ACTION
ROBOTS · MANIPULATORS

Digital Series
Manipulators

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Basic Design Criteria …Standard on *Digital Series!*

- ☑ Several Standard Models with 500-3000 kg payload capacity. Sweep envelopes to meet individual requirements
- ☑ Grapple attachment for handling a wide variety of items
- ☑ Cab, left, right side mounting
- ☑ Engineered robust hydraulic/pneumatic hose and tube routing throughout machine
- ☑ Service plug connections in cab
- ☑ **REAL** diagnostics – not just cryptic codes
- ☑ Open architecture controls, industry-standard components, **NO** proprietary hardware

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Machine Structure

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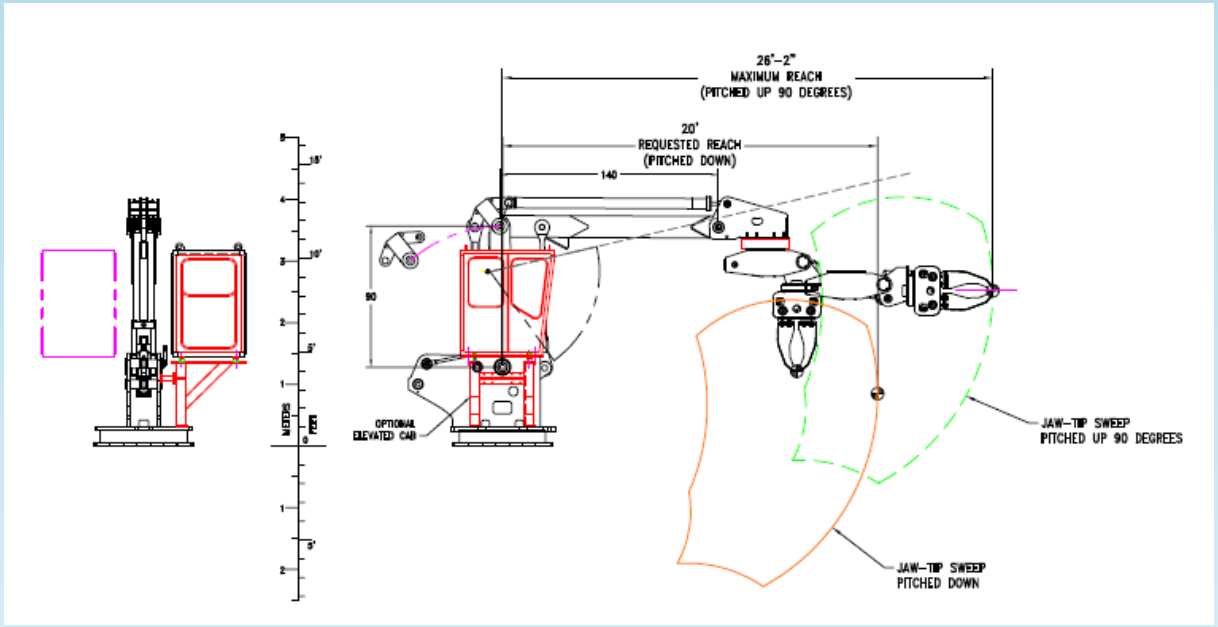
Lift Capacity & Reach

- ☑ *Rated capacity through <u>entire range of motion</u>, including Pitch and grapple rotate*



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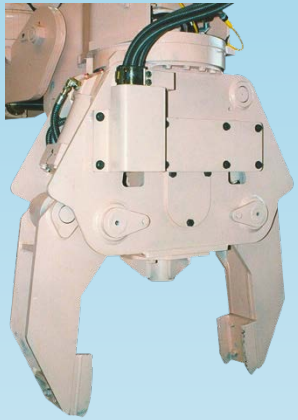
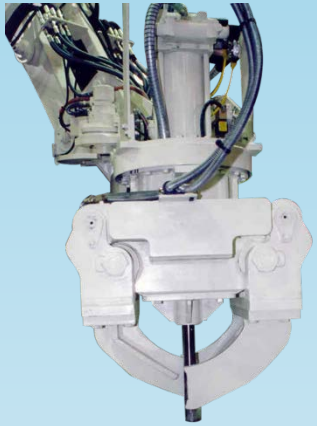
Attachments for Any Job

Patented Grapple/Impactor™





Breaker Grapple

Hot Casting Grapple

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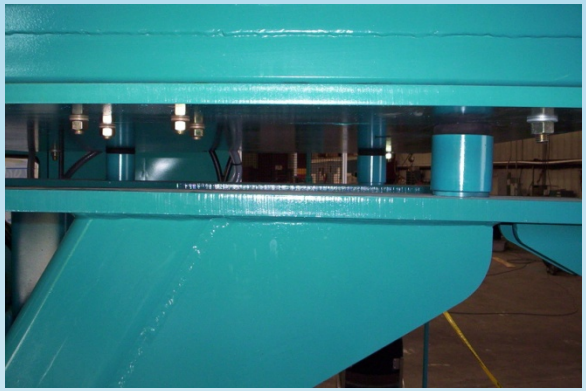
Optional Elevated Cab –Versatile Mount

