The smart journal for surface treatments

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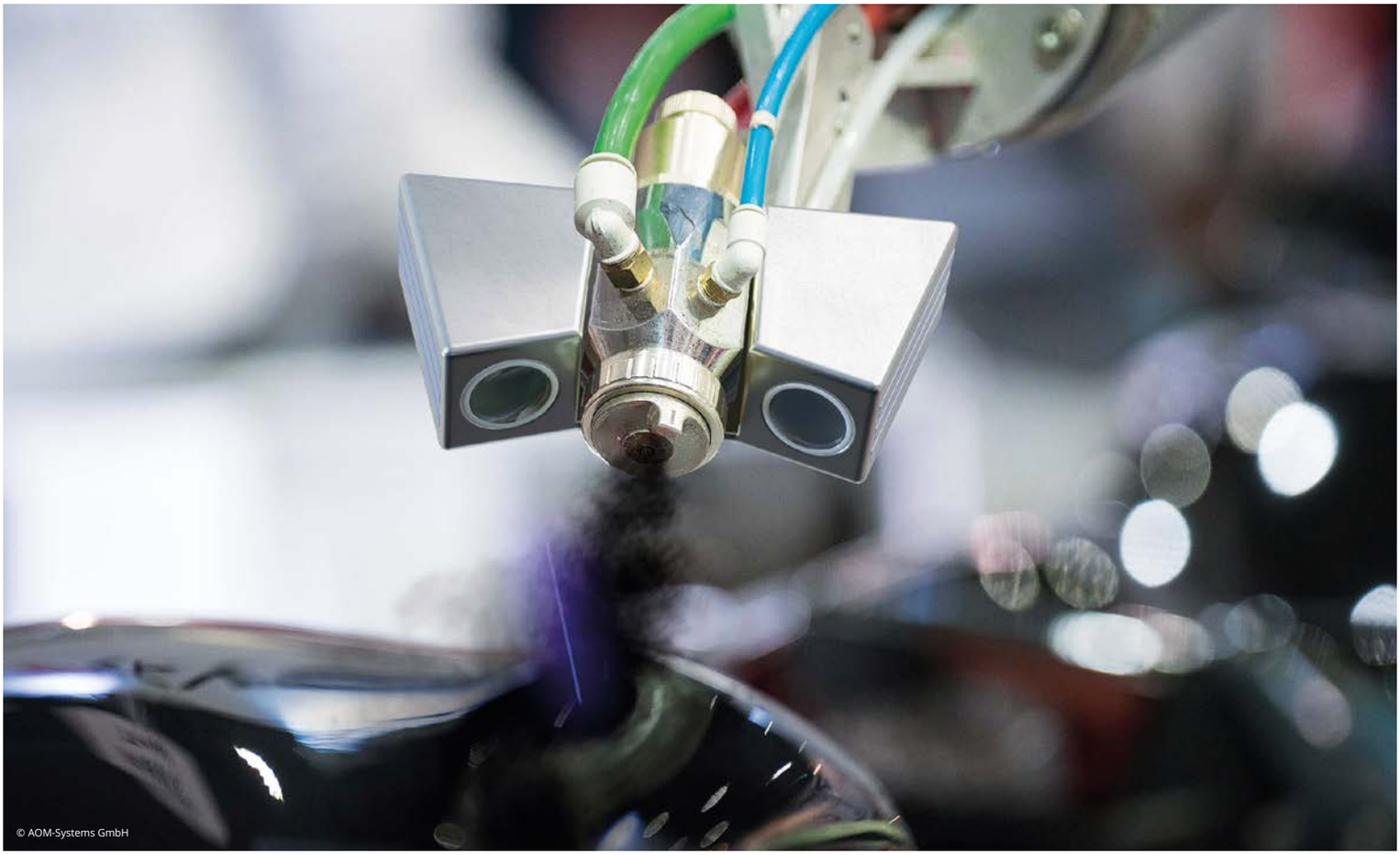

SpraySpy is a miniaturised measuring device that is placed directly on the nozzle. This is a particularly profitable innovation for robotic applications.

