All Applications of the ALBA Skin Concept

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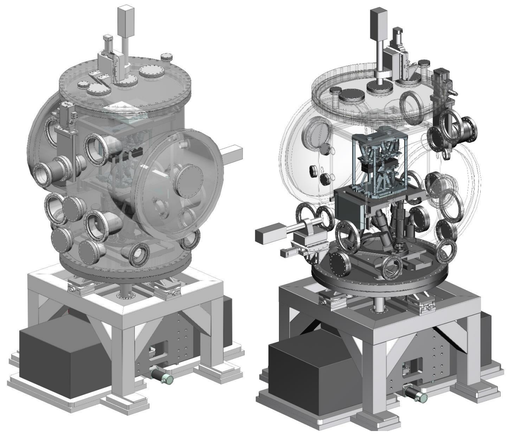
Abstract

During the ALBA design phase the protein macromolecular protein crystallography beamline, XALOC, required several in-house developments. The major part of these designs was at the end station where the necessity of customization is always much higher. The most relevant of these instruments was the beam conditioning elements table [1]. This accurate stage, which supports the diffractrometer as well, includes the four movements required to align the components to the nominal beam as well as position the diffractometer. This design compacts, specially for the vertical and pitch movements, both in a single stage, with a couple of stages for all four excursions. The solution maximizes the stiffness and preserves at the same time the resolution close to 0.1µm while being able to withstand a half tone of payload. Thanks to its compactness and performances this design concept, the vertical and pitch combined stage, was not only applied at XALOC for its diffractometer and detector table, but it has been widely adapted at several ALBA beamlines: at NCD-SWEET [2] as a detector table, a beam conditioning elements table [3] and sample table, at MSPD beamline as the KB table, at NOTOS beamline as metrology table (now under detailed design phase), and also at the new ESA MINERVA beamline [4] for their sample mirror modules positioning (still under design phase). Beamlines have not been the only beneficiaries of this design, also different kind of instrumentation like an in-vacuum hall probe measuring bench [5], and even a stitching platform for the ALBA optics laboratory [6]. Moreover, the concept has outreach ALBA and has been adopted also at other facilities worldwide, synchrotrons and also scientific instrumentation suppliers around Europe. This poster presents most of the applications of the skin concept and their variations and main measured performances.

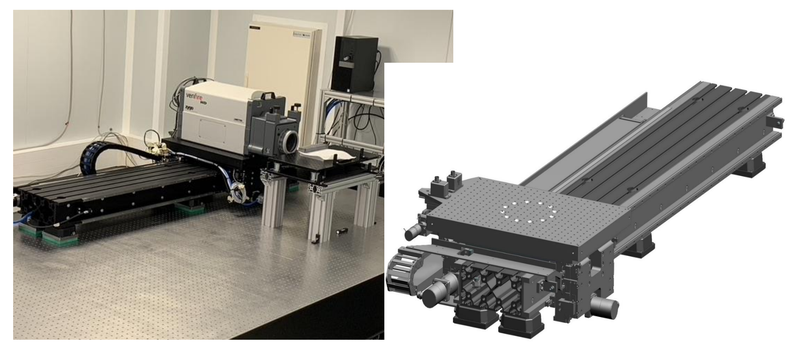


ALBA ESA BEAMLINE

Sample chamber (under Design)

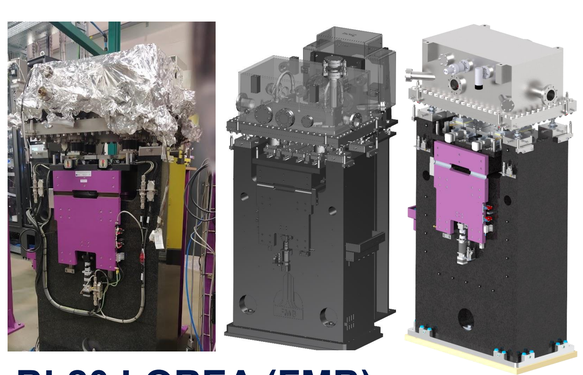
ForMAX BL (MAXIV)