RH Mounted

Heavy Duty Mounting



…with Isolators

LH Mounted

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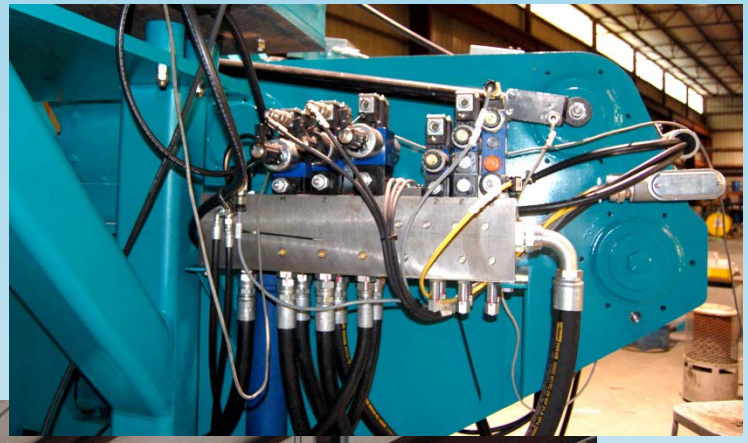
Engineered Hose Routing



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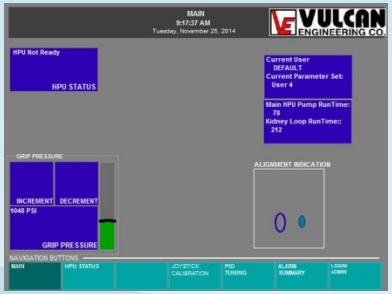
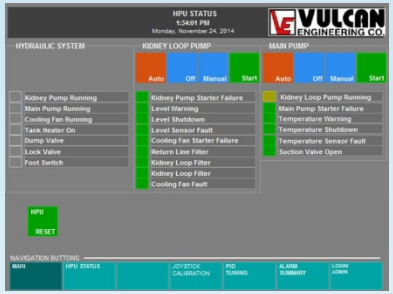
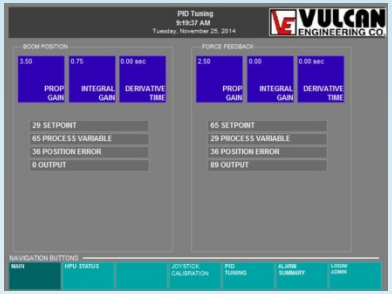
Connectivity & Control

- ☑ PLC with Ethernet communication, network I/O and touch-screen
- ☑ Ethernet port for connection of customer PC
- ☑ Service receptacle for customer use
- ☑ Simple control/monitoring of peripheral equipment; discrete switches and buttons available for heavily-used functions.
- ☑ Diagnostics in plain language on HMI
- ☑ In-cab tuning via HMI







