

BALANCING TIP # 101

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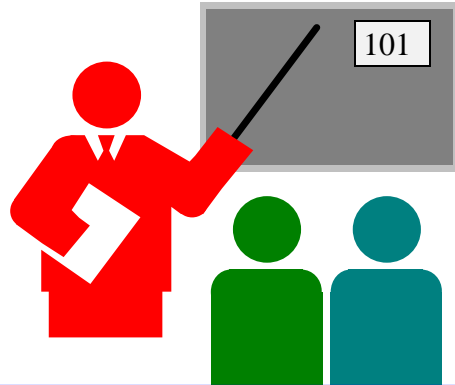
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CHECKING OR PROVING THE BALANCE LEVELS IN ROTORS

There are many times when it is necessary to check to see if a specified balance tolerance has been met, to verify that a balancing machine is performing properly, or to convert measurement readings such as Mills to balance terms of ounce inches or gram inches. Balancing Tip 101 can be used for all these cases.



It is often necessary to state the unbalance level achieved in a balancing machine in terms that are different than those that were used to balance the rotor in the first place. For example, the customer may ask for the final balance level in ounce inches when the rotor was balanced in terms of Mills in the balancing machine. Another case that happens often is the customer states the balance level required and then asks that you prove that the level was achieved.

It is a simple matter to convert mills to ounce inches or gram inches or to show that the balance level expected has been achieved. The following Step by Step procedure shows you how, and is applicable regardless of the type of equipment being used or the readout terms being used.

STEP 1

Balance the rotor in the balancing machine in the normal manner to a level which is deemed acceptable.

STEP 2

Select a test weight to be added to one plane of the rotor. This weight should be large enough to produce a readout that is a least five (5) times the final reading deemed acceptable in Step 1. Also, the following test should be run in both planes, one plane at a time.

Record the amount of weight = _____ (grams/ounces).

Record the radius from the center of the shaft at which the weight is added. Radius = _____ (inches/mm).

Multiply test weight times the radius = _____ (oz-in, gram-in, gram-mm)

Add the test weight to the rotor and call the first location 0 degrees for record keeping purposes.

STEP 3

Spin the rotor and record the amplitude in the table on the following page. A table has been provided for the two most common tests (8 holes or 45 degrees and 12 holes or 30 degrees). The amplitude can be in any terms (mils, in/sec, ounces, grams, volts, etc.). Stop the rotor.

The table provides for space for recording the test for both the right and the left plane if required (A single plane rotor would require only one set of readings).

STEP 4

Remove the test weight from the original 0 degrees position and move to the next location (30 or 45 degrees), making sure the radius remains the same and spin the rotor. Record the amplitude in the table provided.

STEP 5

Continue to move the weight around the rotor and recording the amplitude until all test data is completed.

ROTOR WITH 8 HOLES FOR WEIGHTS

Location of Test weights (degrees)	Amount Left Plane	Amount Right Plane
0/360		
45		
90		
135		
180		
225		
270		
315		

ROTOR WITH 12 HOLES FOR WEIGHTS

Location of Test Weights	Amount Left Plane	Amount Right Plane
0/360		
30		
60		
90		
120		
150		
180		
210		
240		
270		
300		
330		

STEP 6

Review the Table and determine the highest(Hi) and lowest (Lo) readings for both planes. Using the formula;

Residual Unbalance (Ur) = Test Weight (in oz-in, gr-in, etc.) x (Hi -Lo)/(Hi+Lo).

Example: Test Weight = (6.4 ounces) x (Radius = 5.75 inches) = 36.8 ounce inches

Highest reading in the left plane = 11 mils

Lowest reading in the left plane = 9 mils

Residual Unbalance(Ur) = 36.8 ounce inches x (11-9)/ (11 +9)
= 36.8 x 2/20
= 3.68 ounce inches for the left plane.

Calculate Ur for the Right Plane also. Record:

Left Plane _____ Right Plane _____

STEP 7

Compare Ur to the specified tolerance. If Ur for each plane is less than the specified tolerance, then the rotor is at an acceptable level of unbalance.

Note: This test is similar to the ISO Standard test for proving the accuracy of balancing machines, however, in that case it would be necessary to plot the readings to graphically display a sine wave.

A simpler, less accurate method of converting mils to ounce inches or gram inches is provided in Balancing Tip 102.

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