



Four machine styles under one roof

Various machine concepts ensure high flexibility in coating applications for one of the largest manufacturers of injection moulded parts

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Joachim Baumann, Managing Director of Sprimag

Dear readers,

New market requirements such as legal regulations, studies or growing awareness of environmental and health issues among consumers are compelling manufacturers in every industry to carefully examine their products and production processes, and react to the new requirements. If a substance is suddenly declared inadmissible, new materials, processes or even complete system components have to be produced as quickly as possible. Page 4 of this Sprimagazine describes what this means, in particular, for the aerosol industry and internal coating using new paints.

Not only is there a need to comply with legal standards in regard to coatings, explosion protection is also one of the most important safety measures with coating systems and driers. If explosion protection is not ensured, there is a risk of a serious accident in the company. To ensure that machines are operated safely, the exhaust air

values must therefore be verified at regular intervals during maintenance work. On page 2 of this issue you can find out what has to be observed here and how the new measuring instruments from Testo are helping in this respect.

For almost 20 years, Sprimag Inc. has been the main supplier of coating systems in North America for one of the world's largest global suppliers of injected molded automotive interior and exterior decorative parts. Thanks to the seven Sprimag systems which comprise four completely different coating system designs, the manufacturer has enormous flexibility in the area of coating in regard to parts sizes, process requirements and style of conveyance. Learn more about this on page 3.

Happy reading!

Joachim Baumann

On tour with the Mühlbauer truck

During its four-week tour through Europe, Mühlbauer brought its inspection solutions including the CIM-12 can inspection machine right to the doorstep of its customers

Although presenting a new product directly at the premises of a customer or interested parties may be part of the everyday business of manufacturers of smaller products, actually doing this is normally rather difficult, especially in the mechanical engineering industry. Mühlbauer made it possible and toured through Europe in summer in order to explain the TEMA Vision technologies in more detail to interested manufacturers of aerosol cans. Focus of the four-week tour in July this year was on the CIM-12 camera inspection machine, a

cooperation between Mühlbauer and Sprimag. Starting in Germany, the truck went to a total of 13 customers in 9 countries and even crossed the English Channel in order to pay a visit to the customers Envases and Ball Aerocan. Live demonstrations, tests and ambitious discussions during the tour have surely prepared the ground for the next generation of the CIM-12 which is tailored even better to the specific demands of modern aerosol can production.

» marketing@sprimag.de



The show truck at the company premises of the aerosol can manufacturer Envases in Port Talbot, UK

MAINTENANCE & SAFETY

Explosive topic – just to make sure

Explosion protection is one of the most important safety measures for coating systems and driers. If explosion protection is not ensured, there is a risk of a serious accident in the company. To ensure that machines are operated safely, the exhaust air values must be verified at regular intervals during maintenance work. Sprimag relies on measuring instruments from the company Testo for these measurements.

Explosions and their devastating consequences are older than mankind. Bitter experience from the past induced clever minds to use research and development to limit the seemingly almost uncontrollable risk of explosions. It is pleasing to see that the number of unintentional explosions is very low nowadays. Sprimag meets current standards by complying with legal regulations, standardized measures and specifications. The following basic principle applies: The top priority for the safety of Sprimag's machines is to prevent explosions. For this reason, an explosive atmosphere must normally be prevented in spray booths and driers. This objective is attained by complying with the calculated and specified minimum exhaust air volumes. Sprimag systematically performs the required measuring tasks using reliable and precise measuring instruments from the company Testo.

"Be sure." This maxim is both the slogan and the key to success of the com-

pany Testo. The company from the Upper Black Forest has been the market leader in the area of different measuring instruments for more than 60 years. These measuring instruments ensure that food is safe, that a heating system functions properly or that compliance is fulfilled during the manufacture of medicinal products. The range of customers extends from the local craft enterprise around the corner through to global pharmaceutical groups.

Sprimag even uses Testo's measuring instruments simultaneously in several areas: To measure, among other things, air flow, temperature, humidity, vacuum, pressure and some other values. DIN EN 1539, based on which the Sprimag driers are also manufactured, therefore stipulates, for example, a repeat test of the exhaust air flow. Practicable measuring solutions are vital for this purpose for the machine operators.

Since explosive mixtures of air and solvent vapors are produced in driers, the minimum exhaust air volume

flow must be determined in such a way that the maximum permissible solvent vapor concentration is not exceeded even under unfavorable operating conditions. This minimum value can be calculated and must be individually determined with every machine or every drier. The prescribed minimum exhaust air value is also then shown again on the type plate of every machine.