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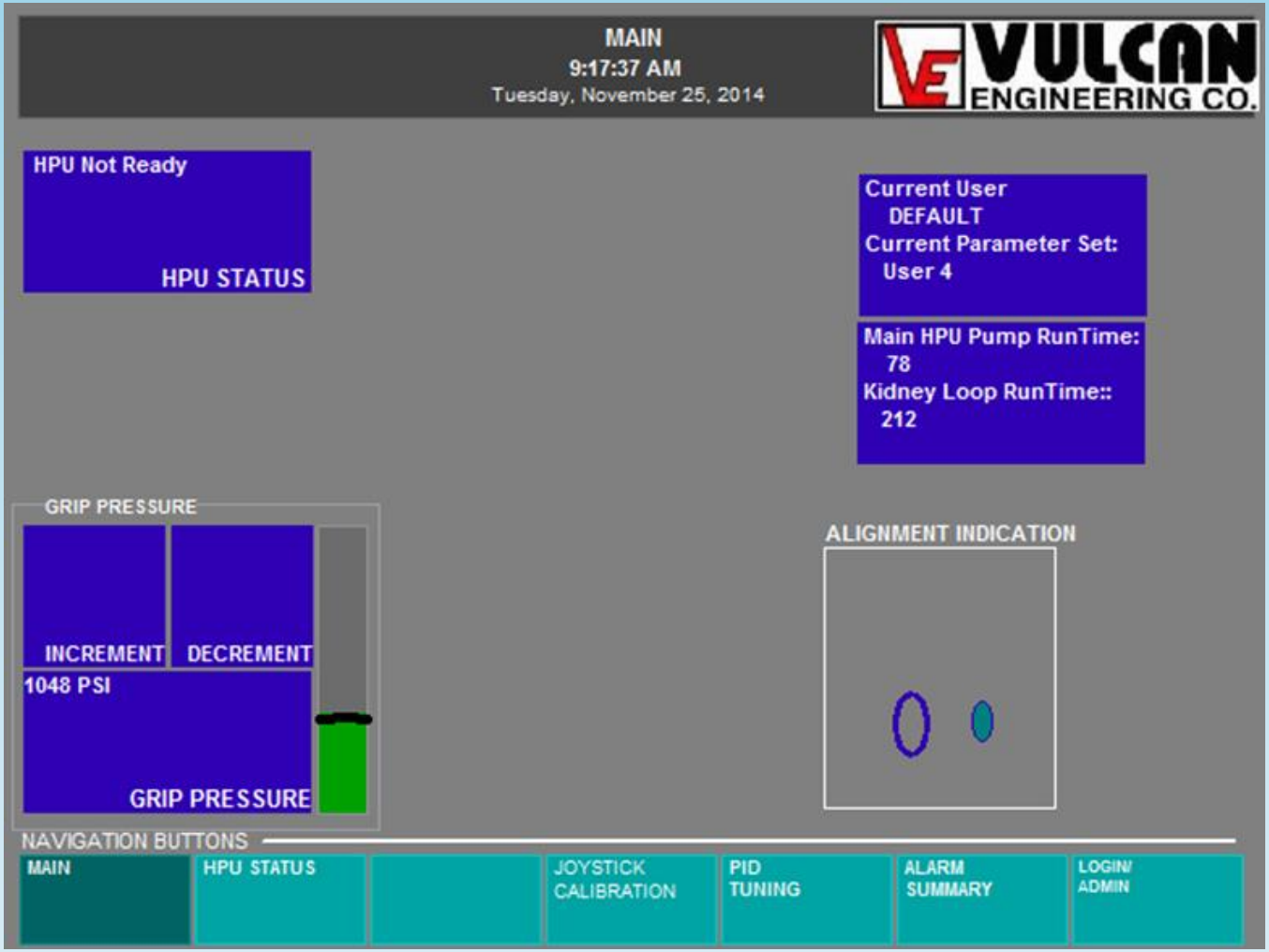
In-Cab Connectivity & Control

The Main screen allows the operator to easily align the hand control and boom position before unlocking the lock valves.



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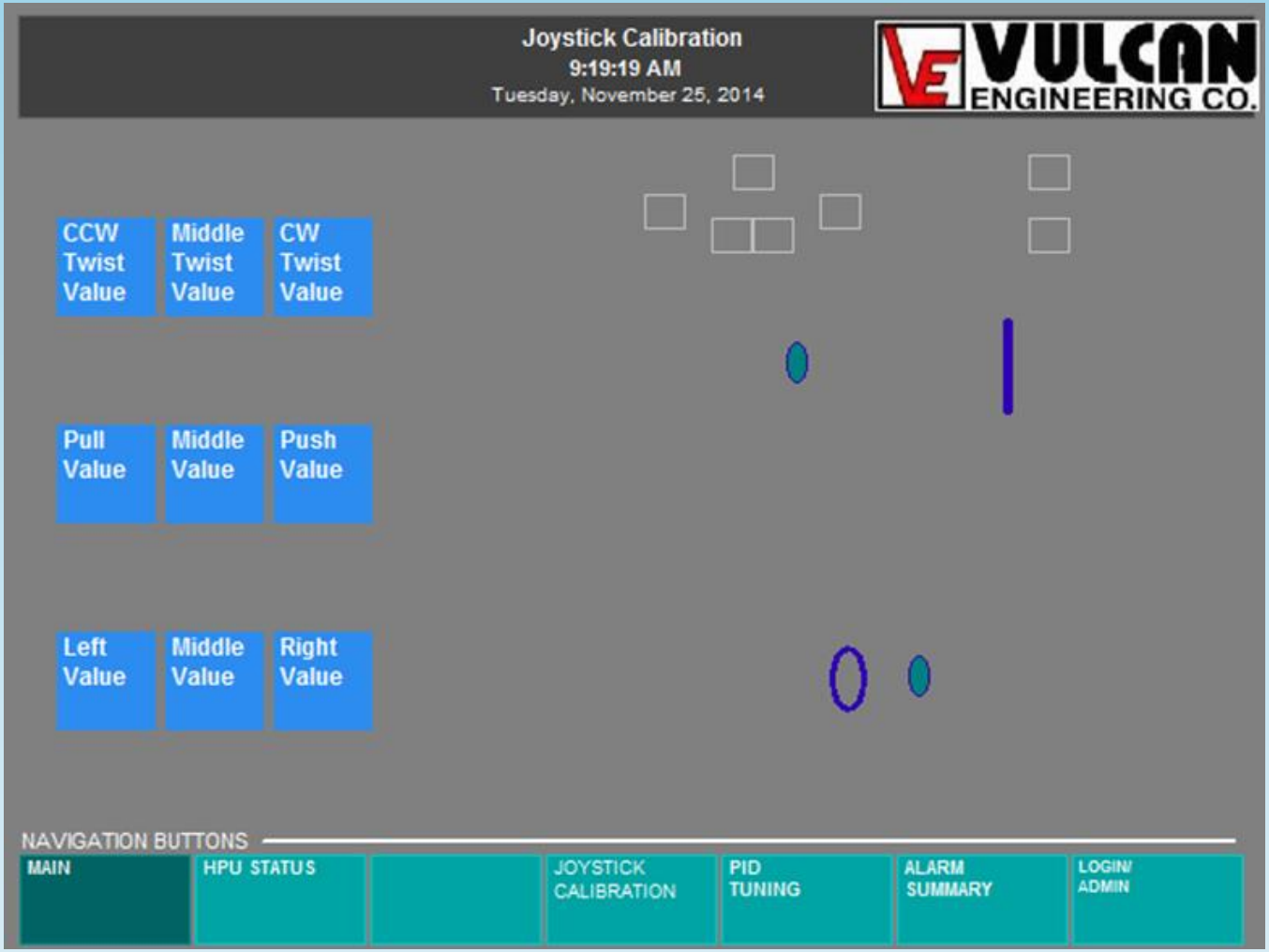
In-Cab Connectivity & Control

