

[Use of PLATINODE® HC enables noticeable energy and CO2 savings in the hard chrome plating process](#)

## **UMICORE'S PLATINISED TITANIUM ANODE FOR SUSTAINABLE HARD CHROME PLATING PROCESSES (PLATINODE® HC) NOW RECEIVES A GOVERNMENT SUBSIDY OF PROBABLY UP TO 40%**

12. September 2023  
Schwaebisch Gmuend

Words: 1926  
Characters: 12285

[mds.umicore.com](https://mds.umicore.com)

It is well known that the use of platinised titanium or niobium anodes in hard chrome plating leads to a more uniform and higher quality deposition result, in addition to other positive effects. The reduced energy requirement through appropriate platinum coating and targeted application is also not new knowledge. Nevertheless, the majority in this branch of industry opt for lead electrodes, which are cheaper, at least in the initial purchase.

This decision will certainly have to be reconsidered in the near future. The platinised titanium or niobium anode PLATINODE® HC, which was specially developed for hard chrome processes and is manufactured using the highest-quality of all electrocatalytic coating processes (high-temperature electrolysis), is probably classified for subsidies in Germany. This significantly reduces the investment costs for the high-quality, durable electrode from Umicore Metal Deposition Solutions, which is more economical in the medium term anyway compared to lead anodes - and without any additional effort for the customer. The company offers the application for the subsidy in Germany as a free service and is working flat out to offer this service in all other relevant European countries as well.

### **GREEN DEAL AS A TRIGGER FOR PROMOTING ENERGY-EFFICIENT PLANTS AND PROCESSES**

The European Commission has set itself the goal of making Europe

the first climate-neutral continent by 2050. To this end, the European Green Deal was launched, with the overarching goal of a better and healthier life for this and all future generations. A key component of the initiative is to reduce energy consumption. Especially because the current electricity mix consists of only 36.4% renewable energy, contributing to significant CO<sub>2</sub> emissions from electricity generation.<sup>1</sup> At the same time, this can also reduce energy costs for industry. To achieve this, the Commission proposes higher binding energy savings targets at EU level to achieve an overall reduction of final and primary energy consumption by 36-39% (compared to 1990) by 2030.<sup>2</sup>

To achieve this, Europe needs to harness the enormous potential of low-emission technologies and sustainable products and services. The transition to a carbon-neutral, circular yet competitive economy requires the commitment of industry as a whole. All industrial value chains, but especially energy-intensive sectors such as hard chrome plating, have a central role to play in this. Appropriate funding is provided to support this, but it is implemented at the national level in each case and must therefore be applied for from the respective country-specific institutions.

#### **GENERAL CONDITIONS FOR SUBSIDIES FOR THE PLATINODE® HC**

In Germany, up to 40 % of the investment in the PLATINODE® HC can be subsidised by the Federal Office of Economics and Export Control (BAFA), up to a maximum of € 300,000 over a period of 3 years. The decisive factor for the subsidy is the avoided CO<sub>2</sub> emissions due to the lower electricity demand compared to lead anodes. Corporate groups can reduce their investment by € 700, small and medium-sized enterprises even by € 900 per tonne of CO<sub>2</sub>.<sup>3</sup>

The fact that Umicore takes over or mediates the application process here without additional costs has an advantage for the customer that should not be underestimated in three respects: the avoided expenditure of time for applying for the subsidy the me-

diation of an independent energy consultant who can submit the subsidy application and the necessary confirmation of the CO<sub>2</sub> savings through an official verification procedure.

The use of these services is, of course, only optional. Especially when involving one's own energy consultant, the waiver may be worthwhile in some cases, as the energy consultant arranged by Umicore claims 10% of the subsidy amount for himself - only in case of success.

### **ENERGY SAVING POTENTIAL OF PLATINODE® HC CONFIRMED BY INDEPENDENT AUTHORITY**

The Berlin-based engineering firm Delta Engineering & Chemistry GmbH has conducted an investigation and comparative analysis of PLATINODE® HC and lead anodes in terms of energy efficiency and savings under laboratory conditions. It was found that a 1:1 replacement of lead anodes by PLATINODE® HC allows energy savings of at least 2.7 %, as the platinum coating conducts electricity better. In practice on optimally set-up large-scale plants, Umicore actually confirms savings of about 12 %. According to measurements by the engineering firm, this reduction in energy consumption can be increased to more than 30 % (see Fig. 2) if the flexible shaping and stability of the platinised titanium or niobium anode are exploited. In contrast to conventional lead anodes, the distance between anode and cathode can be significantly reduced, which allows the required energy input to decrease almost linearly.

