

SULZER

Sulzer Metco

LAYER

1/2008 The Sulzer Metaplas GmbH magazine



Worldwide
It is our service that makes
the difference

Start signal for
strong coatings
Mtec and Mpower

Customer interview:
Forst Technologie

Porsche Consulting
at Sulzer Metaplas

The view ahead

Constant vicinity to the customer



Valentin Bühler
Chief Executive Officer

Dear Readers,

For Sulzer Metaplas, too, China, the outstanding market of the future, cannot and must not be ignored. True to our guiding principle of always systematically seeking vicinity to our customers, we are following the unmistakable call and are currently establishing our presence as a PVD coating company in China. And this is only the first step. Further expansion is planned and will soon follow. For all our customers, both near and far, we are rapidly expanding the network that enables us to provide tried and proven Sulzer Metaplas technologies and services at their renowned constant quality level. LAYER took the opportunity of speaking to the senior project manager, Eduard Müller, on the current status and the sequence of our technology and knowledge transfer to China. He explained the special features of the Chinese market and informed about the next steps to be taken on this important growth market (see Page 3).

Our customer portrait in this issue focuses on Forst Technologie GmbH & Co. KG, of Solingen, a leading manufacturer of broaching machines. The interview on Page 4 provides important information on coating of broaches and on cooperation between Sulzer Metaplas and Forst.

The continuous development work on METAPLAS-DOMINO performed at Sulzer

Metaplas has borne fruit in the form of significant new coating systems: Mtec and Mpower. Learn on Page 6 why these coatings are important - not only for the field of high-performance and high-productivity machining. The demands made on modern surface finishing technology are growing continuously. IONIT OX® combines excellent practical qualities with sustainable environmental characteristics in a groundbreaking coating process. Page 8 of this issue of LAYER explains the individual operations, benefits and applications.

This issue also examines the progress of our project with Porsche Consulting, aimed at consistently refining and improving internal procedures and processes. The interview with Alexander Mohnfeld, Head of Corporate Project Management at Sulzer Metaplas, on Page 9 illustrates the advantages for the customer resulting - now and in the future - from our cooperation with this firm of business consultants.

Sincerely wishing you much enjoyable and informative reading!

Valentin Bühler
Chief Executive Officer

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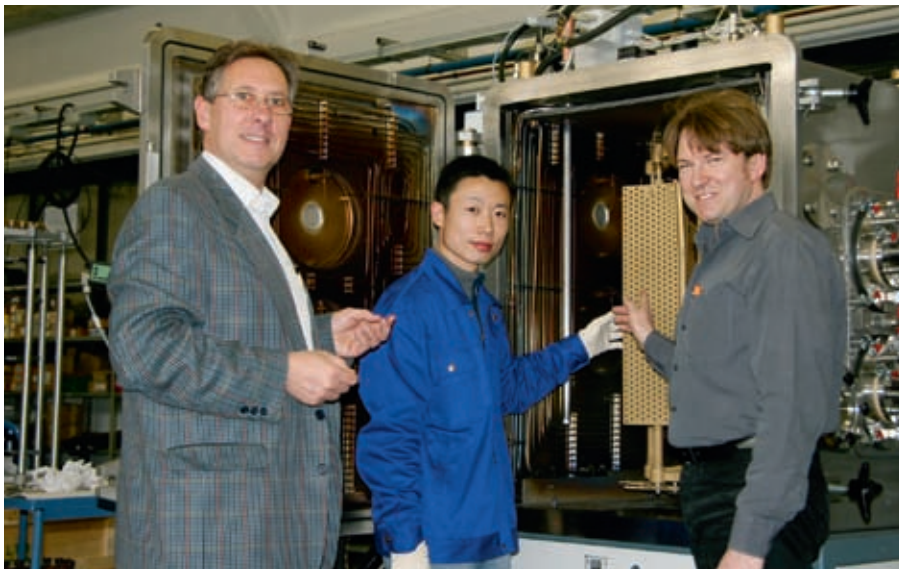
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Eduard Müller (l.) and Detlef Ernst (r.) give Colin Zhang final instructions on the system that will soon be installed in Shanghai

It is our service that makes the difference

PVD technology in China

Sulzer Metco began setting-up its Shanghai location some time ago. Now, under the guidance of Eduard Müller, Sulzer Metaplas is installing a new PVD coating facility in this Chinese metropolis.

