

[Umicore's RUTHUNA® product family beats palladium, which has been the preferred material up to now, in all relevant properties](#)

SUSTAINABLE PALLADIUM SUBSTITUTE WITH SIGNIFICANT PRICE ADVANTAGES OF OVER 70%

For years, palladium has been considered the ideal intermediate or final layer among platinum metals. Due to the continuous price increase of the precious metal, which culminated this year with a five-fold increase compared to 2017, the decorative industry in particular is longing for a real alternative. Umicore Metal Deposition Solutions has recognised the trend and started early with the expansion of its RUTHUNA® product family.

In addition to cost-effectiveness, which is expressed by a price advantage of currently more than 70 %, RUTHUNA® is equally impressive in terms of sustainability, quality, user-friendliness and, in the technical segment, for selected applications in the area of functionality. Thus, former compromises in these points no longer have to be accepted - even if palladium still exists, especially in the decorative area, there is little to be said for the further use of palladium due to the meanwhile strongly expanded RUTHUNA® product family. Especially since an exchange of the electrolytes, which can also be deposited on non-ferrous metals due to their pH neutrality, is possible with almost no effort.

RUTHUNA® IS PROBABLY THE BEST SOLUTION NOT ONLY IN TERMS OF PRICE

The costs for energy, buildings, raw materials, etc. are rising - in order to continue to produce economically and to be able to sell at a competitive price, savings are necessary. The palladium price, which has exceeded the 100 €/g mark this year, is making producers look for alternatives now at the latest. From an economic perspective alone,

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ruthenium naturally stands out among the platinum metals. At less than €20/g, ruthenium is currently many times lower and was only slightly higher at the peaks of the last few years. It is precisely this price stability that makes it possible to calculate with foresight.

Nevertheless, and especially nowadays, price is no longer the only decisive factor. Customers, suppliers and thus also producers are also concerned with the issue of quality and sustainability - now the basis for customer loyalty and winning new customers in a highly competitive market. Ruthenium also has an inherent advantage in these points. Pure ruthenium, for example, is by far the most abrasion-resistant platinum metal. Nothing stands in the way of a long life for brooches, rings, bracelets but also buckles and other decorative accessories despite constant friction. An abrasion of 0.05 µm in the Bosch-Weinmann test shows that RUTHUNA® has a clear quality advantage over palladium. In the company's own test laboratory, pure palladium with 6.8 µm in the same test procedure has 136 times the abrasion.

Ruthenium is also ahead in terms of a steady supply of raw materials. Russia is the world's largest producer of palladium, producing 90 tonnes a year. Unfortunately, Russia has not proven to be a reliable partner for raw materials due to the events in the conflict with Ukraine. Ruthenium, on the other hand, comes 87% from South Africa and only 4% from Russia (as of 2020¹). One point that makes RUTHUNA® a more sustainable product is the company's announcement that it will take back ruthenium from used electrolytes at daily updated prices. Umicore thus closes the circle and ensures a real plus on the producer side in terms of sustainability.

RUTHUNA® ALSO SHOWS ITS ADVANTAGES AS AN IMPERCEPTIBLE INTERMEDIATE LAYER

RUTHUNA® can be used directly as a final coat and impresses with virtually lifetime abrasion resistance in normal use. Light coatings with an L* value (L*a*b* colour space) of 74 to very dark coatings with an L*

value of 63 are possible as standard.

However, ruthenium is not always desired as a final layer or the brightness is not bright or brilliant enough. Here RUTHUNA® has a natural limitation in colouring compared to palladium (L^* value: 84) or rhodium (L^* value: 90). Nevertheless, the obvious advantages of RUTHUNA® can be largely exploited when used as a solid intermediate layer. The argument that a final layer may be partially worn through quickly is not a KO criteria. Due to the colour-matched interlayer, rub-through is not visible to the naked eye.

