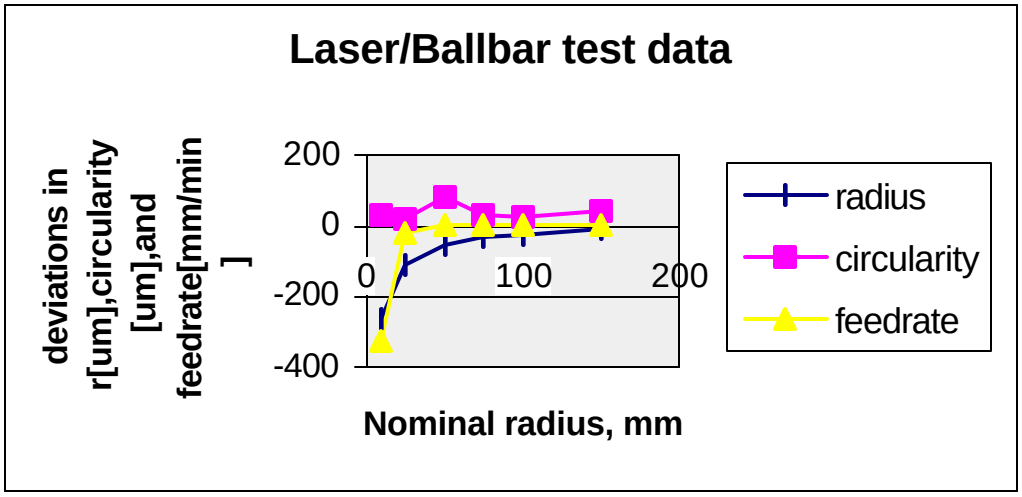
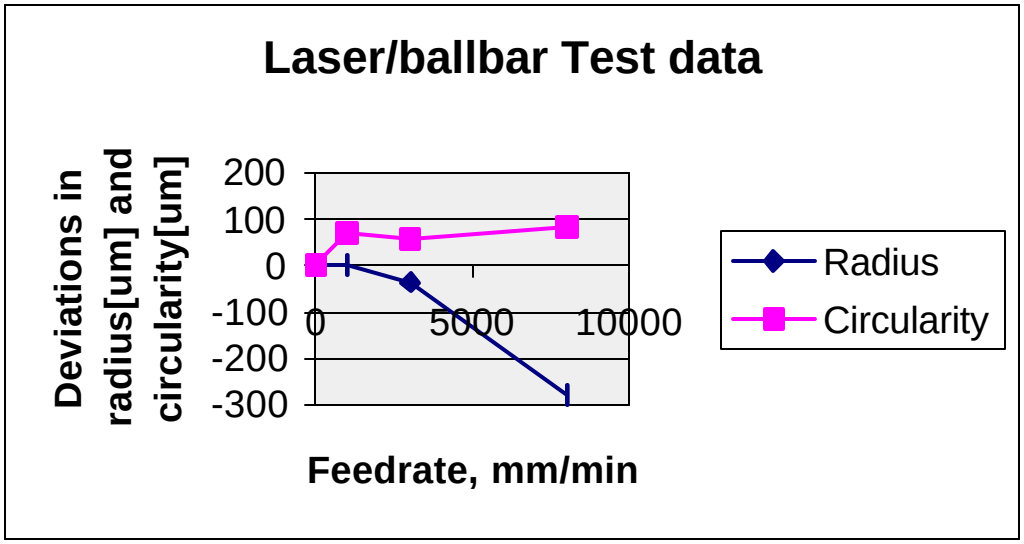
# Do you know your contouring accuracy at high feed rate and small radius?

For most machine tools, the contouring accuracy deteriorates with higher feed rate and smaller radius. It is important to know what is the maximum feed rate your machine can achieve without losing the required contouring accuracy.

Chart 1 shows the deviations in radius, circularity and feed rate at a nominal radius, and chart 2 shows the deviations in radius and circularity at various feed rates.

