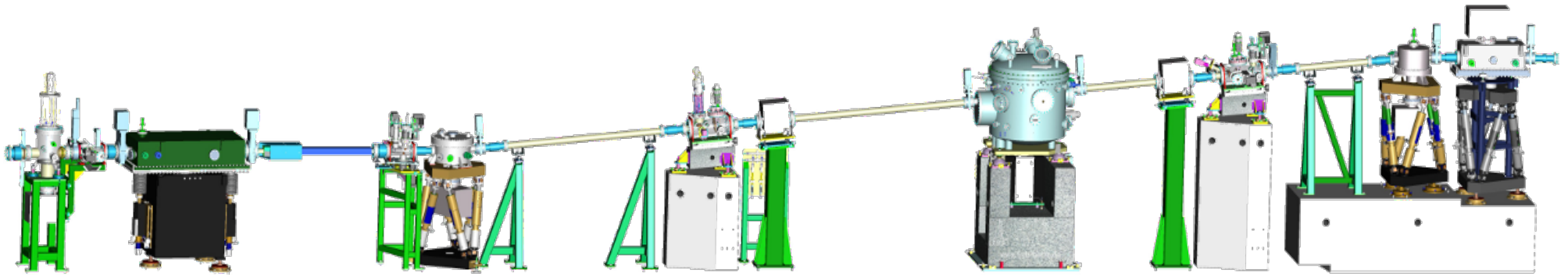
EPICS for Beamline Applications



Outline

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- Introducing FMB
- Collaboration
- Systems Architecture
- Motion Control
- PLC Integration
- Operator Interface
- Conclusions

Introducing ...

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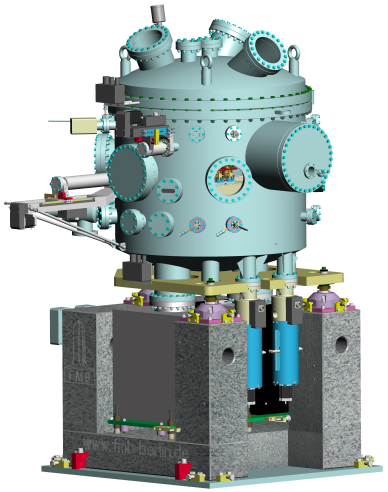
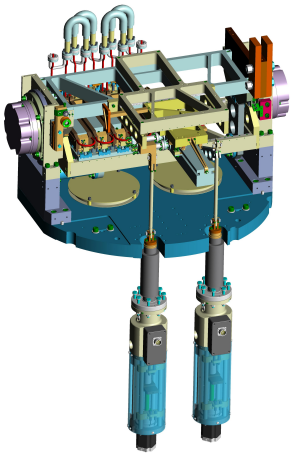
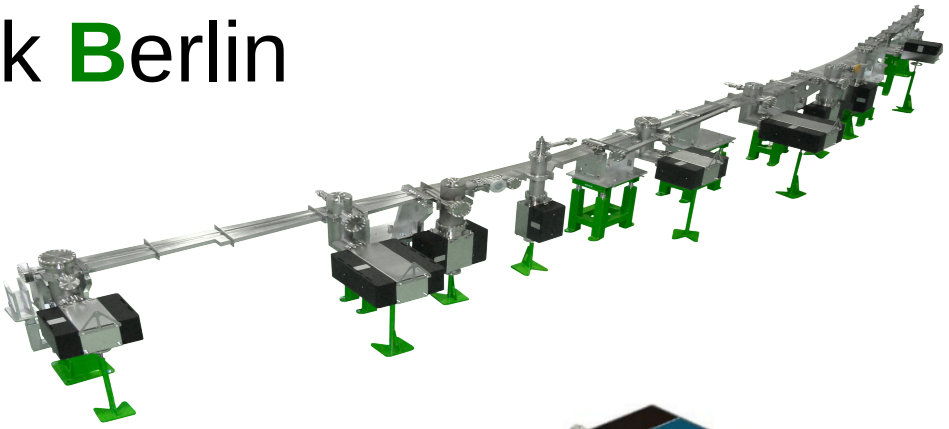
Feinwerk und **M**esstechnik **B**erlin







Soft X-Ray Applications
Beamlines & Components
Storage Ring Vessels
Controls Software

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Hard X-Ray Applications
Beamlines & Components
Detectors and Electronics
Controls Hardware

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Why EPICS?

