



Medical Device Coatings

Solutions From



Engineered Coating Solutions
A DIVISION OF FISHER BARTON



Fisher Barton and TST



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A DIVISION OF FISHER BARTON

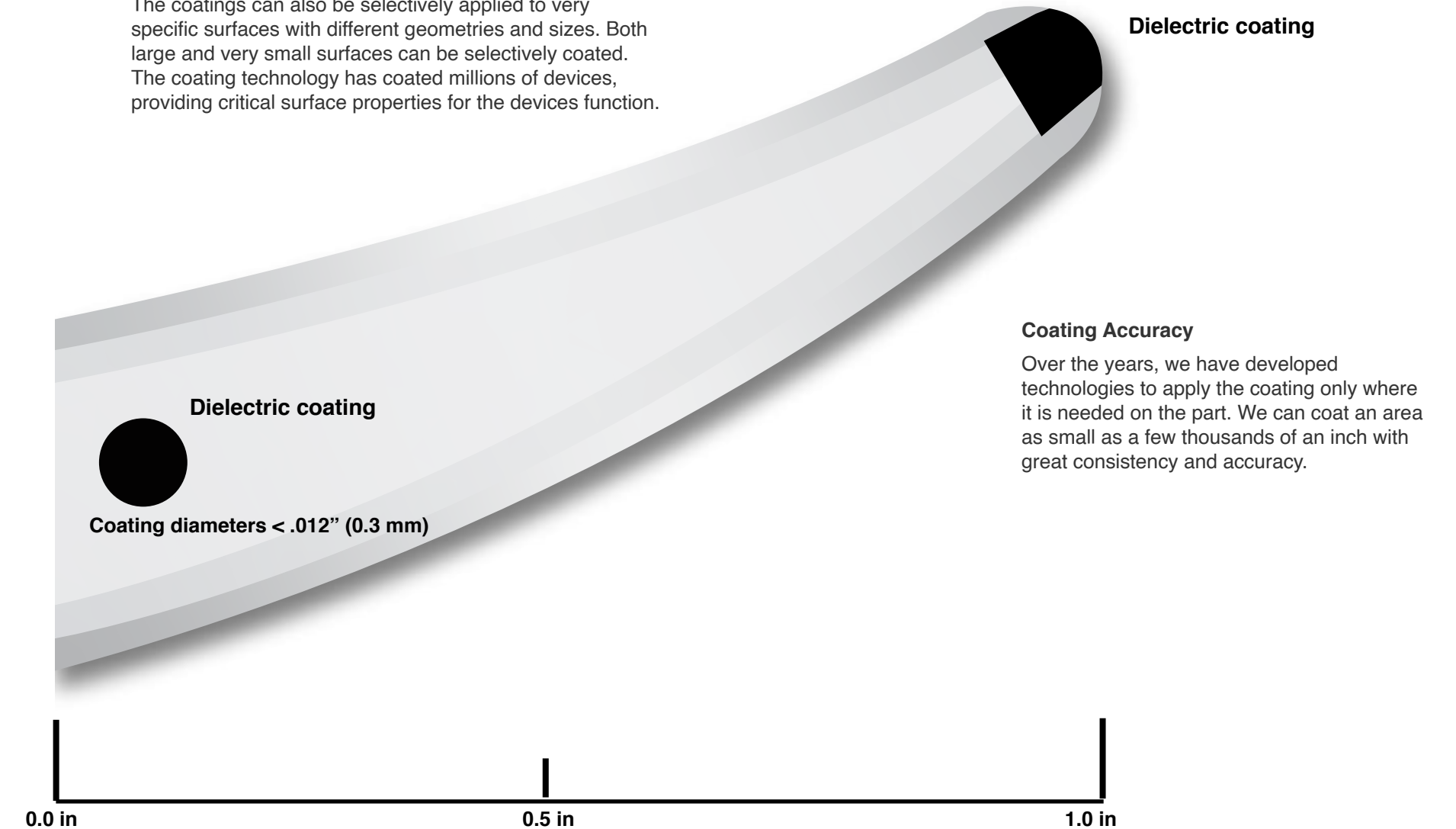
TST Engineered Coating Solutions is a division of Fisher Barton that provides over 60 years of thermal spray coating, design, and development experience. Our expertise stems from our understanding of the environment in which the coating will be used. We then design the properties required to withstand the environment to exceed the component's specific needs.

TST offers unique coating technology for electrosurgical instruments. Through extensive materials engineering, a family of coatings have been developed to provide specific surface properties for these types of devices. With the implementation of these coatings, properties such as electrical insulation, thermal insulation, extreme wear resistance, anti-microbial properties and others can be engineered on specific device surfaces.

Coatings Can Be Accurately Applied to Selective Surfaces

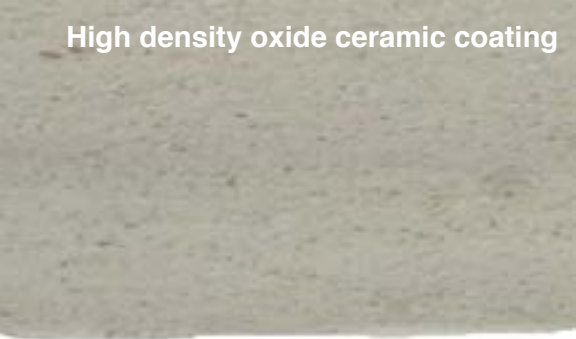
Thermal Spray Coatings

TST's coatings can be applied to a variety of materials including most metals, many polymers, and ceramics. The coatings can also be selectively applied to very specific surfaces with different geometries and sizes. Both large and very small surfaces can be selectively coated. The coating technology has coated millions of devices, providing critical surface properties for the devices function.





