

umicore goldpost

Issue 31 / 2009

The world of noble
and functional surfaces

HARTING – Global success with connectors

Umicore customer report

No ammonia smell in production

PALLUNA® ACF 100 without ammonia

Reliable transmission of wind power

New gold electrolyte AURUNA® 500





Dear Readers,

Further developments and innovative ideas are the key elements in the work at Umicore. The award of the Innovation Prize East Württemberg proved to us again only recently how important our continuous research and development work is. The Innovation Workshop launched last September in which employees of Umicore Galvanotechnik try to optimise products and processes in their day-to-day work is also showing the first signs of success.

Proven magazine in new design

Our "Umicore Goldpost" has also enjoyed a breath of fresh air. As a long-standing communication medium for our customers and employees, it has now undergone a facelift.

You are now holding the first edition in the new design in your hands: Clearly arranged, fresh and attractive. The principles of the Umicore Goldpost, however, have naturally remained the same: Through this magazine we wish to keep you up to date on news, innovations and products at Umicore. The customer report will continue to form a firm part of the Umicore Goldpost and give you an insight into the companies and products of our customers. In the section "Umicore in operation" (page 3) you can find out in future where and how Umicore products are in use.

I wish you an enjoyable read of the new Umicore Goldpost!

Yours
sincerely 
Thomas Engert

Managing Director
Umicore Galvanotechnik GmbH

New standards in gold plating

Innovation prize for Umicore

Patent applications are nothing unusual in Baden-Wuerttemberg: A total of 13,638 companies or private persons in Baden-Wuerttemberg had their inventions protected under the trademark law last year. Particularly outstanding patents are furthermore rewarded with the Innovation Prize East Württemberg of the Kreissparkassen Ostalb, the Chamber of Trade and Industry and the Wirtschaftsfoerderungsgesellschaft Ost-wuerttemberg GmbH (WIRO). Umicore Galvanotechnik GmbH was able to celebrate one of the five prizes in 2008.

The Umicore employees Klaus Bronder and Uwe Manz received the innovation prize for the development of a new process for the electroplating of gold. Using new gold electrolytes we have succeeded in achieving a far quicker build-up of the coating and hence significant increases in production. "With this patent we are setting new standards in gold plating technology," says Umicore Managing Director, Thomas Engert, emphasising the importance of the invention for electroplating technology.

Uwe Manz (2nd from left) and Klaus Bronder (3rd from left) of Umicore Galvanotechnik show their pleasure at receiving the Innovation Prize East Württemberg, from the hands of Dr. Eberhard Veit (left), Executive Board member of Festo AG, and Johannes Werner (right), Board Chairman of KSK Ostalb.



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The "Corpus Clock" in Cambridge is gold plated with AURUNA® 311

Grasshopper driving along the sands of time


Five years of work and 1 million Pounds Sterling (around 1.2 million Euros) have been invested in the 1.5 metre high "Corpus Clock" of Corpus Christi College in Cambridge. But you will search in vain for the hour, minute and second hands on the almost completely gold-plated clock. They are replaced by small LEDs in three concentrically arranged rings that are revealed in turn but seemingly without any recognisable rhythm. Sometimes they move forwards at a breath-taking pace and then they appear to stand almost still whilst moving backwards. In between these movements the LEDs show the right time, and so fulfil the actual purpose of the Corpus Clock.

With his masterpiece, the builder of the clock, Dr John Taylor, wanted to draw parallels with real life where time is sometimes subjectively felt to be moving faster or slower. The movement of the Corpus Clock is driven by an oversized, grim-looking grasshopper which is an analogous to the "grasshopper escapement", a clock drive mechanism invented by the British watchmaker, John Harrison, in the early 18th century.