- What we use it for...
  - Implementing functionality & features of our products for easy on-site integration
  - For in-house applications
- How we collaborate...
  - Adopting standards
  - Developing drivers
  - Help spreading EPICS

System Architecture

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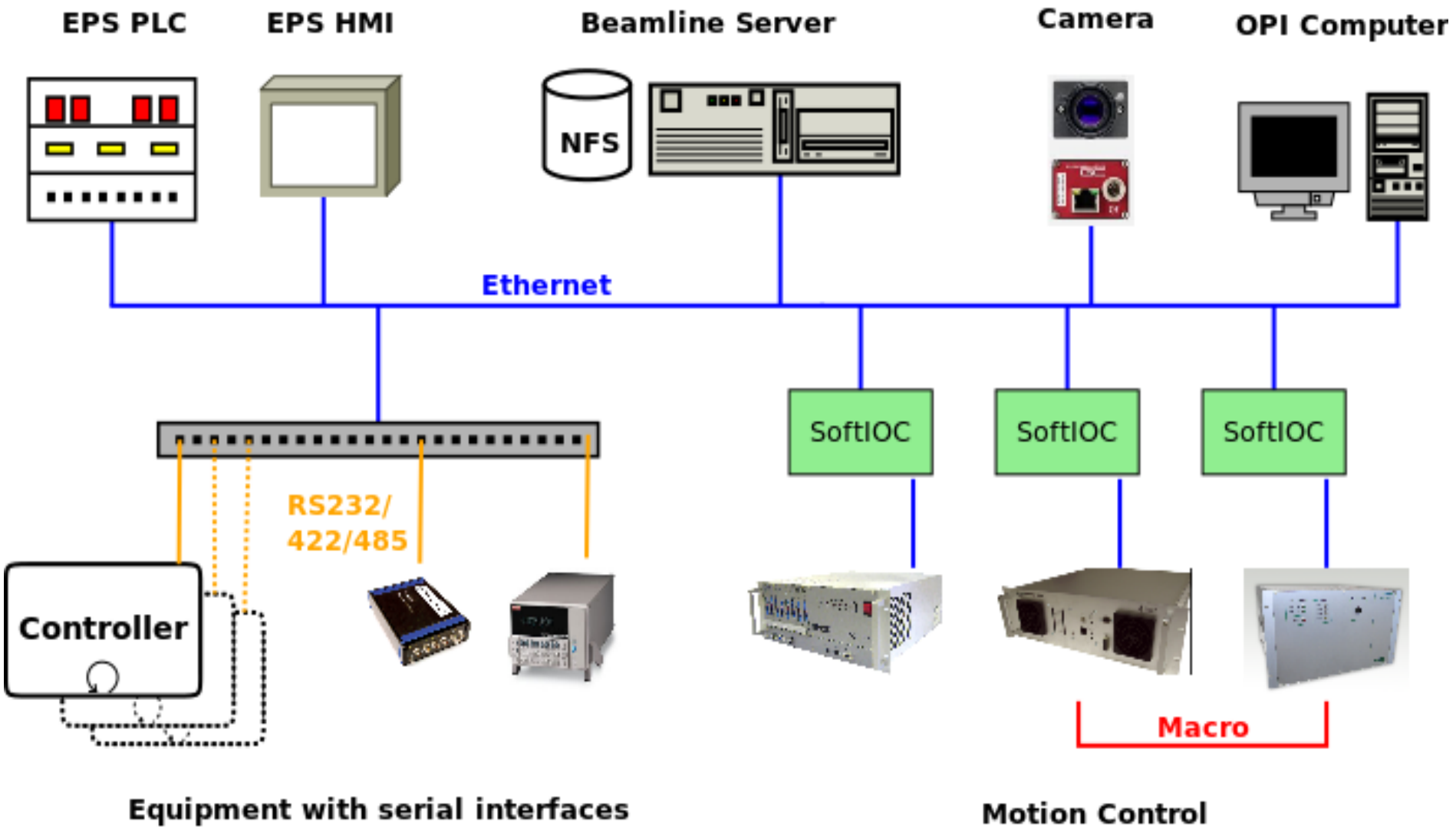
- EPICS on Linux
- Standard x86 hardware running softIOCs
  - fanless embedded systems or virtual machines
- Highly based on Ethernet communication
  - distributed, modular, scalable, cheap, POE
- Move realtime tasks to embedded hardware
  - fast/failsafe protection logic
  - complex trajectories
  - Fast and/or synchronised data capturing

