ACCEL

Highly Customized Industrialized Linacs for Applications in Scientific Research

- Scientific applications
- Project Phases
- Presenting of project types and related skills
- The work behind the work
- Industrial capabilities

Scientific applications

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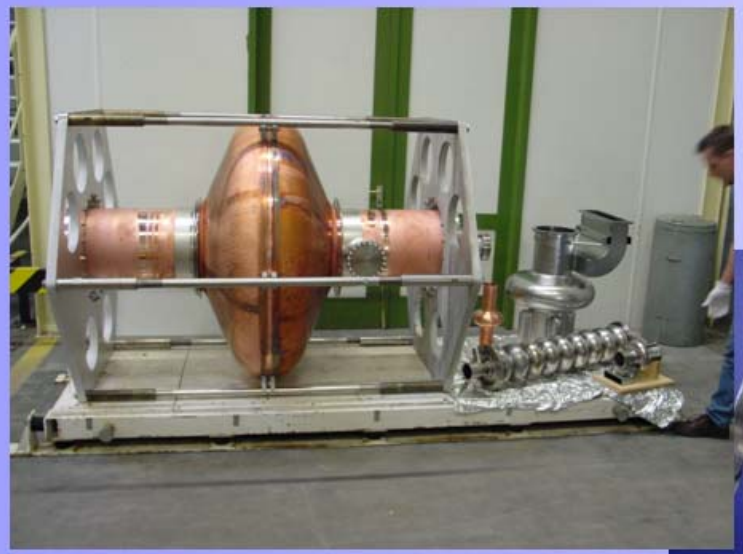
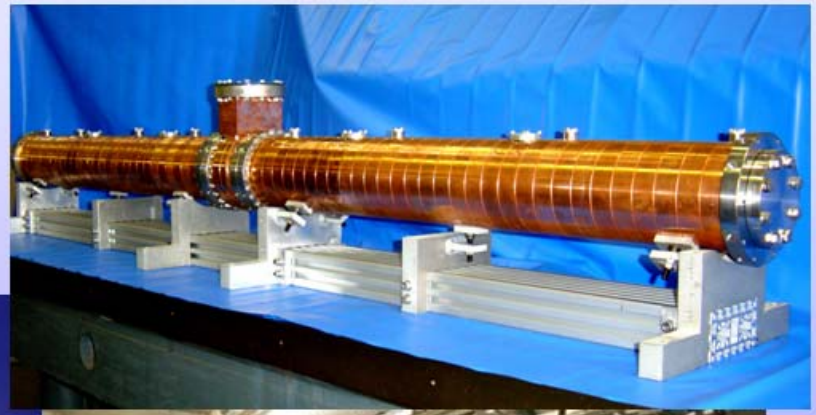
Wide field:
energies from 500keV to 1 TeV,
electrons to rare isotopes
low emittance
high currents
cw and pulsed



