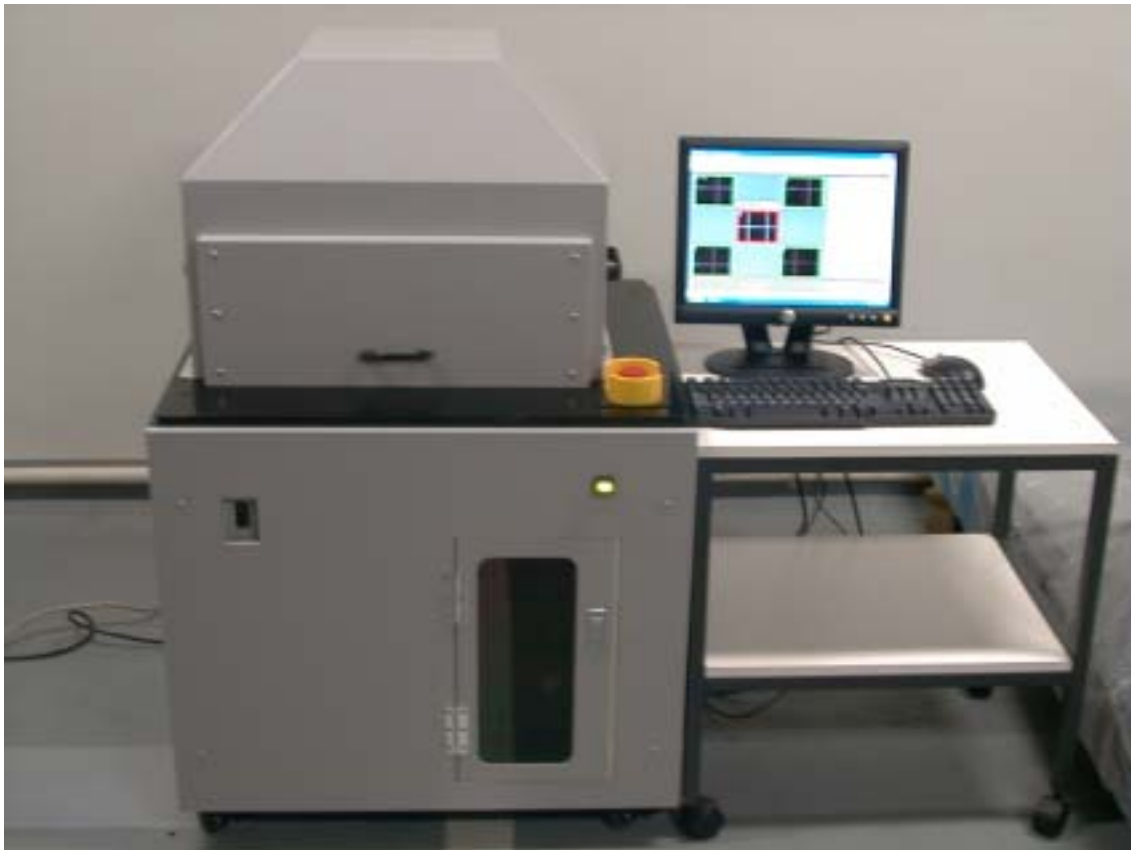




MTF Production System

MTF [Modulation Transfer Function] is the most definitive and widely accepted index of lens performance.



MTF
Automatic Pass/Fail

EFL
Automatic Handling

High - Speed MTF Test Station

for Small Lenses



NANOTEX CORPORATION



Introduction

M-Pro [MTF-Production System] is designed for accurate and rapid MTF testing of lenses in a production environment. The system uses the projection method for testing, that is the target plate is in the normal image plane of lens, and is projected into the object plane where the subsequent image is analyzed by multiple CCD cameras.



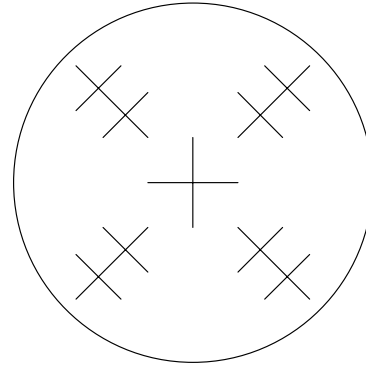
The outputs from the cameras are analyzed in real-time to produce a MTF pass/fail result. Failed lenses are automatically removed into a reject pin. (Automatic)

The test routine is initiated by the operator, after a tray of lenses has been placed into the unit. The lens tray sits on an open frame stage, which positions each lens in turn over the optical axis for testing. Once the lens is positioned, a through focus test is initiated to find the best focal plane, when this is complete, the system analyses the cross-line images on all the cameras and produce MTF results for the lens. Depending upon customer requirements, this can be up to 8 positions, all in the Tangential and Radial azimuths.

The computer then will compare the results against operator set criteria and either pass or fail the lens. If the lens has failed, it will automatically be removed from the tray, into a reject pin. No operator involvement is required and the typical cycle time for a lens is currently around 4 seconds.

