

## General Mode Shape Plot Procedure

When the hand feel procedure is performed on a component or structure and it reveals a possible resonant condition, this suspicion should be confirmed by plotting the mode shape on graph paper. This simple procedure can be performed with the most rudimentary of instruments and is very effective in identifying the mode shapes. Where possible, both the horizontal and vertical directions should be plotted; the direction that indicates the greatest “curl” is the resonant direction.

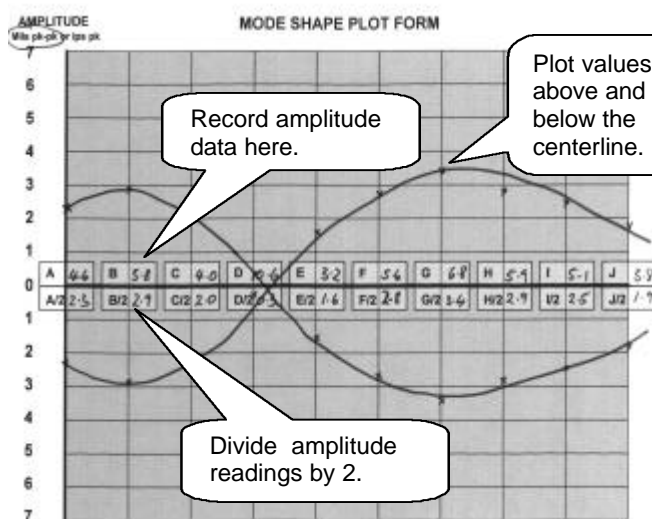
Prior to performing this procedure, determine the dominant vibration frequency.

To plot a mode shape, perform the steps below:

1. Divide the component to be tested into 10 roughly equal parts and identify each measurement point, usually with a letter to avoid confusion.
2. For each point, measure the vibration amplitude at the frequency of interest. Document the amplitude in the boxes provided on the Mode Shape Plot form.

NOTE: Displacement units are preferred, but velocity or acceleration can also be used. If necessary, overall readings can be used, but FFT data is preferred.

3. Divide each reading by 2 and record in the space provided.
4. If a Mode Shape Form is not available, obtain a sheet of graph paper and draw a horizontal line in the middle of the page. On the line, mark the measurement locations spaced approximately 1” or 25mm apart.
5. Plot the results above and below the zero line on the Mode Shape Form using a vertical scale of  $\frac{1}{2}$  “ = 1 mil of vibration, 1 cm = 25 microns or  $\frac{1}{2}$ ” = 0.1 ips.
6. Join the dots and “curve fit” if required.



The more pronounced the curling shape produced, the closer to resonance the part is. Non-resonant sections will exhibit some curling but the clearly defined nodes and anti nodes will not be present.

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### **Suggested Measurement Locations for Mode Shape plots for Different Machines**

The following images depict possible measurement locations for performing the Mode Shape Plot.

