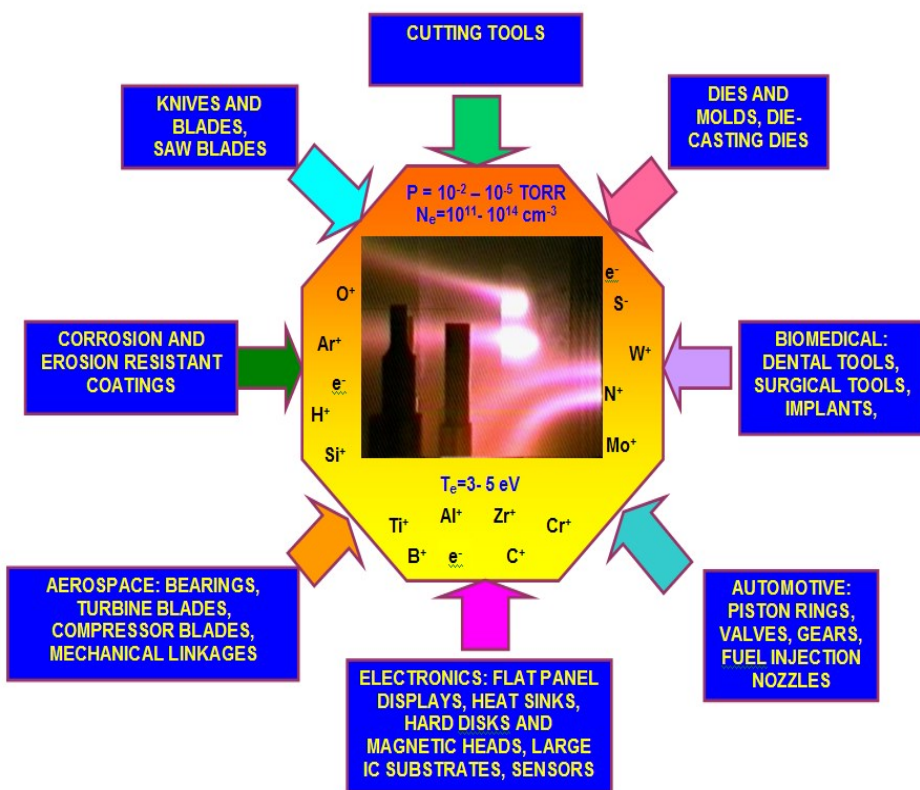




# Nano-Product Engineering

## Providing Advanced Surface Engineering Solutions for Demanding Applications:



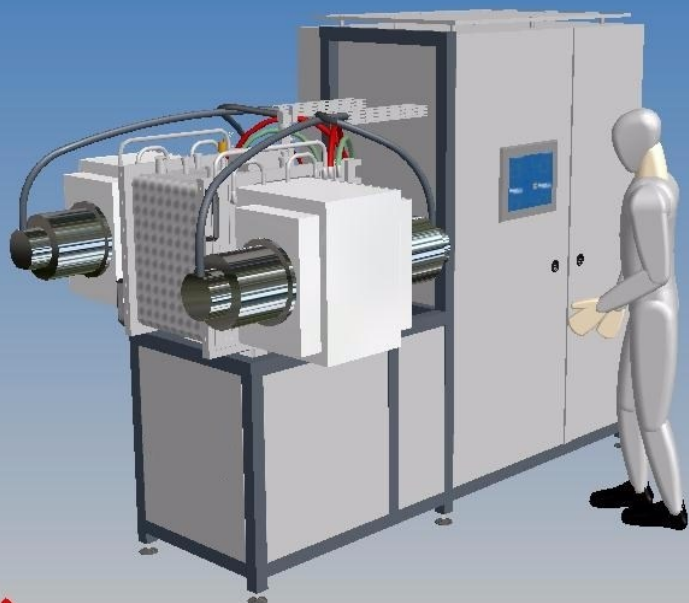
Nano-Product Engineering, LLC (NPE) has developed the line of models of unidirectional dual Large Area Filtered Arc Deposition (LAFAD™) and Filtered Arc Assisted Magnetron Sputtering (FAAMS™) sources for retrofit or integration into conventional coating equipment. These patented metal vapor plasma sources are covering deposition areas ranging from 0.5m up to 2m and more with coating thickness uniformity and deposition rate meeting highest industrial requirements: typically  $>3\mu\text{m/hr}$  average deposition rate with  $\pm 10\%$  thickness uniformity for ceramic coatings and  $>1\mu\text{m/hr}$  for the superhard hydrogen-free ta-C DLC coatings ( $H > 70\text{GPa}$ ) for substrates installed on rotary table, 0.5m dia, with single rotation in case of the LAFAD™ source with primary cathodic arc sources utilizing the billet targets, 100mm dia. In case of the LAFAD™ or FAAMS™ sources with planar rectangular or rotary-cylindrical targets the thickness uniformity is better than  $\pm 2\%$ . The yield of the output current of the metal ions generated by the LAFAD™ sources exceeds 4% of the total arc current generated by the primary cathodic arc sources the LAFAD™ sources.

Please visit our website:

[www.nanoproductengineering.com](http://www.nanoproductengineering.com)

regarding NPE technologies and the updated LAFAD™ and FAAMS™ product lines, in addition to opportunities for collaboration and investment.

## LAFAD™ SURFACE ENGINEERING SYSTEM



## LAFAD™ and FAAMS™ Technology Highlights:

- Atomic-level (atom-by-atom) deposition
- Nanostructure size ceramic crystal growth at the nanometer level
- Capability of producing super-lattice and nanocomposite structuring with multi- phase ultra-fine polycrystalline and/or amorphous structures
- Super adhesion properties
- High ionization and activation of metal-gaseous plasma (up to 100% for metal vapor and more than 30% for gaseous plasma)
- Capable of Supporting the duplex and triplex plasma immersion surface engineering processes in one vacuum cycle
- Capable of supporting near all PVD and low pressure CVD Processes in strongly ionized filtered arc plasma immersion environment, which allows for “hybrid” processing and enhancement of conventional PVD and CVD processes
- NPE’s modular design approach is commercially scalable and cost effective for individual customer requirements
- Large portfolio of different proven surface engineering processes, including deposition of wide variety of coatings (nitrides, carbides oxides, borides, superhard hydrogen-free DLC) and plasma immersion surface modification processes (ionitriding, ion etching, low energy ion implantation)

## FAAMS™ SURFACE ENGINEERING SYSTEM