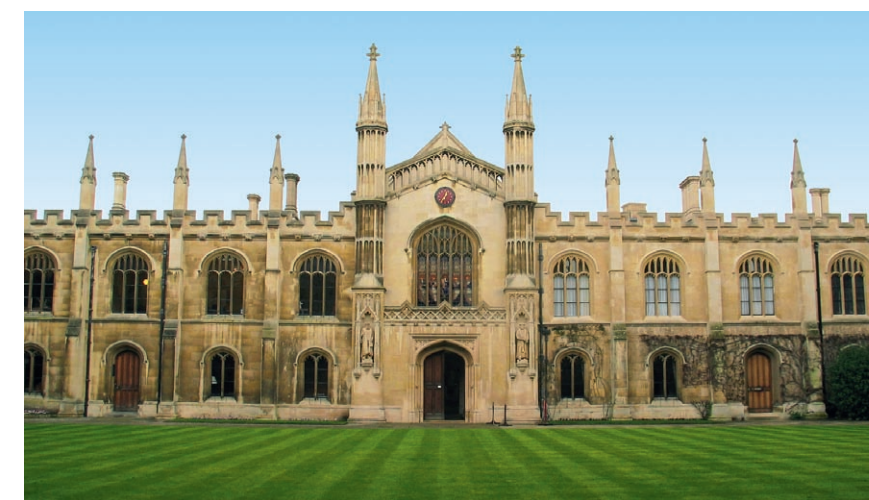
BJS found the appropriate electrolyte and competent technical support at Umicore Galvanotechnik in Schwäbisch Gmünd. They were particularly impressed by the outstanding properties of Umicore's AURUNA® 311 solution which will directly gold plate on to stainless steel. The process first developed as long ago as 1980 and has been continuously improved in

the meantime. A special acid mixture cleans and activates the stainless steel before the electrodeposition allows a gold coating thickness of up to 5 µm of hard gold to be deposited on the surface in a single operation. The AURUNA® 311 made easy work of gold plating the extremely large, three-dimensional, stainless steel dial of the Corpus Clock.

To see the Corpus Clock in action go to www.youtube.com and insert "The Corpus Clock & Chronophage" into the search box. Further information also see www.bjsgold.com

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Corpus Christi College in Cambridge.



HARTING Technology Group

Global success with connectors and automatic machines

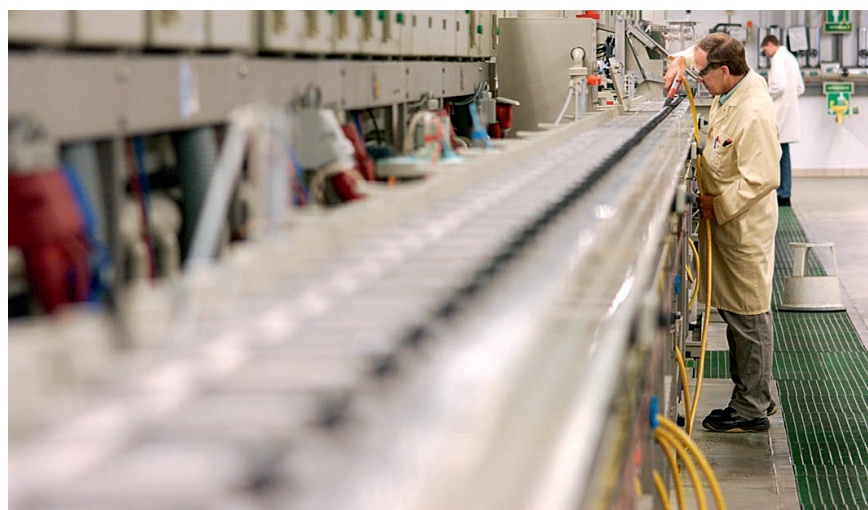
The Espelkamp-based HARTING Technology Group is one of the world's leading companies for industrial connectors. The medium-sized family-owned company has equally as much success with electronic service systems.

Anyone who gets on a train, owns a car or uses a mobile phone comes into contact indirectly sooner or later with products from HARTING. The Westphalian company is one of the largest producers of industrial connectors worldwide.

The patented Han® plug connectors, in particular, are a common synonym

for quality. The company that even today is still 100% family-owned came to fame with the production of jukeboxes and electric cigarette machines. In 1959 the HARTING Technology Group was the first company in Europe to build electric cigarette machines. Today the Westphalian company generates a turnover of 385 million Euros per year with 3,200 employees worldwide.

Reel-to-Reel plating line for coating Han® connectors.



