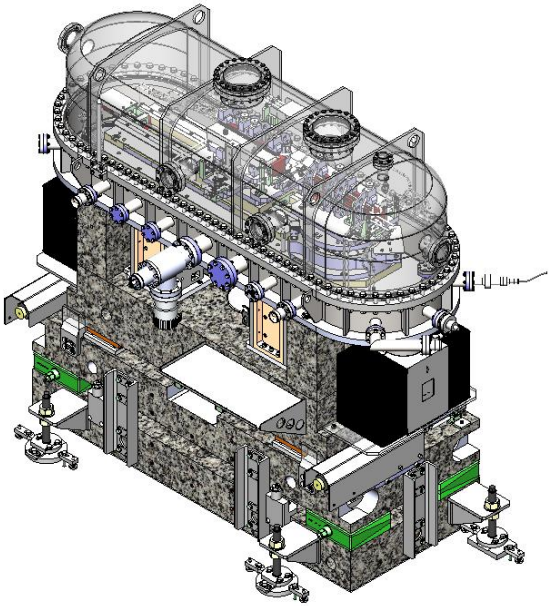

ESRF
The European Synchrotron

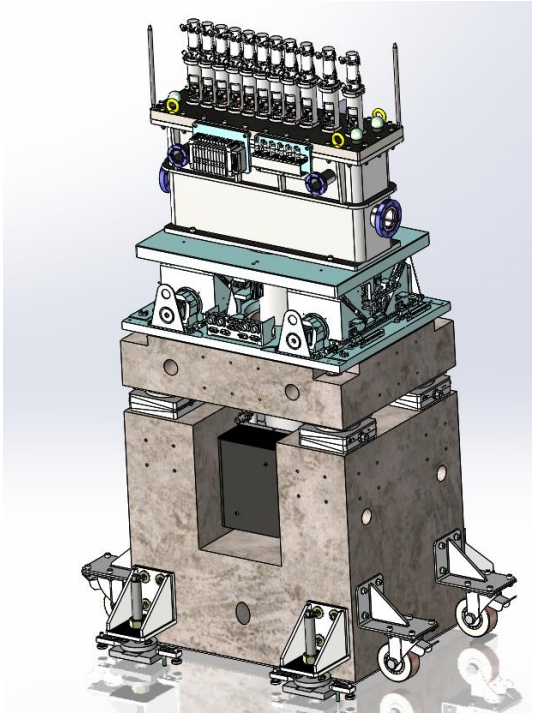
FORTHCOMING PROCUREMENTS FOR THE ESRF FROM NOW TO END 2021

- The ESRF is strongly interested in enlarging its network of industrial partners from its member countries
- In the mechanical field, the following capabilities are required for the ESRF instrumentation:
  - Manufacture of Ultra High Vacuum chambers: Stainless steel welding, sheet metal working, precision machining, cleanliness, vacuum testing
  - Vacuum brazing
  - High precision machining of parts of different sizes (1 to 1500 mm typically). Mainly stainless steel and aluminum alloy
  - Assembly of precision motion systems
  - Welded steel frames
  - Design, manufacture and tests of precision motion systems
  - Design, manufacture and tests of complete beamline specific instruments (slits, monochromators, etc…)