SOME TECHNICAL APPLICATIONS ALSO BENEFIT

It also makes sense to consider changing the previous precious metal for various technical applications such as reed switches, inkjet printer foils, surfaces of catalytic converters or electrolytic electrodes. In addition to the economic and sustainable aspects, functional properties also speak in favour of RUTHUNA®, such as the reduced sparking in current-conducting applications. However, the coating process still limits its broad applicability in all technical areas.

THE NEW KING OF THE PLATINUM METALS

"Close partnership with our customers was also the impulse for this development. Due to price developments, many decorative producers wanted a cost-effective intermediate layer that could replace a large part of the palladium without hesitation. This is exactly what is now possible with our new RUTHUNA® processes and, as far as I know, also unique," explains Martin Stegmaier (Division Manager Decorative Applications) the early development and thus possible competitive advantage, which is obvious for producers with RUTHUNA®. Only accessories with final gold layers still need palladium in the form of a wafer-thin barrier layer - without this, corrosion of the gold is still unavoidable. Stegmaier is optimistic, however, that the product family can be quickly optimised to eliminate this flaw in the near future. A switch to RUTHUNA® as an intermediate layer for gold surfaces is neverthe-

less advantageous in all respects - which alone shows a price saving of over 50 %.

SOURCES AND MORE INFORMATION ONLINE:

¹⁾ Reuters, 22.11.2021

<https://mds.umicore.com/king-ruthuna>

Price and savings information is based on 5 September 2022.

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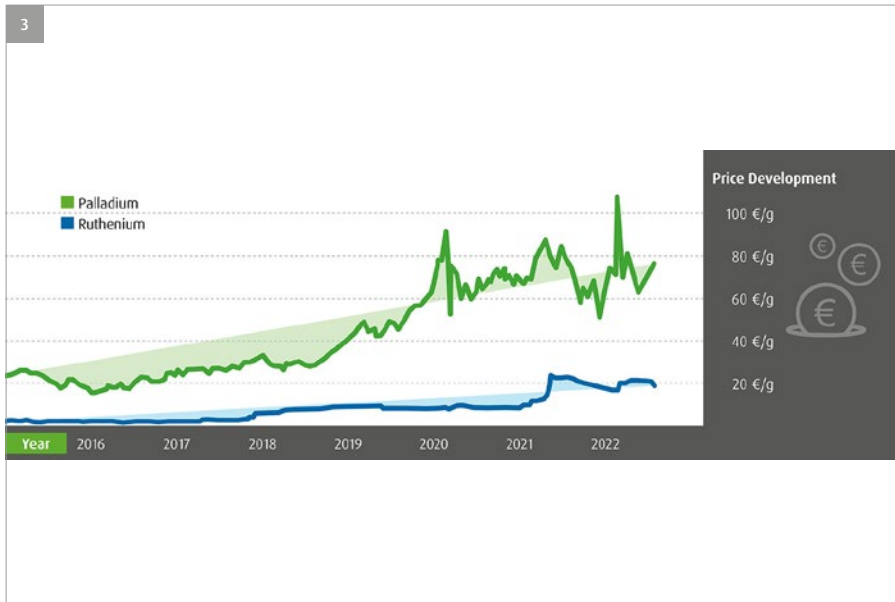
RUTHUNA® can be used directly as a final layer and convinces with light layers with an L^* value ($L^*a^*b^*$ colour space) of 74 up to very dark coatings with an L^* value of 63.

