

# Challenges of International Hardware Exchange

- Take DESY Tuning machine as example
- Four new ( and improved) tuning machines are under construction
  - Two will be given to EU companies for XFEL cavity production
  - One each will be given to FNAL and KEK
    - MoU describes legal, financial and technical boundary conditions
- All four tuning machines should be ready early 2009

# Existing DESY Tuningmaschine

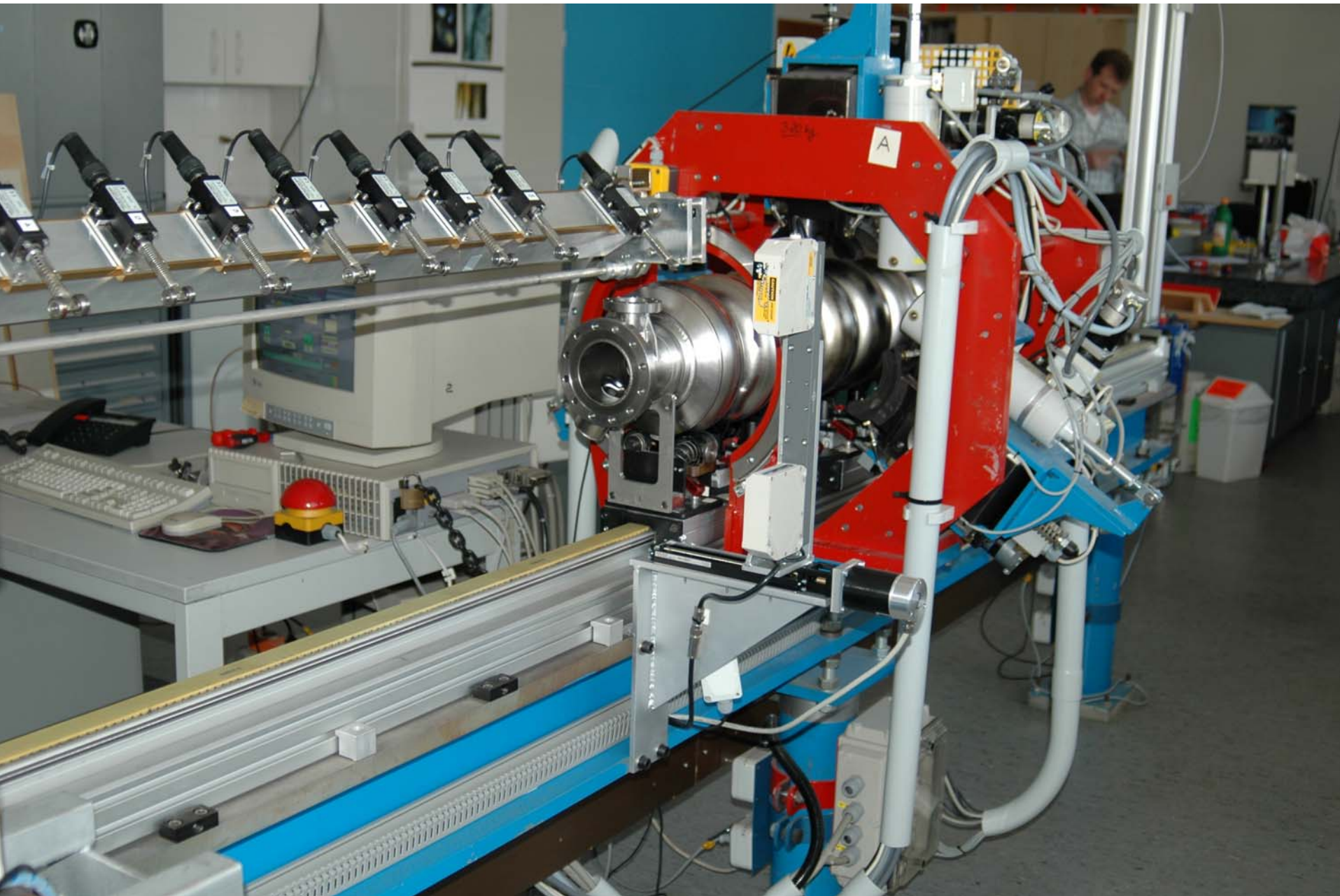


# Existing DESY Tuningmaschine



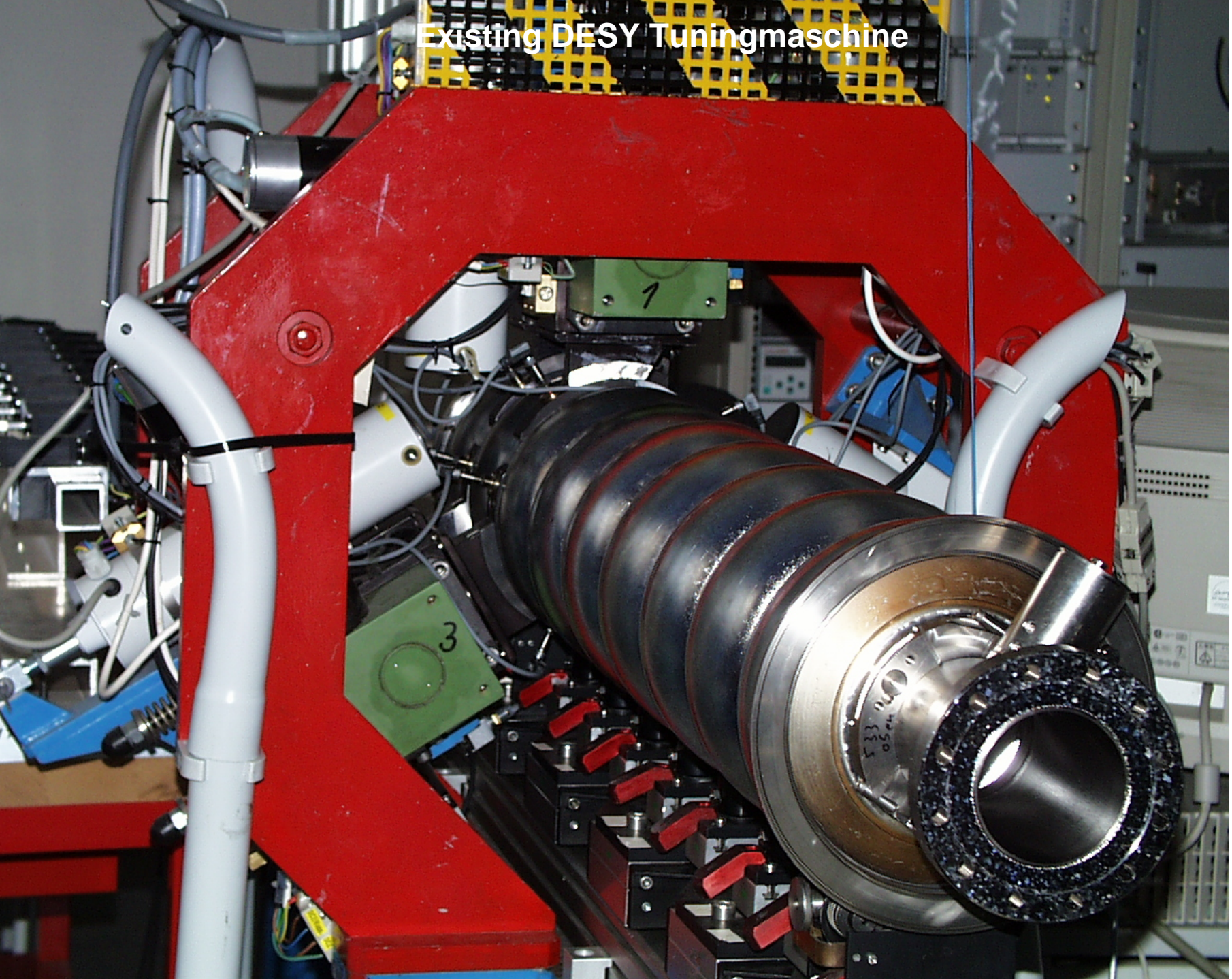


# Existing DESY Tuningmaschine





Existing DESY Tuningmaschine



# Legal boundary conditions for operating „home made“ technical equipment at DESY

- There is a lot of „home made“ technical equipment in use
  - E.g. our old tuning machine, t-mapping,...
- They are operated as *Experimental Test Equipment* by DESY staff
  - In this case we have to follow the DESY safety rules
    - Make safety analysis and implement means to avoid dangerous situations
    - Give detailed instructions to staff how to operate the equipment
    - Establish administrative safety instructions for operation

# Safety aspects of the new tuning machines

- The new machines will be designed and manufactured under the responsibility of DESY
- Two machines will be given to cavity manufacturers to be operated by company staff
- Therefore DESY has to follow the *European Rules for Machine Manufacturers*
- In the framework of the MoU FNAL is responsible for software and some of the hardware
  - **Challenge:** FNAL activities must follow these European rules



# European rules for machine manufacturers

- The uppermost code is the European directive for machine manufacturers
- The major consequence is to pass the European Certificate process (**CE certification**)
- There exists a (expensive) commercial software (**SAVE EXPERT**) which guides through the CE certification process
