



CLS Booster commissioned at record speed ▶

MAGNEX Spectrometer installed ▶

Two new research implanters ▶

New high performance power converters ▶
- SYSTEM 8500
- SYSTEM 9000

MASHA separator for superheavies ▶

Oxford Danfysik at Bessy ▶

Canadian Light Source Booster Synchrotron commissioned at record speed

The 2.9 GeV booster synchrotron for the Canadian Light Source at The University of Saskatchewan was put into operation within few weeks and commissioning was concluded in less than a third of the planned time.

The booster was ordered as a turn-key system from Danfysik in February 2000. The 102 m circumference accelerator complex was designed, built, and installed in less than 24 months from the contract date. Following integration with the existing 250 MeV pre-injector linac the first beam was injected into the booster synchrotron on July 1, 2002. On September 15, the commissioning was complete and the synchrotron was operated at 1 Hz for a full day at 2.9 GeV with 20 mA of circulating current.

"The exceptionally smooth commissioning of the synchrotron, in less than a third of the planned time with several major performance targets already exceeded, demonstrates the effectiveness and high quality of Danfysik's work", says Dr. Mark S. de Jong, Canadian Light Source Project Leader.

"Designing, manufacturing, installing, and commissioning the CLS booster synchrotron based on performance specifications has been a challenge to the booster project team at Danfysik, led by Lars Kruse. We are proud to have fulfilled this task to the satisfaction of our customer", says Dr. Bjarne Roger Nielsen, Managing Director of Danfysik A/S.

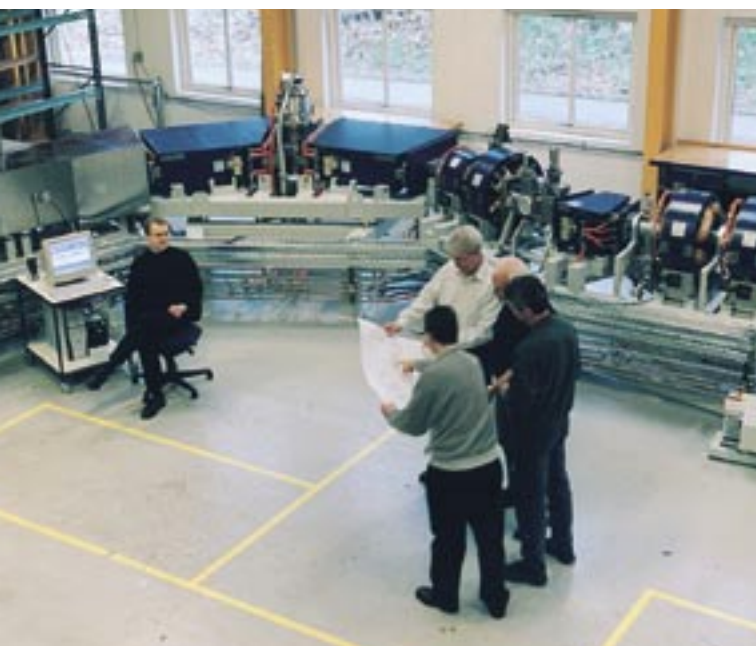
www.cls.usask.ca



Beam diagnostics screen from September 15, 2002: 12 mA average circulating beam current at 2.9 GeV (yellow trace), 28 mA beam pulse passing FCT in booster ring (green trace), and 28 mA extracted beam pulse passing FCT beam transport line (purple trace) showing an extraction efficiency close to 100%.

The cover photo shows the extraction region of the booster ring. Photo courtesy of Canadian Light Source and University of Saskatchewan.

Preparing a new mission to the "Island of Stability"



The construction of the advanced Mass Analyzer of Super Heavy Atoms, MASHA, was completed and commissioned at our factory in December 2002. The 10 meter long separator system comprises two large magnetic and one electrostatic analyzer, a beam transport system, and various diagnostics. It was installed as a turn-key delivery at the Flerov Laboratory of Nuclear Reactions in Dubna early this year.

MASHA is dedicated to the analysis of isotopes from the "island of stability" within the mass range $A=300 \pm 15$, but can work in a wide mass region from $A=20$ to $A=500$. One of the special new features of the MASHA design is that, unlike other mass separators dedicated to superheavy analysis, it allows not only the separation of reaction products, but also the direct determination of the synthesized isotope masses.

We look forward to learn about discoveries of new elements with MASHA in the future.