Joystick calibration allows for quick set up of the joy stick parameters.

Indicator lights to assist in troubleshooting.



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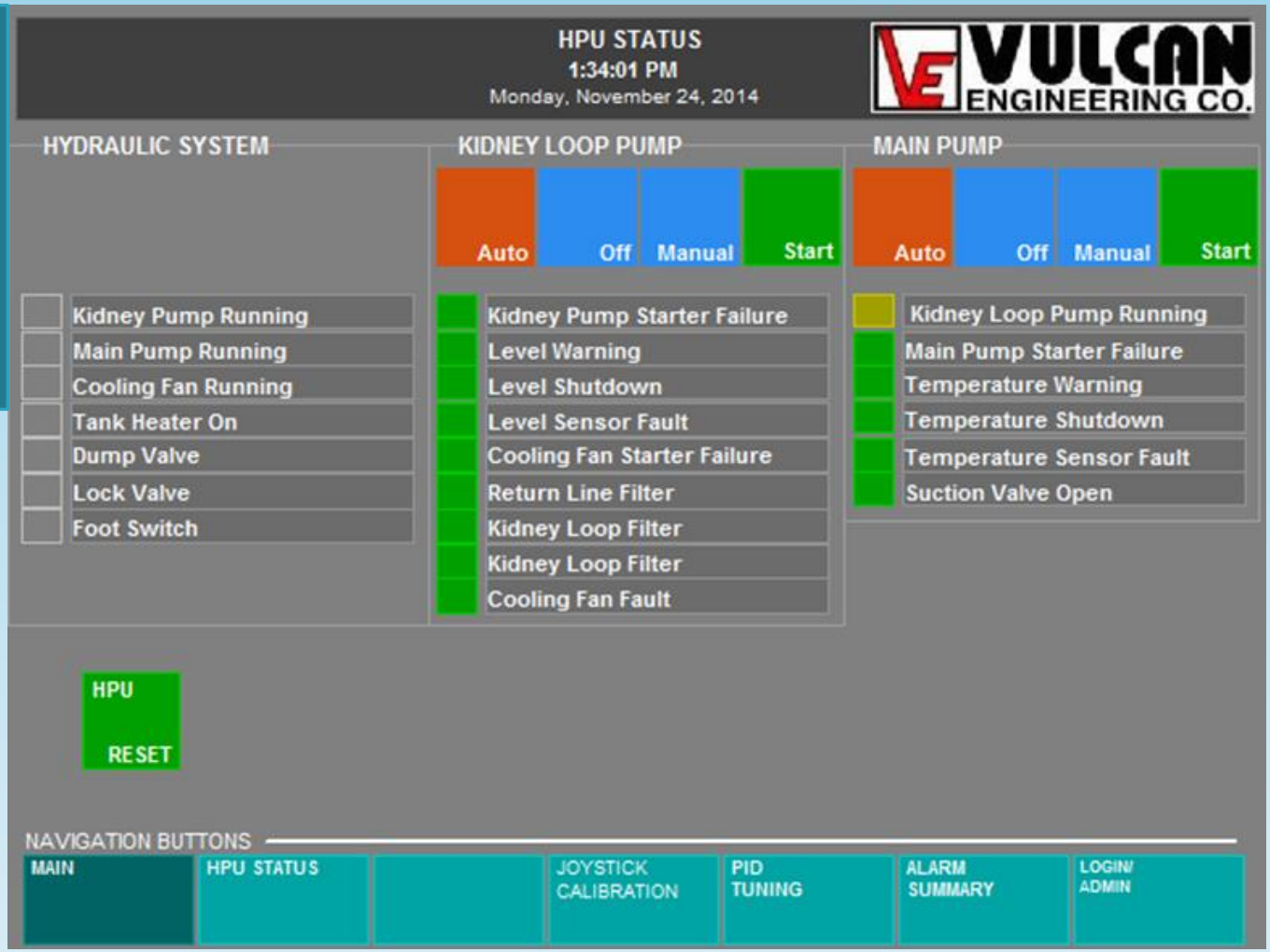
In-Cab Connectivity & Control

