

BEAMLINE INSTRUMENTATION GROUP STRATEGIC PLAN – 1/22/16

Mission

The mission of the Beamline Instrumentation Group is to provide beamline technical support that enables world class research within the XSD Division.

Guiding Principles

1. Listen to the beamline scientists request and ask appropriate questions such that the BI Group engineers understand the problems that need to be solved.
2. Communicate and share knowledge within the BI Group such that engineers build upon each other's work.
3. Keep apprised on external technical developments and share our developments with others.
4. Cooperate and collaborate with the other Beamline Technology Groups to foster a common goal of supporting the Beamline Operations Groups.
5. Develop staff and allocate tasks with attention to diversity and inclusiveness.

Requirements

The BI Group operates within the XSD Division and relies on XSD management to provide:

1. A well-defined roadmap of beamline improvements and priorities
2. Appropriate staffing level, which needs to increase
3. A realistic setting of expectations for what the BI Group can accomplish
4. Appropriate tools – computers, software, metrology
5. Appropriate access to designers and technicians to carry out tasks

Goals

The BI Group will continue providing effective technical support to existing XSD beamlines while pursuing goals that are in-line with the longer term priorities of the XSD Strategic Plan. That Plan emphasizes beamline improvements and technical developments that enhance current capabilities while taking full advantage of the world leading coherence and brightness that the upgraded APS source will provide, especially at 20 KeV and beyond. The BI Group's goals as listed below are directed at making such beamline improvements and technical developments over the next 3-5 years such that XSD beamlines will be poised to take advantage of the upgraded APS source.

1. Improve the overall stability of beamline components such as monochromators, mirrors and slit assemblies to preserve the high brightness.
 - a. The DCM Working Group has already directed effort at developing a standardized monochromator first-crystal LN₂ side-cooling thermal management scheme, optimally designed for the new APS-U source conditions. This thermal management design would be ready to accept a coherence preserving mono crystal when developed.
 - b. Many APS beamlines were originally designed with several layers of motorized adjustments on critical beamline components to aid in the alignment process. These

layers of adjustment can compromise stability. A more appropriate approach to design beamline components with the minimal adjustments required for alignment.

2. Develop coherence preserving optics and windows to preserve the coherence of the upgrade source.
 - a. Several strategies exist for coherence preserving the vacuum windows using windowless-to-air, perfectly crystalline and amorphous materials.
3. Develop vibrationally stable, rapid scanning, nano-positioning capable end stations to exploit the upgraded source.
 - a. The Velociprobe, a Ultra-High-Resolution Ptychographic Hard X-ray Nanoprobe, currently under development as a LDRD project is a good example. The design approach for the main support of the instrument holds promise as a vibrationally stable scanning platform that could be basis for future instruments at the APS.

Strategy

1. Provides the highest quality design, calculation, analysis simulation and measurement support in all areas of beamline engineering.
2. Collaborates closely with scientific and technical staff on beamline development projects, from concept through commissioning.
3. Cultivates a vibrant, energetic and competent in-house staff with expertise in novel research instrumentation, high-precision manipulation systems and quantitative diagnostics.
4. Assists beamline personnel with performance optimization of their experimental systems.
5. Pursues application-driven R&D in partnerships with the scientific staff.

Tactics

1. Liaison Engineer - Each Beamline Operations Group (as well as Optics and Detectors Groups) is assigned a Liaison Engineer who serves as the primary BI Group contact. The Liaison Engineers work with the Group Leaders of their assigned Groups to determine the relative priorities of tasks within a given Group. The Liaison Engineer attempts to balance their efforts such that an equitable division of support is provided to each of the Groups they support.
2. Set BI Group priorities for beamline work in accordance with XSD strategic plan
3. Establish external sources for design work to leverage in-house capabilities
4. Establish close ties with specific designers in the AES-DD Group
5. Keep strong ties to AES-MED Group and other APS engineers to benefit from their experience and resources
6. Establish strong ties with the APS-U Project as it develops new beamlines
7. Establish clear requirements/specifications prior to/as part of the design process
8. BI engineers act as a project managers for BI work