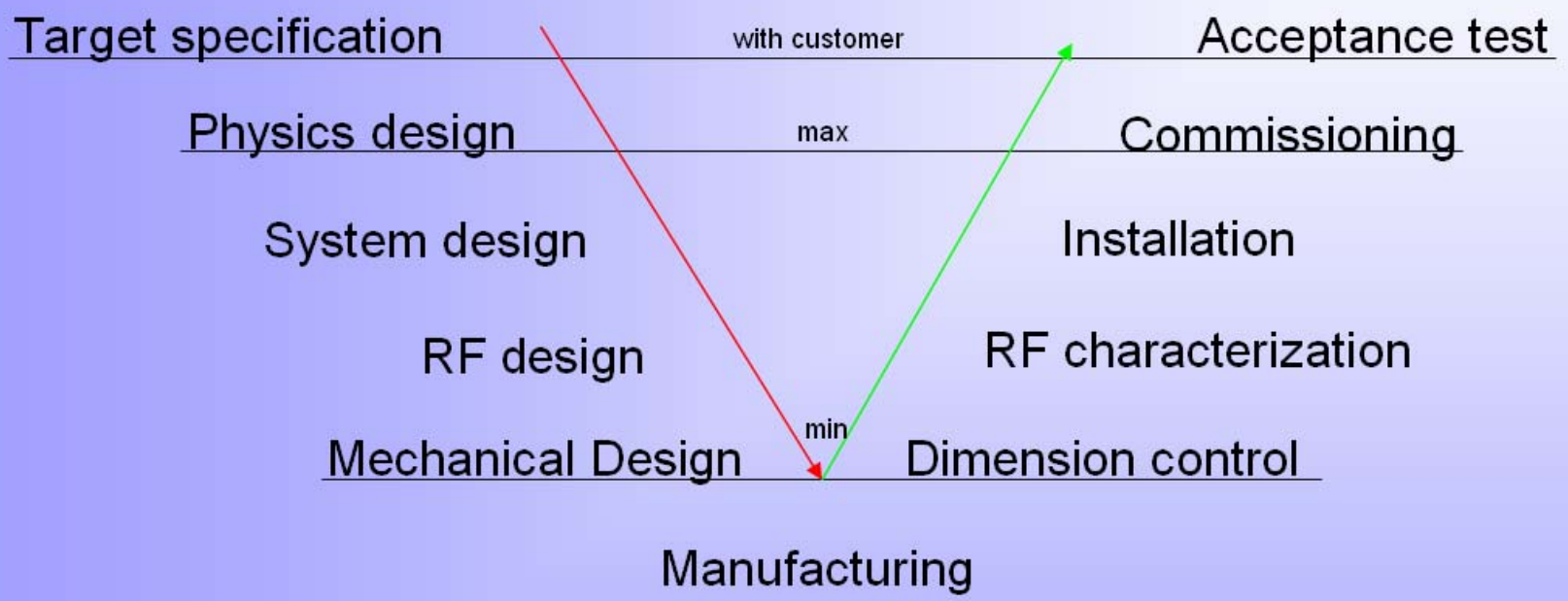


Scientific applications

Technical specification	Species Energy Energy spread Charge Pulse structure Emittance
Principle of accelerator	Linear Re circulating Circular
Choice of technology	Normal conducting Superconducting

we serve them all

Project phases for a scientific linac



S-Band Linacs: History to Future

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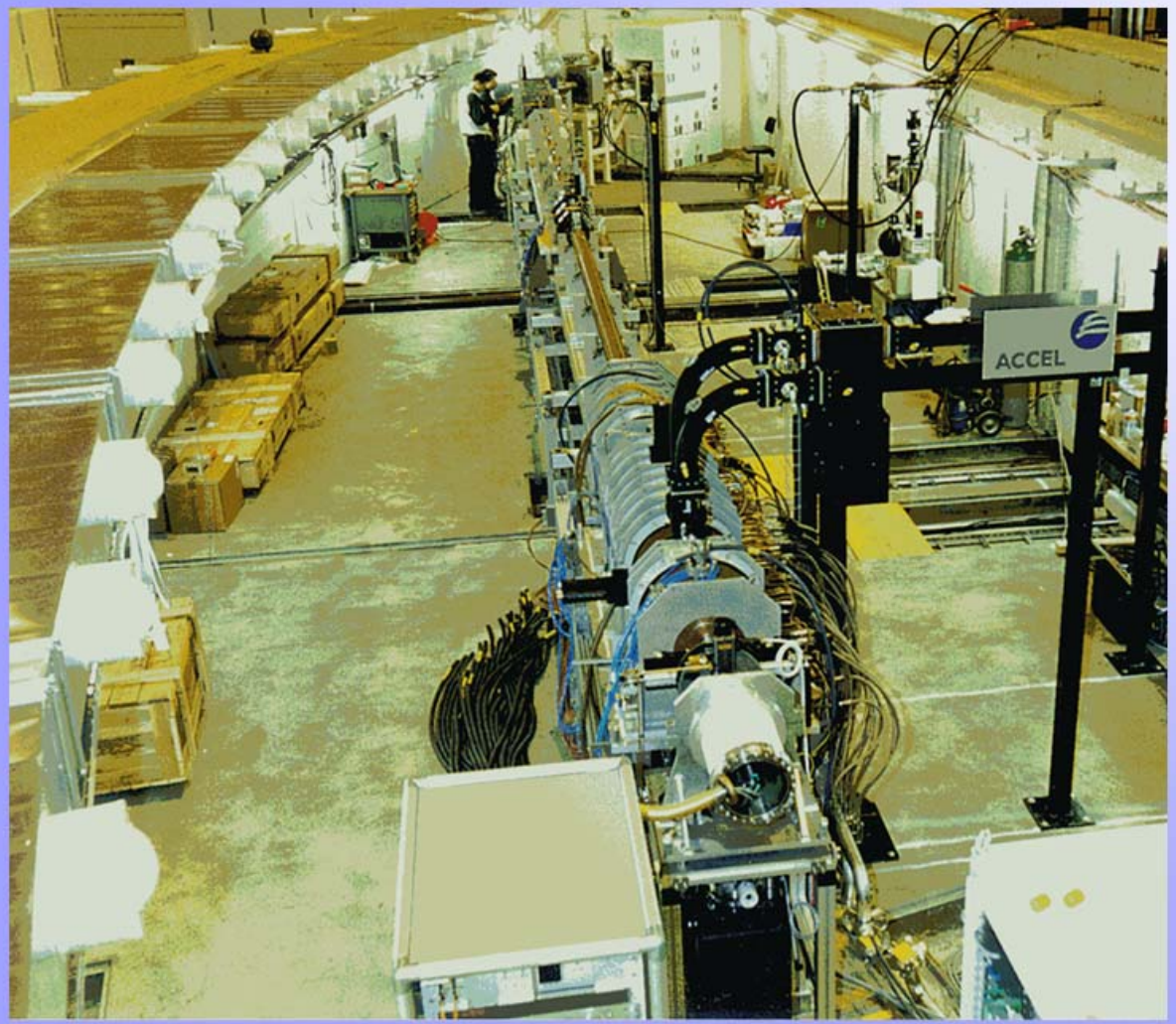

