sprimagazine

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The customer magazine of Sprimag Spritzmaschinenbau GmbH & Co. KG

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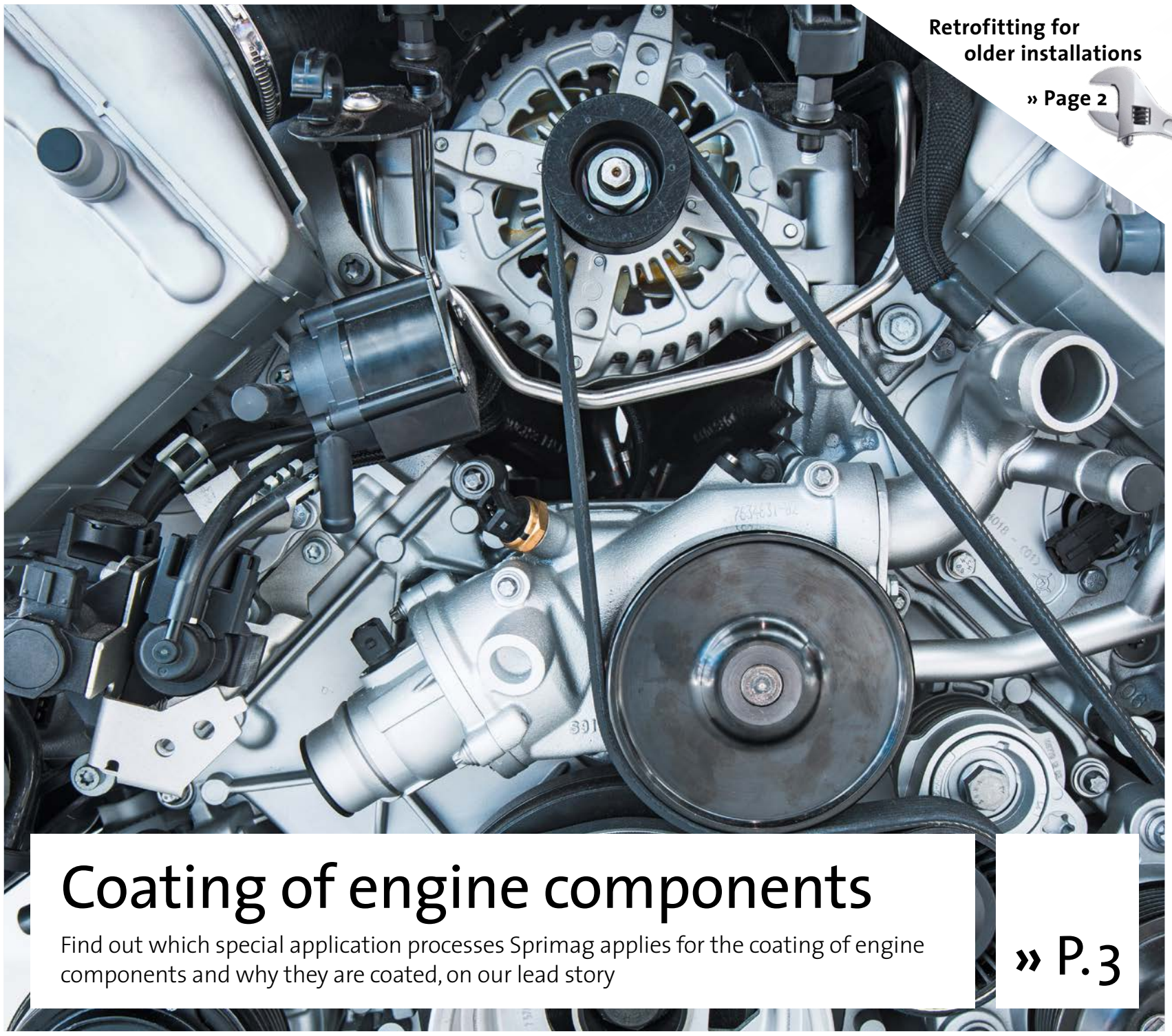

Retrofitting for older installations

» Page 2

Coating of engine components

Find out which special application processes Sprimag applies for the coating of engine components and why they are coated, on our lead story

» P. 3

OVERVIEW

Dear readers,

It is becoming increasingly difficult to begin the year with a reliable forecast. If you follow the evening news, you will quickly understand why there is such uncertainty at many companies. The geopolitical crises and associated uncertainties regarding sales opportunities on the world markets have made companies less willing to invest. This is in conjunction with the turbulence on the currency markets, which can have both positive and negative effects on the economy as a whole.

