Kyma s.r.l.: *Mission and Vision*

Kyma was established in August 2007 bySincrotrone Trieste SCpA (ST) and two industrial partners, with the primary purposeto design, realize and install the undulators for the FERMI@Elettra project, namely the new Free-Electron Laser, built at the ST site in Basovizza, Trieste, Italy.

The origin of Kyma relies on the 20-years experience of the Elettra Laboratory at Sincrotrone

Trieste on the development, testing, installation and operation of insertion devices. At the moment of the launch of the FERMI project a question about the possibility to start a spin-off company, fully devoted to the insertion devices design and manufacturing, was posed.

In a few years since its establishment, Kyma became a well known organization in the light source

community. With almost thirty insertion devices designed and manufactured, Kyma is now recognized as a qualified partner for design and development all types of insertion devices.

A strategic choice of the management makes Kyma the only company in the world whose unique business is design, manufacturing and characterization of insertion devices. Even if this can be at

a first glance a risky choice, as it strongly limits the market possibilities of the company, this decision allows Kyma's organization to fully concentrate its attention and ever growing know-how

on insertion devices, with a knowledge and competence hardly available if the company addressed different fields of accelerator technology.

The company mission is therefore focused on insertion devices (undulators and wigglers) and its vision is to be able to supply equipment to any light source facility in the world.

Kyma Tehnologija d.o.o.

In 2008, Kyma Srl and Sincrotrone Trieste (in the role of controlling partner) took the strategic

decision to locate the manufacturing activities relevant to magnetic assembling and characterization into a building at the Business Innovation Center in Sežana, a Slovenian town just

ten kilometers away from the Elettra site.

Today Kyma Tehnologija is running a fully equipped magnetic measurement laboratory where all the activities relevant to magnetic aspects of insertion device realization are carried out, with particular reference to the final magnetic assembling and characterization. Facility and equipment at Kyma Technologija, Sežana.

The laboratory of Kyma Tehnologija at Sežana has been fully equipped for carrying out all processes relevant to magnet assembling, measurement and characterization. Here a large climate room of more than 300 square meters is available for assembling and characterize the full magnetic structure of the insertion devices. Here the temperature is kept at a specified value in the range 20 to 25 °C, with an accuracy of +/- 0.5 °C.

It may be useful to recall here that design, development, manufacturing and characterization of insertion devices is the only business of Kyma. Therefore, all the infrastructures and the equipment described in the following are fully dedicated to the realization and characterization of IDs.

Figure : Overall view of the insertion device lab at Kyma Tehnologija, Sežana

Hall Probe Bench (HPB)

The Hall Probe Bench dedicated to the measurements of the magnetic field profiles along the insertion device under test is installed on a granite support block with transverse cross-section of 350 x 600 mm^2. The granite support blocks for the two benches at Kyma Tehnologija d.o.o. are 4 m and 6 m long. The effective measuring length of each bench is ca. 0.5 m shorter than the corresponding length of the granite support. This results in the effective lengths of 3.5 and 5.5 m respectively, available for performing a magnetic field scan using the Hall probe system.

The long granite support block is mounted on three vertically adjustable feet. In the case of the short bench there are two such feet. The exact positioning of the feet is optimized with the fine tuning wedges to limit the pitch and roll angle resulting from the vertical buckling of the massive granite beam due to gravity.

The overall flatness of the upper reference surface of the granite benches is better than 20 µm. There are two high precision guiding rails assembled with the parallelism of 5 µm ± 2 µm on the top surface of each bench.

The magnetic assembly of the linear ANORAD motor is mounted along the bench between both guiding rails. This structure provides a guiding system for the precise movement of the linear motor carriage equipped with two transverse movement Newport stages hosting the Hall probe holder.

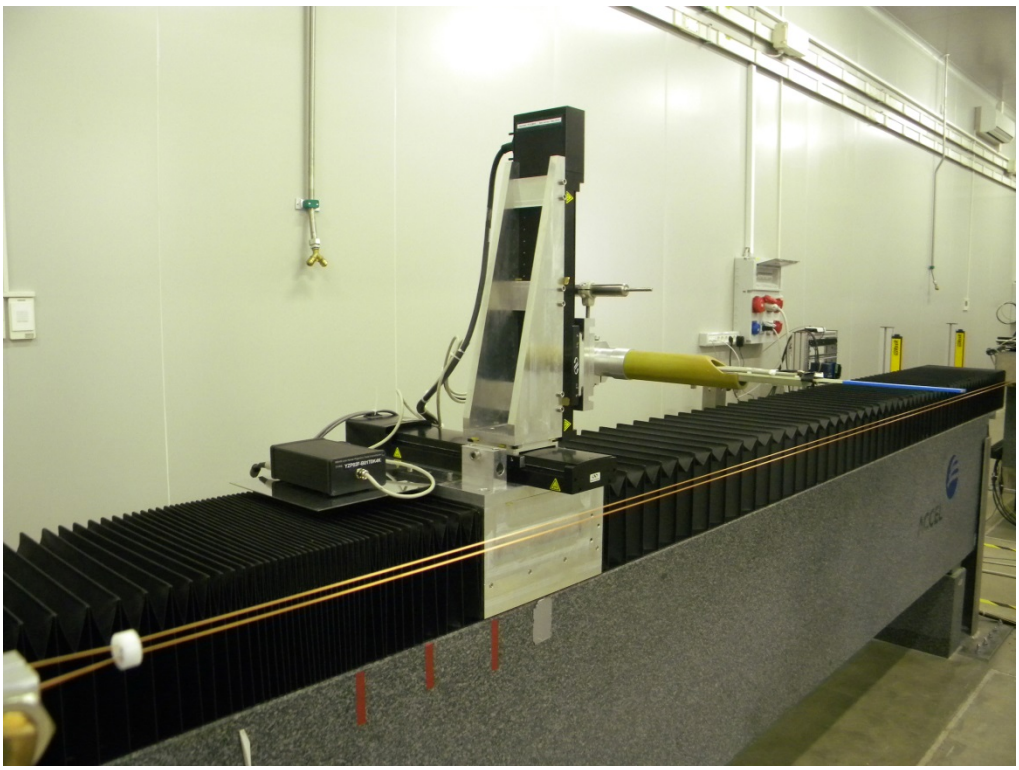

Figure : The Hall Probe and Flip-Coil large benches.

