

## LIST OF OFFSHORE REFERENCES

### Drilling and Production Platforms

Project	Client	Description
Bluewater FPSO Conversion Project 'AOKA MIZU'	Bluewater Energy Services B.V., The Netherlands	Basic engineering including Class approval of the Hull part.
GVA7500 semi-submersible DP3 deep water drilling unit for harsh environment (SeaDrill)	GVA Consultants AB, Sweden	Basic engineering of machinery, HVAC, accommodation and electric systems including calculations, PIDs, arrangements, functional descriptions, conceptual routings and preliminary weight estimations.
CGBS oil & gas platforms LUNA and PAB for Sakhalin II project	RR Offshore, Finland	Coordination of MMO engineering including method statements, schedule & follow-up, fabrication engineering supervision, job cards, material flow control and site assistance in Astrakhan and Nahodka.
Kashagan ePF Module 10 Utility	RR Offshore, Finland / Aker Kvaerner	Engineering management, engineering coordination for all disciplines including support for procurement, workshop engineering, work package preparation (work planning), field engineering.
SHELF-7 drilling rig	RR Offshore, Finland (Lukoil, Russia)	Conceptual technical specification, diagrams for piping systems, engineering plan preparation, complete 3D model.
Atlantis floating production unit for BP	GVA Consultants, Sweden	Project Interface Manager; Project Coordinator; Manager and Lead Engineer of basic strength analysis for lower hull area; structural basic design assistance.
Jotun FPSO	Kvaerner Masa-Yards, Turku	Detail steel design of turret area.
AMOCO Liuhua 11-1 offshore production platform conversion project	AMOCO, USA	Material engineering assistance at Rauma Offshore Contracting, Houston, Texas, USA.
Semi-submersible drilling rig GVAC Petrobras XXIII (ex. Vinni)	Götaverken Arendal, Sweden	Design of the legs and pontoons including outfitting; design of the entire drilling area by using model technique.

GVA 5000, a floating production platform	Götaverken Arendal, Sweden	Piping design in the legs and pontoons.
Vildkat rig	Götaverken Arendal, Sweden	Re-designing of the entire mud treatment area, including layout design, inspection of the actual situation onboard and detailed work drawings.

## Drilling Ships

### Project

Drill ship, TENTECH type

### Client

Norwegian Rig Consultants A/S, Norway

### Description

Project work for mud and drilling areas, layout design, outline specification, FEM analyses and hydraulic pipes for derrick.

Drill ship, DP type for arctic condition

Rauma-Repola Mäntyluoto, Finland

Design of the entire drilling area, the diving section and the engine room; procurement and construction supervision on site.

## Heavy Lift Vessels

### Project

NMA heavy lift vessel

### Client

NMA Marine & Offshore Contracting, The Netherlands

### Description

Basic design / steel for widening the vessel TAK hull to 36 m.

NMA heavy lift vessel

NMA Marine & Offshore Contracting, The Netherlands

Project design for two different sizes of heavy lift vessels (130-150 m) including midship section for weight estimation and preliminary longitudinal strength check in accordance with classification societies.

NMA heavy lift vessel

NMA Marine & Offshore Contracting, The Netherlands

Newbuilding contract assistance for a heavy lift vessel project of abt. 40,000 tons steel weight.

NMA heavy lift vessel

NMA Marine & Offshore Contracting, The Netherlands

Complete concept and contract design of the world's largest heavy lift vessel including all machinery and ballasting systems. Hull steel design including a.o. midship section and FEM analysis.

BigLift heavy lift crane vessel

BigLift BV, The Netherlands

Complete concept and contract documentation including model basin tests and FEM analysis (LOA: 164,3m, Bmld: 30,1m, 2 x 1200 t cranes).

Fairmast heavy lift vessel

Jumbo Shipping, The Netherlands

Comprehensive analysis of hull structure in different loading cases

Machinery study for a heavy lift vessel	Kahn Scheepvaart B.V., The Netherlands	using FEM analysis. Comparison of four different machinery alternatives, including diesel mechanical machinery, diesel electric machinery, conventional shaftline and pod propulsion.
Semi-submersible heavy lift vessel 'Transshelf'	Wärtsilä Turku Shipyard, Finland	Detailed steel design of the entire cargo and engine room area. 3D-detailed design of the main engine room. Outfitting design of the deck, winch and steering gear room.
Machinery study on a 24,000 dwt heavy lift	Siemens, Germany	Comparison of conventional and diesel-electric machinery on COSCO 24,000 dwt semi-submersible heavy lift carrier (ref. 173).
NMA heavy lift vessel	NMA Marine & Offshore Contracting, The Netherlands	All stability, hydrostatics and hydrodynamics.
Arctic lash barge feeder	Hollming Oy, Finland	General and machinery arrangement, weight calculations, specification, hull form design and stability and hydrostatics.

