

XFEL-Cryomodule Design&Assembly Industrial Studies

Part of EUROFEL Design Study Workpackage DS6

BESSY and DESY are partners in DS6

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Motivation

Preparation of the **European XFEL-Project** and other **superconducting linac based FEL-light sources like the BESSY FEL**

In particular, preparation of the **serial production of about 120 XFEL-cryomodules** for the **European XFEL-Project**

Input for the final design and assembly procedures for the **XFEL-cryomodules**

Each cryomodule consist of:

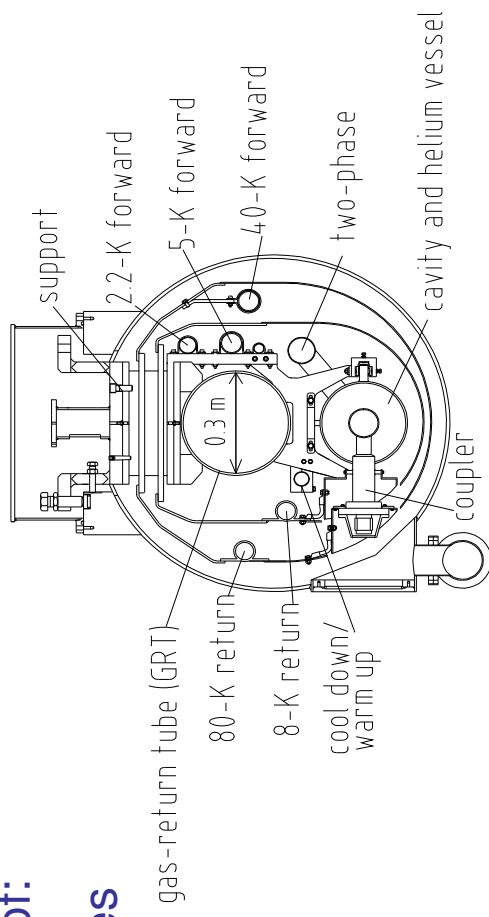
8 1.3 GHz 9-cell Nb cavities

1 magnet package

2 thermal shields

8 main RF couplers

8 cold tuners



Scope

Industrial XFEL-cryomodule design and assembly study

The present cryomodule assembly procedures and some aspects of the present design shall be analyzed and questioned with respect to the most cost effective serial production.

The key aspects of the study are as follows:

- 1.2.1 Define the assembly procedure
- 1.2.1 Analyze cost-reduction and production efficiency measures
- 1.2.3 Analyze performance improvement measures
- 1.2.4 Supply a cost estimate for the module production

A substantial part of the IS shall be the presence of CONTRACTOR's experts during the assembly of two prototype cryomodules at DESY.

Supported by the EUROFEL design study

Cryomodule Assembly

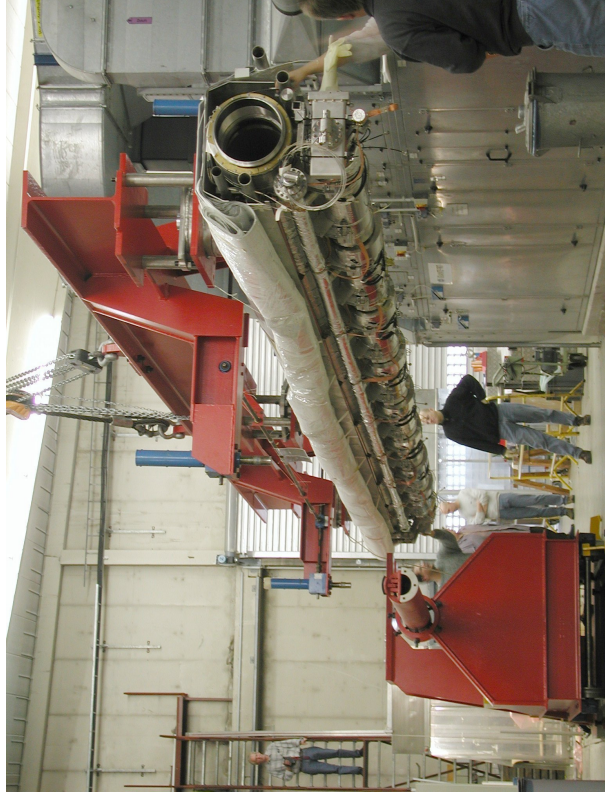
the study shall cover clean room assembly and the assembly outside cleanroom

Startpoint: string assembly in cleanroom
(all parts are tested and ready for assembly)

