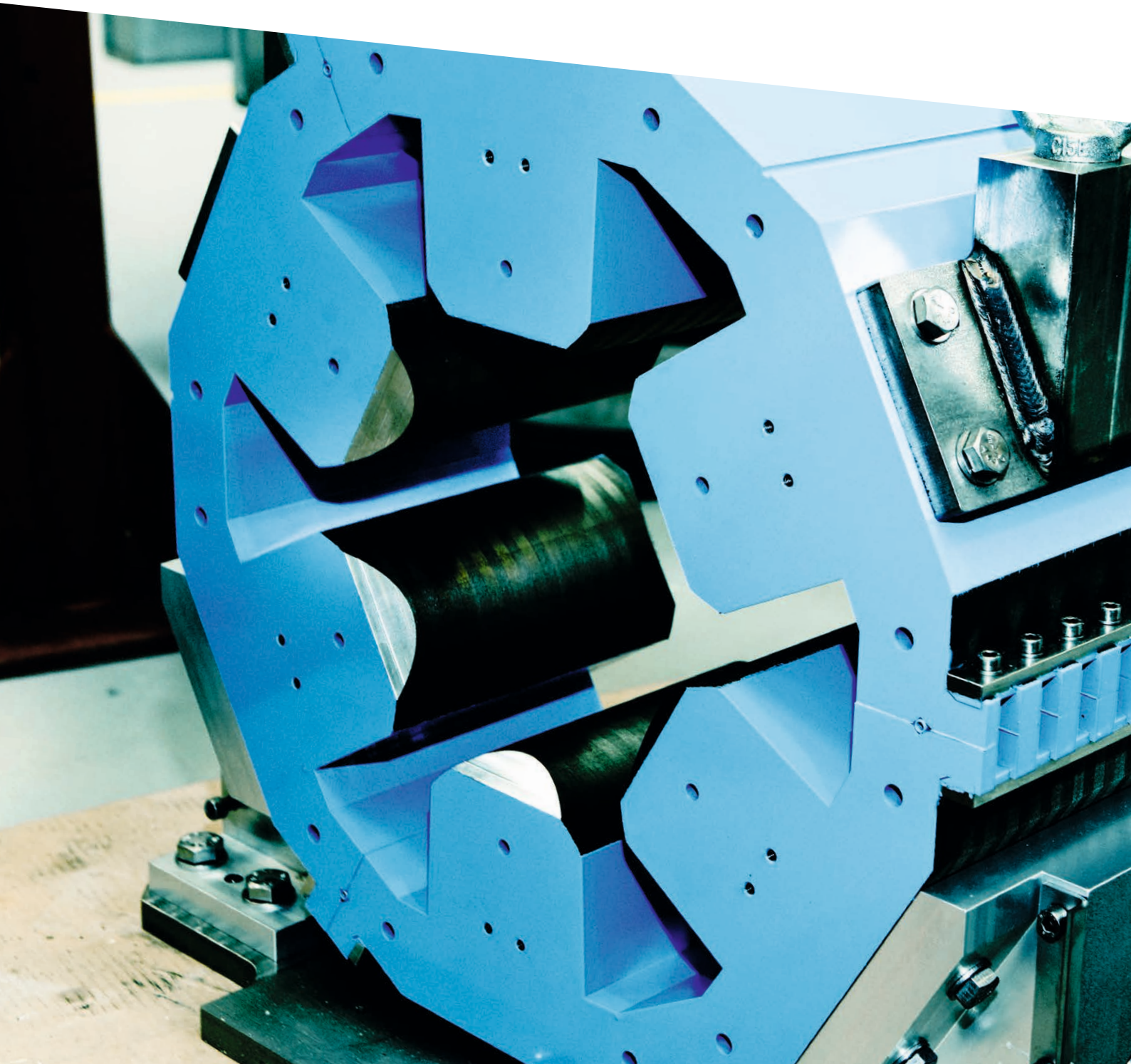
DANFYSIK

PROBABLY THE BEST MAGNET TECHNOLOGY YOU CAN BUY



Quality Assurance

QA procedures
Quality control and performance test are integral elements of our magnet production. The quality assurance system and the total performance test are our customers' assurance that the product fulfils the specifications.