A much more difficult task than calculating the (minimum) exhaust air value is the actual measurement on-site since many factors have to be considered in this case. Measurement should therefore only be carried out by trained users. The air volume flow must be measured in this case. This is the product of the flow speed and the channel area. Since the flow speed in the channel cross-section is not the same in practice, an individual point measurement is insufficient for determining the average air speed. Interfering sources such as panels, manifolds, etc. have an effect on the speed profile in the channel. So-called grid measurement must therefore be carried out at several places in the channel.

The exhaust air flow is measured at Sprimag in the temperature range up to 120 °C using the uncomplicated impeller method. Differential pressure measurement is used for driers and ovens with temperatures between 120 °C and 500 °C. Differential pressure measurement is very robust even with dirty media. Its ideal application is suitable in the medium to high speed measuring range and for high utilization temperatures. The measuring range depends on the differential pressure measuring instrument that is used. The pitot tube opening absorbs the total pressure and transfers it to port (a) of the differential pressure measuring instrument. The purely static pressure is absorbed via

lateral holes and transferred to port (b). The resulting differential pressure is the flow-dependent dynamic pressure. The flow-dependent dynamic pressure is evaluated and displayed. We recommend the new testo 400 as mobile analyzers.

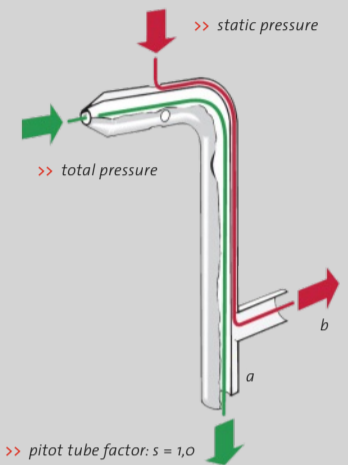
The latest generation of the testo 400 measuring instrument is now used by Sprimag for this purpose. Before the device was finally selected, our engineers and service technicians attended a workshop in Lenzkirch (Germany) where they learnt about the diversity of the Testo devices and their ideal application areas in theory and practice. The conclusion of the participants was overwhelming. "The new testo 400 features technical refinements with a large number of practice-oriented advantages," said Sprimag Engineering Manager Dietmar Ramminger (Metal Packaging Division) praising the new measuring instrument.

Main advantages of the testo 400 compared with previously used systems:

- Differential pressure sensor independent of the position
- Automatic calculation of temperature and absolute pressure (pitot tube measurement)
- Digital probes = calibration without an instrument
- Much easier operation – smartphone operating structure
- Measuring programs
- Reporting function
- Export function

Our employees are very satisfied with the latest generation of the testo 400 since it is very easy and convenient to operate the measuring instruments. They also have many other useful functions which represent genuine added value for both

DIFFERENTIAL PRESSURE MEASUREMENT



- Prandtl pitot tube – calculation of dynamic pressure (differential pressure)
- The non-linear method depends on density (Pabs, °C, %rF)
- Differential pressure increases quadratically with air speed

the Sprimag service employees and our customers. Thanks to this long-term partnership between Testo and Sprimag, we can also continue to offer our joint customers extremely safe machine concepts which always comply with the latest safety regulations if maintained regularly so that a serious "explosion" does not also occur in future.

» dietmar.ramminger@sprimag.de



NEWS

New surface brochure

The new brochure for the area of surfaces describes our wide range of solutions for surface coating: The brochure provides you with a good impression of our portfolio of coating systems and coating solutions, including the accompanying pretreatment and drying processes, as well as the suitable application technology. Whether functional coating or

decorative coating, we will be pleased to provide you with advice regarding your individual coating concept. If you are interested, you can simply download the brochure as a PDF file or ask us for the print version:

» marketing@sprimag.de



Sprimag at Cannex

"Cannex & Fillex – The World Canmaking Congress", is an international meeting point for the entire can and filling industry and all associated technologies and services, and is now also one of the regular events which Sprimag attends. The most recent show, Cannex & Fillex de las Américas 2019, was held from May 1 to 3, 2019 and attracted experts from all over the world to Denver, Colorado, USA. The event was held there for the sixth time. We can look back on a successful event with interesting contacts and will also take part again in the next Cannex in China in 2021.