Overall, the study shows that the PLATINODE® HC is a more efficient and energy-saving alternative to lead anodes. The report prepared for this purpose is provided free of charge by Umicore for BAFA funding as official confirmation of the energy and associated CO<sub>2</sub> savings.

### **ACTUAL SAVINGS POTENTIAL AND SUBSIDIES CAN BE SEEN FROM THE EXEMPLARY INSTALLATION AT WILHELM BAUER**

Wilhelm Bauer GmbH & Co.KG is a renowned company that has spe-

cialised in the finishing of metallic surfaces since 1945. A few years ago, the company decided to replace the lead anodes in a small hard chrome bath with a custom-made PLATINODE® HC. "The investment has paid off", reports Jan Bauer, Managing Director of the Hannover-based company, and continues: "The experience with the platinised titanium anodes has been very positive and the saving of around 10 % in energy costs and our correspondingly more positive CO<sub>2</sub> balance speak for themselves". Since energy costs have risen steadily in recent years, the decision was made in 2022 to also retrofit the significantly larger baths. The goal is to gradually replace the more than 200 lead anodes with PLATINODE® HC. In order to support this project economically, Umicore has not only prepared a preliminary concept and a quotation. At the same time, an application for funding was submitted to the BAFA (Federal Office of Economics and Export Control) through its energy consultant, who is now firmly involved in such retrofits.

At the beginning of 2023, the first 24 customised anodes with an impressive length of over 6 metres were installed and production was successfully started. The effect of the replacement stage is just as impressive: Wilhelm Bauer GmbH & Co.KG consumes 87,121 kWh less electricity per year as a result. At the same time, the company reduces its carbon footprint by 63.8 tonnes - by way of comparison, well over 5,000 mature beech trees would be needed for an equivalent CO<sub>2</sub> offset.<sup>4</sup> Based on the amount of carbon dioxide saved, the company can also count on a grant from BAFA of around 57,500 euros. This would put the investment costs of just under €275,000 into perspective, or around 36% of the total is expected to be financed by energy savings and subsidies. "From an economic point of view alone, an end to the use of lead anodes in hard chrome plating can already be expected in the medium term. Durability, efficiency, energy-saving potential and now the anticipated subsidy for PLATINODE® HC bring monetary competitive advantages that cannot be compensated for by users of lead anodes," Christian Kurrle from the Umicore sales team is convinced.

## **PLATINODE® HC IS OFTEN MORE ECONOMICAL THAN LEAD ANODES IN THE SECOND YEAR OF PRODUCTION**

Basically, PLATINODE® in all versions has a high adhesive strength, corrosion resistance and ductility and thus an above-average service life - this is stated by Umicore to be about five times that of a commercial lead anode. This is already reflected positively in the cost-benefit calculation in the medium term, even without subsidies. As a rule, the investment pays for itself after about three years. In the case of energy-intensive hard chrome plating, this would be likely in the second year due to the possible government subsidy, the energy savings and the elimination of lead chromate disposal with the PLATINODE® HC.

Factors that are more difficult to measure, such as a more efficient workflow, the reduction of maintenance measures and the resulting production downtimes, as well as the image gain, have not even been taken into account. The same goes for the reusability of the customised electrode design, which can simply be replated after the platinum layer wears out. Nor does it include the cost and time incurred by official requirements for lead anodes.

## **PLATINODE® HAS ADVANTAGES IN TERMS OF SUSTAINABILITY THAT ARE INCREASINGLY COMING TO THE FOCUS**

The future belongs to Umicore's platinised electrodes not only for monetary reasons. It is also because environmental aspects are becoming increasingly important. The focus on a sustainable production chain is increasingly causing purchasing companies to sort out suppliers that do not fit into their concept. For example, the continued use of lead anodes in hard chrome plating is becoming an increasing problem for suppliers.

The reason for this is that the lead chromate produced during hard chrome plating is classified in Germany as "highly hazardous to water" (the highest possible classification), i.e. it can trigger natural disasters.

In addition, the waste product is classified as carcinogenic (category 1B) and toxic to reproduction (category 1A).<sup>6</sup> The European Chemicals Agency ECHA has included lead chromate in the candidate list of Substances of Very High Concern (SVHC).<sup>7</sup>

These and other assessments are leading to increasing regulation of lead-processing companies worldwide. There are already time-consuming and cost-intensive hurdles in the procurement of lead for further processing, for example in the USA through registration with the US Environmental Protection Agency (EPA). Conversely, there are often numerous obstacles in the disposal of waste - just mention quantitative levy regulations or the associated costs. The procurement of lead and the disposal of the resulting waste products such as lead chromate sludge are likely to become increasingly complicated and expensive until a possible ban.

