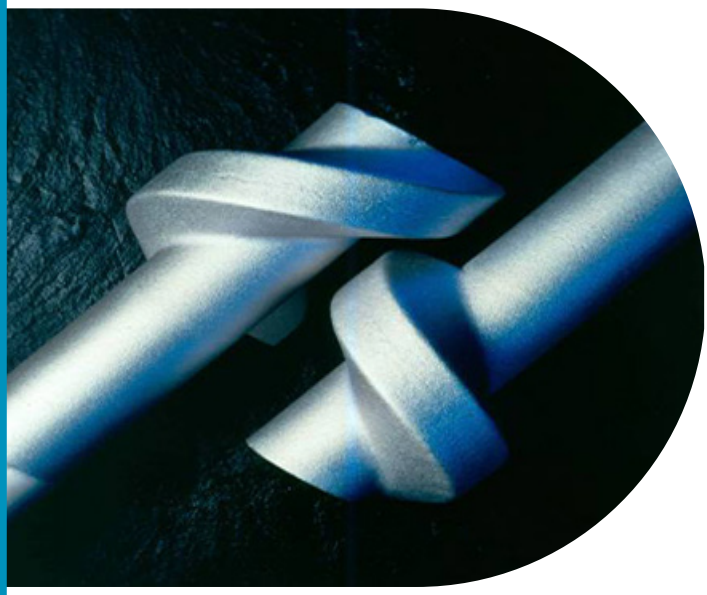
Ceramic stirrers used in glass making are coated with platinum, allowing them to withstand the extreme temperatures and corrosive nature of molten glass. Image source: Johnson Matthey



A COAT OF PLATINUM

Platinum coating applications are widespread, transforming the performance of many critical components

Coating, and its close relation, plating, are both processes in which an object is given a new exterior finish. With platinum coating, a manufacturer can take advantage of the metal's beneficial attributes without incurring the cost of making the item entirely from platinum. The purpose of coating can be to make an object less likely to corrode or to improve its electroconductivity and heat resistance. It also makes items stronger and more hard wearing.

Platinum is a widely used metal for coating and plating due to its unique chemical and physical properties, which make it so important to a range of industrial applications. As one of a handful of elements classified by chemists as noble metals, platinum resists corrosion and oxidation, that is, it does not tarnish. It also has a high melting point as well as being ductile (capable of being drawn out to make long, thin wire) and malleable (it can be hammered or pressed into shape without breaking or cracking).

At first glance, coating and plating appear to be similar processes. However, coating typically involves electrostatically applying a free-flowing powder to a surface, then curing it under heat. For example, ceramic stirrers used in the glass making industry to ensure consistency in the formulation of the molten glass are coated with platinum. This enables the stirrers to withstand the extreme temperatures and corrosive nature of molten glass.

Plating, or electroplating, occurs when an electric current is passed through an electrolyte in which a metal object has been placed.

Platinum coating applications

Other industrial applications of coating or plating include turbine blades used in aircraft jet engines, which can be platinum plated to create high-temperature resistance and significantly increase the blades' service life.

Electronic components are frequently coated with platinum as an anti-corrosion measure, to improve conductivity and durability. Platinum is especially

Turbine blades used in aircraft jet engines can be platinum plated to create high-temperature resistance and improve durability

useful for plating intricate or delicate parts, for example those used in sensors, and new modern plating methods are used to make high-performance films in the microelectronics industry.

Platinum plating is widely used in the production of medical instruments, implants and prostheses, for several reasons. It is highly biocompatible, meaning platinum is well tolerated by the body and unlikely to cause an allergic reaction.

In addition, it is a non-porous metal that forms a uniformly smooth surface when plated, making it less likely to cause bacterial infection. Platinum is also radiopaque, showing up well in X-ray images and during surgery.

In the automotive sector, autocatalysts contain platinum as a catalyst, which is applied as a 'washcoat' – a liquid coating mixture that is then cured in an oven – to a ceramic or silicon carbide substrate.

Fuel cell electric vehicles (FCEVs) are powered by a hydrogen proton exchange membrane (PEM) fuel cell which uses thin-layer platinum electrodes. While the electrode is applied as a thin coat it is a complex granular layer with very high surface area that permits the ingress of hydrogen or oxygen and allows pure water to flow from it.

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