» marketing@sprimag.de



ANNIVERSARIES 2019

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Achim Simon

25TH ANNIVERSARY

Harald Kern
» Process Engineer

40TH ANNIVERSARY

Thomas Meier
» Head of Financing Department



Sprimag thanks all of these employees for their many years of service and for their long-standing relationship with the company.



One customer – four machine styles *under one roof*

Over the course of the past 19 years, Sprimag Inc. has had the distinguished pleasure of being the featured North American paint line provider to one of the largest global suppliers of injected molded automotive interior and exterior decorative parts. While this supplier is a focused supplier to the largest Japanese car manufacturer, they also provide parts to many other vehicle manufactures, both foreign and domestic.

While providing Sprimag paint lines to the multitude of this suppliers' North American facilities, one corporate plant in particular stands out in a very unique way. The supplier plant located in the central Midwest USA area operates seven Sprimag lines that comprise of four distinctly different paint lines designs. This broad range of machine styles gives the supplier a vast amount of painting flexibility in terms of part sizes, process requirements (interior vs. exterior), level of automation, and style of conveyance. Most of the painting lines were a collaboration between the Sprimag USA and Sprimag Germany offices, and nearly all are completely automated systems with conveyors, coating booths, robotic painting, cure ovens, etc. No matter what the finishing specifications are, there is a coating machine at the supplier's disposal to serve all of their needs. All of the subject coating systems are still in operation today, and they stand as a testimony to the long-term quality of Sprimag equipment.

Flatbed Coating Machine

The first line was a dual-booth Flatbed system for coating application on large flat conveyor trays that measure 500 mm long in direction of travel x 2300 mm wide. The paternoster-type conveyor system allows for loading and unloading at the same end. The flat parts, in this case typically body side molding and rear garnishes, are densely fixtured on the trays and travel through the two separate down-draft/wet-exhaust spray booths before entering an IR pre-

drier, a convection cure oven, and finally through a cooling zone.

Pallet Coating Machine

This highly flexible coating system uses a pallet-based, free-flowing type of roller conveyor to move 800 mm x 800 mm pallets through the robotic coating system. The system is modular and was configured with two spray booths for either single or double coat application on three-dimensional interior and exterior trim parts. Such a free-flowing conveyor works like train tracks with switches, such that parts can be sent down various lanes on a programmed basis, or left to stop and accumulate in other process zones like ovens, cooling zones, or load/unload areas. The benefit to such a layout is that it can be operated with each booth working in parallel to provide a single coating layer each and effectively a "double" production rate, or it can be operated with both booths working in series for two-layer, wet-on-wet coat applications at a standard production rate.

These pallet based systems can be fully automated with RFID pallet tracking systems and afford future expansion options due to their modularity.

Shuttle Booth

The first generation of Sprimag "shuttle" booth was installed with two coating cabins, each of which includes one robot and two shuttles. The operation sequence is to manually load a removable 600 mm x 600 mm pallet and have it "shuttled" into the booth to be coated by a robot which is situated in the middle of two angular positioned shuttles. As one shuttle is being used on the "right" side of the robot

for painting, the other shuttle on the "left" side is being unloaded and re-loaded for the next cycle. The two shuttles alternate operation between being painted or being loaded, and this gives a near 100% utilization of the robot cycle time. Such a system can be used for single or double layer painting (Base + Clear) based on the production requirements of the day.

The second generation of shuttle booth was installed to handle larger 800 mm x 1000 mm pallets and used a previously developed Sprimag curved or "banana" shuttle. A curved shuttle design allows the two shuttles to be truly parallel with each other, as opposed to straight shuttles which need to be "toed in" and set at an angle to each other in order to create a large enough center space for the robot to sit in between. The big advantage to the parallel / curved shuttle approach is to reduce the width of the coating cabin itself. A smaller coating cabin requires less make-up and exhaust air due to the smaller cubic booth volume. Plus the operators have less distance to travel as they work between the two closely oriented shuttle ends, which reduces overall cycle time. And finally, the required factory floor space in the plant is also reduced accordingly by the smaller width booths.

The latest generation of shuttle booth, which is installed at the customers facility in Mexico, can handle 650 mm x 1.400 mm pallets using curved or "banana" shuttles.