As in most family-run companies, Wilhelm and Marie Harting started from practically nothing when they founded HARTING on 1st of September 1945. In a small repair workshop they manufactured predominantly items for everyday use: Cooking plates, irons or energy-saving light bulbs. But even in the early 1950s, engineer Wilhelm Harting recognised the enormous potential of industrial plug connectors. These had already been developed during the war by German and American engineers, predominantly for military purposes. Harting set himself the goal of developing a plug connector that was sturdy and easy to use on the one hand, but also flexible in use on the other.

Industrial connectors revolutionize the market

The result was the Han® connector. It has more contact pins than conventional connectors. The contact technology was changed over to plug contact and socket and the connection technologies adapted to the demands of the various applications. The HARTING portfolio today ranges from products for signal transmission



The patented Han® connectors are to be found practically everywhere:

In power generation and distribution plants, in the transport sector and in communication technology.



through to connectors for power transmission (650 A, 4 kV).

An impressive rise to fame began for HARTING with the successful mass production of connectors. In the mid-1970s, HARTING concentrated the whole production on the manufacture of connectors and cigarette machines. Even until today, the Han® connectors have been continuously further developed. Umicore Galvano-

technik is one of the first contact for many questions, as illustrated by the example of the ammonia-free electrolyte, PALLUNA® ACF 100 (see article on page 6).

A family-owned company even until today

Despite its size with subsidiaries in 27 countries, the HARTING Technology Group has remained a family-owned company. The company founders, Wilhelm and Marie Harting, managed the company jointly and with equal rights until the death of Wilhelm Harting, and were thus way ahead of their time in this respect. After the death of her husband in 1962, Marie Harting took over the management of the company with more than 700 employees. Other women who wanted to work at that time still had to ask their husbands for permission.

At the end of the 1960s, the two sons Dietmar und Jürgen Harting joined the company. Dietmar was responsible for the commercial side and Jürgen for the technical side until his death in 1973. Today the limited partnership is managed by Dietmar and his wife, Margrit Harting. Their children



HARTING – 100% family-owned: Philip F. W. Harting, Maresa W. M. Harting-Hertz, Dietmar and Margrit Harting (from left to right)

have also been integrated into the company in the meantime. Maresa Harting-Hertz has been board member responsible for Finance, Controlling and Tax since 2007. Her brother Philip has been head of the Connectivity and Networks Division since 2008. Dietmar and Margrit Harting are engaged in various organisations and initiatives for culture and sport in their home region of East Westphalia and have already been commended with the Federal Cross of Merit 1st Class for their efforts in this area.

HARTING Technology Group

Founded: 1st of September 1945 in Minden; registered offices today in Espelkamp (Westphalia)

Turnover: 385 million Euros (2007/08)

Employees: 3,211 (30.09.2008)

