Definition, Function, Structural Components, Application Scenarios, Maintenance, Troubleshooting and Performance Characteristics of Trapezoidal Thread Plug Gauge

#### 1. **Definition**

The trapezoidal thread plug gauge is a precision measuring tool used for measuring the dimensions of internal trapezoidal threads. It is designed and manufactured according to the standard dimensions and tolerance requirements of trapezoidal threads, and judges whether the threads meet the accuracy requirements by fitting with the measured internal threads.

#### 2. Function

- **Detecting Thread Dimensions**: It can accurately measure key dimensional parameters of internal trapezoidal threads, such as major diameter, minor diameter, pitch diameter, and thread profile angle, to determine whether they are within the specified tolerance range.
- **Ensuring Fitting Accuracy**: It ensures that the processed internal trapezoidal threads can achieve accurate and tight fitting with the corresponding external threads, meeting the functional requirements of mechanical transmission and connection.

# 3. Structural Components

- Plug Gauge Body: It is usually made of high-precision alloy steel or carbon tool steel, with good rigidity and stability to ensure that it will not deform during the measurement process. Its shape is generally cylindrical, and the length varies according to different measurement specifications.
- **Measuring Thread Profile**: On the surface of the plug gauge body, raised thread profiles consistent with the standard trapezoidal thread profile are processed. The accuracy of the thread profile directly affects the measurement accuracy. The dimensions and angles of the thread profile are precisely processed according to the corresponding trapezoidal thread standards.
- **Handle**: For the convenience of operation and gripping, a handle is usually installed at one end of the plug gauge. The handle is designed ergonomically to facilitate the operator to apply force and control the insertion and extraction of the plug gauge.

# 4. Application Scenarios

- Mechanical Manufacturing: In the processing of various mechanical parts, such as screw rods, nuts and other trapezoidal thread connecting parts, it is used to detect the machining accuracy of internal threads to ensure the interchangeability and assembly quality of parts.
- Automotive Industry: In the transmission system, steering system and other components of automobiles, if there are trapezoidal thread connection structures, the trapezoidal thread plug gauge is required to ensure the machining quality of the threads, so as to ensure the safety and reliability of the vehicle.

• **Mold Manufacturing**: When some transmission parts or positioning parts in the mold adopt trapezoidal threads, the trapezoidal thread plug gauge can be used to detect the accuracy of the internal threads of the mold, ensuring the accurate opening and closing actions of the mold and the forming accuracy of the parts.

# 5. Maintenance

- **Cleaning**: Wipe the surface of the plug gauge with a clean soft cloth in a timely manner after use to remove impurities such as oil stains, iron filings, and dust. If there are stubborn stains, a special cleaning solution can be used for cleaning, but corrosive cleaners should be avoided.
- **Anti-rust**: After wiping clean, apply an appropriate amount of anti-rust oil to prevent the plug gauge from rusting. Store it in a dry and well-ventilated place and avoid contact with corrosive substances.
- **Regular Calibration**: Send the plug gauge to a professional metrology institution for calibration according to the specified calibration cycle to ensure that its measurement accuracy always meets the standard requirements. Records and markings should be made after calibration.
- **Proper Storage**: Store the plug gauge in a special measuring tool box to avoid collisions between the plug gauge and other tools or parts, and prevent damage to the measuring thread profile and other parts.

# 6. Troubleshooting

- Inaccurate Measurement: First, check whether the plug gauge is worn, deformed or damaged. If so, it needs to be replaced or repaired in a timely manner. Secondly, confirm whether the operation is carried out according to the correct measuring method, such as whether it is inserted vertically into the threaded hole and whether the measuring position is correct. At the same time, check whether the surface roughness of the measured threaded hole meets the requirements, and an overly rough surface may affect the measurement accuracy.
- **Plug Gauge Sticking**: Check whether there are foreign objects blocking the plug gauge and the measured threaded hole, and clean them if there are. If the thread profile is slightly deformed or damaged, try to repair it; if the deformation is serious, the plug gauge needs to be replaced. In addition, check whether the sticking is caused by insufficient lubrication, and an appropriate amount of lubricating oil can be applied.
- **Thread Profile Wear**: Observe the wear condition of the thread profile. If the wear is slight, it can be repaired by grinding and other methods, but it needs to be re-calibrated after repair. If the wear is serious, the plug gauge should be replaced in time to ensure the measurement accuracy.

#### 7. Performance Characteristics

- **High Precision**: It can accurately measure various dimensional parameters of trapezoidal threads, and the precision can usually reach the micron level, meeting the requirements of high-precision machining and assembly.
- Reliability: With a reasonable structural design and excellent material

performance, under normal use and maintenance conditions, it can stably provide accurate measurement results, with high reliability.

- **Durability**: Made of high-quality materials and advanced manufacturing processes, and through multiple processes such as quenching and grinding, the measuring surface of the plug gauge has high hardness and good wear resistance, and can withstand repeated measurements without affecting the accuracy, with a long service life.
- Versatility: According to different trapezoidal thread standards and specifications, a variety of models of trapezoidal thread plug gauges are available, which can meet the measurement requirements of internal trapezoidal threads with different sizes and accuracy requirements in various mechanical manufacturing fields, and has strong versatility.

