

IST International Surface Technology

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Spray Pattern Monitoring

Every Droplet in Focus by
Artificial Intelligence

Coating In-House

Greater Flexibility and
Lower Logistics Costs

Overspray-Free Painting

Two Different Colors in the
Same Painting Process



For Heavy-Duty Machines
Color-Stable Coatings

Spray Pattern Monitoring – With Every Droplet in Focus

An innovative, automated control system uses lasers, high-precision optics and artificial intelligence to monitor spray painting processes in-line and in real time. This alternative to visual quality checks is faster, always accurate and more cost-effective in the long term.

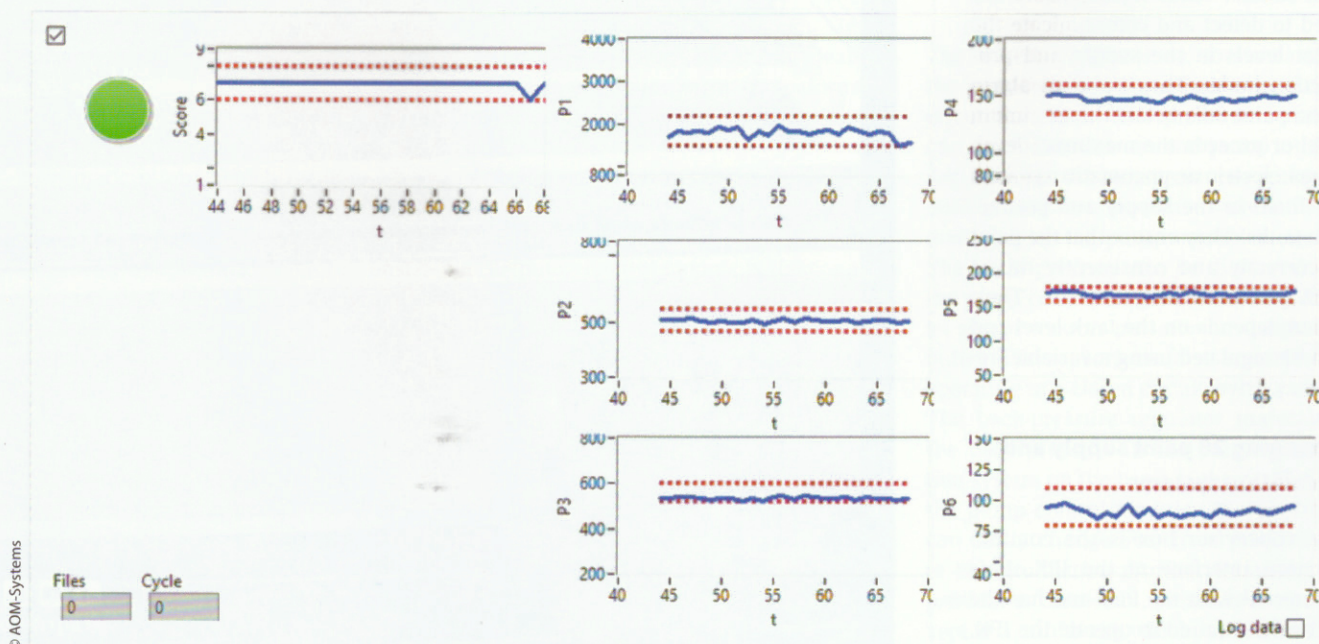
Defects on spray painted surfaces are often discovered too late or not at all despite visual inspections and the use of complex systems. As a result, large numbers of reject parts are produced which have to be disposed of at great expense or undergo extensive reworking. In the worst case scenario, the problem is first identified by the customer, which can lead to even higher additional costs or claims for compensation.

AOM-Systems has developed a new type of automated control system (SpraySpy

ProcessLine) which monitors the coating process in-line and in real time with the use of lasers, high-precision optics and artificial intelligence (AI). The process is based on the light scattering of moving particles. The individual droplets in the spray of paint are measured and the spray quality is calculated by AI-based algorithms (SprayKI). The system is ideal for monitoring sensitive production processes in industries such as surface technology, pharmaceuticals, chemicals, vehicle manufacturing and consumer goods.

