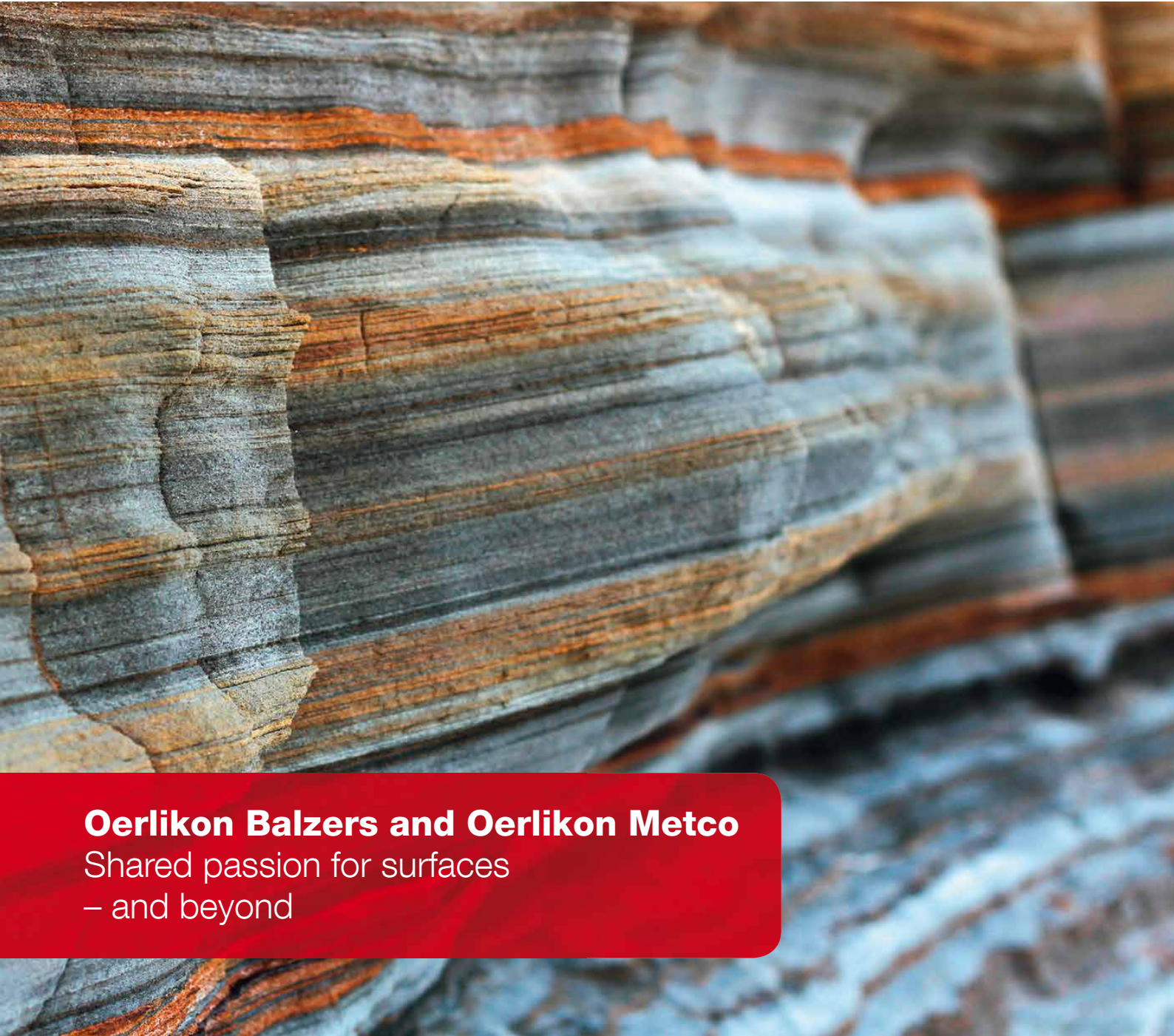


# BEYOND SURFACES



**Oerlikon Balzers and Oerlikon Metco**  
Shared passion for surfaces  
– and beyond

Oerlikon Surface Solutions

**oerlikon**  
balzers

**oerlikon**  
metco



## Dear readers,

In this second issue of BEYOND SURFACES, the customer magazine of the Oerlikon Surface Solutions Segment, we have put the focus on 'Technology & Innovation'. This is because the staff at Oerlikon Balzers and Oerlikon Metco are constantly at work every day to develop new technologies and solutions for you, our customers, so your needs can be met. We want to show you where this passion comes from and how we implement it in market-oriented innovations.

Both brands have been known as pioneers and visionaries in the area of coating technologies right from the time they were founded. But we do not limit ourselves to thin film or thicker layer coatings – the Surface Solutions Segment of the Oerlikon Group is also a decisive player when it comes to new technologies. Exactly what that means will be revealed to you in our rubric 'Viewpoint', where a fascinating interview on the topic of Additive Manufacturing, also known by the term 3D printing, awaits you.

As was the case with the first issue, the second is not only available to you in printed form, but also digitally – as a 'Flipping Book' on the Oerlikon Balzers and Oerlikon Metco websites as well as in PDF form. You can download these and send them to interested colleagues via email, because we're sure you won't want to let go of your own personal copy of BEYOND SURFACES!

Have you successfully mastered an important project using our technologies? Or have you been able to solve a tricky problem with the help of our innovative coating technologies? Then get in touch with our editorial team at [beyond-surfaces@oerlikon.com](mailto:beyond-surfaces@oerlikon.com) and tell us all about it. We are already working on the third issue and you may want to find your story on its glossy pages. In any case, we are always pleased to receive any feedback you would like to provide.

Cordially yours,

**Alessandra Doëll**

Head of Communications

Oerlikon Surface Solutions Segment

### IMPRINT

Beyond Surfaces is the Customer Magazine of the Surface Solutions Segment of the Oerlikon Group and is published twice a year.  
Date of publication:  
25 November 2016

### Publisher

Oerlikon Surface Solutions AG  
Iramalii 18, LI-9496 Balzers  
[www.oerlikon.com/balzers](http://www.oerlikon.com/balzers)  
[www.oerlikon.com/metco](http://www.oerlikon.com/metco)

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### Picture credits

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Automobile Team (p.35); Delphi (p.42);  
all others: Oerlikon Surface Solutions AG

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# Multifaceted collaboration

The Oerlikon Surface Solutions Segment owns about 1'800 issued patents. The innovations that are being brought to market continuously under the two brand names, Oerlikon Balzers and Oerlikon Metco, are the result of intensive in-house research and development, but also of successful collaboration with external partners. These include not only industry-related or university institutes, but also selected customers.

Dr Helmut Rudigier, Chief Technology Officer at Oerlikon Surface Solutions, is no fan of ivory-tower theories or research that only revolves around itself and the company. "Research must be market-oriented. That is the only way it can create a foundation for products that offer sustainability and functions that benefit our customers. Our R&D staff are at the cutting edge of scientific developments, they publish regularly and are members in a wide array of different scientific and practice-oriented bodies. They are invited as experts to international

trade conferences. This guarantees an open mind, as well as interaction with the industry."

The Segment employees engaged in scientific work come from over a dozen nations and are well-connected worldwide. "Many of them come from well-known universities and have been involved in successful top-level research there," explains Helmut Rudigier. And so it is clear that the Surface Solutions Segment employs top-notch specialists who drive forward developments in the areas of new coatings and new materials, but also concerning systems and processes.



"With regard to many of our staff engaged in scientific work, I can say with no exaggeration that they are among the best in their fields."

## Close collaboration with industry-related and university research institutes

In addition to their own development work, the R&D teams also cooperate closely with both industry-oriented and university-affiliated research institutes concerning basic scientific research, especially in the areas of plasma physics, coating technologies and materials sciences. The central focus here is the development of new materials and processes, their chemical and physical properties and potential areas of application.

Both Oerlikon Balzers and Oerlikon Metco also cooperate closely with institutions conducting research in the area of process and surface treatment solutions (with an emphasis on layer development), but also with those which are active in the area of applications, including especially the field of mechanical engineering. Moreover, in various institutes, coating equipment from Oerlikon Balzers and Oerlikon Metco is employed in order to further the institutes' own research work.

"These cooperative relationships, often maintained over many years, are very valuable for us because they al-



allow us to keep our finger on the pulse of science. Current challenges – new materials, new applications, new technologies – are brought to us and we can incorporate them in new developments. Both we and our scientific partners benefit from this – and mainly, of course, so do our customers in industry,” concludes Helmut Rudigier.