Another unique feature of shuttle booth is the use of a gondola-type conveyor that travels through an overhead curing oven. Much like the way a hand-curing gondola travels on a ski-lift cable, or



Curved "Banana" Shuttle

the way a Ferris wheel transports people, the gondola conveyor carries trays of freshly painted parts through a serpentine course through the cure oven. The ovens tend to be vertical and can have multiple levels of back-and-forth chain paths to greatly save floor space. The painted parts are loaded onto the oven transport trays by the shuttle operator, and are then unloaded at a different position opposite the spray area for inspection and packaging.

Power-And-Free Conveyor

The first of two power-and-free conveyor systems was installed in 2016 to allow for painting of large exterior body plastic parts, such as front grills. Both the first system, and the subsequent one installed in 2018, have a part window of 1200 mm wide x 1500 mm high x 400 mm deep. A flexible power-and-free chain conveyor system was selected because it can create un-coupled movement of carriers around the entire system. For example, the carrier

can be physically stopped at the load and unload stations to allow operators to interface with the fixtures, and then moved again at high speed to the next operation. In other parts of the line, the carriers can be spaced at different pitches, to allow for broad-side painting by different robots. And finally the carriers can be rotated 90-degrees and close-packed into an oven for higher part density and smaller oven footprints. As with the pallet conveyor mentioned earlier, the power-and-free carriers can be marked with RFID tags to instruct the painting robot on the fly with the part style (to tell the robot which path program to run) and paint color (to tell the robot to switch from "blue" paint to "red" paint) for the next incoming carrier. Both of the systems included two separate dual-robot/wet-exhaust spray booths for base and clear coat application, as well as a 40-minute cure oven and a 10-minute cooling zone.

» joseph.vanden-eynden@sprimag.com



Flatbed Coating Machine



Pallet Coating Machine



Power-And-Free Conveyor



New coatings for internal can coating

An outlook on the current developments and paint trends in aerosol can coating

From a relatively stable position with established technologies, that we have worked to improve and perfect over 40 years, our industry now faces significant change in the way we formulate an internal coating applied onto a metal packaging to give a protection of the food or cosmetic products filled into a can. From a series of relatively small studies that led to consumer concern we now have a sophisticated industry of chemical assessment and regulatory bodies (NGOs) and these have a big impact on our business.

Market Changes

The single biggest change we have seen in our market began with the French ban on Bisphenol A (BPA) in January 2013 in all food contact packaging for children under the age of 3 that became a complete ban in January 2015. The state of California followed with requirements (the Proposition 65 List) for coatings containing BPA to have warning labels on the packaging from January 2018. For any brand owner, this is simply not an option and with no control over the flow of goods between US states, this effectively means a ban on BPA in the US for food contact coatings. BPA is a core building block of the main epoxy technologies that we rely on for packaging coatings so we had to change the fundamental chemistry of our coatings for these markets.

Together with growing pressure coming from the NGOs (Non-governmental organization) this ban or regulation was the precursor to enforcing scrutiny of the chemicals that are used in coatings for packaging. We see increasing restrictions on what chemicals can be used and sharper labeling with a number of chemicals such as formaldehyde facing further restrictions and others such as NMP (n-methyl pyrrolidone - a solvent used in some internal liners) facing a ban within Europe on use in the future from 2023 or later. NMP is a core solvent of any polyamide-imide (PAM) internal liner and is used extensively in many industries as powerful cleaning solvent because of its efficien-

cy. Regulation is one part of the change in our markets but growing consumer education and concern is also leading brand owners to consider moving to next generation or alternative coating systems as part of their own business strategies. It is consumer concern in response to media stories that ultimately drives NGOs to push for changes in the coating industry. We now have to look beyond these substances of concern to either exclude them entirely or limit their use in our coatings.

