

SURFACE TREATMENT**TITANIUM NITRIDING****DSF 1.1.6****Definition:**

Titanium Nitride (TiN) is an extremely hard ceramic barrier coating added to steel, carbide and aluminium components to improve surface properties. Applied as a thin coating, typically 1 μm - 5 μm , it is used to harden and protect cutting edges and enhance sliding surfaces (low friction). Widely used as a 'top layer' coating usually with nickel or chromium plated substrates and popular as a decorative finish due to its gold appearance.

Treatment Information:

The engineering drawing will identify the area to be coated.
This barrier coating is very smooth and requires no finishing.
The most common methods of coating are:-

Physical vapour deposition: (PVD):

A vacuum deposit method where ceramic powder is introduced into the plasma flame, it is then vaporised and condenses onto the cooler workpiece to form a coating. . The entire range from high-energy ballistic impact to low-energy thermalized motion is accessible by changing the background gas pressure. The sputtering gas is often an inert gas such as argon. For efficient momentum transfer, the atomic weight of the sputtering gas should be close to the atomic weight of the target, so for sputtering light elements neon is preferable, while for heavy elements krypton or xenon are used.

Chemical vapour deposition: (CVD):

A chemical process widely used in the semi- conductor industry, to produce a high quality, high performance solid material. This reaction deposits an extremely thin layer on the substrate surface.

Appearance:

The finished article shall be free from visible plating defects such as blisters, pits or un-plated areas.

The coating will be smooth and adherent, clean and free from damage.

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Substrate to be prepared using electro-less nickel (EN) plate as outlined in (DSF 141).

A titanium coating is applied using splutter deposition which is a version of **Physical vapour deposition (PVD)**. This involves ejecting material from a target source onto a substrate. The sputtered atoms ejected from the target have a wide energy distribution & can ballistically fly from the target in straight lines and impact energetically on the substrates or vacuum chamber (causing resputtering). Alternatively, at higher gas pressures, the ions collide with the gas atoms that act as a moderator and move diffusively, reaching the substrates or vacuum chamber wall and condensing after undergoing a random route.

Properties:

- Low coefficient of friction
- Excellent wear resistance
- Uniform coating thickness. (2 Microns $\pm$ 0.5 Microns without build up on edges.)
- Good corrosion resistance
- Smooth finish

ASM (DEK) Applications:

Note: This is a line of sight process

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