CE Marking Training Session

ESS Lund, 29 – 30 November 2017

ESRF Experience

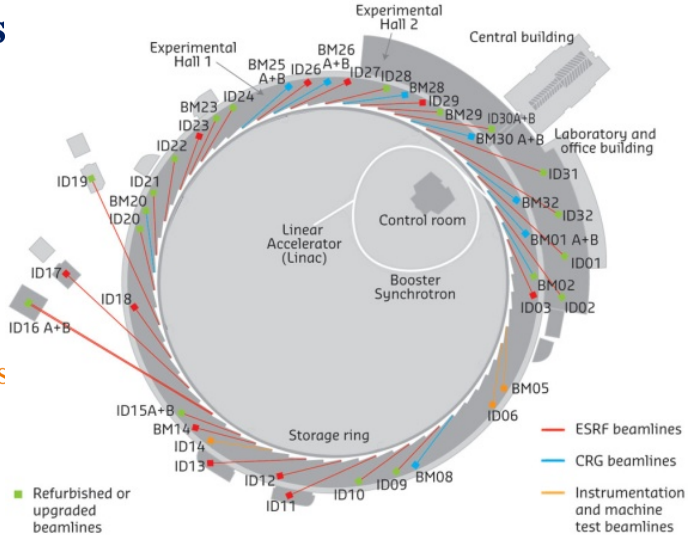
Paul Berkvens

European Synchrotron Radiation Facility

3rd generation high energy synchrotron radiation facility

A research facility unique worldwide

- **6,500 scientific visitors** every year including **4,000 users**
- **2,000 proposals** per year: **900 accepted**, 1,550 experimental sessions
- **30%** of the research involves **indus developments**



6 GeV storage ring
31 public beamlines
12 CRG beamlines

Scientific excellence recognised worldwide

- N ○ 1 in scientific output
- N ○ 2 in number of users
- N ○ 1 in reliability & quality
- 4 Nobel prize-winners among the ESRF users
- > 30,000 reference articles since 1994
- ~ 30 articles in *Nature* and *Science* per year
- Nearly 2,000 publications per year: ~ 5 every day

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A model of international cooperation: 22 Partner nations

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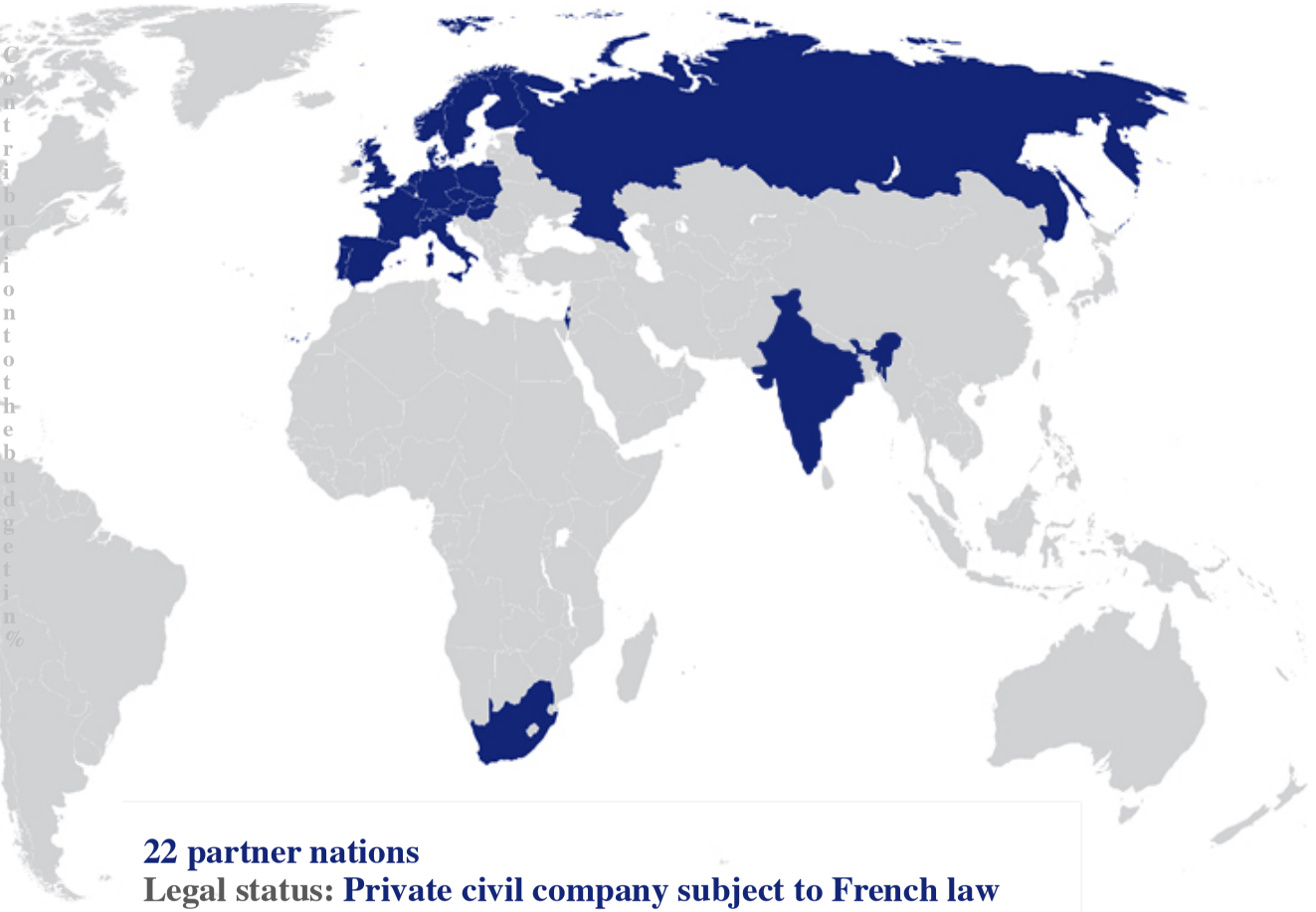
22 PARTNER COUNTRIES