### Anticipating trends

Dr Richard Schmid, CTO at Oerlikon Metco, works with a team based at the sites in Wohlen (Switzerland) and Westbury (USA) that is about 100 strong and focuses on refinements and development in the area of thermal spraying. The primary emphasis of their work concerns spraying processes and materials technology. “We pursue two approaches: On the one hand, we have customer-driven development. This is based on certain requirements the customer has for which we want to find a solution. The second driving factor is the market: We observe trends which appear in the market and develop corresponding solutions which we then bring to series-production readiness working with selected customers. Both of these paths are tremendously fruitful for both parties,” explains Richard Schmid.

The R&D team for thin films at Oerlikon Balzers – 120 researchers led by CTO Dr Helmut Rudigier – also has a broad base. “The foundational technology along with material development – in close cooperation with universities – forms the basis for efficient product development, on the one hand. On the other, it is also the foundation for new types of solutions, which makes Oerlikon Balzers an attractive partner for our customers. The prerequisite for this is that our development work be oriented according to the needs and trends evident in the market, preferably even anticipating them. After all, we want to offer our customers in our global customer centres the perfect solution for their current challenge,” explains Helmut Rudigier.

The in-house Cutting Laboratory at the headquarters in Liechtenstein provides support in the area of layer development for precision tools. For further highly specialized applications, such as gear cutting or forming, Oerlikon Balzers maintains partnerships with different institutes – including the Laboratory for Machine Tools of RWTH Aachen University (Germany) or the Institute of Machine Tools and Manufacturing of the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland.

### Cooperation across brands

Since 2014, Oerlikon Balzers and Oerlikon Metco have been joined together under the ‘Surface Solutions Segment’ umbrella and the work of the R&D teams has also changed. A regular exchange of information and joint road maps are today a matter of course. “An especially positive aspect is that this collaboration is truly being implemented at an everyday level. Our staff members exchange information about developments, new findings and results and work together on projects,” explains Helmut Rudigier.

A number of joint solutions for customers have already been developed in this way – in the automotive sector, for example, where cylinder liners are treated with both thermal spray coatings (cylinder bores) and thin films (piston rings). The oil and gas industry also benefits from these cooperative developments: A suitable combination of PVD technology and thermal spraying makes

it possible to achieve improved performance, and at the same time a reduction in wear in gas turbines. The two development chiefs are in agreement: “The two technologies are not in competition with each other. Instead, they are complementary and sometimes allow completely new solutions which ultimately lead to innovative coating, material, process and system developments.” ●

“The two technologies are complementary and sometimes allow completely new solutions.”

Combined expertise

# Collaboration of research and industry for future coating technologies

Coatings are found everywhere and it has become impossible to imagine our modern world without them. Some of them are obvious, but others are hardly recognizable. Dr Pierangelo Gröning is head of the department for 'Modern Materials and Surfaces' as well as president of the research commission of Empa, the Swiss Federal Laboratories for Materials Science and Technology. He deals with coatings day in and day out – and was available to BEYOND SURFACES for an interview.



**Dr Gröning, coatings exhibit some very multifaceted properties which are able to powerfully influence and change our lives. In what direction are the technologies going to be developing in the next few years?**

Take a look around you – everything is coated. The role and significance of coatings has changed dramatically over the course of time. They not only serve aesthetic purposes, but are also often the key to making highly efficient processes and additional functions even possible. A surface is usually in direct contact with the environment. Consider for a moment the surface of a human

being – the skin: It protects the body from external influences, on the one hand, but at the same time, it consists of innumerable sensors which transmit the information gathered to the interior, to our brain. Of course, there is enormous potential for development in the area of technology with regard to such complex processes as these. We can imagine a great deal, but it takes a while to move from research to implementation.

**And may we ask you for a prognosis for the near future?**

I could imagine that organic light emitting diodes will illuminate our environment in the foreseeable future. This will expand the functionality of surfaces by one additional feature – that of light. For example, this would allow walls to become large-area room luminaires. But I could also imagine the use of organic light emitting diodes in flexible screens, as well as a plethora of further application possibilities.

**The development of new coatings and the processes they require is very time consuming and therefore expensive. What does that mean for the industry?**

The effort involved is indeed very great, which is why industry is often not in a position to undertake this alone. Consequently, cooperative ventures, for example, with universities, are sought as a solution. Many developments must take place at a molecular and atomic level. This requires a broad spectrum of expertise in various disciplines. Understandably, no business wants to, or is able to pursue this.

**So, research and industry should work together more closely?**

Yes – and that is already very often the case today. Both sides benefit equally from such collaboration. The step from the laboratory to production is enormous. In manufacturing, you are confronted with a completely different set of challenges than in the lab. Research facilities usually lack the infrastructure because pilot plants – which are test systems that make it possible to model processes in real time – are very expensive. This means that financing is only possible with the support of industry.

**What are the effects of this type of collaboration?**

It enables early data acquisition under the corresponding production conditions and with the inclusion of the necessary production know-how. This has many advantages. For example, the development time is shortened dramatically because a process can be tested under actual conditions very early on.

And, once we're in a position to produce a quantity of one in the requisite quality, then we can also do it for 100, 1'000 and more. Of course, businesses, for their part, must also express interest in a collaboration of this nature.

**What role does an institute like Empa play here?**

Empa endeavours to create innovations and to make the corresponding knowledge and insights gained available to industry. You could say that we function as a bridge between academic research and industry. The new Coating Competence Center on the Empa grounds in Dübendorf near Zurich is an important step, for example, in intensifying the collaboration between research and the coating industry. In coming years, a location of the 'Switzerland Innovation Park' (SIP)

“We can imagine a great deal, but it takes a while to move from research to implementation.”



## FACTS &amp; FIGURES

## INGENIA S3p at Empa's CCC

Empa is currently establishing a 'Coating Competence Center' in Dübendorf. Using several different coating machines, new manufacturing technologies are being developed and refined there. In addition to other partners from industry, Oerlikon Balzers is also supporting the CCC – with an INGENIA S3p plasma coating system. This enables scientists and engineers at the CCC to conduct research on equipment that is currently in use in the industry. They can carry out process steps and sequences which match those used in production and, at the same time – thanks to Empa's analytical laboratory – analyse them using the best possible scientific methods. This allows findings to be made which greatly reduce the investment required for businesses to accomplish so-called 'up-scaling' to industrial equipment.

will be constructed here in Dübendorf on the grounds of a decommissioned airport. The aim is to encourage businesses to locate their research and development departments there so that, in close cooperation with the scientists of Empa, the Swiss Federal Institute of Technology (ETH) and other institutes, insights can be gained from various processes.

### Empa works with many different businesses – even with some that are direct competitors.

That's true. Empa stands for open innovation, which means making the findings gained from research available to everyone. The last refinements in the development of a process or a product must then still be made by the respective business. As Empa, we enjoy a reputation for the best in professionalism – and that is a plus for us in this sensitive area as well. Trust plays a great role here and forms the basis for good cooperation.

### What benefits does the end user actually derive from the new coating technologies on which industry and Empa work?

There are several. For example, coatings are able to increase the service

life of a product enormously. The area of 'printed electronics', or electronic components which are produced by means of gravure, offset or flexographic printing processes, also offers tremendous potential. This could result in many products becoming significantly less expensive. Coating technologies are also producing new possibilities in medicine such as in the use of coated, high-performance synthetics as implants. In contrast to conventional implants made of metal alloys, these are radio-lucent. This makes examinations to track the healing process much easier than is currently the case.

### What makes a technology a 'good' technology?

A good technology is able to meet needs that you previously didn't know existed. A fitting example of this is the mobile phone. Who would have thought a number of years ago that one day it would be important to be able to use the telephone in any situation? Or to take pictures with a telephone? Initially, this was considered by many to be completely absurd, but today it's totally normal for all of us! Developments of this nature are always unpredictable.



### What would you like to see personally and in your role as a researcher for the future of technology?

My greatest desire is for mankind to be able to keep pace with technology, both intellectually and culturally. This is of crucial importance, in my opinion. As a responsible researcher, you have to ask yourself the question: "What is possible in the laboratory? And how much of that should be taken to the outside?" Let's take the example of lengthening life – does this make sense? And if yes, then for whom? All of our research, developments and refinements, of course, always entail questions concerning social issues. Those involved in any innovation must be aware of this responsibility.

