

PlaTeG – PulsPlasma[®] Nitriding

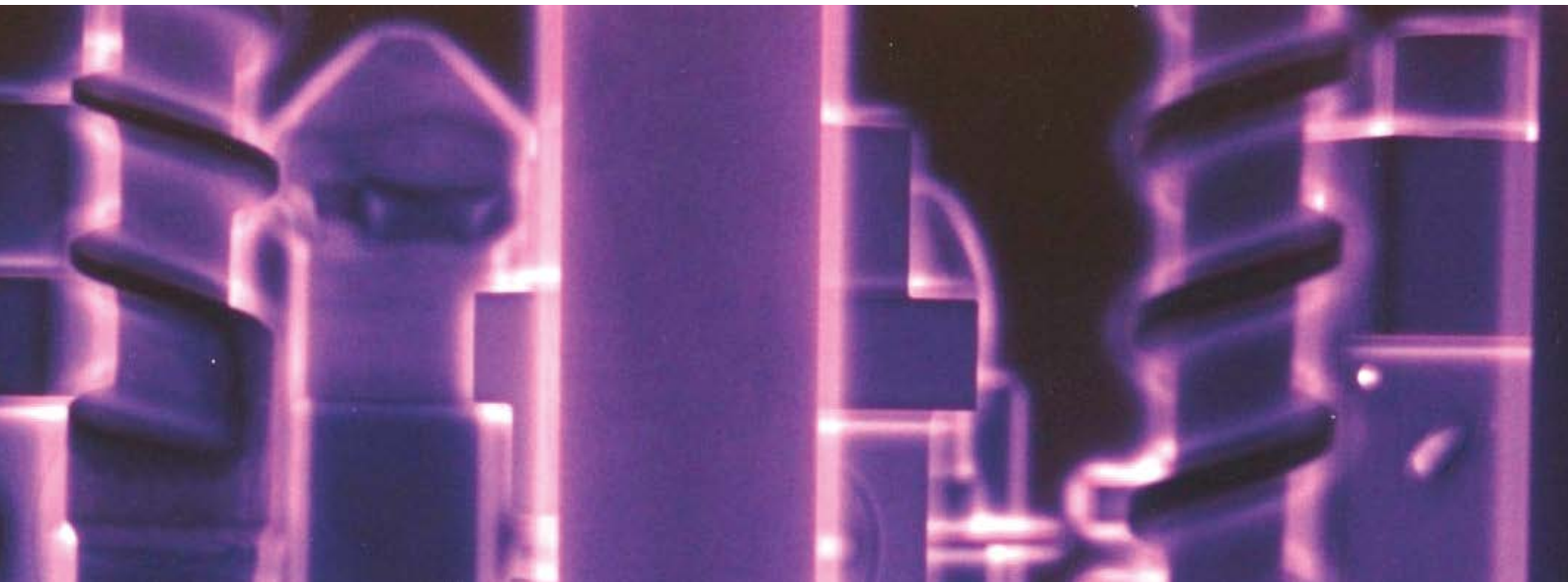
environmentally friendly & cost efficient

Maximum precision in temperature uniformity and control



PlaTeG – The ImPULSe Generators

With over 40 years of expertise in vacuum system design and construction, PVA Industrial Vacuum Systems GmbH specializes in producing cutting-edge PlaTeG – **PulsPlasma**[®] Nitriding (PPN) systems. These advanced solutions are designed for the surface treatment of a wide range of metallic components and complex geometries. Our systems enhance key properties such as hardness, wear and corrosion resistance, heat resistance, and fatigue strength.



PulsPlasma[®] – The thermo-chemical technology

Rising demands on tools and machine parts require future-oriented production technologies. With our **PulsPlasma**[®] thermo-chemical diffusion technology we provide efficient and reliable protection against wear and corrosion.