The mood for 2015 has nevertheless improved somewhat in the first few months. According to the German Association of the Automotive Industry, VDA, the upward trend in the global automobile market will continue even despite the international crises. Growth is being driven in particular by China and the USA.

Western automobile manufacturers are investing more in research and development in order to achieve success in China and further increase their competitive edge. Alongside lightweight vehicle body construction, one area where development has advanced greatly in recent years is engine technology. In addition to e-mobility and the trend towards engine downsizing, there have been further improvements to existing engine components, with the aim of reducing wear, increasing performance, improving protection against corrosion and achieving a reduction in weight or even a reduction in costs. The coating of components plays an important role in these improvements. You can find out about the special methods which Sprimag uses to apply coatings for engine components in our main article on page 3. We also conducted an interesting interview with Rudolf Zechel and Heike Thamerus from Klüber Lubrications on the topic of anti-friction lacquer coating (page 4).

I hope you find it informative and enjoyable to read.

Joachim Baumann,
Managing Director of Sprimag

Joachim Baumann

ecompact

Cost reduction made in Germany

ECOMPACT represents the development of a cost-, space- and energy-optimised coating concept for tubes and aerosol cans

When it comes to reducing costs and, as a result, the sales price of goods and wares, one tends to look towards the domestic automotive industry. This industry uses many opportunities to lower manufacturing costs, including the development of new production and manufacturing sites in distant countries and the use of clever modular strategies.

The modular and strategy also offers the potential to reduce manufacturing costs even to medium-sized companies such as Sprimag, which has committed to keeping its manufacturing location to Germany and has only limited opportunities for transferring production. This is demonstrated by ECOMPACT, the latest development of a small, reduced-power series from Sprimag for the internal coating of tubes and aerosol cans. Besides the fundamental basic data such as system speed (=170 tpm/cpm, 1-row asset transfer), the product management team also prescribed strict cost reductions: Standard assemblies should be used and an identical system platform should be created for the internal coating of tube and aerosol cans. Another important stipulation was that it should be a compact generation of systems which can be used as an exchange system in existing, but mostly compact, older production facilities. As part of a FMEA analysis, all assembly groups were highlighted and, in addition to the core goal of forward-looking error prevention, cost aspects were also included.

The result is a new generation of machines, which rounds off the lower end of the established Sprimag HIL internal coating machine product portfolio. The new HIL-46 aluminium tube internal coating machine and the new HIL-56 aerosol can internal coating machine are enhanced by equally cost-, space- and energy-optimised system components, such as annealing and internal coating dryers. The ECOMPACT line description also reflects the strategic objective. Moreover, the sales strategy is based on a limited range of additional options, so that assembly groups need not be permanently modified or adapted.

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HIL-56 internal coating machine for aerosol cans with small footprint

NEWS + FACTS

Rainer Mendl and Thomas Meier have been named as an authorized signatory

Changes at Sprimag management level

On January 31st, 2015, Philippe Nollet resigned from his post as Commercial Director at Sprimag Spritzmaschinenbau GmbH & Co. KG and left the company on the same day. Joachim Baumann, who up until that point had been Technical Managing Director of the Sales and Technology departments, has taken over management of the Materials Management, Manufacturing, Administration and Personnel departments and is now the sole Managing Director. Rainer Mendl, who has been the Technical Director of the Design and Development departments for a number of years, and who celebrated his 25th anniversary at the company last year, was appointed as an authorized signatory at the same time. Thomas Meier, who had up until then been responsible for the Finance department, has taken over management of the Administration department, and has also been named as an authorized signatory.