But it is not only environmental concerns that are leading to ever stricter regulations. Because of the health hazards, they are also becoming increasingly important in the area of occupational safety, as can be seen from the activities of the US authority OSHA. The requirements for the protection of employees (cleaning equipment, protective clothing, medical check-ups, ...) are becoming more and more extensive and thus more cost-intensive.<sup>8</sup>

The long-term goal of all measures is to increasingly eliminate lead from industrial processes through concerted global efforts.

#### **LAST BUT NOT LEAST, THE PLATINODE® BRAND IS A GUARANTEE FOR A VERY HIGH-QUALITY RESULT**

In the discussion about sustainability and monetary aspects, the main advantage of PLATINODE® is lost from view. With these tailor-made electrodes, the best coating result by far is achieved in terms of quality. The professional, individual design allows for a very uniform coating thickness distribution on the workpiece, which does not require

any post-processing. On the one hand, this is due to the absolute dimensional stability of platinised titanium anodes. On the other hand, it is thanks to the high-temperature electrolysis (clearly superior to aqueous deposition), which enables a 99.99 % pure platinum layer as well as, among other things, high adhesive strength and ductility.

Of course, these advantages also come into play in many other segments besides hard chrome plating. Both in the decorative field, e.g. for the coating of jewellery, and in the technical field, the other variants of PLATINODE® have become indispensable after their use. It has long been at home, for example, in the automotive sector or in water treatment due to its uncomplicated handling. At the same time, coating with these high-quality electrodes has now also established itself in the technical high-performance segment such as semiconductor and printed circuit board technology.

## SOURCES AND FURTHER INFORMATION ON THE NET:

- 1) Share of energy sources in net electricity generation in the EU in the years from 2021 to 2022

Statista GmbH  
<https://de.statista.com/statistik/daten/studie/182159/umfrage/struktur-der-bruttostromerzeugung-in-der-eu-27/>

- 2) European Green Deal

European Commission  
[https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal\\_de](https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_de)

- 3) Federal funding for energy and resource efficiency in the economy - grant and loan (Module 4)

Federal Office of Economics and Export Control  
[https://www.bafa.de/DE/Energie/Energieeffizienz/Energieeffizienz\\_und\\_Prozesswaerme/Modul4\\_Energiebezogene\\_Optimierung/modul4\\_energiebezogene\\_optimierung\\_node.html](https://www.bafa.de/DE/Energie/Energieeffizienz/Energieeffizienz_und_Prozesswaerme/Modul4_Energiebezogene_Optimierung/modul4_energiebezogene_optimierung_node.html)

- 4) How many trees does it take to sequester one tonne of CO<sub>2</sub>?

co2online - gemeinnützige Beratungsgesellschaft mbH  
<https://www.co2online.de/service/klima-orakel/beitrag/wie-viele-baeume-braucht-es-um-eine-tonne-co2-zu-binden-10658/>

- 5) Data sheet lead chromate

Ministry for the Environment, Climate and Energy Management BW  
[https://www.reach.baden-wuerttemberg.de/documents/11233/367355/Bleichromat\\_210503.pdf/6cc6df5a-c10a-4b73-b3ea-5fba85810383](https://www.reach.baden-wuerttemberg.de/documents/11233/367355/Bleichromat_210503.pdf/6cc6df5a-c10a-4b73-b3ea-5fba85810383)

- 6) GESTIS-Substance database / Lead(II) chromate

Deutsche Gesetzliche Unfallversicherung e.V. (DGUV)  
<https://gestis.dguv.de/data?name=002140>

- 7) Substance Infocard / Lead chromate

European Chemicals Agency  
<https://echa.europa.eu/de/substance-information/-/substanceinfo/100.028.951>

