Platinum Space Thruster

What is a Space Thruster?

The component in question is a precision-engineered part made from platinum, designed specifically for use in space applications. This part plays a critical role in spacecraft systems due to platinum's unique properties, including its resistance to corrosion, high melting point, and ability to withstand extreme environmental conditions. The Space Thrusters function in space applications can range from acting as a crucial element in propulsion systems to serving as a part of communication or thermal control systems, where reliability and durability are paramount.

Given the harsh conditions of space, including extreme temperatures and radiation, Cookson Industrial manufactures to the highest possible standards of precision. Even the smallest defect or deviation from the specified dimensions could result in failure, which makes the choice of manufacturing method a vital decision, in this case we 3D printed via additive manufacturing and used our internal quality control checks.

How is it Made?

The platinum part is produced using an advanced additive manufacturing (AM) process that utilizes platinum powder with a particle size ranging from 15 to 54 microns. The AM process, specifically Laser Powder Bed Fusion (LPBF), allows for the part to be built layer by layer, providing precise control over the geometry and internal structures. This method minimizes material waste by using only the exact amount of platinum required, which is a significant advantage given the high cost of the material.

After the additive manufacturing process, the part undergoes several post-processing steps for checks and quality control:

- CNC Machining: Computer Numerical Control (CNC) machining is employed to achieve tight tolerances, further refining the part's dimensions and surface finish.
- Wire EDM (Electrical Discharge Machining): Wire EDM is used for final precision cutting, especially for intricate sections where CNC cannot reach or maintain the required accuracy.
- Inspection via CMM: Finally, the part is inspected using a Coordinate Measuring Machine (CMM), which ensures that all dimensions are within the specified tolerances and the part meets the stringent requirements for space applications.

This integrated manufacturing process, combining AM with post-processing and precision inspection, ensures that the platinum part is free of defects, meets the exacting specifications, and is ready for use in mission-critical space environments.

What are the Uses?

The primary use of this platinum component is in the aerospace and space exploration sectors. Its unique properties make it ideal for high-temperature applications and for environments where corrosion resistance is crucial, such as propulsion systems or sensors in satellites and space vehicles.

Specific uses include:

- Propulsion Systems: Platinum parts can be used in rocket engine components, where their ability to endure high heat and maintain structural integrity is essential.
- Thermal Control Systems: In spacecraft, controlling temperature is critical, and platinum components may be used in systems designed to manage heat dissipation and insulation.
- Scientific Instruments: Platinum's stability and precision are crucial in instruments and sensors used in space exploration, where accuracy and reliability are non-negotiable.

In each of these applications, the platinum component's precision, strength, and resistance to degradation ensure that it will perform reliably in the extreme conditions of space.

Cookson Industrial
Part of HM Precious Metals

T +44 (0) 0121 233 8191
E sales@cookson-industrial.com

Why Choose Additive Manufacturing?

Additive manufacturing offers several advantages over traditional manufacturing methods like welding and machining, making it the superior choice for this platinum component:

- Material Efficiency: Traditional methods involve significant material waste due to the extensive machining required to achieve final dimensions, especially when working with expensive materials like platinum. In contrast, AM minimises waste by building the part layer by layer, using only the necessary material.
- Precision and Complexity: AM allows for the production of parts with complex geometries and internal structures that would be difficult or impossible to achieve with traditional methods. The precision of AM reduces the need for extensive post-processing, whereas welding and machining often require multiple steps to achieve the same level of accuracy.
- Defect Reduction: Traditional welding introduces heat-affected zones, increasing the risk of micro-cracks and other defects that compromise the part's integrity. AM eliminates weld seams, producing a more uniform microstructure and reducing the risk of defects.
- Time and Cost Efficiency: AM reduces production time by eliminating multiple stages of production (such as welding, heat treatment, and repeated inspections) required in traditional methods. This leads to faster delivery times and lower overall production costs.
- In summary, additive manufacturing provides superior material utilization, higher precision, fewer defects, and faster production times, making it the ideal choice for producing high-performance platinum parts for space applications.

Why Cookson Industrial?

Cookson Industrial stands out as a leader in the field of advanced manufacturing, with a proven track record of delivering high-quality, precision-engineered components for demanding industries such as aerospace and space exploration.

Key reasons why Cookson Industrial is the partner of choice for platinum components include:

- Expertise in Additive Manufacturing: With years of experience in AM, Cookson Industrial has perfected the use of additive processes to produce complex, high-tolerance parts from platinum and other precious metals. This expertise ensures that each component is manufactured to exacting standards, meeting or exceeding the expectations of the most rigorous industries.
- State-of-the-Art Facilities: Cookson Industrial's advanced manufacturing facilities include the latest AM equipment, CNC machines, wire EDM technology, and CMM inspection tools. This allows for full control over the production process, from raw material to finished product.
- Quality Assurance: Cookson Industrial is committed to delivering parts of the highest quality, with comprehensive inspection and testing protocols in place to ensure every component meets customer specifications. The use of CMM inspection guarantees that all parts are within the required tolerances, and additional testing ensures the structural integrity of the parts in demanding environments.
- Innovation and Customisation: Cookson Industrial works closely with customers to tailor solutions to their specific needs, providing customized designs, rapid prototyping, and ongoing support throughout the product lifecycle. This collaborative approach ensures that customers receive parts that are optimized for their applications, whether in space or other high-performance environments.

By leveraging cutting-edge manufacturing technology and a deep understanding of industry needs, Cookson Industrial provides unparalleled value to its customers, making it the trusted partner for mission-critical components in space applications.

T +44 (0) 0121 233 8191
E sales@cookson-industrial.com