

Development of a new generation of optical slope measuring profiler*

Valeriy V. Yashchuk¹, Peter Z. Takacs², Wayne R. McKinney¹, Lahsen Assoufid³

¹Advanced Light Source, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA

²Brookhaven National Laboratory, Upton, NY 11973, USA

³X-ray Science Division, Argonne National Laboratory, Argonne, IL 60439, USA

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Abstract:

We overview the results of a broad US collaboration, including all DOE synchrotron labs (ALS, APS, BNL, NSLS-II, LLNL, LCLS), major industrial vendors of x-ray optics (InSync, Inc., SSG Precision Optronics–Tinsley, Inc., Optimax Systems, Inc.), and with active participation of HBZ-BESSY-II optics group, on development of a new generation slope measuring profiler – the optical slope measuring system (OSMS). The desired surface slope measurement accuracy of the instrument is <50 nrad (absolute) that is adequate to the current and foreseeable future needs for metrology of x-ray optics for the next generation of light sources.

The immediate goals of the collaboration were (i) to discuss development of the OSMS; (ii) to solidify the OSMS design approaches that will meet the needs of tight mirror specifications and also be affordable for all parties involved, both manufacturers and metrology labs; and (iii) to put together a common specification for fabrication of a multi-functional translation/scanning (MFTS) system of the OSMS. These goals have been accomplished in the course of two collaborative meetings at the ALS (March 26, 2010) and at the APS (May 6, 2010).

Here, we review the general and specific design requirements for the MFTS system of the OSMS. The schematic sketches of the side and top views of the OSMS MFTS system with approximate dimensions are shown in Fig. 1. The system is analogous to the NOM translation system developed at HBZ-BESSY-II. However, the OSMS MFTS system is designed to be universal, suitable for operation with different non-contact optical surface slope sensors, rather than with only an optical sensor of a conventional long trace profiler or/and an autocollimator.

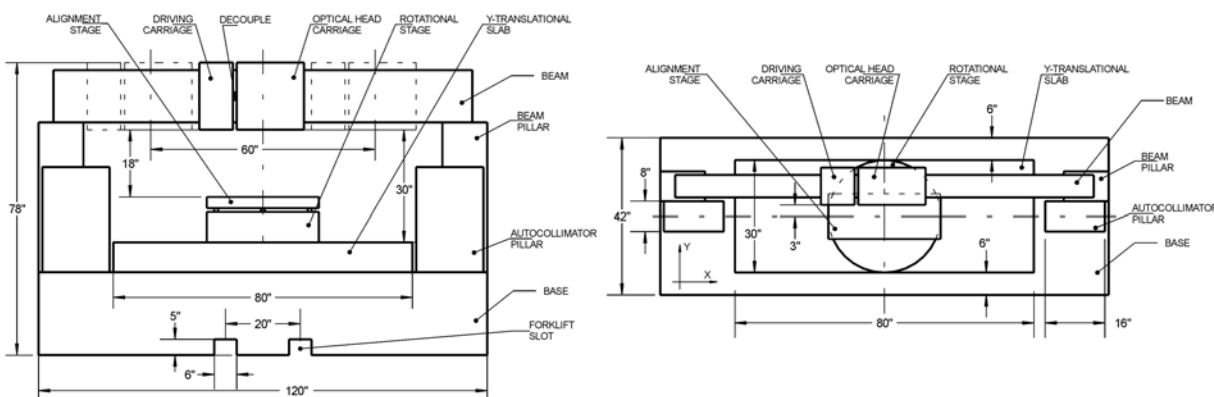


Figure 1: Schematic sketch of side and top views of the specified Multi-functional Translation System of a New Generation Optical Slope Measuring System.

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