The workshops needed for the system are already complete. Eduard Müller, Project Manager Business Development, is now applying great care and attention to ensure optimum transfer of both material and know-how to Shanghai. Sulzer Metaplas orientates itself for this project around market developments, as Eduard Müller explains: „We react to our customers' needs and wishes. If a location in China will enable us to provide better and faster service, it is the only logical step for us“. The company has already started comprehensive preparatory work:

Colin Zhang, PVD Production Line Manager, recently visited the Bergisch Gladbach plant for an intensive training program on the PVD system, for which he will be responsible for on-the-spot in Shanghai.

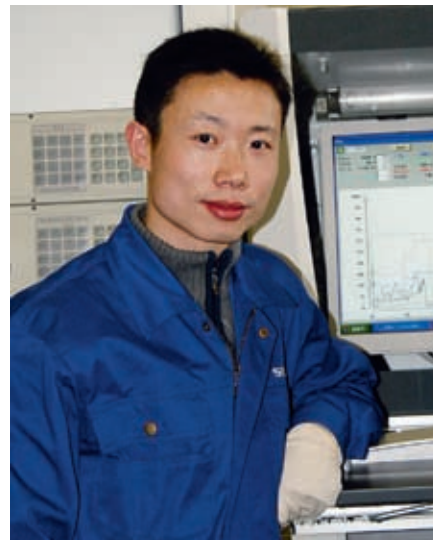
In addition, the responsible members of staff from Sales/Marketing and Maintenance were familiarized in training seminars with the special features of the Chinese

market. „Here, we are judged not only by the quality of our products – because of the special competitive situation in China, demands for customer service are even higher than elsewhere“, explains Eduard Müller, focusing on the need for fast, customized and sustainable service.

To assure such service in all fields, the recently installed system augments Sulzer's range of products and services in China with the contract-based PVD treatment segment. The prime focus here is on the coating of tools for the plastics industry. Sulzer Metaplas is using the opportunities presented by the „Die & Mould China“ fair, taking place in Shanghai from May 12 to

16, 2008, to make the potentials of its products and services known to even wider circles within

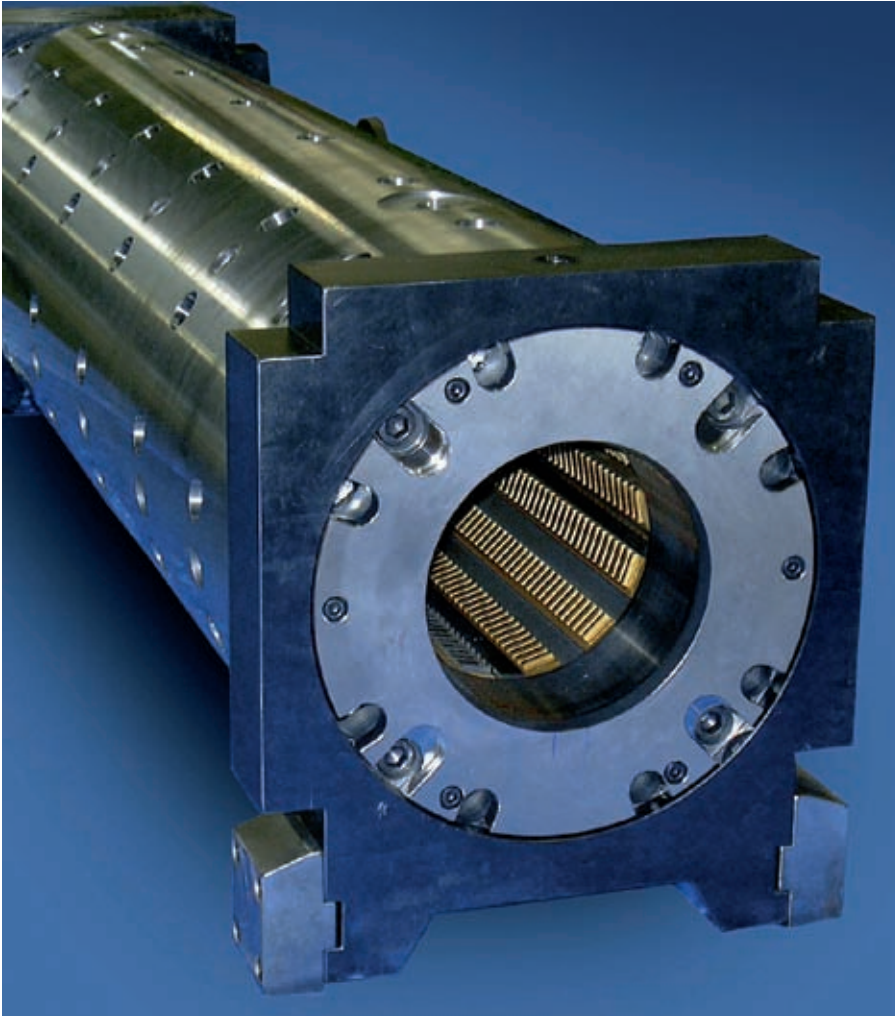
this industry. Other sectors will also be able to utilize these services in future. Planning for the Chinese market also envisages additional expansion of production capacities. „This initial presence in China is only the start. Companies need to establish a broad basis, and offer flexibility and adaptability, in order to fully benefit from the potentials of this region“, comments Eduard Müller on future prospects. ■



