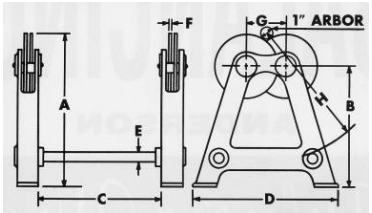
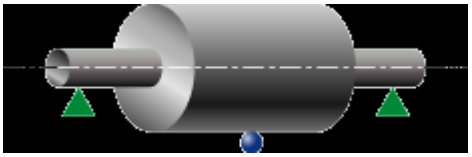
Shop Tech Talk February 2009

Q.	What is meant by static and dynamic imbalance?

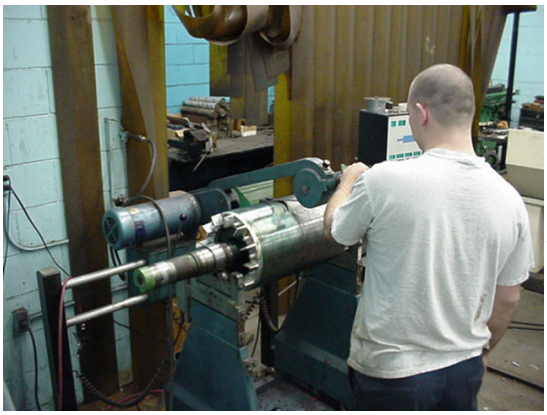


Imbalance or unbalance is the uneven distribution of weight . It occurs when the center of gravity of a rotating object is not aligned with its center of rotation

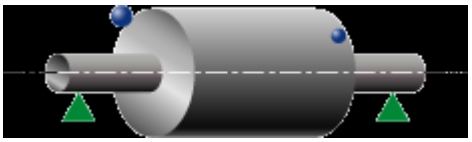
If this unbalance is in one plane then we call it static unbalance and it can be corrected using a static balancing tool (as shown on left)



Static Balancing is a weighting process to detect the imbalance of a circular or cylindrical part which is free to turn on an axis. A part to be balanced is placed on the four discs of the Balancing Tool. An unbalanced part will rotate until the heavy side is downward. Balance is accomplished by adding a counter weight to the lighter side, or by removing weight from the heavy side. When the part remains motionless when placed in any position in 360 degrees, it is then in static balance.



If the unbalance is in two planes then we call it dynamic unbalance.



When the part rotates it generates centrifugal forces. Normally, the sum of these centrifugal forces equals zero, however, if they do not, that rotating object will generate vibration and noise. Dynamic balancing machines (as shown on left) measure the amount and angle of this vibration.

Why doesn't the sum of all centrifugal forces add up to zero? The primary cause is an accumulation of error.

There are many factors than can cause dynamic unbalance.

For formed or machined parts, potential causes include:variations in the specific weight of materials, the shape is not symmetrical with respect to the center axis, variations in forming, machining or other processes involved in the manufacturing of the part.

For part assemblies, potential causes include: variations in the assembly process, variations in the mass of individual parts and variations in placement of the parts.

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