Network Diagram



Motion Control Hardware

Control Hardware: DeltaTau PMAC

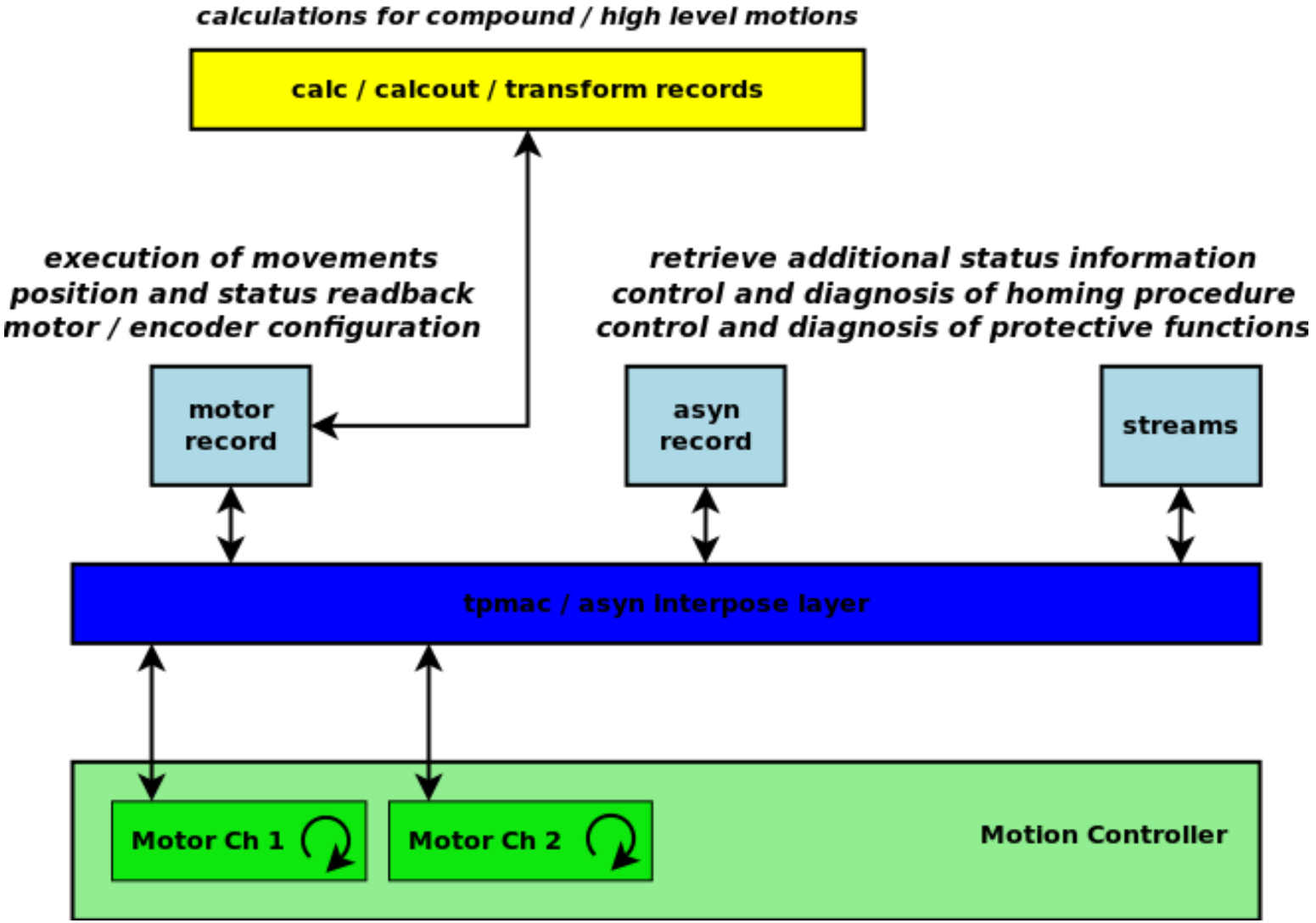
- programmable motion controller
- Ethernet interface