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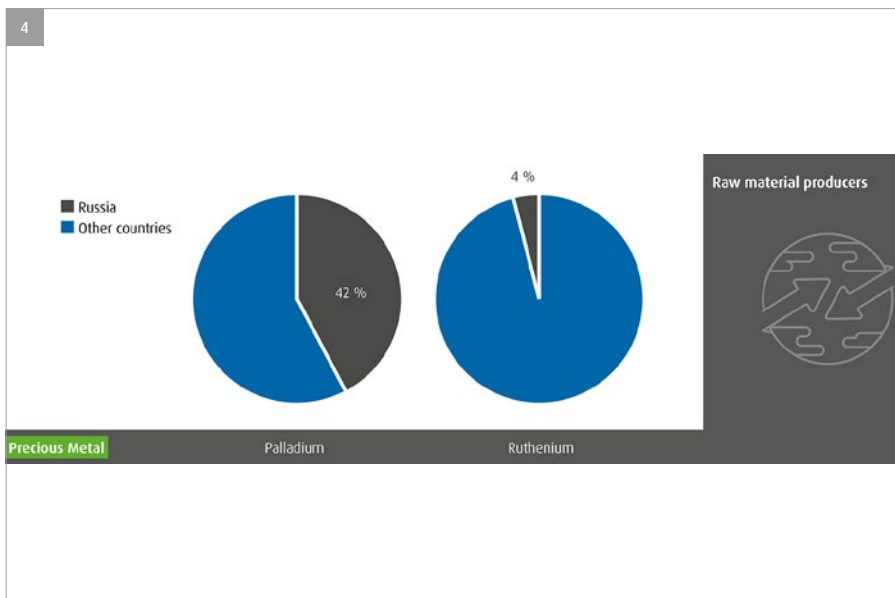


"The king is dead, long live the king", the well-known phrase used in France to announce the death of the old king and at the same time proclaim the new one, now also applies to electroplating. Even though palladium still exists, especially in the decorative sector, there is little to be said for its continued use, given the strong expansion of our RUTHUNA® product family in the meantime.

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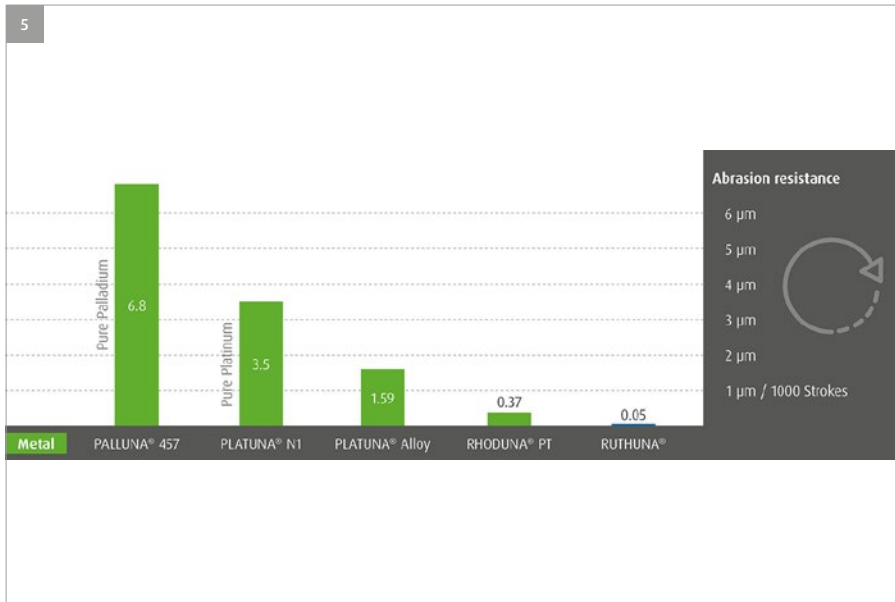


The palladium price has continued to develop over the past few years and has in the meantime also exceeded the €100/g mark. In contrast, the ruthenium price has been stable for years and is many times lower.