13 Member states:

France	27.5 %
Germany	24.0 %
Italy	13.2 %
United Kingdom	10.5 %
Russia	6.0 %
Benesync (Belgium, The Netherlands)	5.8 %
Nordsync (Denmark, Finland, Norway, Sweden)	5.0 %
Spain	4.0 %
Switzerland	4.0 %

9 Scientific Associate countries:

Israel	1.5 %
Austria	1.3 %
Centralsync (Czech Republic, Hungary, Slovakia)	1.05%
Poland	1.0 %
Portugal	1.0 %
India	0.66 %
South Africa	0.3 %



22 partner nations
Legal status: **Private civil company subject to French law**
Annual budget: **100 million euros**
Staff: **630 of 40 different nationalities**

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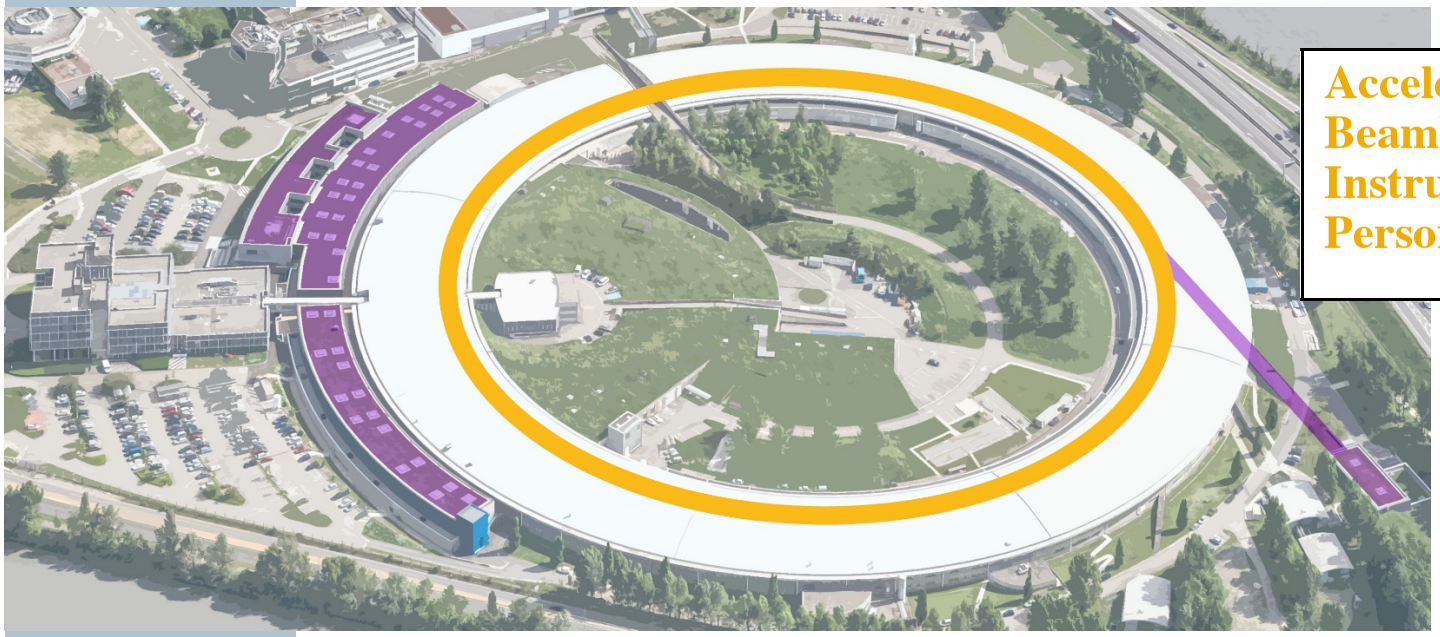
An ambitious and innovative project: The Upgrade Programme