PulsPlasma[®] Nitriding, a plasma-assisted vacuum process that enriches component surfaces with nitrogen and/or carbon, represents a forward-thinking approach to surface treatment. This innovative process meets the industry's growing demand for reliable, efficient, and environmentally friendly solutions.

Advantages

- **Maximum flexibility**
 - Treatment temperatures from 350 - 600°C
 - All types of steel, titanium and other high ferrous alloys
 - Only one process for **PulsPlasma**[®] Nitriding and post oxidation surface treatment
- **Easy partial nitriding with mechanical masking**
- **Corrosion resistance of stainless steel preserved through special processes.**
- **Higher efficiency at lower cost**
 - Suitable for complex geometries
 - Maximum specification conformity through precise control of nitriding compound layer formation
 - Cost reduction via low gas and energy consumption
 - No ammonia required
- **Eco-friendly: Better carbon footprint with sustainable process gases**

Mastering process engineering for exceptional results

Building outstanding plants requires mastery in process engineering. Only through this expertise can the full potential of plant technology be realized, unlocking a wide range of applications for PlaTeG systems.

Low-Temperature Treatment (350°C to 450°C):

PulsPlasma[®] Nitriding enables the treatment of components with diverse geometries at low temperatures. This ensures consistently minimal dimensional and shape changes. Additionally, stainless steels with chromium content >13% can be nitrided without compromising corrosion resistance or causing embrittlement.

Precise Process Control:

Accurate control of the process gas composition, combined with moderate nitriding temperatures, allows for plasma nitriding without forming a compound layer. This makes **PulsPlasma**[®] Nitriding an ideal first step in duplex treatments, providing robust support and adhesion for subsequent PVD or CVD hard coatings.

Post-Oxidation Capabilities:

PlaTeG systems are designed for seamless integration of post-oxidation treatments. By using gaseous oxidants such as air, nitrous oxide, or oxygen, a uniform Fe₃O₄ layer can be formed. This enhances corrosion re-sistance and reduces the surface's friction coefficient.

Expanded Process Spectrum:

The inclusion of oxidants as additional process gases broadens the equipment's capabilities. Applications such as plasma cleaning and oxy-nitriding become feasible, further extending the versatility of PlaTeG systems.




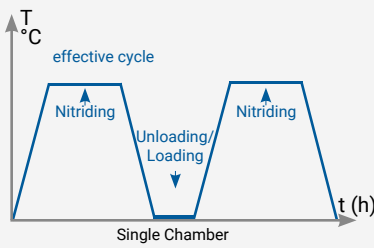
Our furnaces – Your benefits

PlaTeG – PulsPlasma® Nitriding systems offer the possibility to react flexibly to your requirements:

- **Compact and Modular Design:**
For quick installation, ensuring high economic efficiency.
- **Versatile Treatment Options in one plant:**
PPN™ – PulsPlasma® Nitriding
PPNC™ – PulsPlasma® Nitrocarburizing
PPC™ – PulsPlasma® Carburizing
PPO™ – PulsPlasma® Oxidizing
- **Advanced Automation:**
Fully automated operation allows to run processes unattended over night and weekends.
- **System Integration:**
 - Suitable for integration into serial production.
 - Compatible with existing process control systems.
 - Remote access for advanced services.
- **Comprehensive Customer Support:**
 - Treatment recipe service.
 - Advisory support for treatment issues.
 - Remote maintenance for servicing and trouble shooting.
- **German Engineering and Manufacturing:**
 - Designed and manufactured in Germany.
 - Standardized bell-type systems ensure cost-effective and rapid delivery.
 - Tailor-made bell sizes available on request.
 - Every system undergoes rigorous practical testing before delivery.
- **On-Site Commissioning:**
Ensures process safety, failure-free functionality and reliability of each system.