Sample Table



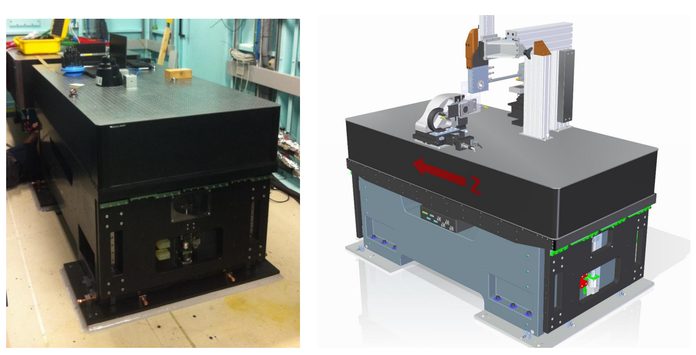
ALBA OPTICS LABORATORY

Stitching Platform



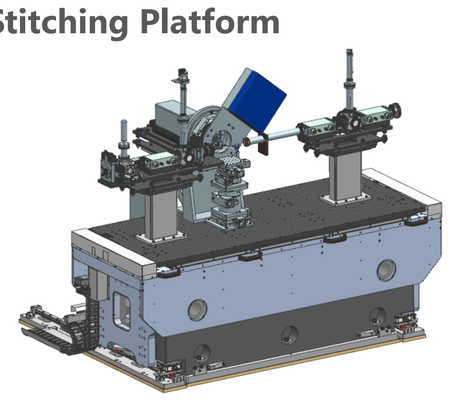
BL20 LOREA (FMB)