- MCS-8 Plus

- Brick Controller

- GeoBrickLV IMS

Standard Motion Control



Standard Motion Control

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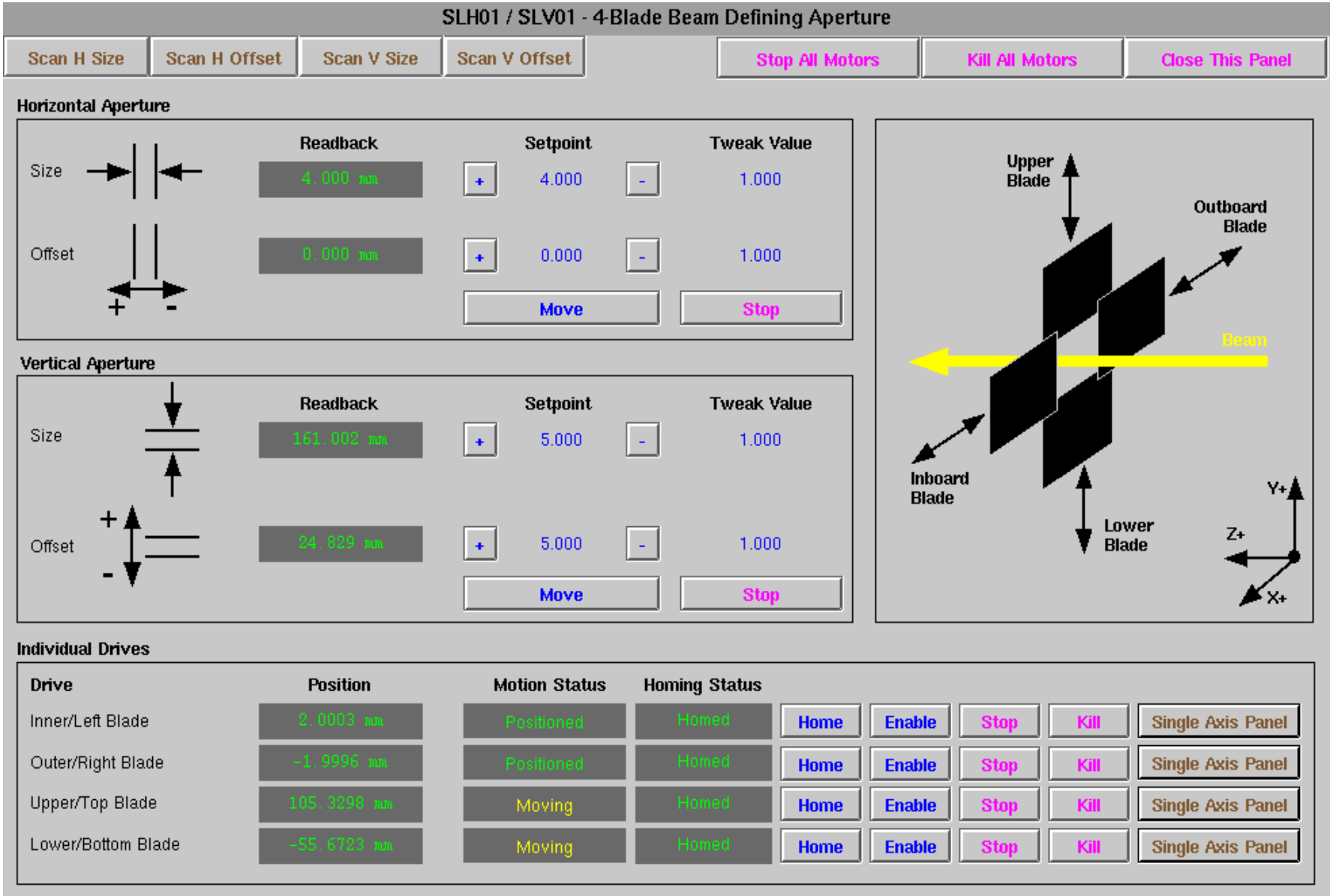

