

## Servo Hydraulics



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When large forces have to be delivered acting in both directions, hydraulic cylinders have no alternative. Especially when used with servo valves, allowing the cylinders to move very accurately at high speeds. That is why servo valves are applied in the Maritime world for motion compensated bridges, cranes and pile grippers.

### Machine Dynamics

Servo valves, or better named electro-hydraulic valves, use a solenoid to actuate a first stage spool, sometimes followed by a second stage valve to run the main valve. A built-in computer allows the valve to be opened or closed very quickly or keep the valve opened at a certain level. This makes servo valves suited very well to drive hydraulic cylinders or motors for high dynamic operation.

The speed of the hydraulic flow through a servo valve is a non-linear function of the valve opening and the pressures on both sides of the valves, which depend on

the pump characteristics on one side and the machine dynamics on the other side. This makes servo valves very difficult to operate in practice.

### Control System

Controllab has developed a control system for servo valves that really works. The servo valve controller can be implemented on the existing machine controller hardware or added as a separate PLC. The servo valve controller assures that a given position of speed setpoint is met by the cylinder or hydraulic motor, without oscillations or other instabilities.

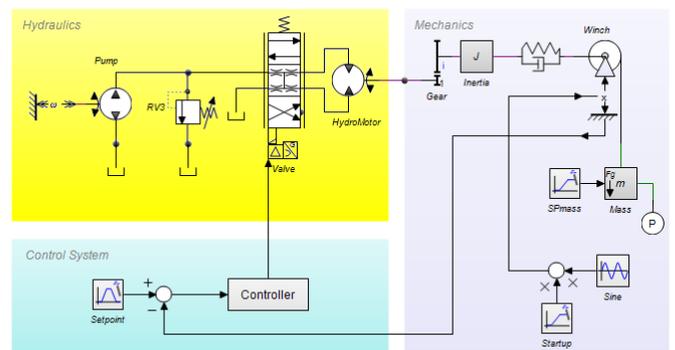




Photo: courtesy of SMST

We use simulation models which includes pumps, servo valves and the machine dynamics for the development of the controller. Using simulations we can tune the controller in such a way that a good and stable operation obtained in practice.

## Access Bridge

SMST provides a range of Telescopic Access Bridges (TAB) that can transfer personnel safely to an offshore structure or the quay side. A recent introduction is the motion compensated TAB-M series. Controllab was asked to introduce model based design in the control department of SMST, and to provide tooling and training for the controlling of servo valves.

Controllab has developed the modeling and simulation package 20-sim. With this package you can model and simulate machines. This was used to implement the servo valve control system. The engineers of SMST were taught to handle this model, run simulations and inspect the performance using virtual reality.

## Motion Compensated Crane

The TTS Colibri™ is double arm lifting device that can be placed on top of a knuckle boom crane to provide motion compensated cargo lifts. The tip of the Colibri compensates in the horizontal plane while the winch takes care of the vertical motion.

The Colibri is equipped with servo controlled hydraulic cylinders. Controllab provided the control system for the Colibri and helped TTS with the commissioning and ship acceptance test. The Colibri is now successfully used on a windfarm support vessel, and new orders are on the way.

## Track Record

Controllab is active in the Marine and Offshore market for more than 20 years. Our engineers have gained a thorough understanding of hydraulics, servo valves and machine design. Please contact us if you are developing machines that require servo valves for a fast and accurate motion.

## Contact Us

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