2009 2015 Upgrade PHASE I – 180 M€
In time and within budget

- Construction of 19 new-generation experimental stations to explore the nanoworld
- Creation of a new ultra-stable experimental hall
- Improvement and refurbishment of most of the cutting-edge scientific equipment and accelerator infrastructure

2015 2022 ESRF-EBS – 150 M€
Launched in June 2015

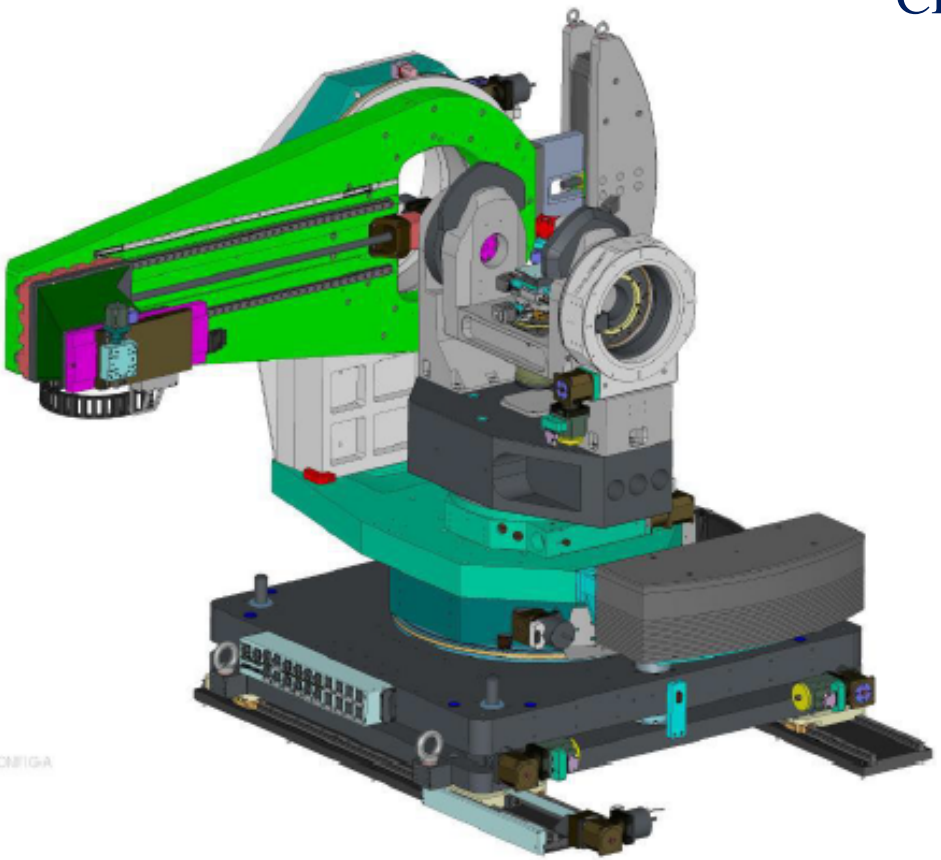
- Construction of a new storage ring, inside the existing structure, with performance increased by a factor of 100
- Construction of new state-of-the-art beamlines
- Ambitious instrumentation programme (optics, high-performance detectors)
- Intensified big data strategy



Accelerator – 100M€
Beamlines – 20M€
Instrumentation and IT – 20M€
Personnel – 10M€

CE Certification at the ESRF

Until a few years ago: no CE certification of special (beamline) equipment at ESRF, despite the fact that many beamline equipment use robots and are perfect examples of **machines**.



