



Sceptre Application Notes Dynamic Dimensional Testing Bed Mechanical Product Development Environment

In the product development life cycle it is often necessary to determine the dynamic distortions, deflections and irregularities that occur in a particular design. These distortion result from the dynamic loads and operation of the design.

Computer modeling and finite element analysis are disciplines that have attempted to predict this behavior. The models are only approximations and as the complexity of component shape increases and components in an assembly interact, these models begin to decay in accuracy.

The CMM is a classic static dimensional test bed at what is in physics and chemistry terminology "STP" Standard Temperature and Pressure @ 20 degrees C. It is the purpose of this new capability to determine the actual dynamic behavior of work pieces under controlled conditions where dynamic conditions are imposed.

A new dynamic testing mode has been added to the Sceptre System. Dimensional Coordinate data can be simultaneously logged in conjunction with several auxiliary channels of input.

The time base can be triggered and sequenced in conjunction with an external event or signal. Data is logged together and presented in a graphic chart format.

Time Base Logging: Duration 0 – 3 hours Programmable
 Increment 1ms – 60 sec. Programmable

Triggering: On Keyboard Prompt
 On Signal Input
 On delay after signal input
 On delay after Keyboard Prompt

Primary Input: Surface movement in surface normal vector, +/- Material direction
 Absolute XYZ part coordinates

Secondary Input: Temperature: when equipped with Temperature compensation
 Voltage: customer supplied sensing equipment
 (i.e. Pressure Sensor, Generic On/Off Switch, Thermo-couple, etc.)

A few examples for using the Dynamic Measurement Process are as follows:

Example 1: Dynamic measurement of engine block distortions as a result of combustion chamber pressures.

Some of the data required would be total time for collecting data points, number of data points, graphical output of coordinate movement vs. combustion chamber pressure, temperature, etc

Total Time	:	30 seconds
Points Logged	:	2,500
RED	:	Coordinate Movement (um)
BLUE	:	Combustion Chamber Pressure

Example 2: Dynamic measurement of printer component distortions as a result of carriage movement.

Again, length of time for collecting data points, number of points collected, graphical output of data collected and analyzed.

Total Time	:	10 seconds
Points Logged	:	1,000
RED	:	Coordinate Movement (um)
BLUE	:	Line Feed

Example 3: Dynamic measurement of bi-metal effect in an assembly as a function of temperature.

Once again, we are using a dynamic measurement to analyze the material growth vs. cold temperature to operating temperature of various materials.

Total Time	:	60 seconds
Points Logged	:	3,000
RED	:	Coordinate Movement (um)
BLUE	:	Temperature Trace Degree C