### Dr Gröning, thank you for this interview! ●



## COMMENT COLUMN

## Enabling highly efficient processes

### Dr Helmut Rudigier, as the Chief Technology Officer at Oerlikon Surface Solutions, you have been involved in the development of new coatings now for decades. What areas are the main focus of your work?

The main issue our coatings are always concerned with is how to enable highly efficient processes, for example, through wear protection or by reducing friction. To do so, a specific effect is achieved by modifying the surface or improving it with a coating or in some cases an additional treatment so that the underlying body is protected from external influences. Dr Gröning mentioned the human skin in his interview, and that is a good example, because just like a 'coating', it, too, protects our body from friction or chemical influences and bacteria. Our coatings work like skin: They protect the covered body against external influences and enable applications that would not be possible without these coatings.

### How do you implement your own research results, and those of others, at Oerlikon Surface Solutions?

Our coatings are made for engine components, among other things, where they reduce friction, resulting in greater fuel efficiency. Or they extend the service life of turbines or industrial tools, meaning these can be employed more efficiently and resources are conserved. However, our newest developments go one step further and enable additional functions. One example of this would be our ePD technology – an environmentally friendly coating method for obtaining a chrome look in plastic parts. The ePD coating can have various colours and can also be transparent for light or signals, which opens up totally new possibilities for designers, for instance in the automotive industry.

### And what will the coatings of the future look like for Oerlikon Surface Solutions?

An interesting and attractive area is that of the so-called 'self-healing' coatings, which are able to repair mechanical damage to their surfaces on their own. Our coating materials will increasingly possess 'self-healing' properties in the future. And here is one more fascinating field: In the future, a component and its coating will no longer be seen as two separate parts – instead, the one will be considered an integral part of the other. Their interaction will be matched and coordinated, opening up new design possibilities for savings in materials.

### Dr Rudigier, thank you for this interview!

Successful model



# When Mother Nature knows best

It may be the world's most versatile coating. It insulates, cools, water-proofs, and kills germs, and it blocks the sun and enables your sense of touch. But no one designed our skin. Instead, over millions of years, skin gradually changed to help humans – and the animals that came before us – adapt to the elements and thrive in an ever-changing world.

by Mark Pearl

Versatile surfaces abound in plants and animals, and they deliver extraordinary performance tailored to the job at hand. Geckos use velcro-like structures on their feet to walk up walls. Carnivorous pitcher plants coat their flowers with a ridged, nectar-laden surface so slippery that insects slide inside to their doom. Tooth enamel lets us crack a walnut in our teeth and emerge with our smile intact.

“Interactions at the surface control life,” says Dr Alex Dommann, a materials scientist who heads the ‘Materials meet Life’ department at Empa, the Swiss Federal Laboratories for Materials Science and Technology. “And nature’s strategies,” he says, “can inspire new surface technologies beyond any yet invented.”

Special coatings can make materials last longer, perform more effectively, or simply look better. Such properties are so essential that an entire discipline of surface engineering now provides critical support for the aerospace, automotive, construction, power generation and biomedical industries.



A hard shell protects the sea turtle from its enemies. Still, it is designed in such a way that the animal can swim and manoeuvre well underwater. The coatings made by Oerlikon Surface Solutions are flexible in a similar fashion: They protect turbines in hydroelectric plants from wear and erosion, for example, and at the same time enable almost completely friction-free movement of the turbine blades – and that optimizes energy production.

### Using nature's strategies to make better products

Surfaces in nature can help the tissue underneath – and the organism – function well in an extreme environment. Desert plants survive long periods of extreme aridity with the help of waxy surfaces and adjustable pores that control how much water escapes into the air. Similarly, turbines in power plants work most efficiently around hot gas at high pressure. But if it gets too hot for too long, their blades, which are made from superalloys, can react with oxygen, corrode and fail. A protective coating that survives blast-furnace conditions keeps oxygen from diffusing in and corroding the turbine blades. This enables the turbine to last longer and work better.

In some cases, surfaces can be designed through biomimicry – by imitating the molecular strategies that animals and plants employ. “If you wanted to make a coating that repels water, you could investigate the lotus plant,” says Helmut Rudigier, the Chief Technology Officer

of the Oerlikon Surface Solutions Segment. “Studying how plants control gas flow into a leaf could help scientists design new types of coatings that restrict the diffusion of gases,” Dommann adds.

### Changing how a material interacts with its environment

Surface coatings can endow materials with properties the bulk material underneath does not possess. Placing a silver-imbued coating on titanium bone-repair screws, for example, can prevent deep infections after surgery because silver is a potent antibacterial agent. “Coatings offer the possibility of changing how a material interacts with its environment,” Dommann says.

Most often, however, studying nature reveals strategies that materials scientists can pursue to develop new coatings. Synthetic surface coatings, unlike human skin, have traditionally offered one function and one func-

tion only. “But in nature a coating has a lot of different functionalities at the same time,” Dommann says.

Gear surfaces in a race car's gearbox, for example, should be hard to enable them to transfer force efficiently and with the required durability. Building them with tungsten carbide takes care of that. But they should also slide off one another easily to reduce friction and transfer maximal power to the drivetrain. Tribological coatings – coatings that reduce friction – help. To make gears slip, engineers layer in graphite, a softer, more slippery material, into the gear's surface coating. The result is a stable but low-friction gearbox that's used in Formula 1 cars.

### Vision for the future: smart coatings

Nature's surfaces can often adapt to changing circumstances, making almost every coating on plants or animals a smart coating. If you get a scratch on your skin, your body activates wound-healing processes to

close up the scratch and replace the damaged tissue. Industrial surface solutions traditionally have not been so adaptable, but look for them to catch up in the years to come. Just think of adaptive airplane wings that shapeshift and become rougher to create the drag needed during takeoff. The pilot would no longer have to adjust flaps and winglets to get the plane off the ground, and the wings would adjust during flight to become smoother and aerodynamic. ●





Left: Emine Bakan, OMYPA winner in 2013, at Forschungszentrum Jülich, Germany.  
Right: Amanda Wang, presenting her thesis at ITSC 2016 in Shanghai, China.

#### Oerlikon Metco Young Professionals Award (OMYPA)

# Attract bright talent into the industry

To the Oerlikon Surface Solutions Segment, social responsibility also means commitment to the next generation. By sponsoring the Young Professionals Award, Oerlikon Metco supports young individuals at universities to inspire future innovative scientists worldwide to prosper in surface technology endeavors. BEYOND SURFACES met Emine Bakan, who won the award in 2013, and this year's award recipient Amanda Wang, and asked them about the impact the OMYPA has had in their professional lives.

The Oerlikon Metco Young Professionals Award (OMYPA) has been given annually to bright individuals who show promise in contributing to innovations in surface engineering. Presented since 2011 at the International Thermal Spray Conference (ITSC), it is granted to exceptional university students who demonstrate significant accomplishments in the field. "It is very important to attract young talent from universities and motivate them to participate in our industry," said Dr Richard Schmid, CTO at Oerlikon Metco. "They represent our future and bring fresh ideas and methodologies to our field. Their contributions enable innovative adaptations which are vital in today's environment of fast technological changes and high market demands."

Besides nurturing new talents, the OMYPA creates an ideal interface between the academic community and industry. This collaboration provides an opportunity for young talent from all regions to present their surface technology and materials research work to an international audience of academia and industry experts.

### Probably the most challenging of all presentations

Emine Bakan received the honors in May 2013 at ITSC in Busan, Republic of Korea, for her outstanding presentation titled 'Overcoming the Implementation Challenges of Gadolinium Zirconate in Plasma Sprayed Thermal Barrier Coatings'. At the time, she was a PhD student at the Institute of Energy and Climate Research (IEK-1) at Forschungszentrum Jülich, Germany. Ms Bakan worked under the direction of Professor Dr Robert Vaßen at IEK-1 in the Materials for Advanced Power Plants division, one of the groups that conducts research on various disciplines of materials synthesis and processing. She thrived in the coatings material group which develops materials for use as thermal barrier coatings in gas turbines. In other words, focusing on producing efficient energy production methods and materials for commercial use.

"Participating in the Young Professionals competition at ITSC 2013 was definitely a nice and enjoyable experience for me," says Emine Bakan about her participation in the OMYPA. "The five-minute scientific presentation is probably the most challenging of all presentations to accomplish. Thanks to this competition, I learned a lot about what it takes to clearly convey complex ideas to an audience. Furthermore, it was a unique opportunity not only to meet with the global Thermal Spray community, but also to pick experts' brains regarding my research. I sincerely encourage young Thermal Spray researchers to take this occasion to expand their knowledge and leverage their networks."

