

Drying Coatings Quickly

Tyrolia uses a special dip pre-treatment process to ensure that powder coatings adhere to the injection moulded plastic parts of ski bindings. The changeover from an alcohol-based process to an aqueous one required the installation of an efficient dryer.

At HTM Sport GmbH in the Austrian town of Schwechat, a company which is better known under its Tyrolia brand name, a change was needed in the process that preceded the powder coating of its components. Until recently, the global manufacturer of ski bindings used an alcohol-based solution to clean its plastic parts. After the solution had evaporated, it made the powder coating process possible and played a major role in the adhesion of the coating. However, the use of alcohol had a number of disadvantages, including the purchase cost, the strong smell and possible health problems for the company's employees.

The process no longer met the high standards that Tyrolia had set itself as the market leader in the alpine ski bindings sector. It was obvious from the beginning that modifying the process would lead to major changes and that dispensing with the alcohol-based solution and moving to another medium would make the installation of a drying station a necessity.

The team responsible for the process at Tyrolia began looking for an alternative solution, which would ideally be aqueous, and a company that could supply a high-quality

dryer and, at the same time, ensure that the parts could be wetted with the solution first as part of a complete concept. Tyrolia opted for the dryer manufacturer Harter, a company that the team at Tyrolia was already familiar with. Harter and Tyrolia worked together to develop a coating and drying system that specifically met the needs of the ski binding manufacturer. Their approach included a comprehensive series of tests in Harter's technical centre.

Injection moulded plastic parts of different sizes and shapes have to be dried in metal baskets with a maximum load of 25 kilograms. All the parts have undercuts and some have blind holes several centimetres deep which represent a particular challenge for the drying process. The drying machine must be able to dry all the company's components fully and gently. The initial results of the drying tests showed that a drying time of 7 minutes at 60°C was required. However, the tests also demonstrated that, in addition to the water residues in the blind holes, the water remaining on the metal baskets was one of the main problems during and after the drying process. The new ma-

chine would have to overcome this challenge too.

A compact system for dipping and drying

The compact machine that has been installed at Tyrolia consists of a heated dip tank for cleaning the components and a drying unit. Both parts of the system are made up of two stations. The various injection moulded plastic parts arrive simultaneously from the upstream baking oven in two metal baskets at predefined intervals. The two baskets travel on a roller conveyor that runs parallel to the dip tanks and drying chambers until they reach the dip tank, where they automatically stop. The pneumatically operated door of the dip tank opens and both baskets pass into it.

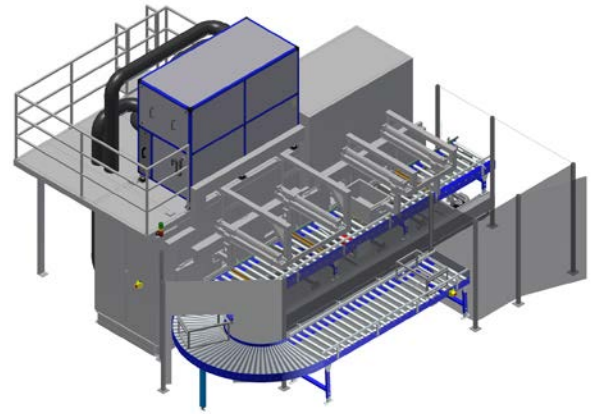
The dipping station has two rotating basket holders with a rotary device. While the baskets are being dipped in the solution, which will not be described in any more detail for reasons of confidentiality, the baskets are turned slowly through 180° at specified intervals.

Following the dipping process, the baskets rotate once more over the tank to drain out any excess water. After this the chamber doors open again automatically and the baskets return to the conveyor which transports them to the next station.