The HPU is Controlled from the HMI Screen

HMI Screen shows the Status of HPU component conditions.



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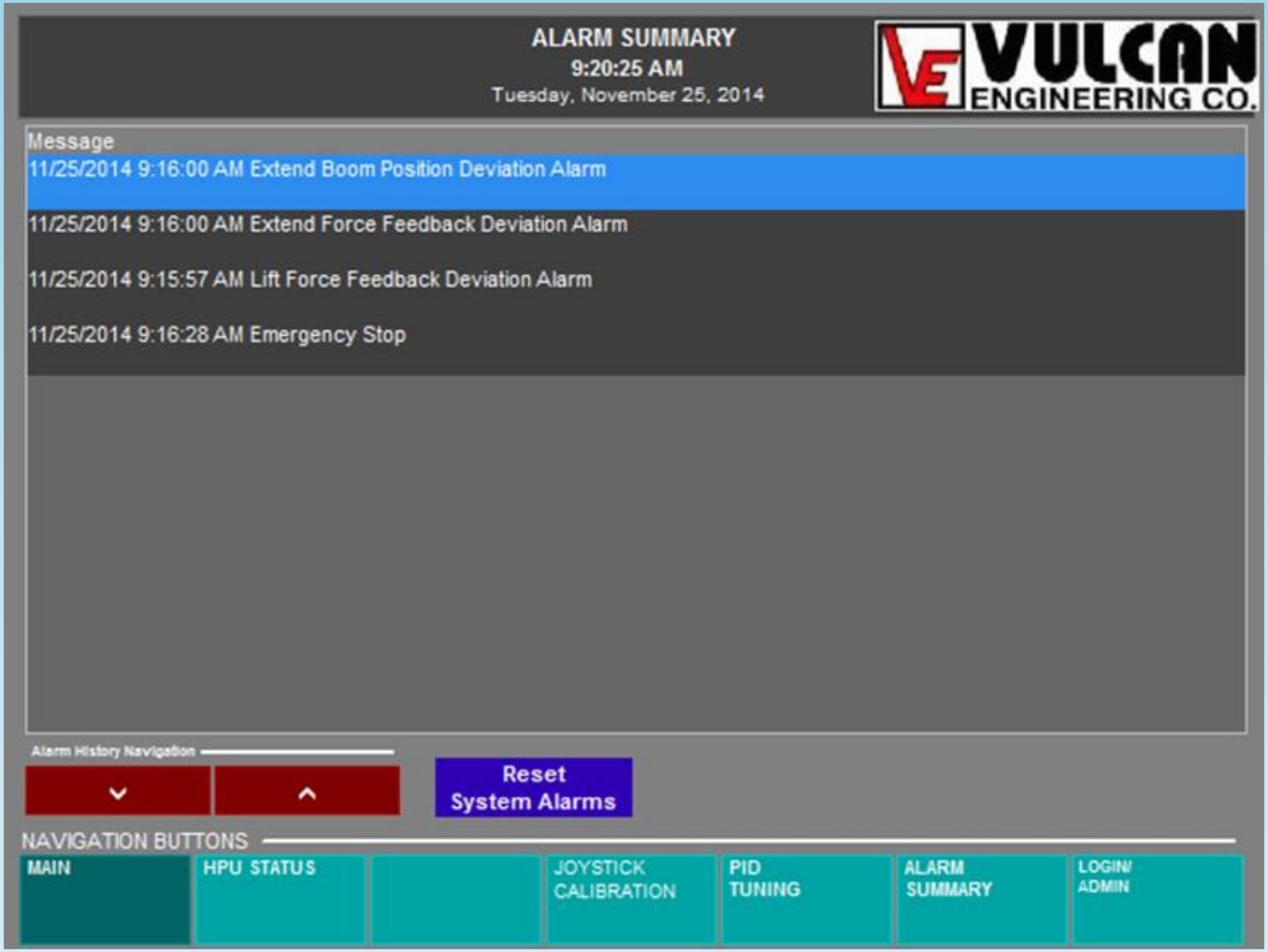
In-Cab Connectivity & Control

Alarm Summary provides a history of warnings and problems that have occurred.