After finishing her PhD, Emine Bakan resumed her studies in the group with Professor Dr Robert Vaßen at Forschungszentrum Jülich, Germany, as a postdoctoral fellow. In collaboration with Oerlikon Metco, they work on the development of environmental barrier coatings.



### Definitely a great opportunity to debut yourself as a researcher

Amanda Wang is this year's award winner. She received the honours at ITSC 2016 in Shanghai, China, for her exceptional presentation titled 'Three Dimensional Reconstruction of Plasma Sprayed Ni-20Cr on Alumina'.

BEYOND SURFACES met the young researcher and asked her about the source of her daily inspiration, her experience and future plans.

#### Ms Wang, what is your inspiration for the work you're doing?

Thermal Spray was one of the subjects in my undergraduate studies so I was familiar with the topic during the project selection for my honours project. My supervisor, Professor Paul R. Munroe, showed me examples of research into Thermal Spray and I was instantly enamoured by the intricate details and designs that exist on the micro- and nano-scales. Even now, I tell people my work is about using large microscopes to view the universe in structures so small the naked eye cannot see.

Near the end of my honours project, Prof. Munroe once again inspired me with the possibility of using 3D tomography to analyse splats. The satisfaction in viewing a splat as a single entity and not as multiple sampled regions, as well as watching every layer around the splat fit together so perfectly, provoked my curiosity on whether I, as a newcomer to the field, can one day achieve results similar to what I had just witnessed.

Now in my third year of my PhD studying Thermal Spray, there is still so much to learn about my current samples. Small deviations in any component can affect the samples, whether it is in the feedstock, substrate, spraying or even milling parameters. However, by drawing on the experience of leading experts in the field, we all have a better chance of piecing together this puzzle.

#### What would you like to share with our readers about your experience thus far?

The International Thermal Spray Conference was truly an eye-opening experience. The number of Thermal Spray experts, all gathered in a common location,

was overwhelming. Not only was I able to meet authors of papers I had read, I was also able to consult and discuss concepts and examples with them! The best part was, everyone was so approachable and humble about their research. The Young Professionals competition is definitely a great opportunity to debut yourself as a researcher. The fact that ITSC organisers had dedicated an entire afternoon to showcase this competition demonstrates how highly regarded young professionals are in this field. This level of exposure bodes well for all young professionals – regardless of whether you win or not.

#### In general, what are your future plans?

At this present time, my main goal is to focus on finishing my doctorate degree. After that, I hope to work in industry, preferably in a field where I can utilise skills acquired throughout my education. ●

#### FACTS & FIGURES

### About the OMYPA

The OMYPA was engendered by Prof. Dr-Ing Kirsten Bobzin of the University of Aachen. It is funded by Oerlikon Metco and organized by the German Welding Society (DVS) and the American Society of Materials (ASM International). It aims to acknowledge students, doctoral candidates and scientists from all over the world, and to encourage new talent to engage in the advancement of surface engineering.

Award contestants are students who enter into their graduate year of University and have completed an aspect of Thermal Spray research. The submitted abstracts are evaluated by an international team of thermal spray professionals from both academia and industry. When an abstract is selected, the finalists present at the International Thermal Spray Conference (ITSC), where each presentation will be evaluated and scored for originality, experimental and research results and presentation style.

Scot Forge and BALITHERM IONIT

# A real heavy hitter

16'500 US tons or nearly 15'000 metric tonnes: this is the almost unbelievable force generated by the new forging press from Scot Forge, a specialist in the area of heavy-duty open-die forging. It is one of the biggest presses in the world and didn't only present the developers at Scot Forge with a number of challenges, but also the heat treatment experts from Oerlikon Balzers. This is because the press's four main cylinder rods alone each weigh 25 US tons (22 tonnes) and thereby count amongst the biggest parts ever treated by Oerlikon Balzers.



The largest press Scot Forge has manufactured to date generates a pressing force of 6'300 US tons (5'700 metric tonnes). Quite an amount – yet still not enough for the increased demands the industry is placing on Scot Forge's heavy-duty presses. “We wanted a press allowing us to process much more complex parts than in the past. Anyone who played with modelling clay as a child will easily know what we are talking about: it's really easy to form modelling clay into a simple shape such as a cube; the more complex a shape is, however, the more force one must apply,” says Laura Diedrich, Scot Forge's Marketing Specialist, explaining the demands.

Scot Forge's expectations regarding the performance of its new heavy-duty forging press were soon clearly defined; however, no provider seemed able to fulfil them. “We therefore decided to develop our new press on our own, as we do for most of our machines,” says Laura Diedrich. The new press generates a force of 16'500 US tons (15'000 metric tonnes), making it one of the biggest open die presses in the world.

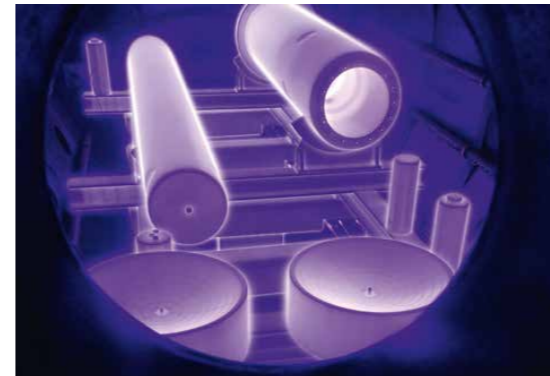
## A jointly developed one-stop solution

In order to achieve the required level of precision and other attributes – maximum wear resistance and shape accuracy with minimal distortion – the engineers from Scot Forge spent a long time tinkering about to find the right coating for the press. Nitriding was soon discussed as a possibility, but the press parts were so big

that the use of conventional methods had to be ruled out. “We joined the project very early in the planning process, when the new press was still only on the drawing board. The engineers from Scot Forge were just starting to look around for ways to manufacture these enormous parts,” explains Craig Reuter, Oerlikon Balzers Account Manager in the USA. Under the joint direction of Roman Gaida, Global Business Development Manager for Components Nitriding at Oerlikon Balzers in Liechtenstein, and the engineers at Scot Forge, a solution was developed which allowed even parts such as the four 25-ton (22 tonnes) main cylinder rods and the 8.4-metre return cylinder rods, each weighing 8.5 tons (7.7 tonnes), to be treated. In the end we were able to offer Scot Forge a one-stop solution, obviating the need to involve other providers,” explains Roman Gaida.

BALITHERM IONIT, a process for the plasma nitriding of steels, was developed by Oerlikon Balzers especially for the surface treatment of large components. To guarantee their safety throughout the entire process, a high-frequency plasma generator was combined with an automatic control system. The INAURA coating system in which this process takes place can accommodate components up to 10 metres long, 3 metres in diameter and weighing up to 40 tonnes – enough space for the different parts of the new Scot Forge press.

“The enormous parts of the Scot Forge press count amongst the biggest components Oerlikon Balzers has ever treated with BALITHERM IONIT. This presented us with a new challenge: the standard fasteners were unsuitable for the accommodation of the parts in



FACTS & FIGURES



**Company:** Scot Forge [www.scotforge.com](http://www.scotforge.com)

**Challenge:** One of the largest forging presses under construction in the northern hemisphere will experience galling and wear of chrome plating on huge pistons and connector rods. Thermal surface treatments have been proven to prevent galling, but the mammoth size of the parts took this option from the design table.

**Objectives:**

- A nitriding vessel of sufficient size had to be used.
- Experts in the field of large component surface treatment had to be engaged to lock in design specifications for these unusual components.
- Demonstration of prior success in the handling and treatment of massive and expensive parts was a key selection criteria.
- Timely and safe turnaround required close logistical coordination with the supplier.

**Solution:** BALITHERM IONIT  
**Location:** Spring Grove, IL, USA  
**Date of project:** 2015/2016

our INAURA. So we worked closely with Scot Forge developers to also make the appropriate holders," says Craig Reuter, illustrating the joint work involved.

**Unique precision for maximum efficiency**

The Scot Forge press is unique – not just in terms of size, but also because of the precision with which it creates near-net shaped parts. This means that extremely detailed parts can be formed, which, in turn, greatly reduces the amount of hard machining work needed to finalize a given part. The result: both Scot Forge and its customers save valuable time during machining.

