

ELR Employment Projects - Confidential

Date:

1990-1996

Org:

Lloyd's Register

Sector:

Lifting

Project:

Derricks

Detail:

Crane Structure

Activity:

Design Analysis

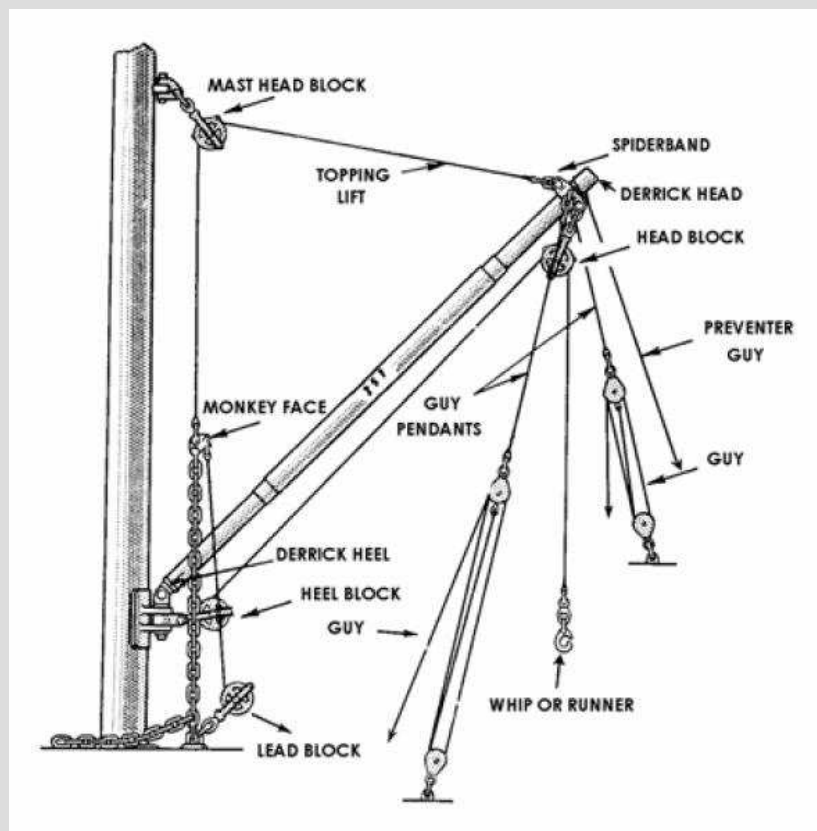
Role:

STRUCTURAL ENGINEER

Resources:

Derrick program & long-hand calculations

Description:



ELR Employment Projects - Confidential

Date:

1990-1996

Org:

Lloyd's Register

Sector:

Lifting

Project:

Dockside Container Cranes

Detail:

Crane Structure

Activity:

Design Analysis

Role:

Structural Engineer

Resources:

FEA & long-hand calculations

Description:

Appraised to BS2573, FEM & JIS B8211 Codes for European and Asian builders. These cranes require a large amount of routine calculations and assumptions on load distributions for statically indeterminate loadpaths when appraisal is made using long-hand calculations. FE Analysis is alternatively used but this also requires much time and effort as the crane configurations always differ. FE Analysis obviously solves the loadpath aspect without effort but load case data compilation still takes time. The model tends to be a highly idealised representation of the real structure and considered judgement is required when assessing the results.



ELR Employment Projects - Confidential

Date:

1990-1996

Org:

Lloyd's Register

Sector:

Lifting

Project:

Gantry Crane

Detail:

Crane Structure

Activity:

Design Analysis

Consultant Report

Role:

Structural Engineer

Resources:

Crane analysis program, fatigue damage program & long-hand calculations

Description:

Coal Off-Loading Gantry Crane

Cranes handling materials with grabs can be prone to fatigue damage because of impact and consistently high working loads.

Fatigue damage had been reported following annual inspection. The objectives of the work were:

- i) estimate operational duty of the crane
- i) calculate cyclic loadings for critical parts of the structure & mechanical systems
- ii) calculate fatigue lives of critical parts
- iii) estimate remaining lives of critical parts and associate with inspection periods.