Almost instant detection of defects

In a fraction of a second, the system measures and logs the size, velocity and number of droplets. The algorithms use these measurements to generate data that provides plant operators and quality managers with valuable real-time information. For example, they can determine whether the coating meets the quality specifications and whether or not the production phase is going according to plan. This allows problems with the paint or



Screenshot of the control software: If the blue measurements are within the red target limits, the spray process is correct (green signal light).

the application system and contamination in the machinery to be identified at an early stage. This is information that can make the difference between manufacturing high-quality products and producing rejects and can therefore lead to significant cost savings.

The data that is collected is also suitable for use in smart factory applications and enables error patterns to be identified, predictive maintenance to be carried out and an automated control loop for the application parameters to be set up.

Reliable alternative to visual inspections

In many production processes, visual quality checks are still carried out and these involve a great deal of time and effort. With SpraySpy ProcessLine, AOM-Systems has developed an alternative that is quicker, consistently accurate and costs less in the long term.

The monitoring system measures the application of paint on the production line and in real time. The integrated AI func-

tions can even detect deviations of less than two percent from the target value.

If the SprayKI system identifies a problem, it can send an error message to the plant control system or an alarm to the process manager's mobile device. At the same time, all the parameters are stored for the purposes of ongoing quality assurance. The data can be used in-house or sent to a contract manufacturer for quality management purposes.

Digital spray patterns, predictive maintenance and automated control loops

During paint application, the control system can be used, among other things, to produce digital spray patterns, also known as false-colour images, for upstream quality assurance. It can also carry out in-line measurements of the spray quality during the production process. Car manufacturers are already making use of this function to anticipate spray nozzle wear before it occurs with the help of predictive maintenance and to develop

self-regulating systems for application parameters based on artificial intelligence.

For other users, the system records deviations from the target values for the spray jet to identify contaminated or worn equipment or highlight changes in the viscosity of the paint. This makes it possible to identify spray defects during the painting process, rather than waiting until the quality checks of painted and processed parts are carried out. The results are long-term savings in time, materials and costs.

Detecting process problems before coating application

One example of the practical benefits of the control system is provided by a manufacturer of consumer face care products. Random checks of a few of each batch of products coated with special materials were carried out under a microscope to identify any hairline cracks and similar coating defects. Problems of this kind can occur if the coating components become separated in the tank, for example.



Dynamic Contour Detection

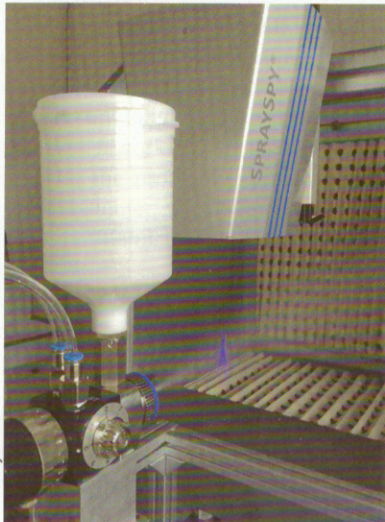
Automate your application process!

This sophisticated solution allows a highly automated level of powder coating. It detects most difficult object shapes and brings each gun in the correct position to coat the complex part.

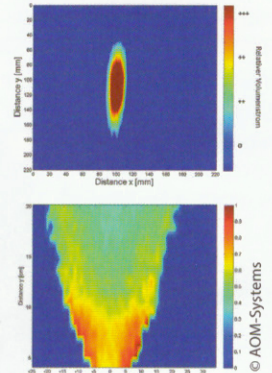
Achieve the highest coating quality!