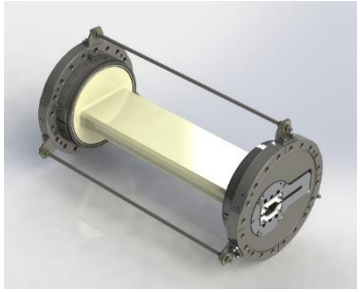
PICTURES



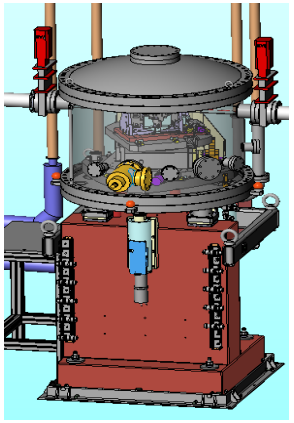
Double Multilayer monochromator



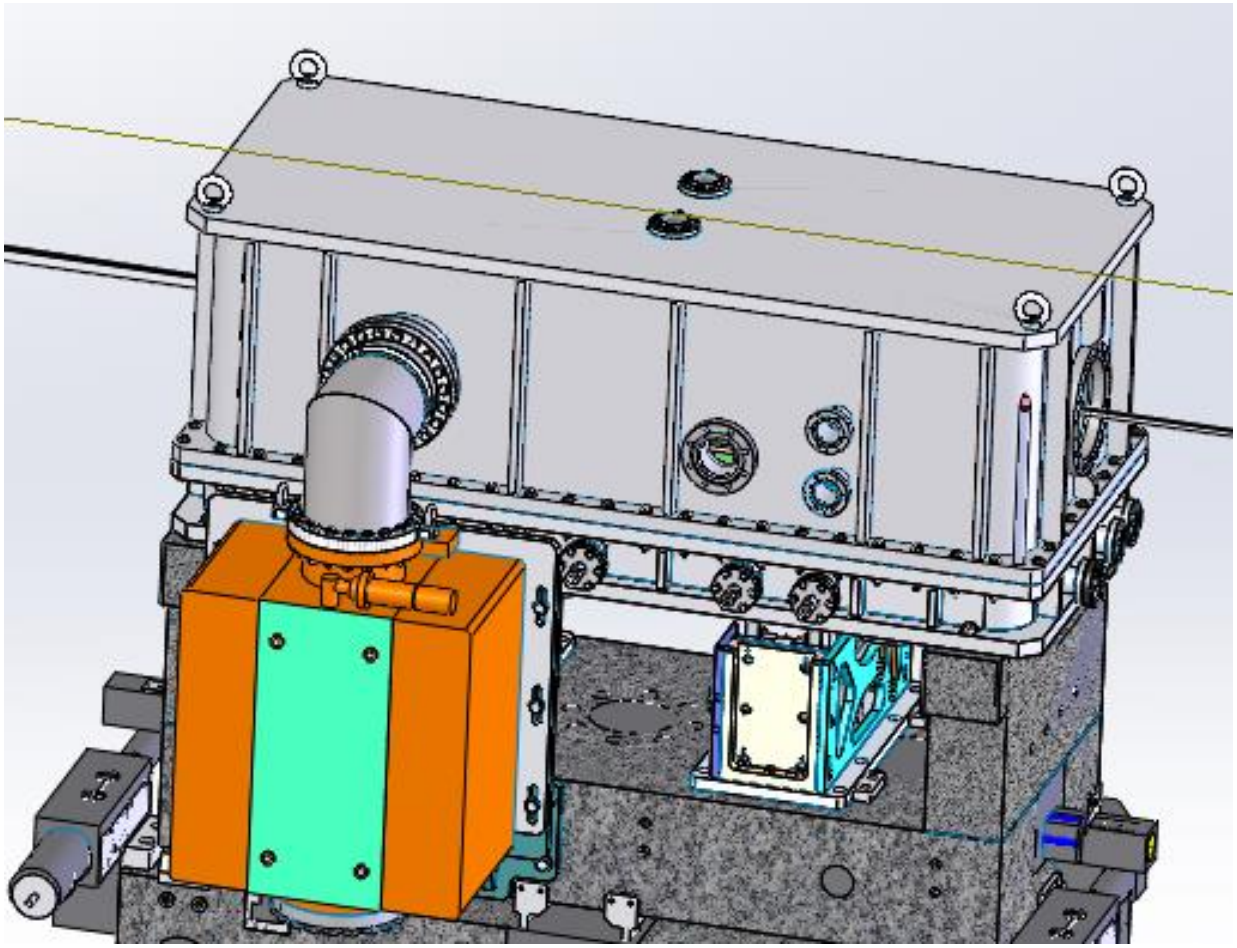