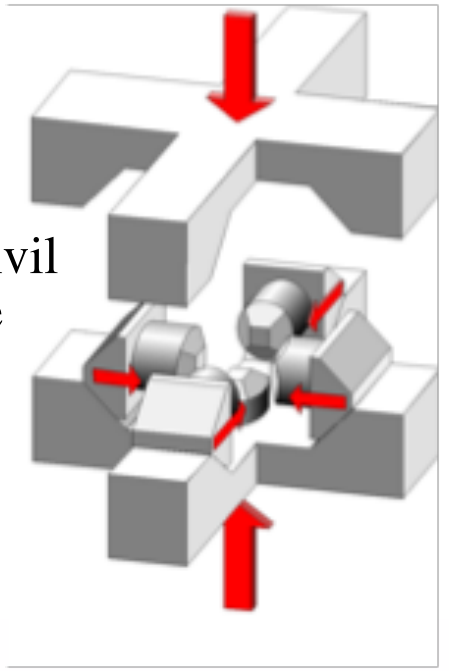
CE certification discussed

- at ITSF meetings
- at EIROforum meetings

CE Certification at the ESRF

2008: purchase of an important new beamline equipment: large volume press.
ESRF specified that equipment had to be CE certified by supplier.
The equipment came indeed with its CE certification.
After installation on site, ESRF asked an independent (French) notified body for an audit.

Principle of multi-anvil pressure device



CE Certification at the ESRF

European Harmonised Standards:

Safety of machinery. Basic concepts, general principles for design. Basic terminology, methodology.
Safety of machinery. Basic concepts, general principles for design. Technical principles and specification.
Safety of machinery. Safety distances to prevent danger zones being reached by the upper limbs.
Safety for machinery. Emergency stop equipment, functional aspects. Principal of design.
Hydraulic presses. Safety.
Safety of machinery. Safety requirements for fluid power systems and their components. Hydraulics.
Safety of machinery. Hand / arm speed. Approach speed of parts of the body for the positioning of safety devices.
Safety of machinery. Electrical equipment of machines. Specification for general requirements.

Vorschriften der Bundesgenossenschaften:

General instructions.
Electrical systems and equipment.
Power-operated equipment.

Machinery Directive

DECLARATION OF CONFORMITY

We **Max Voggenreiter GmbH**
Mechanical Engineering
Industriestraße 9-10

D 95336 Mainleus

declare under our own responsibility that below mentioned product

Label: 20MN Large Volume Press
Serial-Number: 1.0179
Year of Construction: 2008

on which this declaration refers, is where applicable in accordance with the harmonised European Standards:

EN 292-1:1991
EN 292-2:1991+A1:1995
EN 294:1992
EN 418:1992
EN 693:2001
EN 982:1996
EN 999:1998
EN 60204-1:1997

national Standards and/or technical specifications:

VBG1, VBG4, VBG5

according to the guidelines of the:

Machinery Directive 89/392/EEC, 91/368/EEC and 98/37/EEC

Mainleus, 20.06.2007

Thomas Voggenreiter
Managing Director

CE Certification at the ESRF

CE declaration of conformity: reference number is missing and declaration is not signed.

Interesting remark: concerns electrical diagrams which show safety contacts for doors, to be interlocked in safety system (the manufacturer convinced us during the factory tests that these panels were not necessary).

Covers of pit under press can be removed without using a tool.

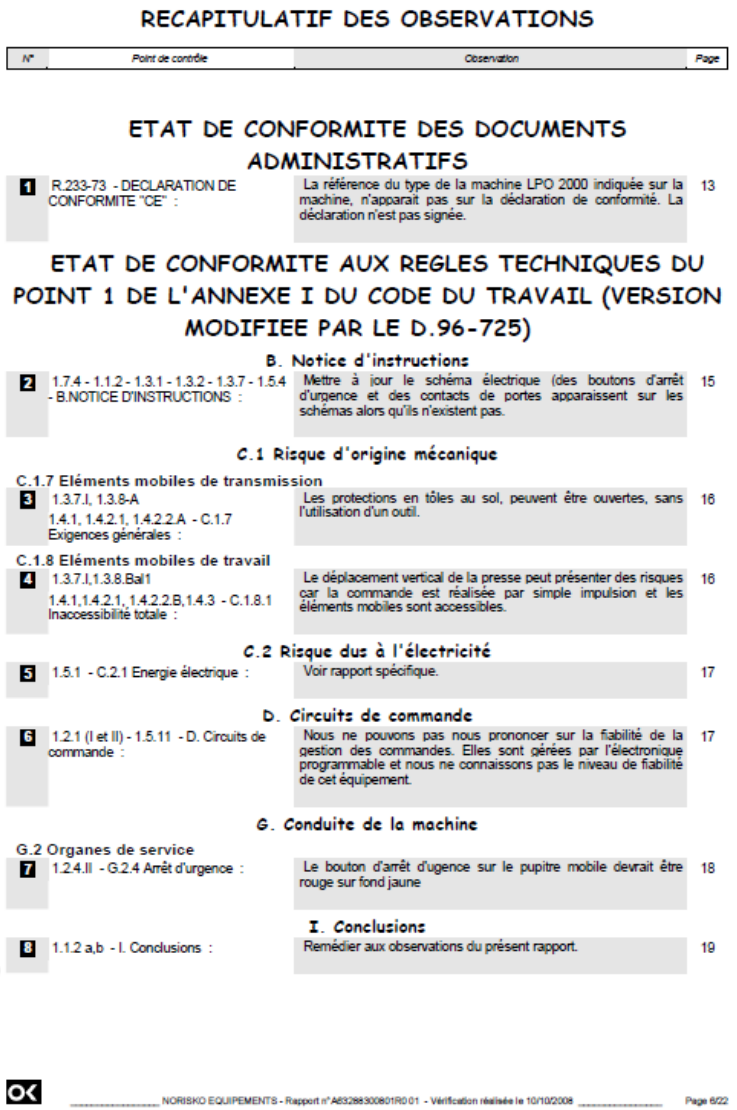
Comment concerning accessibility during vertical movement of press (not relevant).

