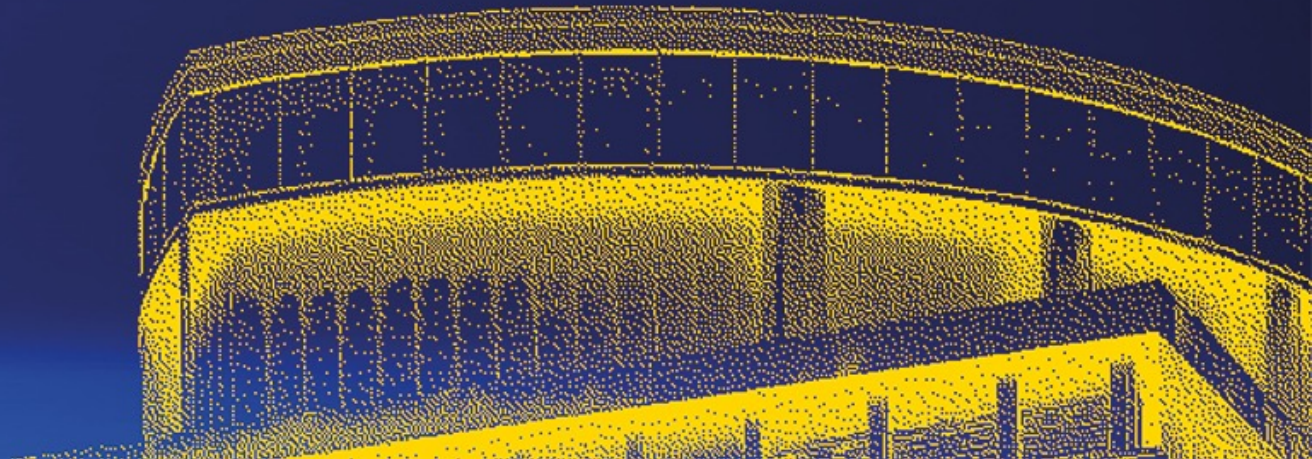


SWEDISH **BIG SCIENCE FORUM**



HOW SWEDISH COMPANIES WIN ORDERS



Patrik Dehlfors
CTO
QAMCOM



Benny Björkander
CEO
RFR SOLUTIONS



Jörgen Stenarsson
CTO
LOW NOISE
FACTORY



Håkan Nilsson
Business Developer
RISE



Carl-Johan Fagerström
CEO
FAGERSTRÖM



SWEDISH BIG SCIENCE FORUM

Patrik Dehlfors, Qamcom
Lund – 2024.01.31



ABOUT US.

● Anywhere (remote)

Göteborg, Stockholm
and Linköping

● Denver (US)

● Budapest (HUN)

