

**SULZER**

Sulzer Metco

# LAYER

2/2007

Information from Sulzer Metaplas GmbH

## METAPLAS-DOMINO

Productive and flexible



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Dear Readers,

Change demands dynamic adjustment – and also continuity and reliability. As an active enterprise in a globalized world, we find ourselves faced by the seemingly contradictory demands of continuity and innovation. Our customers need both: products and services of constant high quality and dependability, on the one hand, and innovation combined with close customer orientation around the globe, on the other. This challenge is what drives us on to ever new achievements.

As the new Chief Executive Officer of Sulzer Metaplas GmbH, I have now assumed responsibility for leadership of our company from Thomas Gutzwiller. I anticipate with the greatest pleasure cooperation with our highly skilled and motivated employees in the service of our customers. I wish here, Dear Reader, in LAYER, our company magazine, to enter into regular, stimulating and informative dialogue and discussion with you.

Details of current personnel changes and restructuring measures can be found on Page 3 of this issue. In addition, we also report on the plasma-combination process and thermochemical heat treatment, two methods for improvement of resistance to wear and corrosion. Our particular pride is our new development, **METAPLAS-DOMINO**, a modular-conception PVD coating system – read more on Page 6. The current issue of LAYER is then rounded off with our latest trading figures and a review of this year's extremely successful EMO in Hanover.

Sincerely wishing you much enjoyable and informative reading

**Valentin Bühler**  
Chief Executive Officer



## Under new management

# Valentin Bühler takes over top job

**Valentin Bühler has taken over from Thomas Gutzwiller as CEO of Sulzer Metaplas and Head of the Sulzer Metco Thin Film business unit. Thomas Gutzwiller now moves to manage Sulzer Metco Surface Solutions.**

Valentin Bühler takes over management of Sulzer Metaplas GmbH from Thomas Gutzwiller with effect from October 1, 2007. Thomas Gutzwiller simultaneously becomes head of the Turbine Components, Euroflamm and Coating Services sectors within the Sulzer Metco division. The emphasis at Sulzer Metco in the past few years has been on careful and disciplined implementation of „Operational Excellence“ projects. With the completion of this important and successful phase, it is now time to start the next stage of our corporate development, with the focus on international expansion of our business, with close customer

orientation, systematic strengthening of our innovative powers and successful continuation of profitable growth.

Valentin Bühler is outstandingly well equipped for the challenges he and the company face. Thanks to his highly successful work as Regional Manager/Vice President Asia, Latin America and Eastern Europe for Balzers Ltd., where he was also responsible, in particular, for geographical expansion, he is able to provide Sulzer Metaplas with valuable impulses for future orientation. He himself is an engineering graduate of the ETH Zürich, and also possesses a licentiate (lic.) in Business Administration from the University of St. Gallen.



Thomas Gutzwiller



Valentin Bühler

The Sulzer Metco division thanks Thomas Gutzwiller for his valuable contribution to the success of Sulzer Metaplas, simultaneously extending a sincere welcome to Valentin Bühler. We wish both much success and enjoyment in tackling their new challenges and are confident that these changes will be constructive in achieving Sulzer Metco's targets of profitability, customer satisfaction, innovation and continuous growth.

## New head of the PVD & IONIT Service Sector

# Emphasis on Service

**Dr. Oliver Kayser, previously Head of the PVD Service department, has left the company. He is succeeded by Dr. Gerhard Beyer, who takes over management of the now combined PVD & IONIT Germany sectors.**

