

Plasmon Surface Technologies Pvt Ltd

Plasma Ion Nitriding

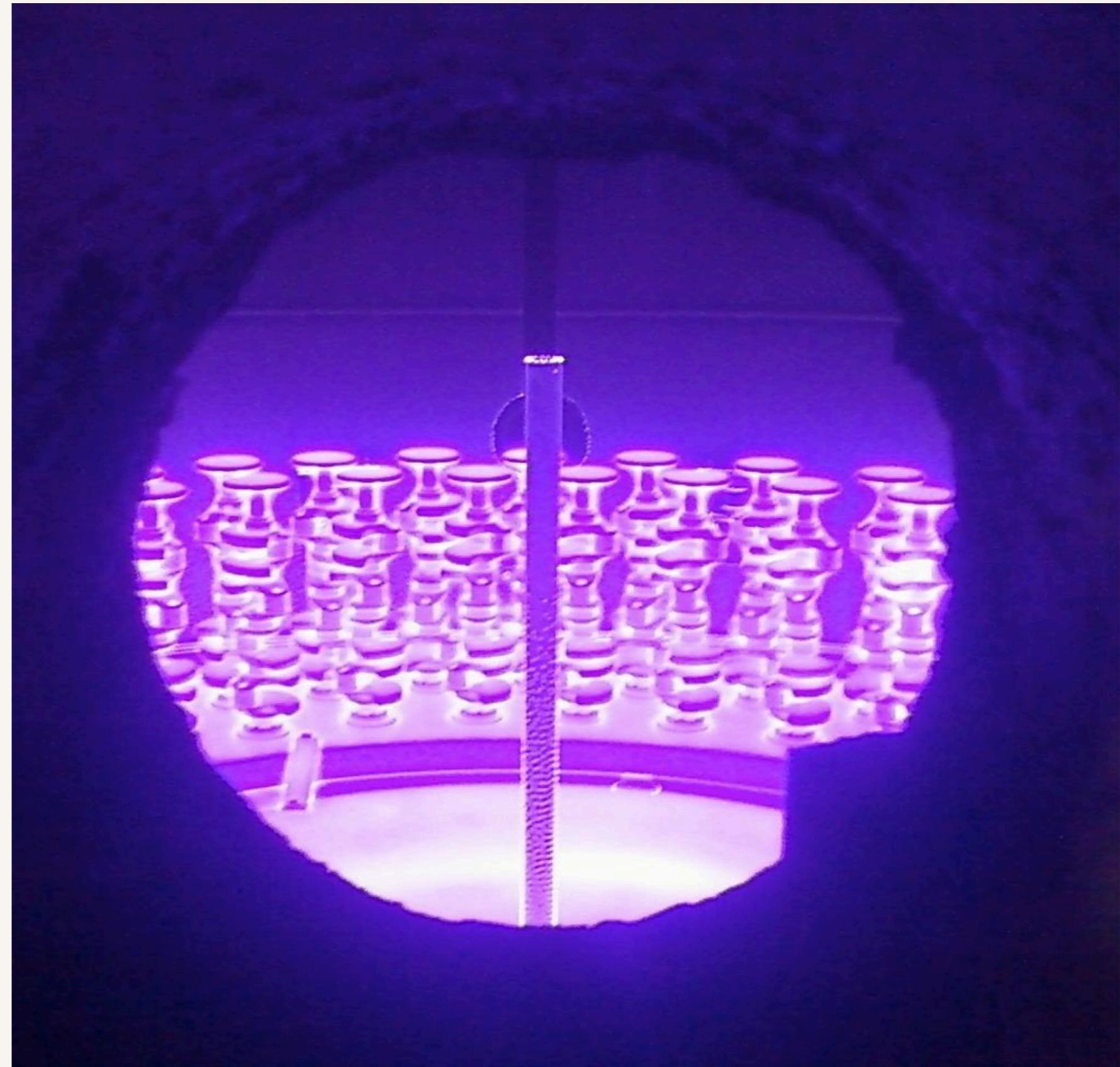
Plasma Ion Carbo Nitriding

Plasma Ion Nitriding with Post-Oxidation

Glass Bidding / Dry Blasting

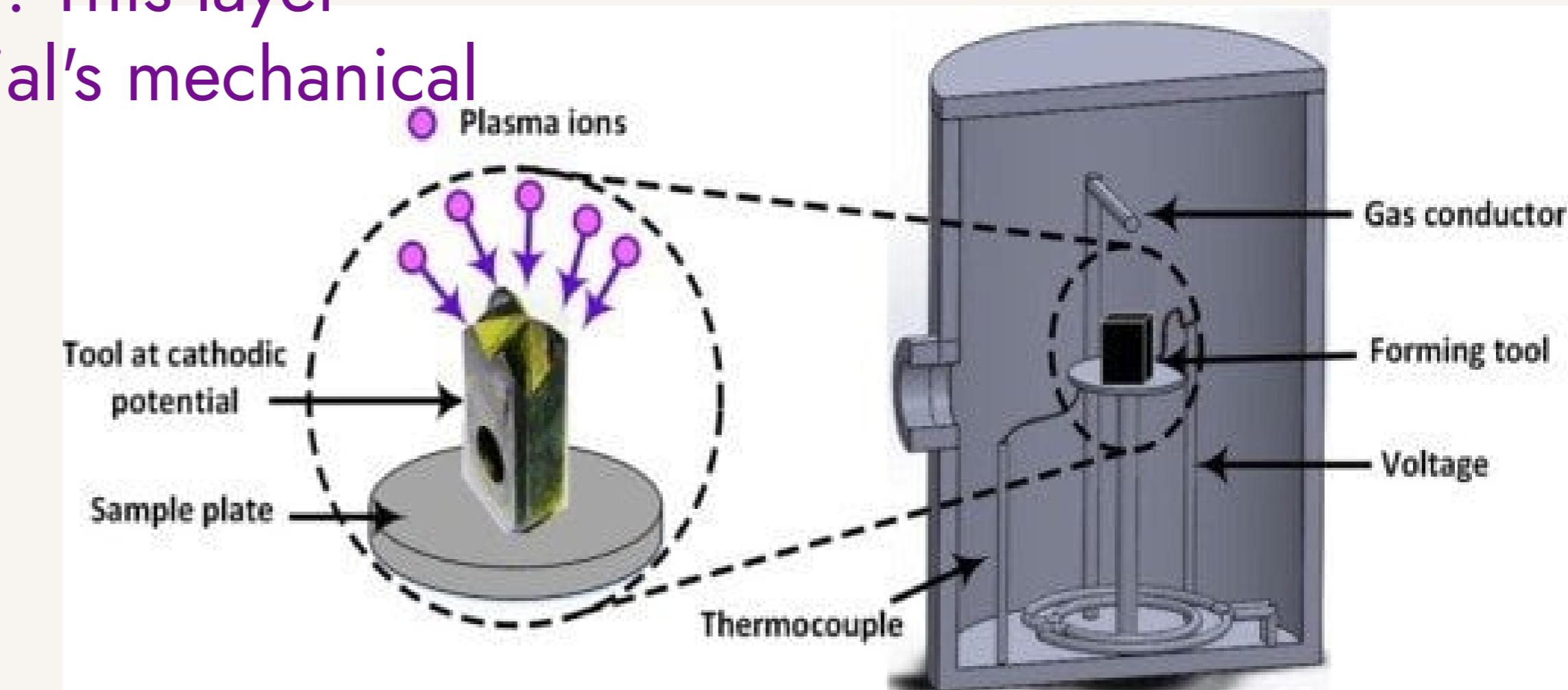
Introduction

Our high-temperature vacuum furnaces are developed and proven for all types of heat-treating applications from simple steel to high-temperature nickel-based alloys and titanium and a variety of industries, including aerospace, nuclear, power turbine, medical, tool and dies, MIM, and 3D additive, among others.



Plasma Nitriding Process

The **plasma nitriding** process involves the exposure of a material to a low-pressure **plasma** environment at elevated temperatures. During this process, nitrogen ions penetrate the material's surface, forming a **nitrided layer**. This layer significantly improves the material's mechanical and chemical properties.



PLASMA NITRIDING ADVANTAGES

1. Low process temperatures.
2. Low-distortion process.
3. Minimization or elimination of rework
4. Final cleaning and surface activation
of components in plasma good
treatability of high-alloy steels and
stainless steel.
5. Layer structure can be adapted to the
stress Layers are less brittle and
porous than with gas and bath
nitriding.
6. Shorter treatment times than (with the)
gas nitriding no subsequent cleaning
necessary.

Plasma Ion Nitriding with Post-Oxidation

Post-oxidation is an additional step in surface treatment processes, particularly after plasma nitriding. Let's explore how it contributes to corrosion resistance:

Purpose of Post-Oxidation: After nitriding, the material's surface is enriched with nitrogen, resulting in improved hardness and wear resistance. However, nitrided surfaces can still be susceptible to corrosion due to their high nitrogen content. Post-oxidation aims to enhance the material's corrosion resistance by forming a protective oxide layer on the surface.

Process of Post-Oxidation:

Oxidation Step: The component is exposed to an oxidizing atmosphere (usually air) at elevated temperatures.

Formation of Oxide Layer: During oxidation, the surface reacts with oxygen, forming a thin oxide layer.

Benefits:

- Increased Corrosion Resistance:** The oxide layer acts as a barrier, protecting the underlying material from corrosive agents.
- Improved Surface Stability:** The oxide layer stabilizes the surface, reducing reactivity with aggressive chemicals.
- Enhanced Appearance:** Depending on the material, post-oxidation can also improve the surface color and appearance.

