

Fiber Grating Inscription System With Newport IMS Series Stage

Market: Telecom

Application: Fiber Sensing Research

Fiber grating is an optical device which enables the systematic variation of refractive index in the core of a special type of optical fiber. Fiber grating technology can be found widely in optical communication systems, and more recently in sensing technologies.

Optical communications systems often use fiber gratings in wavelength division multiplexing (WDM), allowing optical signals of various wavelengths to be combined, transmitted and then decoded. This helps achieve the increased efficiency and capacity of fiber optic networks. Fiber grating characteristics are also readily adapted to sensing. In these applications, fiber gratings can be used as direct sensing elements for physical characteristics such as strain or temperature, as well as transduction elements for converting the output of another sensor. The versatility of fiber grating technology makes it well suited for embedded sensor networks and they are found in applications such as real-time monitoring of bridge deformation or downhole sensors in oil exploration.



With its broad domain of applications, fiber grating technology has inspired researchers to continue the investigation of its property and optimization of technique. Many researchers often develop their own experimental setup to fabricate the fiber gratings, and the image shows an example using Newport stage. This setup is a phase mask inscription system which consists of a UV laser (not shown), Cylinder lens, high precision motorized linear stages and phase mask.

This Newport customer is a researcher of fiber based components in the optical communications field. They are using this setup to fabricate high quality fiber gratings for optical filtering, dispersion compensation and fiber sensing. In developing the experimental setup, they have selected the [M-IMS600PP](#) which provides an ideal platform for the phase mask scanning method of fiber grating fabrication.

Newport M-IMS600PP provides a position MIM (minimum incremental move) of just over a single micron and it helped meet the most critical precision requirement at the micron and nanometer scale. The full 600mm travel of stage enabled the continuous patterning of long sections of the fiber, and the velocity control helped achieve a smooth grating spectrum and a high side lobe suppression (SLS) ratio.

Key specifications of IMS600PP:

- 1.Travel Range:600mm
- 2.Minimum Incremental Motion:1.25um
- 3.On-Axis accuracy:15um
- 4.Uni-Directional Repeatability:1.25um

The customer also used an [M-561D-XYZ stage](#) with [PZA12 actuator](#) for securing the position of fiber relative to the mask, as well as for adjusting the strain of the fiber.