INNOVATIONS: PRESENT&FUTURE

AI Measurement of Spray Variance for Reducing Reject Rates

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In many industrial spray processes, surface defects are often detected too late or not at all. This translates in high reject rates, resulting in high follow-up costs and expensive claims for damages. Measurement technology specialist AOM-Systems GmbH offers high-tech solutions to control coating spray quality in real time and use AI for preventive fault detection.

AOM-Systems (Heppenheim, Bergstraße, Germany) has developed an automated control system called SpraySpy ProcessLine, which can monitor coating processes inline and in real time through laser, high-precision optics, and artificial intelligence (AI) technologies. "With our innovative laser-based SpraySpy technology, we can measure individual droplets in a spray jet and assess its quality degree with AI-based algorithms we call SprayAI. This method is based on the light scattering of moving particles and it can

be used for monitoring sensitive production processes in the surface treatment, pharmaceutical, chemical, automotive, and consumer goods industries," states Meiko Hecker, the Sales Manager of AOM-Systems.

Lightning-fast fault detection and valuable data for Industry 4.0

In fractions of a second, the SpraySpy device can measure and record the size and speed of the droplets as well as the flow rate and spray angle in a spray jet. Data is then generated from this through patented algorithms, which provide plant operators and quality managers with valuable production information in real time, e.g. whether the coating process meets its quality specifications or whether the production results are positive or negative. This also enables to detect any faults in the spraying medium or hardware, as well as any system contamination at an early stage. In other words, it produces information that can determine – in a matter of seconds and right during production – whether the parts are to be accepted or rejected, thus guaranteeing significant cost savings. The data obtained can also be used for numerous Industry 4.0 applications, e.g. error pattern recognition, predictive maintenance, and automated control of application parameters.

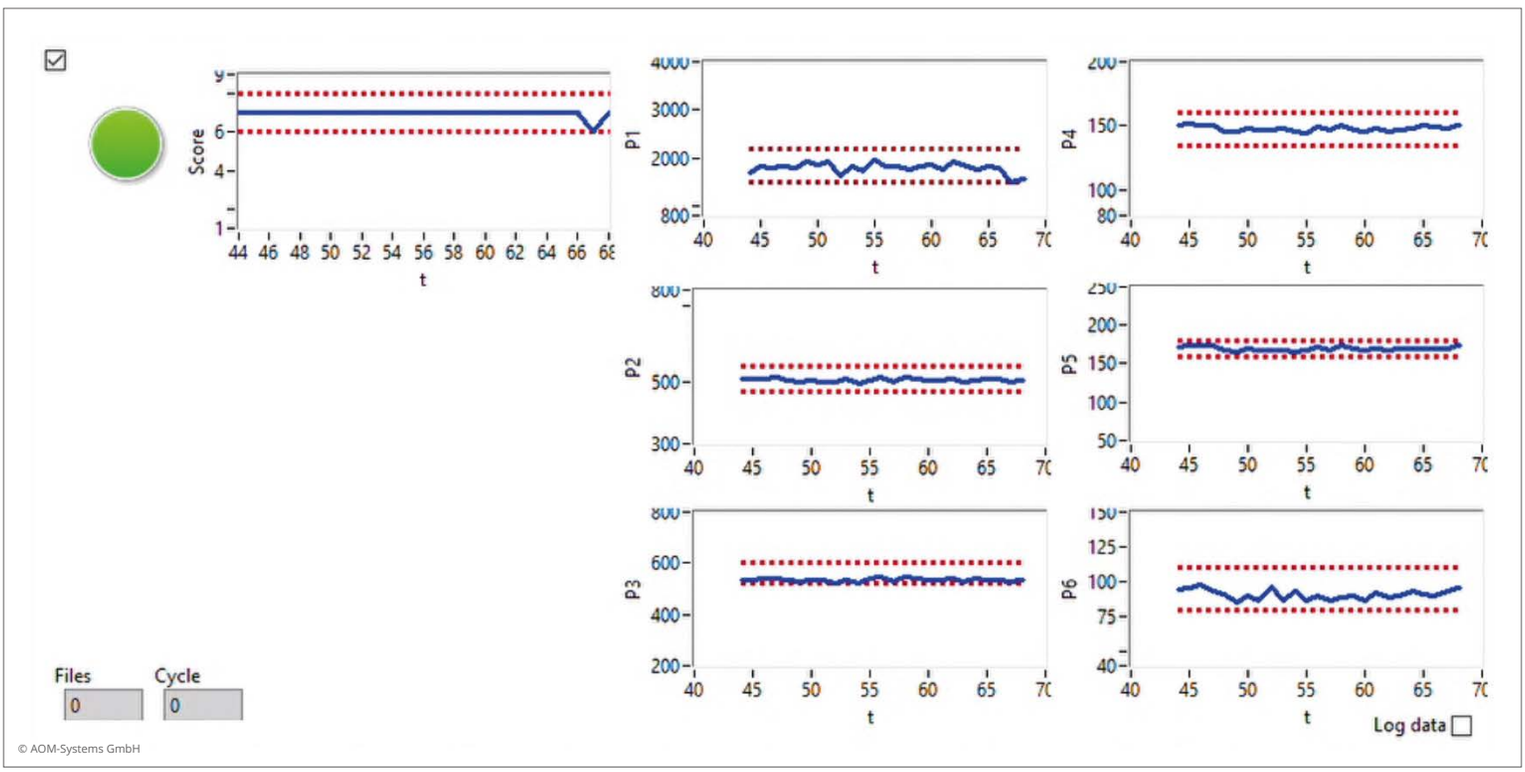
A reliable alternative to visual controls