Transfocator



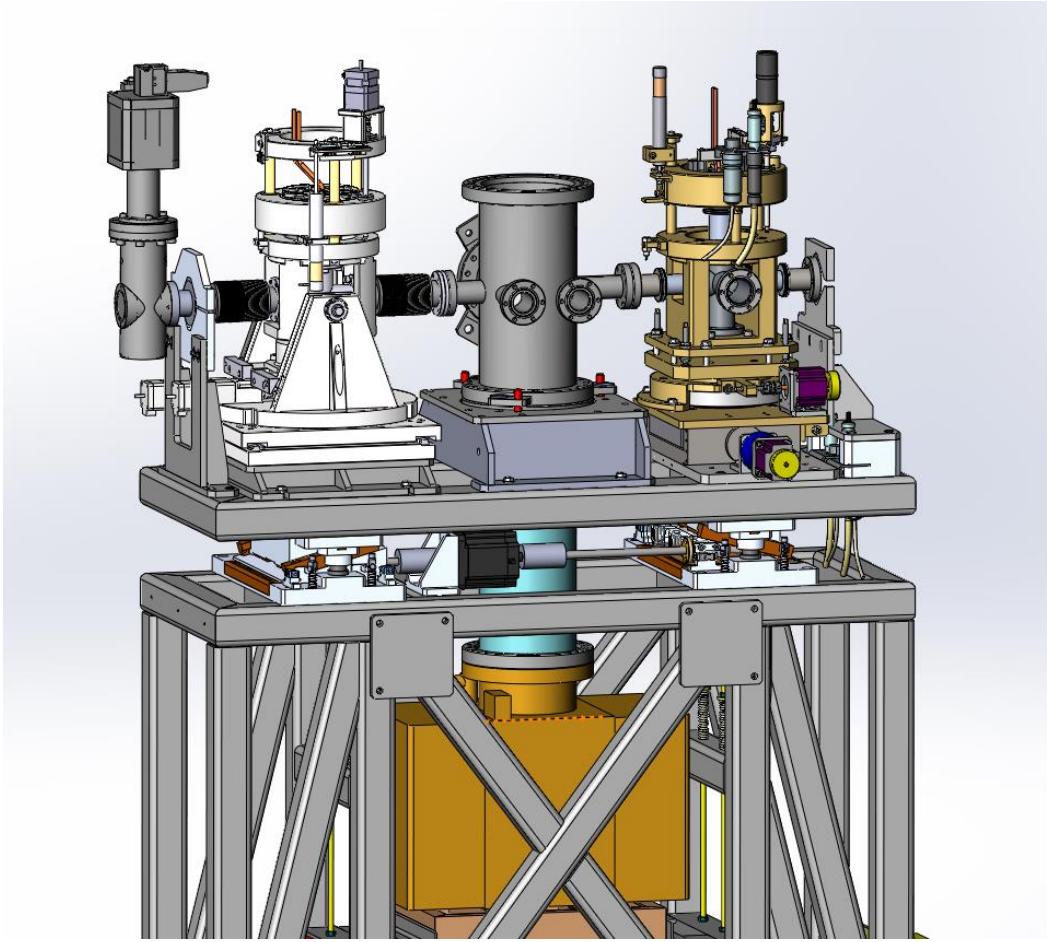
Ceramic chamber

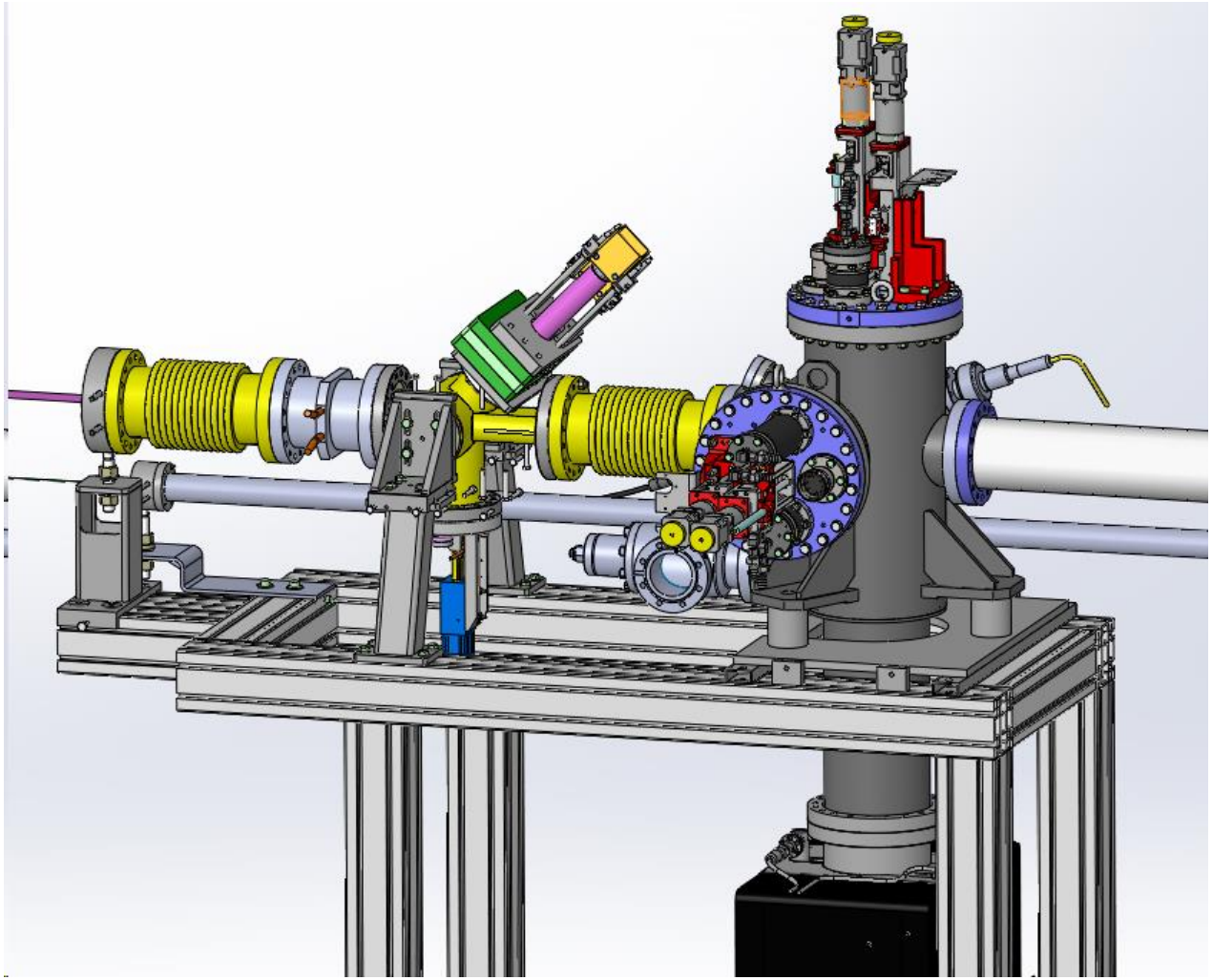


Beamline specific instrumentation: Vertical axis monochromator

