FOCUS ON TECHNOLOGY

The Keys to Colortechnology's Success: Digitalisation Strategy and Pre-Treatment Results Repeatability

Monica Fumagalli ipcm®

Digital transformation is one of the most popular current trends in the manufacturing industry. But what does it actually mean? We visited Colortechnology, a small but innovative company specialising in contract powder coating, which has effectively digitised its pre-treatment and coating processes, thus optimising results and making them repeatable, thanks to a targeted strategy and collaboration with DN Chemicals and Soft Rain.

"SMEs such as ours should never be taken for granted, as they may always surprise you," says Colortechnology owner, Maurizio Medeghini, at the end of our visit to this small, innovative powder coating contractor based in Travagliato (Brescia, Italy). Considered the backbone of the entire production system, SMEs account for 99.91% of all active enterprises in Italy[1] and they are actually crucial for the digital transformation of the Italian industry, which is still struggling to take off[2]. "What many small and medium-sized companies are still lacking is a digitisation strategy," explains Medeghini.

[1] https://blog.osservatori.net/pmi-significato-numeri-innovazione
[2] https://www.econopoly.ilsole24ore.com/2021/04/16/digitalizzazione-pmi

A phase in the preparation of substrates prior to coating: the repeatability of pre-treatment results is one of the keys to Colortechnology Srl's success.

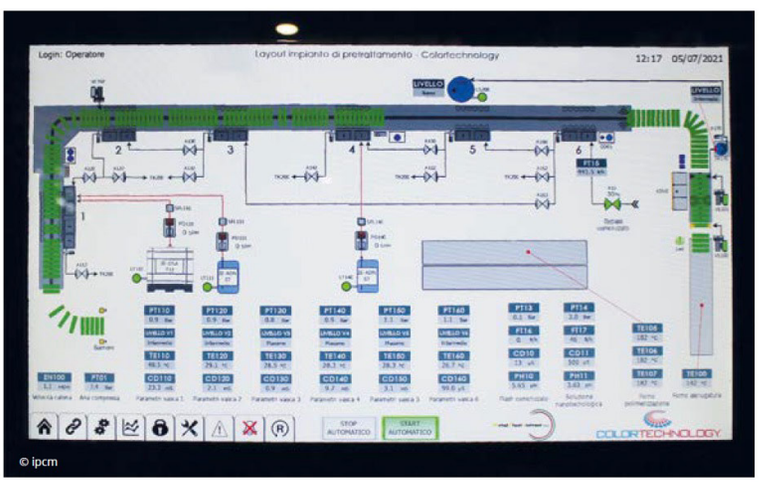
"Digitising one's own company is not simply a matter of obtaining state funding, such as that offered in Italy by the Industry 4.0 plan, to introduce new machinery and connect it to software or dematerialising documents. It should be rather understood as an opportunity to review the entire organisational system and production process and study how these can be improved and renewed. Only with a decisive change in mentality, starting with a new approach to the concept of 'enterprise', can we make the cultural leap that enables firms like ours to grow in terms of digitalisation and become more resilient".

"We are a young company, which I founded in 2004 on the basis of the skills I have acquired over thirty years of experience in the coating industry, and we now employ 15 people. Over these almost twenty years of continuous growth, we have grasped the importance not only of a reliable service and of high product quality, but also of the skills owned by the entire team, the result of experience, preparation, and teamwork, and of attention to optimal process management and the environment. Unfortunately, we have also found that it is sometimes difficult for a company of this size to find the right partners to develop new projects: in some cases, multinational suppliers prefer to serve larger companies, perhaps assuming that a small firm does not have great growth prospects. At least in our case, I can say that they are wrong, and the projects that Colortechnology has carried out and is still carrying out to demonstrate the worth of powder coating are a clear proof of this. Luckily, however, we have also found some reliable partners who have been following us for years, carrying out together with our team the necessary tests and research for the continuous improvement of our production phases. These include DN Chemicals, a group specialising in surface pre-treatment, nanotechnology, and water treatment, which has worked with us for two years to find the best pre-treatment solution for our processes, digitalise our workflow, and integrate it with our growth strategy, and FINGENIUM, a company specialising in arranged finance measures, which supported us in conscious use of public funds."

"A job well done"

Colortechnology specialises in the powder coating of parts for a wide range of sectors. Its customer base is mainly located in North and Central Italy, but there are prospects for expansion into other regions as well. "We mainly coat extruded, die-cast, and moulded aluminium, which accounts for about 85% of our work," states Elena Piccinelli, the company's sales manager, "for firms in the lighting, furniture, automotive, and ACE sectors, to name but a few. Thanks to our sales network, of which we are very proud because it represents a rarity in the contract coating sector, we are aiming to further expand our target markets."

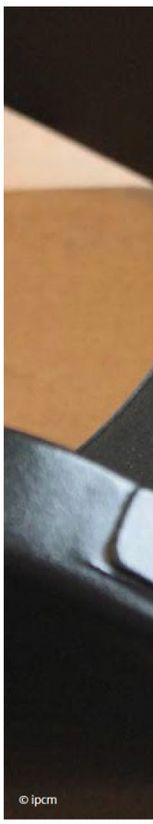
The treated parts have a maximum size of 3000x2000x600 mm. After passing through the pre-treatment tunnel, they reach the automatic



From top to bottom: The pre-treatment tunnel, the Soft Rain King plant, and the display on which all process data can be viewed.

The inside of the coating booth.