<http://159.93.28.88/flnr/index.html>

SYSTEM 9000 air cooled Power Converter

High Performance at very competitive prices

With the SYSTEM 9000 Power converter program we are offering our customers a new generation of high performance, air cooled power converters with output current stability in the 25 ppm class. We are filling a gap with the SYSTEM 9000 between our well-known SYSTEM 8000 program, which meets the highest performance class and at the other end of the scale, the traditional industrial power converters on the market in the 0.1% current stability class. The performance level of the new medium power system line matches applications, such as quadrupole magnets, small dipole



magnets and general laboratory use. The SYSTEM 9000 high efficiency converters are compact as the concept incorporates primary soft switching technology with MOS FET's operating at 150 kHz, resulting in a very low output ripple. The current power rating is 5 to 16 kW covering an output range of 50 to 300A. The SYSTEM 9000 power converters are offered in various optional control and monitoring configurations - at very competitive prices.

For further information please contact Danfysik

SYSTEM 8500 - a new generation of high performance Power Converters



The SYSTEM 8500 is a carefully planned evolution of our well known SYSTEM 8000 which is powering thousands of magnets in particle accelerator laboratories world wide, with ultra stable current. In the SYSTEM 8500 all electronic circuits have been replaced with new modules. What strikes immediately when seeing the new cabinets besides the new colour-scheme is the totally new concept in the human interface – the Control Panel. Commands and information are accessed in a “windows” like fashion, with a menu driven graphical interface.

A new main controller module incorporates advanced features like arbitrary current waveform generation, time log of interlock events, extended read back and diagnostics. Current and voltage loops have been redesigned to obtain greater stability and higher bandwidth with a code module which acts as a personality module for individual adoptions.

The series regulated version of the SYSTEM 8500 power converters has a redesigned water cooled transistor bank with modern transistors in a very compact design. Last but not least, all new control modules are backwards compatible into the well known System 8000 power supplies.

The new compact transistor bank with water cooled paralleled transistors



Dr. Francesco Cappuzzello and Prof. Angelo Cunsolo from INFN in front of the MAGNEX Dipole at Danfysik factory

Spectrometer "MAGNEX"

Giant magnets successfully installed at INFN-LNS

Danfysik has over the years built a number of large and demanding spectrometer magnets for accelerator laboratories world wide. The MAGNEX project is the latest delivery in the series and has been constructed for the INFN in Catania, Italy.

MAGNEX is a large acceptance magnetic spectrometer with very high requirements for magnetic and optical performance. Prior to manufacture

Danfysik performed a comprehensive design review including 2D and 3D field calculations. A set of surface coils mounted on the dipole pole faces provide tuneable quadrupolar and sextupolar fields used for the compensation of the kinematic effect up to 2nd order. Extensive field measurements were performed in our factory prior to shipment to Italy.

<http://web2.lns.infn.it/magnex/magnex.htm>

Design, Manufacture and Installation of Oxford Danfysik DCM at BESSY



During November 2002 the Oxford Danfysik Double Crystal Monochromator was installed at Bessy. This DCM is one of the most complicated Oxford Danfysik has built, incorporating the largest number of motorised in-vacuum adjustments. The DCM features three sets of crystals which can be translated across the beam, allowing the selection of different crystal types without breaking vacuum or moving the whole assembly, the first crystals fully motorised enabling ease of operation. The DCM was designed, manufactured, tested and delivered in 8 months, a month ahead of schedule. Dr William Peatman, Deputy Director at BESSY, was pleased with the end result:

"We are very satisfied with the precision that was observable in the surveying in of the instrument and the precision of the various movements. We are looking forward to a very good performance in user operation".

<http://www.bessy.de>

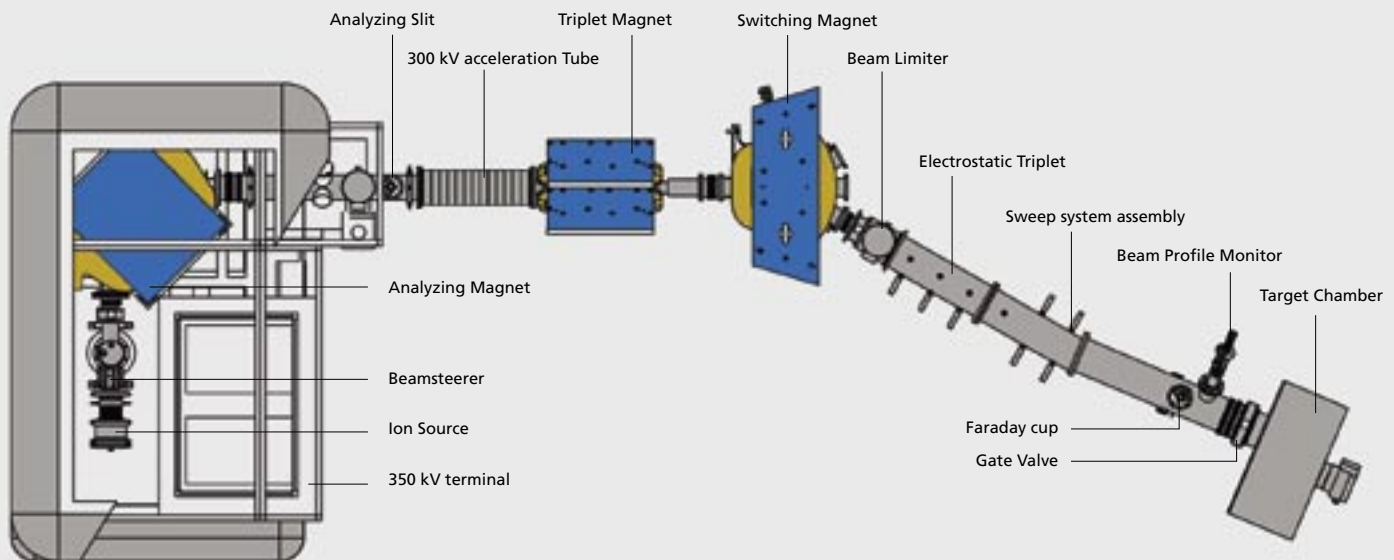
New tailor made Ion Implanters for European research facilities