PVD specialist Colin Zhang starting highly motivated his special training at Sulzer Metaplas

Quality for quality – the basis for and result of good cooperation

Interview with Hans-Gerd Rudolph of Forst Technologie



Pot broaching tool

Forst Technologie of Solingen, Western Germany, was founded by Oswald Forst in 1909. The company initially produced horizontal, mechanically operated broaching machines. Broaching achieved its breakthrough in series production in the 1960s, with the introduction of the high-speed broaching process. Construction of broach sharpening machines started from 1970 onward, achieving improved tool production and service lives. Forst supplied the first helical broaching machine for machining of internal profiles on ring-gears for automatic car transmission systems in 1973. Research and further development of hard broach-

ing, and subsequent series production, followed in the 1980s. The company now employs around 150 people at its Solingen plant and is, on its own data, the world's leading manufacturer of broaching machines, broaching tools and broach sharpening machines. This is an enterprise which works unceasingly on the improvement of its process and product quality, with more than twenty staff responsible for Research & Development activities. LAYER spoke to Hans-Gerd Rudolph, formerly a member of the Forst purchasing department, about the value of high-quality coatings. www.forst-online.de

LAYER: Mr. Rudolph, what makes the coating of your tools so important?

„The coating provides protection against wear, and it also improves tribological properties. About 80 percent of tools in our segment are coated nowadays, without a coating they wouldn't be competitive“.

LAYER: What components do you have coated at Sulzer Metaplas, using which processes, and since when?

„We started having our broaches coated there using the PVD arc process around ten years ago“.

LAYER: And what led you to select Sulzer Metaplas for coating of your tools?

„The decisive factor is coating quality. In addition, the size of the Metaplas PVD facilities is also a great benefit for us. The company is highly orientated around customers' needs and requirements. Metaplas is able to fulfill our special needs, particularly when you remember that our tools are up to four meters long - the longest on the market“.

LAYER: How would you characterize your cooperation with Sulzer Metaplas?

„We go to Bergisch Gladbach practically every day to deliver components for coating, or pick up finished components. Over the years, we have developed a cordial and eq-



Hans-Gerd Rudolph interviewed by LAYER

uitable business relationship, and the Metaplas staff knows exactly how to handle our tools. We particularly appreciate the reliability and flexibility at Metaplas; they have never let us down, even when the time-frame was very short“.

LAYER: You appear to have very great confidence in the work of Sulzer Metaplas.