Certification
Danfysik is ISO 9001 certified by Bureau Veritas Denmark. Our magnet deliveries include complete documentation of production test and certification such as:

- Material certifications
- Dimensional test
- Electrical tests
- Hydraulic tests
- Helium leak tests

Performance tests

When a magnet is cleared from production, it will undergo a 100% performance test as a complete assembly.

The performance test covers electromechanical and hydraulic tests as well as magnetic test such as:

- Excitation curve
- Homogeneity plots
- Fringe field measurements
- Complete field mapping by means of computerized x-y-z mapping table
- Measurement of harmonic content by means of slow or fast rotating multipole measuring bench
- High precision field mapping on long stroke field mapping bench for use on open magnets
- Field integral measurement with pick-up coil or stretch wire
- Hall probe "mole" measurements

Probably the best magnet technology you can buy

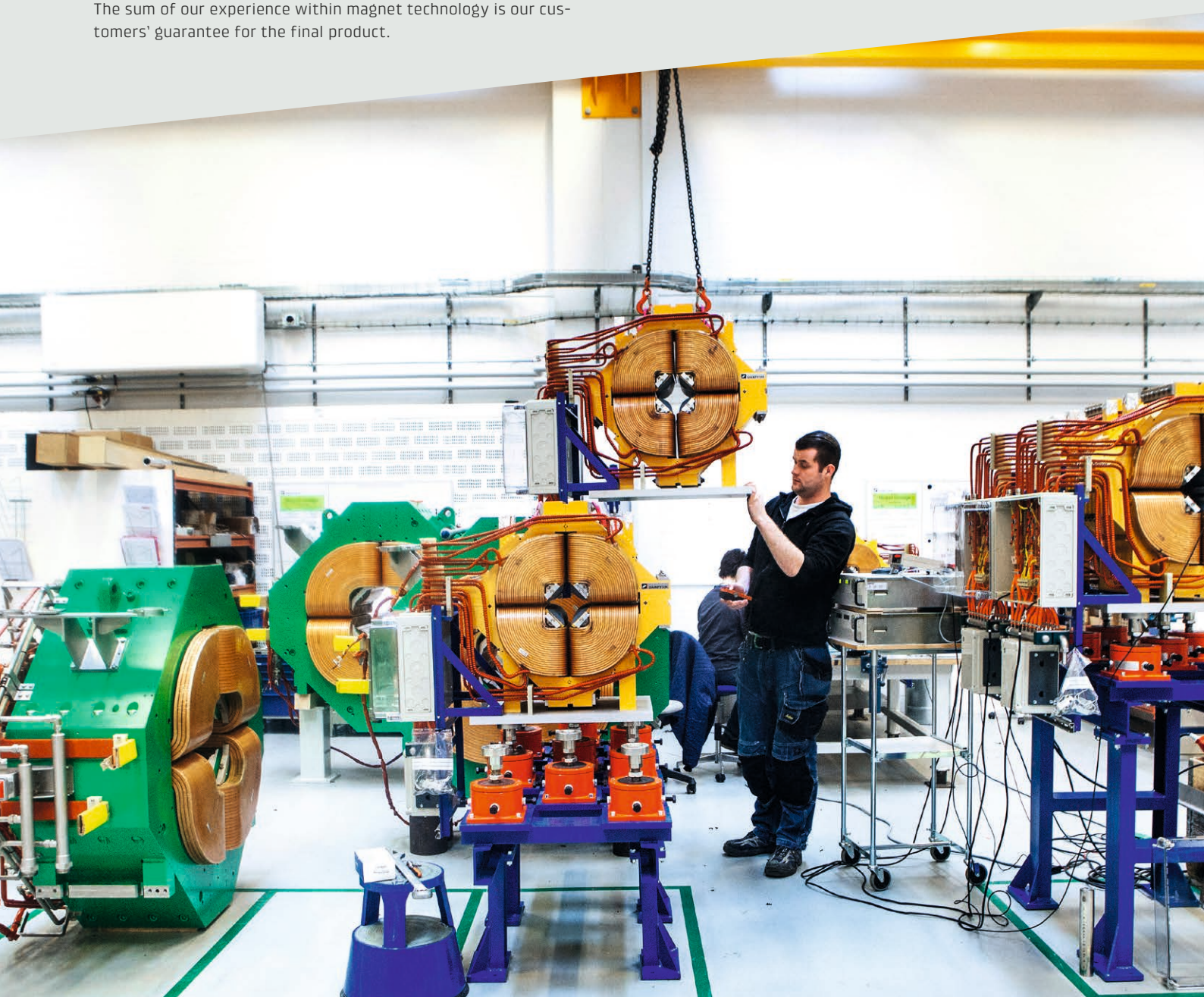
Since 1964, Danfysik has developed, designed and manufactured accelerator magnets. Our team of experienced physicists and engineers understand your requirements and help you find optimized and cost effective solutions for accelerator magnets. We master all state-of-the art magnet technologies, whether your magnet design is based on normal-conducting coils, superconducting coils (low temperature or high temperature) or on permanent magnets.