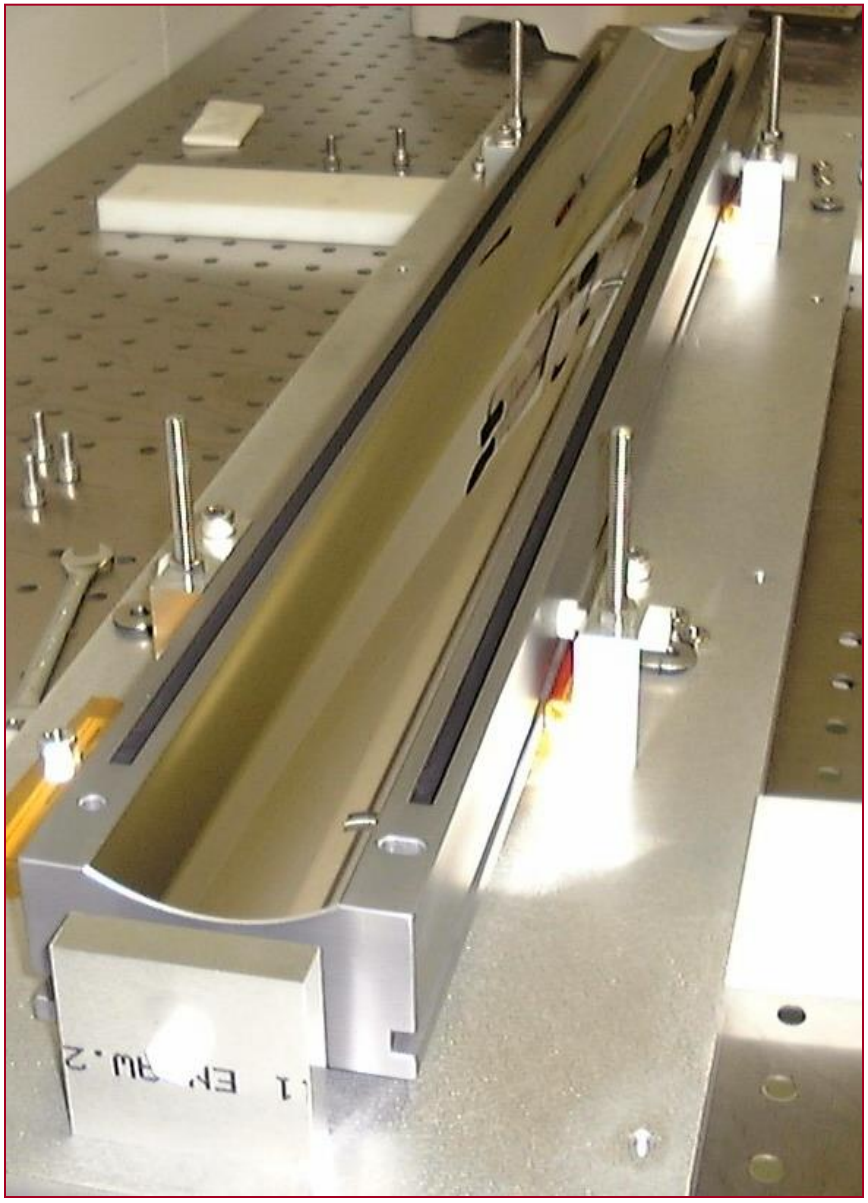


Beryllium lenses





TOROIDAL MIRROR (ID09 ESRF)

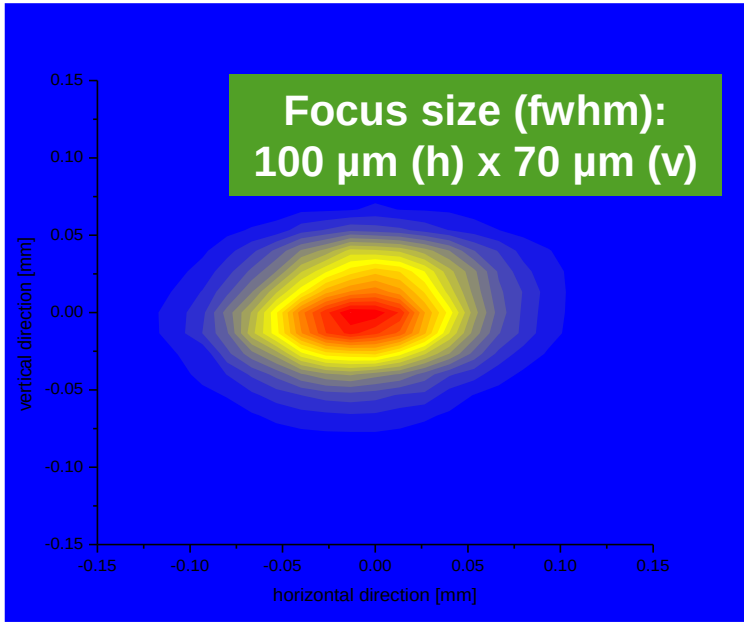