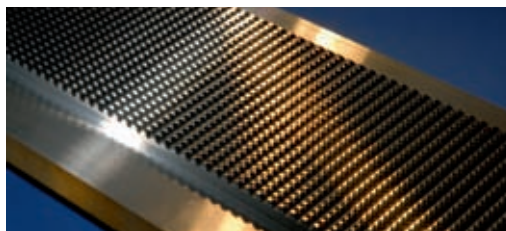
„That's absolutely right - dependability is of enormous importance, when we entrust our tools to outside companies. The manufacturing process for our products is extremely complex and expensive. Together, all the factors involved - the material used, the technology and the large number of working operations necessary for production of a broach - result in long production times and thus a high product value“.

LAYER: And how important are quality assurance and repeatability in this industrial sector?

„Our customers themselves make high demands on the quality of our solutions. So we, naturally, also demand a lot from Sulzer Metaplas. We need a high level of repeatability, and they provide it, along with a complete process record. So we can check at any time exactly what happened during the coating operation. And their team is always extremely cooperative if we have any queries. In addition, we are, of course, in more or less continuous contact, in the context of optimization of this technology for use on our products. And end users also pass on ideas for new and modified coating types and methods to us via Sulzer Metaplas“.



Helical broaching machine



Coated tools from Forst





Start signal for strong coatings

METAPLAS-DOMINO creates new potentials
with **Mtec** and **Mpower**

The new Sulzer Metaplas Mpower and Mtec coating systems are the fruit of the consistent refinement and development of established technologies and processes. They improve the service-life and performance potential of coated tools significantly. METAPLAS-DOMINO generates these coatings with a high level of productivity and provides numerous potentials for coating customization.

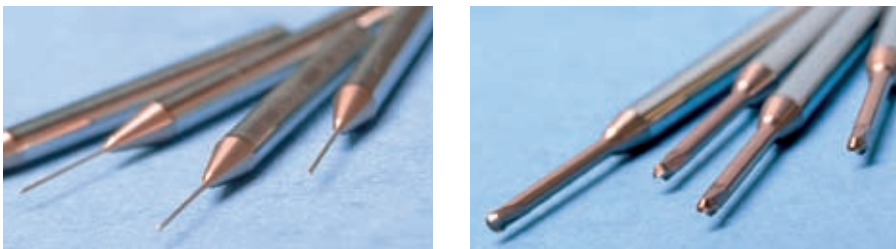
The Mtec coating originates from the METAPLAS Machining series and has been optimized for high-performance cutting (HPC), in particular. Its extremely dense morphology is ideal for processing of difficult-to-machine materials. The adjustments achievable, with the same target composition, range within a broad parameter field from fine columnar to nano-crystalline. It is thus possible to tailor the desired structure optimally to any requirement profile. Thanks to Advanced Plasma-Assisted (APA) evaporator technology, METAPLAS-DOMINO achieves extremely high ionization of the coating material and high plasma density. These give Mtec thermal stability, hardness and resistance to oxidation. This coating type is also excellently suitable as a bonding layer. Mtec is the right coating for tools for machining of quenched and tempered steels, austenitic steels and a broad range of high-temperature alloys. Mtec has no tendency to sticking to the work, due to its interface properties. Thanks to Arc-En-

hanced Glow Discharge (AEGD), it adheres to all widely used tool materials. The coating thus even improves the performance characteristics of ceramic surfaces, and protects them against wear.

The first coating in the „microalloyed-coatings“ series is Mpower. Its excellent performance characteristics for HPC and high-speed cutting (HSC) enable it to demonstrate its strengths on extremely hard steels of 60 HRC and above, in particular. Innovative users and mould-makers value the Mpower coating due to its application-specific microstructure and phase stability up to 1150° C. These features permit significant performance and productivity enhancements. Mpower features a broad and diverse range of options, which can be exhaustively exploited by means of ultra-small adjustments to the material to be machined. This is especially true considering the current dynamic rate of development in materials. Mpower-coated tools are also capable of machining tool steels and mould-making steels for plastics with lower hardnesses but high carbide contents cleanly and with high accuracy. Like Mtec, Mpower also possesses, thanks to AEGD, optimum adhesion to all widely used tool and die materials, including ceramic surfaces. The coating's microgeometry results in a low tendency to sticking and a high resistance to wear in processing of hard and high-carbide steels and of difficult-to-machine alloys. The coating layer

can be precisely customized to match the machining task.