Wellington (NZ) ●

Proud roots in
Göteborg,
one of Scandinavia's
most vibrant
innovation hubs

Founded in
2001

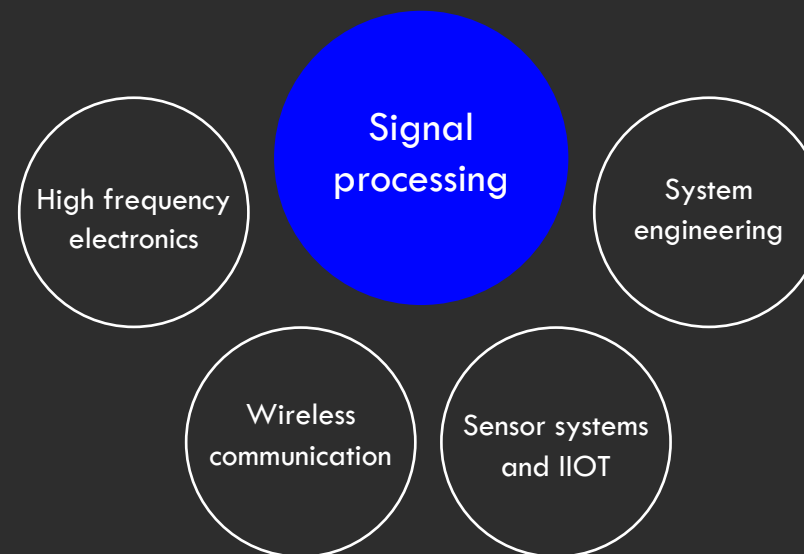
6
locations

150
outstanding people

40%
have a PhD

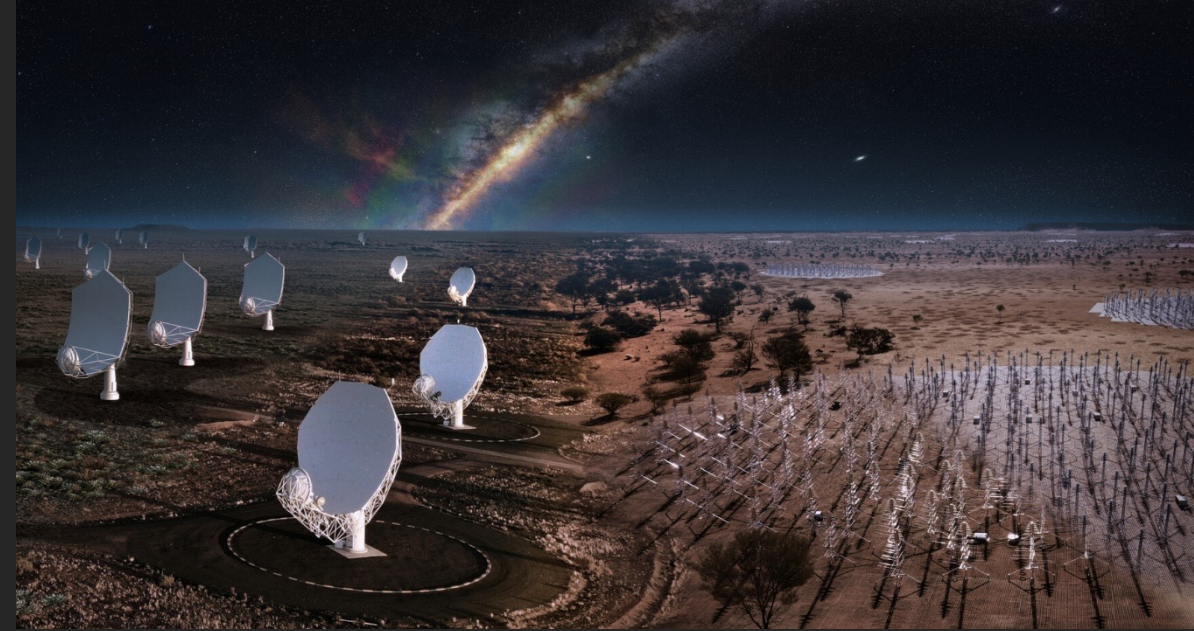
16
Average years
of experience

FOCUS AREAS



A key part of the world's largest telescope

- SKAO – Set to reveal the secrets of the Universe.
- SKA-Mid, a radio telescope megaproject in South Africa.
- Mid-2023, Qamcom was awarded responsibility for final design and industrialization of a subsystem
- Filter and convert the collected analogue radio signals into amplified and clean digital signals.
- Advanced low-noise signal processing expertise and the supporting capabilities to build functional modules
- Making research a reality.
- Proud to enable investigation of the most ancient and far-away parts of the universe.





Qamcom is a knowledge-based research technology company
within hardware, software and system development bridging
the gap between research, technology and business.

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RFR Solutions AB

Success projects

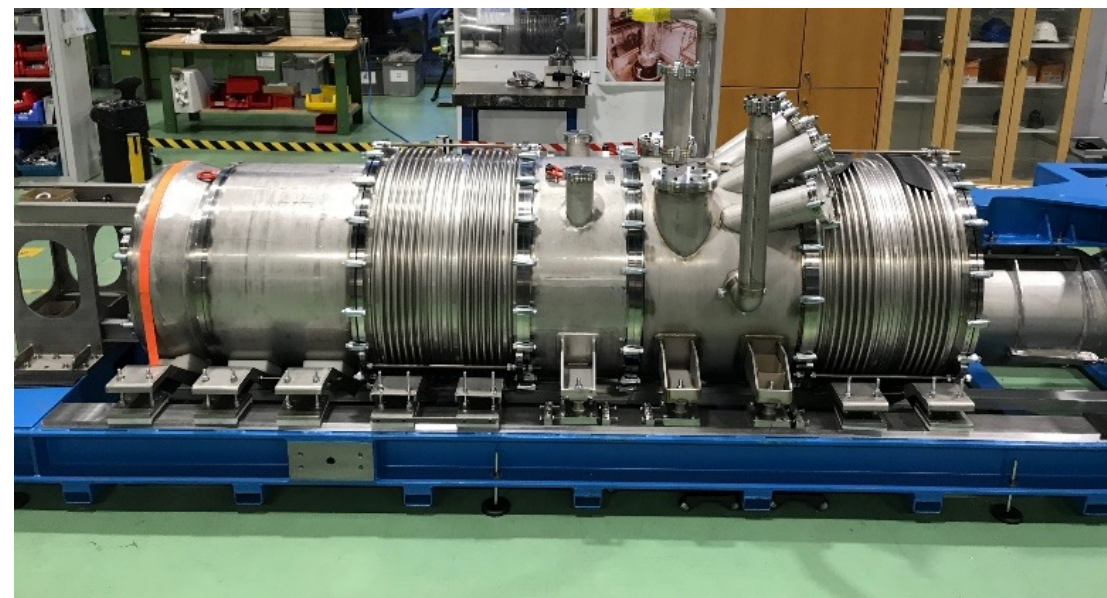
RFR Solutions at a glance

- Stainless steel specialists
- Full support from initial idea to tested, documented and installed product.
- A carbon steel free manufacturing facility
- Focus on high requirement markets, Big Science, Nuclear, Pharma, Food
- Lasercutting, bending, licensed welding, surface treatment, validation
- Testcenter with Helium leak test, dimensional control, pressure test
- ISO 3834-2, ISO 9001, ISO 14001,