Advanced Motion Control

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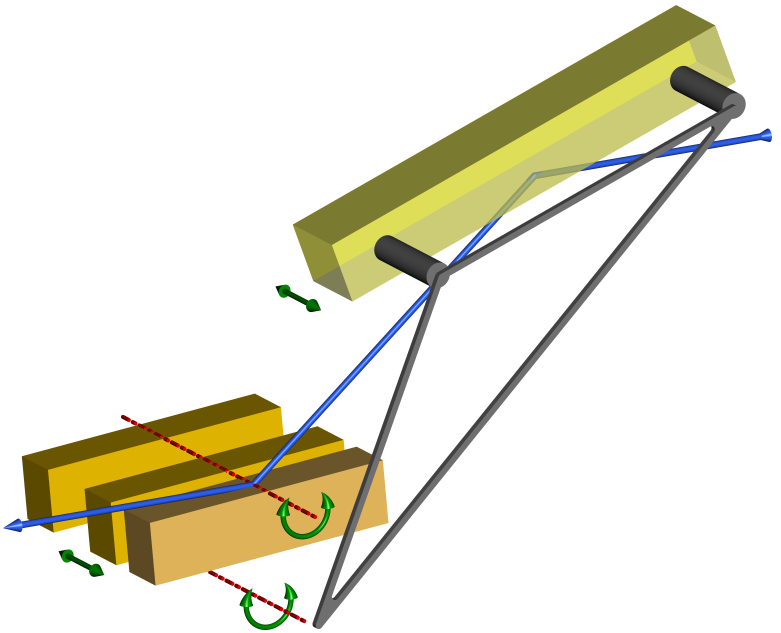
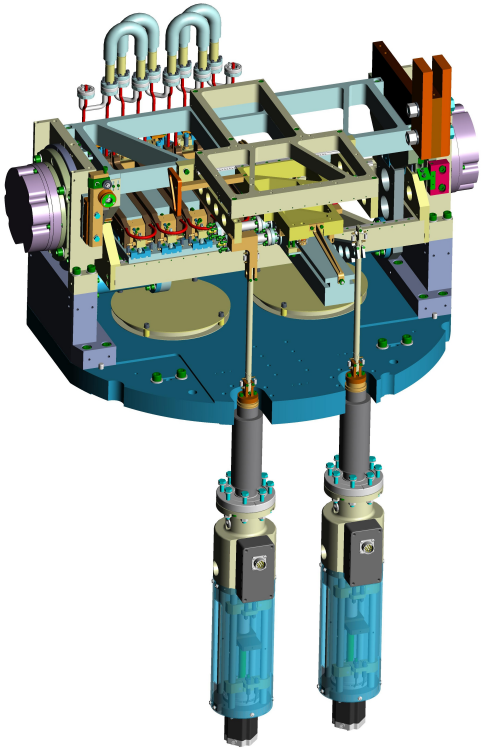
If interpolation and synchronisation is required ...

- complex trajectories
- hexapod control
- on-the-fly scanning





- Coordination of movements on controller level

Advanced Motion Control

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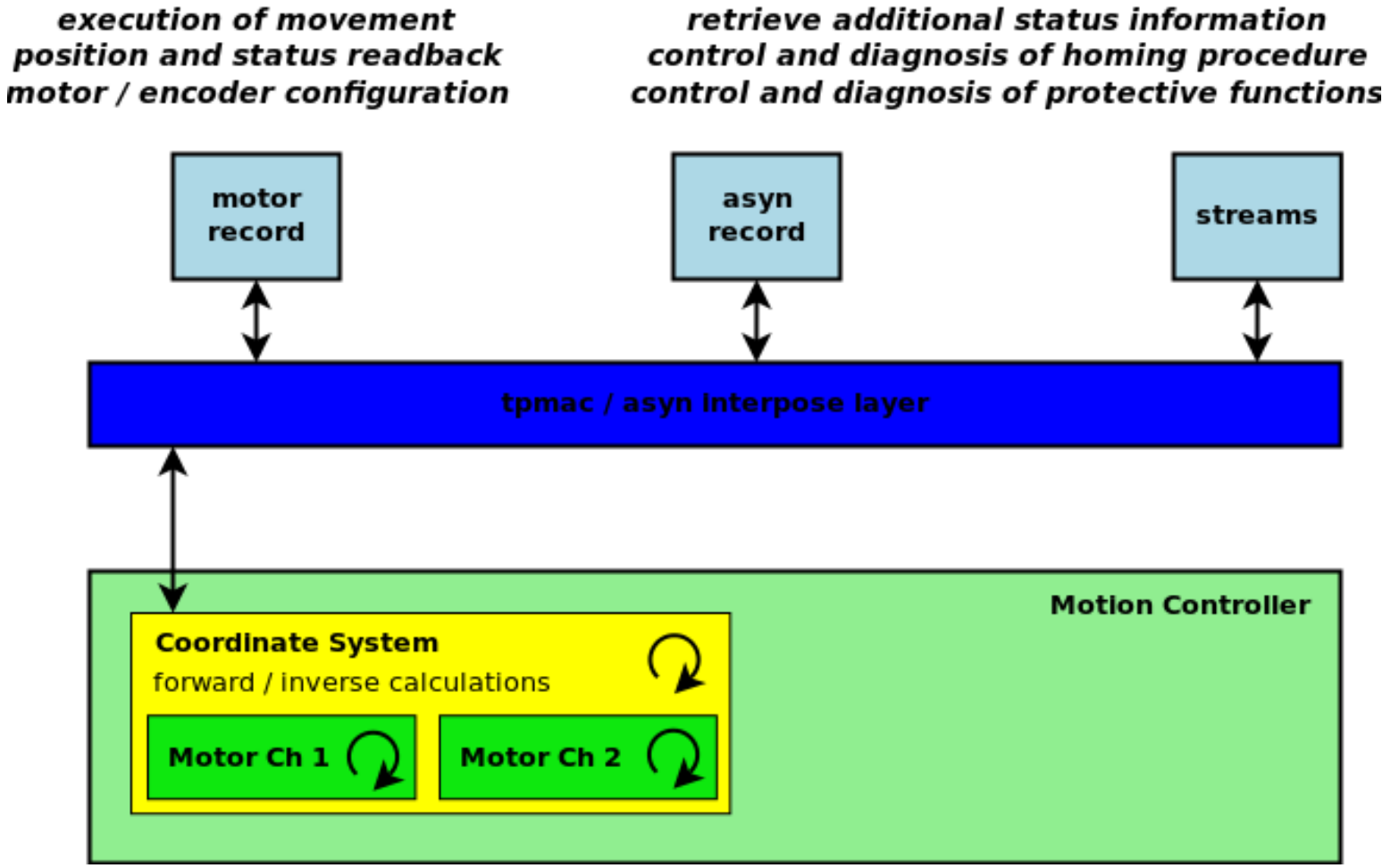

