

LG Motion design and supply custom-built 2 axis precision positioning system for 280 kg detectors on Diamond Light Source

Basingstoke UK, July 2009: LG Motion Limited recently designed and supplied a large custom built X-Z detector positioning system for the I24 Microfocus Macromolecular Crystallography (MX) beamline at Diamond Light Source, the UK's national synchrotron science facility.

The design specification called for the ability to load the positioning rig with multiple detectors up to 280 kg mass with a volume of around 1 m³ over a 1.55 metre horizontal and 0.85 metre vertical travel range to allow increased flexibility and research throughput on the I24 beamline. At acceptance testing, the system was actually loaded with 420 kg -1.5 times the rated load - and positioning repeatability for both axes was measured to better than 10 microns which is well inside the desired specification for the I24 detector.

The newly commissioned I24 beamline is used by chemists and structural biologists for cutting-edge molecular level studies in genomics, immune systems and membrane proteins, and ground-breaking research in drug design that combats major disease and viruses.

Minuscule protein crystal samples are illuminated with I24's intense X-ray beam and the detectors are positioned to a precision of just a few tens of microns to capture scattered light that reveals the complexities of protein structure and their functions.

LG Motion's custom-built detector positioning system is based around Schneeberger MONORAIL AMS series linear motion guide bearings with magnetised track linear encoders built into the rails. This compact and durable bearing support and fully

protected incremental position measurement system is used extensively on large scale precision machine applications with advantages of 'close to load' measurement and simplified installation plus cost benefits over separately supplied bearings and encoders.

Two AMS bearing rails are fixed to a large 3000 x 1000 mm horizontal base plate that is bolted to the experiment hutch floor with provision for alignment, levelling and grouting on installation. Each horizontal rail has three bearing carriages that support the upper moving horizontal stage carriage plate which is approximately 1000 mm square and 20 mm in thickness.

The 280 kg detector load is evenly distributed on the horizontal stage carriage plate using a welded steel framework with four vertical linear bearing rails which allow the vertical translation of the detector mounting platform which is fabricated from MiniTec ProfileSystem machine framing components. With one pair of bearing rails utilising three bearing carriages and the opposing pair just one carriage, this design is much preferred to a more conventional dual bearing arrangement with an inherent overhung load; allowing for smaller linear bearings and simplified power transmission mechanics to be used.

Each axis is servo motor driven with precision ballscrews, bearing block type supports and a flexible coupling. The vertical axis includes a safety brake and further in-line planetary gearhead reduction to ensure that it does not back-drive under power off conditions, even if the fail safe brake is disengaged for any reason. Both axes also include datum and over-travel limit switches as a part of the specification.

During the design approval, manufacture and commissioning, LG Motion worked closely with scientists and support staff at Diamond to ensure that the detector positioning



system was installed on-budget and on-time, and fully met relevant machine directives, safety standards and performance specifications originally required for the project.

As a key distributor for leading motion control equipment manufacturers including Schneeberger, Agile Systems and SMAC, plus a full design service and in-house manufacturing capability along with its own range of linear and rotary stages, LG Motion Limited provide a complete service for all types of customised positioning systems.

About LG Motion

LG Motion design, manufacture and successfully supply motion products to some of the great prestigious industrial, scientific, research and educational institutions throughout the world. Unlike the majority of UK based motion system suppliers, we operate from our own manufacturing facility and have complimentary partnerships with leading-edge suppliers with a value-add, design-and-build service for mechanical and electrical systems that can include on-site installation and software programming.

With an extensive product range that spans machine building components, mechanical positioners, panel building, distributed servo and motion control systems, LG Motion provides complete technical support and an after sales service covering product training and maintenance.

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