The CLS Motion Control Mix

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Overview

- The Canadian Light Source
- Common Motor Controls
- Specialized Motor Controls
- Obsolete Motor Controls
- Challenges

Canadian Light Source

2.9 GeV Synchrotron serving academic institutions, government and industry

Have beamlines for Infrared, soft X-ray, and hard X-ray

Have a variety of experimental endstations deployed and experimental techniques in use

EPICS is the primary control system at the facility

CLS Motion Control Needs

- Limited requirements for Accelerator, Booster, Storage Ring
  - Phase Shifters
  - Scrapers
  - Viewers
- Main requirements for Beamline control and Data Acquisition Endstations
  - Monochromators, Mirror tanks, viewers, BPMs, tables, stages

Common Motion Control

- OMS-58 VME controller with CLS-designed breakout card
  - Challenge – 4 motor controls take 2 VME slots
  - Card is no longer available
  - Used for some of the motors in the Phase I Beamlines
- Prodex MaxV VME controller with CLS-designed breakout card
  - 8 motor controls per VME slot

Common Motion Control

- CLS implementation of motor controls
- We don’t use the EPICS motor record (mostly)

Specialized Motion Control

- Pneumatic – valves, shutters, filters
- Fine positioning – beamline stages
- Piezo controls
- MaxNet controller – Ethernet as a fieldbus, rather than VME. Easily available for non-EPICS control
- APS soft motor control interface to CLS motor control

Specialized Motion Control

- Geobrick/Delta Tau - Magnet Mapping
- PI motion control – used for fine stage control with STXM
- SPEC drivers – not always used with EPICS software
- Labview drivers – integrated endstation
- Better integration of position and data acquisition – using Zebra (developed at Diamond), evaluating MUSST (developed at ESRF)

Obsolete Motion Control

- CLS-designed motor controllers and drivers
  - Based on 25 MHz 68360 CPU
  - EPICS layer challenged to ‘keep up’ with CA SEARCH requests
  - Low max steps/second
  - Inadequate support for encoders

Challenges

- Interface Consistency
  - Early adoption of MaxV – some systems require specific revisions of MaxV board
  - Use of CLS EPICS motor driver software – different approach, no collaboration
- Specialized motor needs at a small facility
  - Continuous varying velocity with stepper motors
  - Servo motor – matching controls, motors, and devices

Challenges 2

- No individual is tasked with just motion control from an Engineering, Electronics, or Software position
  - Challenging to get breadth and depth of knowledge
- Small organization
  - The more specialized the knowledge an individual has, the less likely the cross-training – staff turnover hurts more

Answers?

- How have other facilities dealt with limited resources?
- How have other facilities dealt with equipment and software diversity?
- How have other facilities dealt with obsolescence?

Questions!

Questions and Comments are welcomed