S-Band Linacs

100 MeV linac for:

- the Swiss Light Source (SLS) based on DESY
- DIAMOND Light Source
- Australian Synchrotron Project (ASP)
- 0,5 to 50 MeV variable energy linac for the Physikalisch Technische Bundesanstalt
- IR-FEL injector(s) upcoming

Building according to print (SNS CCL structures)

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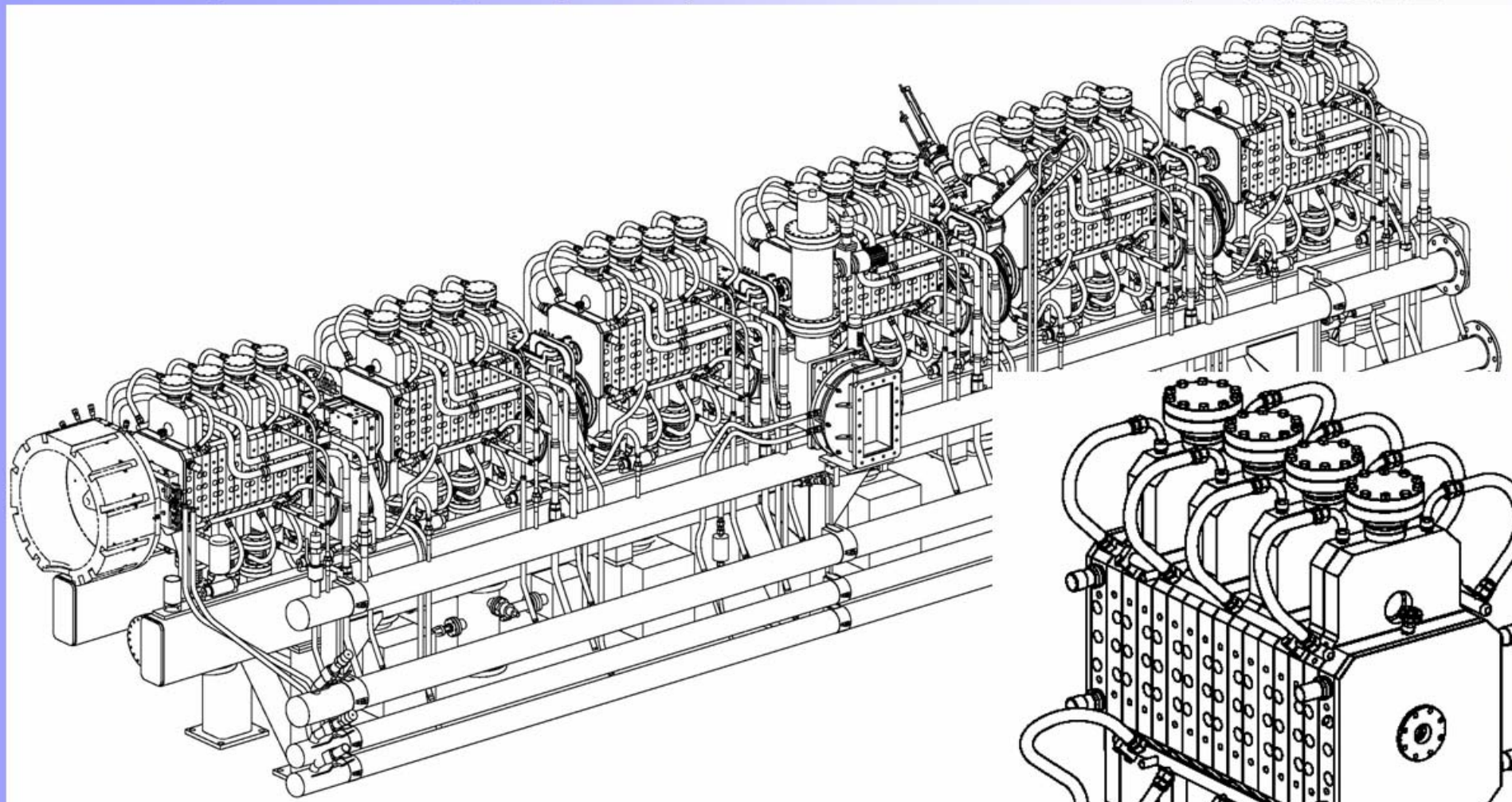