Advanced Motion Control

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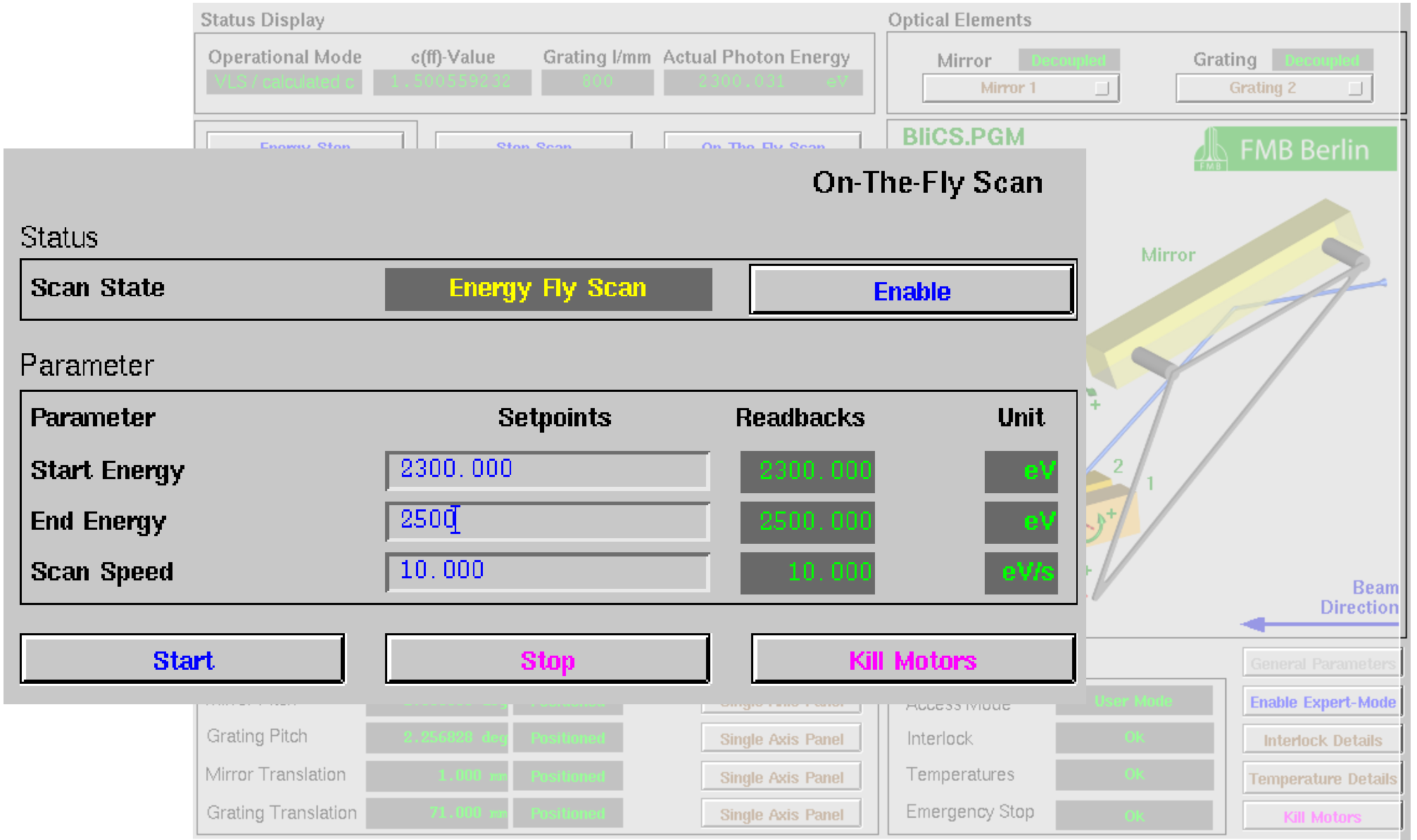