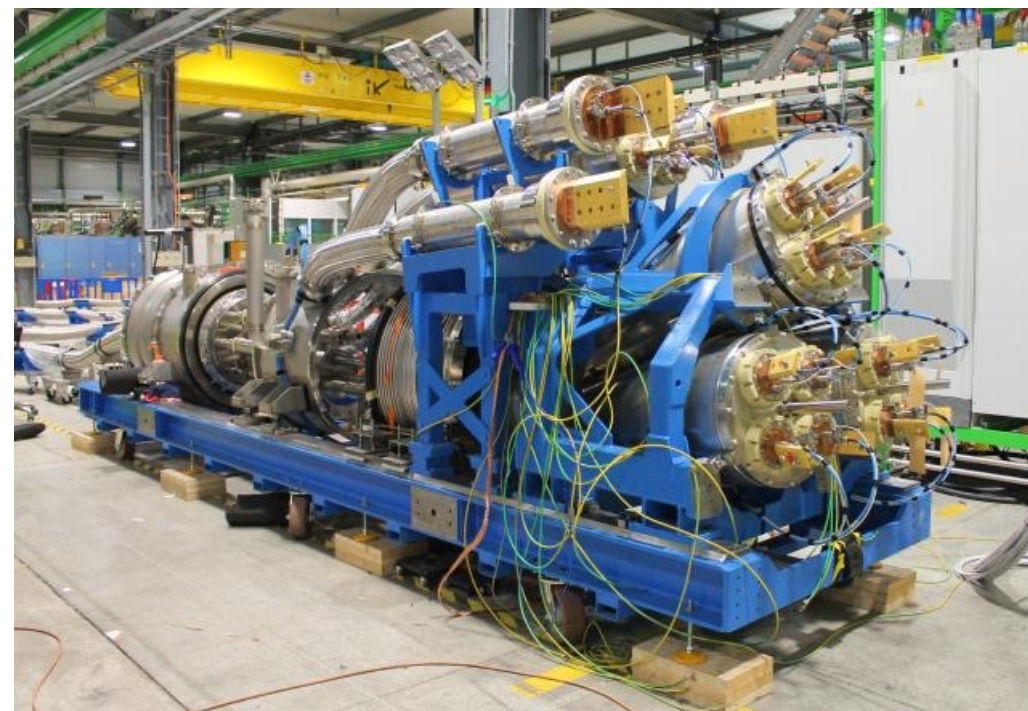
CERN Hi-Lumi – DFH cryostates

- Superconducting power feed cryostat
- Tight cooperation with CERN and Uppsala University
- Parts to first prototype delivered 2021
- Contract for another 9 pcs 2022-2024
- RFR Solutions manufacture all parts in stainless steel
- Close discussions regarding mechanical design, tolerances and vacuum design



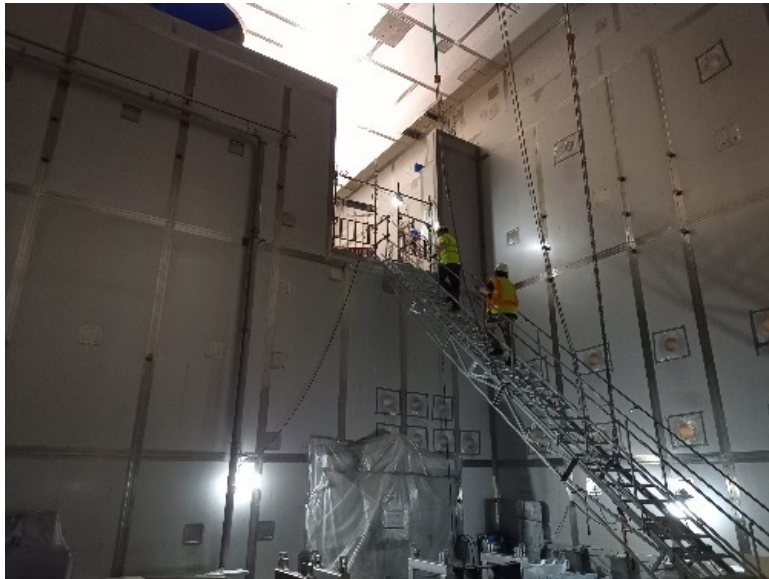
CERN Hi-Lumi – the road to success

- Building references from ESS to CERN. From minor orders to bigger
- Building network at CERN and development partners like Uppsala University
- Open partnership with suppliers to achieve quality and capability
- Persistence to show technical performance, capability, financial solutions and patience
- A way to build knowledge transfer (vacuum, cryotech, mechanical design)
- Build-up of new lab 2022 at RFR for He-leaktest and metrology testing
- Great reference for other industry



Projects - ESS

- ESS, Sweden
 - Started with ESS establishment
 - Active cell – complete containment
 - Framework and media penetrations in Active cell
 - Containment pits for radioactive material
 - Tanks for radioactive water



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Low Noise Factory AB
lownoise factory.com



Low Noise Amplifiers for SKA

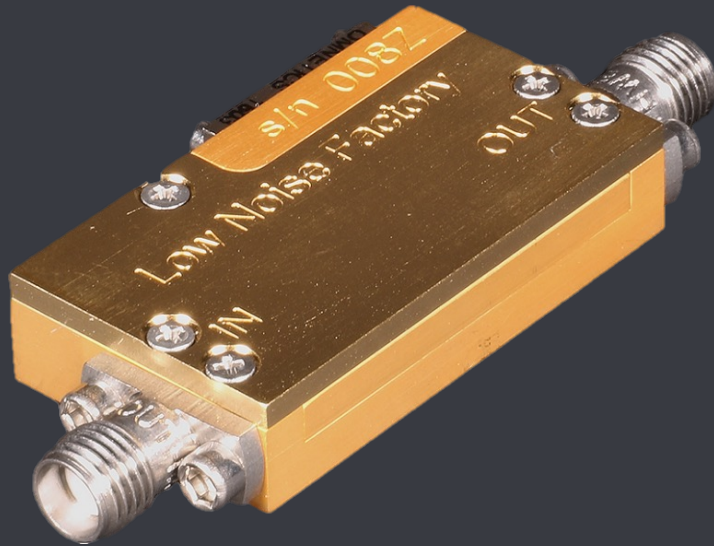
Jörgen Stenarson
stenarson@lownoise factory.com

Basic facts

- Founded in 2005 by Niklas Wadefalk
 - Niklas worked at Chalmers and Caltech as a research Engineer developing cryogenic Low Noise Amplifiers for microwave frequencies
- Privately owned
- 18 employees
- 1000 m² offices and lab in Göteborg, Sweden



Cryogenic LNAs and Isolators



- Physics research (80%)
 - Strong focus on Quantum Computers (1-12 GHz)
- Radio Astronomy (15%)
 - Telescopes (0-116 GHz)

Square Kilometer Array (SKA)

- Next generation international radio astronomy telescope
 - Aspirational goal is one square kilometer collection area
- Two telescope systems
 - Low 50 – 350 MHz (Australia)
 - Mid 350 MHz – 15.4 GHz (South Africa)



Artists rendering of SKA from SKA organization website: skatelescope.org

Why care about noise of astronomy receivers?