Clean room assembly



Assembly outside cleanroom



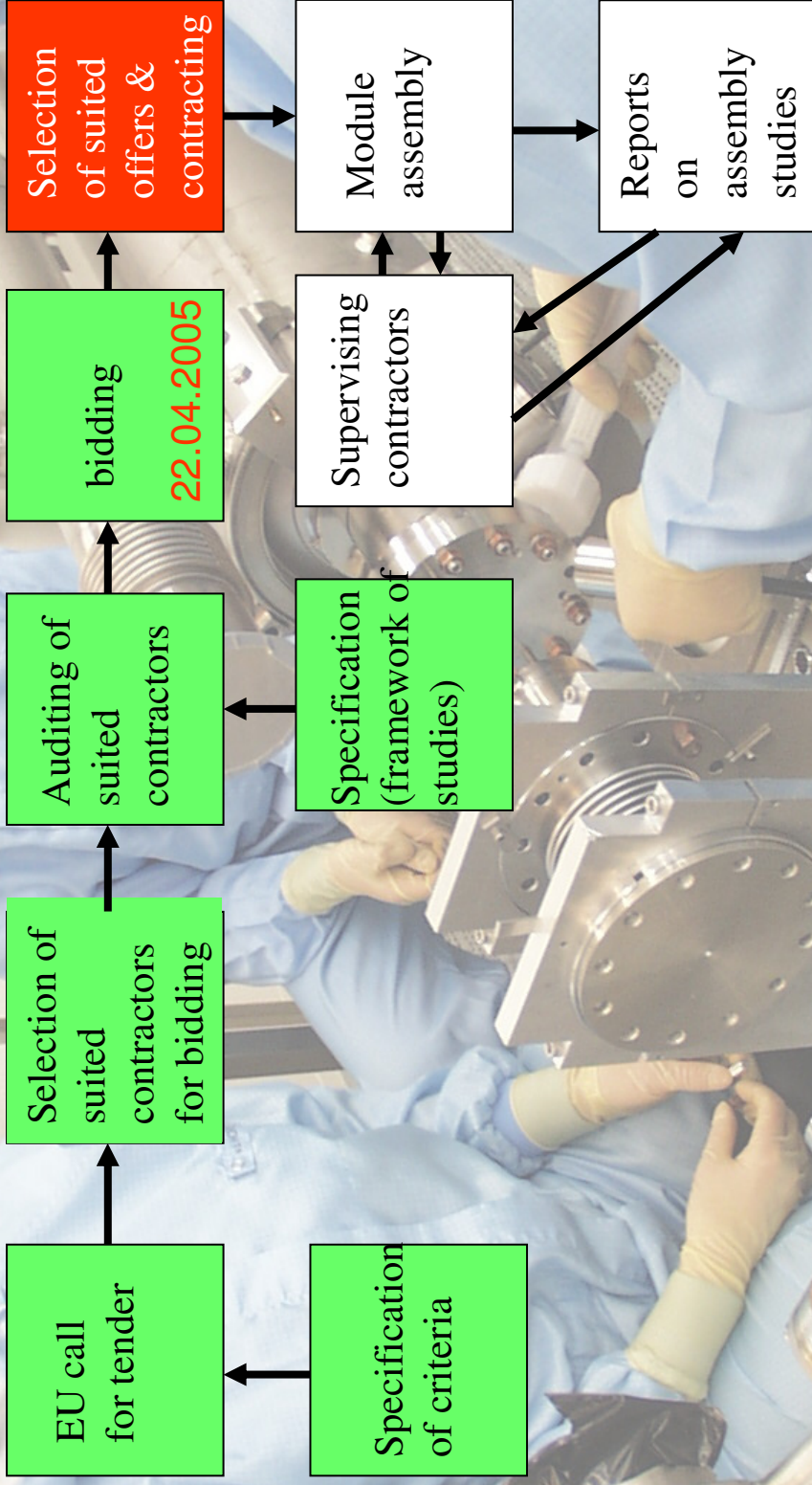
Prerequisites of the CONTRACTOR (key technologies)

- 1) Experience of **serial production** of large Particle Accelerator Components.
- 2) Experience of design and construction of **Cryogenic** Components used at liquid helium temperatures.
- 3) The **Know-How of industrial serial production** at hand.
,should have' criteria:
- 4) Experience of applied **Clean-Room Technology** (10-100 ASTM)
- 5) Experience of applied **Ultra-High-Vacuum Techniques** (oil- and particle free).
- 6) General experience in the application of extensive and particular **Low Tolerance Quality Assurance Procedures** in the required fields

Industrial XFEL-cryomodule design and assembly study

Procurement Procedures

21.01.2005



Next Cryomodule Prototypes

production No. (*)	type	required accelerating field	assembly date	comments	material
6	TTF-III	> 35 MV/m	1 / 2006	ACC6 in VUV-FEL	complete
7	TTF-II	20 -25 MV/m	12/ 2005	VUV-FEL spare	complete
8	TTF-III plus	> 28 MV/m	2006	XFEL preparations VUV-FEL spare	to be ordered
9	TTF-III plus	> 28 MV/m	2006	XFEL preparations	to be ordered
10	TTF-III plus	???? MV/m	2007	FNAL	To be ordered
11	XFEL-Prototype	> 28 MV/m	2007	XFEL-prototype	to be ordered

(*) the production number does not necessarily define the order of assembly

Deliverables

Four reports on the specified issues:

- 1) Report on assembly of module 6
- 2) Report on assembly of module 8
- 3) Report on BESSY-FEL cryomodule special issues (cw-operation)
- 4) Final report

The reports shall cover also special issues, as specified

These reports will be published as part of the **EUROFEL-Study**

Cost issues shall be covered in separated attachments to the reports. **These attachments are confidential and will not be published.**