PLC Integration

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- Siemens PLC via **s7plc**
  - S7-300, S7-400, S7-1200
  - CP-343 or CPU PN/DP

SIEMENS

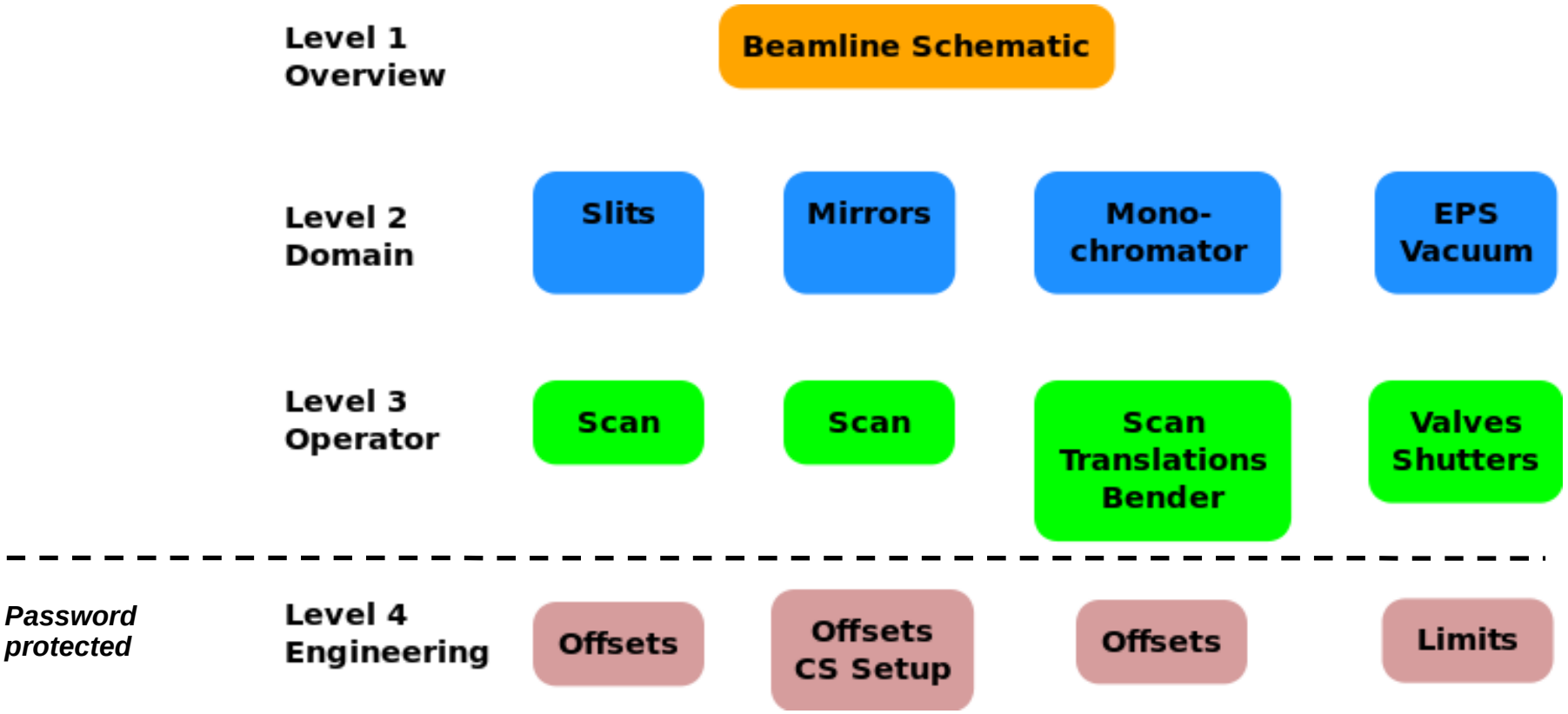
CODESYS

- Codesys certified hardware via **modbus TCP**
  - synApps **modbus** module
  - For PLCs and couplers from:
    - WAGO
    - Beckhoff