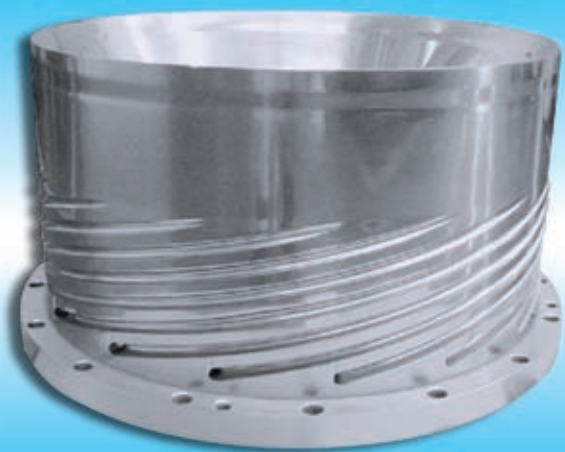
Dr. Oliver Kayser, head of the PVD Service department for many years, left the company at his own request with effect from the end of Septem-

ber, 2007. We lose in Dr. Kayser a universally acclaimed specialist in the PVD sector, and a manager who played a significant part in the success of this business field. We regret Dr. Kayser's departure, at the same time wishing him all happiness and success for the future.

The succession process at management level also brought an organizational change: in order to ori-

entate the company better around present-day and future requirements, the PVD and IONIT service sectors have been combined with effect from September 1, 2007, but placed under separate management for German and for international markets. Sulzer Metaplas anticipates systematic international growth from this newly introduced structure.

We are extremely pleased to have gained for management of the Service Sector Germany the abilities and experience of Dr. Gerhard Beyer, who has repeatedly demonstrated his skills, elevating the IONIT sector to a highly successful business unit in the past two years.



## Degradation reaction in the polymer chain versus process stability

# A case for plasma-combination treatment

**The use of modified polymers and elastomers, with the aim of achieving improved mechanical and chemical properties, is also accompanied by negative phenomena which urgently need solution.**

Abrasive wear, corrosive degradation products, cavitation, adhesive interactions and erosive wear are all phenomena caused by additives in the polymers. Removal and servicing of tools, combined with the associated production downtimes, result in a significant increase in production costs. Sulzer Metaplas supplies a solution which counteracts these wear mechanisms effectively, in the form of combination treatment, i.e.,

*... An efficient tool for “combating wear ...”*

combined plasma nitriding and the appropriate PVD hard layer. Enormous potentials for savings and for increases in profitability compared to non-coated tools are powerful arguments in favour of the use of coated tool components.

Plasma nitriding prior to PVD coating is recommendable, in order to counteract tribological wear of surfaces. Plasma nitriding is a classical surface-layer heat treatment process, in which surface hardness is increased by means of diffusion of nitrogen into the parent material in a glow-discharge plasma. The plasma nitrided layer provides a support function for the subsequent PVD layer, imparting optimum wear-resistance to the overall hardcoating. Plasma nitriding ensures that the surfaces of plastificators possess the necessary hardness and that glass

fibers, for example, are not able to penetrate the thin hardcoatings.

Metaplas hardcoatings are generated by means of physical deposition from the gas phase. Electron forces assure excellent bonding between the layer and the substrate. The classical Metaplas PVD hardcoatings TiN, CrN, CrN-Multilayer, CrN-mod and the W-C:H dry-lubricating layer, in particular, have proven their capabilities in the polymer- and elastomer-processing industries. The many and diverse coating and layer variants make it possible to meet the large spectrum of demands made by polymer processing, with coating being possible from temperatures as low as 180° C. The combination of plasma nitriding and PVD coating also permits treatment of heat treating steels and less hardenable hot-work tool steels. The mechanical properties of the center of the material, including toughness and insensitivity to cracking, remain

unchanged when this process is applied.

Selection of the individual coating systems depends greatly on the polymers or elastomers to be processed, and on the individual parameters of the chosen process routes. Maximized optimization of service-lives, and therefore maximized cost-efficiency for the overall process, can be achieved with a coating specifically tailored to the particular application, combined with careful selection of the correct material and with plasma nitriding in appropriate cases. The enormous potentials for enhancement of service-lives make it vital to select the correct coating and layer systems at the tool-design stage. The benefits also generate advantages for other departments and sectors: enhanced reliability in production increases the entire company's assured-supply capability, an important factor in commercial competitiveness.





