

HOW KNOWLEDGE AND TECHNOLOGICAL TRANSFER CAN DEVELOP INTO AN INDUSTRIAL REALITY: KYMA SRL CASE HISTORY

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Abstract

Kyma was established in 2007 as a spin-off company of Elettra-Sincrotrone Trieste, to design, realize and install all the 18 undulators of FERMI, the seeded FEL, at the time being built at the Elettra lab in Trieste, Italy. For Kyma establishment, Elettra-Sincrotrone Trieste formally transferred to the new company know-how and references relevant to Insertion Devices and, by a Knowledge Transfer monetarily evaluated, could participate to Kyma capital owning the 51% of the shares. In few years, Kyma became a well-known organization in the light source community. After more than forty Insertion Devices and sixty phase shifters designed and manufactured, Kyma is now recognized as a qualified partner for design and development of this kind of equipment. Some examples of Kyma industrial achievements in developing skills, knowledge, technologies methods of manufacturing transferred by Universities and Institution, will be presented. An example out of many: the joint effort between Kyma and Cornell University right now leading to the development of a new perspective into the ID world, i.e. the CHES Compact Undulators (CCU).

ORIGIN AND STRUCTURE OF THE COMPANY

Kyma was established in August 2007 by Elettra - Sincrotrone Trieste S.C.p.A. (ST), with the primary purpose to design, realize and install the undulators for the FERMI@Elettra project, namely the new Free-Electron Laser, at the time being built at the ST site in Basovizza, Trieste, Italy.

The origin of Kyma relies on the 20-years experience of ST 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.

After a feasibility study during the year 2006 a European tender was launched to find possible suppliers of mechanical, magnetic and control subsystems for the realization of eighteen undulators for the FERMI@Elettra project.

In the tender a clause was included that the proponent(s) had to supply the undulators not directly, but through a new company to be set up together with Elettra - Sincrotrone Trieste.

The tender procedure was completed in spring 2007 and the new company was formally established in August of the same year.

Kyma is located in the Sincrotrone Trieste site in Basovizza, Trieste, an aerial view of which is shown in figure 1, where the FERMI@Elettra facility can be seen in the forefront.



Figure 1: The Elettra site with the FERMI@Elettra Free-Electron Laser facility in the forefront.

Know-how and References

At the moment of the establishment of Kyma Srl, Elettra - Sincrotrone Trieste formally transferred to the new company all the know-how and the references relevant to insertion devices.

In fact the capital of the company was formed by 51% of shares as intangible assets supplied by Elettra - Sincrotrone Trieste and 49% of liquid capital supplied by the partners.

As a consequence of this approach, all the references of Elettra - Sincrotrone Trieste on insertion devices are now formally owned by Kyma Srl.

In this way, more than twenty years experience in design, assembling, characterization and operation of insertion devices at Elettra - Sincrotrone Trieste, meets now the manufacturing capabilities of the industrial partners, to build up a world-class company for insertion devices realization (see Fig. 2).

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Figure 2: FEL1 EPU chain at FERMI@Elettra.

The Partnership

The shares of the company are as follows:
 51% Elettra - Sincrotrone Trieste S.C.p.A.,
 27% Cosylab d.d. – Ljubljana,
 22% Euromisure SpA – Pieve San Giacomo (CR).

Owing to the actual origin of the company, the Partners are at the same time shareholders and the major sub-suppliers of Kyma itself.

This two-fold role of the partners guaranties an iron-clad relationship with the suppliers of the key component and sub-systems of the insertion devices realized by Kyma.

THE PRESENT ORGANIZATION

Kyma is organized in the form of a “Virtual Company” (VO). A virtual company is an Extended Organization (EO), which directly controls an interrelated set of co-ordinated processes carried out at different locations, by different legal subjects (independent companies).

A model for Virtual Organizations was proposed as early as in 1993. The approach followed at Kyma refers to the model developed in the frame of VOSTER project, Virtual Organizations Cluster, supported by the European Community under the Information Society Technology Programme.

In spite of the coordination of processes, it must be clearly stated that Kyma is formally and completely independent from its Partners, with particular reference to Elettra - Sincrotrone Trieste, as a public research infrastructure. Any time a Partner works for or supplies any item to Kyma, a formal order is placed and the relevant invoice is issued. There is in no way any informal transfer of competence and manpower from any partner to Kyma and vice versa.

Overall Organization

The overall structure of the partnership is the one represented in figure 3.

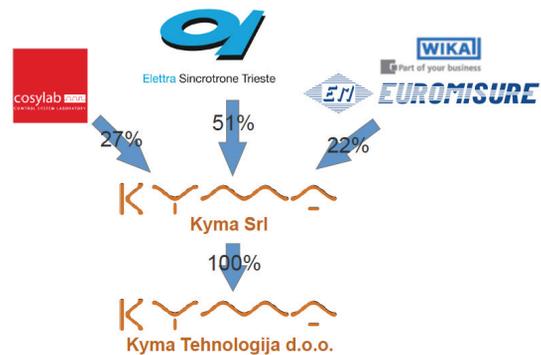


Figure 3: Overall partnership structure of Kyma Srl.