The positioning system of the linear motor operates in a closed loop configuration, coupled with a Heidenhain linear encoder, whose optical ruler runs parallel to the guiding rail system of the motor. The choice of the motor system has been made in order to assure the negligible magnetic perturbations resulting from the movement of the carriage during the magnetic field measurements performed with the Hall probes. The linear motor is responsible for the movement of the carriage along the beam direction(s), whereas the Newport stages, each with 250 mm of total displacement range, are responsible for the horizontal (x) and vertical (z) displacement of the Hall probe holder with respect to the linear motor carriage.

The Hall probe holder consists of integrated sensors responsible for measuring of the magnetic field induction uniquely in the respective x (transverse), and z (vertical) directions. It is mounted on a fibreglass arm. The total length of this assembly is about 0.5 m. The measurements of the magnetic field profile along the bench are executed on the fly with the typical measurement speed of 25 mm/s. The maximum movement speed may be as high as 100 mm/s. The position controlled triggering is provided by the electronics of the linear motor.

Hall probe sensors are Ultra low noise magnetic transducers from Senis AG. This transducers have a compensation for the planar hall effect, very low noise comparable to the old ESRF probes, and excellent low signal drift. This enables good measurement of magnetic field profiles of the insertion devices. Due to good performance it is possible to extract also the first and second field integrals from field profiles with good accuracy.

The measurement results in form of the Hall voltage readings are stored in the memory buffer of three hardware triggered Keithley voltmeters dedicated to the corresponding Hall probe sensors. The system allows to store up to 20.000 readings during a single hall probe scan, which translates to 20.000 steps of 0.275 mm length over the entire length of the longer (5.5 m) measuring bench.

The steps may be even finer for the shorter total measurement lengths.

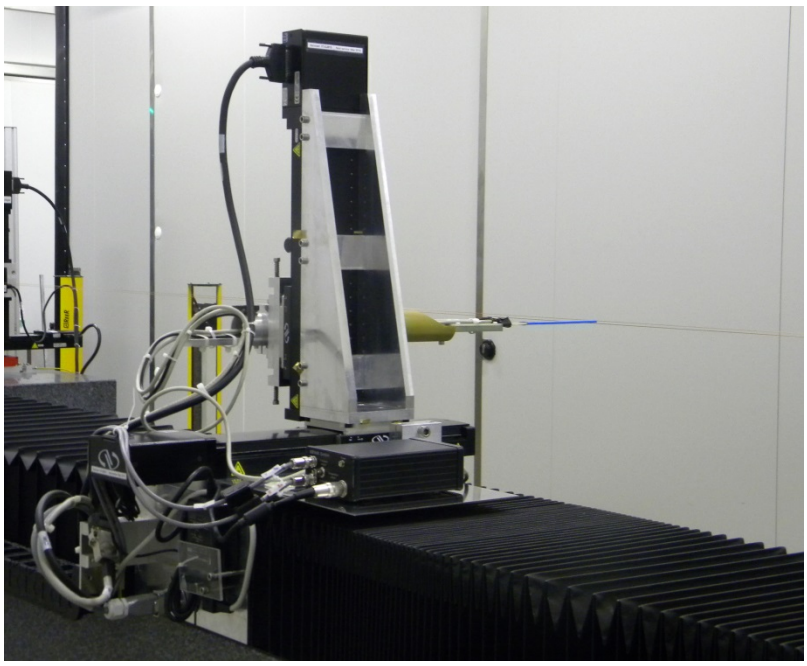

Figure : Senis A.G. Ultra Low Transducer mounted on the measurement bench.

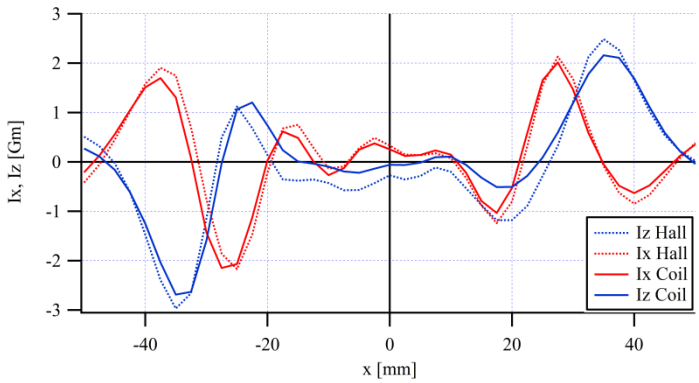

Figure : Comparison of the first field integral measurements with flip coil and Senis A.G. Ultra low Noise Transducer. This hall probe has an excellent stability due to low noise and minimal drift. It can be seen from the graph that corrections of hall probe scan with the measured flip-coil field integrals is no longer necessary. This is unique property of the Senis hall probe transducer.