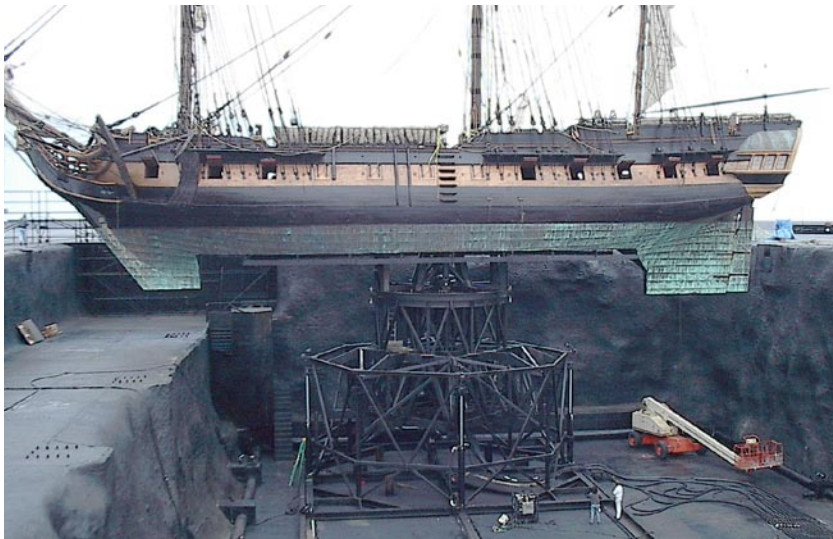


Drive & Control profile

“Master and Commander”— Rexroth on the High Seas in Hollywood



The replica of the HMS Surprise is fully dressed on the motion platform just before a six-acre tank is flooded with water.

Bosch Rexroth is right up there with the action in Hollywood, supplying the hydraulic components for the double Oscar award-winning high seas adventure film “Master and Commander” starring Russell Crowe. As 30-foot waves crashed over the sides of *H.M.S. Surprise*, the 179-foot sailing ship remained afloat, heaving and pitching with the ocean and looking like the original 19th century naval frigate it replicates. The typhoon that buffeted the ship was also a replica, with winds, rain and

swells that repeatedly capture the attention of audiences who are viewing the blockbuster feature film, *Master and Commander: The Far Side of the World*.

Master and Commander is one of a string of motion pictures that feature a behind-the-scenes partnership between Rexroth components and its distributor, Hydraulics Controls, Inc. (HCI). The partners have also collaborated on the movies *Jurassic Park*, *Spider-Man* and *Titanic*. Not surprisingly, Dan Sudick, special

Challenge

Multi axis motion platform simulates full-size replica of 19th century sailing ship moving on the high seas

Bosch Rexroth Solution

- Industrial Hydraulics
- Rexroth 4WRZ25 proportional valves
- Rexroth AA10VSO140 axial piston pumps

Benefits

- One-of-a-kind multi-axis 60 ton gimbal
- Operate flawlessly while being bombarded with hundreds of gallons of water
- Eight cylinders provide motion control: up, down, pitch and roll axes
- Four custom-built high-flow manifolds
- Design powered by Rexroth AA10VSO140 axial piston pumps

effects coordinator at Commander Production Ltd., asked HCI to provide the hydraulic components to power a multi-axis motion platform or gimbal. The gimbal would control a full-size replica of a 19th century naval frigate that would “sail” in a 6 1/2-acre water tank with a crew of more than 100 people on board.

To simulate the full range of a ship at sea and in battle, the gimbal needed to provide various axes of motion, while constantly being bombarded with hundreds of gallons of water. HCI designed a hydraulics system capable of powering such an unusually large gimbal. Paul Stavrou, manager of Bosch Rexroth’s Technology Group, ran computer simulations on the design using Rexroth’s HYVOS software. HYVOS is a proprietary software program that allows designers to simulate a single-axis servo system. In the *Master and Commander* project,



Two 750 HP diesel engine power packs were used extensively to drive four Rexroth AA10VSO140 axial piston pumps.



With the rocky coastline of Baja, Calif., as a backdrop, the main hydraulic valve stand features four Rexroth custom high-flow manifolds and six Rexroth 4WRZ25 proportional valves.

HYVOS evaluated the HCI design to determine if the gimbal would operate as desired.

The final design called for eight cylinders to control the motion of the gimbal. Four large stroke

cylinders addressed the heave axis, lifting the ship up and down. Two small stroke cylinders provided the pitch axis, raising and lowering the bow as needed, and mid-size stroke cylinders controlled the roll axis, enabling the ship to roll from port to starboard. Two 750 HP diesel engines provided power to the cylinders on the gimbal.

In addition to the central hydraulic system, Bosch Rexroth designed and built four custom high-flow manifolds for the project. A pressure header and a return header, both custom-built, handled the plumbing from the hydraulics system to the gimbal. HCI also provided the hydraulic components for two smaller gimbals used in the shooting of the film.



Hydraulic Controls Inc. provided the hydraulic components to power a gimbal (multi-axis motion platform), which controlled a full-size replica of a 19th century naval frigate. The gimbal measured 40 feet tall with a 40-foot base and weighed 60 tons.

Rexroth
Bosch Group