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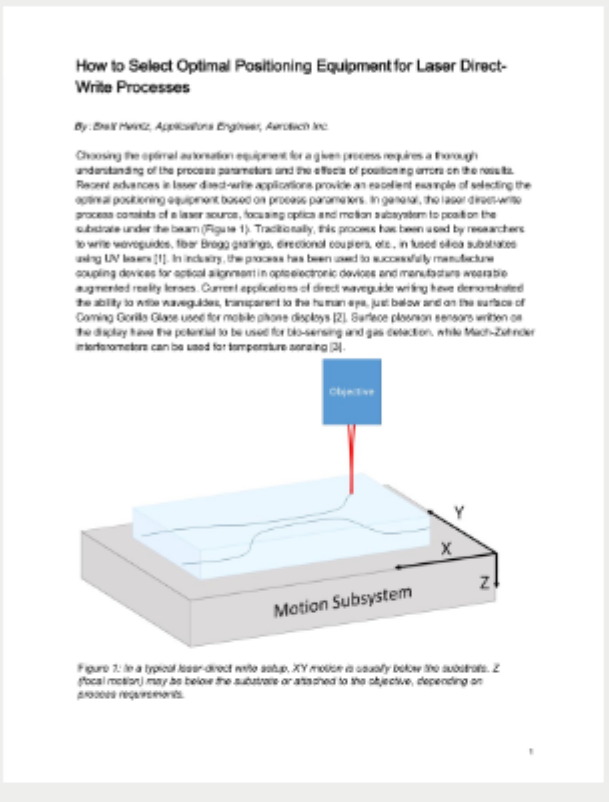
How to Select Optimal Positioning Equipment for Laser Direct-Write Processes

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Choosing the optimal automation equipment for a given process requires a thorough understanding of the process parameters and the effects of positioning errors on the results. Recent advances in laser direct-write applications provide an excellent example of selecting the optimal positioning equipment based on process parameters. In general, the laser direct-write process consists of a laser source, focusing optics and motion subsystem to position the substrate under the beam (Figure 1). Traditionally, this process has been used by researchers to write waveguides, fiber Bragg gratings, directional couplers, etc., in fused silica substrates using UV lasers [1]. In industry, the process has been used to successfully manufacture coupling devices for optical alignment in optoelectronic devices and manufacture wearable augmented reality lenses. Current applications of direct waveguide writing have demonstrated the ability to write waveguides, transparent to the human eye, just below and on the surface of Corning Gorilla Glass used for mobile phone displays [2]. Surface plasmon sensors written on the display have the potential to be used for bio-sensing and gas detection, while Mach-Zehnder interferometers can be used for temperature sensing [3].

Figure 1: In a typical laser-direct write setup, XY motion is usually below the substrate. Z (focal motion) may be below the substrate or attached to the objective, depending on process requirements.

How to Select Optimal Positioning Equipment for Laser Direct-Write Processes

This paper explains how to select optimal positioning equipment for laser direct write processes. Advanced manufacturing techniques, such as laser direct write of waveguides in mobile phone displays, rely on optimized precision positioning equipment to achieve new applications with the potential to provide previously unrealizable benefits, such as personal biosensing and chemical detection capabilities integrated into mobile phone displays.

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