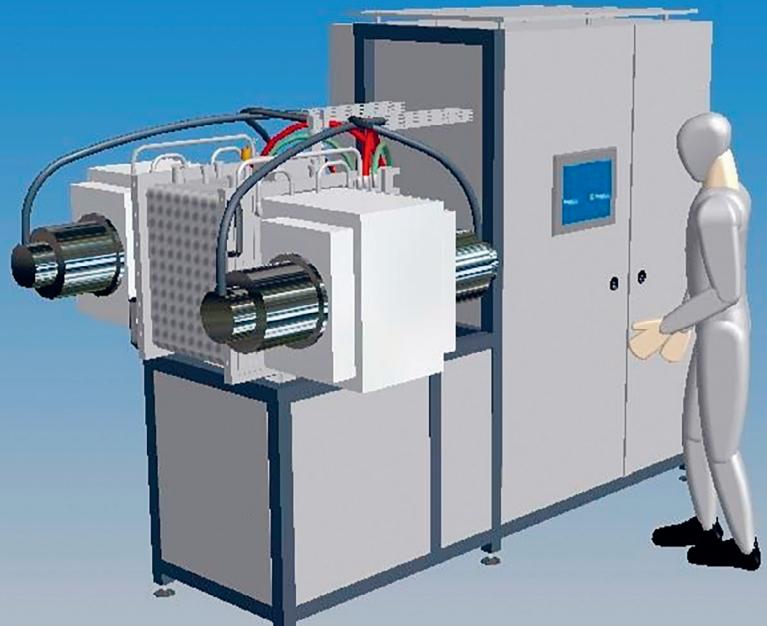
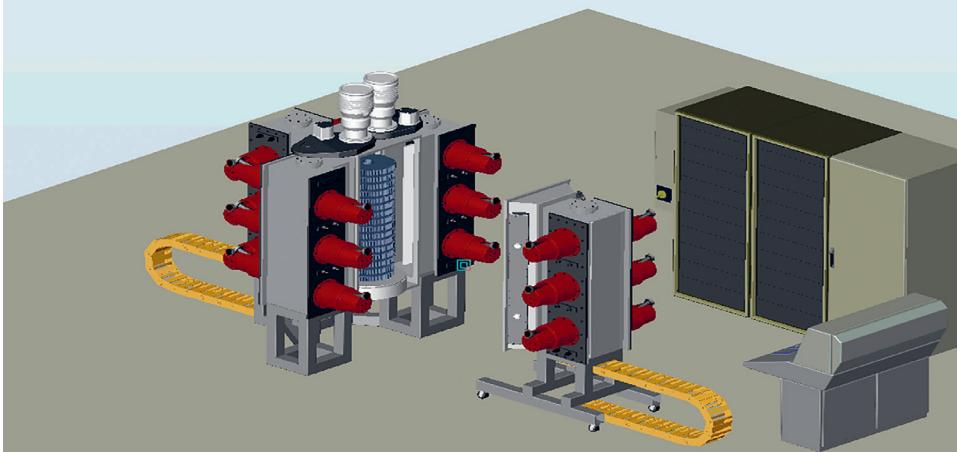


