

## Trident: Controller for Complex Structural Component Testing

Trident is a PC based software/hardware system designed to operate large scale hydraulic actuators in real time to test small scale masonry wall structures by statically compressing them while applying cyclic sinusoidal side loads. Trident can also be used to similarly test reinforced concrete and steel frame structures and components. The LabVIEW program provides an active feedback to produce a uniform vertical dead weight compression load on the wall during testing, ramping, and side loading. Multiple user controlled screen and input variables allow features such as ramp speed and ramp target to be applied while a comprehensive set of plots deliver graphical feedback on the status of the test. Data is stored in ASCII format and can be further evaluated using MS Excel.

## Features

- Allows for the definition of relationships between actuators that will be real time closed-loop controlled during testing. For example, assume a masonry wall is being racked horizontally by one actuator and two other actuators are providing vertical loads at opposite ends of the wall cross beam. The relationship can be the three constraints:
  - That the vertical displacement at each end of the wall be equal.
  - That the total vertical load be constant.
  - That the horizontal displacement or load be as specified by the user.
- Allows the user to enter location information and calibration factors for 16 channels (upgradable to 128 channels) of response transducers.
- Creates the sinusoidal or ramp drive signal to the actuators while monitoring their load and displacement and assuring the relationships are met.
- Provides for plotting, archiving, post test data review, and exporting of all data.
- Test data set ups can be saved and retrieved for later use, review, and modification.
- Operates at a sampling rate suitable for quasi static testing.
- Can accommodate 1-8 actuators.