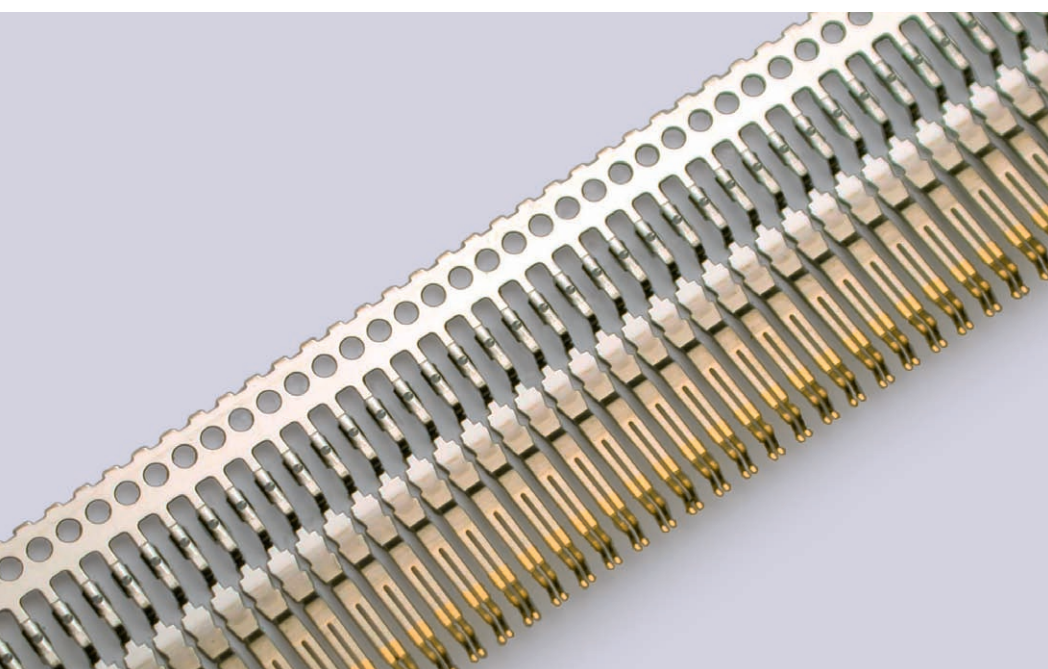
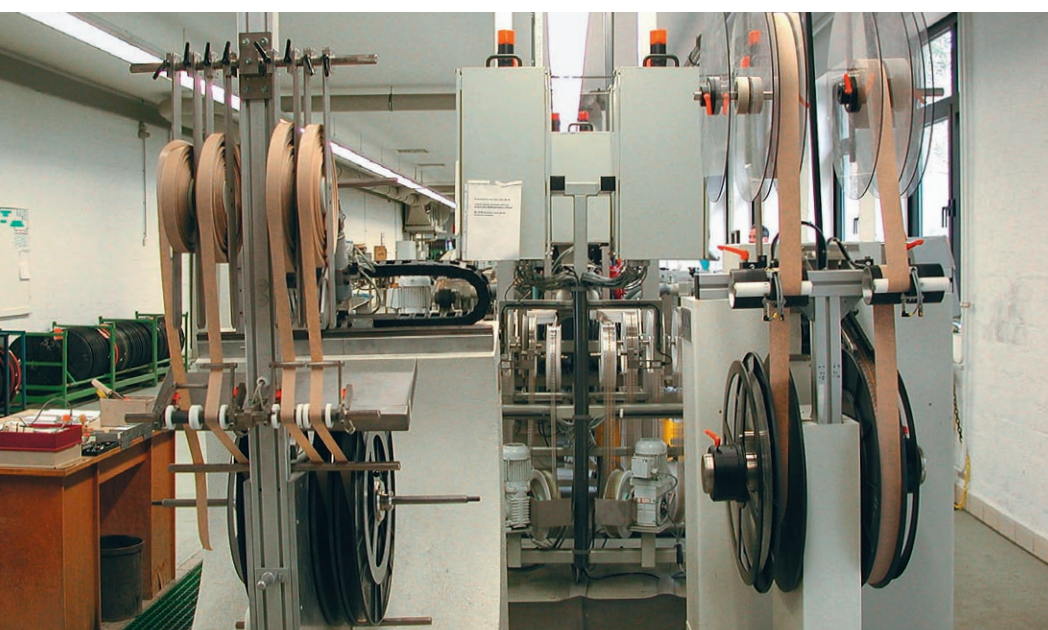
Products / services: Connector and network technology, microtechnology, PCB technology, housing technology and electronic shop systems, electro-magnetic components for the automotive industry



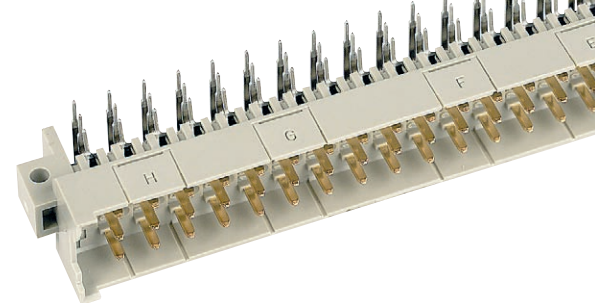
PALLUNA® ACF 100: New palladium-nickel electrolyte

No unpleasant smell in production

The formation of ammonia gas is a natural process during the use of plating electrolytes, containing ammonia. The pungent odour of the colourless vapour is then an unavoidable side-effect. "There must be another solution", said the engineers at Umicore Galvanotechnik. The HARTING Technology Group is now able to benefit from the results of their research and development work: The electrolyte PALLUNA® ACF 100 now allows pleasant working without unpleasant odours in the company.



