



## Forces on ships in the Port of Rotterdam

After the permanent opening of the 'Beerdam', ships locally encounter difficulties entering the Port of Rotterdam because of strong and unexpected cross currents.

Commissioned by the Rotterdam Port Authority, Svasek Hydraulics carried out numerical simulations to assess the forces the ships encounter under influence of stratified cross currents. The FINEL3D flow model was used to calculate the longitudinal forces, transverse forces and moments by integrating the pressures around the ship's hull. The stratified flow (salt and fresh water) was included. Various approach channels and keel clearances were studied.

The results of FINEL3D were compared with physical model tests, which had been carried out by MARIN, the Netherlands, by order of the Oil Companies International Marine Forum (OCIMF). The results of the numerical FINEL3D computations correspond well with the results of the physical simulations.

**Client**  
Port of Rotterdam

**Location**  
Rotterdam, the Netherlands

**Date**  
2001

**Services**  
Numerical calculation of forces and moments on a ship for various situations: angle of approach velocity, keel clearance and stratified and unstratified situations

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