Marble V-Block Introduction

1. Product Introduction

1.1 Definition and Function

A marble V-block is a precision positioning and measuring tool made from high-quality natural marble or granite. It features a V-shaped groove (typically with a 90° or 120° angle) designed to securely hold cylindrical workpieces (e.g., shafts, rollers) and provide a stable reference for inspecting **roundness**, **straightness**, and **parallelism**. Its core functions include:

- Supporting cylindrical parts during measurement or machining, ensuring they are centered and aligned.
- Serving as a stable base for checking geometric tolerances, such as the straightness of a shaft using a dial indicator.

Example: In gear manufacturing, a marble V-block holds a gear shaft to measure its runout, ensuring the gear teeth are evenly spaced and aligned.

1.2 Structure and Materials

- **Material**: Crafted from dense, non-porous marble (e.g., granite gneiss) with:
 - Low thermal expansion (\approx 0.5-1.0ppm/°C) for dimensional stability.
 - High resistance to wear, corrosion, and magnetic interference.
- V-Groove: The groove is precision-machined to a precise angle (e.g., 90° or 120°) with smooth, polished surfaces (Ra 0.2-0.8μm) to minimize friction and ensure accurate workpiece seating.
- **Base and Sides**: The base is flat and ground to high flatness (±2-5µm) for stable placement on inspection tables or machine tools. Some models include tapped holes for mounting fixtures or clamping devices.

2. Application Scenarios

2.1 Precision Machining and Inspection

- **Roundness Measurement**: Holds shafts or cylindrical parts for checking roundness with a dial indicator or CMM.
- Straightness Inspection: Aligns long cylindrical components (e.g., camshafts, drill rods) to measure straightness along their length.
 Example: In automotive engine repair, a marble V-block supports a crankshaft to detect bends or wear that could cause engine vibration.

2.2 Metrology and Calibration

- Calibrates cylindrical measuring tools (e.g., plug gauges, ring gauges) by providing a stable reference for dimensional checks.
- Verifies the accuracy of roundness testers and surface finish meters.

2.3 Aerospace and Bearing Industries

- Positions aerospace components (e.g., turbine shafts, landing gear pins) for precision measurement.
- Inspects bearing races and rollers for geometric accuracy, ensuring smooth operation and longevity.

2.4 Educational and Research Labs

• Used in technical training to teach geometric measurement principles.

• Supports research in materials science for testing cylindrical specimen alignment during mechanical testing.

3. Maintenance and Troubleshooting

3.1 Maintenance

- **Cleaning**: Wipe the V-groove and base with a soft cloth and mild detergent to remove debris or oil. Avoid abrasive tools that could scratch the marble.
- **Storage**: Store in a dry, temperature-controlled environment (20±2°C) to prevent moisture damage. Use a protective cover to shield the V-groove from impacts.
- **Calibration**: Recalibrate annually using a master cylindrical gauge or laser interferometer to verify the V-groove angle and base flatness.

3.2 Troubleshooting

- Inaccurate Workpiece Alignment:
 - **Cause**: Dirt in the V-groove, worn surfaces, or thermal expansion.
 - **Solution**: Clean the groove, inspect for wear (replace if damaged), and ensure the environment is thermally stable.
- Unstable Base:
 - **Cause**: Uneven placement or damage to the base surface.
 - **Solution**: Check that the base is flat and seated on a stable surface. Refinish the base or replace the V-block if damaged.

• Scratches in V-Groove:

- Cause: Rough handling or contact with hard materials.
- **Solution**: Minor scratches can be polished; severe damage requires professional repair or replacement.

4. Performance Characteristics

Feature	Description	
Precision V- Groove	Angle tolerance within ±5-10 arcseconds for 90°/120° grooves, ensuring consistent workpiece alignment.	
Thermal Stability	Minimal expansion/contraction, ideal for high-precision measurements in varying temperatures.	
Durability	Resistant to chipping, corrosion, and wear, with a lifespan of 10+ years under proper care.	
Vibration Damping	Dense marble structure absorbs minor vibrations, reducing measurement errors.	
Non- Magnetic	Safe for use in magnetic environments (e.g., near CNC machines or magnetic chucks).	

Key Applications Summary

Industry	Use Case	Benefit
Automotive	Inspecting crankshafts and camshafts	Ensures engine balance and performance
Aerospace	Measuring turbine shaft straightness	Maintains engine efficiency and safety
Metrology	Calibrating cylindrical gauges	Ensures traceable dimensional accuracy
Manufacturing	Holding parts for surface finish inspection	Improves quality control efficiency

