Integrated approach reduces production costs

A new coating center combines powder preparation, feeding, dosing and color change in a closed, fully automated system. This integrated approach leads to increased productivity with consistently high quality and, for the first time, enables the configuration of a fully automated powder coating system.

Michael Topp

Globalization and digitalization increase the competitive pressure in the industry – also in the field of powder coating. Plant availability and productivity must therefore continue to rise. At the same time, end customers are demanding ever more individual products, leading to smaller batches and more frequent color changes. Added to this is the shortage of skilled workers, which is already affecting performance and quality in some countries.

Wagner's new IPS coating center represents an innovative solution for these diverse challenges. It is a fully automated system that enables decisive improvements in the powder coating process. The abbreviation IPS stands for „Integrated Powder System" and reflects the basic concept of the new coating center.
The integrated approach allows to achieve increased productivity while maintaining high quality and ease of operation.

Powder preparation, feeding and dosing are integrated in the new coating center. The possibility of working with two boxes considerably increases the available time interval for the box change. The coating time gained adds up to a significant productivity increase.

In combination with an automatic powder booth, a powder recovery system and guns, a fully automated powder coating system can be configured for the first time.

Constant results thanks to a high degree of automation

At the heart of the coating center, the IPS Master, powder preparation, feeding and dosing are integrated, including an ultrasonic sieve as an important component for good coating quality. The high degree of automation ensures constant process sequences; there are usually no personnel-related fluctuations. While, for example, conventional powder centers have to be cleaned manually by the operator, which exposes him to powder dust and pollutes the surrounding area, the IPS cleaning process runs completely automatically in a closed system.
The cleaning intensity can be adjusted according to the color change. This has a significant effect on the average color change time and allows an easily com-

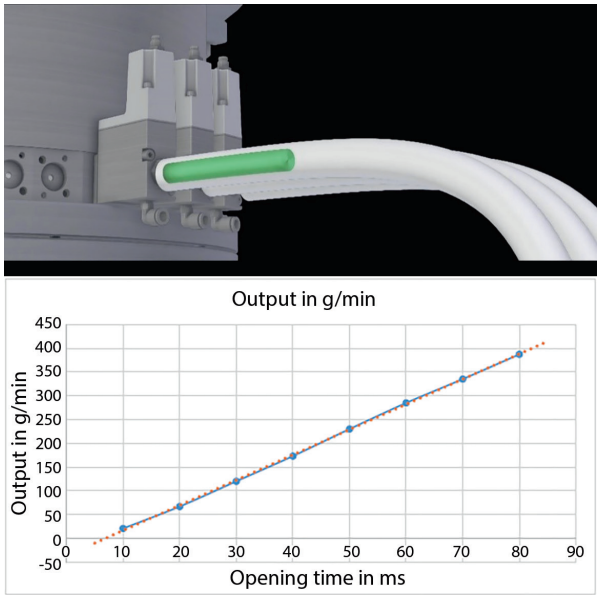
prehensible reduction of several minutes. The automated color change and easy operation via a flexibly positioned touchscreen also reduce the risk of operating errors, which can quickly lead to rejects and renewed cleaning.
Many plant operators are confronted with a shortage of skilled workers. They face the question of how they can achieve consistently high coating quality without experienced specialists or frequent personnel changes. With IPS, manual activities are replaced by automated processes. This produces constant results and makes production planning much easier.

Optimum powder preparation as a basis

In the case of an injector, it is often criticised that the conveying capacity is reduced by wear over several weeks. Pump solutions on the market offer better long-term constancy with a rather complex system. However, the simple design of the injector allows easy maintenance, which, when carried out regularly, also ensures good and constant coating results.
The Integrated Powder System is neither a pump nor an injector. The term Smart Feeding Technology (SFT) comprises several functional units which are responsible as an integrated system for optimum powder preparation and feeding. Fresh powder and recovered powder are introduced into a sealed container without kinetic energy via the Soft Flow system. There the ultrasonic sieve and several level sensors are located with which the powder level can be individually adjusted.
The powder is fluidized and the container is additionally vibrated. The vibration homogenizes the fluid air and thus ensures a more uniform mixing, and minimization of air bubbles, which results in a more homogeneous powder cloud. This in turn has a positive influence on the layer thickness distribution.