- Radio Astronomy

- Telescope Sensitivity $\propto \frac{A}{T_{\text{sys}}}$

A = Collecting area

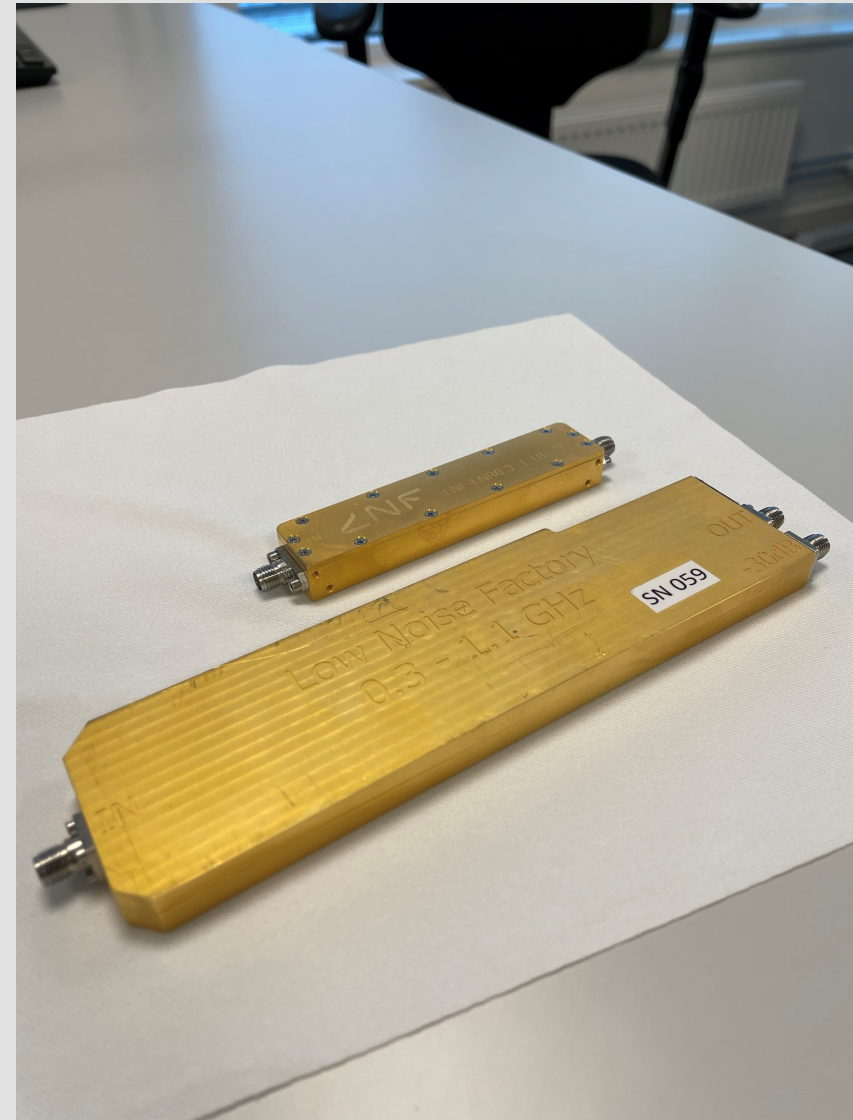
T_{sys} = System noise temperature



SKA Organisation/Swinburne Astronomy Productions.

Mid band 1 LNA

- Room temperature LNA
- 350 MHz – 1050 MHz
- Gain 37 dB
- Noise temperature < 14 K
- 2 LNAs / antenna



LNF's recipe for success

- Propose a room temperature LNA with competitive performance in the technology development phase
 - Save money on cooling systems that can be removed
 - Band 1 has the largest antenna feed
 - Less equipment to both buy and service
- Participate in the technology development by providing prototype LNAs



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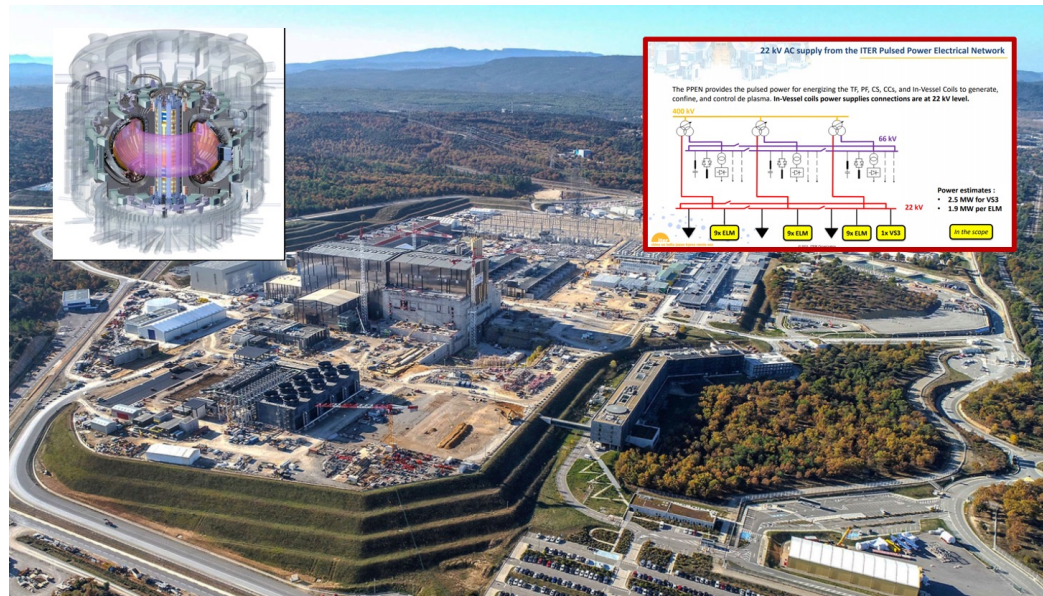


Håkan Nilsson
Business Developer
RISE



Carl-Johan Fagerström
CEO
FAGERSTRÖM

ITER has a need for different electrical power converters to feed numerous super conducting coils

