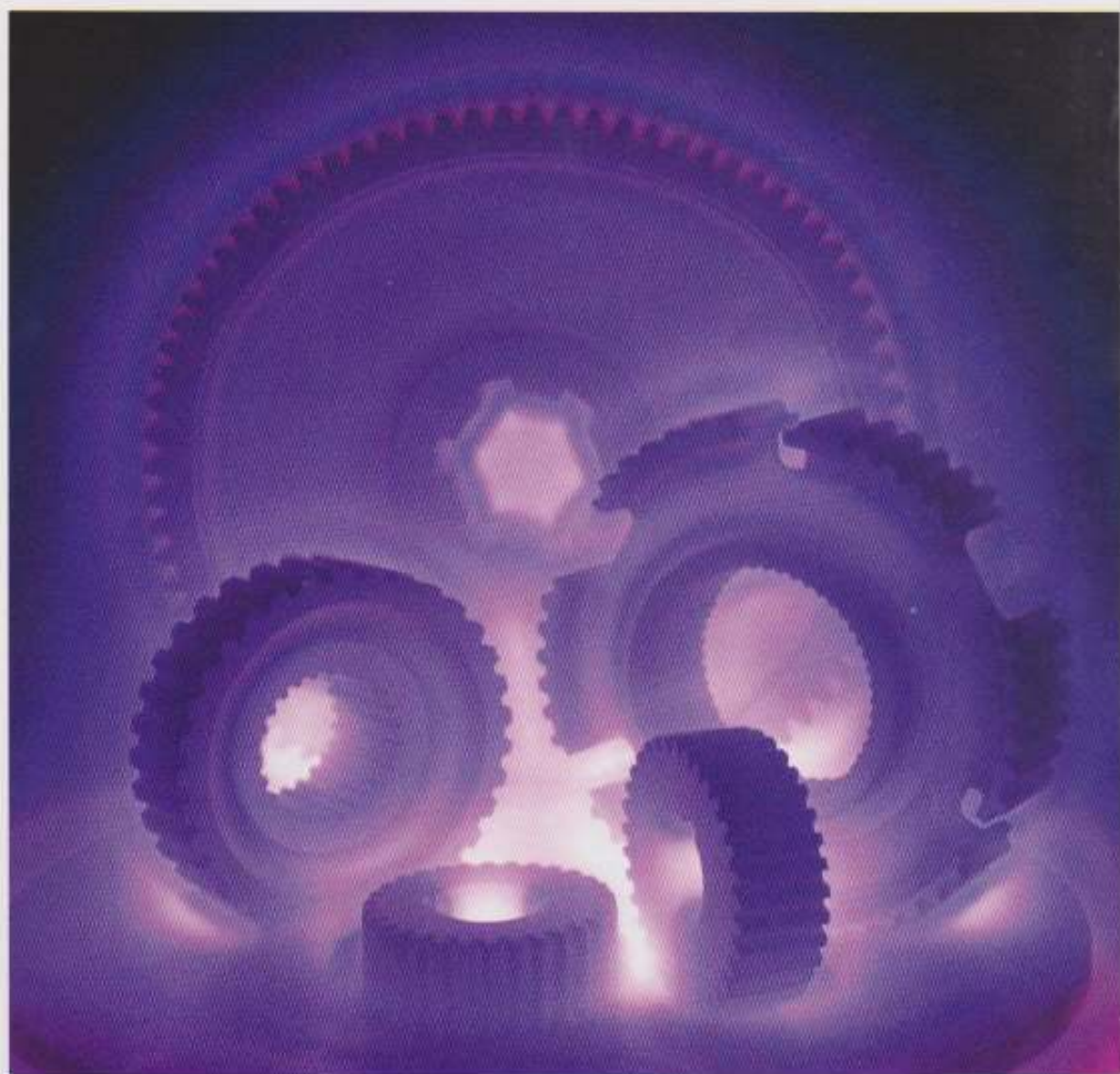


PIATEG

PVA TePla



Competence in Plasma-Surface-Technology

Attaining new Goals,
taking new Approach...

Development



Plasma technology has become a classic already.
We set up milestones. Today we are setting new standards.

Earliest research into and knowledge about plasma technique (glow discharge technique) go back to the year 1920. The development of PulsPlasma® surface engineering at laboratory level started in the seventies and reached maturity for industrial application in the eighties.