This Simplifies maintenance & troubleshooting.



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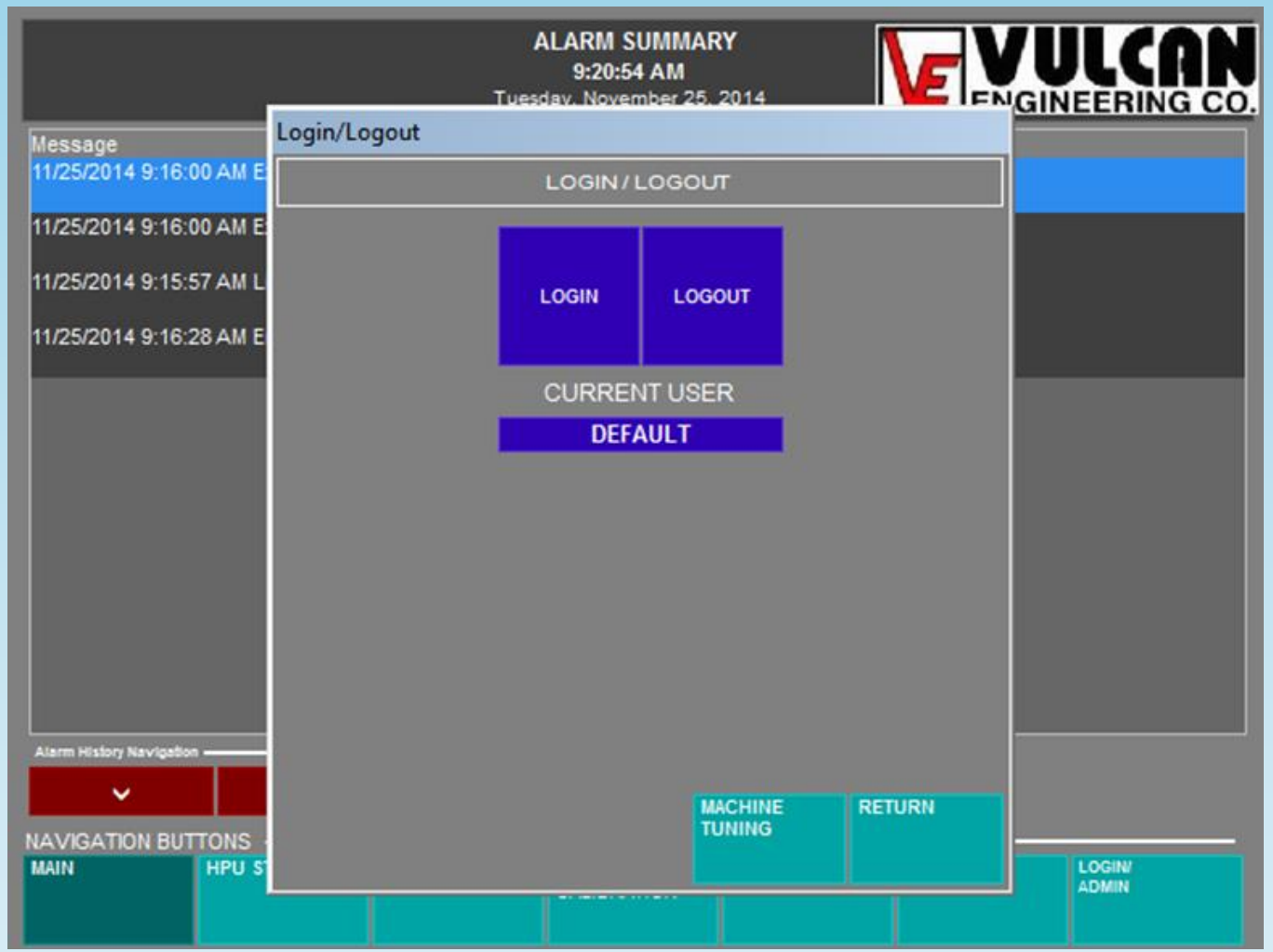
In-Cab Connectivity & Control

Login window provides User level security. There are different levels of access for operators, supervisors, and maintenance.