Mtec and Mpower offer not only exceptional performance - they are also notable for their adjustment and application flexibility. Process design, parameter set-up and coating architecture adapt the residual compressive stress of Mtec and Mpower to the intended application, for optimized results. Combination with METAPLAS-DOMINO generates powerful and diverse options for coating of tools for innovative machining. The versatile potentials for adjustment enable the user to react quickly and without complication to future materials developments. ■



Mpower demonstrates its strengths on extremely hard steels of 60 HRC and above



Mpower-coated tools



METAPLAS-DOMINO generates tried and proven existing layer types more cost-efficiently, provides multiple potentials for new layer architectures, and also features the new Mtec and Mpower coating systems. This machine is thus equipped even now for all future needs and applications.

To obtain further information on the new coating types and the new machine, simply request our brochure from: metaplas@sulzer.com



Benefits of the Mtec-coating

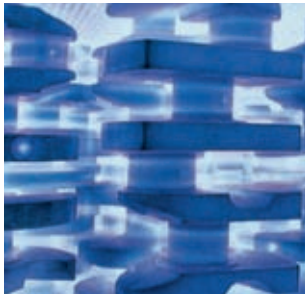
- Especially suitable for processing of difficult-to-machine materials
- High hardness, thermal stability and resistance to oxidation
- Adheres to all widely used tool materials



Mtec-coated tools

IONIT OX[®] – efficient and conserving the environment

Ideal corrosion-proofing for all sectors



Plasma-nitriding and plasma-nitrocarburizing are surface hardening processes. Low treatment temperatures guarantee low dimensional and geometrical distortion. These processes generate a white layer of extremely high hardness.

Rust is the natural enemy of many more people than just car owners – complex hydraulic assemblies in mechanical engineering, tool-making and pump construction are also susceptible to attack by this form of corrosion. Air, water, lubricants and fuels charge metals continuously, and promote oxidative and corrosive processes.

There are many extremely diverse coating systems available for protection against rust; unfortunately, the production and the subsequent after-service disposal of the majority of them are highly environmentally harmful. The corresponding legal provisions are appropriately strict, and are becoming ever more so. The demands made on a protective coating are therefore very high. The Sulzer Metaplas IONIT OX[®] process harmonizes ideally with the requirement profile for an intelligent protective coating system, however. It is free of hexavalent chromium, which is a carcinogenic substance and may therefore no longer be used in or on any components. Neither the production nor the disposal of protective coatings using IONIT OX[®] result in any environmentally hazardous substances. To dispose of life-expired components, the coating can be melted down again together with other steel scrap. And this protection method is clearly superior to other processes in terms of corrosion-resistance: IONIT OX[®], with a service-life of around 500 hours, achieves significantly better scores in the salt-spray test (DIN 50 021 SS) than, for example, hard chromium (around 330 hours) and electroless nickel coatings (around 280 hours).

The beneficial properties of this coating method are the result of the combination of

the three thermochemical processes of gas nitrocarburizing, plasma-activation (plasma-nitrocarburizing) and oxidizing. The nitriding layer generated in the first operation consists of a diffusion zone and a nitride white layer. The bonding layer is elemental for reduced wear and permits longer service-lives. The following operation, plasma-activation, stabilizes the nitride layer and optimizes the adhesion of the oxide layer which is generated in the subsequent oxidation process. Finally, oxidation generates a 1 to 3 µm thick and extremely dense, oxide layer. The morphology of this layer provides good corrosion-proofing properties and low coefficients of friction. This layer thus combines a whole series of positive characteristics: the high passivity of the surface generated imparts excellent corrosion-protection, even against corrosion resulting from contact with other metals. The low coefficients of friction improve even further during the service-life of the component. Precise process-control permits a repeatable nitriding structure and is the guarantee of constant high quality and planning certainty.