Spring contacts require a crack-free and abrasion-resistant coating. In the plating baths at HARTING, this is possible without the release of ammonia gas, thanks to PALLUNA® ACF 100.




The electrolyte PALLUNA® ACF 100 is utilized at HARTING in connectors.

The new palladium-nickel electrolyte PALLUNA® ACF 100 developed at Umicore Galvanotechnik GmbH has all the technical advantages of other electrolytes – but without the pungent smell of ammonia. The deposited layers are ductile, crack-free and resistant to abrasion. Furthermore, PALLUNA® has the cost benefit on its side: With comparable contact properties to those of hard gold, the palladium-nickel material used is by far the less expensive alternative.

For companies where electroplating processes form a fixed part of the production, the development of the ammonia-free electrolyte means a major improvement in the working conditions. Those companies include the HARTING Technology Group. For more than 60 years, the family-owned company with registered offices in Espelkamp in North-Rhine Westphalia has been successful on the international market as a producer of connectors and specialist for industrial applications. Electroplating processes form a major part of the day-to-day work here.

Umicore worked together with the HARTING Technology Group in further developing the PALLUNA® ACF 100 electrolyte. Special demands could therefore be taken into consideration and implemented. HARTING is the first customer to successfully employ the new PALLUNA® ACF 100 high-speed electrolyte. With deposition rates of up to 15 µm/min, it achieves absolutely top values. In addition to the high-speed version, a rack and a barrel plating version will also be brought onto the market in the near future.

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The wheel is turning – with AURUNA® 500

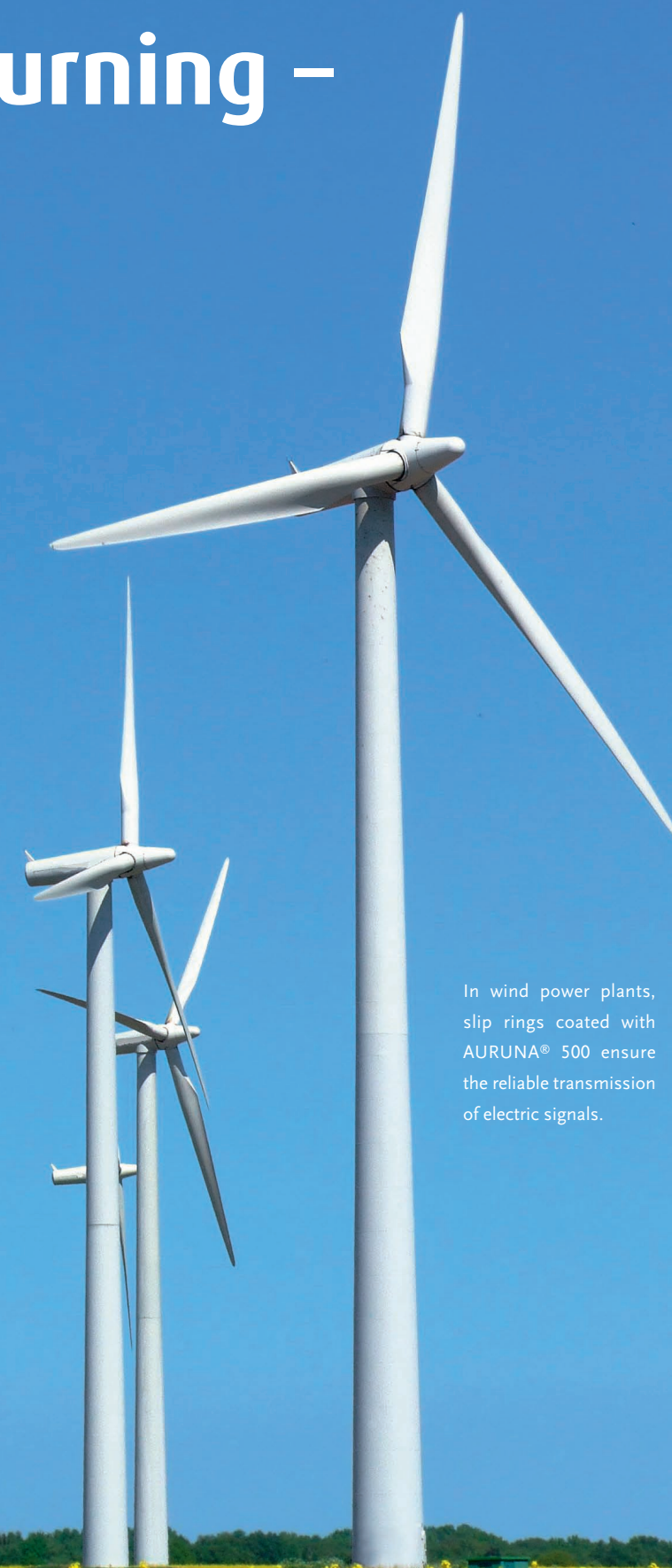
Electric contact materials have to fulfil an extensive range of demands: They should be corrosion- and abrasion-resistant as well as being very hard. Installed in delicate and highly sensitive systems, they have to guarantee reliable transmission of electric signals and a constant electric power. Coatings with the AURUNA® 500 gold electrolyte from Umicore meet all these demands.

