

The Hope Group Redesigns and Builds Multi-Axis Motion Platform for the Navy

The hydraulically actuated motion platform capable of carrying a 30,000 pound payload was originally designed and manufactured to provide a force-and-motion environment suitable for testing shipboard equipment, particularly satellite antenna systems. Unfortunately, the existing system did not perform to the minimum specifications required by the contractor.

Design engineers at The Hope Group were engaged to review the system and determine what was keeping it from meeting its specification requirements. A thorough engineering review was conducted and a report was presented that reviewed all of the pertinent parameters of the project. This included, among other things, the center bearing load, full motion analysis, proportional valve analysis, review of performance discrepancies, and all components including cylinders, pumps, motors, accumulators, and heat exchanger.

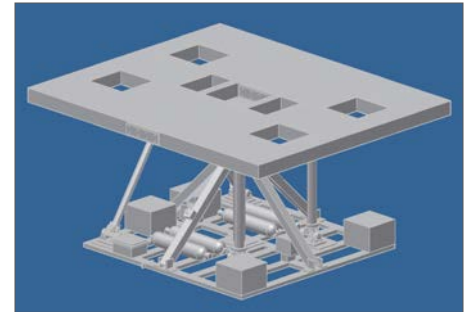
As a result of the analysis, the contractor recognized that a major rebuild was required and it engaged The Hope Group to perform the work. The system included a motion platform, hydraulic pumping unit and a motion controller. The controller used a standard PC-type computer to provide a user interface and operation features, while a dedicated system controller implemented individual leg servos, hydraulic power unit control, and system monitoring functions.

The platform itself employs a unique configuration of four hydraulic legs to provide a controlled motion to heave, yaw, pitch, and roll, as might be expected in a ship at sea.

The control computer interfaces via USB to an outboard controller in a separate, wall-mounted cabinet. The software provides a means of manual control of the platform, the ability to produce a variety of motion profiles, the ability to store and replay customer-produced motion profiles, and the ability to interface to a host computer for real time motion control.

The internally generated profiles include a versatile, user-configurable sum-of-sines algorithm. The controller is also equipped with a data acquisition system that permits simultaneous logging of actual and commanded platform instantaneous position. The data acquisition system makes automated performance testing possible, and the test software includes an automated test facility.

The system is powered by a hydraulic pumping unit that comprises two 70-HP motors, each equipped with a pair of 35 gpm pumps operating in tandem. The HPU can supply sufficient oil to allow continuous sinusoidal oscillation in roll with an amplitude of 13 degrees and a period of seven seconds. The HPU system is completely controlled by the motion control computer.



Using computer-aided design software, The Hope Group re-engineered a motion simulator that was not meeting performance standards.



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The re-designed and re-manufactured positioning table replicates shipboard pitch, roll and yaw, permitting successful testing of new radar antennas.