One half of in total 4 modules, more then 40 m of linear accelerator

Project History: SNS CCL Structures

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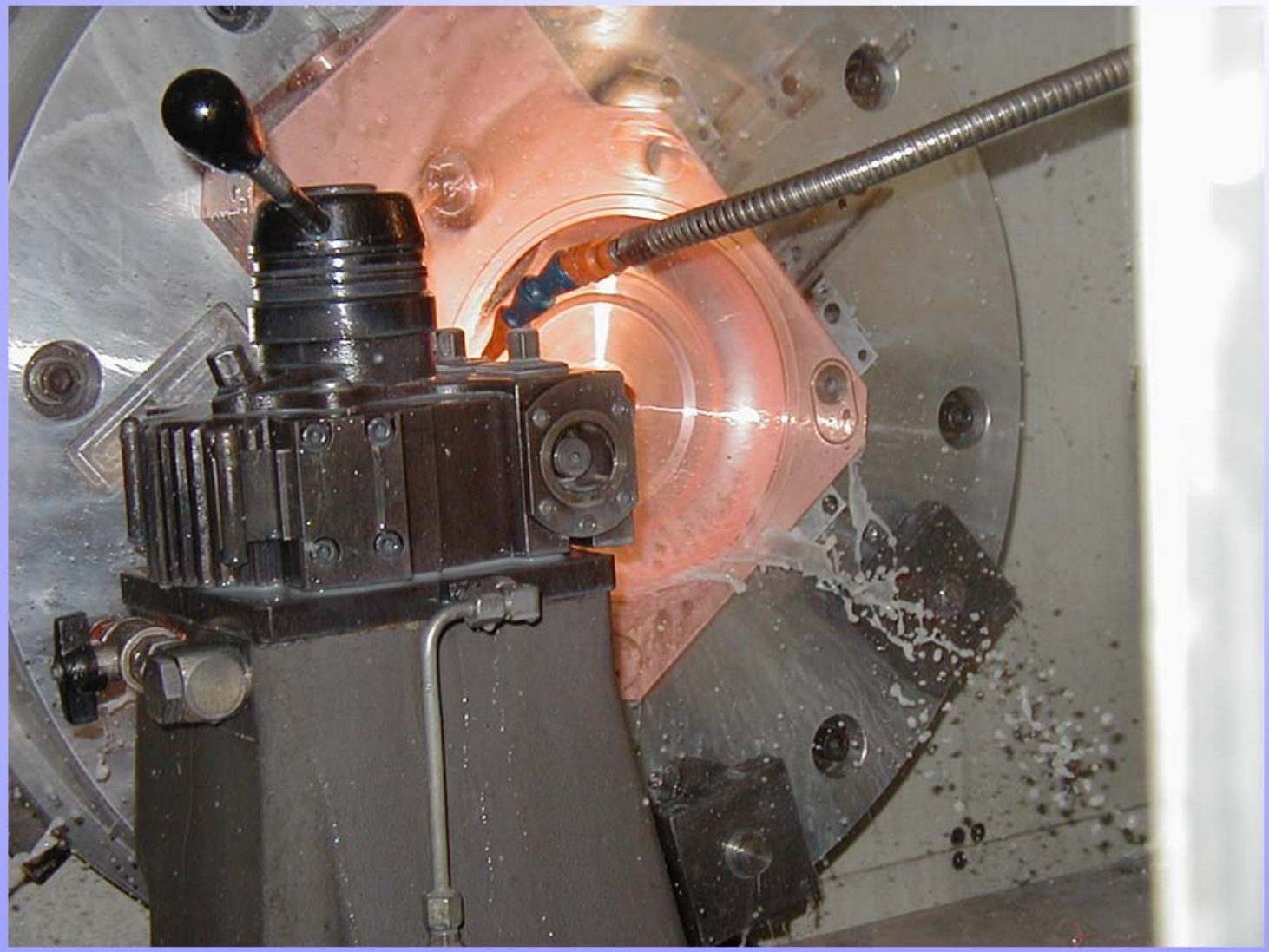
1998	First offer placed together with GA for design and production
2001	Manufacturing contract placed, design responsibility with LANL
2003	First article (one segment and one bridge coupler), after qualification of all joints
2004	Module #1 tuned
2005	Contract finalized