Electrical safety: no comments.

Cannot comment on the reliability of the controller (which is standard CE marked Siemens equipment).

Comment concerning the colour of the emergency. button on the remote control.

OK once the points above are taken into account.

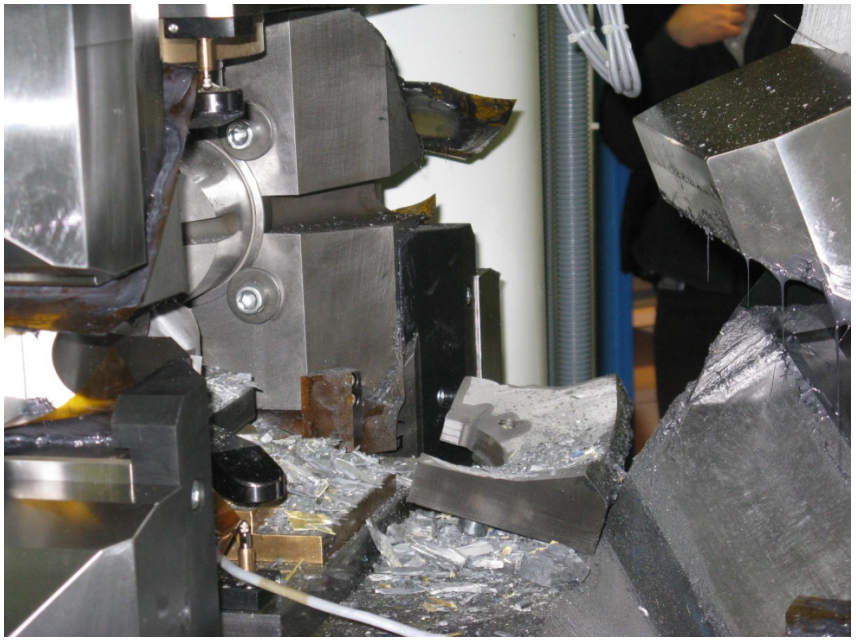


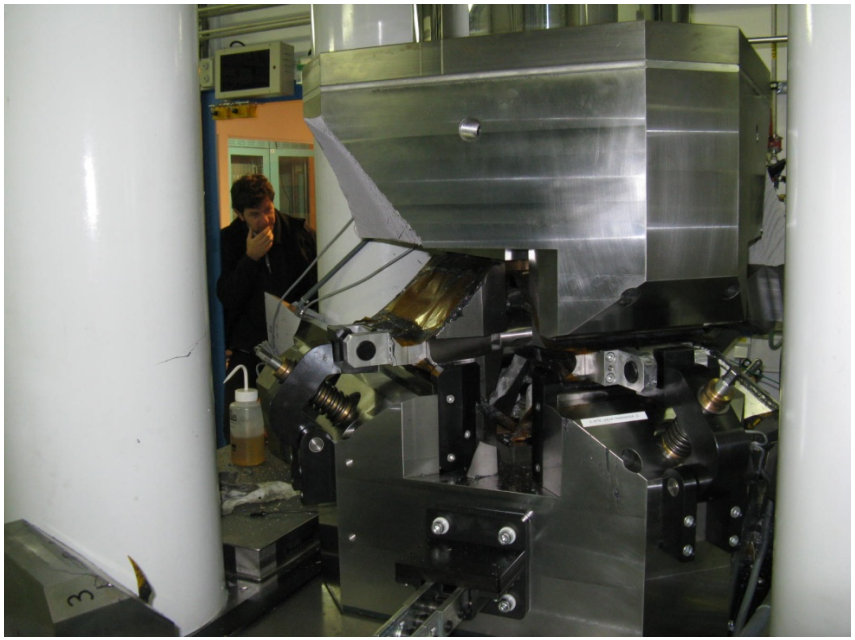
RECAPITULATIF DES OBSERVATIONS

N°	Point de contrôle	Observation	Page
	ETAT DE CONFORMITE DES DOCUMENTS ADMINISTRATIFS		
1	R.233-73 - DECLARATION DE CONFORMITE "CE" :	La référence du type de la machine LPO 2000 indiquée sur la machine, n'apparait pas sur la déclaration de conformité. La déclaration n'est pas signée.	13
	ETAT DE CONFORMITE AUX REGLES TECHNIQUES DU POINT 1 DE L'ANNEXE I DU CODE DU TRAVAIL (VERSION MODIFIEE PAR LE D.96-725)		
	B. Notice d'instructions		
2	1.7.4 - 1.1.2 - 1.3.1 - 1.3.2 - 1.3.7 - 1.5.4 - B.NOTICE D'INSTRUCTIONS :	Mettre à jour le schéma électrique (des boutons d'arrêt d'urgence et des contacts de portes apparaissent sur les schémas alors qu'ils n'existent pas.	15
	C.1 Risque d'origine mécanique		
	C.1.7 Eléments mobiles de transmission		
3	1.3.7.I, 1.3.8-A 1.4.1, 1.4.2.1, 1.4.2.2.A - C.1.7 Exigences générales :	Les protections en tôles au sol, peuvent être ouvertes, sans l'utilisation d'un outil.	16
	C.1.8 Eléments mobiles de travail		
4	1.3.7.I,1.3.8.Bal1 1.4.1,1.4.2.1, 1.4.2.2.B,1.4.3 - C.1.8.1 Inaccessibilité totale :	Le déplacement vertical de la presse peut présenter des risques car la commande est réalisée par simple impulsion et les éléments mobiles sont accessibles.	16