Material-coating: Silicon-Pt
Roughness ≤ 2Å rms
Radii of curvature:

- Sagittal: 71.60 mm
- Meridional: 25 km

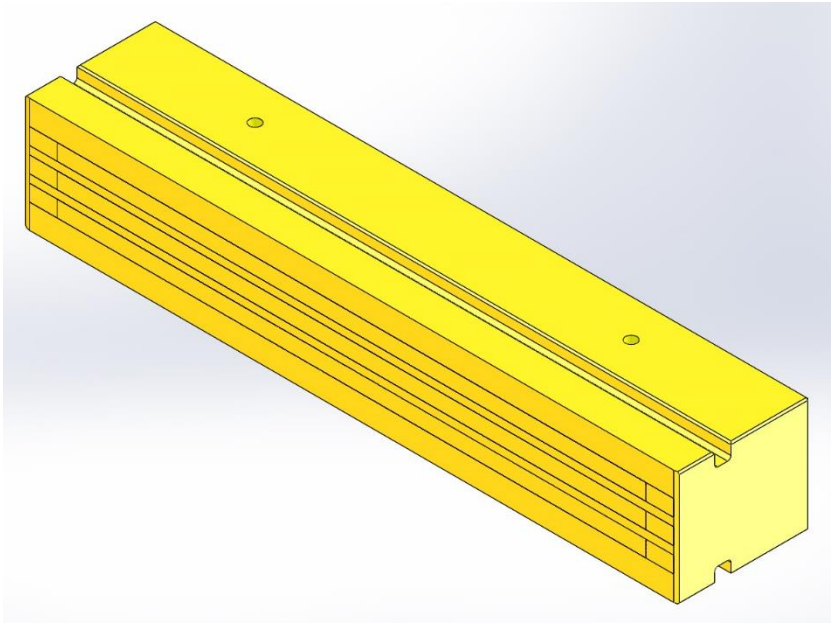
Slope error (RMS)