LAFAD™ SURFACE ENGINEERING SYSTEM



V. Gorokhovsky, "LAFAD-Assisted Plasma Surface Engineering Processes for Wear and Corrosion Protection: A Review"

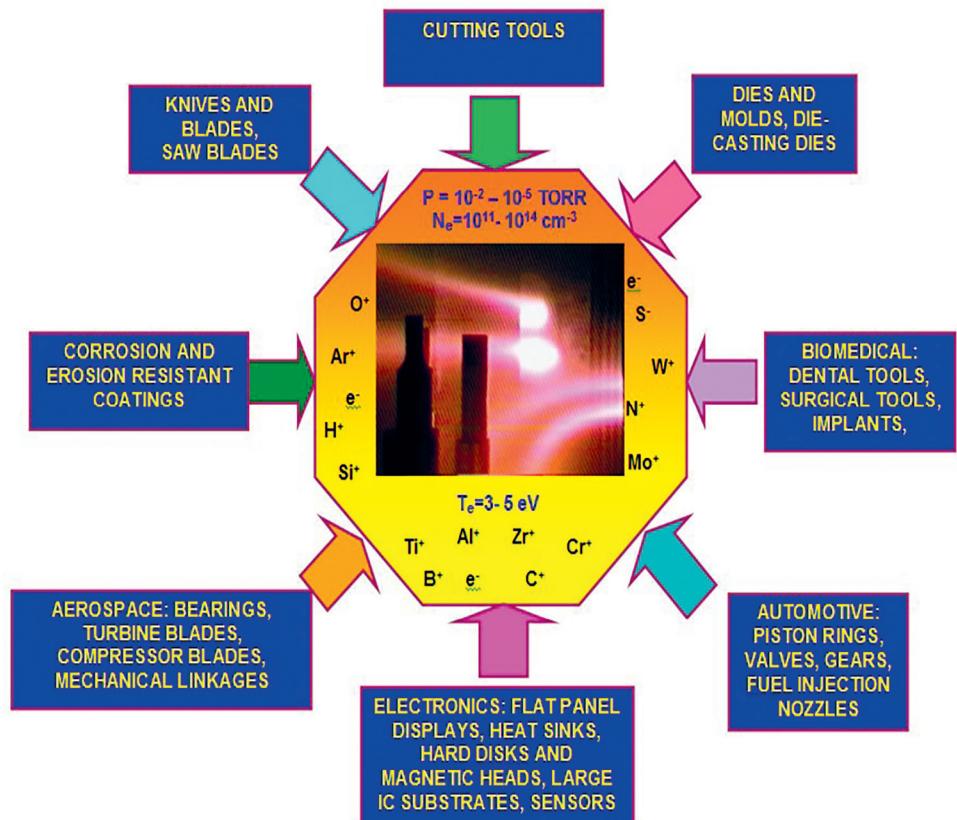


FAAMS™ SURFACE ENGINEERING SYSTEM

US Pat. ## 9257263, 9482105, 9761424, 9765635, other patents pending



Providing Advanced Surface Engineering Solutions for Demanding Applications:



Unidirectional dual Large Area Filtered Arc Deposition (LAFAD™) and Filtered Arc Assisted Magnetron Sputtering (FAAMS™) sources for retrofit or integration into conventional coating equipment:

- Deposition areas ranging from 0.5m up to 2m
- *Coating thickness uniformity and deposition rates deliver conformal hard coatings on complex 3D surfaces cost effectively:
 - Metal and ceramic coatings (nitrides, carbides, oxides, borides)
 - >3µm/h (for substrates installed on rotary table 0.5m dia with single rotation)
 - +/-10% thickness uniformity for ceramic coatings deposited by LAFAD™ or FAAMS™ sources utilizing billet targets
 - Superhard hydrogen-free ta-C DLC coatings (H>70GPa)
 - >1µm/h (for substrates installed on rotary table 0.5m dia with single rotation)
- Thickness uniformity is better than +/-2% for coatings deposited by LAFAD™ or FAAMS™ sources utilizing planar-rectangular or rotary-cylindrical targets
- LAFAD™ sources exceeds 4% metal ion output current yield making it more efficient than typical technologies seen in production today

***Please visit our website for further details and contact us directly to learn more about how we achieve deposition rates and uniformity listed in this brochure.**

Opportunities for collaboration and investment.

LAFAD™ and FAAMS™ Technology Highlights:

Access our large portfolio of proven surface engineering processes:

- Metal ceramics
 - Nitrides, carbides, oxides, borides
- Superhard hydrogen-free ta-C DLC (H>70GPa)
- Remote arc plasma immersion surface modification
 - ionitriding, reactive ion etching, low energy ion implantation

Technology built for industry:

- Super adhesion of thin films and coatings
- Deposit high-value super-lattice and nanocomposite films
 - multi-phase ultra-fine polycrystalline, and/or amorphous structures
 - Nanostructure size ceramic crystal growth at the nanometer level
- Duplex and triplex plasma immersion surface engineering processes in one vacuum cycle
- “Hybrid” processing and plasma enhancement of conventional PVD and CVD processes:
 - metal vapor plasma with high kinetic energy of metal ions
 - controllable metal ions concentration in the mixed ion/neutral atomic flows from 0 to 100%
 - atom-by-atom deposition of smooth nanostructured layers over a large area substrate
 - healing the initial substrate surface defects with energetic metal ion bombardment
 - patented, modular design approach is commercially scalable and cost effectively tailored for individual customer and specific application specs

Contact NPE directly to learn more or for collaboration and investment.