As with all its coating lines, Aliplast Poland uses the two V-shaped booths simultaneously: one is devoted to bright colours and the other to the dark ones, so that colour changeovers are even faster. Thanks to their rotating mats, the booths are constantly cleaned during spraying. However, the colour change operations occur differently on these new V-shaped booths and they call for a few manual operations, such as the cleaning of the floor and the guns, which were automatic in the previous version.

This allows for a faster and more flexible cleaning process (Fig. 12).

“We found improvements also in the design of the drying and curing ovens,” states Podlaski. “They are better insulated and they show better, softer, smoother, and more uniform distribution of air, since it comes out from numerous holes in the ovens’ bottoms with the same speed. Therefore, air flows in a fragmented



Figure 13: The revolving doors at the entrance and exit of the drying and curing units.



Figure 14: Anodised profiles.

manner and with a constant flow: this avoids collisions between the profiles and the so-called “snow effect” of powder coatings, which causes dust inclusions on the parts’ surfaces. Gas consumption is lower. Another important design detail is the position of the fans at floor level, which facilitates maintenance. The oven chambers feature rotating doors, an excellent solution because they give the profile time to gel, with very positive effects on the coating quality and the reduction of any dust inclusions (Fig. 13).

For this purpose, we also requested the installation of filters inside the oven to further prevent the “snow effect”. Finally, we invested in an excellent ventilation system in our paintshop to manage correctly the volumes of air intake and outtake, as well as in a good lighting system to help quality control. Quality is our focus, because 70% of

our production is directly or indirectly intended for foreign markets: this leads us to increase controls and reduce waste. That is why we perform checks both on the lines and in our internal laboratory (Fig. 14)."

Aliplast is a Qualicoat member and its coating cycle is Seaside certified. The company offers two colour collections, one with Qualicoat 1 powders (*Life Colours*) and the other with Qualicoat 2 powders (*Timeless Colours*). "Actually, we can apply any tint requested, especially with fine textured finishes: this forces us to always keep 50 tonnes of powder in stock, i.e. about 1400 different coatings," indicates Podlaski. "This is essential to maintain such a short lead time, because, although our suppliers (mainly TIGER and IGP) are very rapid, we would lose one or two days only for the delivery of the painting products."

Conclusions

Aliplast Poland's investment in a second vertical line was driven by an increase in production volumes and sales. "We continue to use the largest horizontal line as a service line, for coating metal sheets, bent profiles, and small lots of maximum 3 m², equal to 2 profiles," states Podlaski. "We are constantly improving our processes. We also intend to expand our building and increase our staff, which currently includes about 700 people. Production must keep up with sales and, besides predicting the extent of their growth, we must equip ourselves to sustain it in the best way (Fig. 15)." ○



Figure 15: The production team led by Rafal Podlaski (far right)