- 0.7 µrad over 450 mm
- 1.0 µrad over 900 mm



X-RAY MIRROR SPECIFICATION

		M1
substrate		
surface geometry		**flat**
material		Si <100>
dimensions (L x W x H) / mm		400 x 70 x 80 +/- 0.5
		rectangular
optical surface		
clear aperture (L x W) / mm		360 x 40
type of footprint		rectangular
geometry parameters		
minimum meridional radius		> 25 km
minimum sagittal radius		> 100 m
surface quality		
meridional slope error		≤ 0.5 µrad (rms)
	Option 1:	≤ 0.3 µrad (rms)
meridional shape error	(75% of 20 20x2mm^2 areas,	≤ 4 nm (pv)
spatial sa	in the middle 100mm)	1 - 360 mm
sagittal slope error		≤ 10.0 µrad (rms)
spatial sampling		1 - 40 mm
microroughness		
MSFR (mid spatial frequency roughness)	(ZYGO 2,5x+50x)	≤ 0.3 nm (rms)
spatial sampling		20 µm - 1 mm
coating		
material	**3 stripes:**	Pt + bare + Pd
thickness / nm		50nm +/- 10nm
binding layer		5nm Cr



Optical parameters	Type of measurement	Device	Resolution	spatial sampling area
surface quality	Interferometry	Carl Zeiss D100 direct measuring Interferometer	< 1 nm	1 mm < λ < 1000 mm
physical dimensions	Tactile coordinate measurement	Carl Zeiss precision coordinate measuring device UPMC 850 S-ACC Carat	< 300 nm	
MSFR	Micro-interferometry	ZYGO NewView 700 (magnification 50x)	< 0.1 nm	0.58 µm < λ < 290 µm
MSFR	Micro-interferometry	ZYGO NewView 700 (magnification 2,5x)	< 0.1 nm	11.7 µm < λ < 5.84 mm
HSFR	Atomic force microscopy	Nanosurf Nanite S200 AFM	< 0.1 nm	16 nm < λ < 2 µm

- Mirrors used in grazing incidence (θ):
- Linear profile measurements often sufficient
- Sagittal direction tolerances relaxed by factor 1/sin(θ)

(A) MOTION CONTROL – ESRF STANDARD SOLUTION

. **In-house development**
. Stepper motors

. Unique interface with the ESRF control system

. Cost effective solution

. 8 axes per crate
. 1 controller board
. System up to 128 axes

Icepap

The standard solution for motion control at the ESRF

Also used for other types of motors with adequate interfaces

. More than 6000 axes installed at the ESRF

. Around 9 000 in total

. Collaboration with ALBA & MAX IV

(B) BL CONTROL - IN HOUSE DEVELOPPED INSTRUMENTATION

. **Stand-alone**
. Ethernet control

. Highly Standardized:
Hardware, Firmware, Software

. Reduce development lead time

. A range of instruments for **Beamline control**
➔ Counting, synchronization, encoder processing, …
➔ FMC compatible

. And also **Accelerator** specific applications

DAnCE

Data Acquisition & Control Electronics platform

Standard Hardware modules and bricks

. Standard Digital board (FPGA + ARM)
. Standard or customized carrier board
. Embedded in 19”case

Qseven ARM® processor

XILINX ALL PROGRAMMABLE

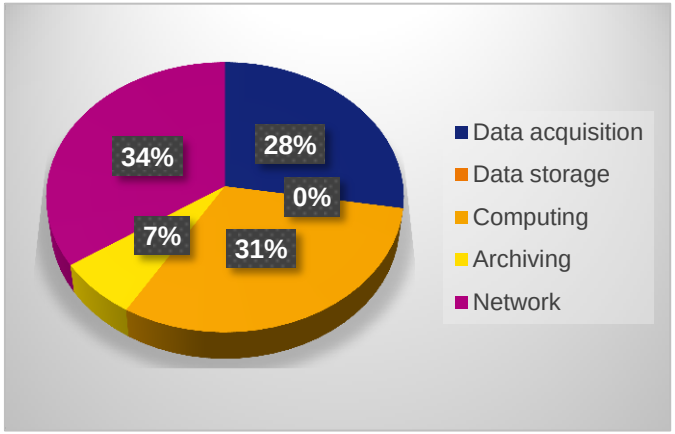
FPGA and tool chain.

