OAK RIDGE National Laboratory

MOTION CONTROLS FOR ORNL NEUTRON SCIENCE EXPERIMENTAL BEAMLINES

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Introduction

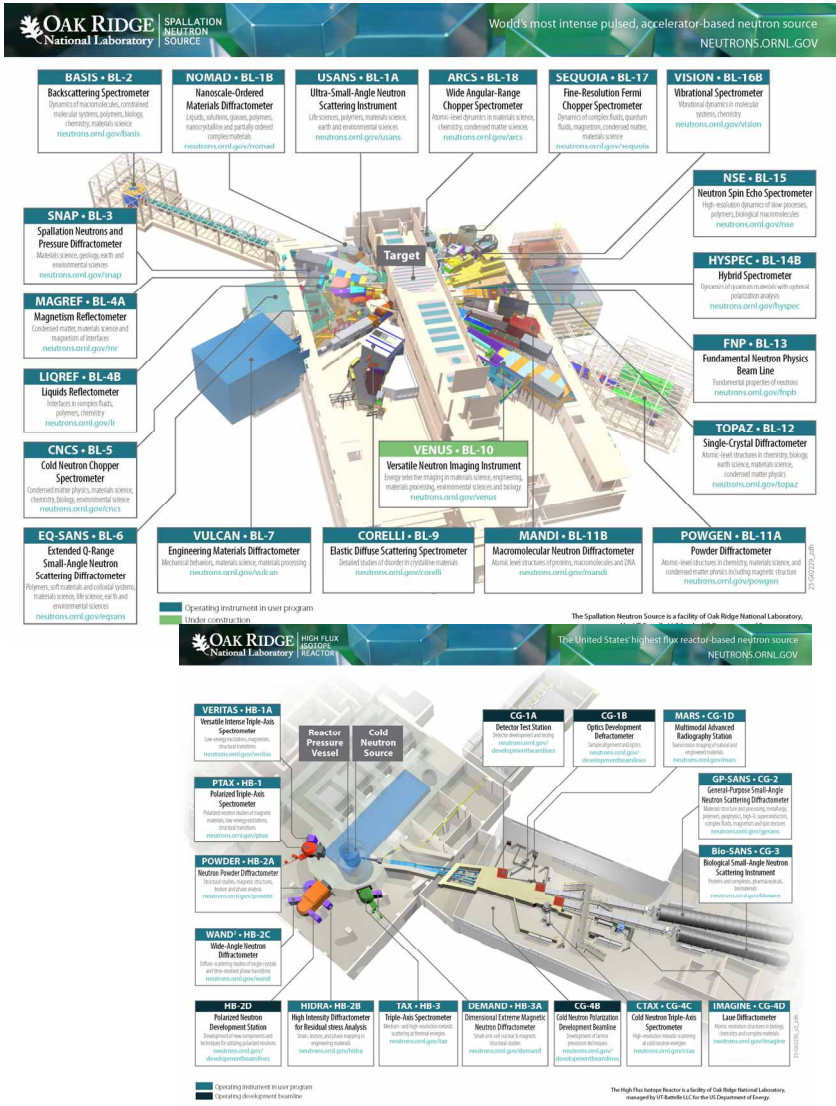
- **Two Facilities, Total of 35 neutron beamlines**
  - Spallation Neutron Source (SNS) : 19
  - High Flux Isotope Reactor (HFIR): 12, + 4
- **Control Systems**
  - EPICS/CSS based: SNS 19, HFIR 5
  - SPICE (LabVIEW based): 7
- **Motion Hardware**
  - Mostly stepper motors, servo motors
  - Controller:

    Parker 6K, Parker GT6K

    Galil DMC-40x0, 30x1x

    Newport

    PI Servo, Hexapod

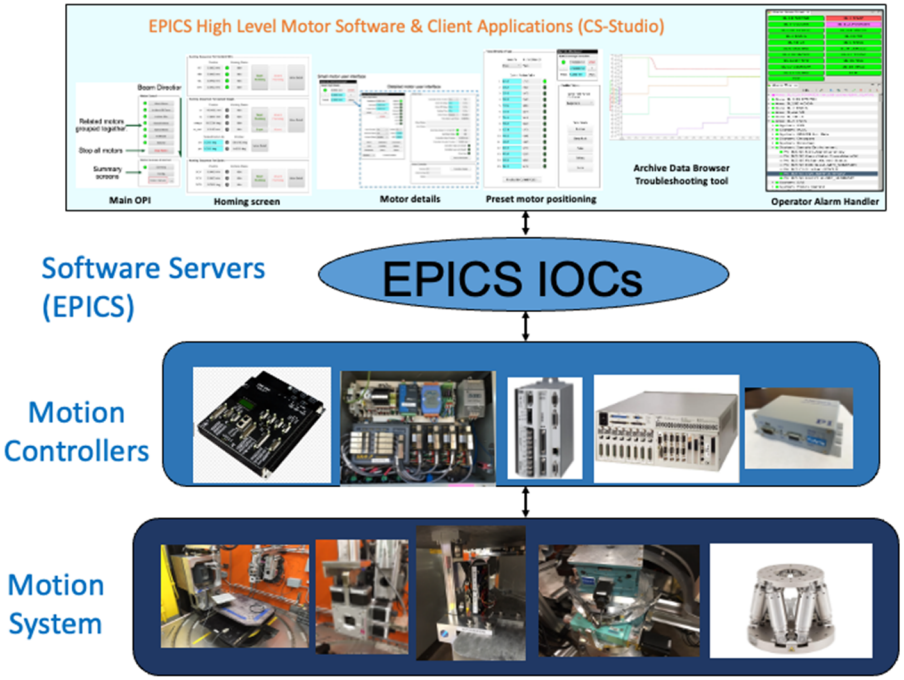


Facility	Controllers	Axes
SNS	91	400
HFIR	29	146
Total	120	546

Motion Control Software

- EPICS IOC Motion Applications
  - EPICS motor record
  - Soft motor, virtual motor record
- Homing Sequence
  - Home motors concurrently or sequentially
  - GUI configuration
- Scan Applications

  TableScan, Exp. Specific Scans, Align, Scripting…



- Sample Changer Pre-set Positioning

  Configurable pre-set sample changer positions enable users to easily move to predetermined positions.
- Slits

  Special algorithms were developed for coordinating slit blade positions
- Sample Environment Rotation Stage Configuration

  Software tool provides configuration of all 34 sample stages across all beamlines.

Upcoming Projects and Upgrades

- **EPICS Migration: 2 Beamlines Scheduled for DAQ and Control System Conversion**
  1. SNS-NSE (Neutron Spin Echo Spectrum) Motion Control System

     The original TACO and SIEMENS control system developed by Research Center Jülich

  2. HFIR-HB3 Triple-Axis (TAx) Spectrometer Instrument

     LabVIEW-based

- **PPS Secondary Shutter System**
  - Galil DMC-3x01x single axis controller to replace Parker controller drives the existing servo motor, Moxa ioLogik E1212, as standard
- **Motion System Standardization**
  - Upgrade Parker controller to Galil DMC-40x0

All upgrade are motivated by hardware reliability, adaptability, ease of use, and maintenance.