Quality control is still carried out visually in many production processes, requiring a great deal of manual effort and time. With its SpraySpy ProcessLine, AOM-Systems offers an alternative that is faster, always accurate, and cheaper in the long term.

The SpraySpy ProcessLine system monitors the spray operation inline and in real time and its in-built AI device can detect even the smallest deviations, up to less than 2% from the setpoint. When the SprayAI algorithms detect such a deviation, the device can send an error message to the plant control system or send an alarm to the process operator's mobile device. In addition, all parameters are continuously monitored and stored as a quality assurance measure: this data can in fact used in-house or as a support for quality management at a contract manufacturer.

Successful applications in numerous fields

In the surface treatment sector, SpraySpy ProcessLine can be used in wet coating processes, among other things, to generate spray digital images in the so-called false colour technique, which serve as an upstream quality control step. Alternatively, the system can be used as an inline spray quality measurement device. The first OEMs to implement it are already employing it as a predictive maintenance tool, e.g. to predict nozzle wear and take preventive action, but also to develop self-regulating systems for their application parameters with the help of artificial intelligence. Other firms are using this technology



Screenshot of the control software program. If the blue measures lie within the red setpoint limits, the spraying process is occurring properly (green signal light).

Screenshot of the database. Users can access their measurement results from anywhere and in real time through the internet.

The laser light detects even the smallest deviations from the setpoint in the spray jet.

to detect dirty or worn equipment as well as any deviations in viscosity; for this purpose, deviations from the setpoint are continuously measured. Indeed, thanks to the SpraySpy ProcessLine, spray defects are detected directly in the coating process and not during the inspection of finished parts. This saves time, material, and money in the long term.

An impressive example of the practical benefits of the SpraySpy ProcessLine range can be found at multinational company BOSCH. One of its branches needed to apply a precisely defined minimum amount of coating material for a specific component painting process. This could not be guaranteed by its existing plant, so much so that the process ran with a safety factor of up to 20%. However, this made production slower and more costly due to increased overspray and valuable resources were consumed inefficiently. BOSCH decided to critically test the SpraySpy technology: the result was convincing and the system has been already integrated into a first coating line.

