



Seismic Sensor Test Fixture

California Mechatronics Center

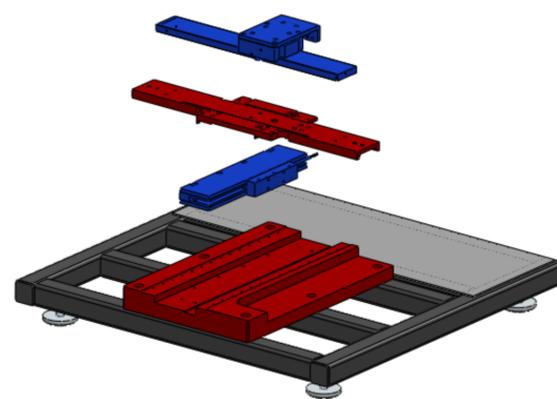
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PROJECT OVERVIEW

The purpose of this project is to test and verify the California Mechatronics Center's seismic sensor with a test fixture that provides accurate positional displacement data while simulating a seismic event.

The constraints of the project include:

- Test fixture must have accurate positional feedback to compare with seismic sensor data
- Test fixture must be semi-portable
- Test fixture is constrained to a budget of \$5000.00



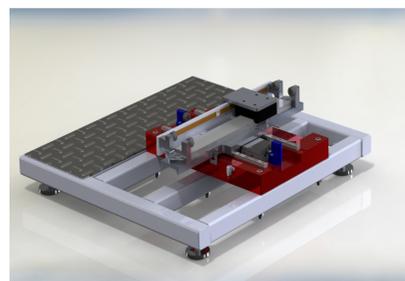
- Machined Parts
- Motors

HOW IT WORKS

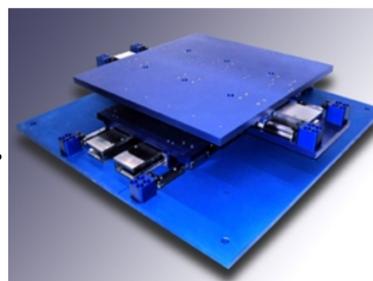
Custom mechanics had to be designed and built to enable the two motors to be used together. A frame was built to carry the stage as well as the electronics and was designed to keep the center of gravity as low as possible. Programs are sent to the machine to move both motors and replicate earthquake data and the position data is sent back to the operator. The data can then be compared to the CMC's sensor data to verify their design.

BUDGET CONSTRAINTS

There are commercially available options like the blue H2W motion table but with a cost of about \$20,000 which is four times the available budget. With donated parts and labor the test fixture was built with similar performance.



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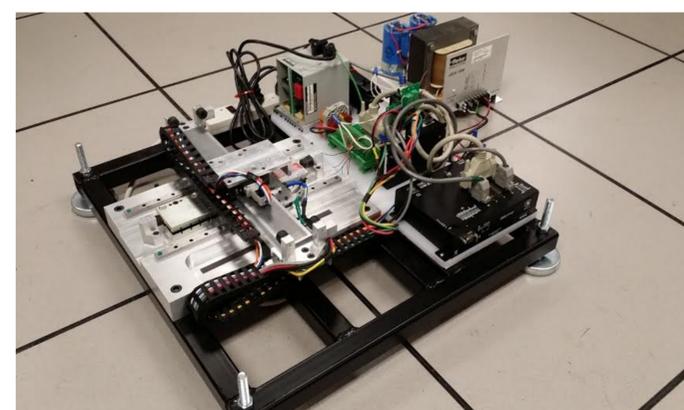


MOTORS

The speed and accuracy requirements for this machine made linear motors the best option for motors. With access to CMC's spare parts, a Baldor single axis linear stepper was selected for the top axis and a Kollmorgen direct drive linear servo was selected for the bottom axis. The Baldor is capable of 2.8 lbs continuous force and 5 lbs maximum. The Kollmorgen is capable of 6.8 lbs continuous and 27 lbs maximum.

POSITION DATA

The Renishaw magnetic linear encoders provide feedback with position data and have a resolution of 10 μ m, or about 0.0004 inches.



PROJECT OUTLOOK

The test fixture will provide linear motion in two axis to replicate earthquake data and provide feedback with position and frequency data.