  - DESY uses this software
  - Language is German and English!!



# CE Certification

- The CE Certification process can be (roughly) separated into
  - Electrical safety aspects
    - i.e. follow the standard rules for electrical cabling, insulation, main power supply,...
  - Mechanical safety aspects
    - i.e. structural stiffness of the construction, mechanical protection of moving parts,...
  - General risk assessment of the machine
  - Detailed documentation of the machine as well as an operating manual

# CE Certification, cont.

- A reference for European safety directivities is given here [CE conformity](#)
  - It gives reference to the next lower level of regulations to be considered
- Save Experts offers detailed checklists to proceed step by step through all issues for CE certification
  - As example the check list relevant for electrical aspect is shown here [CE electric](#)

# Consequence for CE Certification of the tuning machine

- Major load for CE certification is related to the mechanical construction / motor drive of tuning sluice => DESY action
- Cabling to motors and sensors must be jointly coordinated between FNAL and DESY
- Software layout, safety aspects (e.g. what happens after mains breakdown?) => FNAL
- **Documentation and handbook is a major activity for FNAL and DESY**
  - **Was always neglected in the past!!**



# Concluding remarks

- The CE certification is needed for XFEL production
  - It is a major activity, but we can do it
- Are there differences in the certification or safety rules in US and Japan as compared to EU?
  - We urgently need experts to look into it
- Are there any other aspects to be considered for the operation of the „DESY“ tuning machine in FNAL and KEK?
  - E.g. translation of manuals, software of design documents??