Application: Post-oxidation is commonly used after plasma nitriding of low and medium alloyed materials. It complements the benefits of nitriding by providing an additional layer of defense against corrosion. In summary, post-oxidation is a valuable step to enhance the longevity and durability of nitrided components, especially when corrosion resistance is crucial.

Applications of Plasma Nitriding

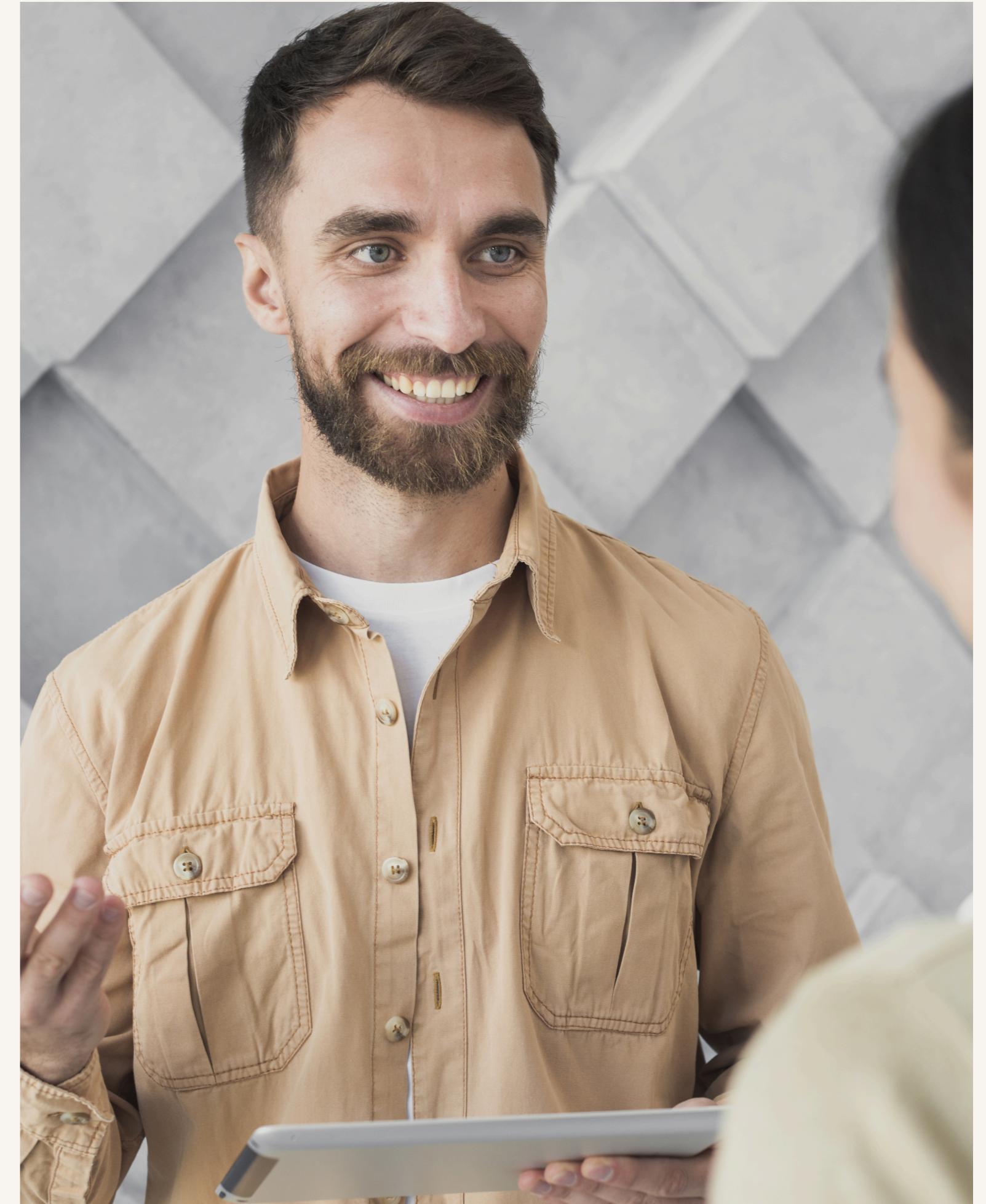
Plasma nitriding finds extensive use in the **automotive** industry for enhancing the durability of engine components, in the **aerospace** sector for improving the performance of landing gear and turbine components, and in the **tooling** industry for increasing the longevity of cutting tools, Valves and molds.

Future Developments

Ongoing research in plasma nitriding focuses on optimizing process parameters, developing new nitriding techniques, and exploring novel materials suitable for nitriding. The future holds promise for further advancements in surface engineering, leading to enhanced material performance in diverse applications.

Conclusion

Plasma nitriding is a versatile surface hardening process that significantly enhances material properties, offering benefits such as improved wear and corrosion resistance, increased surface hardness, and enhanced fatigue strength. With its wide-ranging applications and ongoing developments, plasma nitriding continues to be a vital technique in material engineering.



Thanks!

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