

Testbed 3

Testing Standard Operating Procedure

Lab: POETS Research and Development Center

Department: MechSE

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Section 1: Overview

Type of SOP: ☐ Process ☐ Hazardous Material ☐ Hazardous Class of Materials ☒ Equipment

Synopsis:

This SOP describes the proper testing operation of the Testbed 3 dynamometer test stand. The testbed has dangerous electrical and mechanical hazards and this SOP works to minimize risk to the operators.

Section 2: Risk Assessment Summary (Hazards and control measures)

Materials:

Material (name, CAS #, other ID)	Hazards
None	

Relevant References for Material Hazards:

N/A

Equipment Hazards:

Electric Drives – High voltage (400+ VAC, 600+ VDC) and high current (500+ A)

Electric Motor – High voltage, high current, rotation

Dynamometer – High voltage, high current, rotation

Hazardous Conditions:

Conditions are considered low hazard

Technique Hazards:

Techniques are considered low hazard

Personal Protective Equipment

The following are in addition to proper dress for work in a laboratory:

Safety glasses

Earplugs

Engineering Controls

Machine guarding

Safety stanchions and chain

Section 3: Procedures

Before powering on any of the equipment associated with the testbed a visual inspection is required. Look for exposed or fraying electric wiring, ensure machine guarding and barricades are in place. Check that all communication and safety cables between the PC, PXI chassis, and drives are properly connected. Ensure that the emergency off button is within reach of the operator. Verify that the building chilled water loop's pump is on and circulating (control panel located in bay B on West wall).

Once the visual inspection is complete, ensure that the PXI chassis used for data acquisition and the control PC are powered on and connected. If the drives are to be used in regenerative mode (i.e. the drive connected to the dynamometer will be supplying power to the drive connected to the motor), first close the breaker switch on the DC link between the two drives (panel is labeled "DC Link"). Next, power on one or both of the drives by closing the breakers switches on the wall next to the testbed (labeled 'DYNO' for dynamometer and "MOTOR"). Wait for the drive(s) to complete their power on sequence and ensure that the LED on the front panel is lit and that no warnings are displayed.

Open the Desktop shortcut labeled "Testbed 3.lvproj" which will open the LabVIEW project containing the testbed application. Find the project VI labeled "Launcher.vi" and click the run arrow which will start the application. Click "Connect to Hardware" and ensure that all sensors are reading data (should be low noise centered at zero with no equipment powered). If necessary, edit the hardware configuration settings to ensure that all sensor channels and drives are configured correctly. Ensure that the safety limits are set according to the various equipment specifications. The drive(s) can manually be controlled using the manual control panel screen, or a test profile can be created and drive setpoints stepped automatically. Before running a test profile, manually operate the testbed at low speeds and verify all sensors are reading data and within safety limits.

Once the desired testing is complete, wait for the motors to stop spinning. Open up all breakers and ensure that the drive(s) power down completely (this will take several seconds as the internal capacitors discharge).

If at any point during operation any immediate hazards are noticed and the drives are not automatically shut down, use the testbed software to stop the test. Use the emergency off buttons if that fails or if you are not within reach of the control PC. If maintenance actions are required, follow the Testbed 3 Maintenance SOP

Section 4: Waste Disposal/Cleanup

No waste disposal/cleanup is necessary.

Section 5: Emergency Response

A class ABC fire extinguisher and first aid kit is located at the door of the lab Bay.
In case of a fire, exit through either of the two doors to the lab bay.
In the case of out of control rotation or equipment malfunction, wait for rotation to stop after using the emergency off button as dislodged parts may be thrown from the testbed.

Section 6: Additional Information

Advice:

1.

Checklist:

- ☐ Proper fire extinguisher is nearby.
- ☐ Another researcher is nearby and knows the hazards present.
- ☐ Emergency off button is within reach
- ☐ Visual inspection has been completed

References:

Training Documentation

Signing this document means that you have read and understand all aspects of this Standard Operating Procedure. The supervisor is the person that acknowledges you took the training and understand the procedure. They can be a lab manager or researcher assigned by the PI to oversee this particular SOP.

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