The Target

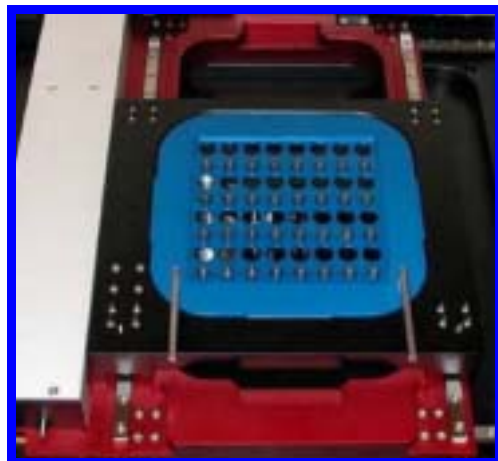
The target consists of 9 cross-lines, positioned at the required measurement positions. The exact form of the application. A typical target layout is illustrated below.



Cross-line target

The target is illuminated via a fibre-optic light source, and is positioned at the focal plane by the focusing stage. The resulting images are then projected through the lens under test into dome.

As described earlier, the open frame stage positions the lenses contained within the tray over the optical axis of the system. The image below shows the stage, with a lens tray mounted in it.



With small plastic lenses tray can typically hold approximately 40 lenses giving a tray cycle time of around 2 minutes.

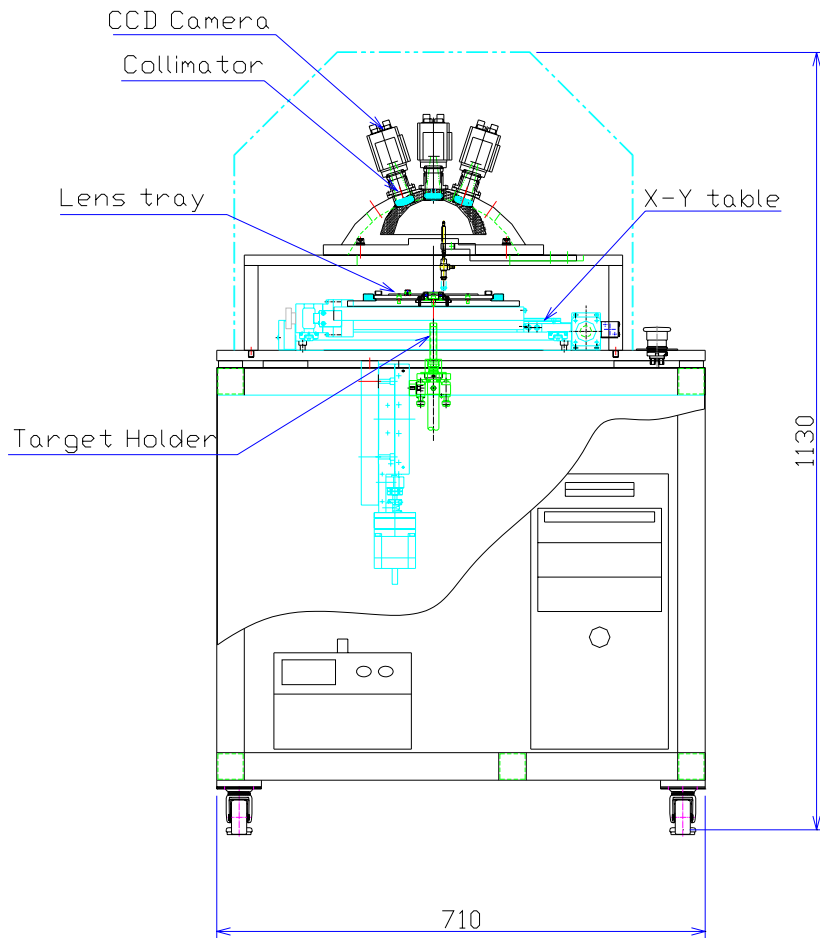


Image Acquisition

The CCD cameras are mounted in a custom designed dome, where the angular position is defined by the customer's field angle test requirements.

Each camera is fitted with a de-collimating lens to form real image on the sensor. The collimators can also be supplied focused to a pre-defined finite conjugate, based on the customers individual test requirements.

The image on the left shows a dome with 5 cameras fitted. Customers can choose to have any number of test points and therefore cameras, mounted on the same. Mounted at the angular positions to suit their own test requirements.





SYSTEM COMPONENTS

Sensor	1 to 9 High Resolution CCD Cameras
Target	Custom graticule with up to 9 cross-line targets
Illumination	150W Fibre Optic Light Source with color temperature control.
Positioning	Automatic positioning and finding with M-Pro Software
Focusing	1 μ m accuracy 100mm 5-phase automatic stage
Field Stages	1 μ m accuracy 150mm X-Y travel 5-phase stage
Lens Mount	Choice of Lens Mount dependent upon application
Computer	Pentium 4 System 2.0 +GHz and 15" TFT Display
Software Package	Matrix M-Pro Software for Windows

SPECIFICATION

Lens Type	Infinite Conjugate
Focal length range	1.5 - 30mm
Test Features	MTF, EFL (Option)
Spatial Frequency	0 - 250 lps/mm
Max. Off Axis	100 % Field of View
System Speed	< 5 sec per. 10 MTF point Test.
MTF Repeatability	± 2 %



Manufactured ;

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