Motion control @ ESS

Torsten Bögershausen

Motion Control and Automation Group

www.europeanspallationsource.se
Overview

- Hardware
- Software
- Collaboration
- Work to be done
Hardware

- All motion today is EtherCAT based
- Different motor terminals covering a range of:
  - Stepper 8..50V 3.5 A (rms)
  - Servo 100..480V 6A
More hardware

- Most work is done outside ESS, “in kind”: List with recommendations
- Level A: first choice
- Level B: second choice
- Neither A nor B: “special”
- https://confluence.esss.lu.se/display/MCAG/Motion+control+electronics
Software

- 3 layers:
  - High level (CSS, NICOS with scan engine)
    - EPICS with motor
    - SW running in the motion controller.
SW platforms Motion Controller

- Commercial: Beckhoff TwinCAT
  "Industrially proven"
  International working group (.de, .uk, .se)

- Open Source: "ECMC" under Linux
  Motion controller & EPICS IOC on same CPU
  "works very well"
motorRecord

- Some patches done @ ESS:
  - All configuration is done in TwinCAT:
    The IOC reads it into the motorRecord fields
  - Allow the record to be configured
    NOT to stop the motor on a limit switch
  - Better connection handling ("late connect"):
    IOC is started before controller

- ACCS field for acceleration
  Better debug prints ("SPAM" field)
Challenges @ ESS

- Common HW list
- E-plan drawings, PIN layout
- Common code for TwinCAT
- Automated testing
- TwinCAT – EPICS IOC communication
  - "dig out all configuration from MCU"
  - "Motor position every 10 msec"
Hardware @ ESS

- HW has been build outside ESS :-)
- Motion control (hardware) standards: https://confluence.esss.lu.se/display/MCAG/Motion+Control+Hardware+Standards
- EtherCAT HW catalogue: https://confluence.esss.lu.se/display/MCAG/Motion+control+electronics
- Training material
- TwinCAT: https://confluence.esss.lu.se/display/MCAG/Commissioning+Workflow+TwinCAT
- ECMC: https://indico.esss.lu.se/event/1156/
Test crate
Thanks

- 

Merci & Thanks