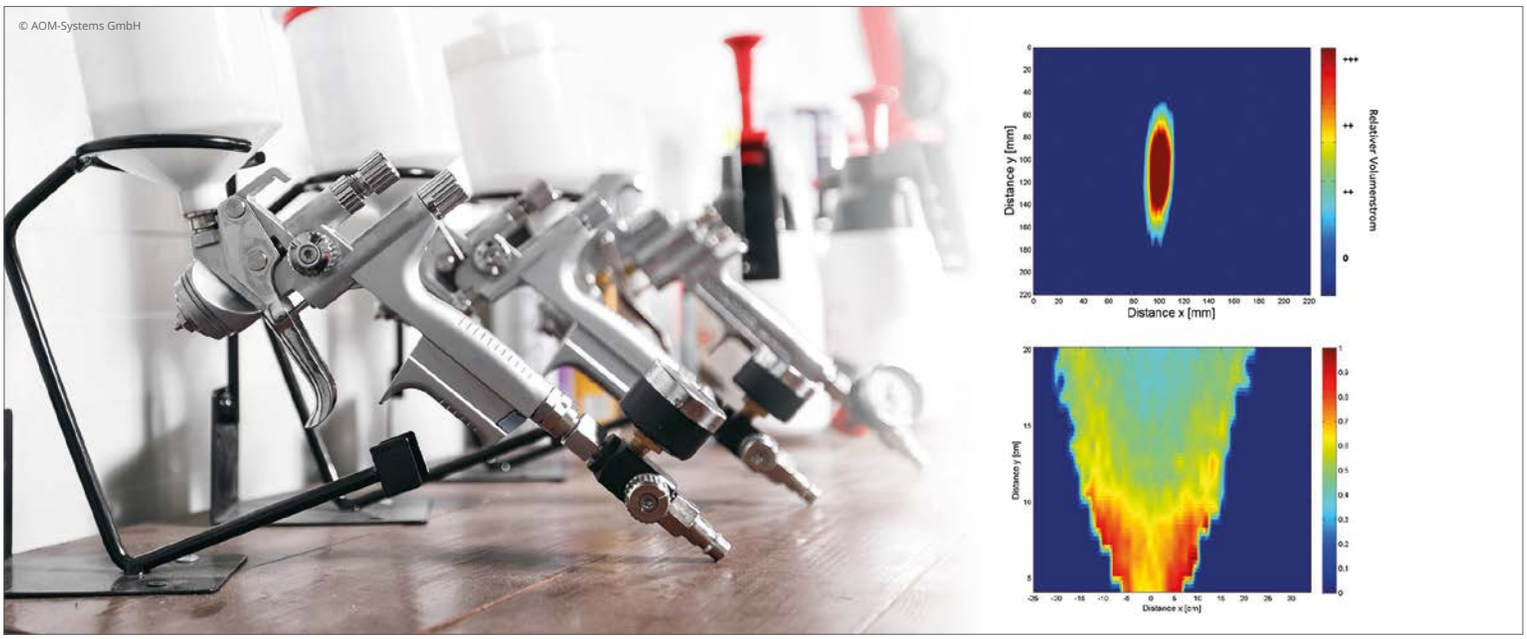
A manufacturer of electronic devices in the personal care sector uses SpraySpy ProcessLine to predict the wear of air caps within an automatic plastic coating application. This client used to have the problem that air caps would get dirty and worn out at irregular intervals: the resulting fault was only noticed a few minutes after the cycle had been completed, which regularly led to the production of considerable amounts of waste. The SpraySpy ProcessLine device installed, on the other hand, detects even the smallest deviations in the quality of the spray jet, so that the user can preventively clean or replace the air caps before the fault occurs. As a result, the "first-run-no-touch" rate has increased significantly.