On the basis of that body of empirical and technological knowledge Plasma Technik Grün GmbH (PlaTeG) was founded in 1986. After developing the process-engineering technique for nitriding and coating work-pieces in low-pressure plasma, PlaTeG began to construct plants which work with PulsPlasma® technology.

PlaTeG has since been a leading company in the advance of plasma technology and has give many impulses to promote the use of advanced technology when treating metal surfaces.

Future oriented technical construction is part of our daily work ever leading us to new applications and results.

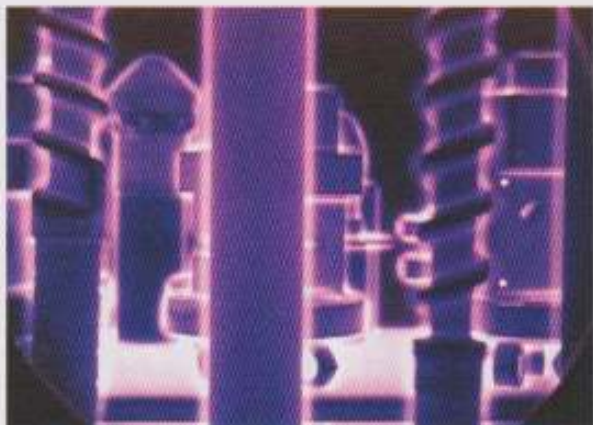


PLATEG – stimulation progress

PlaTeG has given many important impulses to co-operation between research and industry. Various regional, national and international activities in the field of surface and plasma surface engineering in particular were initiated by PlaTeG.

PulsPlasma®

Application



The thermo-chemical technique
- protecting against wear and corrosion.

Constantly growing demands on devices and machine parts must be met by new, future-oriented technologies.

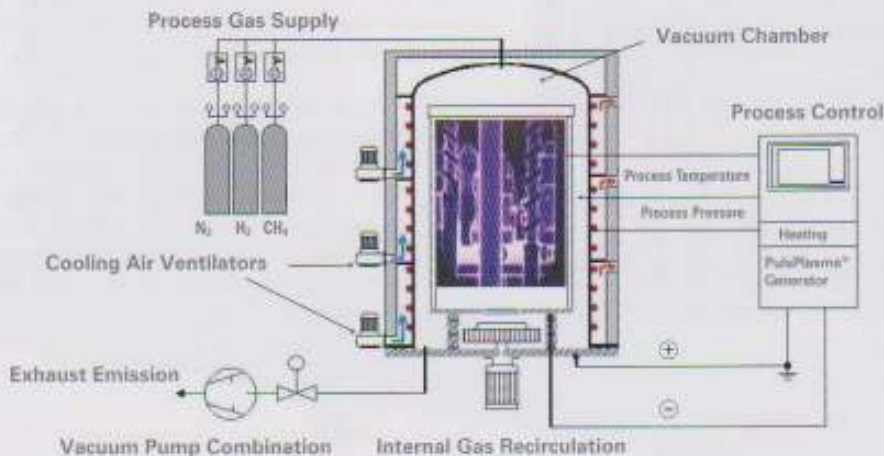
The plasma (ion-) nitriding technology shows a clear orientation towards future developments. Hence it ideally satisfies current and future industrial demands for economical and efficient solutions to the treatment of surfaces. It is also an answer to social demands for improved environmental protection.

This technology uses plasma as a gaseous reaction medium consisting of freely moving, negatively and positively charged particles (electrons, ions etc.) as well as electrically neutral atoms and molecules. The plasma envelops the workpieces to be treated, which are set up, electrically insulated, in a vacuum vessel.

The electrically activated plasma and the influence of pressure and temperature now induce a thermo-chemically controlled change on the surface of the workpieces.

The PulsPlasma® technique can be applied to the hardening, coating or etching of surfaces. The process is precisely controlled and easily adapted to many fields of application by using different gases and elements. Precision control is guaranteed by plasma activation in pulse-like intervals. The destructive effects of electric arcs to the treated surfaces are reliably avoided.

The distinctive features of this technique are its highly efficient use of energy and gas as well as the omission of chemical baths, substances, and waste products.



Application



Automobile industry
 Mechanical engineering
 Aircraft industry
 Aerospace industry
 Tool engineering
 Moulding
 Gear construction
 Metal working
 Heat treatment shops

Whoever constructs superb plants must master the technology. Only then optimal performance can be achieved. Intensively elaborated know-how flows back into technological procedures and opens a wide field of applications.