	C.2 Risque dus à l'électricité		
5	1.5.1 - C.2.1 Energie électrique :	Voir rapport spécifique.	17
	D. Circuits de commande		
6	1.2.1 (I et II) - 1.5.11 - D. Circuits de commande :	Nous ne pouvons pas nous prononcer sur la fiabilité de la gestion des commandes. Elles sont gérées par l'électronique programmable et nous ne connaissons pas le niveau de fiabilité de cet équipement.	17
	G. Conduite de la machine		
	G.2 Organes de service		
7	1.2.4.II - G.2.4 Arrêt d'urgence :	Le bouton d'arrêt d'ugence sur le pupitre mobile devrait être rouge sur fond jaune	18
	I. Conclusions		
8	1.1.2 a,b - I. Conclusions :	Remédier aux observations du présent rapport.	19

OK

NORISKO EQUIPEMENTS - Rapport n° A6328830080 1R0 01 - Vérification réalisée le 10/10/2008 Page 6/22





MARKer

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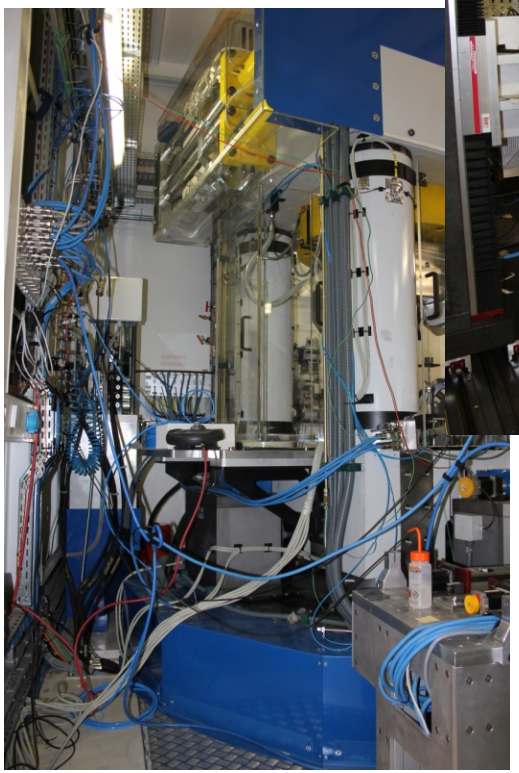
High Volume Press, After repair works

Improved outer anvil block geometry



Interlocked protective covers

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MARKer

CE Certification at the ESRF

2009: an ESRF staff member broke a toe while he was opening an electronic cubicle and the door of the cubicle fell on his foot official enquiry from the Works Inspection: one of the documents to provide was the “certification of the machine”.

- Process of CE certification started slowly again.
- CE self certification, with help of notified body to assess compliance (2013):
  - Sample changers on MX beamlines;
  - XY polishing machine in optics laboratory.

