PLC-based control systems at SOLEIL - ICALEPCS 2017

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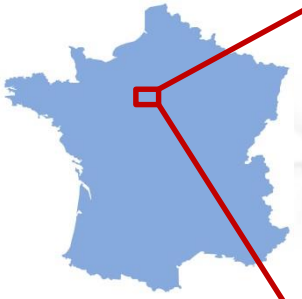
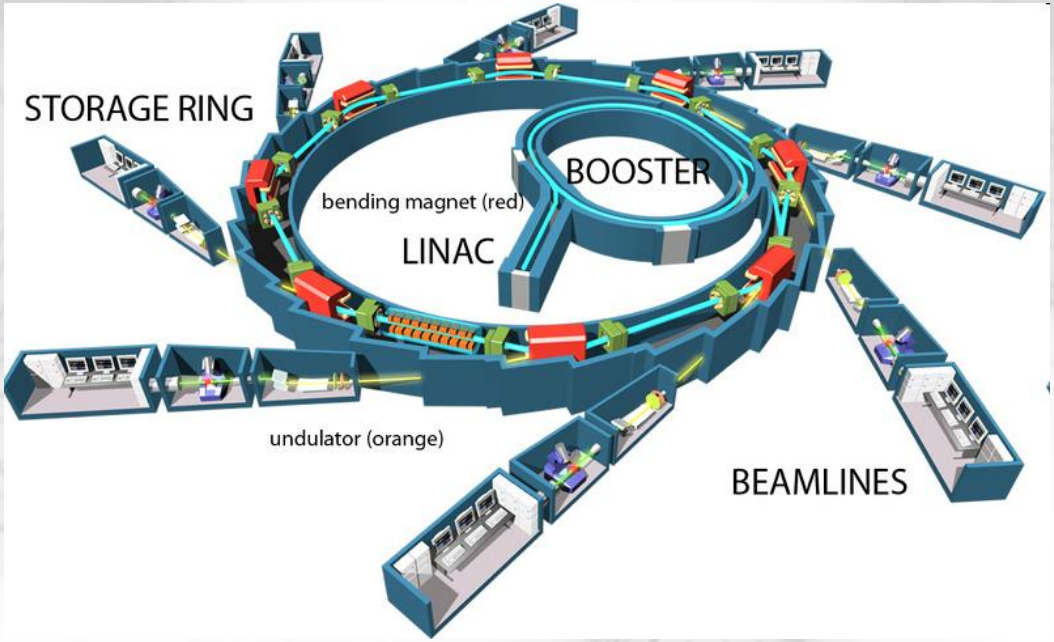
Since 2006: French synchrotron light facility



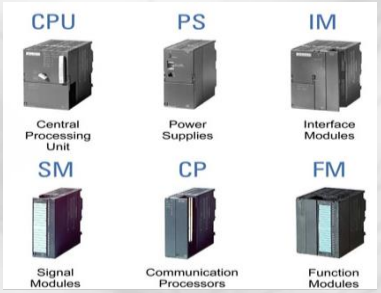
St-Aubin (~25 km from Paris)

- Electron storage ring (354m circumference / 500mA@2.85GeV)
- 29 Beamlines in operation (43 possible)
- Permanent staff: 357 persons
- ~58M€/year operation budget

- 2700+ users per year
- All scientific domains using X-rays covered
- 43 weeks of run per year (5200 h)
- 1 machine day/week



Types and applications of PLC



- Technical choices:
  - SIEMENS S7 300
  - Profibus DP as fieldbus

Domain	Quantity	Details
Vacuum	~130	Machine & Beamlines
Machine interlocks	21	Use of daisy chained Boolean processors (FM352)
Magnet power supply (DC and pulsed)	31	Large Profibus networks (max 104 slaves, 600 meters long)
Radiofrequency cavities	9	
Personal Safety System	~60	Safety modules & program
Beam Diagnostics	36	
Cryogenics	2	External programming by subcontractors
Ventilation & cooling	~30	Full Honeywell supply (hardware, installation, programming & maintenance)

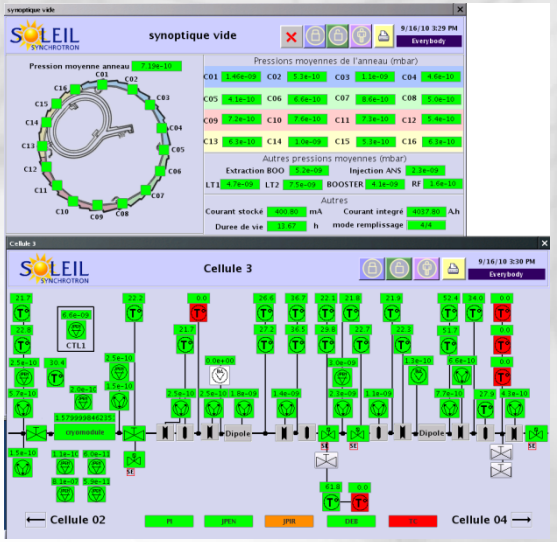
Hardware, network and software integration

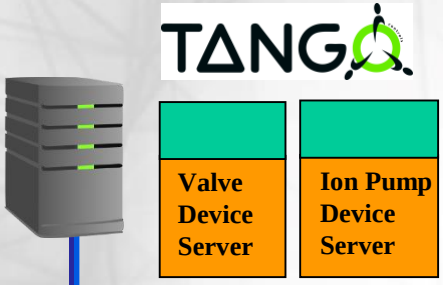
Front

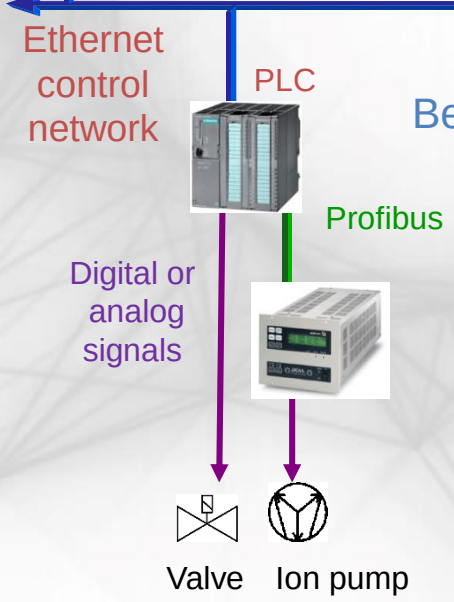
19” rack integration:

- PLC at the top of racks.
- Industrial cabling elements mounted on rear plate.

Rear







Benefits of TANGO:

- Software representation of physical devices
- Compatible with multiple supervision applications languages
- Native monitoring & Archiving tools

Lifecycle engineering

Step	Performer	Remarks
Specifications	Machine or beamline staff	Almost every format accepted, then translated into more formalized documents by automation group.
Wiring scheme	Automation group	Sometimes performed by subcontractors
Cabling and hardware integration	Automation group	Sometimes performed by subcontractors
Software development	Automation group	Now covers also the associated TANGO Device Servers
Testing and commissioning	Machine or beamline staff & Automation group	Site acceptance tests
Maintenance	Automation group	Use of computerized maintenance management system for stocks & elements lifecycle

Workshop expectations

- Overview of other institutes PLC based controls systems
- S7-3xx PLC series and Step7 obsolescence management (end of delivery dates, progressive replacement methods)
- TIA Openess API experience ?
- PLC diagnostics: how and use