## Trends and applications

# Thermo-chemical heat treatment

**The aim of thermochemical heat treatment procedures is improving the component surface's wear resistance, corrosion resistance and tribological performance characteristics, or a combination of these. Currently, the focus is on improvement of resistance to wear and corrosion, with the target of conquering markets which were previously the exclusive preserve of electrochemical plating processes.**

Protection of the environment, a central issue of twenty-first century politics, presents industry with ever new challenges. Products, plants, systems and processes are required to conform with the high standards demanded by legislators. Particularly worthy of emphasis here is EU Directive 2000/53/EC, which requires that components be free of hexavalent chromium (Cr[VI] is a carcinogen). The field of thermochemical heat treatment profits from growing environmental legislation which is imposing increasing restrictions on the operation of electroplating systems and salt baths. The trend toward exportation of production to threshold countries with less restrictive environment regulations is likely, in the mid-term, to be reversed, against the background of globalization and rising transportation costs.

The prime clientele for these

surface-refining processes are the companies and corporations of the automotive industry. Here, the use of cheaper parent metals, achievement of greater strengths and fatigue characteristics, combined with weight savings, play the greatest role, in addition to the requirements already discussed above.

Plasma-assisted nitriding processes are able to meet not only the above demands, but also the need for consistent and repeatable quality. In these processes, nitrogen is firstly diffused into the surface zone of the steel materials. It is mainly structural, carbon, case-hardening

... advantages over “  
” electroplating ...

and heat treating steels, i.e., low-alloyed grades, which are treated using these processes. In diffusion of nitrogen into the surface zone, it is first interstitially dissolved in the iron matrix. A monophasal nitride layer is

formed when the nitrogen concentration exceeds the solubility limit of 2.5 %wt. The addition of carbon results in the generation of hard and wear resistant nitride layers, which have a greater chemical resistance than untreated steel grades.

The corrosion resistance of nitrided and nitrocarburized steel in the salt-spray test in conformity with DIN EN ISO 9227-NSS is around 24 hours. Subsequent oxidation of the nitrided layer generates a layer combination consisting of Fe<sub>2-3</sub>(N,C)-nitride and magnetite, which further increases resistance to corrosion more than 20 times. Corrosion resistance ratings of above 500 hours can be achieved using this process. Unlike Cr(VI) layer systems, the outer nitride layer does not possess a self-healing mechanism, but is, due to the greater layer hardness, significantly more resistant to scratching. A further benefit of this layer type is its chemical resistance to biodiesel (RME). No contact corrosion occurs with this layer system in combination with aluminium and other light alloys.

In addition, the diffusion of nitrogen into the surface zone also generates a hardness gradient into the parent material, inducing residual compressive stresses as a result of distortion of the lattice and thus resulting in greater component and fatigue strengths which, for their part, permit useful weight-savings.





## The new **METAPLAS-DOMINO** Productive and flexible

The new **METAPLAS-DOMINO** PVD coating system combines high productivity with individual equipping potentials, assuring flexible application.

The game of dominos was the inspiration for the name selected for the **METAPLAS-DOMINO** system from Sulzer Metaplas. The fascinating thing about this game are the numerous ways in which the dominos can be positioned alongside one another. The game can be expanded in all directions with virtually no limitations, all depending on the number of pips on the dominos. The player who plans his or her moves most cleverly, and uses the dominos to the best effect, is the winner. The game of dominos is probably centuries old, and there are numerous variations of the rules, depending on local tradition. Just as matching pieces are positioned alongside one another in the game of dominos, in the **METAPLAS-DOMINO** system a number of modules can be variably assembled to form a large whole, conforming to the individual user's specific needs. As in the game, only those who know the rules and plan their strategies intelligently can win in the world of globalized production. And just as there are no „fixed“ rules in the game of dominos, the rules of play in coating technology also vary: Tool service-lives must be increased, and per-item production costs cut simultaneously.