Electroplating processes with AURUNA® 500 play an important role in the field of sliding contacts, and here in particular for slip ring contact systems. Slip rings such as those installed in wind power plants have to withstand high loads. Modern wind turbines are generally expected to operate for a period of seven to ten years. This means that the slip ring has to withstand an enormous number of load cycles without material deterioration. At speeds of 25 revolutions per minute, that corresponds to one hundred million revolutions during the life cycle of a slip ring or a distance of 17.000 km with a slip ring diameter of 50 to 60 mm.

Slip ring applications are to be found wherever signals and data have to be transmitted with high reliability via rotary joints. These include robot and automation technology, as well as medical technology where rotary joints are employed in tomography, nuclear medicine or in catheters. But slip rings are practically indispensable also in aeronautical and aerospace engineering. Here they form part, for example, of highly sensitive radar and satellite technology.

Apart from the technical applications, AURUNA® 500 has also established itself in the field of decorative coatings. The gold electrolyte has been extremely popular for many years for the coating of jewellery, watches, writing utensils and perfume packagings due to its tarnish and corrosion-resistant coating and its reddish-gold colour.

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In wind power plants, slip rings coated with AURUNA® 500 ensure the reliable transmission of electric signals.

Mechanical production in new facilities

PLATINODE® – highest quality for over 30 years

In surface finishing processes, anodes have a very important role to play. They should be both electrochemically and mechanically stable and have a high level of quality. The anodes with the name PLATINODE® developed by Umicore have been reliably meeting these demands for more than three decades.

The dimensionally stable electrodes marketed under the brand name PLATINODE® are refractory metals coated with pure platinum or with mixed metal oxide. The basis for the coatings is generally titanium or niobium, but always particularly hard wearing metals with a high resistance to chemicals. The coating of these materials with platinum is effected by high-temperature electrolysis. The platinum is thereby deposited from a cyanide molten salt bath at temperatures of 500 to 600 °C. The dense and highly adhesive functional layers can thereby achieve a thickness from 0.2 to > 50 µm. They are characterised by high resilience, excellent corrosion resistance and a long service life.

For many years now the PLATINODE® product range has also included mixed metal oxide (MMO) anodes. Here precious metal oxides – generally iridium and/or ruthenium oxides – are combined with non-precious tantalum and titanium oxides. Solutions of these metals are applied in layers to the base metal in a multi-stage process and subsequently transformed in a thermal process.

