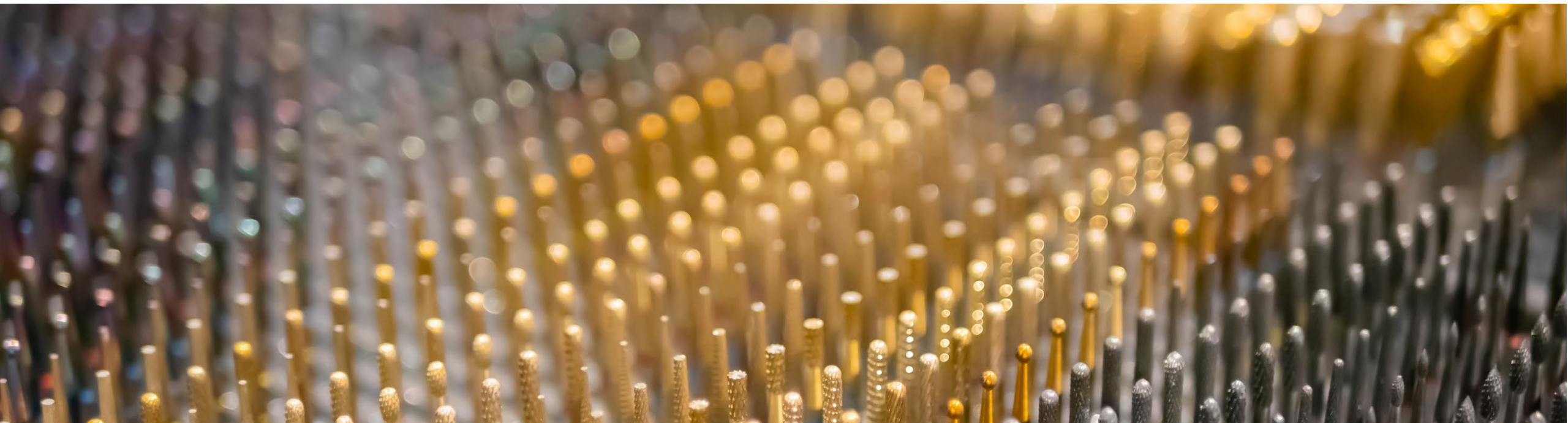


PVD COATING – MEDICAL DEVICES

• AN INTRODUCTORY GUIDE





WHAT IS PVD COATING?

To create a PVD coating, take a material, vaporize it in a vacuum, and deposit it — atom-by-atom — onto a surface.

The process forms a thin, bonded, metal or metal-ceramic layer on a medical device's surface to improve performance, durability, and aesthetics. The deposition process is optimized to create the desired coating characteristics (hardness, lubricity, wear resistance, color, etc.).

The coatings are so thin they have almost no impact on dimensional tolerance and do not mask desired textures on the parts.

PVD for medical devices —————▶

PVD COATING ON MEDICAL DEVICES

Medical device manufacturers have a variety of coating options to finish their product's surface. However, PVD coating offers specific benefits for medical devices and instruments. PVD coating options are available that are:

- Biocompatible
- Inert
 - Unreactive to common sterilization processes
 - Unreactive to bone and tissue
- Reduce wear
- Lower friction
- Retain edge characteristics
- Offer color differentiation



COMMON MEDICAL DEVICE COATINGS

TiN

Titanium nitride

Excellent hardness and toughness, biocompatible and non-toxic, reduced friction, compatible with acids/bases/solvents.

DLC

Diamond-like carbon

An amorphous carbon coating with very low friction, high hardness, resistance to sliding wear, and an attractive appearance.

CrN

Chromium nitride

Excellent hardness/ toughness, reduced friction, resistance to sliding & impact wear, excellent resistance to corrosion & oxidation, and good release properties.

Zr

Zirconium-based

Zirconium-based coatings provide performance characteristics and a broad color palette to enhance product durability and appearance.

Medical applications include:

- Orthopedic implants
- Plates, screws, and tapers
- Guidewires
- Surgical tools and drills
- Blades, scissors, forceps, clamps

Dental applications include:

- Dental implants
- Burs and Diamonds (dental drill bits)
- Handpiece (dental drills)

Breakdown of coating types

PVD PERFORMANCE COATINGS

TiN

Titanium nitride is a tough lubricious coating perfect for surfaces that come into contact with acids, bases, and solvents, as well as bone or tissue.

In addition to these performance characteristics, TiN offers distinctive bright gold color for instrument differentiation and esthetic appeal.

CrN

Use chromium nitride for its sliding & impact wear-resistance, corrosion- and oxidation-resistance, and non-stick qualities in contact with many materials.

Chromium nitride is a metallic silver coating used in many performance applications, including as a replacement for plated hard chrome.



DLC PERFORMANCE COATINGS

DLC

a-C:H DLC, or DLC coating, is an amorphous carbon coating favored for its high coefficient of friction, resistance to sliding wear, and distinctive graphite-to-black color.

W-DLC

a-C:H:W DLC is a DLC variant created by mixing (“doping”) carbon atoms with tungsten metal to create a coating with improved toughness and a darker color.

DLC is a great choice for high-performance applications and product differentiation.



PVD DURABLE COLOR COATINGS

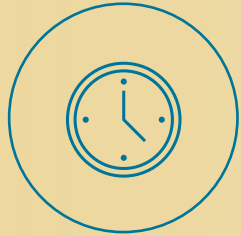
Zr

Zirconium-based PVD coatings offer medical device manufacturers PVD coatings with excellent durability in a rainbow of color options.

These coatings differentiate the appearance of medical instruments and improve visual identification.



IN-HOUSE COATING BENEFITS



Time savings

An in-house coating process eliminates repackaging and reduces lead times.



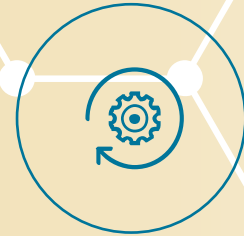
Improved quality

Complete control of the cleaning and coating process.



Low per-part coating cost

Medical device components are often coated for significantly less than \$1 per part.



Flexible for multiple sizes/shapes

VaporTech chamber sizes fit larger/longer parts up to 48 inches and coat complex geometries.

Common medical device coatings →



WHY VAPORTECH?

LOW COST OF OPERATION



VaporTech systems' short cycle times mean high throughput, low costs per part, and an excellent return on investment.

A SIMPLE PROCESS



We partner with you to make coating development, site prep, implementation, and training simple and straightforward.

EXPERTISE



Our experienced materials scientists and state-of-the-art labs mean coatings optimized for your needs.



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