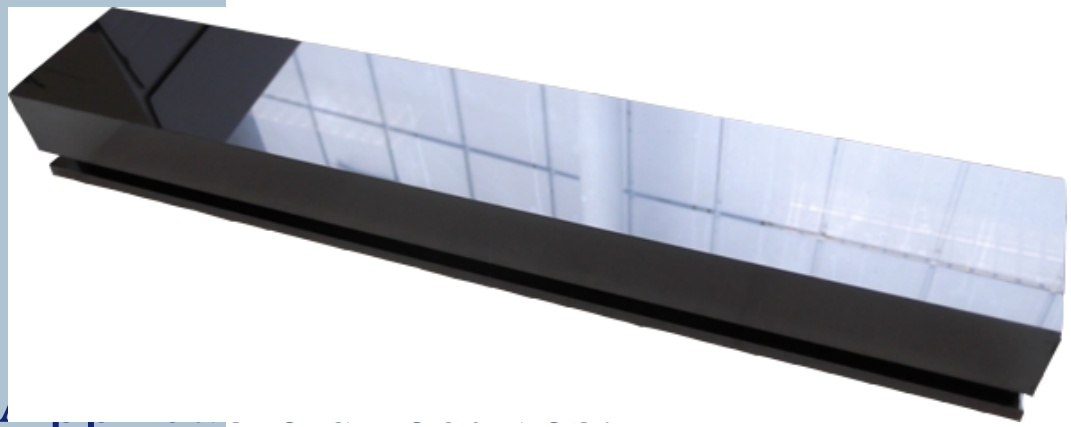
Sample changer

Joint EMBL / ESRF development to standardise sample environment on MX beamlines at ESRF.

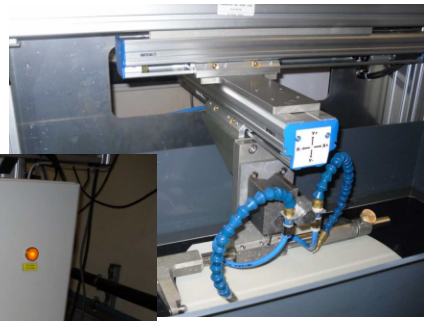
XY polishing machine

Description:

- Abrasive polishing of silicon or germanium materials (300 mm to 400 mm length crystal)



- Machinery directive
- Low voltage directive



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XY polishing machine

Technical construction file:

- Risk assessment

DEKRA industrial SAS
Activité EQT Grenoble
Parc Galaxie Sud, 4-6 rue des méridiens
38130 ECHIROLLES

ESRF

11 ANALYSES DES RISQUES

ANALYSE POINT DE VUE PROCESS ou MODE OPERATOIRE

	Risques										
N°	DESCRIPTION DU RISQUE	OPERATION	P	G	C	MESURE DE PREVENTION MISE EN PLACE	P	G	C	Documents
						Moyens				fiabilité
1	Risque de heurt avec un élément mobile de travail ou transmission	Automatique	3	3	9	Installation d'un capot mobile	2	1	2	PL=c
		Manuel	3	3	9	Pupitre manuel avec bouton à action maintenue et d'assentiment	2	1	2	PL=c

Risk of impact with moving elements

- No mention about hazardous substances, which is one of the main hazards of the equipment.
- **We decided to manage the CE self certification in an independent manner inhouse.**

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CE Certification at the ESRF

2014: CE certification process formalised.

CE certification must be taken into account from design phase (TDR).

Creation of a **CE certification expert panel**.
Members of the panel:

- Trevor Mairs , Mechanical Engineering Unit
- Jeffery Wade, Mechanical Engineering Unit
- Joachim Leonardon, Vacuum Group
- Jean Marc Gay, Electrical Engineering Unit
- Ricardo Hino, Electronics Unit
- Nicolas Janvier, Electronics Unit
- Eric Dettona, CRG Office
- Stéphanie Ricot, Safety Group
- Véronique Landuré, Safety Group
- Paul Berkvens, Safety Group

CE Certification at the ESRF

1. Identify the applicable Directive(s).
2. Identify the applicable requirements of the Directive(s).
3. Identify an appropriate route to conformity.

   Self certification or need for notified body…
4. Assessment of the equipment's conformity.

   • **Risk assessment**

   ISO 14121-1 & 2 + ISO 12100: Risk Assessment – Principles & Practical guidance and examples of methods.
5. Compile the technical documentation.

   Technical description, drawings, circuit diagrams and photos, test reports and/or assessments, user instructions…
6. Make a Declaration of conformity and affix the CE marking.

CE Certification at the ESRF

Weekly meetings, during which one or two projects are reviewed.

