

## High Vacuum Motor Drive for the Uniform Deposition of Nanolaminates

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The large optic fabrication community has interest in using nanolaminate films for the fabrication of hybrid mirrors instead of conventional optics. A motor drive was built in order to aid in the production of these nanolaminate films. Using nanolaminates in hybrid mirrors significantly lowers production cost and manufacturing time. In addition, nanolaminates have the ability to correct mirror figure by integrating adaptive optic drivers to thin film nanolaminate optic elements. Nanolaminates' technology can be applied in ultra-strength materials, magnet transducers, high performance tribological coatings, EUV, soft x-ray and x-ray optics, coating for gas turbine engines, high performance visible optics, etc. Nanolaminates are thin film bi-layers structures. In order to produce nanolaminates, they must be deposited uniformly on the face of a metal or glass mandrel. This mandrel is then passed alternately over a pair of deposition sources (magnetrons) in an Ultra High Vacuum (UHV) chamber. The mandrel is spun on its axis to average the irregularities of the sources and achieve uniformity. In order to spin the mandrel within the UHV, a DC motor drive was built to run within the conditions of a High Vacuum environment. The motor drive consists of a rotary motion feed through that utilizes ferro fluidic or liquid magnet (seal). The final motor drive prototype will be tested under vacuum. The source coating must have a uniform film for this prototype to be utilized. Previously, this technique was used by the Extreme Ultraviolet Lithography (EUVL) with successful results.

*Elizabeth Hernandez is a student at Oxnard College. She plans to apply to transfer next fall to California Polytechnic State University San Luis Obispo to pursue a career in Civil Engineering. Elizabeth is the oldest daughter in a family of five and the first that will transfer to a four-year university. She is a math tutor about 16 hours per week. She is the president of a dance club which promotes the culture of Mexico through dance and music. In addition, she is the secretary of the Math Club where she works to motivate and inspire people to have fun with math and get involved with the campus and community activities.*