The surface's excellent corrosion properties also make it possible to eliminate the costs of expensive high-alloy steels and the associated mechanical production operations. This process is used for components such as shift levers, pump housings and ball studs, for example. The extremely low material fatigue of such components conforms to maximum safety standards, including, in particular, those of the automotive industry. IONIT OX[®] protects components against corrosion and wear, improves friction characteristics, and thus saves costs while at the same time protecting the environment. ■

„... an intelligent protective coating ...“

Sulzer			
millions of CHF		2007	2006
Order intake		4054.0	3276.9
Sales		3537.0	2801.7
Operating income before depreciation/amortization	EBITDA	501.3	376.1
Operating income	EBIT	393.5	295.6
Return on sales (EBIT/sales)	ROS	11.1%	10.6%
Return on capital employed (EBIT/capital employed ¹⁾)	ROCE	24.2%	23.7%
Net income attributable to shareholders of Sulzer Ltd		284.1	221.4
Capital expenditure		134.8	106.0
Shareholder's equity excl. minority interests		1547.1	1536.9
Employees (number of full-time equivalents) as of December 31		11 599	10 393
Cash flow from operating and investing activities		177.7	170.6
Net liquidity		198.5	299.7

¹⁾ Average capital employed incl. goodwill at net book values

Sulzer Metco				
millions of CHF		2007	2006	+/-%
Order intake		762.8	658.7	15.8
Sales		753.1	644.1	16.9
Operating income (EBIT)		75.8	53.4	41.9

Trading figures for 2007

Sulzer achieves record turnover and profitability

The pleasing trend already discernable from the six-month statement was totally confirmed. With a gross profit of CHF 75.8 million, Sulzer Metco improved on the result for the previous year by no less than 41.9%. Lively markets, in the field of aviation, energy generation and other industrial segments, combined with concentration on the development of new solu-

tions, brought the division orders totaling CHF 762.8 million. Rationalized internal processes then made it possible not only to handle this 15.8% higher volume without difficulty, but also to achieve an average of 95% on-time completion and delivery. Continuous investments in innovation, such as the new pilot plant for gas vacuum atomization commissioned in Switzerland in 2007, in combination with continued consistent strategic concentration on strengthening of the division's position as a supplier of services and surface-finish solutions, provide an excellent basis for the continuation of 2007's positive trend through 2008.

Magical triangle with lean processes

Cooperation with Porsche Consulting bears fruit at Sulzer Metaplas

The central concept underlying cooperation with this firm of business consultants is simple and straightforward: optimized procedures and processes for greater customer benefit. And customers become aware of internal improvements in their perception of the magical triangle of quality, on-time delivery and market-orientated prices.

Porsche's success story since the mid-1990s, combined with good experience with this consultancy within the Sulzer group, were convincing arguments for the integration of Porsche Consulting into our improvement process as an external consultant. Such a process is, admittedly, not an end in itself. „Customers want quality, on-time delivery and market-orientated prices. To meet their requirements, we have to maneuver within this magical triangle and align and orientate our procedures

and processes accordingly“, explains Alexander Mohnfeld, Head of Corporate Project Management at Sulzer Metaplas GmbH. For this purpose, the entire process and procedural chain, from receipt of orders, via procurement, engineering and assembly, up to and including delivery, was firstly carefully analyzed. The procedures were then redesigned to be low-waste and lean. This process also extended to the field of project management. All interfaces within the procedure chain were analyzed, in order to ascertain the best system to progress a project from its start to its conclusion. The whole staff is involved in this continuous improvement process. „The most important thing in implementation is that of motivating people, i.e., all colleagues. Every single person involved must be aware of his or her own importance for improvement, and thus for the success of

the company“, adds Mohnfeld. The improvement process thus has a long-term and sustainable effect, with benefits for the customer, in particular. As Alexander Mohnfeld concluded in his interview with our editorial team:



„We assure the sustainability of all optimized processes, in order to further expedite positive development in the future“.



Optimization at Sulzer Metaplas

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