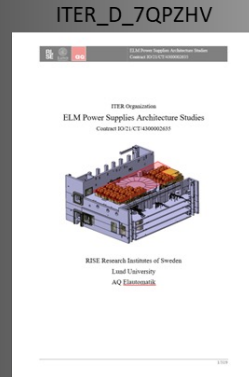


- **Presentation on planned procurements within power electronics/converters at ITER Big Science Business Forum 2021**
- **Consortium between RISE, LTH and AQ Elautomatik**
- **Restricted procurement**
- **Extensive administrative tender documentation and requirements**
 - **Draft consortium agreement and draft quality plan**
- **Evaluation based on 60% technical issues and 40% economy**
- **Quality audit performed at RISE**
- **The consortium was awarded a contract in March 2022**

Find technical solutions that can withstand ITER's environment

Contract #1 ELM Power Supplies Architecture Studies

- Expert views, justification, and evidence for the suitability of different architectures for ELM power supplies
- Recommendations for final solutions (KPI, cost, weight, size)
- SMF impact on magnetically sensitive components

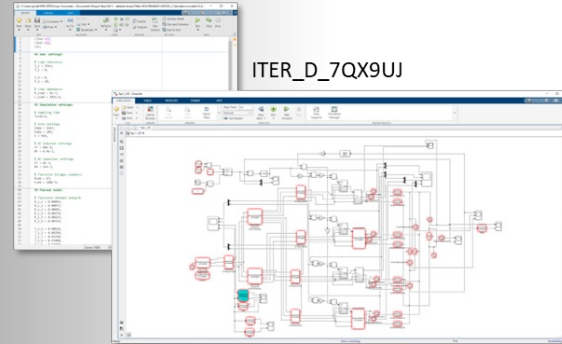


D2.1 Detailed study report

Format: Word (.docx)

For each architecture: design overview and description, performance, losses and temperature, lifetime, reliability, protection and safety, overview table.

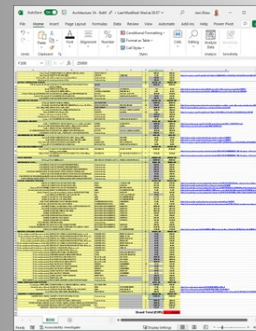
Annexes: common topics, shielding of magnetic fields, selection of sensor technology, and list of signals



D2.2 Bill of Materials

Format: Excel (.xlsx)

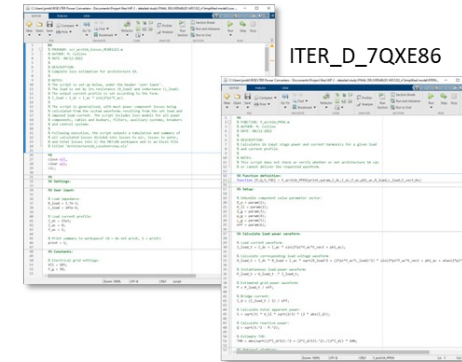
Table including components, costs, suppliers, and external links to datasheets.



D2.3 Simulation models

Format: Matlab script and Simulink (.m, .slx)

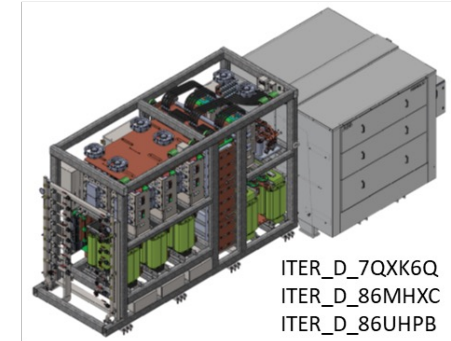
Includes thermal modeling and control loops. Used for determining architecture performance.



D2.4 Simplified models

Format: Matlab (.m)

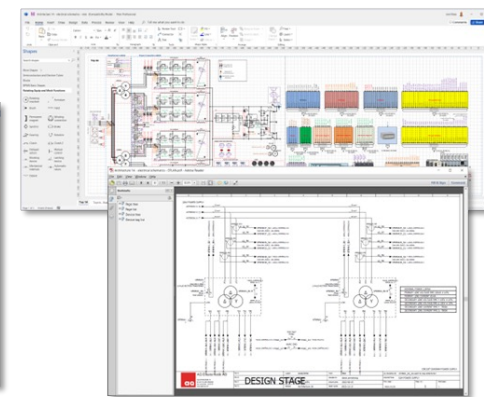
Scripts for fast calculation of AC power quality parameters, power losses (air and water) and device temperature for any load current waveform.



D2.5 Mechanical 3D models

Format: STEP file (.STEP, .stp)

3D visualization of power supply (separate files for transformer and converter cabinets)



D2.6 Electrical schematics

Format: pdf, vsd
Exported schematics from EPLAN and Visio.

Contract #2

Design and procurement of a power electronics assembly for SMF compatibility tests

- Design, manufacture, and deliver system to ITER for performing SMF compatibility tests on power electronics devices
- Small-scale system representative of typical power electronics systems to be installed at ITER
- 7 interconnected subsystems tested individually in magnetic field generator at ITER



D1.2 Simulation models

Format: Matlab Simulink(.slx)
Control of system, integrated into real-time target simulator (Speedgoat)