Available PlaTeG – PulsPlasma® Nitriding (PPN) systems

Mono-Plant


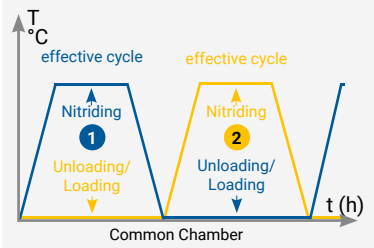
Single Chamber

- Low cost entry
- One chamber
- Option for Shuttle and Tandem

Throughput*

100 %

Shuttle-Plant

Common Chamber


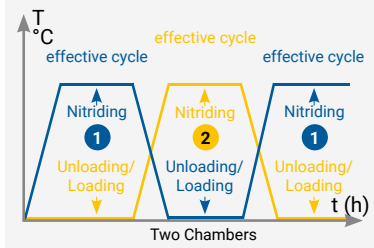
- Best value for money
- Integrated chamber transfer
- Option for Tandem

Throughput*

100 % + 60 %

+ 60 % throughput / + 21 % invest

Tandem-Plant

Two Chambers

- High efficiency
- Two chambers
- 24/7 with 2 shifts/5 workdays

Throughput*

100 % + 100 %

+ 100 % throughput / + 33 % invest

* Based on 2 shifts/5 workdays per week, total cycle time 17 h including loading and unloading.

PulsPlasma® generators

The heart of our best-in-class systems

PlaTeG – **PulsPlasma®** generators are available in various power levels, and can easily be adapted to customer requirements and plant size. Their compact design enables integration into the plant's air-conditioned control cabinet, ensuring a long service life and low-maintenance, reliable operation. Short switch-on times in the μs -range and the nearly ideal rectangular pulse shape of the generated pulse voltage enable a stable glow discharge plasma even at room temperature.

This allows PlaTeG's typical PPSA™ technology to be used in the temperature range between room temperature (RT) and 350 °C. It ensures perfect surface conditioning prior to nitrogen diffusion, optimised treatment times and uniform nitriding results.



Available systems

Standard systems for a wide range of applications. Other chamber sizes and **PulsPlasma®** (PP) generators on request.

Plant type *	"working area Ø / height (mm)"	batch weight	connected power
PP 60 Ø700x1000	Ø600 / 700	500 kg	55 kW
PP 60 Ø700x1400	Ø600 / 1000	750 kg	70 kW
PP 120 Ø1000x1600	Ø800 / 1200	2000 kg	100 kW
PP 120 Ø1000x1800	Ø800 / 1400	2000 kg	110 kW
PP 200 Ø1200x2200	Ø1000 / 1700	3000 kg	165 kW
PP 300 Ø1400x2600	Ø1200 / 2000	5000 kg	230 kW
PP 500 Ø1800x2900	Ø1600 / 2200	8000 kg	350 kW

Industries and applications

PlaTeG – PulsPlasma® Nitriding systems are perfectly tailored for treating a wide range of components made from steel, sintered iron, cast iron, titanium, aluminum and some nickel base alloys. These systems are widely and successfully utilized in the following industries:



Contract Heat Treatment Shops

Treats components like gears, shafts, and molds to enhance hardness, wear resistance, and fatigue strength.

Mechanical and Plant Engineering

Improves wear resistance, corrosion protection, and service life for hydraulic cylinders, spindles, and drive shafts.

Tool and Mold Manufacturing

Enhances surface hardness, reduces friction, and extends tool life for cutting tools, stamping dies, and molds.

Gear Manufacturing

Strengthens gears for machinery and wind turbines, improving fatigue resistance and wear performance under high loads.

Automotive Industry

Increases durability and efficiency for engine and power train parts like crankshafts and camshafts.

Aerospace Industry

Boosts fatigue resistance and corrosion protection for turbine blades, landing gear, and fasteners.

Offshore Industry

Protects subsea fasteners and pump components from fretting, corrosion and wear in harsh marine environments.

Plastics Industry

Enhances hardness and wear resistance of screw barrels, and molds used in plastic injection molding.

Power Plant Industry

Improves durability and reduces friction for turbine blades, valve stems, and pump shafts in extreme conditions.