Production capabilities

Milling

Turning



Production capabilities

Milling

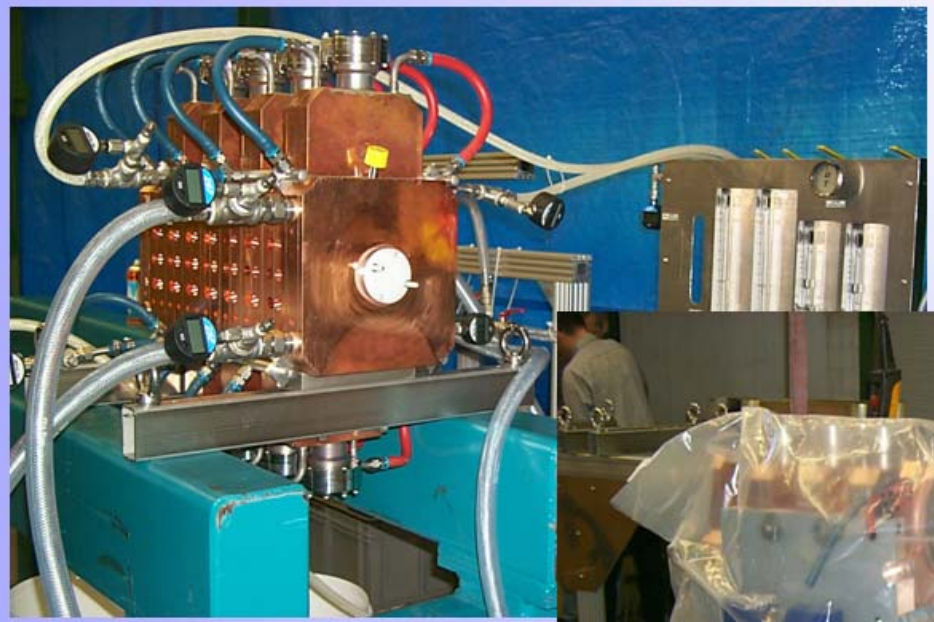
Turning

Joining

Cleaning

Mounting

Checking



Production capabilities

ACCEL

Milling

Turning

Joining

Cleaning

Mounting

Checking

Transport

Installation

Production capabilities

ACCEL

Milling

Turning

Joining

Cleaning

Mounting

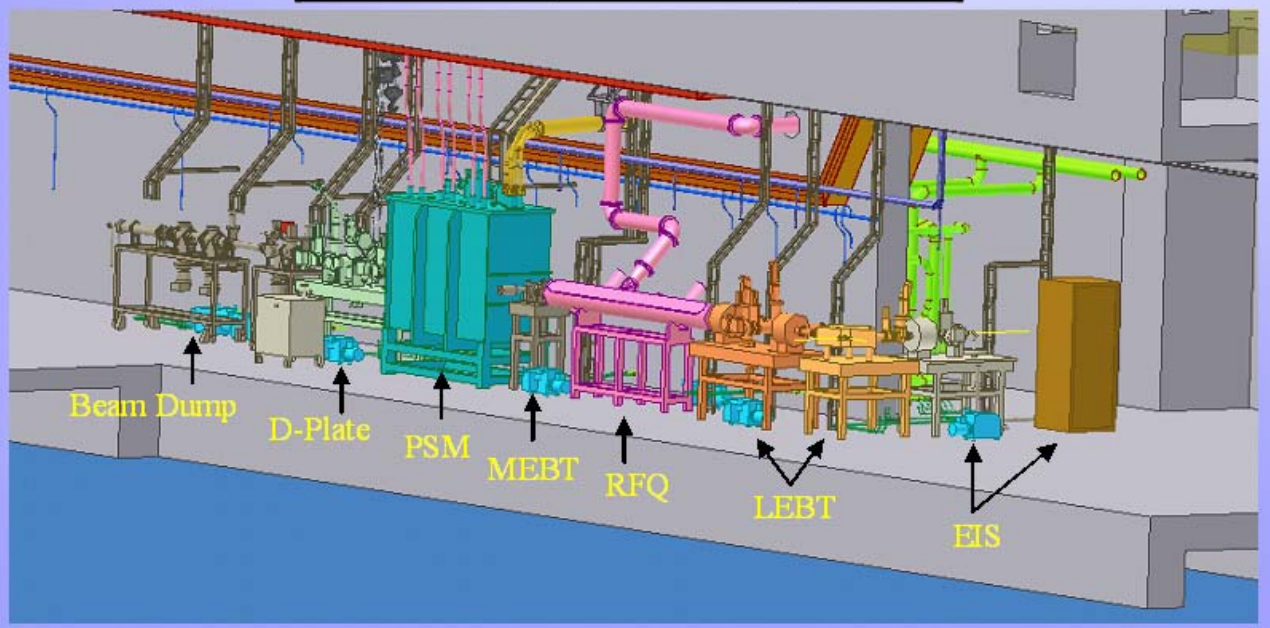
Checking

Transport

Installation

Design to specification (SARAF)

Parameter	Value	Unit
Ion species	Protons/ Deuterons	
Energy Phase I Final	 5 40	 MeV MeV
Current	2 (4)	mA



Project History

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September 2000:	First discussion on a proton/deuteron accelerator project
January 2001:	SOREQ presentation of general requirements.
Until May 2001:	Concept validation