D1.4 Bill of Materials

Format: Excel (.xlsx)
Table including components and suppliers



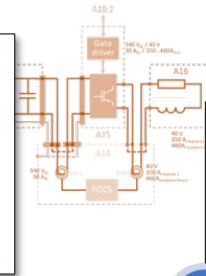
D1.5 Testing and commissioning plan

Format: report (.docx)
Requirements and acceptance criteria of FAT



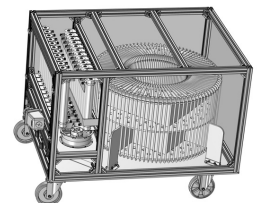
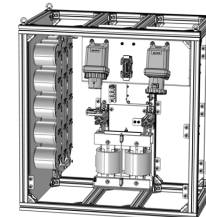
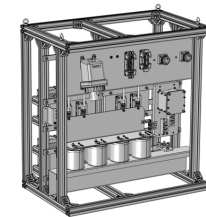
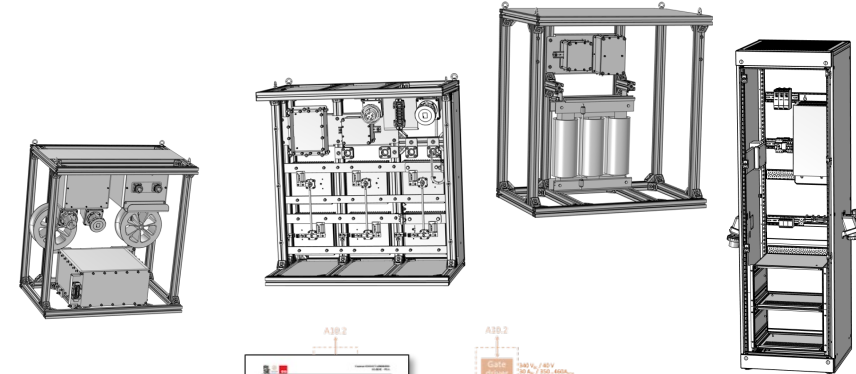
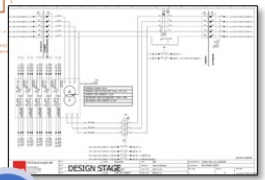
D1.6 Final design report

Format: report (.docx)
Description and justification of complete system design



D1.7 Manufacturing dossier

Format: ePlan
Electrical schematics and mechanical drawings





ITER site visit lead by the Swedish ambassador in France

- Sweden declares its interest in being active in Fusion research and in coming ITER projects and procurements

Conclusions and way forward

Doing business with ITER might look complicated, however:

- do not hesitate to take contact with Big Science Sweden for advice or assistance
- the tender process is straight forward
- competence is a key factor in building confidence for future collaboration
- next steps within power electronics and coming procurements

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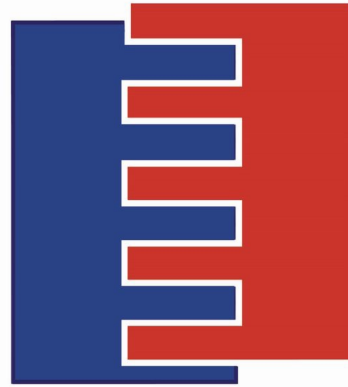
Jörgen Stenarsson
CTO
LOW NOISE
FACTORY



Håkan Nilsson
Business Developer
RISE



Carl-Johan Fagerström
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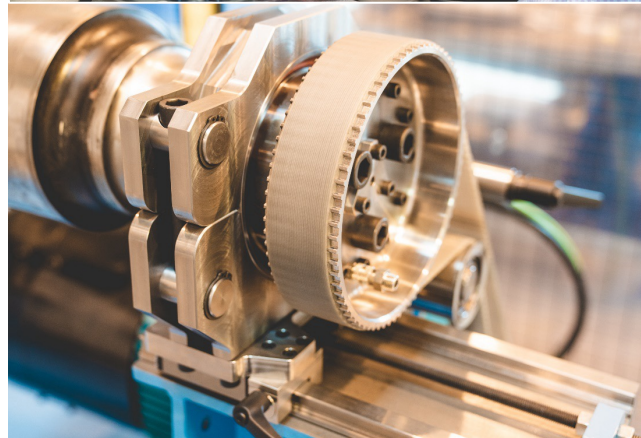


FAGERSTRÖM
INDUSTRIKONSULT AB

Fagerstöm

- Founded 1994
- 29 employees
- +200 customers
- +500 projects
- Consultancy services
- Turn-key Projects with hardware Delivery

Passion for technical challenges

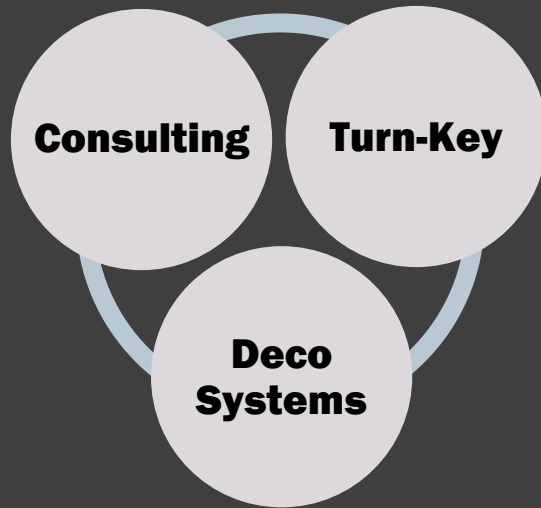


Clients

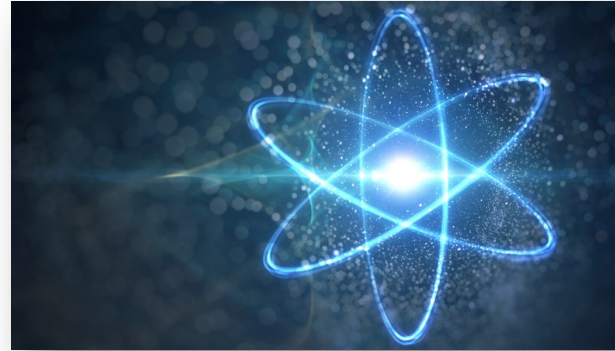
- Mechanical Design
- Project Management
- System Engineering
- Process Design
- Calculations & Analysis



Business Areas



- Mechanical Design
- Project Management
- System Engineering
- Process Design
- Calculations & Analysis