- 8) Occupational Safety and Health Administration/ Lead

United States Department of Labor  
<https://www.osha.gov/lead>

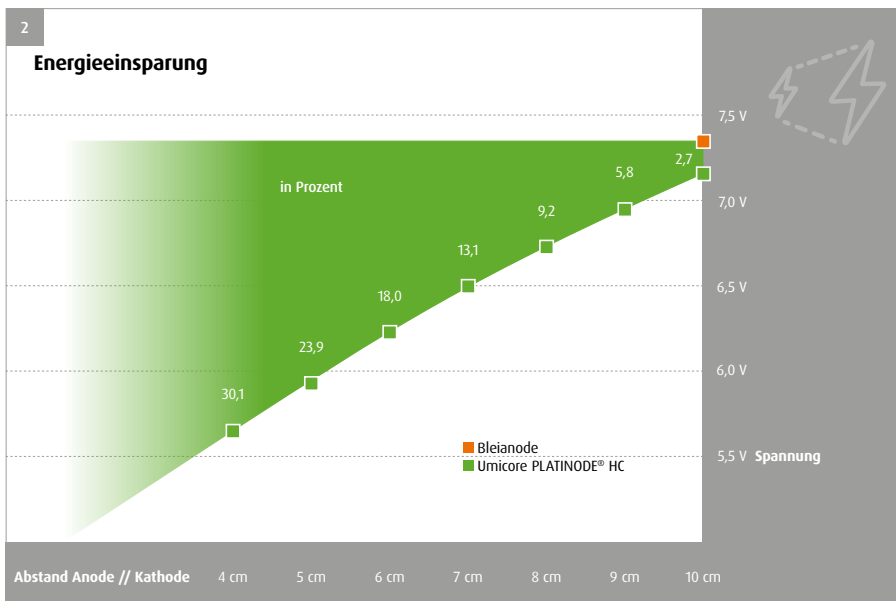
Accessed: 06.07.2023



## IMAGES

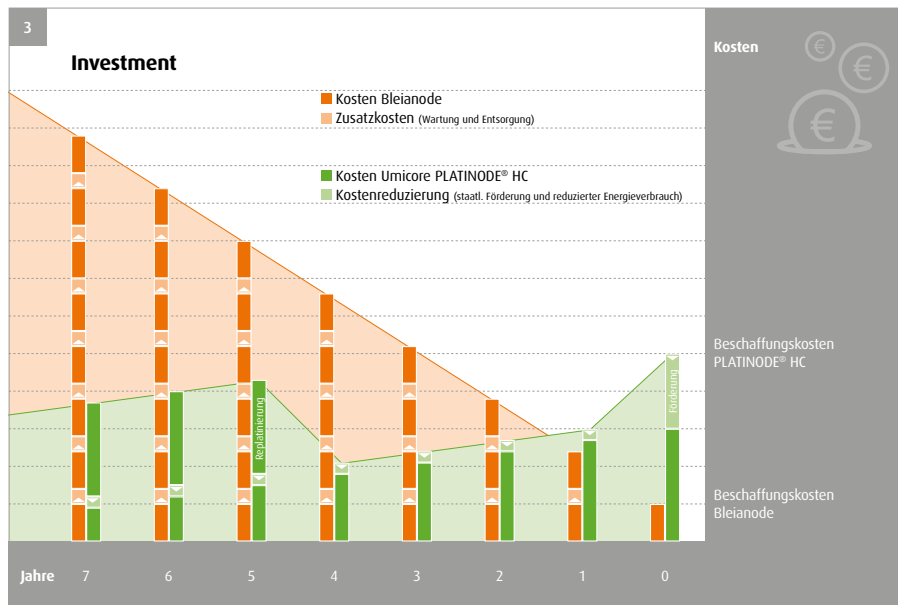


The platinised titanium or niobium anode PLATINODE® HC, which was specially developed for hard chrome processes and is manufactured using the highest-quality of all electrode coating processes (high-temperature electrolysis), brings positive effects in terms of quality, economy and sustainability.



The Berlin-based independent engineering firm Delta Engineering & Chemistry GmbH has determined that a 1:1 replacement of lead anodes with PLATINODE® HC enables energy savings of at least 2.7 %. In practice on optimally set-up large-scale plants, Umicore actually confirms savings of about 12 %. According to measurements taken by the engineering company, this reduction in energy consumption can be increased to more than 30 % if the flexible shape and stability of the platinised titanium or niobium anode is exploited and the distance between the anode and cathode is reduced.

## IMAGES



As a rule, the investment in the PLATINODE® HC pays for itself in the second year due to the possible government subsidy, the energy savings and the elimination of lead chromate disposal. The reusability of the individually manufactured electrode design, which can simply be replatinated after an average of 5 years after the platinum layer wears off, has a positive effect on the overall calculation.