Until August 2001:	Presentation of a design study to peer committee for a superconducting cw 40 MeV linac based on HWRs. Conclusion: Two phase approach
January 2003:	Coming into force of SARAF phase I contract
November 2003:	CDR SARAF phase I
November 2003 to November 2006	Manufacturing and factory testing
November 2006 to September 2008	Installation and commissioning

Engineering skills

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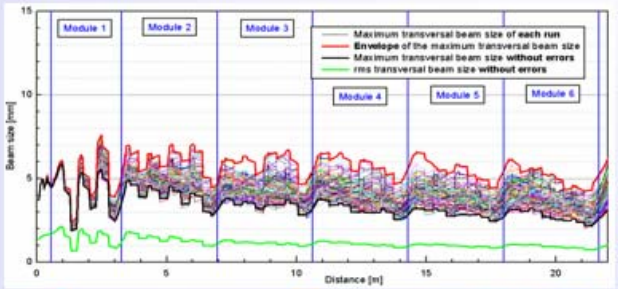
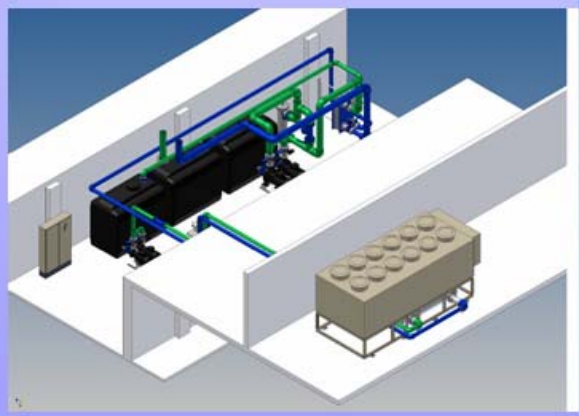
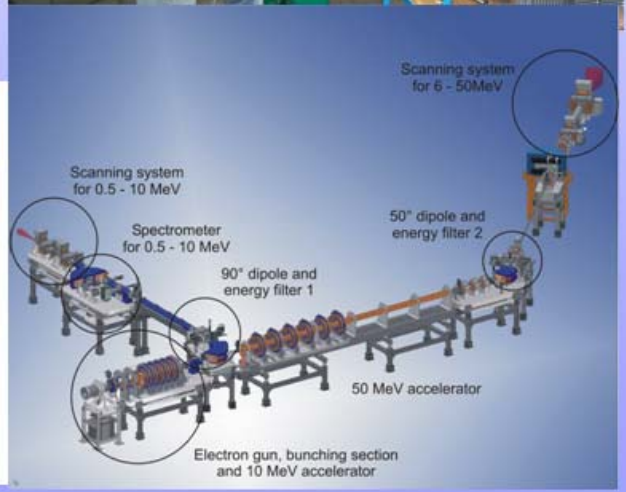
Physics design	Particle sources Beam dynamics Diagnostics
System design	Infrastructure Logistics Documentation Integration planning
RF and electrical design and control	RF resonator design RF controls design Electrical supply systems
Mechanical Design	3D design Stress analyzing Thermal analyzing