Medical Technology

Enhances performance and biocompatibility for surgical instruments, implants, and medical devices.

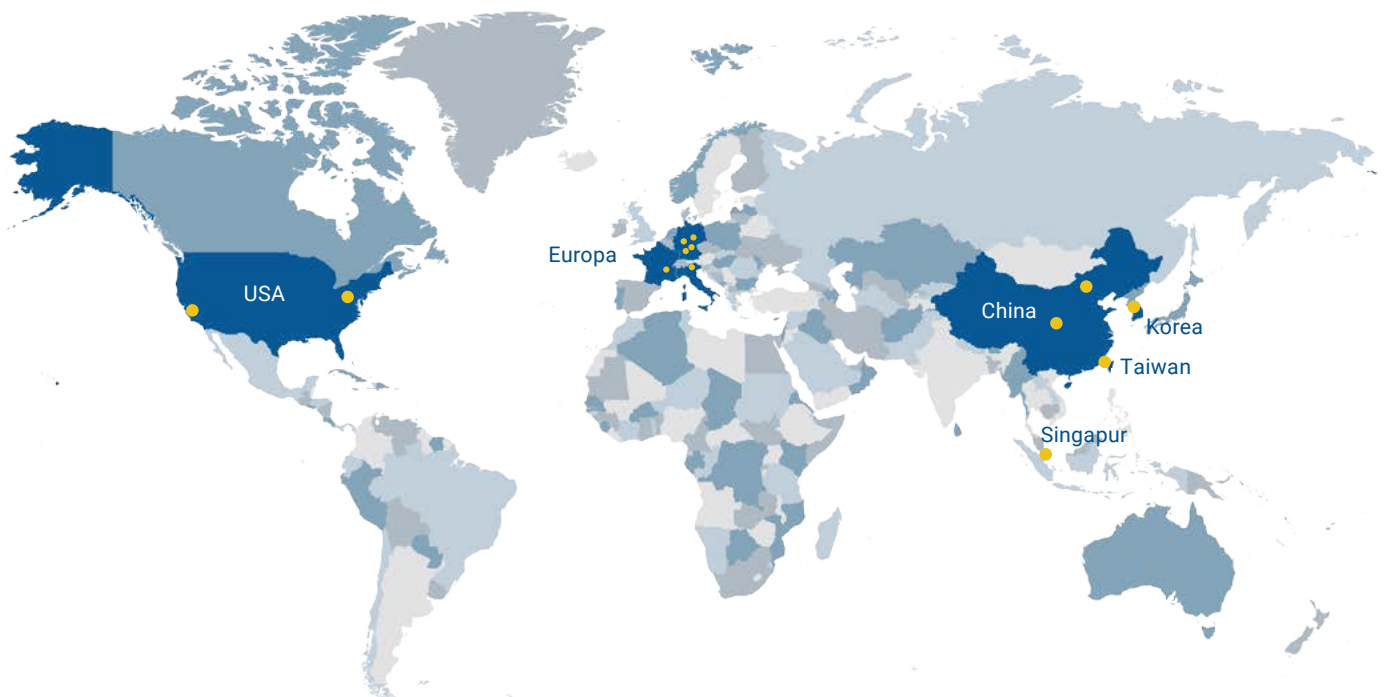
Our range of services

Simple, safe, environmentally friendly, reliable

- Planning and delivery of complete plasma nitriding systems, including specialized components for **PulsPlasma**® Nitriding of steel and other metals.
- Courtesy test treatments in our R&D facility to support your purchase decision.
- **PulsPlasma**® Nitriding as a service for special and single parts (on request)
- Treatment recipe service exclusively for PlaTeG customers.
- Full global service on PlaTeG equipment for our customers.
- Guidance on introducing and implementing plasma nitriding in your company and general consulting in surface treatments for wear and corrosion protection.

Get in touch

Your perfect solution starts with a conversation. Let's explore your options together – we're just a call or message away.





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