Scot Forge is targeting customers from a wide range of sectors with the new press: aerospace, ship building, energy, defence, oil and gas, and mining, to name just a few. "For us, the new press does more than simply allow us to forge new and more complex structures than we could before. It also means that the parts we have been forging on our existing machines can now be produced much more efficiently," says Laura Diedrich. ●

**BALITHERM IONIT**

BALITHERM IONIT and IONIT OX processes are the nitriding diffusion and nitrocarburizing brands for all types of steel and non-ferrous metals.

Plasma nitriding is an industrial surface hardening process in which molecular nitrogen and hydrogen are ionized under vacuum and react with an iron substrate. The addition of carbon to the nitriding process and the subsequent oxidization lead to plasma nitrocarburizing, which creates an especially hard, wear resistant compound layer. Nitrocarburizing moreover significantly reduces the tendency of iron to react with other materials in the environment, for example lubricants.

- Very good wear resistance
- Extended service life
- Improved corrosion resistance
- Increased surface hardness
- Environmentally friendly technology, as no harmful chemicals or gases are used in the process

Find more information at:

[www.oerlikon.com/balzers/balitherm-ionit](http://www.oerlikon.com/balzers/balitherm-ionit)

Video: BALITHERM IONIT for Components

[youtu.be/5LiOet1jmFo](https://youtu.be/5LiOet1jmFo)





# Viewpoint

Additive Manufacturing

## On the way to industrialization

Additive Manufacturing (AM), also known as 3D printing, has the potential to significantly change the way manufacturing is done in industry: The increasing industrialization of additive manufacturing is altering the manner in which industrial processes are being carried out. More and more companies are already experimenting with 3D printing. Now, Oerlikon is also entering the AM business. Florian Mauerer, Head of the Business Unit 'Additive Manufacturing', provides some insights.

**Mr Mauerer, everyone is talking about additive manufacturing. What's behind it?**

Additive manufacturing is a process for the fabrication of three-dimensional workpieces. It's also often referred to as 3D printing. Up until now, it was customary to fabricate workpieces out of one solid block by removing material through milling, drilling or grinding. Additive manufacturing, however, builds up a workpiece layer by layer. This gives rise to entirely new possibilities.

**But why is AM technology the buzzword just now? After all, 3D printing has been around for quite a while.**

That's right. Additive manufacturing has been around for a long time, but the technology has enjoyed some considerable successes just recently and is making great strides forwards. Previously, it was primarily used for processing plastic, which is well-suited for prototypes, but has not really become established for use

in industrial end products. Today's methods can also process metals, which means we are on the threshold of an important step: the industrialization of additive manufacturing. This is the reason the big companies are now getting on board. Metallic 3D printing is reaching a certain maturity level at the moment and this makes it interesting for industrial applications.

**Why is Oerlikon getting involved now as well?**

The great potential we see for additive manufacturing lies in the area of industrial fabrication. The manufacture and processing of key industrial components is part of our company's DNA. As a technology partner, we are already serving leading industrial enterprises in the area of modern materials and coating technologies.

That means we are already present today in two of the three most important work steps: our two brands, Oerlikon Balzers and Oerlikon Metco are leaders with their coating technologies for the final processing of components. And what's more, Oerlikon Metco is also a specialist in working with metal-based materials. In addition, we have a wealth of know-how to draw on concerning process technology for the manufacture of key industrial components.

Our aim is to build on these unique areas of expertise and to be active at the very forefront in shaping the industrialization of additive manufacturing. We are presently rapidly expanding our know-how and capacities in this area and are able to make them available to our customers.

**Is the market actually ready for this?**

I would say: The market is more than ready. There is hardly a technology at the moment which offers more potential for growth. The aero industry, as a driving force for highly complex and safety-critical manufacturing, is currently repositioning itself for the future.

The figures of the 'Expert Commission for Research and Innovation' of the German Federal Government confirm this development, for example. While the worldwide revenue for additive manufacturing processes (3D printers, materials, accessories, software, services) was 3.07 billion US dollars in 2013, it will already reach a volume of 7.31 billion in 2016. And by 2020, it will even grow to 21.2 billion dollars – a three-fold increase in only eight years! A technological revolution has begun here and we want to be at its forefront.

**You want to open the way to additive manufacturing for your customers. What is the advantage for customers as compared to conventional manufacturing?**

To put it simply: Additive manufacturing makes new and more complex products possible, and does so more inexpensively and faster than with conventional production processes. For one thing, with additive manufacturing, mass-produced items can be customized (I'm thinking of

medical technology, for example), but it is also possible to create products that, with conventional means, have been either impossible or very difficult to fabricate up until now. The increasing industrialization of additive manufacturing will not only promote further innovative advances,



# Viewpoint

it will also alter the manner in which industrial processes and manufacturing are carried out. The AM processes give you more latitude in terms of design and shape. While the slogan yesterday was: "Design for Manufacturing," today, thanks to AM, we can say: "Design for Function." This is what makes additive manufacturing so revolutionary.

## When does additive manufacturing make sense?

There are many areas. A classic example is the area of one-off parts or spare parts. If these are produced by means of additive manufacturing, repair times can be shortened and resource intensive warehousing can be avoided.

But we are already one step further, because the technology is increasingly becoming established in the manufacturing industry where it complements conventional fabrication processes. Individualized one-off parts and small series can be produced this way more promptly and more locally

for the customer. Instead of producing centrally and sending things halfway around the world in containers or by air freight, the future will see us simply sending the data to the printer which then accurately prints out the needed part in a short time right on site. And if an apparatus with the desired specifications is not yet available at the moment, then it, too, will be printed in the foreseeable future!

Another, significant advantage is also that industrial components can be manufactured quickly and in an uncomplicated manner in new and complex forms that previously were only possible with great effort and expense – even, in fact, using new materials that were previously not possible. Ultimately, this will further improve the performance of products and reduce the costs. And, by the way, these are not just visions of the future. Parts printed in series are already in common use in aircraft, for example in jet engines or control mechanisms.

## You have mentioned the costs several times now. How can these be reduced through the use of additive manufacturing?

There will be several possibilities here. A significant difference between additive manufacturing and previous manufacturing processes is that material is not removed or cut off, but instead added layer by layer exactly where it is needed. This saves material, which makes the production more sustainable, and, of course, for expensive metal-based materials, this has a noticeable effect on the costs.

But there will also be savings in the logistics chain and warehousing when spare parts are only produced on site when needed. However, to get that far, the productivity of additive manufacturing must still be improved greatly, meaning the costs must go down. This will be achieved through more efficient machinery, automated processes, reduced material costs and new procedures. Today, a good deal still takes place manually in this process.

## What is additive manufacturing being used for already today and what will the future look like?

The core application areas on which we are concentrating have to do with the manufacture of key components for the aerospace, automotive and medical sectors as well as for customers in the area of toolmaking and in industrial production. We are already working on customer projects in all of these areas. Moreover, we are also using additive manufacturing to fabricate our own products – in the area of thermal spray equipment, and for special components for transmission solutions and textile systems. Although these

projects are still in the research and development phase, we will also pass this knowledge on to our customers.

## What are you working on right now?

In order to move the industrialization forwards, it is especially important to increase the productivity of the process and expand the range of materials. These are our main topics. As a technology partner for key components, we are working on developing service centres where we can offer our customers access to the production of components by means of additive manufacturing. We are also working on improving the process technology and

the workflows. Our materials specialists are also engaged in further expanding our portfolio of materials for this area.

## Are your customers already able to work with the AM process?

Yes, we are already working on the development of small series with various different customers. And, because we are going to expand our capacities for printing, we will soon be able to offer our customers manufacturing of 3D products globally as a service.

**Mr Mauerer, thank you for the interview! ●**

“There is hardly a technology at the moment which offers more potential for growth.”

Behind the scenes

# Passionate and enamoured with detail

They couldn't be more different. But what they have in common is their passion for their jobs and the enthusiasm with which they talk about them: BEYOND SURFACES visited one team each from Oerlikon Balzers and Oerlikon Metco in Liechtenstein and Switzerland and met four men and one woman for whom "Passion for Surface Solutions" is not merely a slogan, but a mindset.

