

How to Apply Tungsten Disulfide Coating

A Comprehensive Guide to the Application Process and Best Practices



Prepared by: LowerFriction Engineering Team

Date: November 2024

<https://lowerfriction.com/>



Table of Contents

1. Introduction to Tungsten Disulfide Coating
2. Properties of Tungsten Disulfide Coating
3. Surface Preparation for Application
4. Application Methods
5. Curing and Final Touches
6. Advantages of Tungsten Disulfide Coating
7. Safety Measures and Handling Guidelines
8. Common Applications

1. Introduction to Tungsten Disulfide Coating

- **What is Tungsten Disulfide Coating?**
 - Tungsten Disulfide (WS_2) is a solid lubricant known for its low friction, high temperature stability, and wear resistance. Its application enhances the performance and longevity of mechanical components.
- **Why Use WS_2 Coating?**
 - It reduces friction, minimizes wear, and withstands high temperatures, making it ideal for high-performance industrial and engineering applications.

2. Properties of Tungsten Disulfide Coating

- **Low Coefficient of Friction:**
 - One of the lowest among solid lubricants, at approximately 0.03.
- **Thermal Stability:**
 - Performs at temperatures up to $650^{\circ}C$ in normal air and higher in inert environments.

- **Chemical Inertness:**
 - Resistant to most chemicals, maintaining performance in corrosive environments.
 - **Thickness:**
 - Provides an ultra-thin layer (~0.5 microns), ensuring minimal dimensional changes to parts.
-

3. Surface Preparation for Application

- **Cleaning:**
 - Remove grease, dirt, and contaminants with solvents or ultrasonic cleaners.
 - **Surface Roughening:**
 - Use abrasive blasting or sanding to create a slightly rough surface for better adhesion.
 - **Drying:**
 - Ensure the surface is completely dry before starting the application process.
-

4. Application Methods

- **Spray Application:**
 - WS_2 powder mixed with a liquid carrier is sprayed

onto the prepared surface using a precision spray gun.

- **Burnishing:**

- Rub the powder directly onto the surface under pressure to embed the particles.

- **Dipping:**

- Submerge parts into a WS_2 solution for even coverage.

- **Vacuum Deposition:**

- Apply WS_2 in a controlled vacuum chamber for a highly uniform and durable coating.
-

5. Curing and Final Touches

- **Curing:**

- Heat the coated parts at $150^{\circ}C$ to $400^{\circ}C$ to enhance adhesion and durability.

- **Polishing:**

- Buff the surface to remove excess particles and achieve a smooth finish.
-

6. Advantages of Tungsten Disulfide Coating

- **Wear Resistance:**
 - Protects surfaces from abrasion and mechanical wear.
 - **Temperature Tolerance:**
 - Retains properties under extreme temperatures.
 - **Long-Lasting Performance:**
 - Requires minimal reapplication compared to liquid lubricants.
-

7. Safety Measures and Handling Guidelines

- **Protective Equipment:**
 - Use masks and gloves to avoid inhalation or contact with WS_2 powder.
 - **Storage:**
 - Keep WS_2 powder in a sealed container in a dry, cool environment.
 - **Ventilation:**
 - Apply in well-ventilated areas to avoid inhaling fine particles.
-

8. Common Applications

- **Automotive Industry:**
 - Coatings for engine components, pistons, and bearings.
 - **Aerospace and Defense:**
 - Used on turbines, gears, and other high-performance mechanisms.
 - **Industrial Equipment:**
 - Protects tools, rollers, and mechanical parts from wear.
-