Hundreds of different magnet concepts have passed through our hands; all designed according to our customers' needs and wishes, following a steady development of simplicity and refinement of the construction.

Our magnet deliveries have ranged from simple beam line magnets to high performance spectrometer magnets, often delivered as total systems with vacuum chambers, support, and power supplies. The sum of our experience within magnet technology is our customers' guarantee for the final product.

We offer complete system solutions:

- Dipoles: For bending, switching, analyzing or scanning.
- Multipoles: Quadrupole, sextupole, octupole, or mixed multipole magnets.
- Solenoid magnets
- Steerers and corrector magnets
- Iron dominated, super-ferric or air coil designs
- Fast ramping magnets with laminated core or ferrite core.
- Special magnets: Septa, kickers, bumpers.
- Compact magnet systems with several functions integrated into single yoke
- Green Magnets®, based on permanent magnet technology.
- Wien Filters
- Electrostatics



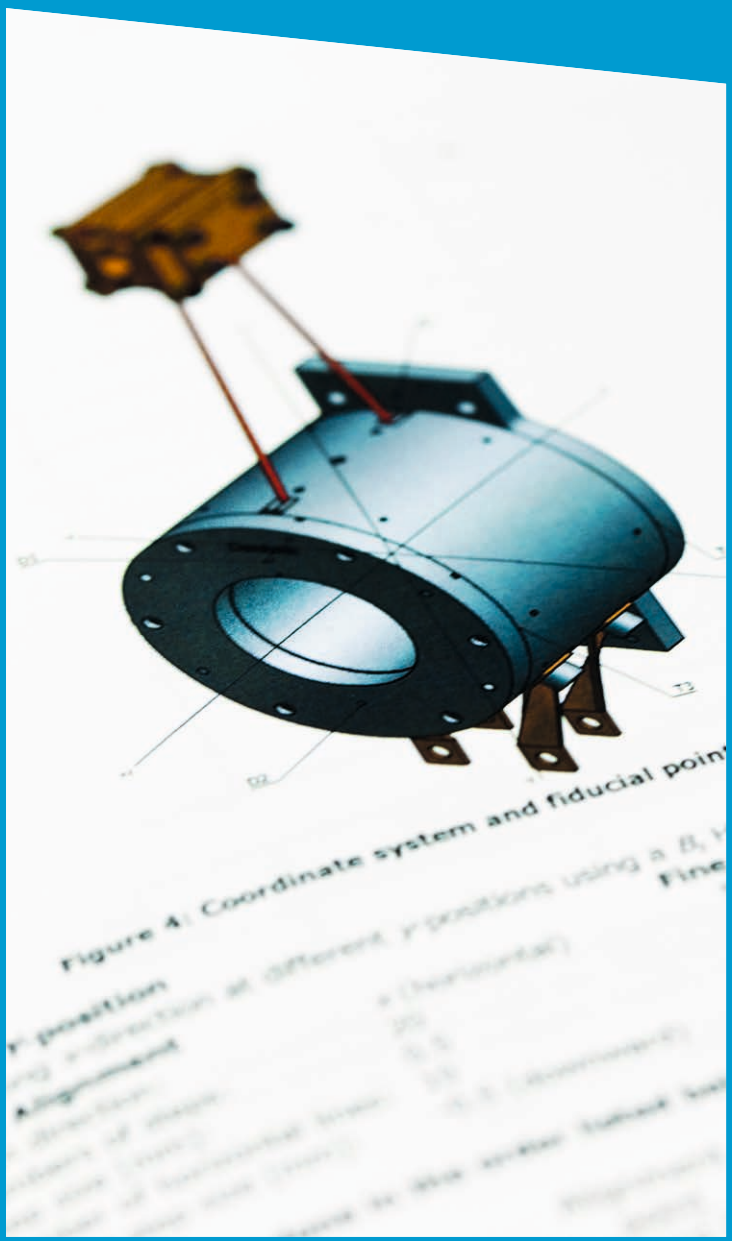
Design
Danfysik offers all necessary services required to reach an optimum system solution.

