

# Orbital Motion Simulator

## Project Description

The aim of the project was to design a system that will support rotation of remote weapon station (RWS) in isolation to, and in parallel axes off-set to, a rotating turret. The project was provided by Kongsberg Protech Systems (KPS), who have numerous customers that request to have the RWS mounted at various set-ups onto a turret-carrying vehicle. The great level of complexity of design, integration, testing and verification requires a "demo system" that simulates how the system will respond in real operational environments.

## Product

A system that supports parallel axis rotation of the RWS at offsets up to 40 cm was designed. The system; named OMS; offers offset increments of 10 cm intervals and can deliver rotational speeds up to 2.1 rad/sec and 6 rad/sec<sup>2</sup> acceleration.



Kjetil Fjeld



Haytham Ali



Anders Gunbjørnsen



Martin Sandberg



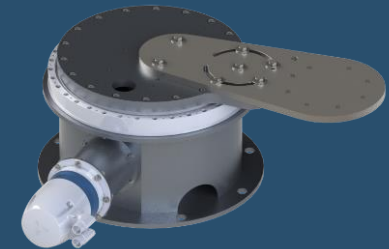
Heidi Kallerud



Fredrik Thoresen



<http://www.oms-hsn.no>



## Load Scenario

The OMS is designed to support a 250 kg RWS at an offset of 40 cm from the rotational axis. The RWS can be rotated at speeds up to 2.1 rad/sec. The system is further designed to endure the motion of a motion table which combines translation and rotation about three axis; each with a specified displacement, velocity and acceleration. The complex combined motions expose the system to considerable bending and shear stresses. The OMS is designed to withstand a complete and sudden stop of a worst case load scenario. A comprehensive dynamic model of the system was developed in SimuLink, through the use of differential equations and vector analysis. The model uses a Matlab function block with different inputs to calculate the torque needed to satisfy the given input conditions.