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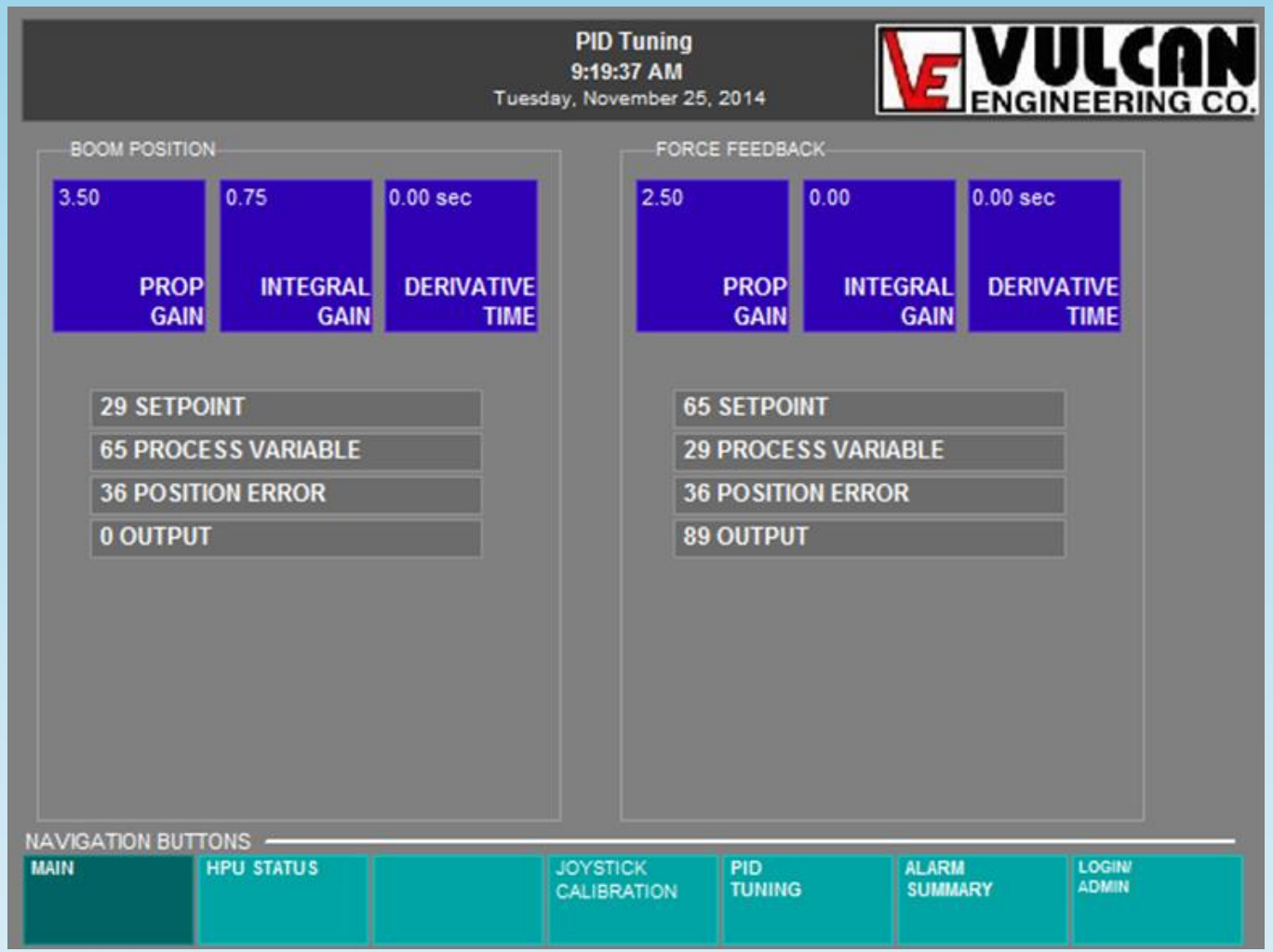
In-Cab Connectivity & Control

Tuning of the main axis of movement is easily performed from the HMI Screen.



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Industry Standard Components

- ☑ PLC & Touchscreen, Ethernet
- ☑ Standard network I/O for efficient cabling
- ☑ Newest generation control-integrated valves commanded directly from PLC – absolutely NO proprietary cards or circuitry
- ☑ Open standards for programming
- ☑ Top-quality HPU featuring readily available hydraulic components

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Ease of Use

- ☑ Hand control is primary user interface
- ☑ Hand control is instantly intuitive as hand motion directly corresponds to boom motion
- ☑ Intuitive, user-friendly HMI provides *real* information during normal operation and error/alarm events

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Ease of Maintenance

- ☑ Common, industry standard parts
- ☑ Designed in 3D and checked for accessibility and ease of assembly
- ☑ Plain Language error/troubleshooting info via the HMI – no error codes to look up or voltages to manually check
- ☑ In-cab tuning of the motion controls, so a single technician can perform the job quickly
- ☑ Easily expandable to accommodate future requirements