ELR Employment Projects - Confidential

Date:

1990-1996

Org:

Lloyd's Register

Sector:

Lifting

Project:

Heavy Lift Tower System

Detail:

Installation Structures

Activity:

Design Analysis

Role:

STRUCTURAL ENGINEER

Resources:

Long-hand calculations

Description:

Heavy Lift Tower System (Max Load 3200t)

PSC Heavy Lifting scheme appraised for the erection of the world's largest Goliath Crane at Dalian, China. This was considered to be a landmark in heavy lifting history and the Principal Engineering Consultant, acting for the lifting contractor, delivered lectures on the subject at Institution of Structural Engineers meetings. The analytic work comprised long-hand calculations and the plans were examined for compliance with the requirements of BS5400 & BS5950. The tower guy arrangements were identified as critical details and the designer duly incorporated proposed amendments.



ELR Employment Projects - Confidential

Date:

1990-1996

Org:

Lloyd's Register

Sector:

Lifting

Project:

Heavy Lift Tower Systems

Detail:

Installation Structures

Activity:

Design Analysis

Role:

Structural Engineer

Resources:

Long-hand calculations

Description:

A number of PSC Heavy Lifting schemes were appraised including those for 1000t process plant site placements (UK, Holland & Mexico) & shipyard module lifts (UK). The analytic work comprised long-hand calculations and the plans were examined for compliance with the requirements of BS5400 & BS5950.



ELR Employment Projects - Confidential

Date:

1990-1996

Org:

Lloyd's Register

Sector:

Lifting

Project:

J-Pipelay Stinger & Handling System

Detail:

Equipment Structures

Activity:

Design Analysis

Role:

Structural Engineer

Resources:

Nastran & long-hand calculations referenced to the LR LAME Code

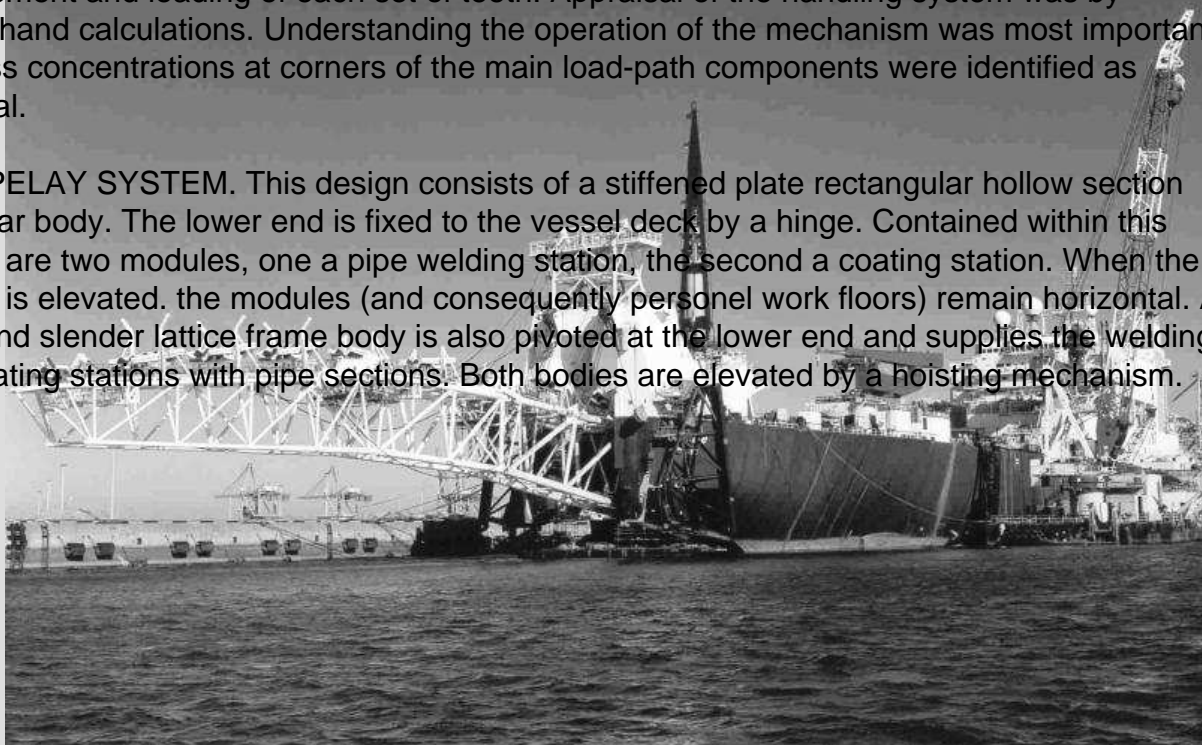
Description:

Huisman Stinger & Handling System for the pipe-laying vessel Solitaire appraised to the LR LAME Code.

STINGER. The Stinger is a slender lattice frame with cast nodes, fixed to the Aft End of the vessel and elevated by the Hoisting System. It guides the new pipe out the Stern at appropriate angle towards the sea bed resting place. Hydro-dynamic and inertial Stinger loading was considered. Appraisal of the Stinger was by FE Analysis.

STINGER HOISTING SYSTEM. The Hoisting System was of mechanical type. A rack was engaged and loaded through one of two sets of square cut teeth at any time. Variation in mechanism length is made by a member sliding along the rack with start-stop motion and fixed to the rack by one of the two sets of teeth. Mechanism length variation was effected by disengaging the second teeth and sliding by hydraulic ram to adjacent rack engagement position. The hydraulic ram on the first teeth are relaxed, causing the second teeth ram to carry full mechanism loading. progressive length variation is made by alternate relaxation, movement and loading of each set of teeth. Appraisal of the handling system was by long-hand calculations. Understanding the operation of the mechanism was most important. Stress concentrations at corners of the main load-path components were identified as critical.

J-PIPELAY SYSTEM. This design consists of a stiffened plate rectangular hollow section tubular body. The lower end is fixed to the vessel deck by a hinge. Contained within this body are two modules, one a pipe welding station, the second a coating station. When the body is elevated, the modules (and consequently personnel work floors) remain horizontal. A second slender lattice frame body is also pivoted at the lower end and supplies the welding & coating stations with pipe sections. Both bodies are elevated by a hoisting mechanism.



ELR Employment Projects - Confidential

Date:

1990-1996

Org:

Lloyd's Register

Sector:

Lifting

Project:

S/Y Goliath Crane (900t)

Detail:

Crane Structures

Activity:

Design Analysis

Role:

Structural Engineer

Resources:

Long-hand calculations

Description:

Appraised for compliance with the requirements of BS5400 & BS2573.

This crane was designed by KONE, fabricated by Hyundai Heavy Industries and was for their own eventual use.



ELR Employment Projects - Confidential

Date:

1990-1996

Org:

Lloyd's Register

Sector:

Lifting

Project:

Vessel Access Door

Detail:

Structure & Mechanical Systems

Activity:

Design Analysis

Consultant Report

Role:

Structural Engineer

Resources:

Nastran & long-hand calculations

Description:

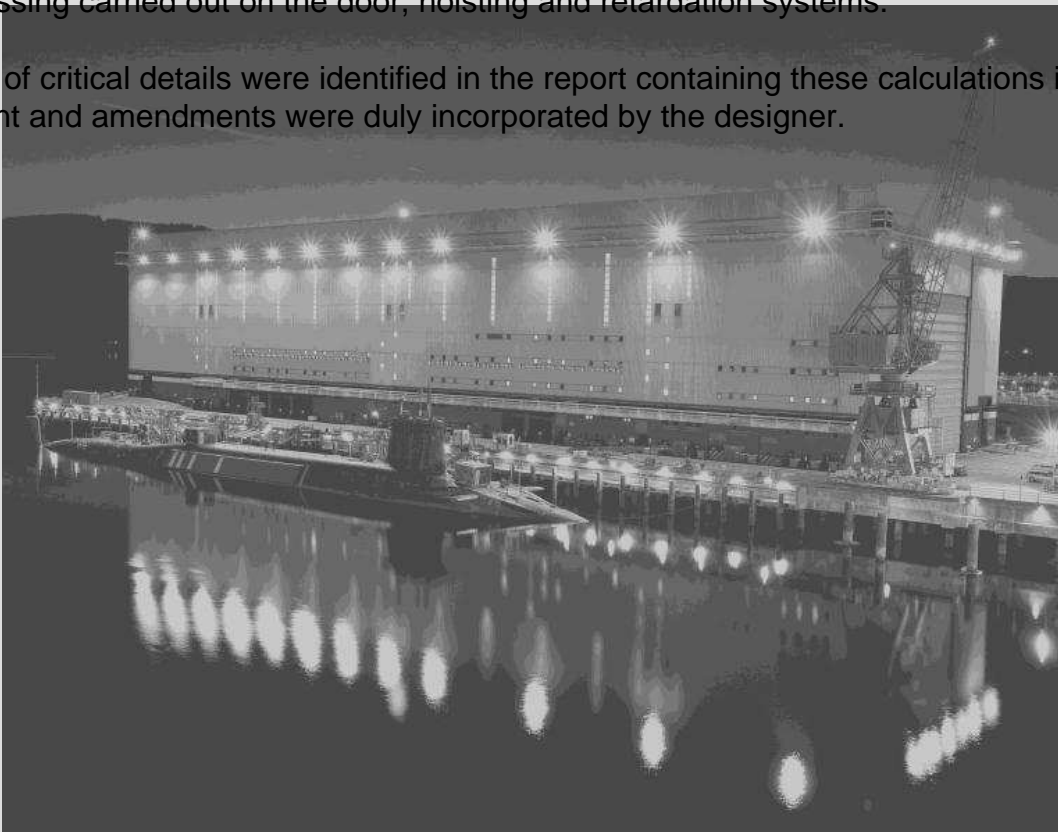
Appraisal of MoD Vessel Access Door & Hoisting System for Facility 210 (Coulport).

This system comprises two doors suspended by ropes at each side.

When lowered, one door covers the upper space and the second covers the lower space. To allow vessel access, both doors rise above the opening, one fitting behind the other. An emergency retardation system comprises two vertical rails supported by rubber spring units at each side of the doors and wedge mechanisms fixed to the doors, actuated when tension is lost in the suspension ropes.

The analytic work required a FEA Transient Dynamic Analysis of the door and retardation system, where the initial condition was the door moving downwards at maximum permitted free-fall velocity, followed by wedge retardating action. No less important was the long-hand detail stressing carried out on the door, hoisting and retardation systems.

A number of critical details were identified in the report containing these calculations issued to the client and amendments were duly incorporated by the designer.



ELR Employment Projects - Confidential

Date:

1990-1996
2006

Org:

Lloyd's Register

Sector:

Lifting

Project:

Mechanical Lift Docks

Detail:

Dock Structures & Hoisting System

Activity:

Design Analysis

Role:

Structural Engineer

Resources:

Crane analysis programs, Mathcad, spreadsheets and long-hand calculations

Description:

Including 5200t dock. Appraisal to the LR Lame Code. The welds fixing hoist rope sheave plates were identified as critical.



ELR Employment Projects - Confidential

Date:

1990-1996
2013-2015

Org:

Lloyd's Register
American Bureau of
Shipping

Sector:

Lifting

Project:

Deck Cranes

Detail:

Crane Structure

Activity:

Design Analysis

Role:

STRUCTURAL ENGINEER

Resources:

Deck crane program, Mathcad and long-hand calculations

Description:

Deck Cranes appraised to the LR LAME Code for a number of European and Asian builders. These cranes are of simple configuration and typically incorporate no novel features and are routine work.