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An important industry event in Paris: The Aerosol & Dispensing Forum

Aerosol-Industry Event in Paris

On the 4th and 5th of February 2015 the ninth Aerosol and Dispensing Forum took place in Paris, France. Sprimag attended this important industry event for the aerosol-branch with an own booth. The show was visited by 5,570 international experts and 300 exhibitors. This year, it has been noticed, that the Aerosol and Dispensing Forum is finding increasing acceptance among manufacturers of aerosol cans and has thus developed alongside the established big trade shows like METPACK to another, global industry meeting.

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Improved machine capacity thanks to retrofitting

With retrofitting measures from Sprimag, old systems can meet the current demands of machine capacity, energy efficiency and ease of use

Sprimag coating machines are known for their sturdy, robust and durable design. As such, it is not uncommon to see these machines still in operation after 30, 40 or even 50 years. Despite their high quality, these systems no longer meet current requirements for safety and system availability. However, it is not always necessary to invest in a new system – there are often considerable advantages to retrofitting an old system. The most likely reason to modernize control, drive and automation components is that the components used have been discontinued. In such cases, the supply of replacement parts can no longer be guaranteed, updates are no longer provided and system availability can no longer be ensured. "Using customer-specific modernizations, we ensure that systems continue to be usable in the future, while also increasing machine capacity, boosting energy efficiency and improving ease of use," states Mark Gotzmann, Head of Customer Service at Sprimag, confirming the benefits of retrofitting measures.

Sprimag has successfully retrofitted the internal tube coating systems HIL-42 many times. The original PLC components and drive system found in machines from this series which were built before 1999 have already been discontinued. Sprimag recommends that its customers have their old systems modernized for this reason alone.

The extensive modernization measures for the HIL-42 include replacing the Siemens S5 control system with an up-to-date Siemens S7 or TIA control system. On request, the control system can be equipped with a Safety Integrated feature in order to implement a more efficient safety concept. The Profibus system is replaced with an up-to-date ProfiNet system with local peripherals. In addition, the Atlas Copco drive system is replaced with cutting-edge drive technology from Siemens or Baumüller with the Safety on Board functionality. After these components have been replaced, the entire drive and control technology of the HIL-42 is as good as new. The system is also provided with an up-to date HMI panel with an intuitive interface instead of its existing control panel, meaning that retrofitting also improves system usability.

Sprimag service technicians carry out all retrofitting measures quickly and easily. Because they completely replace the existing control cabinet and its connection cables, they can achieve the highest possible quality of modernization while keeping any disruption to production to a minimum. The extensive conversion measures can often be carried out within one week of maintenance work, so that the loss of production is negligible.

In addition to ensuring that replacement parts are available for many years to come, modernization measures of this type provide the system operator with a manufacturer's warranty for the new components and open up entirely new opportunities for carrying out remote maintenance on the system. Further benefits for the system operator include the standardization of control concepts across systems with different years of manufacture and, last but not least, a significant reduction in storage costs as a result of using up-to-date components in all systems.

Retrofitting measures can be carried out on almost all old Sprimag systems. Sprimag is currently experiencing an increased demand for retrofitting, both for internal coating systems and for surface coating systems, which include Round Table and Chain-on-Edge coating machines.

