

# Graphite Coatings

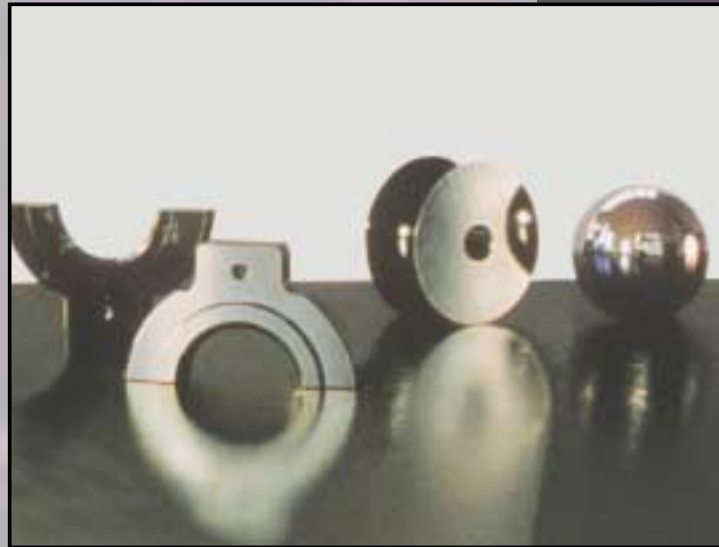
Solar Atmospheres offers titanium carbide (TiC) and silicon carbide (SiC) coatings for improved graphite parts.

A proprietary process, Solar coatings result in a super hard ceramic finish for graphite parts providing:

- Extraordinary wear life
- Bright parts coated with TiC
- Chemical and oxidation resistance
- Superior thermal shock resistance
- Clean handling and usage
- Clean operating environment

Graphite and carbon/carbon parts with the TiC or SiC coatings expand the applications and working environments of graphite.

Solar's graphite coating accommodates parts of numerous shapes and sizes.



1969 Clearview Road, Souderton, PA 18964  
215 721-1502 • FAX 215 723-6460 • 800 347-3236  
[www.solaratm.com](http://www.solaratm.com) • [info@solaratm.com](mailto:info@solaratm.com)

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## The Coatings

Graphite coatings offered by Solar are revolutionary. An abundance of new applications for graphite parts with titanium carbide (TiC) and silicone carbide (SiC) coatings are continually being developed. When the recommended grade of graphite and carbon/carbon substrates are matched with TiC and SiC coatings, the service life of the coated part can be extraordinary.

The coatings have essentially the same mechanical and thermal properties as the graphite substrates. TiC coated graphite components are exceptionally resistant to abrasive wear. Additionally, the coatings resist the corrosive effect of many aggressive chemical agents.

TiC and SiC coated graphite offer superior thermal shock resistance as compared to traditional ceramics. Shock cycling from room temperature to 800°C has shown no sign of thermal cracking in the composites. The coatings hold close dimensional tolerances and are applicable to simple or complex geometry. Thickness of TiC is typically 0.006" (152.4 microns). Thickness of SiC is typically 0.0002" (Approx. 4 microns).

The Vickers hardness of TiC coatings can range up to 3200kg/mm<sup>2</sup>, one of the hardest of engineering materials.

## Applications

### Chemical

TiC enhances the excellent chemical resistance of graphite. Wear resistance is improved, lessening the effects of hard particles where fluid velocities are high. Specific applications for critical parts include pump impellers, crucibles, valves and nozzles. Surface finishes (Ra of less than 0.2 micrometers) minimizes deposits in certain chemical processes.

### Fibers

The hardness of titanium carbide is superior to metals, and most other ceramic materials, including carbides, nitrides and oxides. Because of the inherent smoothness of TiC, most grinding and polishing steps required for ceramics can be eliminated. Lower weight allows for low inertia and lower fiber tension in the rotating roller guides. Potential uses: thread guides, rollers, eyelets, tubes and rods, oiling nozzles and rollers.

### Glass

Hot handling applications are a superb usage for Solar coatings. The TiC coating allows graphite significant improvement for wear and oxidation resistance in high temperature applications. Solar's coatings offer superior results in sliding wear applications due to high hardness and surface finish. Specific applications include splitter combs, gathering shoes, finish applicators, guides for fiber production, take out tongs, dead plates, heater and heater tubes for optical fiber pulling, mandrels and flaring tools for glass forming.

### Metallurgy

Non-wetting to many metals, the TiC ceramic coating also protects the graphite in aggressive acidic or alkaline environments. Numerous uses include: molten aluminum pump components, anti-vortex aluminum mixing pot vanes, precious metal and solidification dies, electron-beam (E-Beam) crucibles and coating evaporator boats.

### Paper

Solar's graphite coatings' non-porous, smooth, hard surfaces offer substantial benefits to the chemically corrosive wear environment of pulp and paper equipment parts. Cost savings can be expected for various components of the paper manufacturing process.

### Furnace

To complement equipment performance, TiC coating's smooth and polished finish enhances gas flow and helps prevent part contamination. In production operations, Solar coatings prevent adverse interaction of graphite jigs, fixtures, furniture, setter and hearth plates with various metals.

### Service

As vacuum furnace specialists, Solar Atmospheres' customer service includes application consultation and prototype trials. The result — the discovery of new applications for your graphite or ceramic replacement parts, in a timely manner. Prototype and field trials for new designs and applications are performed in response to your development goals.