Production process and quality degree always under control

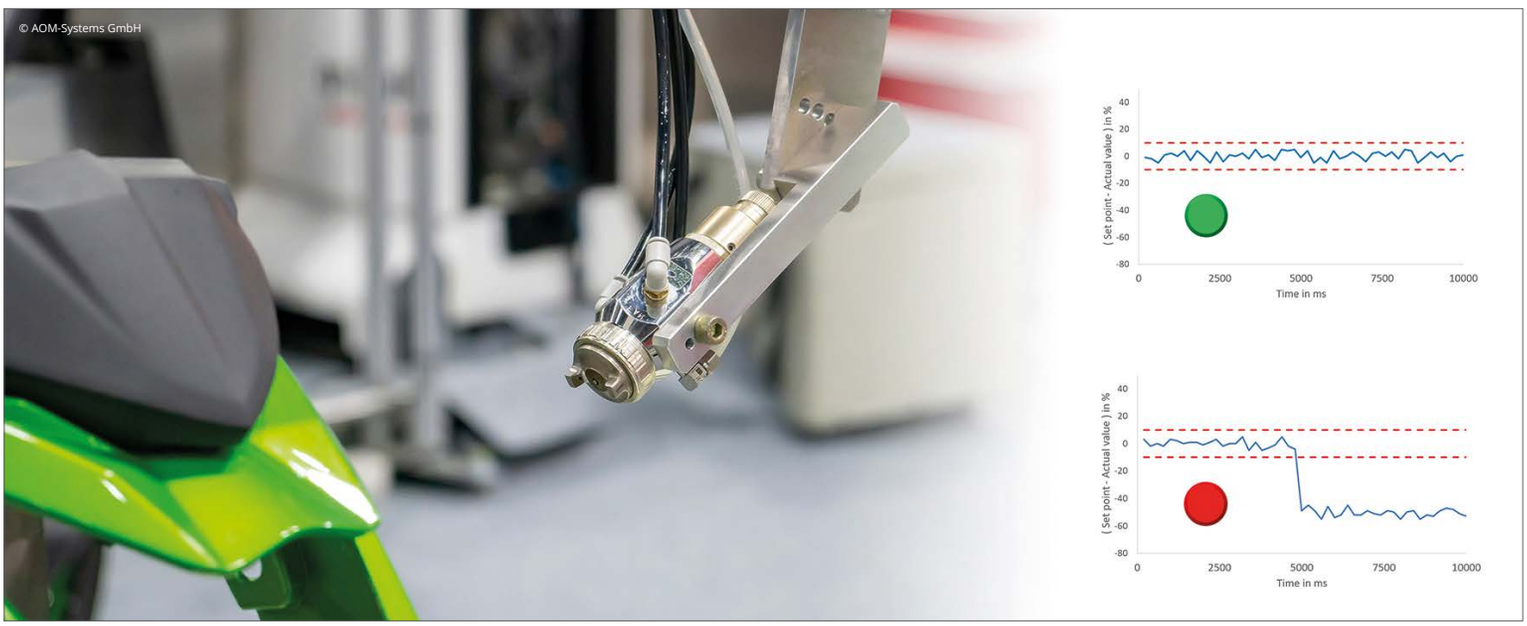
With its SpraySpy ProcessLine range, AOM-Systems can guarantee several direct and indirect benefits wherever elaborate visual or manual quality controls are necessary or a production process with spraying operations is to be monitored. "The easy-to-handle monitoring of the spray quality level and the possibility to detect any unwanted spray variance with the SprayAI algorithms measurably increase process quality and prevent expensive production errors at an early stage. In this way, users reduce their production and follow-

up costs and the investment in these devices pays for itself in a short time," says Meiko Hecker to summarise the advantages brought by SpraySpy.

The next evolution step of the SpraySpy series, which is about to enter the mass production phase, is the miniaturisation of the detection device. The newly developed laser detector, to be attached directly to the spraying robots, will expand the application field of the SpraySpy systems exponentially. With this new, compact device, AOM-Systems will be able to offer a very efficient and user-friendly fault detection system to the users of small quantities of robot-guided pneumatic spray guns. This will ultimately enable every company to make the quality control of its production processes more reliable and safe.



An example of a spray digital image. The image at the top shows the volume flow in the cross-section in the direction transverse to the jet. The image at the bottom shows the velocity distribution of the spray droplets in the direction longitudinal to the jet.



Spray variance measurement in an automatic spraying cycle. Above, the spray variance value lies within the tolerance thresholds. Below, the spray variance deviates too much from the setpoint. The red/green signals can be output via optical signal transmitter or data interface.