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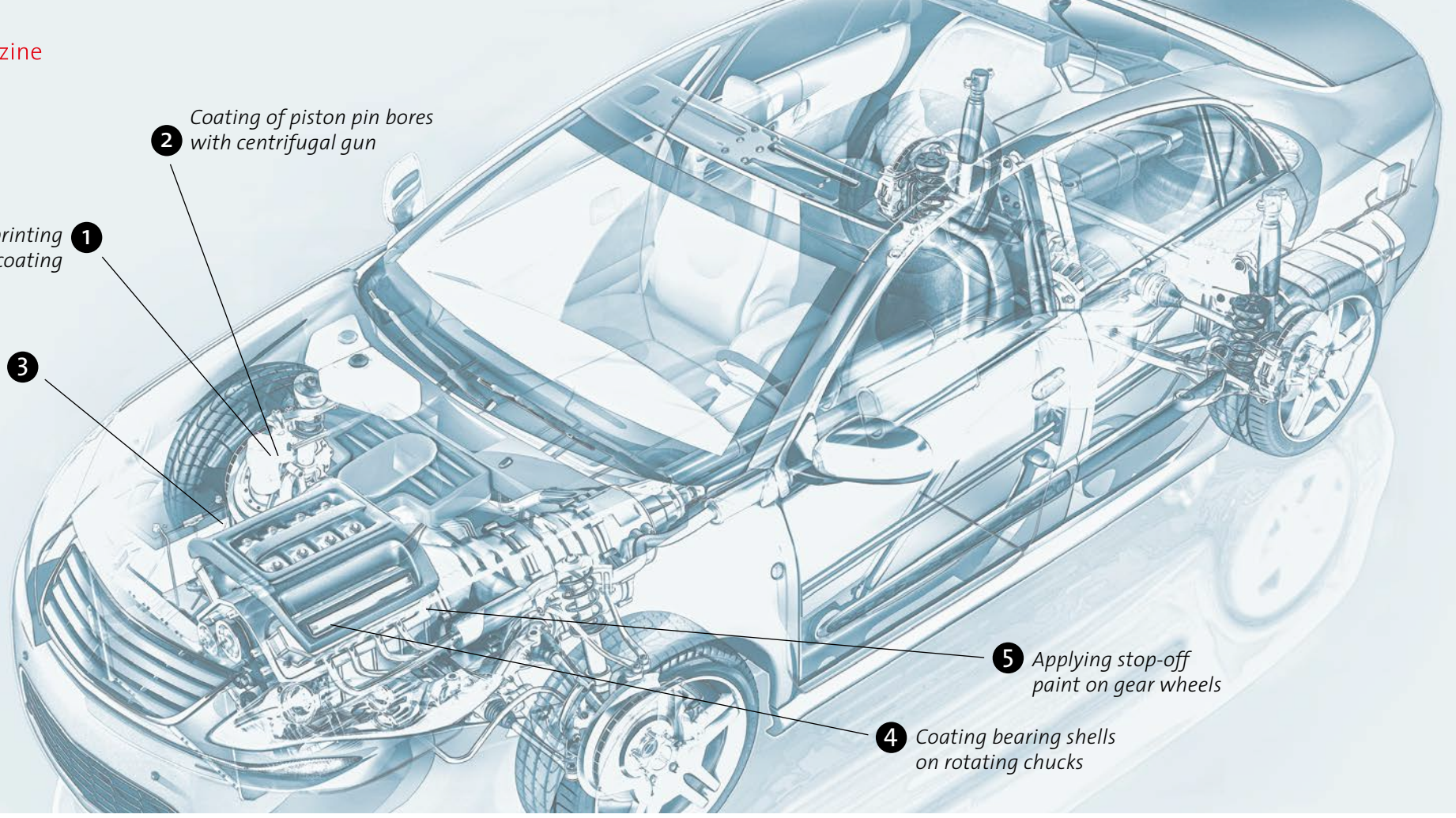
Before

Control system: The replacement of the Siemens S5 control system with an up-to-date Siemens S7 or TIA system, ensures a good machine performance for the future

After

Control panel: The existing control panel is replaced by a modern HMI Panel, thus the system usability is significantly improved

Drive technology: Thanks to the new drive technology, the machine performance can be increased and energy costs are reduced



Special coating methods for modern engines

Sprimag offers special coating methods, using its proprietary application technology, in order to meet the strict requirements on the coating of engine compartment components in automobiles

The car is still the most popular means of transport among the Germans. A great deal of importance is attached not only to engine performance, but also to the appearance of the vehicle: A trendy color, polished rims and an attractively designed interior. It goes without saying that the visible parts of the car often have painted surfaces. However, many of the hidden parts also have coatings which are applied using very special methods, and which often have a purely functional rather than a visual purpose. For example, pistons, connecting rods, bearing shells, vibration dampers, drive components, drive shafts, gearbox parts and even diesel injection pumps are all coated. The reasons for coating components may vary greatly. Reduced wear, increased performance, protection against corrosion, ease of installation, increased operating temperature range, reduced weight and even cost savings thanks to a reduced need for conventional bearing systems or additional lubricants – these are just some of the benefits which can be achieved by coating components. For example, friction losses on modern engines are often reduced by using anti-friction lacquer, which is very effective in improving the lubricant properties of oil films.