What are the applications for PulsPlasma® technology? Practically they appear in those industrial branches where workpieces with hard surfaces are processed. Where abrasion, wear, and corrosion must be countered. Where longer lifetimes are required.

Workpieces of the most complicated geometrical shapes (like threads, drillings, or slots) will be homogeneously nitrided. Soft spots are excluded. If however soft spots on surfaces are desired, they can be covered prior to treatment. The core hardness will not be impaired. High dimensional stability is guaranteed - the workpieces themselves are exposed to relatively low temperatures.

The most important advantage of this is that in most cases final processing can take place before nitriding. Post-processing thus becomes unnecessary. Composition, thickness, and hardness of the nitrided layer can be controlled and adjusted to each particular case of application. The treatment of the workpieces can be reproduced at any time because the data are stored in the process control unit.



Equipment

The nitriding plant mainly consists of three components:

1. the thermally insulated vacuum vessel with heating system
2. the PulsPlasma® generator
3. the process control unit.

The equipment takes only little space, and its modular structure allows flexible planning, guarantees fast installation and highly economical output.

The devices and internal processes are completely controlled by a process controller, which optionally can be remotely operated by a master controller. Routines for surface treatments can be executed directly or programmed individually to run fully automatically afterwards.

Before client installation the entire plant will be fully tested by us, according to the client's real operating conditions. Safety and reliability are therefore guaranteed, from the very beginning...

As individual device or integrated into mass production facilities.

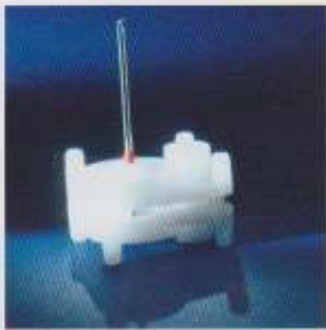
For varied fields of application through optional compositions of gases.

Highly economical use of resources.

Solutions ready to operate, without post-treatments.



Plasma surface modification of plastic parts



Surfaces of plastic parts can be changed significantly in their properties by plasma treatments:

The surface tension can be reduced (Plasma Activation) to achieve a better wettability. By this a considerable improvement for a painting, printing or bonding will be reached.

To avoid a wetting of plastic parts by oil or similar such parts can be coated (Plasma Epilamination).

The remove of coatings or the cleaning of plastic parts with a plasma process is possible (Plasma Etching). Such prepared plastic parts are clean and wettable excellently.

The plasma technology has a lot of advantages compared to other surface technologies:

- pollution free, because no toxic media are used or produced by the processes.
- reproducible results by the use of free programmable computers.
- automatic handling and integration in the production cycle possible.
- gentle treatment of the plastic parts due to no remarkable temperature increase and due to no use of acids etc.

In the vacuum chamber the plasma is created by electric fields. By this gas molecules and atoms will be ionised and they will influence the plastic surface. By the addition of small amounts of special process gases the surfaces will be influenced specifically. The plasma for the treatment of plastics will be produced by micro-waves or high-frequent alternating voltages.

Equipment

The Plasma activation plant mainly consists of three components:

1. the vacuum vessel
2. the Plasma generator
3. the process control unit.

The equipment takes only little space, and its modular structure allows flexible planning, guarantees fast installation and highly economical output.

The devices and internal processes are completely controlled by a process controller, which optionally can be remotely operated by a master controller. Routines for surface treatments can be executed directly or programmed individually, to run fully automatically afterwards.

Before client installation the entire plant will be fully tested by us, according to the client's real operating conditions. Safety and reliability are therefore guaranteed, from the very beginning...



RONDO 7000

Plasma surface modification equipment of plasma parts

Performance

...means: after preparing the basis for plasma surface engineering and applications, to be still one step ahead.

Take the safe way:

- test treatments before you decide to buy
- test runs of the plant with your workpieces under commercial conditions before delivery
- after-sales support for new applications.

Our range of services and devices includes the design and delivery of plants and special components:

- PulsPlasma® Nitriding (PPN) of steel and other metals such as Ti, Al, etc.
- PulsPlasma® Assisted Chemical Vapor Deposition (PPA CVD) for thin film hard coatings (TiN, TiC, etc.)
- PulsPlasma® Cleaning and Activation (PPCA) of metals
- Surface processing in our own plants as a customized service offer, for parts of up to 3 m in length or 1,1 in diameter, and up to 5000 kg
- Cleaning and Activation of electrically non-conductive materials like plastics, ceramics, glass, etc. through HF- or microwave-plasma technology
- Consulting on special problems of surface engineering.



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