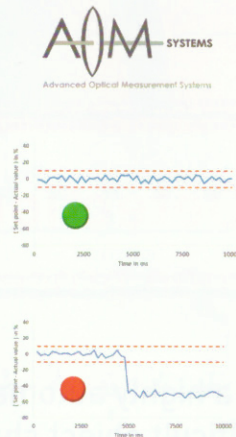
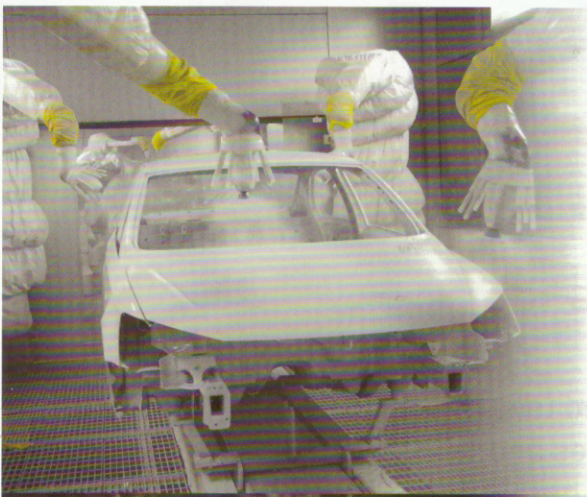
Screenshot from the database: Users can track their measurements on the web in real time.



The laser detects even the smallest deviations from the target values for the spray.



Example of a digital spray pattern: The volume flow is shown as a cross-section of the jet (top). The velocity distribution of the droplets in the spray is recorded along the length of the jet (bottom).



Measuring the variance of an automated spray jet: If the variance is within the tolerance limits, the signal is green. If the variance differs too greatly from the target value, the signal is red. The red/green signal can take the form of a light or a function on the user interface.

If a problem was detected, the entire production batch of several hundred products had to be disposed of. Now, using the AOM-Systems measurement system, the coating process is monitored during application so that action can be taken immediately in the event of problems. During investigations carried out as part of the FAT (factory acceptance test), process errors were discovered while the coating was being applied.

Another practical example of the use of the system comes from the manufacturer Bosch, where a clearly defined minimum quantity of coating material has to be applied to a range of components. In the existing application system, this cannot be guaranteed and so the process operates with a safety factor of up to 20%. The result is a slower and more costly production process, because of the higher proportion of overspray. In addition, the company is making inefficient use of valuable resources. Bosch decided to evaluate the SpraySpy technology during a one-year research project and to develop a new production process. The company was impressed by the results of the trial and is currently integrating the new technology into its production system.

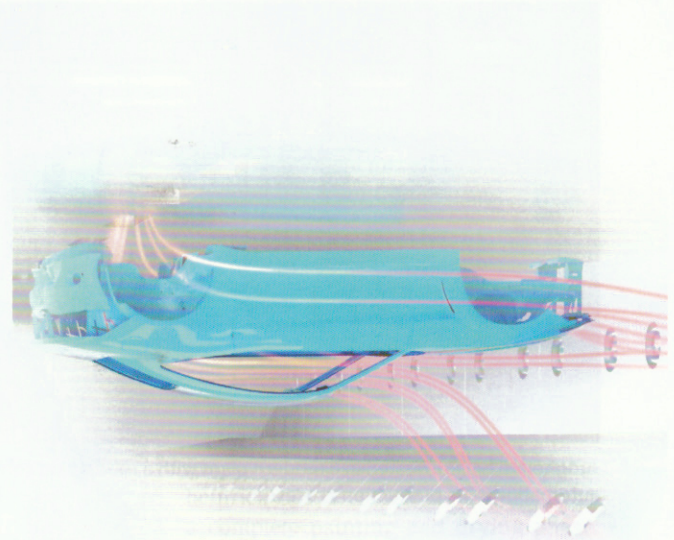
Constant monitoring of production processes and quality

SpraySpy ProcessLine from AOM-Systems provides direct and indirect benefits in all types of processes where time-consuming visual or manual quality checks are currently needed or where the spray application of paint has to be monitored. The system measures the droplet size and velocity, number of droplets and, if required, pulses and volume flow rate on the production line.

The spray quality can easily be monitored and unwanted variations in the spray jet can be detected using SprayKI during the production process. This brings measurable improvements in quality and quickly prevents expensive production faults from occurring. The results include lower production and follow-up costs for users, which means that the investment in the system will pay for itself very quickly. //

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