Frequently Asked Questions

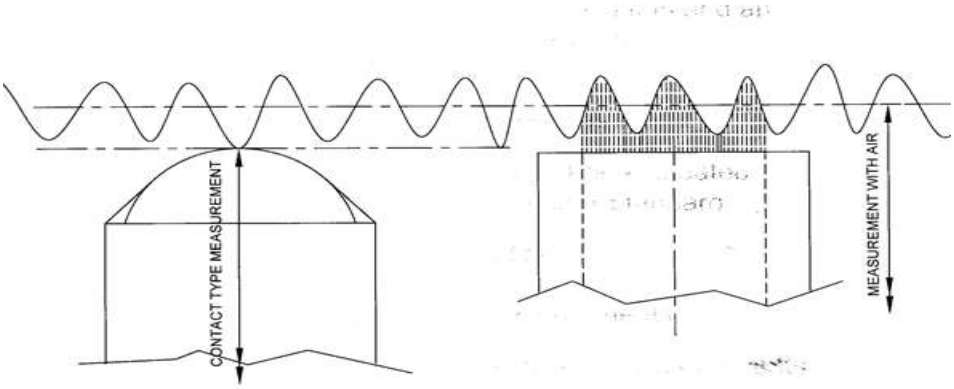
1) Why Air Gauging?

- Air Gauging is the best proven method of gauging a bore.
- The only system that gives 0.001mm accuracy and reliability in the harsh shop floor environment.
- Is non-contact I.e. the gauging element is a column of air – hence minimum wear.
- Is a clearance type of gauging – large clearance between the body and the part. Ideal for rapid checking.
- Probes can be lapped to check highly finished and soft surfaces.
- Has self-cleaning effect on the part.
- Is non-subjective.
- Checks size, taper and ovality in one go – 10 times faster than a mechanical gauge.
- Can be easily given from 1mm to 200 mm
- Checking is unaffected by normal changes in the environmental temperature.
- Very high magnifications can be achieved..

2) What is Difference between Contact Type Gauging & Non- Contact Air Gauging?

- Contact gauging means there is a physical contact of the sensing element which is a required to be of hard wear resistant material – this may leave a mark on the surface. Where as in Air gauging the gauging element is column of air.
- Cannot give very fine least counts and accuracy – Air gauging can give very high accuracy and reliability.

- The ambient temperature changes does not affect Air gauging (all Steel) where as in contact gauging it may have a detrimental effect.
- Prone to error
  - due to wear of contact points.
  - Due to wear and tear of the transmission mechanism.
  - Is Subjective – needs skill to judge the reading hence becomes very slow as compared to Air gauging.
- The surface finish of the part plays an important role in the measurement out-put of Air gauging.
- Air gauging checks the average of the peaks and valleys of surface as shown below:



3) What Is the Linearity of the Air Gauge?

- Linearity of the air plug solely depends upon how laminar the flow of air is when it leaves the jet.
- The straightness of the column of air flowing out is the linearity. The air must impinge normally.
- If for any reason the air flow turbulates it affects the linearity.
- If the jet has a bell mouth the linearity is affected.
- If the jet bore is oval the linearity is affected.

- Calibration is done when setting is done by the two setting masters.
- Therefore to keep a constant check on linearity 2 setting masters are provided.

4) What is the Life of Air Plug??

Theoretically when the body of the plug wears and come to the level of the jet face, the air plug is said to be worn out. But FBS wear is not the only reason

Life of an air plug is a factor that depends on

- The friction that the body of the air plug has with bore. This depends on the clearance
- The condition of the jet.
- The jet recession

Friction would be more in rough bores and harder materials.

Non-ferrous materials would cause less frictional wear on harder Air plug. Whereas Cast Iron which is supposed to contain carbides would cause more wear. Similarly hardened (60HRC) material also causes wear.

The body of the plug wears therefore the positioning of the jets changes and causes asymmetry.

The damage to the jets inside edge.(jets are recessed but they are not totally protected against damage) causes jet to become imbalanced.

This is the main reason for the Air plug to be non-functional hence care is to be taken to prevent this from happening.

5) What Are The Inputs for Good Gauging?

- Condition of Measurement.
- Condition of the Component.
- Type of Gauging Required.
- Components produced per shift.

- Gauge Utilization per hour.
- Type of Output Needed
- Clear cut Parameters to be gauged

6) What Is In – Process & Post Process Gauging?

- In-Process - Basic idea behind this is to ensure 100% parts are checked & to keep a check on its size while processing and to give a feed back to the machine.
- Applicability normally seen in grinding processes like shaft, bigger bores, bearing races and operations where relational parameters are not involved.
- Has limitations in applicability.
- Cost involved are high resulting in higher cost for Quality.
- Post Process - Carried out after the Process is complete - sounds like Post-Mortem but not so in reality. Now machines are more stable and process parameters do not unpredictably vary.
- Can be done on machine I.e. Air Plug for checking bore diameters, Air Snap gauge to check shafts etc.
- Is done off the machine by dedicated gauging fixtures, which can have single or multi parameter capability, checking simple or relational parameters depending on the requirement.

7) What are the advantages Of Post Process Gauging?

- Provides a major advantage of rigidity that is needed on the shop floor and a limitless applicability.
- Ideal for first part pass-off & SPC.
- Always has a scope using better technology based on experience & change.

- Ideally suited for the “Cell Manufacturing Concept” One operator many machines. Automated Gauging becomes a part of the process cycle by even marking grades.

8) What is the Difference between Precision, Accuracy & Sensitivity?

- PRECISION: is the repeatability of the measuring process.
- ACCURACY: the closeness of the measured value to the true value. It is also referred to as Bias - the difference between the observed average of the measurement and the reference value.
- SENSITIVITY: is the ratio of the change in the indication of the instrument to the change in quantity being measured. It is also referred to as discrimination.

9) What is Repeatability & Reproducibility?

- Repeatability is the variation in measurements obtained with one measuring instrument when used several times by one appraiser while measuring the identical characteristic on the same part.
- Reproducibility is the variation in the average of the measurements made by different appraisers using the same measuring instrument when measuring the identical characteristic on the same part

10) What is Uncertainty of Measurement?

- Is defined as the probability of a reading lying in a given range on either side of the mean value with a stated confidence level. (usually 95%)
- A measurement has imperfections that result in errors. These errors can be either Random or Systematic.
- Random errors are caused due to unpredictable reasons and they cannot be eliminated but the effect reduced by increasing the number of observations. But it cannot be totally eliminated.

- Systematic errors also cannot be eliminated but can be corrected. The errors can be quantified and a correction factor applied to reduce the effect to Zero.

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