For almost 19 years, they have been working together in the Oerlikon Balzers coating centre at the headquarters in Liechtenstein, operating several RS50 coating systems simultaneously. They complement each other quite literally: "Sometimes it's almost spooky! There are days in which we hardly even speak to one another during our shift; we work together so well as a team that we understand each other without a word. But outside of the workplace, no, we hardly ever do anything together." Handling worker, Helene Aggeler, has to smile as she says this, and Christian Bärtsch adds: "Helene goes fishing, but I prefer sports. She took me along a few times, but it's not really my thing."

## Almost half a century of experience

Loading the parts, insertion and removal, as well as operating the RS50 systems for which they are

responsible are the most important tasks which occupy the dedicated Oerlikon Balzers employees. They coat several thousand tool parts daily with BALINIT C, which is one of the perennial successes in the Oerlikon Balzers portfolio. Christian has been with Oerlikon Balzers for nearly 30 years, and Helene for about 20. "You could say that together, we have almost half a century of experience. That's worth a tremendous amount, because details are especially important in our work, things like perfect cleaning. If even only one little detail isn't right, the customer doesn't get the quality that he expects from us," explains Christian.

Helene adds: "The work offers a lot of variety, which makes it very interesting. You always have to stay focused, though, even when things get tough. I've known some customers for as long as I've been with Oerlikon Balzers myself – or, more accurately, their tools!" When the two are asked about what they consider to be personal highlights in their work,



there is immediate agreement: "We have already been invited by some customers to come and see how 'our' tools are put to use. After that, you see the parts that get coated in a completely different light!"

## "We're called Solutions, and that's what we make!"

Some 150 kilometres towards the west, in the Swiss canton of Aargau, is the small town of Wohlen – about 220 employees make it the most important Oerlikon Metco site in the world. In the Coating Solutions Center (CSC) Europe, we meet the three project managers, Massimo Cunsolo, Halil Arifovic and Peter

Zürcher. Together, the three tinker with problem areas in thermal spraying. "We're called Solutions, and that's what we make," explains Massimo Cunsolo assertively.

Peter Zürcher, the supervisor of the energetic team, already has 27 years of service at Oerlikon Metco. He elucidates: "We support our colleagues in sales and other business areas by developing customer-specific solutions. It's our job to ensure that the customer gets precisely the system or the exact material that meets his needs. This also includes the production of test series to the customer's specifications, the definition of the parameters needed for a perfect solution that matches up the part to be coated, the powder and the machine, but also involves direct customer support."

### A new challenge every day

Halil Arifovic is proud of his work: “We are the connecting link between the customer and Oerlikon Metco. In order to make sure the customer is satisfied with the end result, we work closely together with other departments, such as Equipment Assembly or Engineering. Our job also includes advising and supporting our internal, and of course our external customers with respect to the overall technical process sequence which is of relevance for coating. Consequently, Massimo and I visit customers on site regularly. That gives us very fascinating insights and the collaboration with the experts on site is very fruitful!”

Peter is happy to leave the foreign travel assignments to his two younger colleagues these days: “Even after so many years, I still learn something new at CSC every day – that’s what motivates me the most. Some of the problems which customers bring



to us can be solved in a matter of a few hours. But sometimes you have to tinker with it for a couple of days to find the perfect solution – after all, we offer over 1'000 powders and over 35 different processes. I've had and still have the opportunity to work with some of the true experts for thermal spraying – there is no classic training for our profession, you see. Oerlikon Metco is a leader in the area of thermal spraying and we are all immensely proud to belong to the small circle of people worldwide who have so much knowledge and experience in this area.”



### Pragmatists enamoured with detail

During the visits BEYOND SURFACES paid to the two teams in Balzers and Wohlen, not only the enthusiasm for their respective professions was truly palpable: Their passion for detail is also a trait all five share in common. “Our experience and our careful attention to even the smallest details makes it possible for us to offer the quality the customer expects. That is not only good for Oerlikon Balzers or Oerlikon Metco, but also for us as individuals. It might sound like a cheap advertising slogan to say that the customer is king. But that doesn't matter. The main thing is that the customer is happy and we're happy,” explains Helene Aggeler pragmatically. And meticulous pragmatists is what they all are – they're in agreement on that. ●



Authentic look ●

## VW Tiguan study relies on ePD technology

In a striking dragon red, Volkswagen presented their study on the Tiguan GTE Active at the Detroit Motor Show beginning of this year. The Oerlikon Balzers ePD technology used on the exterior mirror covers, the front-light frame and the radiator grille strips makes a significant contribution to the design of the vehicle.

The study concerns the five-seater VW Tiguan which is conceived as a zero-emission vehicle (a petrol engine starts up only as needed) and is based on the newly developed second generation of the VW Tiguan. The topic of design is of central importance for the Volkswagen brand. An emotional design and a high level of precision are factors which define automobiles with an appealing character. This is expressed in the Tiguan GTE Active as it presents itself with independent design elements in an 'authentic off-road look'.

The ePD technology from Oerlikon Balzers has a decisive share in this: For one thing, it represents the environmentally friendly and sustainable alternative for plastics metallization, and for another, the attractive

colour range opens up many new possibilities for designers which are otherwise offered by only very few technologies. The exterior mirror covers, front-light frame and radiator grille strips were metallized in an ePD hue similar to haematite called 'black chrome', which the Oerlikon Balzers ePD specialists defined in cooperation with VW designers.

### Sustainable ePD technology

The technology of plastic metallization has attracted the attention of designers and important industrial sectors for many years. High-quality components with glossy, metallic surfaces, such as those used for interior and exterior equipment on automobiles or in the consumer electronics segment, presently represent a strong trend and increase the value of the end product. The ePD technology developed by Oerlikon Balzers is a trail-blazing coating method for all areas in which high-quality metallic surfaces are required on plastic parts. What's more, it is an environmentally friendly alternative to conventional production methods: Because ePD operates entirely without the use of toxic substances such as chromium derivatives, this type of metallization will comply with the European REACH environmental regulations taking effect at the end of 2017. ●



Formula Student

# Faster with coatings

Silverstone, Hockenheim, Spielberg. Roaring engines, fast cars, hot asphalt. The nerves of drivers in the paddock are strung taut as the last fine tuning is carried out on their cars. What's at stake are points – and honour. Because, even if it sounds and feels like Formula 1, the prize money at the Formula Student is the experience of putting theoretical knowledge from the lecture hall into practice. And having a blast doing it. Oerlikon Balzers and Oerlikon Metco are at the track too.



At the beginning of the 80s, the Society of Automotive Engineers in the USA founded the Formula SAE, a university competition. Just shy of two decades later, the idea arrived in Europe as the Formula Student. Today, nine competitions are driven in different countries throughout the world and the number of participating racing teams is rising steadily.

The participating student teams conceive, design, and construct a formula racing car over the course of one year with which they compete against each other in various events before a jury of specialists from motor-sport and the automotive industry. The winner, however, is not the team with the fastest car, but the one which attains the highest point score in a series of disciplines. In static (engineering design, cost analysis and business plan presentation) and dynamic disciplines (acceleration and long-distance tests, autocross, figure 8s and energy efficiency), a maximum of 1'000 points is possible. "That's why our team doesn't just have engineers, but also students studying business administration or marketing. The task that has been posed is to build a prototype for a fictional small series of cars, and that means we need more than just technology. We also need a business plan and must attract investors for our idea," comments Francesco Salerno, spokesperson for the racing team from the University of Stuttgart, Germany (Rennteam Uni Stuttgart), explaining the Formula Student concept

## SUMEBore scores thanks to reduced friction

The world ranking currently lists over 500 SAE and Formula Student teams. The University of Stuttgart team is among the top ten and at the end of May was even able to take first place in the Formula SAE in Michigan, thereby claiming the victory in the unofficial world championship. Peter Ernst, Head of SUMEBore Technology at Oerlikon Metco, is especially pleased at this: "For several years now, we have sponsored the racing team from the University of Stuttgart with our SUMEBore technology, so of course we cheer them on during every competition."

The SUMEBore coatings on the cylinder bore surfaces in the engine's interior reduce friction and thus increase engine power. At the same time, they reduce oil and fuel consumption as well as wear and increase the corrosion

resistance. “Thanks to SUMEBore, we achieve a lower specific consumption over nearly the entire engine speed range. That’s very important for us because for the ‘Efficiency’ discipline, the consumption is calculated for the 22 kilometre distance race of the endurance competition and the team with the lowest consumption wins 100 of the possible 1’000 points. Low consumption is also of special importance for us because with our four-cylinder engine, we naturally have a higher consumption level than teams with a one-cylinder engine,” explains Francesco Salerno.