Two Ion Implanters are presently under construction at our Jyllinge factory.

A contract for building a 350keV accelerator (see illustration) was signed in July 2002, with the National Ion Technology Centre at the Ångström Laboratory, Uppsala University, Sweden. The implanter, which is intended for research as well as for service implantation, will include one beam line with beam scanning and target chamber for 6 inch wafer handling, and will be prepared for more beam lines. Installation and commissioning at Uppsala University will take place by the end of 2003.

Also a Low Energy Ion Implanter is in progress. The accelerator will be able to produce singly charged ions in the range from 200eV to 50KeV. The customer is Forschungszentrum Rossendorf, Germany. Both implanters are based upon our standard Ion Implanter model 1090.

www.angstrom.uu.se/index.html
www.fz-rossendorf.de/FWI/



Design-build In-vacuum Undulator to The Swiss Light Source

In September 2002 The Swiss Light Source in Villigen awarded Danfysik the contract to design and construct an in-vacuum, small gap undulator for their Protein Crystallography Beam Line. The device will provide high brilliance radiation in the 5-18KeV energy range.

A number of in-vacuum insertion devices already exist at a few synchrotrons, but have so far been developed in-house and built by the laboratories. Danfysik has many years of experience with vacuum techniques, and combining this technology with our extensive know how to design and construct permanent magnet based insertion devices is a natural next step for our Insertion

Device Group, who welcome this challenge. The completed and tested device will be delivered to The SLS by spring 2004.

Danfysik now offers a broad range of insertion devices, such as:

- Permanent magnet based undulators and wigglers
- Planar and Apple II undulators
- In vacuum undulators
- Electromagnetic EPU's and wigglers

sls.web.psi.ch/view.php/about/index.html

ULTRASTAB 867-700

A new transducer exceeding all expectations

Meeting the most stringent demands from our customers, the brand new 700A current transducer with onboard electronics, has literally proven performance "exceeding all our expectations", says project engineer Andreas Marcussen. The superior data for temperature coefficient, noise, step response, and bandwidth, has indeed brought the new product up to the state of the art in the world of high precision current transducers. Three versions are already available, all with onboard electronics:

- Ultrastab 867-700I with current output
- Ultrastab 867-700U with voltage output
- Ultrastab 867-700P a true programmable transducer



New products available from Oxford Danfysik

The Quercus Bent Crystal Laue Analyser



The Quercus Bent Crystal Laue Analyser is a new addition to the range of detector products offered by Oxford Danfysik. It is a transmission filter for removing unwanted energies from fluorescence signals in X-ray Fluorescence and X-ray Absorption Fine Structure experiments at a synchrotron beamline. The device will also remove much of the scattered and diffracted X-rays that would also contribute to the background noise. The BCLA may be used instead of an energy dispersive detector which counts all X-rays then electronically accepts only the energies of interest. In contrast the BCLA suppresses much of the noise and the detector required is then a low cost counting device. Count rate limitations become less significant.

There are a range of Ionisation Chambers and Scintillation Counters available for sale with the BCLA and all are available from stock.



DANFYSIK A/S · Møllehaven 31
DK-4040 Jyllinge · Denmark
Tel.: +45 46 79 00 00 · Fax: +45 46 79 00 01
E-mail: sales@danfysik.dk · www.danfysik.dk



Oxford Danfysik · Unit 1 · Ferry Mills Osney Mead
Oxford OX2 OES United Kingdom
Tel.: +44 1865 320300 · Fax: +44 1865 320301
E-mail: oxford@oxford-danfysik.com
www.oxford-danfysik.com