CAD ALTIUM DESIGNER

ESRF IT INFRASTRUCTURE

Estimated Investment for 2021

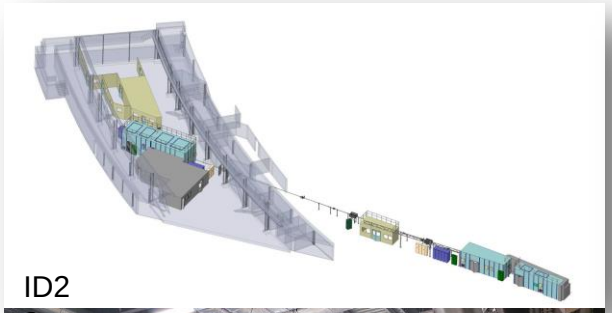
- Data acquisition : 800 k€
- Data storage : 1200 k€
- Computing : 900 k€
- Archiving : 200 k€
- Network : 1000 k€



Long Term Planning (2025)

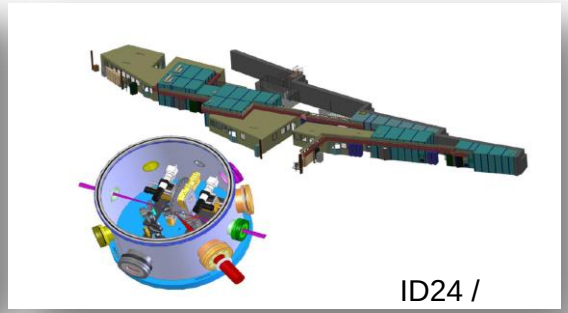
- Data acquisition : increase capacity for detector throughput up to 10 GB/sec
- Data storage : increase capacity up to 30 PB
- Computing : increase the computing capacity by factor of 3 to 10 including IA specific solutions
- Archiving : increase to 300 PB, possible replacement of the libraries tape systems
- Network : adaptation to the infrastructure, regular upgrade and replacement