1 Silk-screen printing for piston coating

If we start by looking deep inside the (internal combustion) engine, the first thing we see is the pistons, which drive the crankshaft with their smooth stroke movement. These pistons have been coated with anti-friction lacquer for some time. Whereas pneumatically atomizing spray guns were used to do this in the past, silk-screen printing is now the preferred method, obviating the laborious but necessary task of masking the piston bores and the costly cleaning of the spray station. This process allows the pistons to be given an edge-retentive coating at a constant thickness. In contrast to previously used spraying processes, silk-screen printing causes negligible discoloration. It involves using a squeegee to press a highly viscous coating agent through a screen, which rolls over the circumference of the piston, transferring the coating paste onto the piston following the contour of the screen. If the silk-screen system is integrated in the assembly line and equipped with a loading robot, it forms a highly efficient complete system. This silk-screen system has been an established part of the Sprimag product range for years under the name PiCo, derived from Piston Coating.

> » Many of the hidden parts of a car also have coatings which are applied using very special methods. «
>
> Axel Bolowich

2 Centrifugal Gun for special coating requirements

Occasionally, the piston pin bores on the piston also need to be coated. The challenge here is achieving an edge-retentive coating all the way up to the circlip groove. Centrifugal Gun are used to satisfy this requirement, applying the anti-friction lacquer inside the bores using a rapidly rotating centrifuge nozzle (approx. 16,000 – 20,000 rpm). In the past, the stroke movement of the Centrifugal Gun was limited by its large electric motor together with its belt drive. In order to increase its range of application, Sprimag set itself the task of designing a Centrifugal Gun and drive which could be moved by a small, compact robot. The result is the new Sprimag S-541E Centrifugal Gun, which satisfies this special requirement by combining rapidly rotating servomotors with effective centrifuge technology.

3 Rotating extension for high surface performance

The next link in the chain of engine power transmission is the connecting rod, the bore on which may also need to be coated. Two different coating methods can be used to do this: If an edge-retentive coating is more important, the Centrifugal Gun can once again be used. However, if the coating needs to be applied quickly and some overspray on the front panels is permissible, a rotating extension can be used instead. The rotating extension coating method is also often used with asymmetric components, since these cannot be evenly coated using component rotation. This involves setting the external air pipe of a pneumatic spray gun in rotation, with an extension to allow it to coat bores. This diverts the spray jet outwards, allowing it to coat the entire circumference of the bore surface. Not only can the rotating extension coat the entire circumference of bore surfaces or the interior surfaces of cylindrical bodies, it does so with a higher surface performance and insertion depth than that offered by Centrifugal Gun.

4 Variable coating using rotating components

The main bearings for the crankshaft use bearing shells, which nowadays are also coated with anti-friction lacquer. These bearing shells can be coated in the same way, using a rotating extension (if the component is mounted in place) or stationary extensions (if the component is held in a rotating mount). There is currently a slight trend towards rotating components, since they allow a wider range of nozzle variants to be used when setting up the coating system. Sprimag offers an extremely wide range, with a large number of different spray guns in combination with a selection of over 1000 extensions, to satisfy the most diverse coating requirements.

5 Fluid application of stop-off paint

After the crankshaft, the flywheel and the clutch comes the gearbox. The gears in the gearbox are coated with a stop-off paint to ensure that certain sections are left untreated during the hardening process. This requires the accurate application of a highly viscous paste with a high coating thickness – a process performed by a flow gun, which has been successfully used at Sprimag for many years. This involves applying the stop-off paint as a strand (without atomizing) onto the surfaces which require coating. The preferred systems to use for this are small robots or two-axis systems, which can position the flow gun over the slowly rotating component. The surface performance is limited due to the processing conditions.