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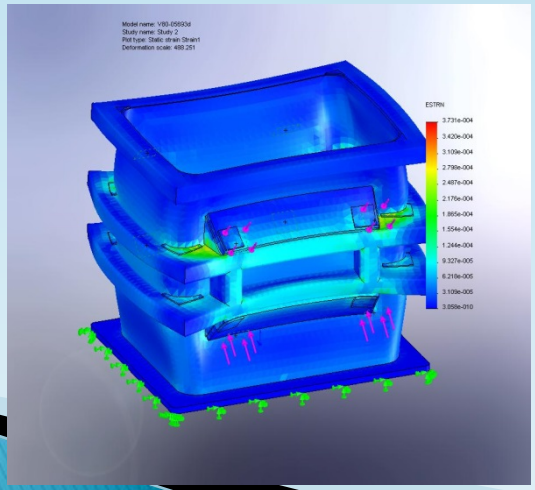
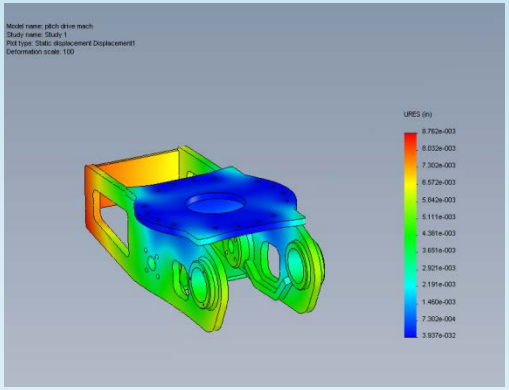
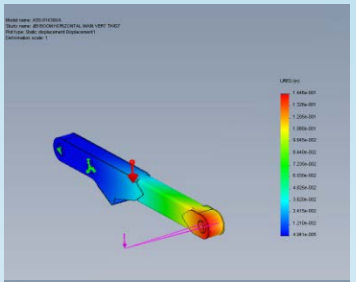
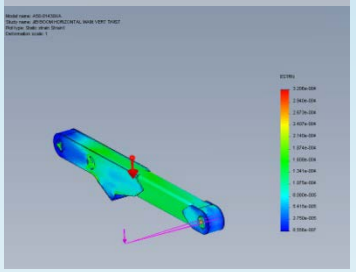
Design Engineering

- ☑ Design & detail engineering done in-house by a cross-trained staff of engineers involved daily with robotics & manipulators)
- ☑ 3D and 2D CAD programs used for machine design
- ☑ FEA is employed in critical areas to maximize reliability and product life.









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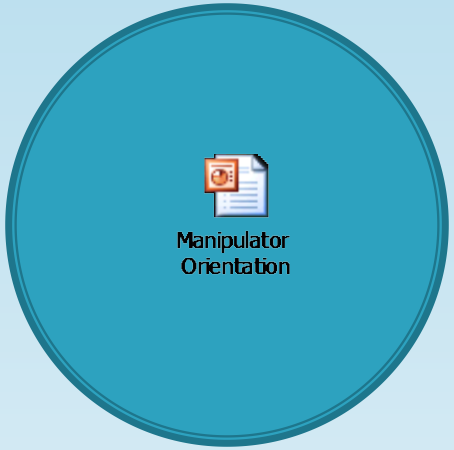
Training

- (3) Levels of Training
  - Production
  - Maintenance
  - Engineering
- Classroom and hands-on training at the machine



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History/Experience with ACTION®

- ☑ In the market: Over 500 **ACTION®** Manipulators and Robots sold since the mid 1970's
- ☑ Majority of machines in marketplace are based on 1980's technology, with incremental improvements in the 1990's and 2000's
- ☑ Control technology primarily from the 1990's

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…Enter *Digital Series* ACTION® Manipulators

- ☑ Based upon years of discussion with manipulator users *and* our experience in other areas
- ☑ Latest hydraulic control elements, mechanical design
- ☑ Digital control system, exploiting latest practical capabilities while maintaining simplicity
- ☑ Industry-standard hardware with open-source components and programming, non-proprietary!
- ☑ Depth and breadth of experience in different plants with different machinery, crucial for effective new designs—a major advantage over one-dimensional companies.

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In Summary…

- ☑ *Digital Series* **ACTION®** Manipulator is a truly up-to-date design—the most current available
  - ☑ Latest technology in mechanical and hydraulic components
  - ☑ Industry-standard digital controls—open, customizable, expandable, with no proprietary components

- ☑ Vulcan Engineering Co. has the depth and breadth of experience and personnel to collaborate with Customer on configuring, deploying and supporting equipment.

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