### Offshore related ships

Project	Client	Description
MSV Fennica and Nordica, 10 MW multipurpose icebreaker	Aker Finnyards, Rauma	Detail design covering total electric and deck outfitting, steel and piping for fore ship.
Diving support vessel	Valmet Laivateollisuus Oy, Finland	Steel, outfitting and engine room design.
Oil recovery vessel	Hollming Oy, Finland	Complete design of the vessel: steel, outfitting, interior, electrical and machinery.
Methanol carrier, USSR	Rauma-Repola Oy Savonlinna Shipyard, Finland	Complete design of the vessel: steel, outfitting, interior, electrical and machinery.

### Offshore related studies

Project	Client	Description
DP3 study for Aoka Mizu FPSO	Bluewater, Netherlands	Definition and studies for upgrading existing DP1 design to DP3 level.
Motion and acceleration study (ref. 342)	Eunice Energy Ltd, Greece	Evaluation of wave induced motions and accelerations for a

VLCC/FPSO concept study (ref. 262)	Rolls-Royce Kamewa, Sweden	turret moored power barge intended to operate in the Mediterranean outside the Greek coast where water depth is 600 m. Study regarding VLCC design for easy conversion into a FPSO as a part of USA based Merlin Production's project.
Retractable thrusters for use on offshore loading shuttle tanker (ref 95)	Aquamaster, Finland	Review of possibilities to upgrade existing Suezmax tanker for offshore loading duty.
Machinery study on a 24,000 dwt heavy lift (ref. 173)	Siemens, Germany	Comparison of conventional and diesel-electric machinery on COSCO 24,000 dwt semi-submersible heavy lift carrier.
Machinery study for FPSO (ref. 149)	Wärtsilä Diesel, Finland	Comparison of gas diesel and gas turbine based power plants for use on a FPSO vessel operating on Jotun field.
Machinery study for a shuttle tanker (ref. 109)	Hibernia Lifting Company	Machinery study for a shuttle tanker for Hibernia Lifting & Transportation company.
Machinery development for a 125,000 DWT North Sea shuttle tanker	ABB Strömberg Drives, Finland	Introduction and development of novel diesel-electric machinery concepts for a shuttle tanker at the North Sea.
Machinery study for a UT-712 type supply vessel	Wärtsilä Diesel, Finland	Evaluation of three different propulsion and electric power plant options from economical and technical point of view.
Thruster system comparison for a DP drill rig (ref. 6)	KaMeWa AB, Sweden	Evaluation of four different thruster propulsion options from economical and technical point of view.

### Offshore stability and hydrodynamics

Project	Client	Description
NMA heavy lift vessel	NMA Marine & Offshore Contracting, The Netherlands	All stability, hydrostatics and hydrodynamics.
Peregrine 7 DPDS drilling ship	R&B Falcon, USA	All stability for classification and hull external and internal modifications; hydrostatics and hydrodynamics.
Peregrine 1 & 4 DP drilling ship	R&B Falcon, USA	All stability for classification and hull external and internal modifications; hydrostatics and hydrodynamics.

## Offshore supervision

Project	Client	Description
Spar production platform Project Tahiti (Truss Spar)	Undisclosed	Site supervision of all disciplines and sub-supplier supervision.
Oil drilling and production platform truss spar project Constitution	Kerr-McGee Oil and Gas Corp., USA	Supervision and site manager at Technip Offshore Finland Aker Mäntyluoto.
Oil drilling and production platform truss spar project Mad Dog	Kerr-McGee Oil and Gas Corp., USA	Supervision and site manager at Technip Offshore Finland Aker Mäntyluoto.
Gas and oil drilling and production platform cell spar project Red Hawk	Kerr-McGee Oil and Gas Corp., USA	Hull supervision at Gulf Marine Fabricators in Ingleside, TX, USA.
Oil drilling and production platform truss spar project Gunnison	Kerr-McGee Oil and Gas Corp., USA	Supervision and site manager at Aker Mäntyluoto Works, Finland and supervision at Aker Gulf Marine in Corpus Christi, TX, USA.
Horn Mountain truss spar	BP/Vastar, USA	Supervising assistance at Aker Mäntyluoto, Finland (hull, outfitting, piping, electric).
World's first truss spars Nansen and Boomvang	Kerr-McGee Oil and Gas Corporation, USA	Supervision and site manager at Aker Mäntyluoto, Finland (hull, outfitting, piping, electric).
Exxon DDCV oil drilling and production platform project Diana (classic spar)	Exxon, USA	Supervising assistance at Aker Mäntyluoto Works, Finland (hull, outfitting, piping, electric) and supervising assistance at Aker Gulf Marine, Corpus Christi, TX, USA.
Spar oil drilling and production platform project Genesis (classic spar)	Chevron/Exxon Spar	Supervising assistance at Aker Mäntyluoto Works, Finland (hull, outfitting, piping, electric) and at Aker Gulf Marine, Corpus Christi, TX, USA.

## Steel Basic Design / Classification References

We have so far about 100,000 hull steel Basic Design / Classification hours executed.

This is accumulated by doing some 30 pcs of 3D hull models, complete hull or partly, with Tribon.