FocusTrac™
Laser Auto Focus System

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FocusTrac™ Laser Auto Focus System from Motion X provides real time focus for most all infinite conjugate microscope systems including those manufactured by Olympus, Leica, Nikon, Zeiss, and Mitutoyo. It can also be configured to work with many older finite conjugate microscope systems as well as individual Telecentric optics. The ***FocusTrac™*** design is based upon a modified optical version of the "mean transfer function" commonly used in CD/DVD players. By applying advanced optics, mechanics and electronics the ***FocusTrac™*** is able to differentiate between "in-focus", "above focus" and "below focus" conditions to produce a relative error signal that can be used to drive the position of the microscope and optics relative to the sample of interest into an "in focus" condition.

While simple in concept the system is unique to each of its many applications. It has been used to inspect semiconductor wafers and devices, hard disk read write heads and disks, razor blades, photovoltaic substrates, MEMs devices, flat panel displays, ink-jet substrates and a number of other automated inspection and vision based applications. The results of using the ***FocusTrac™*** are a substantial increase in through put and a significant reduction in processing time for a given automated inspection system. In the case of a manual inspection system it provides both a substantial increase in through put as well as greatly reduced operator fatigue. The ***FocusTrac™*** is able to maintain focus of the image over the entire inspection area.

Real Time Focus for Microscope Systems.

The system introduces a collimated laser source beam into the optical path of a microscope system via a custom designed Dichoric Narrow Band Beam Splitter, which is highly reflective of the laser source at an incident angle of 45 degrees and highly transmissive to other Visible and Infrared wavelengths. Due to the unique design of the Beam Splitter, the microscope image is not adversely affected by the introduction of the dichoric or laser source energy.

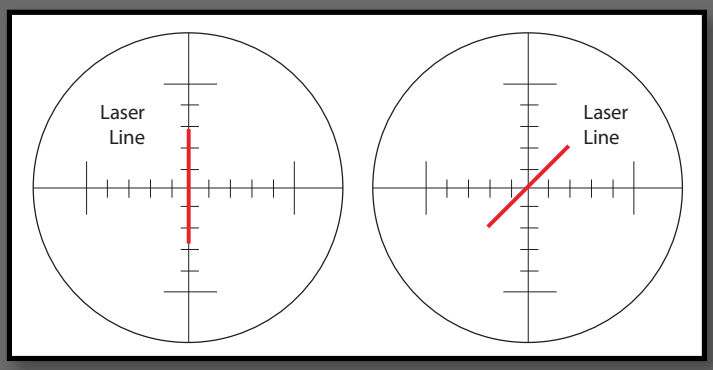
The dichroic beam splitter reflects the laser source beam through the microscope objective onto the inspection surface. The laser light reflected from the inspection surface is directed back into the ***FocusTrac™***. Internally the ***FocusTrac™*** images the returned laser light onto a position sensitive sensor, resulting in an error signal proportional to the intensity of the signal returned. By monitoring this reflected beam fast and repeatable focus is maintained continuously at a rate dependant on the drive mechanism.

The convergence of the ***FocusTrac™*** system to an "in focus" condition is affected by many factors. The most fundamental is the bandwidth of the focusing drive mechanism. Through the use of traction wheels, stepper motors, servo motors, direct drive systems, Piezo electric elements, and air bearing voice coil type actuators the ***FocusTrac™*** is capable of substantial bandwidths.

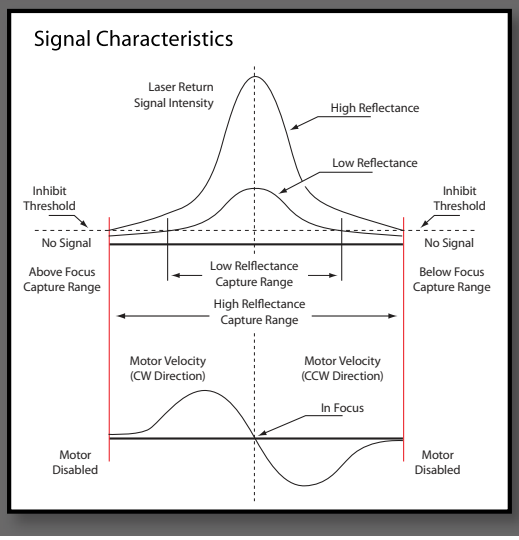
Given the performance and bandwidth range available, the ***FocusTrac™*** can be integrated into a number of automated inspection and vision system applications. If used in tandem with a linear feedback device such as a glass scale encoder or other transducer, the FocusTrac™ can also be utilized in automated height measurements for both static and dynamic applications.

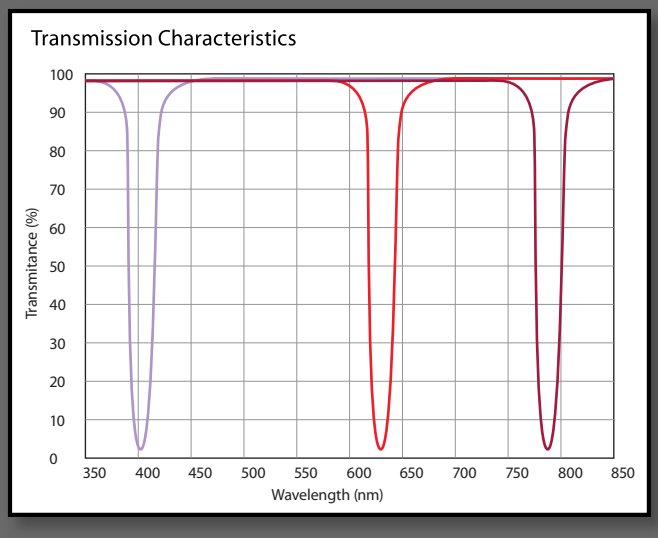
FOCUS METHOD

The ***FocusTrac™*** was designed specifically to project a laser image onto the surface of a sample being imaged. The laser image can be configured as a spot or a line with different lengths. The line has the distinct advantage of integrating the focus information over the entire topology of the Field of View. This line integration reduces hunting and is far less confused by high-relief wafers. Spot-based systems lack this important capability



TECHNICAL DATA





SPECIFICATIONS

Laser
405nm Class 1
635nm Class 1
780nm Class 1

Electrical
± 12 VDC 600mA

Environmental
50-90º F (10-32 ºC)
40-90% Humidity

Physical
7.9 L x 3.9W x 1.6H (inches)
20 L x 9.9W x 4.1H (cm)
3.5lbs / 1.3kg

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