### In racing, commercial vehicles, passenger cars and motorcycles

The systems for the application of the SUMEBore coatings are based on atmospheric plasma spraying (APS). The coating is carried out by means of a plasma torch which is rotated using the RotaPlasma system. “It basically works like this: The coating powder is introduced into a hot plasma. The powder particles melt forming droplets which are applied uniformly to the inside of the cylinder by means of the rotational movement of the plasma torch and the acceleration of the plasma gas, thus creating the coating,” explains Peter Ernst, summarizing the highly complex process. SUMEBore has not only been used for years in racing: HGV manufacturer, Scania, relies on the SUMEBore technology for virtually all of their engines; the Volkswagen Group uses it, for example, in their EA211 four-cylinder engine which is manufactured in large numbers every year; SUMEBore is also used in the new Porsche 918 Spyder (see BEYOND SURFACES 1/2016).

### Friction concept with BALINIT DLC

The Coburg Automobile Team, or CAT, from the Coburg University of Applied Sciences, Germany, also depends on SUMEBore. “We asked ourselves the question, What kind of performance could we get from a series engine? In our case, that’s a Yamaha R6 which has been a faithful part of our team for years. We have developed a friction/performance concept and in Oerlikon Metco, we have found our sponsoring partner. But we were sure of one thing: that our engine offered even more potential. Then Oerlikon Balzers gave us the opportunity to coat individual components with BALINIT DLC STAR,” says Thomas Schnurr, power train team leader for CAT, looking back at the beginning of the season.

Sascha Hessel, Head of Precision Components at Oerlikon Balzers, Germany, explains: “We support several German university teams with our coatings. For CAT, we coated the piston pins, bucket tappets and camshaft of the new car with BALINIT DLC STAR. We get regular feedback from the team as to how the system is developing. That represents valuable data for us.”

### Lower consumption + lower weight = more points

BALINIT DLC STAR, a modified diamond-like carbon coating, exhibits outstanding tribological performance and is employed by automobile manufacturers for the components in diesel injection systems and the engine parts which are subjected to the greatest loading. A ductile (elastic) metal-based coating of chromium nitride provides the necessary hardness and with its high load capacity, it supports the superimposed tribological carbon coating.

“We expected our friction/performance concept to generally provide more power and less consumption, which represents an important aspect in the ‘Endurance’ discipline: With lower consumption, less weight needs to be taken along and that means more points for us. We were then also able to validate significant benefits resulting from our friction/performance concept in terms of fuel consumption, oil consumption and engine running,” summarizes Thomas Schnurr.

### Outstanding results achieved

After a brilliant season, both teams have good reason to be satisfied: The Stuttgart racing team was able to win four of five races, which put them at the top of the ranking after all of the races in Europe were completed. The Coburg Automobile Team was also able to finish the season with one win at the Formula SAE event in Italy, putting them in sixth place in the overall ranking. ●



Gigaset and BALITHERM PRIMEFORM

# Immaculately smooth



The sound of the name Gigaset is renowned in the communications industry. Europe's market leader for DECT telephones stands out through top quality and design. Tools treated with BALITHERM PRIMEFORM ensure perfect, high-gloss surfaces on finished plastic parts and shorten production cycle durations as well as the time required for maintenance.

An exceptionally elegant appearance marks the new Gigaset 'Sculpture'. Its surfaces are resplendent in immaculate white or black. The production facility in Bocholt, Germany, expends a good deal of effort to bring this about. The injection moulding tools for forming the plastic parts mustn't have even the slightest scratch. "You would see that immediately on the finished component – especially in the colour high-gloss black," explains Stefan Schlottbohm, Head of Toolmaking at Gigaset.

The risk of scratch formation was greatest during retooling as well as during the regular polishing required by the steel mould inserts (material: 1.2343 ESU). In the worst-case scenario, this meant: remove the tool, allow cooling, strip down, re-polish and then re-mount – a process which can take up to a week, for example, if

the mould needs to be sent out for reconditioning. That is an unacceptable situation for the high-performance production facility in Bocholt, because speed is essential. "A good 90% of customer orders require delivery already within three days," says Stefan Schlottbohm. Immaculate results and speed – in light of these challenges, the suggestion made by coating partner Oerlikon Balzers to treat certain tools with the innovative BALITHERM PRIMEFORM method was spot on.

## Plasma-assisted process

The BALITHERM PRIMEFORM approach creates a wear and scratch resistant diffusion layer with high surface hardness in the base material using a plasma-assisted

process. Because this is not a deposited coating, but rather a 'depth treatment' of the surface, the tool can subsequently be polished to high-gloss with no difficulty. This significantly reduces the maintenance effort required because the moulds no longer have to be sent out either for re-polishing or for stripping and re-coating.

The demouldability as well as the injection and flow behaviour of the plastic material, in this case ABS, are also improved. This facilitates the manufacture of products which have nearly invisible weld lines and thus solves a ubiquitous problem faced by high-end suppliers in the industry.

## Cycle duration reduced by more than 10%

A further perpetual challenge is the reduction of the production cycle duration. In an initial step, BALITHERM PRIMEFORM delivered a reduction of about 10% at the Gigaset facility in Bocholt. Further improvements over the total product cycle of around four years with a projected quantity of approximately 570'000 parts appear to be possible. Up to this point, the single-cavity mould for manufacturing the charging cradle of the 'Sculpture' telephone as well as the two-cavity moulds for the charging cradle cover and the upper shell of the handset have been treated – all three are high-gloss components. Previously, moulds for structured elements were protected by a TiN coating which required additional maintenance work if damaged. "With BALITHERM PRIMEFORM, this, too, is a thing of the past. And if all goes as planned, the way will be clear for further high-gloss products," predicts Stefan Schlottbohm, taking a look at future developments. ●

## Gigaset

### Gigaset

Gigaset AG with headquarters in Munich is Europe's market leader for DECT telephones and has a market presence worldwide in approximately 70 countries.

[www.gigaset.com](http://www.gigaset.com)

## Strengthening the footprint in South Korea

With its own Oerlikon Metco sales office and sales force, and the 5<sup>th</sup> Oerlikon Balzers customer centre in South Korea, the Surface Solutions Segment emphasizes its presence in this important market.

The new location in Gwangju is Oerlikon Balzers' 5<sup>th</sup> Customer Centre in South Korea, and its 108<sup>th</sup> worldwide. "Korea is a genuine Oerlikon Balzers success story. This new centre will enable us to provide an even better, short-term delivery service for our customers in the forming tool/home appliance industry and for our automotive industry customers in the prosperous Gwangju area,"

says Marc Desrayaud, Head of Business Unit Balzers Industrial Solutions at Oerlikon Surface Solutions.

Effective 1st April, Oerlikon Metco took over all Metco assets from IWS, its long-time local distribution partner, and officially opened the new Oerlikon Metco Korea branch office in Seoul. "Our two companies have enjoyed a highly successful partnership since 1985 when IWS became Oerlikon Metco's representative in South Korea. Oerlikon Metco has, in the meantime, become, the leading thermal spray brand in South Korea. The new Oerlikon Metco Korea office is the next step in this process, and will provide even better and more direct service for our regional customers," stressed Markus Heusser, Head of Business Unit Metco Aero & Energy at Oerlikon Surface Solutions. ●



The new Oerlikon Metco sales office in Seoul, South Korea.



The new Oerlikon Balzers Customer Centre and its customer service team in Gwangju, South Korea.

# News & Events

## New customer centre in Bielefeld

The new Oerlikon Balzers Customer Centre for the region of Northern Germany is under construction in Bielefeld. Three currently existing plants will be merged at the new site. The objective is to expand the range of individualized solutions and to optimize processes and internal workflows to be able to respond to customers' wishes with even greater flexibility.

"The new Bielefeld Centre will be ready for occupancy in March 2017

and combines the core expertise of the three existing Oerlikon Balzers plants of Hildesheim, Spenge and Herford to offer innovative coating solutions, especially for the plastics-processing industry for the automotive and pharmaceutical industries. An additional focus will be coatings for cutting tools in toolmaking," explains Hendrik Alfter, Managing Director of Oerlikon Balzers, Germany. ●



## Metco Twin 150: Powder feeder for additive manufacturing and coating processes

Oerlikon Metco's new versatile, multi-process powder feeder Twin 150 can be easily fully integrated into a thermal spray, laser cladding or powder additive manufacturing system.