Both of these charts were obtained by using a laser/ballbar in less than 2 hours.



# Do you know your velocity profile at high feed rate and small radius?

Is your servo controller properly tuned?

Chart 1 is the displacement, velocity and acceleration of x-axis while making a 1” (25mm) circular pattern at a feed rate of 150 in/min (3800mm/min), and chart 2 is the displacement velocity and acceleration of x-axis of a different machine making a 25 mm circular pattern at a feed rate of 4800 mm/min.

This dynamic information was obtained by using Optodyne’s laser/ballbar. The laser measurement is accurate to 1 um/m (1 ppm) and traceable to NIST. Chart 1 and 2 are shown below.

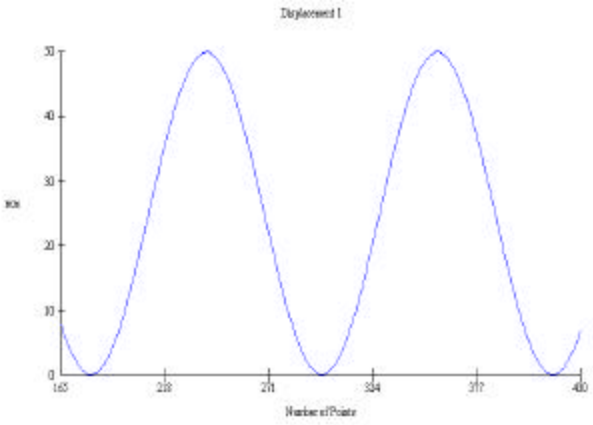
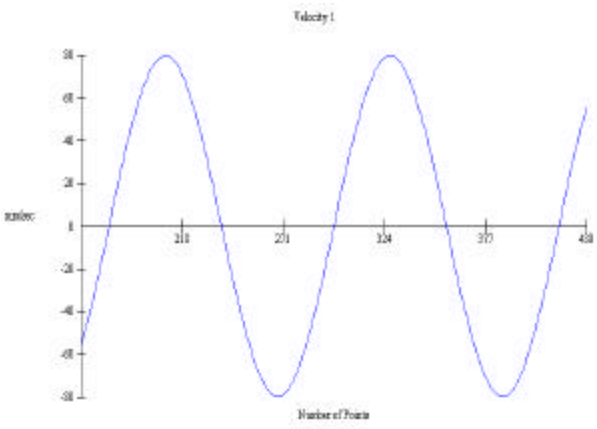
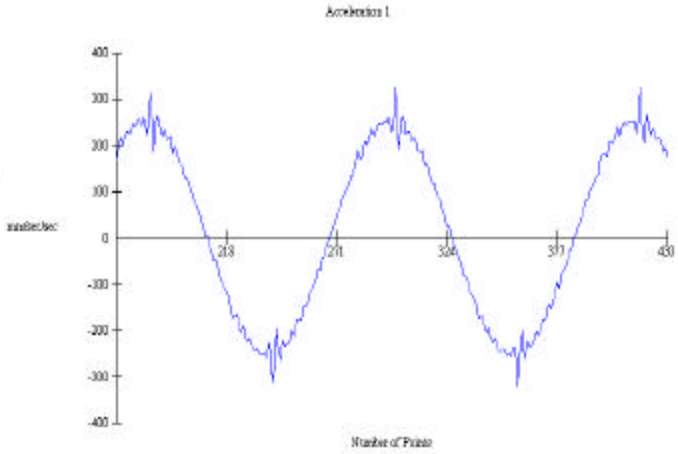
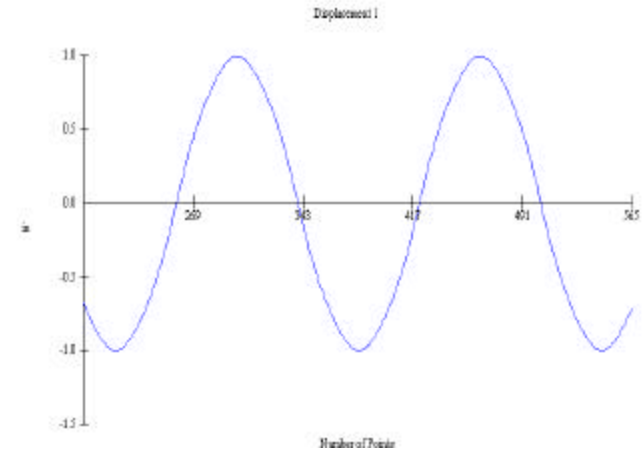
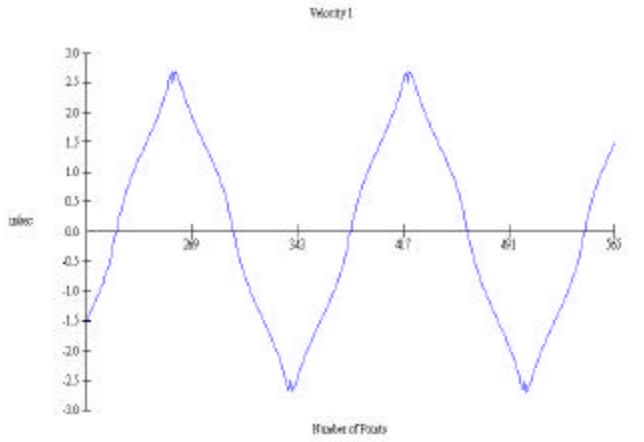