In principle, this process is then repeated, with the only difference being that the second time it is a drying process. Here the two metal baskets containing the dipped plastic parts are stopped automatically and then loaded into the two drying chambers. These also contain a rotating basket holder. At the start of the dry-

Power supply for the Airgenex unit	9.5 kW
Power supply for 4 barrel drying fans	each 1.6 kW
Drying time	Varies depending on the product. A maximum of 4 minutes.
Dwell time in the dip tank	Based on the drying time for each product.
Temperature	60 °C
Throughput	14 to 16 baskets per hour

Key data for the dipping and drying system



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The compact dipping and drying machine. The dehumidification unit is located above the drying chamber to save space.

ing process the baskets are turned slowly and gently through 180°. This empties the water out of the majority of the blind holes and the movement also allows some of the water to drain out of the baskets.

After this, the actual drying process starts. When it has been completed, the metal baskets leave the drying chambers automatically and are transported to a manual unloading area by the roller conveyor.

Going back to the subject of the drying process, the question arises as to how complex parts of this kind can be dried fully in these quantities in only four minutes. The answer lies in the way in which the specialised drying system functions.

Perfectly coordinated: dehumidified air and an air ducting system

Two components are crucial in ensuring that the heat-pump-based condensation drying system developed by Harter has its full impact. One lies at the heart of the dryer and this is the Airgenex dehumidification system. It supplies the drying chambers with extremely dry air. As a result, the moisture on the components is absorbed very quickly by the air and they become dry. The moisture-laden air is cooled and the water condenses. After this the air is heated again and returns to the drying chambers as part of a closed energy circuit. “However, this is not enough to complete the difficult task of drying the parts,” explains Jochen Schumacher from the technical sales department at Harter. “The second decisive factor is the air ducting.” The dry air must go to exactly the point where it can absorb the moisture. In the case of Tyro-

lia, it must pass through the metal baskets containing the injection moulded parts and emerge on the other side. Air naturally follows the path of least resistance, so guiding it in the right direction is one of the two key success factors. A successful drying process relies on the perfect combination of dehumidification and ducting. In Tyrolia’s system, the small rotating movement helps to achieve completely dry parts within a very short time. During this project, Harter was able to make use of its extensive experience of barrel drying solutions from a number of other completed projects.

One controller for all the system components

The entire machine is covered by one PLC. This allows the temperature, the drying and dipping cycles and the speed of the rotation in the dip tank and the dryer to be individually controlled. The controller also monitors the temperature and levels

of the dip tanks. The complete process is displayed on a touch panel. At Tyrolia’s request the control system was designed to allow the machine operator to set the process parameters for all the existing and possible future product ranges individually. With its innovative, customised machine, Tyrolia is well-equipped to meet future challenges. //

Contacts

Harter Oberflächen- und Umwelttechnik GmbH

Stiefenhofen, Germany
Jochen Schumacher, Tel. +49 8383 9223 17
jochen.schumacher@harter-gmbh.de
www.harter-gmbh.de

HTM Sport GmbH

Schwechat, Austria, Stefan Stracke
Tel. +43 01 701790, www.tyrolia.com

About Tyrolia

For more than 80 years, the Tyrolia brand has been developing innovative solutions in the field of ski bindings. The company, which was founded in 1847 as the Wiener Metallwaren, Schnallen- und Maschinenfabrik GmbH, manufactured its first ski binding in 1928. With a production of 1.1 million bindings every year and a 30 percent market share, HTM Sport is now the world market leader. Around 90 percent of its products are exported to 32 countries all over the world. At its two sites in Schwechat near Vienna and in the Czech Republic, Tyrolia employs around 200 people. In 2014, its annual turnover amounted to 43 million euros. In 2001, Tyrolia was the first company in the ski binding sector to receive ISO 9001/2000 certification from TÜV. Ski brands such as Head, Fischer and Elan have been making use of Tyrolia’s expertise and technological knowledge for their products for many years. Kästle, 4FRNT, Kessler, Liberty, Amplid, Armada, Black Crows and Blossom also rely on the quality of the Austrian manufacturer’s bindings. Tyrolia sets new standards of functionality, technology and design and has transformed its ski bindings into high-tech solutions that are skiers’ first choice.