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# Operating Deflection Shapes

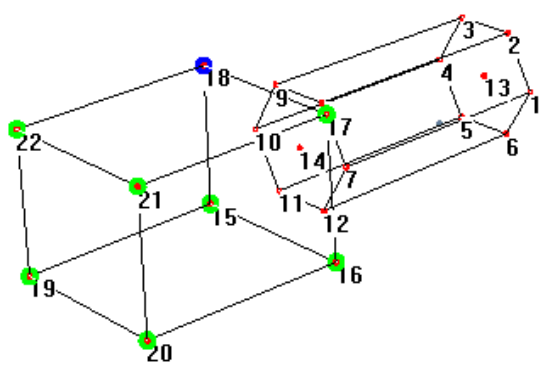
It is well known that in the case of many types of variable speed machines, there usually are certain speeds at which the machine performs poorly, either evidenced by excessive vibration levels or poor quality of the product. A good example of this is found in the paper industry, where production capacity is reduced because the machine may not safely be operated at certain speeds.

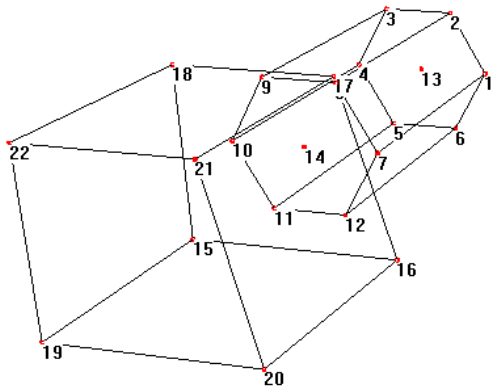
The primary reason for the erratic behaviour of complex machines at different speeds is that mechanical resonances in the structure are excited when forcing frequencies approach a natural frequency of the structure. A large machine will have a great many modes of vibration, each one at a particular natural frequency, and it is usually very difficult to determine by inspection how and where the structure is moving at any resonant condition.

In the past, bump testing of machinery has been used to ascertain crude measures of a machine's natural frequencies. However, bump tests have limited capability to precisely determine a machine's resonant frequencies. Success is governed largely by the skill of the user and the right combination of structural parameters. Furthermore, bump tests very often require the machine under test to be off-line, shutting down production.

Operating Deflection Shape analysis (ODS), is a technique where vibration measurements are made at many locations on a machine and transfer functions are calculated between a reference location and all the other sensor locations. These TRFs contain phase and amplitude information about the motion of the machine when it is running. The operation of the machine itself provides the excitation forces for the measurement -- unlike other techniques, no external excitation is used for ODS.

After the measurements are made, a computer program examines all the data and produces a series of animated 3-D pictures on the screen that shows the motion of the machine parts at selected frequencies. The ODS analysis provides information to the designer about how to modify the structure to solve the vibration problem by pointing out the locations and directions in which the excessive motion is occurring.

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# Operating Deflection Shapes (Cont.)

## These Days Portable Multichannel Instruments And Associated Windows Based Software, Makes It Easy To Visualise Machine Movement

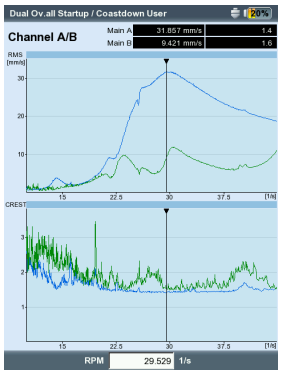
In the past, analysts required extensive knowledge and expertise in applying complex mathematical formulas to perform such analysis. And until now, software designed to assist analysts has been complex or ineffective in providing the functionality and power required to obtain the most accurate information.

Pruftechnik, now provides an intuitive, easy to use approach to performing Operating Deflection Shape Analysis. By designing an interface between the portable data collector / analyser and the advanced, easy to use operating deflection shape/modal analysis software, which gives every user the opportunity to perform expert analysis.

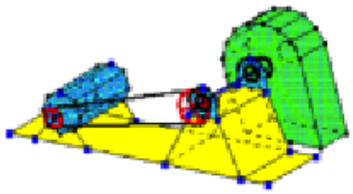
A user begins the easy and convenient process simply by selecting the structure to be analyzed from the software's extensive template library. Once selected, the active test points are downloaded into the instrument. After collecting the data, it is uploaded to the software to animate the structure for review and analysis.

Panning, rotating, and zooming allow you to move the structure for more detailed observations. Colored contour plots, displayed during deflection animation, let you view critical node lines and identify logical options for "What If" structural modification.


**VIBXpert II *New***




**Observe, analyse and document the dynamic behavior of a machine, under varying load conditions**



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