Long-term stable and precise powder feeding

Whereas in conventional powder centers the fluid air is directed to the outside and leads to dust or powder loss, it is still used in the IPS container to build up pressure in the container. The energy is used twice, so to speak. This slight overpressure replaces the need of building up a vacuum to suck powder into the injector or pump.



The powder removal takes place at the bottom of the container and is controlled by a dosing valve (top). At the outlet of the dosing valve, the powder is accelerated and brought to the guns by air conveyance. By decoupling powder supply and further transport, up to 400 grams of powder per minute can be conveyed at 30 meters (bottom).

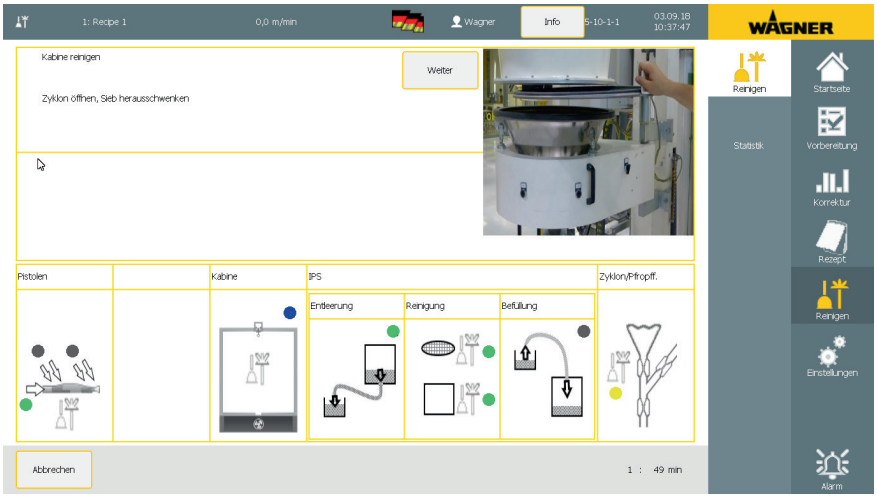
The powder removal takes place at the bottom of the container; the powder quantity is controlled by a dosing valve. At the outlet of the dosing valve, the powder is accelerated and brought to the guns by air conveyance. By decoupling powder supply and further transport, considerably more powder can be conveyed over longer distances – 400 g/min at 30 meters are possible.
SFT works extremely precisely and remains constant for a long time, eliminating the disadvantage of the injector. The dosing valve has a very simple design and significantly reduces maintenance compared to pumps.

Higher system availability

The IPS fresh powder system (Smart Boxer) can accommodate two powder boxes, which reduces the risk of system downtime due to a shortage of powder. Powder deficiency is detected by weight sensors directly at the source, not in the working container.
The ability to work with two boxes, with the system automatically changing from empty to full box, significantly increases the available time interval for changing the box. This eliminates the need to stop the conveyor due to a lack of time to change the box. The resulting coating time adds up to a significant productivity gain.
The feeding process to the guns is also monitored by one sensor per gun. This means that a malfunction is detected immediately and not only by the quality control at the receiving station.

Color change in less than 10 minutes with the highest quality standards

In the St. Margarethen facility of Liosaplast, a leading Swiss company in functional and decorative plastic coating, a modern, highly efficient, computer-controlled plant for pretreatment, liquid and powder coating is located. The compact and flexible system configuration ensures short throughput times. A Power + Free hanging conveyor system transports the parts through the system. The product carriers allow component sizes of up to 3.2 × 2.0 × 0.8 meters and a weight of up to 300 kilograms.
An IPS system from Wagner was installed in April 2018 with the aim of significantly reducing color change time while maintaining consistently high coating and color change quality. After short commissioning and operator training, the color change time could be reduced significantly – even with extreme color changes and the highest quality requirements. „Today we have an average of less than 10 minutes. Before the installation, it was 20 to 25 minutes," confirms Managing Director Roger Gauderon.
In addition to a constant process flow through automation, the Airblade and pulse flushing units used play a decisive role. The operator can also change the intensity depending on the type of color change and thus influence the times.