The variety of possible coatings for subcomponents in the engine compartment is therefore wide – almost as wide as the variety of ways in which these special coatings can be applied. Sprimag offers an extensive range of different systems which have been designed to ideally meet the requirements of coating any metal components, not just those in the engine compartment. Sprimag has been successful in the field of anti-friction coating, as in many other fields, for years, and boasts a great many reference projects. We are constantly developing new application solutions in our in-house Applications Center in order to meet very specific coating requirements. If you have a requirement of this nature, we would be happy to work with you to define a suitable application.

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INTERVIEW

“Anti-friction coating can only be as effective as the application allows.”

Rudolf Zechel, Marketing and Application Engineering, Product Management at Klüber Lubrication München SE & Co. KG

When it comes to anti-friction coating, Sprimag has been working with lubricant manufacturer Klüber Lubrication for years. In addition to joint customer projects, we have already conducted several trials in the field of anti-friction lacquer at our own in-house application centre in Kirchheim-Teck. In the interview, Rudolf Zechel and Heike Thamerus of Klüber Lubrication München SE & Co. KG explain exactly what is behind the special anti-friction coating.

What were the demands that led to the development of the anti-friction lacquer?
Originally, anti-friction lacquer was developed to provide reliable lubrication for the aerospace industry. The industry is known to have to handle extreme temperatures and safety is the first priority. But it wasn't long before people recognized its additional uses in the automotive industry; the clean, dry lubricant has many positive characteristics, such as the constancy of the friction coefficient over a long service life, protection against corrosion and fretting corrosion/tribocorrosion, improved intake and the prevention of Stick-Slip (slipping back), and all this along with substantial hygiene benefits. Thanks to the expertise of Klüber F & E, it is now possible to modify existing anti-friction lacquers for use in many technical areas and applications, or even to offer tailor-made solutions based on new technologies.

What is the functional principle of anti-friction lacquers?
As a rule, the functional principle of anti-friction lacquer is based on transfer lubrication. This means that a small amount of the anti-friction lacquer coating is chalked off when the machine is put into operation and is deposited in the surface roughness of the counter body. After this running-in effect, the anti-friction lacquer coating provides lifetime lubrication within a narrow range of friction coefficients. However, there are also anti-friction lacquers that achieve excellent friction coefficients without significant chalking and, for example, prevent contamination of the belt strap in the safety belt pillar loop. Anti-friction lacquers can guarantee this lifetime lubrication thanks to their optimised friction behaviour and resistance to ambient media, as well as their UV and vacuum resistance.

Which specific demands must be met by an anti-friction lacquer?
The demands on anti-friction lacquer are as diverse as the possible applications and their functional areas. Firstly, the anti-friction lacquer must protect against wear, and usually within a defined friction coefficient window. In order to protect against wear, there needs to be a transmission of force between the surfaces that are in relative movement to each other. These forces are reliably transmitted as friction in the anti-friction lacquer coating. The dry surface frequently helps coated parts, for example in automated assembly, to be separated easily, and prevents sensors in the vicinity of the friction point from being contaminated with lubricant. This secures its role of signal provision. Depending on the base material, it must also be possible to elastically deform the anti-friction lacquer, for example when working with elastomers, without suffering damage. To improve its comfort characteristics, it should also eliminate squeaking noise.

What needs to be taken into account when using anti-friction lacquers?
Anti-friction lacquer can only be as effective as permitted by the application and, in particular, the surface pretreatment. It is therefore very important to carry out intensive degreasing and cleaning of the surfaces before coating, followed by micro-roughening of the surfaces to be coated, using a phosphating or sand-blasting/shot blasting process. The actual application of the anti-friction lacquer can be performed in various ways, namely in mass processing and in spraying or rolling processes online (for example, integrated as a process step in the manufacture of elastomer profiles) or off-line. In all process steps, special hygiene requirements must be observed concerning the absence of dust and dirt in the application environment. Thanks to many years of experience, Klüber is able to provide valuable support at all stages of the process, from selecting the anti-friction lacquer right through to detailed solutions for surface pretreatment and application.