The unit can be operated in Full Remote Mode, where the feeder's functions are completely controlled by the user's external control system.

"Owners of many types of powdered systems will benefit from the ability of the Twin 150 to fully integrate into their automated system by allowing them to simplify their processing with better process control," states Product Line Manager, Omar Sabouni.

Oerlikon Metco's volumetric powder feeders have long been a favorite of laser cladding manufacturers as a result of the accuracy of the feeding mechanism, even at very low feed rates. The new Twin 150 feeder, with its ability for full system integration, is expected to be an attractive choice for manufacturers of powder-fed laser cladding, additive manufacturing and thermal spray systems. ●



The new Twin 150 Powder Feeder from Oerlikon Metco meets the needs of many different powdered manufacturing processes.

# News & Events



## Oerlikon Balzers: 70 years of innovation

A new business was entered in the princely commercial register of Liechtenstein 70 years ago: the 'Gerätebau-Anstalt' in Balzers. The founders, Prof. Max Auwärter, Prince Franz Josef II von und zu Liechtenstein and the entrepreneur Emil G. Bührle, had the revolutionary idea of developing manufacturing processes in the area of thin coatings and constructing the equipment required for the industrial implementation themselves. Thus, for the first time, the process and the equipment became a single unit and were also offered and sold together – a business model that has enjoyed exceptional success for over 70 years.



Today the former 'Gerätebau-Anstalt' is called Oerlikon Balzers and is a part of the Surface Solutions Segment of the Oerlikon Group which was formed in 2014 after the takeover of Metco, the coating business line of the Sulzer Group.

Back then, Professor Auwärter produced sun protection and anti-reflective coatings for eye glass lenses and camera lenses, as well as thin films for electronic applications. The vacuum technology remained the main focus for a long time. Even today, the use of high vacuum is a significant factor for thin-film coatings, however, this part is now purchased while the coating processes and the equipment they require are Oerlikon Balzers' area of core competence.

### From aircraft turbines to piston pins: Greater efficiency and less wear

Development work on PVD coatings (PVD = Physical Vapour Deposition) was begun in 1974. The breakthrough came in 1978 with the BALINIT brand of coatings, which remains an important mainstay of Oerlikon Balzers to this day, alongside further groundbreaking developments. "Essentially, our solutions are always about combining reduced wear with increased efficiency, whether for Formula 1 engines, aircraft turbines, piston rings for the automotive industry, precision instruments, or for tools used by the plastics or metalworking industries. At the end of the day, increased efficiency and reduced wear mean lowering the use of harmful substances and

conserving resources – an important aspect of our work. Because we are proud of the fact that our everyday activities are based on values such as sustainability, tradition and innovative drive," states CEO Roland Fischer.

Today, Oerlikon Balzers employs over 4'800 people worldwide with about 550 of these working at the headquarters in Balzers. More than 100 employees at this location are engaged in global research and development activities. Roland Fischer spans the range of 70 years of innovation: "We are proud of our independent research that has led to many coating and system developments in the area of surface solutions – and has made our company the technology leader in thin-film coatings." ●

- Find out more at [www.oerlikon.com/balzers/history](http://www.oerlikon.com/balzers/history)

## Oerlikon Balzers Turkey wins environment award

Oerlikon Balzers Turkey is the winner of the 'Environmentally Friendly Industrial Plant Contest 2016'. The award recognizes continuous efforts on environmental topics in Turkey. Special emphasis is placed on a project with the Turkish Foundation for Combating Soil Erosion, for Reforestation and the Protection of Natural Habitats, in which Oerlikon Balzers contributed by planting one tree per employee in a forest area in Izmir, Turkey.

53 companies participated in the contest in three categories. Oerlikon Balzers Turkey employees are happy about the first prize, a small electrical car, which will be donated to a local charity project. "I am proud that the award committee visited



our facility on a typical production day without prior notice – nothing exceptional had been organized. It clearly shows that we live environmental protection and sustainability throughout our whole process

chain, and abide by the standards that are valid for all Oerlikon Balzers sites worldwide," says Ugur Urkut, General Manager of Oerlikon Balzers in Turkey. ●

## Award for innovative spirit

Eldim receives the 'High Tech Branch Award 2016'

The Oerlikon Metco subsidiary, Eldim, with headquarters in Lomm (The Netherlands) has been honoured with the 'High Tech Branch Award 2016'. The independent institute, NBSA (National Business Success Award), nominated the company based on positive feedback

from the industry and, after a visit on site and talks with staff members, chose it as the winner. Moreover, Eldim received an award as the most innovative business in the year 2016. And yet another prize is in sight: In February 2017, the bearer of the title 'Best Dutch Company 2016' will be chosen from among the winners in the 15 industry sectors.

Eldim serves the aerospace industry exclusively and specializes in machining and manufacturing gas turbine blades, seals, inlet ramps and cooling plates. ●

# News & Events

## Oerlikon Balzers receives Pinnacle Award from Delphi Automotive

Oerlikon Balzers received a 2015 Pinnacle Award for Supplier Excellence from Delphi Automotive, its most prestigious supplier honor. Oerlikon Balzers was recognized for its contributions to Delphi's Excellence culture and commitment to quality, value and cost performance.



From left to right:  
Ms Nichole Felton, Category Director, Mechanical Value Stream, and Ms Lucie Navarre, Global Purchasing Director Diesel and Powertrain EMEA, both from Delphi Automotive, hand over the two Pinnacle Awards to Mr Bernd Moll, Global Key Account Manager, and Dr Joerg Jorzick, Head of Global Sales Automotive, both from Oerlikon Balzers.

„Suppliers like Oerlikon Balzers play a significant role in Delphi's success,” said Sidney Johnson, Senior Vice President, Delphi Supply Chain Management. “They help us provide our customers with globally relevant solutions that capitalize on the megatrends of safe, green and connected. We appreciate Oerlikon Balzers' outstanding performance and understanding that excellence is simply how we operate.”

In recent years, Oerlikon Balzers has developed customized tribological coating solutions for and in close cooperation with Delphi. Coatings such as BALINIT DLC STAR have been adapted to meet Delphi's needs over several years of development focused on reducing friction and wear. “Our R&D team members have profound knowledge of tribology and automotive applications that allows them to support car

manufacturers and their suppliers in developing optimized systems. The solutions being developed by our experts enable our customers to further reduce fuel consumption and emissions through innovative designs,” says Wolfgang Konrad, Head of Business Unit Automotive at Oerlikon Balzers. ●

## Commitment to safety and health

Oerlikon Balzers subsidiaries in India receive awards

The Oerlikon Balzers Customer Centre in Pune is the winner of the 'Safety Systems Excellence Award for Manufacturing' which was given by the Federation of Indian Chambers of Commerce and Industry (FICCI) in March 2016. The Pune Centre was chosen from amongst 80 candidates in a multi-stage selection process.

In July 2016, the Oerlikon Balzers Customer Centre in Bengaluru received the '3 Star Rating' of the 'Excellence Award in Environment, Health and Safety' from the Confederation of Indian Industry (CII) Southern Region.



Both distinctions recognize Oerlikon Balzers India's commitment to the safety and health of their employees in production and manufacturing. ●

## Will we be seeing each other soon?

### 2016/2017 Trade Show dates

Oerlikon Balzers and Oerlikon Metco will again be represented at the important Surface Solutions trade shows. We look forward to your visit!

**30 Nov – 3 Dec Automechanika** Shanghai, China.

**8–10 Dec PRI** Performance Racing Industry. Indianapolis, USA.

**7–9 Feb MDM West** Anaheim, CA, USA.

**16 Feb EPM** European Press-Shop Meeting. Schopfheim, Germany.

**22–24 March Subsea Tieback** San Antonio, TX, USA.

**22–25 May AWEA Windpower** Anaheim, CA, USA.

**13–15 June AMPM** Additive Manufacturing with Powder Metallurgy. Las Vegas, NV, USA.

**19–25 June Le Bourget** Paris, France.

**3–7 July EUROCORR** International Corrosion & Process Safety Congress. Prague, Czech Republic.

**7–9 July ITSC** International Thermal Spray Conference & Exhibition. Duesseldorf, Germany.

**12–14 July Semicon West** San Francisco, CA, USA.

**18–23 Sept EMO** Hannover, Germany.

**25–29 Sept Schweißen & Schneiden** International trade fair Joining Cutting Surfacing. Düsseldorf, Germany.



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