SARAF Project Team

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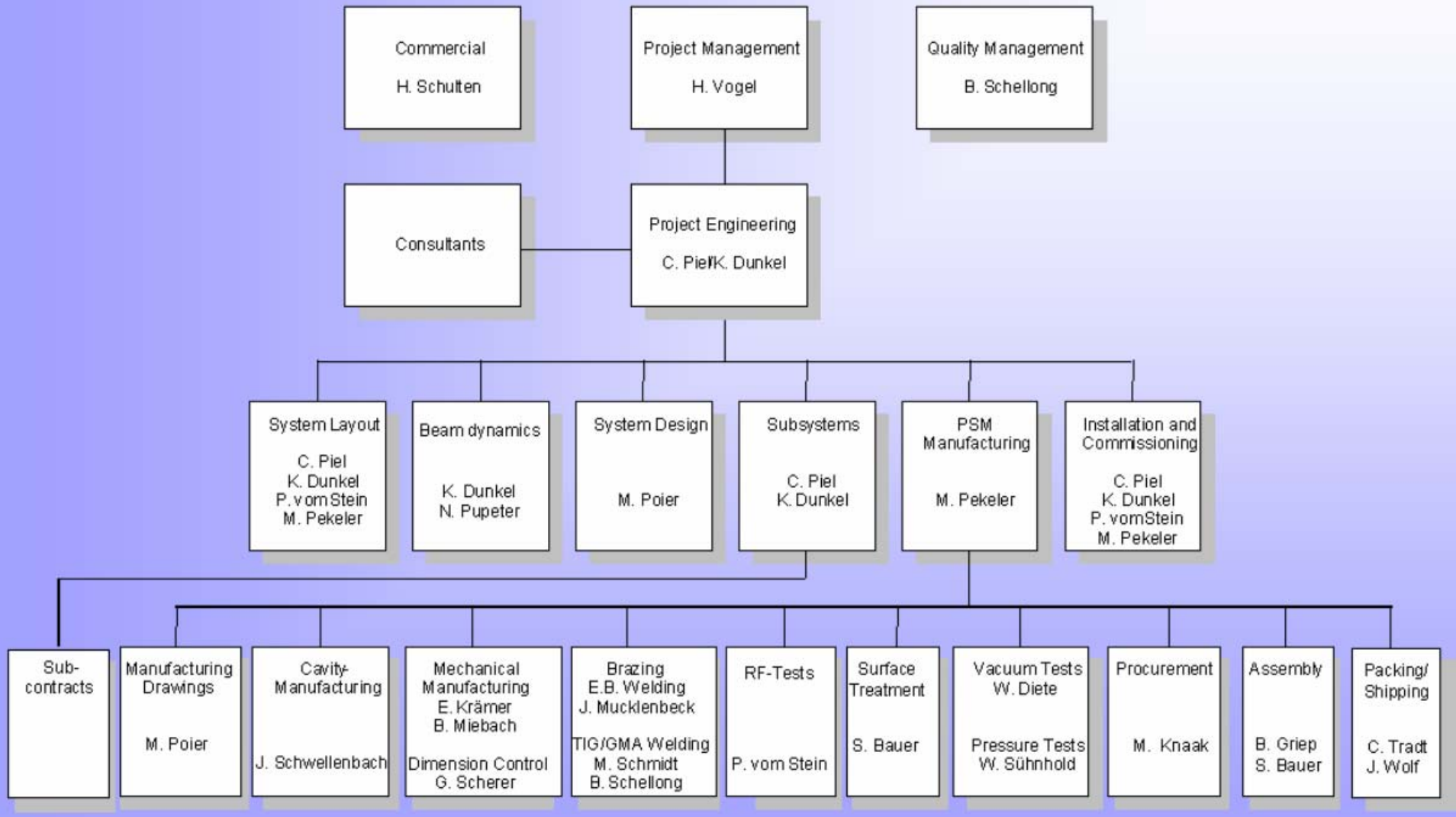