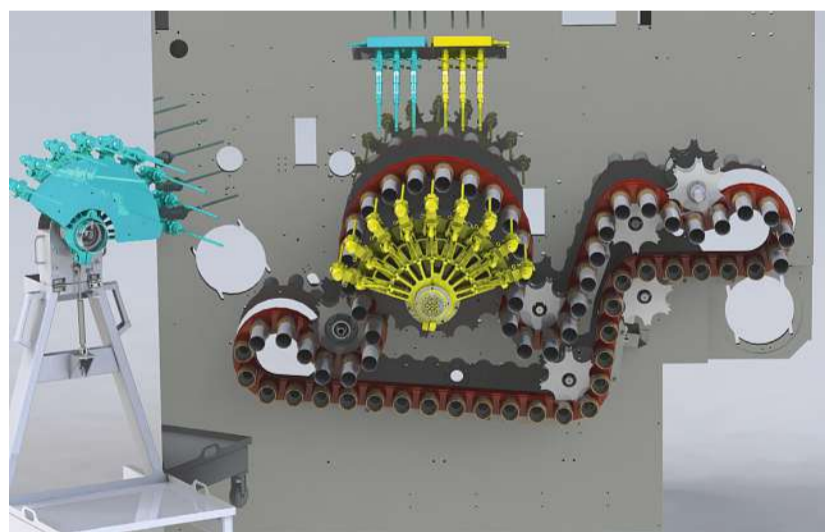
Use of New Paints

New internal coatings have to be based on new back bone technologies that exclude BPA and seek to reduce or eliminate other materials that have or will

placement coatings, we move from low solids two component lacquers to higher solid one component systems which require more changes to line settings.

Changes Regarding the Application Process

In order to be compliant with the new regulations, we need to ensure these chemicals of concern do not find their way into cans placed in the market for consumer use. We run the risk of cross contamination from application equipment when changing from established coatings to new internal lacquers. Additionally, these new lacquers may not be compatible with existing coatings so any contamination may also affect the application and lacquer performance.



The possibility of exchanging the complete spray gun arm including the fittings, paint tubes and paint supply, eliminates a cross contamination of solvents and paints.

have restrictions in the future such as Formaldehyde and NMP. These coatings have fundamentally different chemistries to those that are currently in use and essentially, we find ourselves on a new learning curve. In the case of epoxy replacement material, the coatings are generally similar in terms of core physical properties - viscosity and solid content - and can generally be applied using existing equipment with minimal adjustment to line settings. For PAM re-

This requires a very stringent cleaning process of the application equipment to avoid contamination by removing any traces of the previous coating. In some instances, it makes more economic sense to run separate and dedicated lines and guns for these new materials to eliminate the risk of contamination.

The new coatings also require different cleaning solvents from those used for epoxy and PAM and this increases the complexity further.

These coatings do not require different equipment in order to apply them but there are some differences that need to be taken into account. In general, epoxy replacement liners have got an application viscosity similar to the ones of actual systems meaning that existing equipment settings are acceptable with minor adjustments.

For PAM replacement liners, the physical characteristics of the new lacquers may require more changes to gun and line settings. Newer systems have no requirement to have a premixing stage and lower starting viscosities also mean there is less time required for thinning but they still require preheating and proper stirring. The higher solids content means that without any changes to gun settings, the equipment would deliver too much coating onto the can leading to weaker performance. One way to address this is to lower the material pressure in the guns and at the same time, to increase the atomizing pressure to maintain an efficient spray pattern hence a proper coverage of the metal substrate.

Drying and Heating

In general, for the major coating suppliers internal epoxy and PAM coatings and their replacement liners, the drying process and temperatures remain broadly the same. New coatings have different color tones that require different calibration panels to be used by the operators in the plant as a visual check of the recommended operation range (cure and applied film thickness).

As an industry, we are moving along a learning curve and are gaining more experience of using these new coatings and better understanding their operational performance. We are at the very beginning of a process that, even for established coatings, was not finished even after 40 years.

» A collaboration between Stuart Verney, Global Segment Director at PPG Industries and Sprimag (Marketing)

CALENDAR 2019 / 2020

K Show

The World's No. 1 Trade Fair for Plastics and Rubber
Düsseldorf, Germany
October 16 - 23, 2019,
Hall 4, Booth No. E52
www.k-online.de



FABTECH

Chicago, Illinois (USA)
McCormick Place
November 11 - 14, 2019
Booth No. B10059
www.fabtechexpo.com



ADF & PCD PLD

Paris, France
January 29 - 30, 2020
Booth No. W12
www.adfpdparis.com



PaintExpo

Karlsruhe, Germany
April 21 - 24, 2020
Hall 1, Booth No. 1330
www.paintexpo.com



Metpack

Essen, Germany
May 5 - 9, 2020
Hall 3, Booth No. 3D36
www.metpack.de



IMPRINT



Sprimag
Spritzmaschinenbau GmbH & Co. KG
Henriettenstrasse 90
73230 Kirchheim / Teck,
Telephone: +49 (0) 7021 579-0
Fax: +49 (0) 7021 41760
info@sprimag.de

Managing Editor
Susanne Horn
(Responsible for content)

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