Are there different types of anti-friction lacquer?
As anti-friction lacquers are used on a wide range of substrates (metals, plastics, elastomers) and also for diverse applications (for different temperatures, wear conditions and media influences), there is of course also a variety of differently composed anti-friction lacquers. For example, the anti-friction lacquers differ according to the bonding agent (and thus by criteria such as temperature and chemical resistance, stoving and hardness conditions or flexibility) and according to the quantity and combination of solid lubricants (these influence aspects such as friction coefficient and wear resistance).

There are therefore both inorganic coating systems, which are used at very high temperatures (more than 500 degrees Celsius), and room-temperature drying, highly flexible coating systems, which allow for elongations of more than 200 percent.

Have there been any key developments in anti-friction lacquer over the past few years?
There was a quantum leap in anti-friction lacquer innovation when nanoparticles were developed to strengthen the binder matrix. Due to wide-ranging experiences with speciality lubricants and, in particular, with anti-friction lacquers, Klüber was invited by a renowned automotive supplier to take on the role of anti-friction lacquer development in a multi-technology team project supported by the Federal Ministry of Education and Research. The goal was to make a substantial innovative advance in anti-friction lacquer toughness, component wear protection and service life extension.

Thanks to this innovation, it is now possible to significantly further increase the performance of previously high-wear-resistant protective lacquers in terms of component service life and toughness. Depending on its use, a standard anti-friction lacquer that contains nanoparticles can double to quadruple component service life, compared to traditional high-performance anti-friction lacquer.

Besides the automobile industry, which other areas of application use anti-friction lacquers?
Speciality lubricants have the advantage that they can be used in any area that requires wear protection and/or optimised friction behaviour. It is the same with anti-friction lacquers, whose hygiene benefits offer an additional improvement in comparison with classical lubricants. So, fields of application may be found where not only wear protection but also a dry, non-polluting surface is required or extreme temperatures such as those found in the aerospace technology sector. Furthermore, anti-friction lacquers are used, besides many areas of the automotive industry, in the textile industry, drive and joining technology, and in metal working.

Are there any developments that could replace anti-friction lacquers in future?
Alongside anti-friction lacquers, there are other dry coatings that may affect friction behaviour, such as metallic and ceramic coatings or speciality plastics. The most suitable coating is selected according to the technical and economical requirements of the application. These technologies are used for different applications and cannot be substituted for each other.

We do not foresee that anti-friction lacquers will be replaced by alternative technologies. On the contrary, at present there is a clear trend towards dry lubrication. The importance of anti-friction coated surfaces for construction parts and machine components will increase significantly in the coming year.

Interviewees:

Rudolf Zechel
Marketing and Application Engineering, Product Management

Heike Thamerus
Research and Product Development

ABOUT KLÜBER LUBRICATION

Klüber Lubrication is market leader for speciality lubricants for machines, systems and technical parts and components. In 1929, Theodor Klüber established Klüber Lubrication in Munich. The headquarters still remain in the Bavarian capital today. The company employs 1,980 workers in over 30 countries across the globe.

CALENDAR 2015

Cannex & Fillex Asia Pacific
June 01 – 04, 2015, Guangzhou, China
Sprimag booth 525
spgevents.com/cannex-fillex

NEW COLLEAGUE

New sales representative

The surface coating department sales team is now being actively supported by Mathias Epple, who joined the team on the 1st of March 2015. Mathias has in-depth knowledge of Sprimag coating machine technology, gained through many years working as a design engineer at Sprimag. The qualified industrial mechanic started his training at Sprimag in Kirchheim-Teck in 1988. He completed in-service training in mechanical engineering before moving into mechanical design, and was most recently responsible for standardizing systems in the development department. With his expertise and comprehensive knowledge of a wide variety of system concepts and areas of application, Mathias Epple will be able to provide you with expert advice on attracting investment in new systems.

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IMPRINT

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automated coating systems

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