Cosylab d.d., Euromisure SpA, and Elettra - Sincrotrone Trieste S.C.p.A. are the shareholders of Kyma Srl, which in turn owns 100% of Kyma Tehnologija d.o.o., the daughter company set up to actually take care of magnetic assembling and characterization of insertion devices.

Kyma is not bound to its physical perimeter, but it is rather a complex structure of processes that extend to all the five partners involved: Kyma itself, Kyma Tehnologija, Elettra - Sincrotrone Trieste, Cosylab, Euromisure.

With this organization the players are not acting merely as suppliers or sub-contractors, but as actual “departments” of the enlarged company.

Kyma Srl is in any case formally responsible of the management of all processes involved and is fully liable against its Customers for any aspect related to the supply.

The overall Kyma organization and operation are defined through a full set of processes, described in an extensive system of documents.

The above organization, as set up and managed by Kyma, presents a number of advantages that assure the guarantee of better overall quality for its Customers:

- reduced fixed costs, with consequent better prices for the Customers;
- direct availability to all the information and know-how necessary for design, development, realization and characterization of insertion devices;
- direct availability to a large set of equipment and instrumentation;
- great flexibility, with the possibility to involve as many people as is necessary in each single project;
- reduced lead times and consequently shorter delivery times;
- increased project and process control, with overall better quality for the Customers.

COLLABORATIONS AND FURTHER TECHNOLOGICAL TRANSFER

Kyma is constantly committed to develop new generation of IDs, and this is feasible maintaining a clear positioning at the invention/innovation boundary.

New collaborations and further Technological Transfer are capitalized by Kyma, which manages the transition from the laboratory to industrial environment in the light of the experience gained in seven intense years fully dedicated to IDs manufacturing.

An example of a fruitful cooperation is the partnership with Cornell University.

In 2012, Cornell University was looking for industrial partners and, the following year, Kyma was identified as leading company for IDs. In 2014 two CHESS Compact Undulators (CCU) were co-designed, realized and commissioned. Now they are successfully operating at the Cornell Electron Storage Ring.

The CHESS Compact Undulator development was driven by the needs of CHESS upgrade as well as by a budgeted constrains and by the limit of available space. In the process of the development, several novel engineering solutions were adopted. Instead of traditional massive C-shape strong back, CCU has compact and rigid *rectangular box-like* frame that provides compactness and excellent mechanical integrity. Box-like frame and phase adjusting together with few others features provide compactness, lightweight and cost efficiency of the CCU.

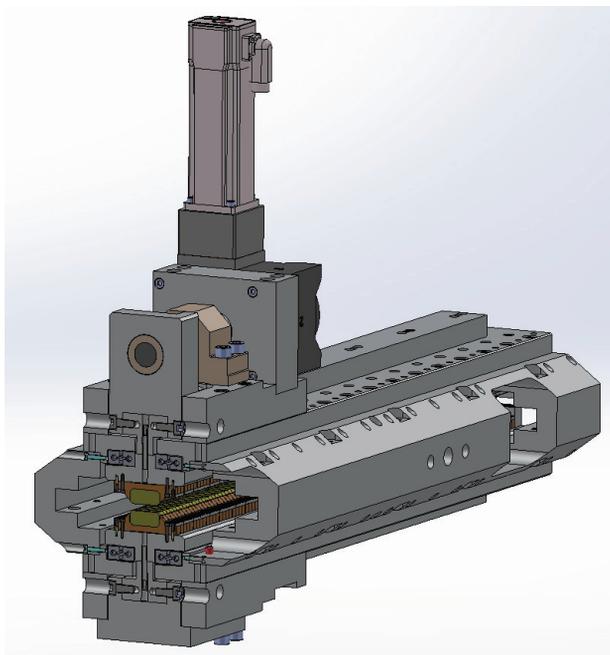


Figure 4: CHESS Compact Undulator.

Two more CCUs are now being manufactured.

SUMMARY

Summarizing, the keys for a lasting success of TT are the following:

- Hot start with an important contract granted
- Partners fully committed to the development of the business (not on short-term profit)
- Full Customer-oriented approach
- Virtual organization (lean, extended, adaptive)
- Extreme focus on project and process management
- Clear positioning at the invention/innovation boundary
- Very close relationship both with the pure industrial and pure research environments
- Operative partnerships (scientific & industrial)
- Continual improvement of products and processes

CONCLUSIONS

Kyma has received from Elettra - Sincrotrone Trieste and further implemented a twenty-years know-how on the development and realization of insertion devices.

This know-how meets now the manufacturing capabilities of the industrial partners.

Moreover Kyma has implemented a very effective managerial and technical organization that allows the company to supply insertion devices with the best performance/cost ratio available on the market, with the shortest delivery times.

Kyma is committed to develop new generation of IDs and to this end, is open to new collaborations and further Technological Transfer. The successful partnership with Cornell University has to be seen in this perspective.

REFERENCES

For a comprehensive review of the concept and the implementation strategies of Virtual Companies the following report can be addressed: "*Guidelines for Virtual Organizations*", - *Virtual Organizations Cluster project Information Society Technology Programme, VOSTER Consortium, 2004* (VOSTER project, Virtual Organizations Cluster, supported by the European Community under the Information Society Technology Programme contract IST-2001-32031).