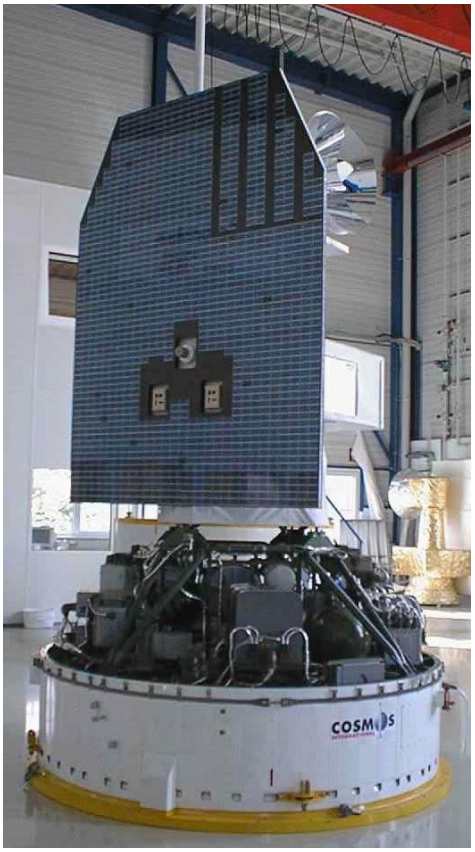
Category: Materials, Coatings and Processes

Reference: TD-DE-1021

Electroless nickel coatings as functional protection of metallic surfaces



In aerospace technology, surfaces of certain components or component groups are coated with electroless nickel. The surface finishing process serves:

- To guarantee electromagnetic compatibility (EMC).
- As a protection against corrosion.
- To prevent the forming of build-up (insulation effect).
- As a protection against wear.

When solid lubricants such as PTFE (Teflon) and bornite are incorporated in nickel matrix (electroless nickel dispersion coatings), the process can also be used for sliding coatings (coefficient of friction < 0.1). The dry lubricant coatings thus produced have a temperature resistance of up to 295°C for electroless nickel PTFE and up to 670°C for electroless nickel bornite.

Electroless nickel coatings are deposited "without external current" from aqueous solutions at a maximum temperature of 90°C. The coating is an alloy of nickel and phosphorus. The deposition of the nickel on a metal surface is done by reduction.

Almost any metallic base material can be coated with adhesive, e.g.:

- Steel: hardened or unhardened; low or high alloy.
- Non-ferrous metals: aluminium, copper, and copper alloys.

Innovative Aspects:

- The coating temperature is maximum 90°C, therefore coating can be done distortion-free.
- Almost any metallic base material can be coated without affecting its microstructure or other properties.
- Most accurate molding of the surfaces. The structures of the surfaces are retained and there is no edge buildup.
- Deposition technique also in drill holes and ribs possible, to the desired dimension.
- Layer thickness variations are about 4%.
- Decoting is possible (chemical).
- All environmental requirements are met (state of the art).
- Freely pre-selectable layer thicknesses for each application.

Application Areas:

- Plastic processing industry
- Mold and tool making, e.g., as demolding aid in plastic processing
- Medical technology
- Mechanical engineering, plant design and equipment construction.
- Metrology.

The electroless-nickel-dispersion-coatings are suitable for the following applications:

- Corrosion protection of exterior surfaces and temperature control systems.
- Wear protection against abrasion (approx. 780 HV / tempered 1,150 HV).
- Wear protection of soft base materials (aluminum, copper alloys).
- Wear protection polish (approx. 740 HV / annealed 1,150 HV).
- Generation of slippery surfaces with low friction values for permanent lubrication.

Cooperation:

The company offers coating services.