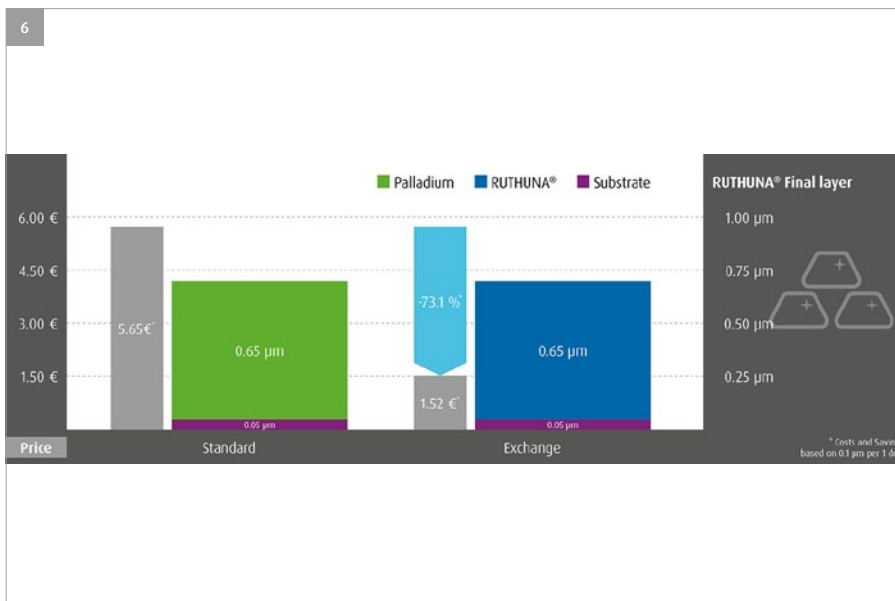


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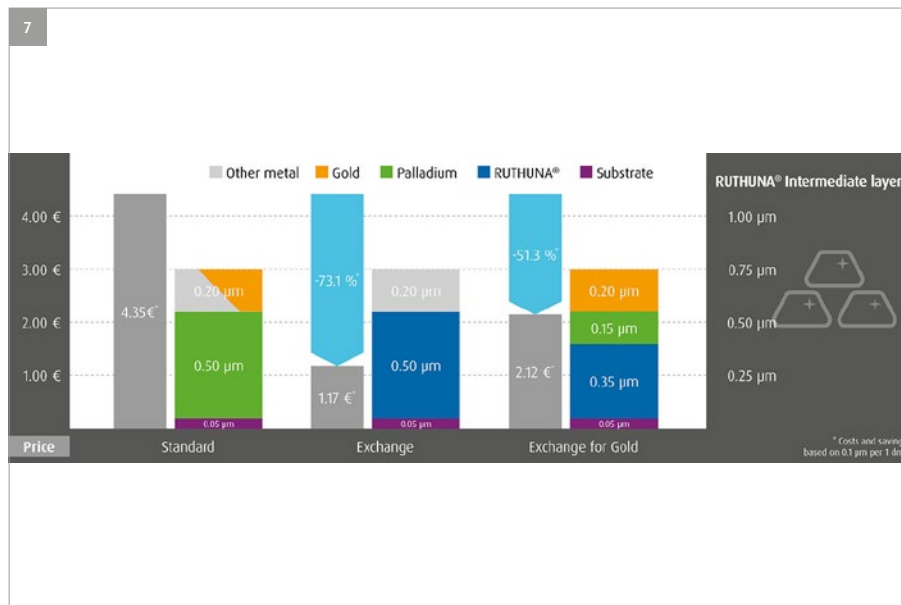


However, pure ruthenium is by far the most abrasion-resistant platinum metal - the specially manufactured RUTHUNA® therefore also convinces in the Bosch-Weinmann test (layer removal per 1000 rubbing processes with a sandpaper).



Replacing palladium with RUTHUNA® can save over 70% in precious metal costs.

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RUTHUNA® as an intermediate layer is also significantly more economical. Even with an intermediate step that has to be taken with a gold final layer to avoid the corrosion resulting from the direct contact of gold with ruthenium.



Martin Stegmaier
Division Manager Decorative Applications

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Logo

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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: www.mds.umicore.com

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