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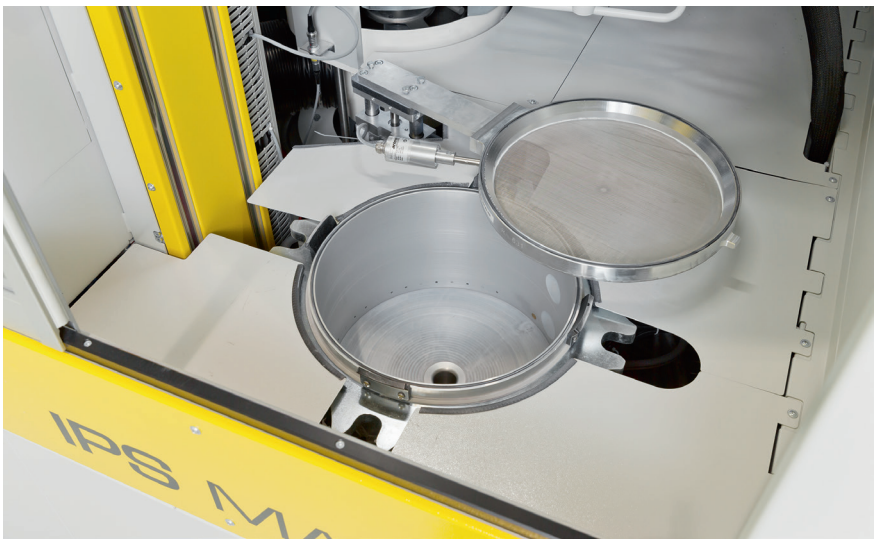
Automated color change and easy operation via a flexible touchscreen reduce the risk of operator errors that can quickly lead to rejects and re-cleaning.



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The fully integrated ultrasonic sieve enables a powder throughput of 85 tons in eight months without changing the sieve. The powder is conveyed to the sieve without kinetic energy and cleaned automatically without contact. This eliminates the risk of mechanical damage such as cracks or changes in sieve tension.

Uniform layer thickness distribution reduces powder consumption

Liosaplast states a better layer thickness distribution after only a short period of operation and estimates this to be 20 micrometers. The new SFT powder feeding concept works in two directions: The high-precision control of the powder dosing produces a very constant powder output, even over a long period of time. The effect is supplemented by the lack of variation in powder output due to a fluctuating powder level, which has to be accepted in open systems due to the hydrostatic pressure of the powder column.

The IPS system is a physically closed system in which fluctuations in the powder level do not alter the powder quantity. It is therefore superior to conventional powder centers and produces a higher quality level in terms of layer thickness distribution. Thus the total powder consumption is reduced in the long run. The system has also proven its worth in the coating of different substrates, powder types and color shades.

8 months without sieve change

The ultrasonic sieve makes a considerable contribution to increasing the coating quality. In recent years, the technology has improved to the extent that vibration generation through dynamic frequency optimization (Cool Sieve) generates a stable process in which, for example, heat spots on the sieve with melting powder are avoided.

The understanding of the dependence of the sieving function on powder type, powder production, sieve mesh width and sieving capacity could also be clarified further, so that the sieving process today functions reliably. However, the service life is often unsatisfactory. In the IPS system, a powder throughput of 85 tons in eight months is possible without changing the sieve. This effect was also confirmed in enamel powder processing.

The powder is conveyed to the sieve by Soft Flow feeding without kinetic energy and is cleaned automatically and without contact. This eliminates the risk of mechanical damage such as cracks or changes in sieve tension.

Ready for production 4.0

High system availability, fewer manual activities, simple operation, assured coating quality, reduced wear and energy consumption all lead to lower production costs. In addition, companies that coat many workpieces every day are ideally prepared with IPS for production 4.0: The coating center can be connected to Wagner's Internet of Things solution Coatify, which, for example, provides graphically enhanced live monitoring of key figures and an interface to the service department. //

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