Coating Properties:



Medical device base metal

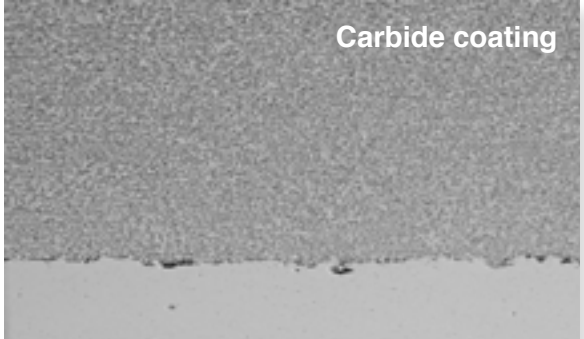
Cross section of medical dielectric coating

Dielectric Coating Properties

TST has developed a family of oxide ceramics coatings that provide electrical insulation for medical instruments. The coatings are engineered to provide specific dielectric properties to a variety of surfaces and components. In many cases these coatings and be deposited onto select surfaces with a high degree of accuracy. Some of the properties of these coatings include:

- Dielectric strengths as great as 1000 volts/0.001 in
- Hardness greater than 900 Vickers
- High density with porosity levels less than 0.5%
- White, gray, or black color
- Excellent adhesion with bond strengths of $\geq 8,000$ psi
- Coating thickness from 0.001-0.020 inch
- High compressive strength
- Effective dielectric properties over a wide range of temperatures

Engineered to Provide Many Other Surface Characteristics



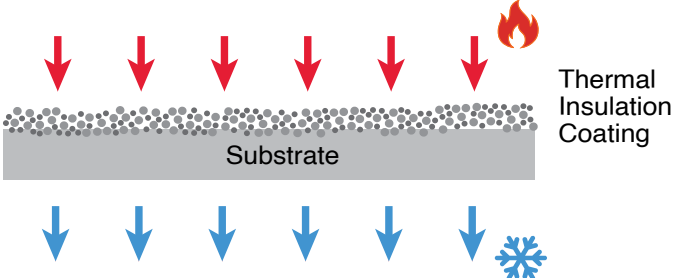
Base metal

Wear resistant carbide coating cross section

Wear Resistance

Coatings comprised of oxide ceramics, carbides, or hard metals can be deposited on medical device surfaces to provide extreme wear resistant properties. These coatings with hardness's as high as 1500 Vickers can greatly improve the life of critical surfaces by preventing wear.

- Hardness: 1200-1300 Vickers
- Coating density $\geq 99.5\%$
- Coating adhesion $>12,000$ psi measured by ASTM C633 testing

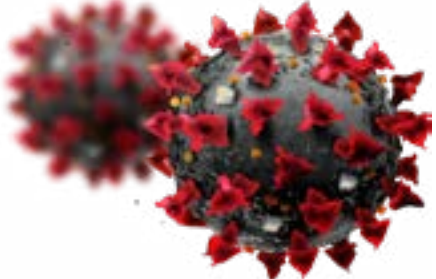


Thermal Insulation/Heat Management

Thermal barrier coatings originally engineered for use in aerospace engines can be used to provide thermal insulation to surfaces of medical devices. These coatings are comprised of oxide ceramics. The thermal conductivity of these coatings can be controlled by the composition of the coating chemistry and the structure of the coating. Thermal conductivity can be engineered to be as low as 0.5 W/(m K) through controlling coating chemistry and coating deposition parameters. These coatings can also be selectively applied onto a specific surface requiring thermal protection or insulation.



Thermal barrier coatings used to protect high temperature aerospace engine components can be used to manage heat for medical devices



Anti-Microbial

Several coating alloys typically containing high contents of copper can be produced to provide anti-microbial surfaces. These coatings have proven to effectively kill many types of contagious viruses. These coatings can be applied to large and small surfaces to help prevent the spreading of viruses and bacterial infections.

CDC/NIH study shows Corona virus is killed within 4 hours on copper coated surface compared to 2-3 days on stainless steel or plastic

Surface Engineering Technologies

TST provides surface engineering solutions for many of our customers components used in a variety of industries. These solutions are uniquely developed with a combination of materials engineering and the understanding of the thermal processes and their capabilities. When a new surface engineering project is introduced by one of our customers, our materials engineers will work closely with the customer to fully understand the components surface properties that are desired, along with the operating environment of the part. Next, our engineers will select the materials that can produce the preferred surface characteristics. These materials will then be paired with the correct thermal spray process that can be used to maximize the desired surface characteristics.

Coating properties such as porosity content, adhesion, oxidation, hardness, and microstructure are metallurgically examined during the coating development to assure the optimum coating structure is produced. When the successful surface solution is engineered, it can then be reproduced in volume production. Engineered process automation and quality control measures assure the coatings are repeatably manufactured over the life of the coated component.





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**Learn more about surface engineering technologies from
Fisher Barton and TST by visiting tstcoatings.com/medical
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SS21-1000 (5-21)