SAXS tube on ID02 / UPBL9a tube

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CE

DECLARATION CE DE CONFORMITÉ
EC DECLARATION OF CONFORMITY

Nous déclarons sous notre entière responsabilité que l'équipement couvert par cette déclaration est conforme aux exigences essentielles de santé et de sécurité définies par l'annexe I de la Directive Machine CE, 2006/42/CE.
We hereby declare in sole responsibility that the equipement covered by this declaration is in conformity with all the relevant essential health and safety requirements of the annex I of the EC Machinery Directive, 2006/42/EC.

Nom et adresse du constructeur / *Name and address of the manufacturer:*
ESRF - The European Synchrotron
71, avenue des Martyrs
38000 Grenoble-FRANCE
N°SIRET : 338 723 919 00019

Description de l'équipement / *Description of the equipment :*
Type / Type : SAXS tube UPBL9a
Numéro de série / Serial number : X002

Personne autorisée à compiler la documentation technique / *Person authorised to compile the relevant technical documentation:*
Narayanan Theyencheri
Group Head Soft Matter Structure
ESRF - The European Synchrotron
71, avenue des Martyrs
38000 Grenoble-France

Lieu et date / *Place and date*:
Grenoble, 12/06/2014

Personne autorisée à signer / *Person authorised to sign:*
Paul Berkvens
Head of the ESRF Safety Group
ESRF - The European Synchrotron
71, avenue des Martyrs
38000 Grenoble-France

Signature / *Signature:*

ESRF - The European Synchrotron- CS 40220 - F-38043 Grenoble Cedex 09 France
N°SIRET: 338 723 919 00019

ESRF
ESRF – The European Synchrotron
71, avenue des Martyrs
38000 Grenoble - FRANCE

CE

Equipement / Equipment: SAXS tube UPBL9a
N° série / Serial number: X002

Mise en service / Construction: 12/06/2014

Constructeur / Manufacturer: ESRF

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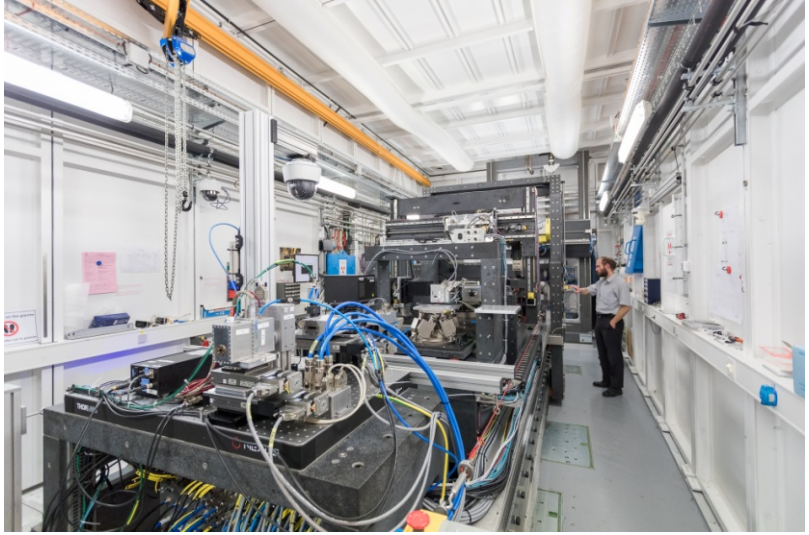
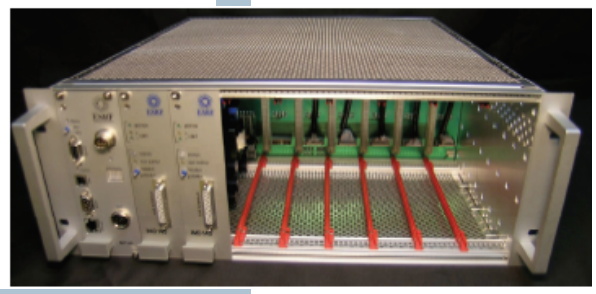
Large range of equipment

ID06 Hard X-ray microscope





ICEPAP stepper motor controller

ID31 CARNAC instrument
ID31

ID32 RIXS spectrometer

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CE Certification at the ESRF

- Overall positive experience.
- Still on a learning curve.
- Difficulties to finalise certification for a given equipment.
- Partially completed machines:
  - Explicitly ask for a copy of risk assessment (not a legal obligation).
  - Declaration of incorporation:
    - Beware of "don't put your head in the plastic bag" syndrome.
    - Clearly state that the equipment is not to be used by the "grand public", but should be used only by technically competent people.
  - Consider as much as possible individual equipment, rather than ensembles of equipment.

→ Example ESS: ion source

- **Difficulties to catch up with existing equipment.**

CE Certification at the ESRF