A post-retouching phase.



powder application booth equipped with 16 guns, performing up to 5 colour changes per day, and they are then cured in the oven with a maximum temperature of 210 °C. After unloading, they are subjected to strict quality controls before being packed and shipped to customers. "Meeting the demands of our stakeholders is increasingly challenging because they are constantly evolving. Lately, for example, we have noticed a new trend: the products coated by Colortechnology are directly put on our customers' first assembly lines. This is why we have developed a company policy that focusses primarily on the quality of our human resources, whom we support to make them grow within our firm, and on the quality of our increasingly accurate, high-performance, and environmentally friendly service. This is perfectly summarised in one of the phrases that recurs most often in our daily dealings with customers: 'a job well done'."

Colortechnology's entrepreneurial vision is based on a number of essential cornerstones, starting with the quality certification of the company and its processes. "We have been ISO 9001 and 14001 certified since 2013 to guarantee maximum process control. Precision, punctuality, flexibility, and transparency are the other elements that characterise our work and constitute our added value compared with the offer of our competitors. We also have a close-knit team with a strong propensity for experimenting with new applications, which is why we need trusted partners to collaborate with us not only in terms of support, but also and above all in the development of new application solutions." One of these R&D projects concerned the preparation of substrates prior to coating. "We had to find a solution to keep process parameters constant and ensure the repeatability of results. After a long period of testing with DN Chemicals' laboratory, we achieved all our objectives."

A stable pre-treatment process guarantees repeatable results

The previous pre-treatment process involved a 6-stage cycle including alkaline degreasing, two rinses with mains water, multi-metal passivation, a final rinse with demineralised water, and a final evaporator to treat the waste water produced by the pre-treatment process itself. The cycle that DN Chemicals has developed together with the staff of the Brescia-based company, on the other hand, is specifically conceived for the pre-treatment of aluminium. "We have implemented the use of nanotechnology products to make the process as suitable as possible for Colortechnology's needs," says Roberto Rebuffo, Sales Executive at DN Chemicals. "The process now includes

Perfect adhesion of the layer of paint applied to the substrate enhances the quality of the finished product.

alkaline degreasing, two rinses with mains water, deoxidisation with an acid cleaner (particularly suitable for cast aluminium but also effective for extruded aluminium), and three further rinses, i.e. one with mains water, a low-electrical conductivity one (semi-osmosis), and one using osmotic water that is hydraulically atomised inside the pre-treatment tunnel. We have also added a non-chromic nanotechnology conversion stage, performed through atomisation in a new stainless steel unit."
The management of the pre-treatment process and the design, construction, and installation of the spraying devices were entrusted to Metal Plast Sistemi Srl, the owner of the Soft Rain System brand and a partner of DN Chemicals. "A job well done, in my opinion," says Metal Plast Sistemi Srl owner, Andrea Paganelli, "had the primary aim of achieving stable performance throughout the plant's operating hours, in terms of both mechanical adhesion and corrosion resistance. In order to make this ambitious project possible, we carried out a thorough analytical study of water consumption, energy consumption, and disposal costs. This enabled us to create a process with a clearly defined logic, which had the goal of dramatically reducing the use of the existing demineralisation plant while eliminating the use of the final evaporator. This, in turn, made it possible to lower the energy consumption of the pre-treatment line and its related disposal costs."

The coated products are subjected to strict quality controls using feeler gauges (pictured), gloss meters, and spectrophotometers.

The embossed effect of this powder coating applied by Colortechnology.

Pre-treatment 4.0

"The atomisation process," adds Paganelli, "is therefore performed according to constant pre-set parameters, which guarantee the repeatability of the surface degreasing and cleaning results. The combined action of the products used in the previous pre-treatment phases and the nanotechnology products is decisive for the effectiveness of the process. Moreover, the Soft Rain King system can be supplied with different auxiliary accessories according to user needs."
"Thanks to this solution, which we have integrated into our company management system to collect all process data on a single display," emphasises Medeghini, "we can immediately check whether any part has been treated according to the pre-set parameters. However, we additionally chose to install some pressure sensors on the spray pumps because, by our standards, it is not enough for the parts to be treated with a good aqueous solution: it is also necessary to control the application method used and have a detailed overview of consumption – which in the case of the nanotechnology product currently amounts to around 0.7 - 1.0 litres per hour. Thanks to our collaboration with DN Chemicals, we can now manage one of the most important steps in our coating process much better and we have raised the bar in terms of performance, by improving substrate corrosion resistance and paint adhesion. The results of our salt spray tests are in fact over 600 hours, but we are aiming to reach a higher value soon."

Colortechnology's conscious digitalisation

"The process developed for Colortechnology," says André Bernasconi, the Sales Director of DN Chemicals, "is widely used in the coil coating sector, from which we have borrowed and perfected it to adapt it to the preparation of die-cast aluminium surfaces. We made a very careful selection of products that could meet the needs of this innovative coating contractor and our choice fell on Qualicoat approved products, which have the advantage of being immediately ready for use once diluted. We are also developing further nanotechnology conversion products formulated with special molecules that, when deposited on the surface, form a layer having more weight and thus ensure high long-term performance. Nowadays, the development of these products must take into account that each phase of their use will be monitored and integrated into a conscious digitalisation system – exactly what is happening at Colortechnology". "The information we are currently gathering thanks to the digital transformation of our company is an invaluable asset, because it gives us a complete picture of our production process and its possible evolutions, based on which we can assess the next steps to take in order to become even more competitive. That is why I would like to tell both customers and suppliers that one should not underestimate the worth of new ideas and projects, regardless of the size of the company proposing them, and that... SMEs such as ours should never be taken for granted, as they may always surprise you."