HUTCH

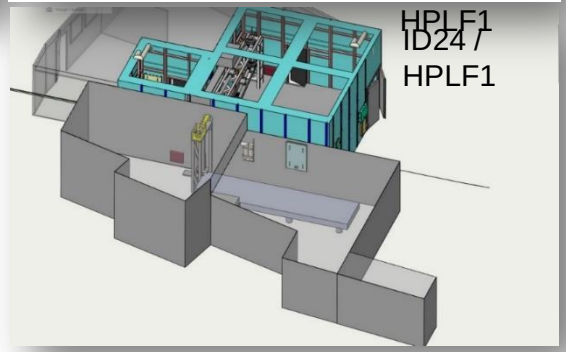


ID29

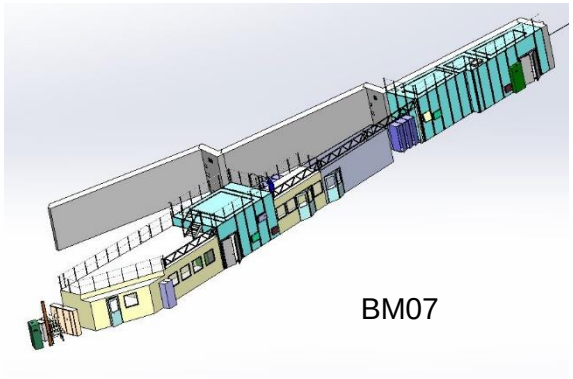
ID29



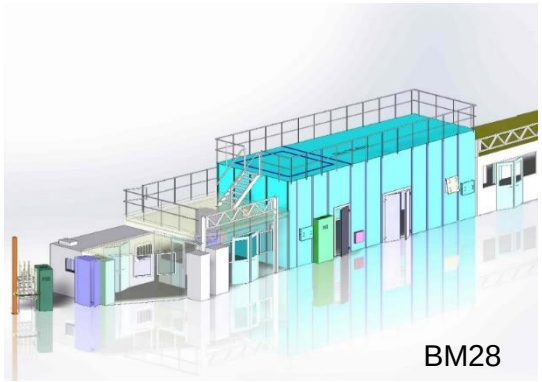
ID24 / HPLF1



ID24 / HPLF1



BM07

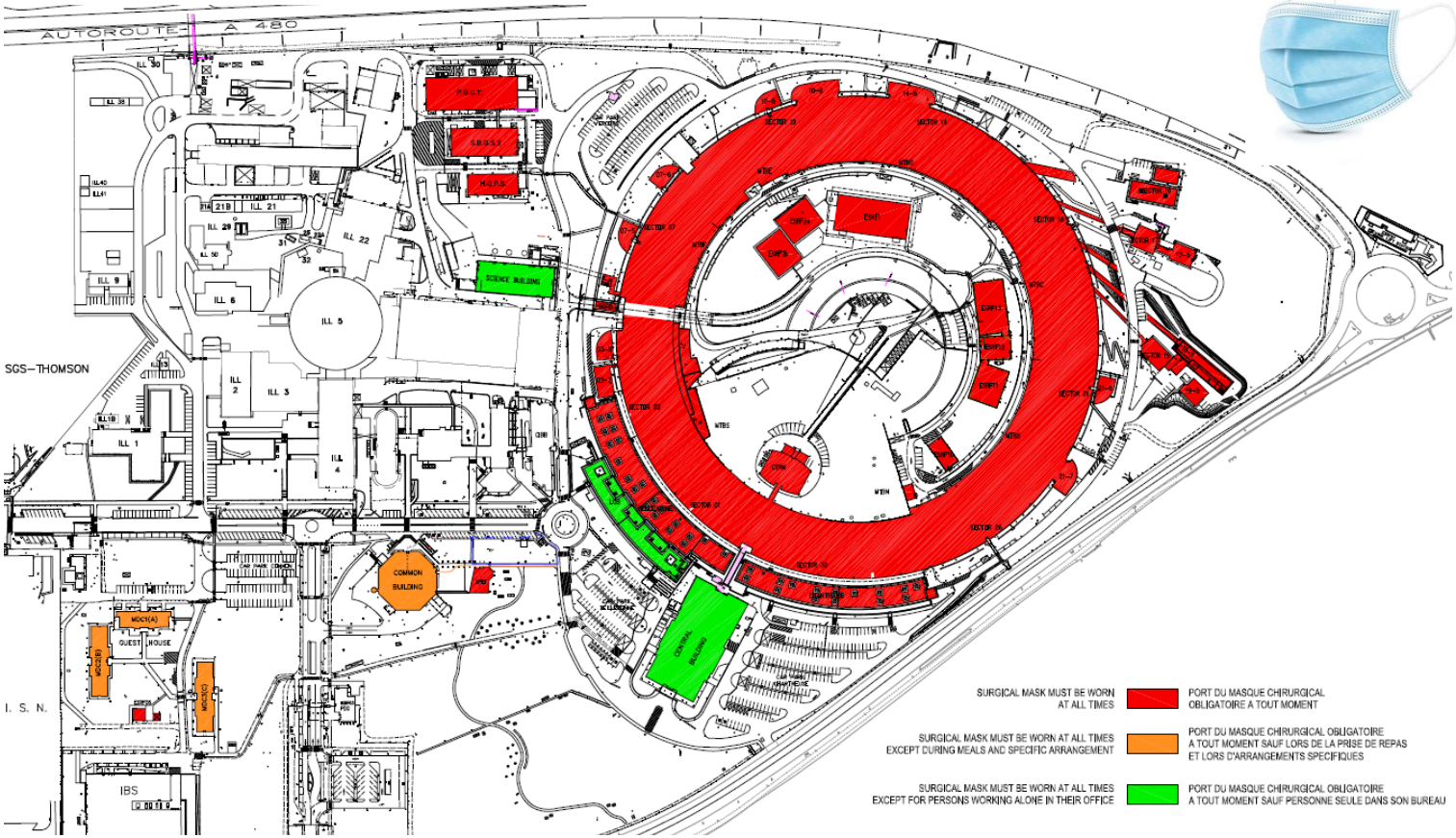


BM28

PIPING

COVID-19 HYGIENIC MEASURES

- People must wear a surgical mask or a FFP2 mask without exhalation valve on ESRF site (outside and inside buildings).



- For specific interventions without a minimum of 2 meters between people, facial screen and FFP2 mask without exhalation valve can be imposed.

Thank you for your attention