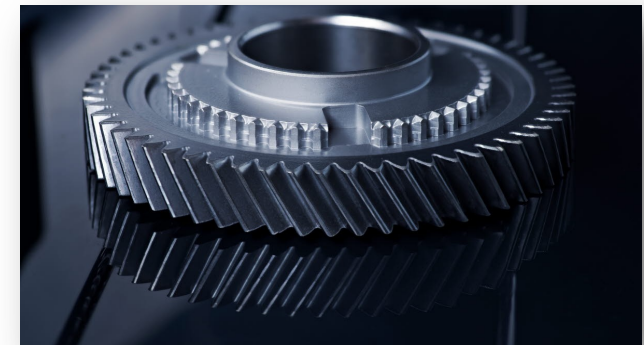
Nuclear



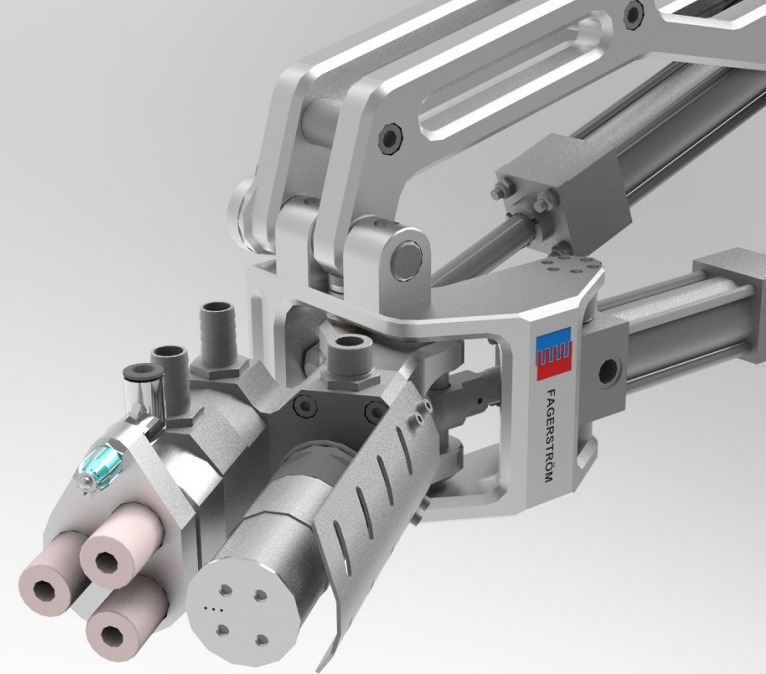
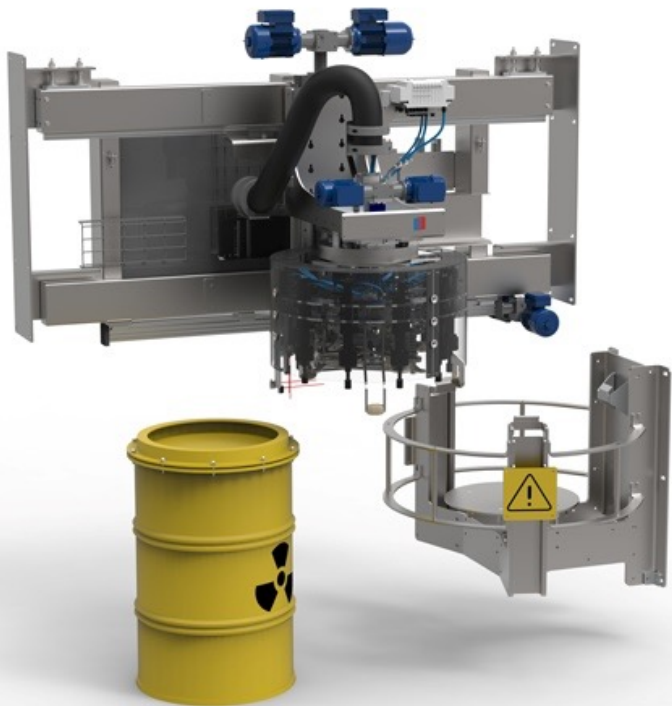
Big Science