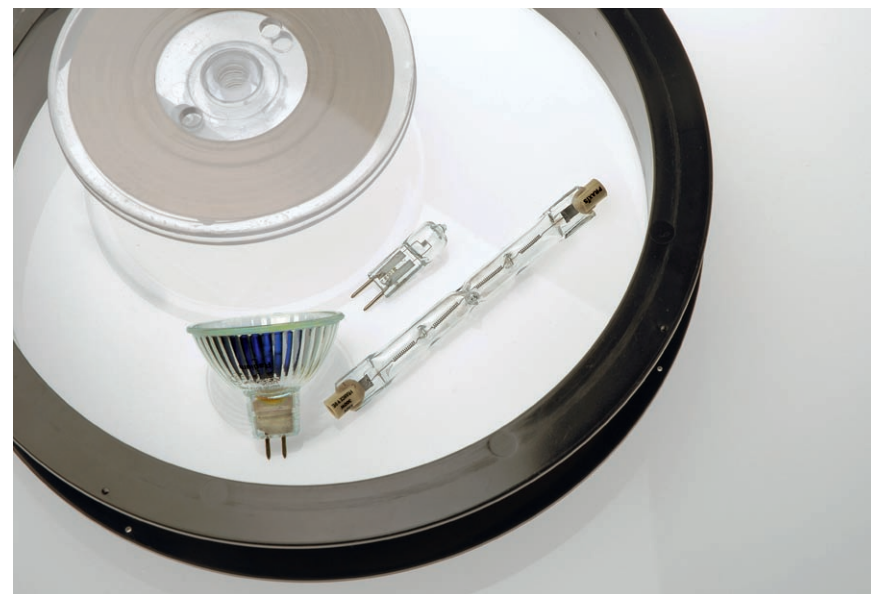
Which of the two anode coatings is more suitable for the customer depends on the particular field of application. In order to meet the different requirements, the coating thickness of Pt-anodes or the mixing ratio of precious and non-precious metals and

the coating weight of MMO-anodes can be varied.

The mechanical production and assembly of the electrodes takes place in the Umicore production facilities in Schwäbisch Gmünd that were opened in 2008. An extensive machine park and highly qualified specialists guarantee high flexibility and short delivery times. The production plant also includes two continuous lines for the coating of molybdenum ribbons and wires for the lighting industry. The key focus in all the processes is on the quality of the products. That is why all the processes are examined and documented.

Umicore plays a pioneering role in anode production also when it comes to recycling: The refractory metals used for PLATINODE® are extremely corrosion-resistant and can therefore generally be used several times.

In the new production facility, platinised molybdenum ribbons and wires are produced for the lighting industry.



Further important information on this proven product can be found in the new Umicore brochure "PLATINODE® - Product overview and range of services".

The brochure can be downloaded at www.umicore-galvano.com



Umicore therefore offers its customers a special service: The company carries out a close examination of the used electrodes and recommends production of new electrodes or replating of the electrodes, depending on the condition. In all cases the value of the residual platinum is credited to the customer on a weight account or offset against the next order.



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Further improvement of MIRALLOY®

Crowning achievement with nickel-free coating

The MIRALLOY® copper-tin and copper-tin-zinc electrolytes have been a nickel-free alternative for the coating of clothing accessories, fashion jewellery or high-frequency connectors for more than 25 years. One new development and two further improvements guarantee enhanced stability and brightness.

A recent addition to the product range is the MIRALLOY® 2842 rack electrolyte. It is characterised to be able to deposit a white alloy of copper, tin and zinc. The colour is similar to that of silver. In addition, the electrolyte is significantly more stable and has an improved throwing power. The layers can be deposited with a thickness of up to 10 µm and more. The new MIRALLOY® 2842 is used in particular in the fields of fashion jewellery, plastic coating and connectors.



Button up your trousers without allergic reactions? This is possible since many years with MIRALLOY®, the nickel-free electrolyte from Umicore.

Furthermore, the brightener systems of MIRALLOY® 2843 and 2847 have been fundamentally improved. The coating system remains unchanged in these optimised versions, but the lifetime of the electrolytes has been significantly increased. MIRALLOY® 2843 and MIRALLOY® 2847 have special gloss properties and are absolutely haze-free. Both are equally suitable for decorative and functional applications.

Old and new terms of the MIRALLOY® brightener systems

Product	Old term	New term
MIRALLOY® 2843	Brightener 1–1 Brightener 2	Brightener 1–2 Brightener 2–1
MIRALLOY® 2847	Brightener 1 Brightener 2	Brightener 1 Brightener 2–1



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Prototype of a Hull cell testing tool

Electrolyte testing like the professionals

The function test of common electrolytes according to given test methods has been a quick and reliable matter using the Hull cell for many years. Until now, however, the components of the small portable electroplating system have not been available in a set. Commercially available laboratory equipment had to be combined with specially manufactured parts in order to be able to carry out the function tests. It was not unusual for a pot from the camping accessories to be used as liquid tank. Therefore, a number of trials were necessary in order to find the correct position for the magnetic stirrer in the trapezoidal Hull cell.