SARAF Project Team

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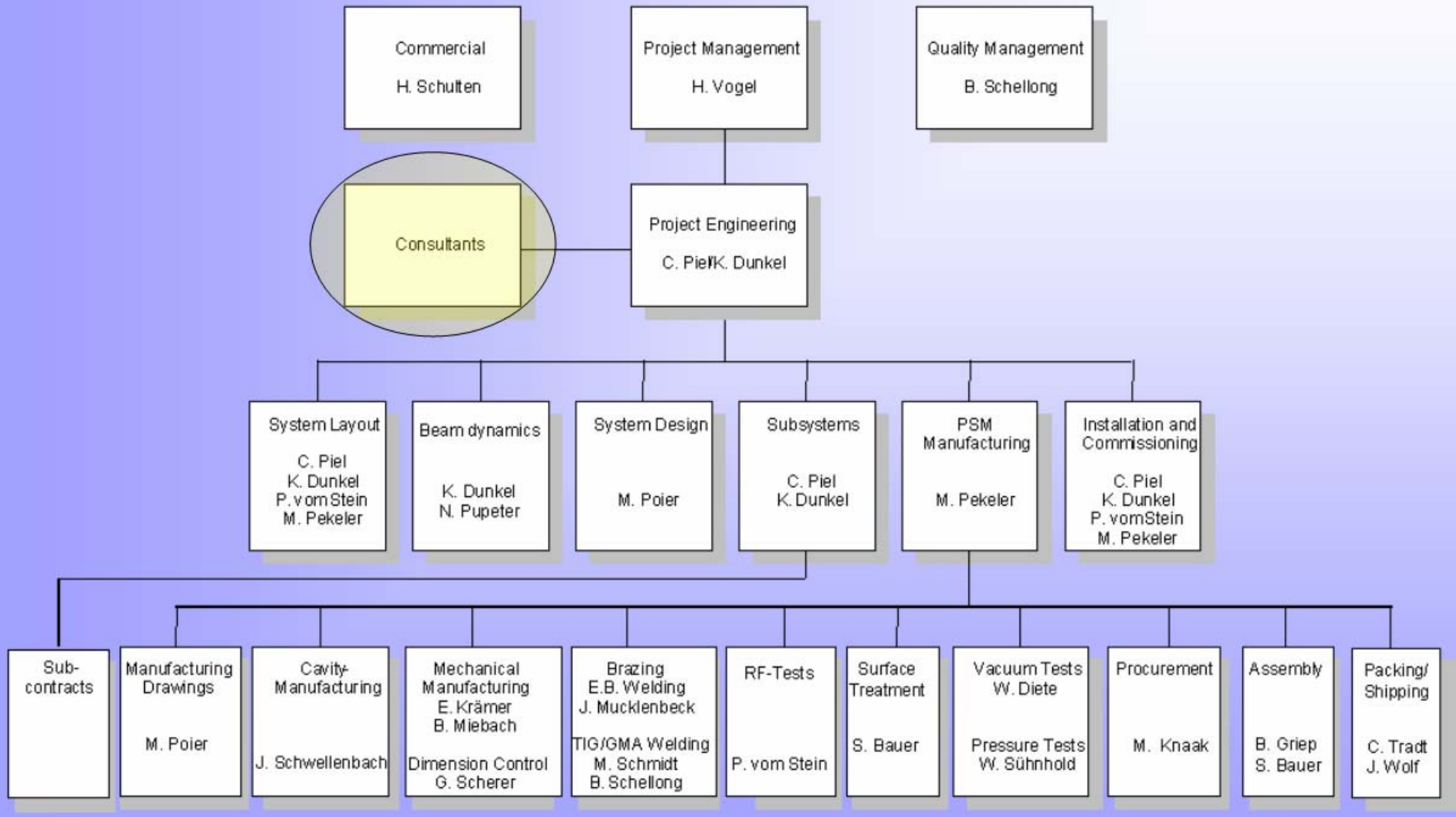

The work behind the work

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Target specification → Contract

SNS contract with more then 200 pages of FAR clauses
ASP with 120 pages contract and another 50 pages of additional information
SARAF individual contract with about 30 pages but 10 iterations required

The work behind the work

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Target specification ⟶ Contract

The work behind the work

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Target specification → Contract

Design Phase → Bonds / Bank Guarantees

BID Bonds
Performance bonds
Guarantee bonds

The work behind the work

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Target specification → Contract

Design Phase → Bonds / Bank Guarantees

Manufacturing → Quality Management
Investments

Transport → Customs

Installation → Insurances
Travel arrangements

Indirect costs for those services not to underestimate
Project related financial costs add another few percent

Conclusion

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Since a decade ACCEL supplies linacs to the scientific research institutes world wide, for various applications (SLS, SNS, DLS, ASP, SARAF, PTB).

Those systems are designed in accordance with individual needs of each customer.

Design, engineering and production expertise and capabilities are in house, or with qualified subcontractors (e.g. power converters, rf supplies).

The continuous supply of these turn key and tailored linacs makes a business.

The challenge remains to keep the expertise in house and busy

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Thank you
for your
attention