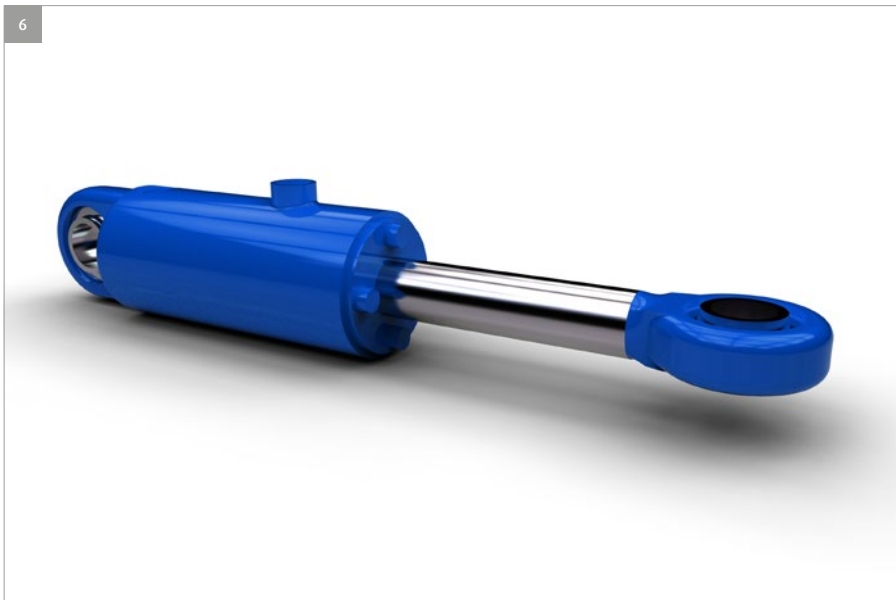
The customised and absolutely dimensionally stable PLATINODE® achieves by far the best coating result in terms of quality. The professionally designed platinised titanium or niobium electrodes enable a very uniform coating thickness distribution on the workpiece, which does not require any post-processing. Added to this is an incomparably long service life.

PLATINODE® is manufactured in many variants and its advantages are used in many other segments besides hard chrome plating. Once used, PLATINODE® is indispensable both in the decorative sector, e.g. for coating jewellery, and in the technical sector.

## IMAGES



In the energy-intensive hard chrome plating of casting rolls, for example, PLATINODE® HC is often already more economical than lead anodes in the second year due to a possible government subsidy, the energy savings and the elimination of lead chromate disposal.



The focus on a sustainable production chain is also already noticeable in the hydraulic cylinder segment.

## IMAGES



At the beginning of 2023, customised anodes with an impressive length of over 6 metres were installed at Wilhelm Bauer GmbH & Co.KG. The effect of the replacement is equally impressive: Wilhelm Bauer GmbH & Co.KG consumes 87,121 kWh less electricity per year and at the same time reduces its carbon footprint by 63.8 tonnes.



Wilhelm Bauer GmbH could reduce its investment costs for Umicore's platinised titanium anodes (PLATINODE® HC) by around 36 % due to energy savings and government subsidies.



## IMAGES



Reducing the distance between anode and cathode and thus saving energy is not possible with conventional lead anodes due to deformation in the course of use.



Hard chromium plating with lead anodes produces lead chromate, which is considered to be highly hazardous to water, carcinogenic and toxic to reproduction.

## IMAGES

11



Christian Kurrle  
Sales Electrochemical Electrodes  
Umicore Metal Deposition Solutions

12



Wilhelm Bauer  
GmbH & Co KG

Logo  
Wilhelm Bauer GmbH & Co.KG

## IMAGES

13



Logo Umicore  
Business Unit Metal Deposition Solutions

## CONTACT

### Christian Kurrle

Sales Electrocatalytic Electrodes

Business Line Electroplating

Phone: +49 7171 607 167

Mobile: +49 157 8053 5100

Email: [christian.kurrle@eu.umicore.com](mailto:christian.kurrle@eu.umicore.com)

### Thorsten Klopfer

Manager Communications

Business Line Electroplating

Phone: +49 (0) 71 71 / 607 - 218

Mobile: +49 (0) 172 / 730 26 95

Email: [thorsten.klopfer@eu.umicore.com](mailto:thorsten.klopfer@eu.umicore.com)

Umicore Galvanotechnik GmbH

Klarenbergstrasse 53 - 79

73525 Schwaebisch Gmuend

Germany



## ABOUT UMICORE METAL DEPOSITION SOLUTIONS

Within the Umicore Group, the Metal Deposition Solutions (MDS) business unit is the business headquarters for the two established business lines Electroplating and Thin Film Products. Metal Deposition Solutions is one of the world's leading suppliers of products for the (precious) metal-based coating of surfaces in the nanometer and micrometer range - with the expertise of the two divisions we combine the two highest-quality processes: Electroplating and PVD coatings.

The business unit's solutions are used in many everyday products or make their production possible in the first place. Almost all well-known manufacturers in the electronics, automotive, optics and jewelry industries source components coated with our Umicore products either directly or indirectly.

In addition to development and production, Metal Deposition Solutions offers a comprehensive service for their products. This includes, for example, recycling or precious metal management in addition to consulting and on-site technical support.

Further information: [mds.umicore.com](https://mds.umicore.com)

###