Pharma



Industry



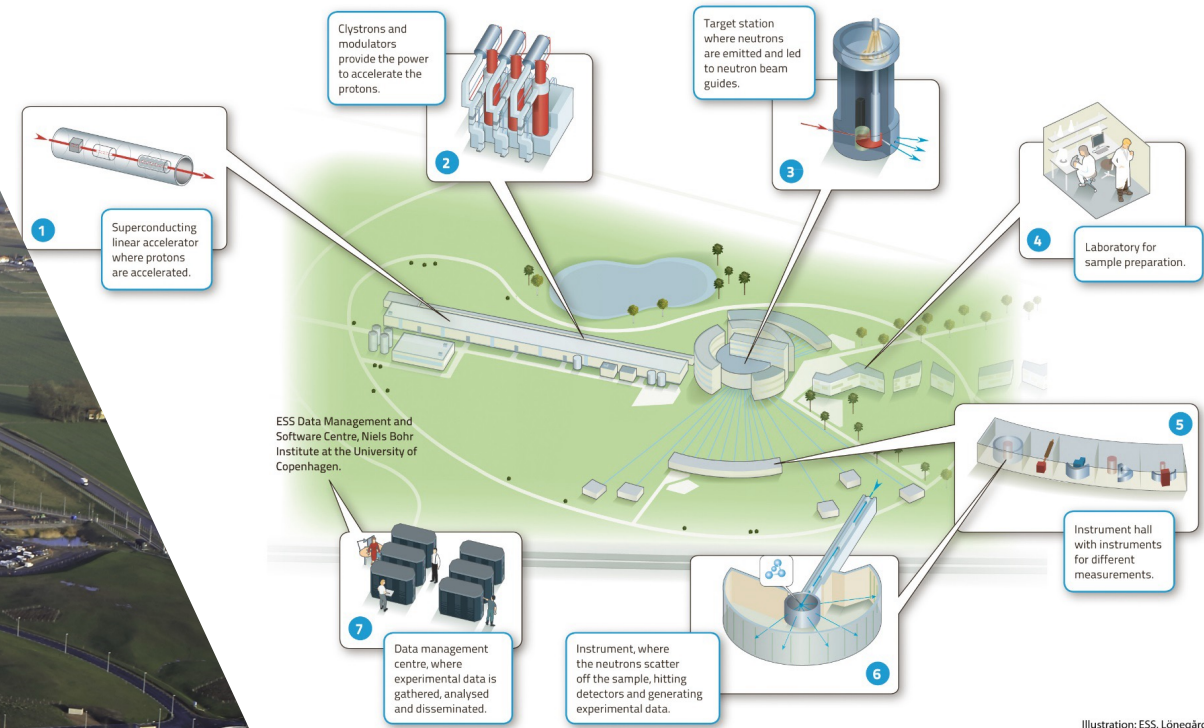


Illustration: ESS, Lönegård



**EUROPEAN
SPALLATION
SOURCE**

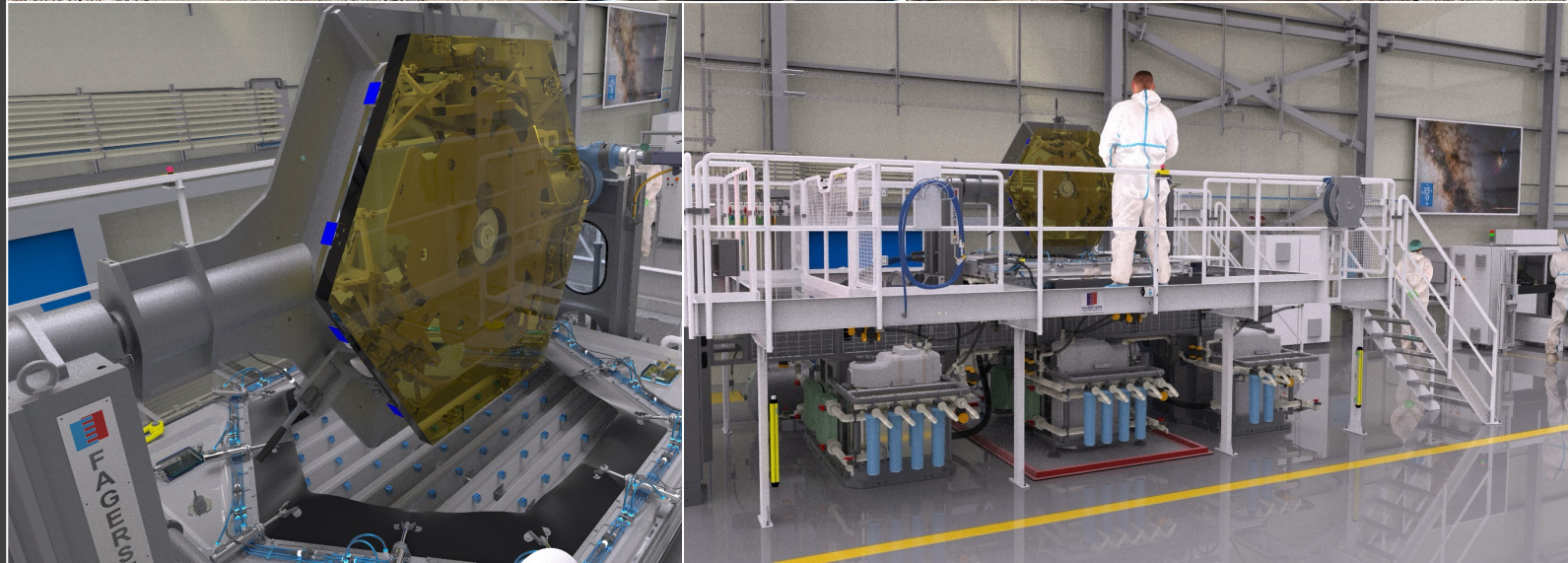
Tasks: Consultancy Services

ELT Extremely Large Telescope

- Fagerström Project:

Mirror Washing & Stripping Plant

- Atacama desert, Chile
- 3 064 m
- Seismic area



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BIG SCIENCE BUSINESS FORUM 2024

Trieste

2018

Copenhagen, Denmark

2022

Granada, Spain

2024

Trieste, Italy



Paolo Acunzo

Director

**BIG SCIENCE
BUSINESS FORUM
TRIESTE 2024**

***BSBF usually attracts more than
1000 delegates from around 30
countries, representing more
than 500 business and research
organisations working in the Big
Science market***



TRIESTE
1 - 4 OCTOBER 2024

www.bsbf2024.org

Big Science Business Forum 2024

Paolo ACUNZO

Head of ENEA service
ILO Network Italia

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Host Organisers of BSBF Trieste 2024



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Rete Industrial Liaison Officers



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FRIULI
VENEZIA
GIULIA

BSBF – Big Science Business Forum is a business oriented congress which congregates the main European Research Infrastructures, focused on technology and with the aim to be the main meeting point between Research Infrastructures and industry.



BSBF 2024 in Trieste will be the third edition of the event after the success of the previous edition in Copenhagen (2018) and Granada (2022), where thousands of participants from hundreds of organisations and dozens of countries gathered together to discuss the future prospects of the Big Science Market.

BSBF Trieste 2024 overview

The spirit of our programme is to consolidate the BSBF brand, involving all Big Science Organizations (BSOs) currently partners and continue the trends seen in Copenhagen and Granada, maintaining the cornerstones of best practice while, at the same time, trying to improve some aspect and introduce our own innovative ideas

- 3-day event with an industrial exhibition
- 3 plenary sessions
- 16 parallel sessions
- 1 to 1 (B2B-B2C) meetings in parallel
- Satellite meetings and side events
- Social programme
- Visit to research infrastructure in Italy and Slovenia

Big Science Business Forum 2024

TRIESTE
1 - 4 OCTOBER 2024

www.bsf2024.org
<https://newsletter.bsf2024.org/subscribe/BSBF2024/>

BSBF 2024 is a **business oriented congress** promoted by the main **European Research Infrastructures**, focused on technology and innovation with the aim to be the main meeting point between **Research** and **Industry**.

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LUNCH

Opportunity for one-to-one meetings

Where are all the women in Big Science? (Botulfshörnan)

SWEDISH
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