The prototype of a Hull cell testing tool, developed by Umicore Galvanotechnik and IKA®, now provides a complete set for the testing of electrolytes for the first time.

Notches in the base of the tank and a fixed position of the electrolyte tank allow the defined fixing of the magnetic



The prototype of the hull cell testing tool.

stirrer now. Furthermore, the tool has a temperature sensor cable integrated into the tripod.

The prototype of the hull cell testing tool is just one of many valuable results to come out of the innovation group at Umicore founded in September 2008. The innovation group consists of employees from Umicore Galvanotechnik. Their duty is to optimise processes in the day-to-day work and thus to set highlights with recognition value.

The working tool will be available from October 2009 via IKA® under the order number 3986600.

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The Umicore copper product range

Copper coatings for every demand

From silk matt to high brightness: The five copper electrolytes from Umicore Galvanotechnik offer the right solution for every field of application. Here is a brief overview of the most important characteristics of the electrolytes.

Electrolyte	Basis	Application	Deposition rate	Brightness level	Remarks
Umicore Copper 830	Potassium cyanide	rack / barrel	R: 0.8 µm / min at 2 A / dm ² B: 0.4 µm / min at 1 A / dm ²	silk matt to glossy	—
Umicore Copper 831	Potassium cyanide	barrel	B: 0.3 µm / min at 0,75 A / dm ²	silk matt to glossy	—
Umicore Copper 835	Sulphuric acid	rack / barrel	R: 1.1 µm / min at 5 A / dm ² B: 0.22 µm / min at 1 A / dm ²	high gloss highly levelling	Application temperature up to 30 °C
Umicore Copper 836	Sulphuric acid	rack / barrel	R: 1.1 µm / min at 5 A / dm ² B: 0.22 µm / min at 1 A / dm ²	high gloss highly levelling	Application temperature up to 40 °C
Umicore Copper 838	Pyrophosphate	barrel	B: 0.1 µm / min at 0,5 A / dm ²	silk matt to glossy	—



Great interest in the first Umicore Kids Day

Almost forty girls and boys were curious and excited at the beginning of March when they had the opportunity to visit their parents' place of work. During the first Umicore Kids Day, the children of numerous employees were able to try out for themselves what their parents do day in, day out. After a welcoming address by the management, the work and storage rooms were visited, microscopes tested, sample sheet metals examined and numerous questions answered.



Trade fairs

Umicore Galvanotechnik GmbH and its foreign agencies will be represented at the following trade fairs in the coming months:

Bangkok Gems & Jewelry Fair, Thailand: 15. – 19. September 2009

Umicore Galvanotechnik and Umicore Precious Metals Thailand give you an insight into our broad range of products at the Bangkok Gems & Jewelry Fair.

TPCA Show, Tapei – Taiwan: 21. – 23. October 2009

At the annual Taiwan Printed Circuit Association (TPCA) Show, we will be represented by Ages, our local partner. At this fair you can obtain information on the production of printed circuit boards.

Productronica Munich: 10. – 13. November 2009

During this year's Productronica, Umicore Galvanotechnik is staging a forum with technical discussions for its customers from the electronics sector. Further information will be available in the coming weeks.

SF China, Shanghai: 18. – 20. November 2009

The broad spectrum of our products will be presented at the SF China by Umicore Marketing Services Hong Kong.



Umicore employee Martin Mack (middle) together with colleagues from the local Umicore agency, Core PMG Corporation in Seoul, at the KPCA 2009.



Umicore employee, Torsten Lange (right), in discussion with a customer at the Productronica in Munich.



Umicore products in new design

The Umicore bottles for salts and liquids now have a new and uniform appearance. The new packagings with an improved sealing system make transport and storage of the chemicals even safer. With the green Umicore caps, the packagings now also show an uniform appearance.

The safety aspect of the Umicore products was also enhanced during the redesign: All labels now have a Holospot label. That makes product counterfeiting far more difficult and makes it easier to recognise the original Umicore products.

www.umicore-galvano.com