M1 Mirror & M3 Mirror



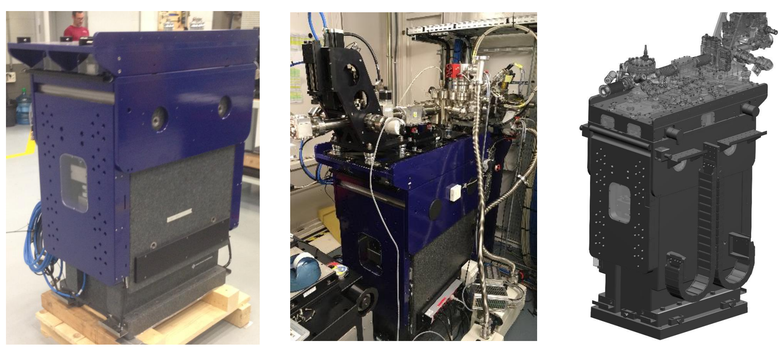
XFM BL AUSTRALIAN SYNCHROTRON

KB Table



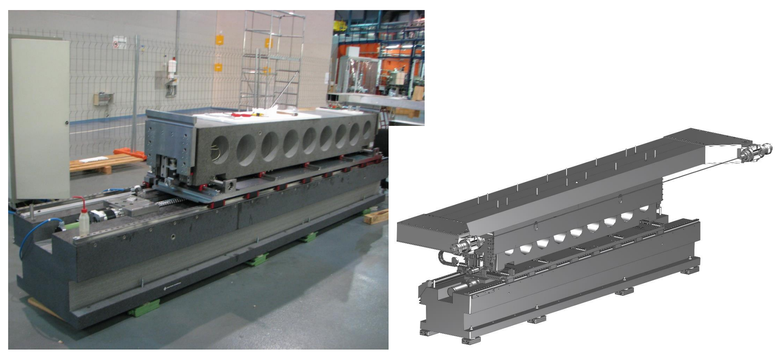
BL06 NOTOS

Metrology Table



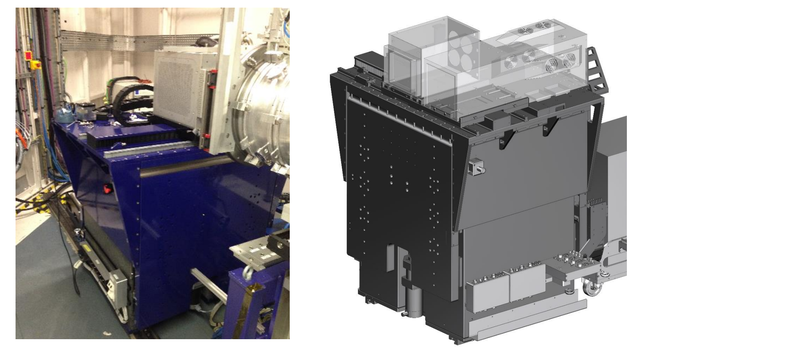
BL11 NCD-SWEET BL

Beam Conditioning Elements Table



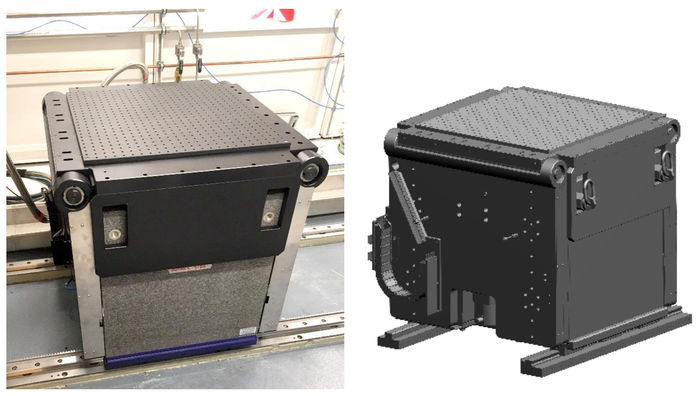
ALBA INSERTION DEVICE LABORATRY

Close Gap Hall Probe Bench



BL11 NCD-SWEET BL

Detector Table

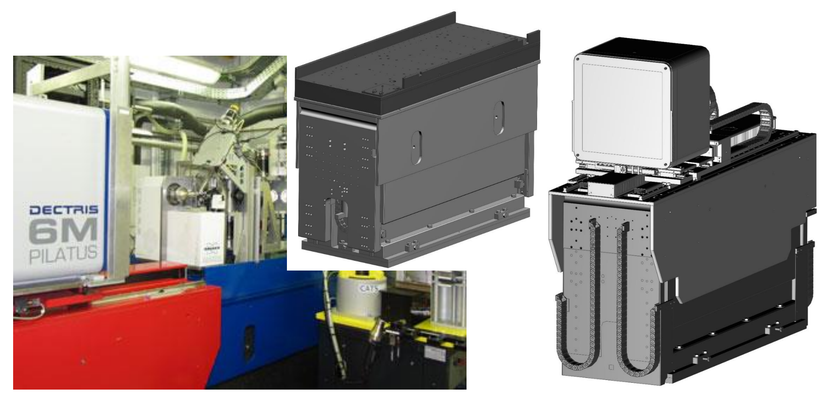


BL11 NCD-SWEET BL

Sample Table

BL04 MSPD

KB & BCEM Table



BL13 XALOC: Two applications

Diffractometer Table & Dectector Table

Conclusions

ALBA's skin concept is a good solution for longitudinally long tables requiring vertical and small pitch positioning stages as well. The original solution has been upgraded in some applications extending the pitch ranges, using bearing articulations instead of flexure hinges, has allowed a range up to 10º of pitch. In addition, novel flexure construction has been proposed [7] to further increase the combined stage rigidity. The simplicity and performance of this solution has demonstrated its versatility for a wide range of applications, e.g. end stations positioners, mirror mechanics, measurement benches, etc … always providing high resolution, up to 0.1 µm, and at the same high stability, from 40Hz up to 160Hz, as well as being able to withstand a payload up to 0.5 tones.

References

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