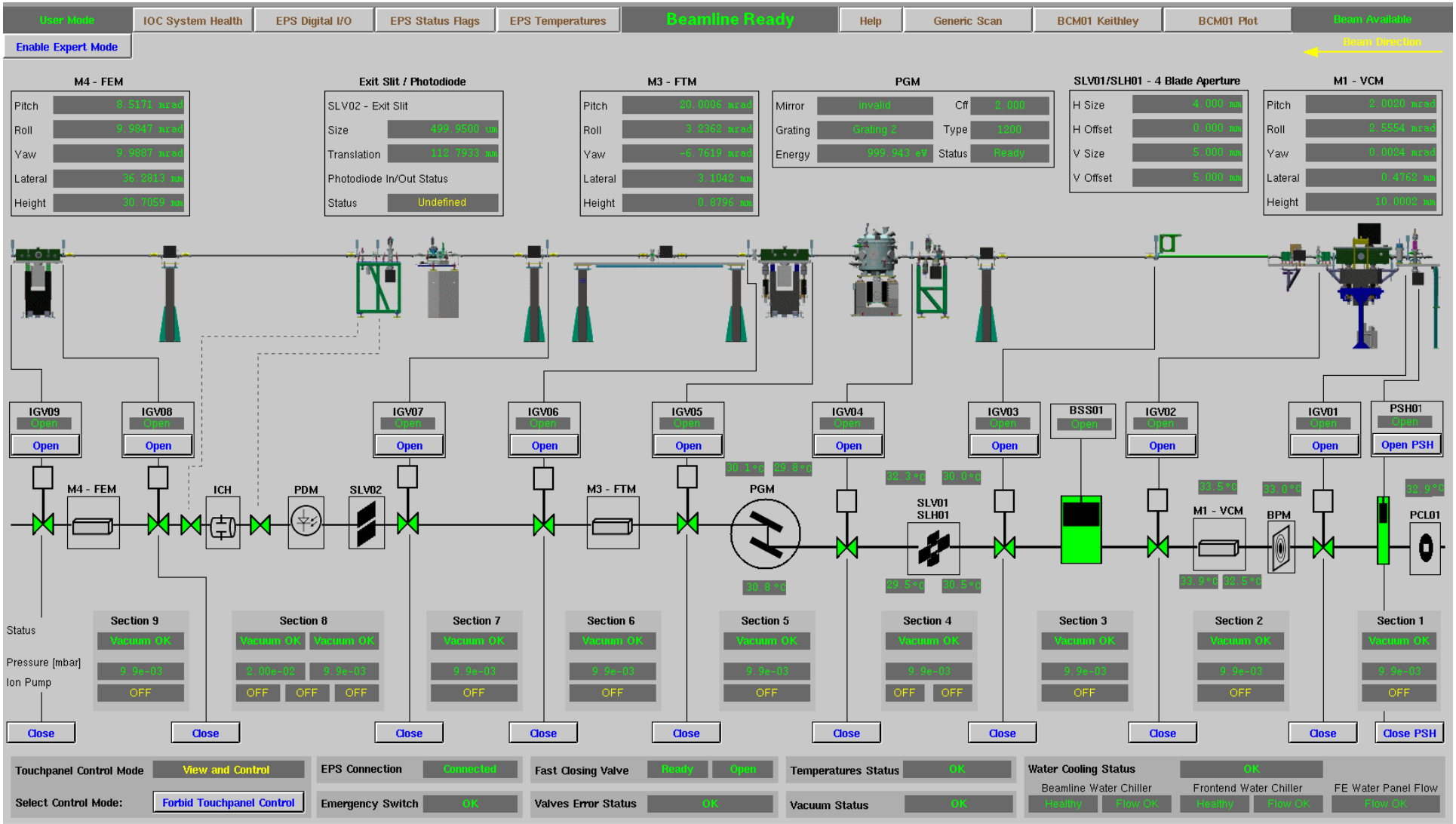
WAGO® INNOVATIVE CONNECTIONS

BECKHOFF

Operator Interface



Operator Interface



Conclusions

- Use of EPICS toolkit helps to create systems:
  - robust and cost efficient with small footprint
  - based on off-the-shelf hardware
- open source software
  - future-proof and scalable environment
- transparent communications
  - no proprietary protocols
- Migration of critical tasks to lower levels
  - use of real time OS not necessary

Thanks for your attention.

Questions?