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Enhanced Dynamometer for Conducting Long-Term Brake Wear Testing

Grant Adams
Virginia Commonwealth University

Andres Alvarez del Piño
Virginia Commonwealth University

Casey Greenstreet
Virginia Commonwealth University

Matthew Wall
Virginia Commonwealth University

CAPSTONE DESIGN EXPO 2017

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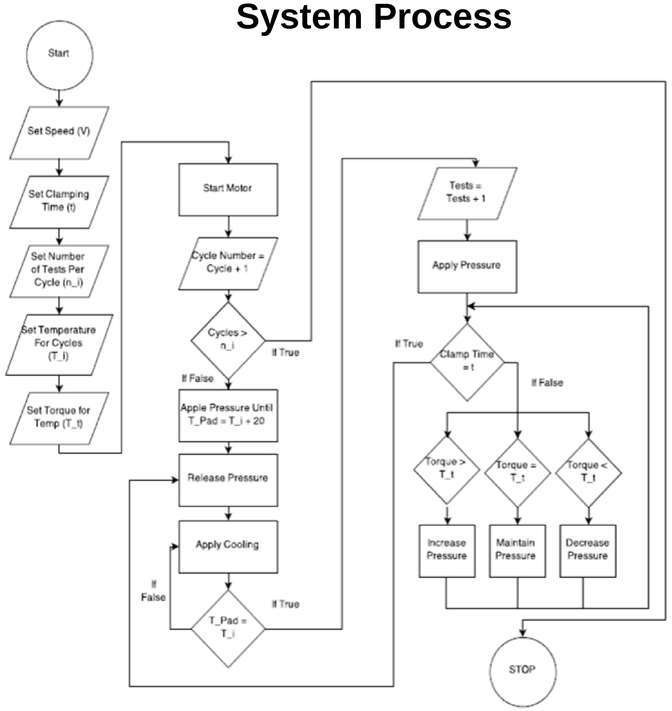
MNE502 **Team members:** Grant Adams, Andres Alvarez del Piño, Casey Greenstreet, Matthew Wall
Faculty adviser: Charles Cartin, Ph.D. **Sponsor:** FDP Virginia Inc **Sponsor adviser:** Cody Boyd, Plant Engineer

Objective

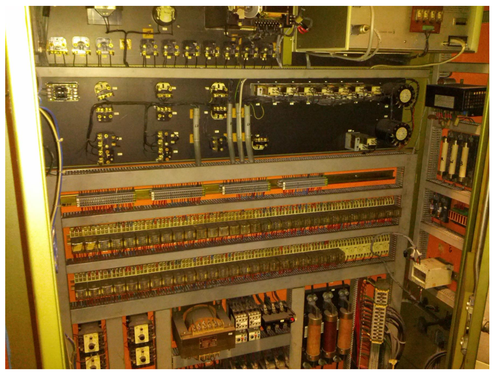
The objective of this project is to create a simplified process for brake life testing with the use of programmable logic controls to compete in today's industry. The removal of antiquated components such as switches, gages and relay control boards are required to augment the current machine.

System Process

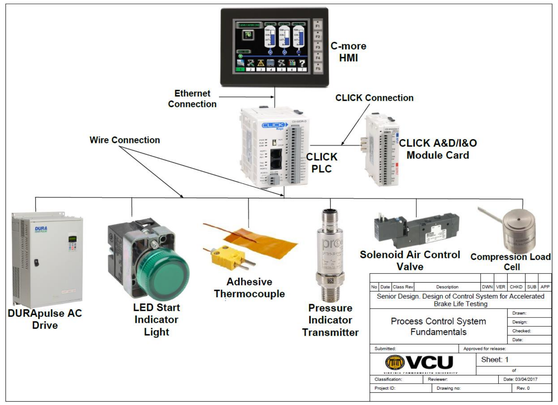


Current Configuration

The Automatic Test Bench RWS 60 S is currently operated with the use of sensors, relays and switches. The items operate under a basic logic of "If this happens, then this must happen." This current function has been in use since 1974, when the machinery was built.



Optimized Design



Improved Technology

All prior electrical systems will be removed in order to update the entire structure for the new components.

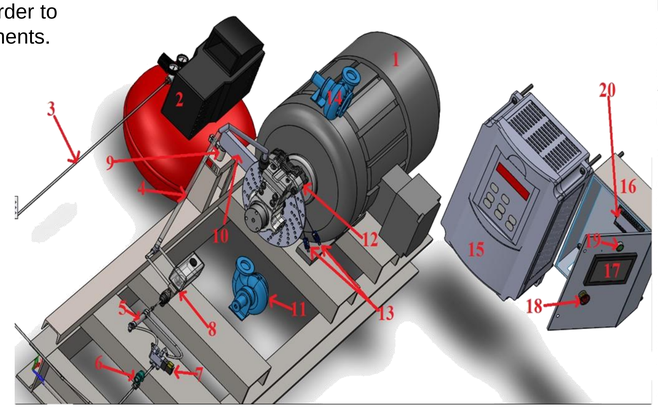
- Click PLC (Programmable Logic Controller)
- C-more HMI (Human-Machine Interface)
- VFD (Variable Frequency Drive)
- Pressure Transmitter
- Thermal Transmitter
- Load Cell Transmitter
- LED Start Indicator Switch

Enhanced Practicality

With the use of the new PLC and HMI products, the brake life testing operation will be brought down to a one man operation. The easy to use HMI will simply prompt the user to input the required information in the correct fields, and press start. The PLC and HMI will take care of everything else until the tests are complete.

Data Retrieval

The operator simply connects a data storage device to the HMI to retrieve the output file from the test. The output file is already pre-formatted as a .csv file for easy transfer into a Microsoft Excel Spreadsheet for data post-processing.



DESCRIPTION

1. AC Motor.
2. 100 PSI Compressor with 10 Gallon Tank.
3. Air Line.
4. Brake Line.
5. Pneumatic Cylinder.
6. Pressure Indicator Transmitter.
7. Three-way Solenoid Air Valve.
8. Master Cylinder.
9. Compression Load Cell.
10. Torque Arm.
11. Cooling Fan.
12. Caliper and Brake Pads.
13. Thermocouples.
14. Fumes Exhauster.
15. VFD.
16. Control Panel.
17. HMI
18. E-stop Button.
19. LED Green Light Indicator.
20. Click PLC and I/O Module Card.

VCU School of Engineering

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