Chart 1, we can see the shape of displacement sinusoidal as well as the velocity and the acceleration , all is smooth and well controlled, the machine is well dimensioned and well tuned.





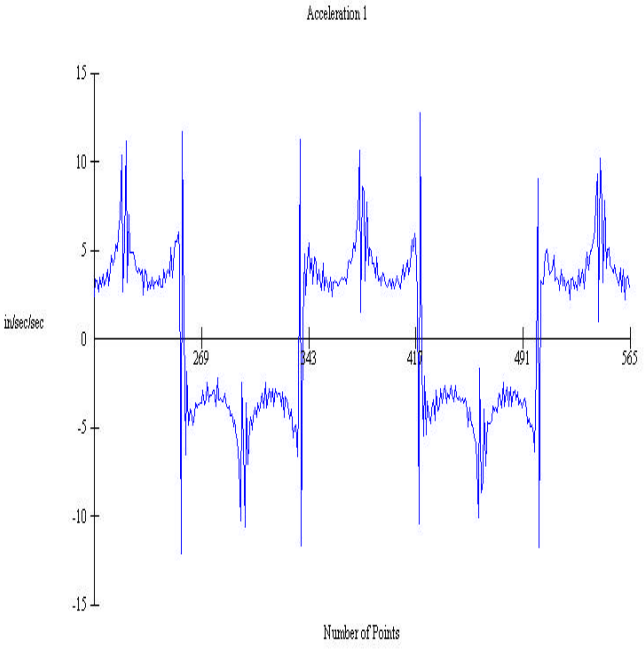




Chart 2 The displacement looks sinusoidal, but at the further analysis we can see velocity with triangular wave and acceleration with square wave. The servo system is acting with two basic condition only, full power forward and full power backward trying to follow
the imposed position.

The system needs to be tuned increasing the loop gain for instance.

# What is the volumetric accuracy of your machine? Do you compensate your machine properly?

Optodyne's new Vector Measurement technique (patent pending) will measure the volumetric errors, including the linear position errors, vertical straightness errors, and horizontal straightness errors for all 3 linear axes and the 3 squareness errors. Using these volumetric errors, you can compensate your machine volumetrically and improve the volumetric accuracy.

Using Optodyne's MCV-500 system you can collect data on all these volumetric errors (3 linear, 6 straightness and 3 squareness) in about 2 hours (1 meter volume).