Innovative surface finishing technology must provide diversified potentials for both present-day and future layer architectures. Simultaneously, the demand is also for enhancement of manufacturing productivity. **METAPLAS-DOMINO** integrates all these requirements. The secret of its

success can be found in its modular-concept platform, which can be adapted to the user's individual needs in the basic configuration and in the context of subsequent expansions and upgrades. The system can be optionally equipped with PVD Arc or sputter technology, or with a combination of both, permitting hybrid processes.

Also new is the innovative APA evaporator technology, which combines a large range of benefits: It achieves twice the coating rate of evaporators currently available and provides a complete spectrum of new layer architectures in terms of morphology, stoichiometry and doping, and in terms of multi- and nanolayers. Enhanced target utilization, adjustable magnetic fields and a high plasma density are further benefits of this technology.

The conception of the system preserves tried and proven elements: highly efficient plasma-cleaning using patented AEGD (Arc Enhanced Glow Discharge) technology assures achievement of excellent layer adhesion. The overall result is homogeneous layer characteristics throughout the charge. Optimum design of the coating volumes, reduced cycle-times, combined with short installation and commissioning times all contribute to the boosting of productivity.

The combination of well proven and innovative elements, coupled with the individual potentials for expansion provided by the modular platform, permit a high level of flexibility: just as the dominos player can position his or her dominos according to the game situation, **METAPLAS-DOMINO** enables the user to adjust production to prevailing requirements.



**Sulzer**

in millions of CHF		2007	2006
Order intake		2132.9	1654.8
Sales		1653.7	1336.6
Operating income	EBIT	177.4	136.3
Return on sales (EBIT/sales)	ROS	10.7%	10.2%
Operating income – divisions	EBIT	188.3	129.1
Return on sales (EBIT/sales) – divisions	ROS	11.4%	9.7%
Net income attributable to shareholders of Sulzer Ltd.		131.8	104.3
Equity attributable to shareholders of Sulzer Ltd. as of June 30/December 31		1565.7	1536.9
Employees (number of full-time equivalents) as of June 30/December 31		11604	10393
Cash flow from operating and investing activities		-52.3	167.2
Net liquidity <sup>1)</sup> as of June 30/December 31		82.2	299.7

<sup>1)</sup>Cash, cash equivalents, and marketable securities, less borrowings

**Sulzer Metco**

in millions of CHF		2007	2006	+/-%
Order intake		395.0	332.6	18.8
Sales		368.0	298.9	23.1
Operating income	EBIT	36.1	21.9	64.8
Return on sales (EBIT/sales)	ROS	9.8%	7.3%	

## On the right course

# Half-yearly figures:

## An overview

The operational improvements initiated a number of years ago at Sulzer Metco bore fruit in the first six months of 2007. The company's gross profit increased by 64.8 percent to 36.1 million Swiss Francs. Growth in the important market segments of aviation, industrial gas-turbines and general industry continued to be reflected in greater volumes of orders received and turnover. Growth in Asia, in particular, was remarkable. The division continues to concentrate on improvement of products and services, but will gradually orientate itself around expansion. The market trend remains good, and new business potentials are opening up as a consequence of the need to find environmentally friendly solutions. The pleasing conclusion: Sulzer Metco is on the right course for a good result on the year for 2007.

**EMO in Hanover**

# A huge success

**Positive record for Sulzer Metaplas GmbH; lively interest in the new METAPLAS-DOMINO PVD coating system.**

More than 166,000 visitors arrived in Hanover between September 17 and 22, 2007, for the EMO, to purchase machinery, place orders and get the latest information on metalworking developments. Sulzer Metaplas GmbH took this opportunity of unveiling the innovative **METAPLAS-DOMINO** PVD coating system with its new and functional styling, which was extremely well received by exhibition visitors. The newly developed branded concept for Metaplas layer systems was also welcomed, with a great deal of positive feedback.

The 2007 EMO in Hanover gave a clear boost to international machine-tool business. Sulzer Metaplas

GmbH also booked first orders for **METAPLAS-DOMINO** immediately following the EMO. The company considers the event a success and

looks forward with pleasure to the next EMO event, which is to be held in Milan from October 5 to 10, 2009.



# IMPRINT

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