
35.7 General Characteristics and Selection of Measuring Instruments

The characteristics and quality of measuring instruments are generally described by various specific terms, defined as follows (in alphabetical order):

- **Accuracy:** The degree of agreement of the measured dimension with its true magnitude.
- **Amplification:** The ratio of instrument output to the input dimension; also called *magnification*.
- **Calibration:** The adjustment or setting of an instrument to give readings that are accurate **within** a reference standard.
- **Drift:** An instrument's capability to maintain its calibration over time; also called *stability*.
- **Linearity:** The accuracy of the readings of an instrument over its full working range.
- **Magnification:** The ratio of instrument output to the input dimension; also called *amplification*.
- **Precision:** Degree to which an instrument gives repeated measurement of the same standard.
- **Repeat accuracy:** The same as accuracy, but repeated many times.
- **Resolution:** Smallest dimension that can be read on an instrument.
- **Rule of 10 (gage maker's rule):** An instrument or gage should be 10 times more accurate than the dimensional tolerances of the part being measured. A factor of 4 is known as the *mil standard rule*.
- **Sensitivity:** Smallest difference in dimension that an instrument can distinguish or detect.
- **Speed of response:** How rapidly an instrument indicates a measurement, particularly when a number of parts are measured in rapid succession.
- **Stability:** An instrument's capability to maintain its calibration over time; also called *drift*.

The selection of an appropriate measuring instrument for a particular application also depends on (a) the size and type of parts to be measured, (b) the environment (temperature, humidity, dust, and so on), (c) the operator skills required, and (d) the cost of equipment.