Ion Optics Calculations
Magnets are often part of a larger system, such as a spectrometer, a beam transport system, an accelerator or a storage ring. Ion optics calculations are essential for the definition of the basic performance requirements of the magnets, such as homogeneity, harmonic content, focusing properties, effective length, and fringe field effects.

Magnet Field Calculations
Using software packages such as Vector Fields OPERA Suite and Mathematica/RADIA we define the general design of magnets, including dimensions and shape of poles and yoke parts, material quality, field clamps, shims etc. This is our way of ensuring at an early stage in the design that the magnets comply with the ion optical requirements.

We also offer the electromagnetic design assistance as a separate service. The service covers electromagnets as well as insertion devices (electromagnetic devices and permanent magnet based devices) for particle accelerator applications.

One point of contact
The Project Manager, being a member of our team of design engineers, will take care of your order all the way from design to shipment or even installation on site, and will be your prime contact person at Danfysik on all matters related to the project.



Production

Experience, flexibility and skilled personnel ensure the good product

With the customers approval of the design the project Management Engineer initiates the manufacture of the magnetic system.

Magnetic Circuit

We can manufacture our magnets from a vast variety of materials:

- Low carbon steel
- Electrical steel laminates
- Soft Magnetic Cobalt-Iron-Alloys
- Ferrite cores

Narrow mechanical tolerances and good material quality are critical requirements for high performing magnets.
We deliver both.

Coils

All coils are manufactured under clean conditions, according to well documented and proven procedures.
Our coil manufacturing technique incorporates high quality materials and processes, such as:

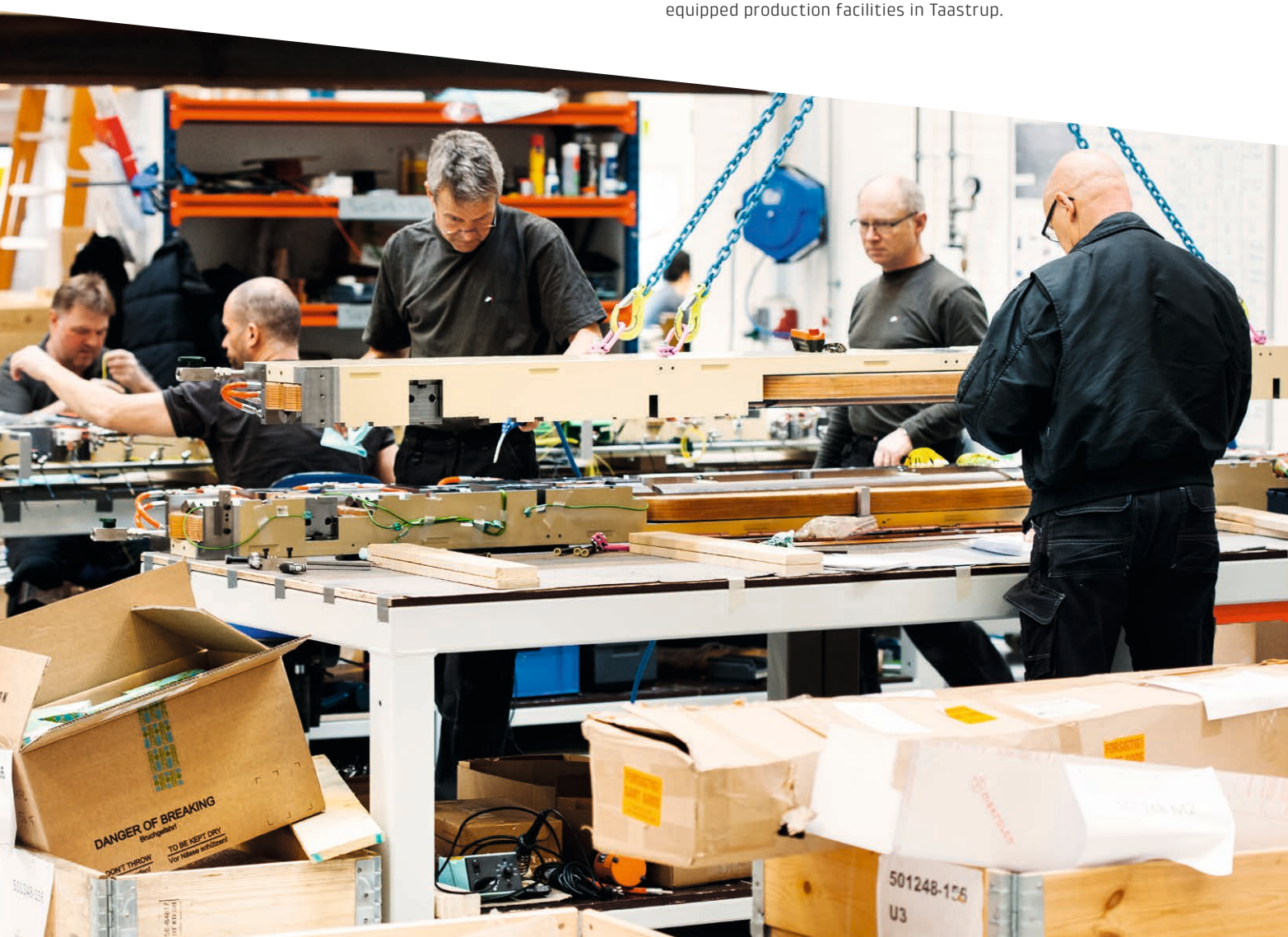
- OFHC hollow copper conductor
- Solid conductors
- Glass tape insulation
- Epoxy vacuum impregnation technology to provide high radiation resistance, deflection temperature, electrical and mechanical strength.

The vacuum chamber

The stainless steel vacuum chambers are welded by skilled, certified welders according to documented procedures to ensure a non-magnetic and vacuum tight product.

The assembly

The final assembly of the magnets is taking place at out well equipped production facilities in Taastrup.



Installation

With the magnet in house at the customer's site the installation can start. In this phase, we offer our expertise concerning supervision of the installation or we can take complete responsibility for the installation, making the magnet system turnkey ready.

Service

Modern accelerators are operated almost around the clock and every day of the year, regardless of their application. Up-time requirements are ever increasing, often exceeding 95%. In order to free resources at our customers' organizations, we continuously develop our service and maintenance activities at Danfysik.

We offer our customers fast response service and preventive maintenance contracts, because we want them to use their valuable resources for whatever their accelerators are made for: science, industrial production, or clinical patients.

Applications

Industrial/medical
- Radio isotope production
- Particle Therapy
- Ion implantation
- Food sterilization
- Scanning of luggage and goods
- Ion beam modification of materials

Research
- Synchrotron Radiation
- Free electron lasers
- Ion beam applications
- Rare isotope production and separation
- THz and IR sources
- High energy physics
- Atomic, molecular and astrophysics
- Material sciences
- Biochemistry and molecular biology

Magnet Power Supplies

We also offer precision magnet power supplies in 0,1, 1 or 10PPM stability classes ranging from 50A to 10,000A.

Danfysik also offers you
- Ion implanters and Ion Sources
- Beam Diagnostics Instrumentation
- Precision Teslameters
- Turnkey accelerator systems
- Complete consultancy and design service from basic optics to finished documented products.

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