ELR Employment Projects - Confidential

Date:

1990-1996
2013-2015

Org:

Lloyd's Register
American Bureau of
Shipping

Sector:

Lifting

Project:

Elevators (Personnel Lifts)

Detail:

Lift Structures, Hoisting & Braking
Mechanisms

Activity:

Design Analysis

Role:

Structural Engineer

Resources:

ABS Code checking by Mathcad & hand calculations

Description:

Lift structures, hoisting & braking mechanisms and guides & supporting structures

Appraised to the LR LAME Code. normal operating (in-harbour use only) and emergency retardation loading is considered. Guide rails are checked to bending and buckling criteria.

The role included: representing the company in client facing meetings on technical & scope of work issues; being authorised to liaise directly with the client company on technical enquiries.

Rack & Pinion Lifts. Client company Alimak passenger lifts SE 900 VFC (Samsung), SE EX 450 DOL (Samsung 2063/2109 2071 'Brava Star' 2019 'Maersk Valiant'; Brasfels M883/N0001A M964/N0015A M962/N0013A M963/N0014A Column Stabilised Drilling Units; Keppel FELS M1179 'Can-Do' Drillship), SE EX 500 DOL (Samsung 2119 Drill Ship 'Ocean Rig Crete' Samsung 2059). The lifts are designed for operating in sea conditions specified for the installation. The lift is stowed for survival conditions.

Traction Lifts. Clients: EDN (Cosco Nantong); HML 149.0166-167 (Estaleiro Navship NAV129 & NAV130). The lifts are designed for operating in-harbour only where vessel heel & trim and dynamic loading effects are minimised and the safety of passengers is not compromised by excessive motions within the lift car. The lift is stowed for survival conditions.

Scissor Lift

ELR Employment Projects - Confidential

Date:

1990-1996
2013-2015

Org:

Lloyd's Register
American Bureau of
Shipping

Sector:

Lifting

Project:

Heavy Lift Crane

Detail:

Crane Structures

Activity:

Design Analysis

Role:

Structural Engineer

Resources:

In-house crane program, ABS Code checking by Mathcad & hand calculations

Description:

The role included: representing the company in client facing meetings on technical & scope of work issues; being authorised to liaise directly with client companies on technical enquiries.

Shear Legs (3000t). appraised to the LR LAME Code. The structural configuration of these is simple and a few assumptions may be made to render the load distribution statically determinate and consequently amenable to long-hand calculation. Due to their large scale, however, there tends to be necessary complications in structural details on the load paths and these must be well considered. They tend to be required to operate in high sea states.

Project Huisman A13-57100 1500t Crane, shipyard project Samsung 2095 Seajacks 5.

400t Jib Extension. client Eide Marine, shipyard Far East Levingston B235/Asian Hercules II' crane barge.



ELR Employment Projects - Confidential

Date:

1990-1996
2013-2015

Org:

Lloyd's Register
American Bureau of
Shipping

Sector:

Lifting

Project:

Heavy Lift Mast Cranes

Detail:

Crane Structure

Activity:

Design Analysis

Role:

Structural Engineer

Resources:

General crane program, Mathcad & long-hand calculations

Description:

Appraisal to LR LAME

General. A number of these were appraised for Dutch crane builders. Mast cranes incorporate complicated reeving and the range of structural details requires comprehensive appraisal skills. The masts are constructed from vertically orientated cylinders, sometimes connected to a truncated cone at the lower end, without stabilising ring frames. The engineer's attention is naturally drawn to this detail as being potentially critical but data for this class of detail is found in API Rules and the arrangement has satisfactory service history. This detail was identified as critical on one crane and the designer responded by providing FE results which did confirm high stress concentration due to local bending effects. The crane was approved following due consideration of this additional submission.

Including Llebherr MTC 78000 1600t Crane. Shipyard project Pt. Drydocks World Pertama H191, Offshore Support Vessel 'Sampson'. Review of additional load rating charts to original codes.



ELR Employment Projects - Confidential

Date:

1990-1996
2013-2015

Org:

Lloyd's Register
American Bureau of
Shipping

Sector:

Lifting

Project:

Hydraulic Cylinders

Detail:

Equipment Structures

Activity:

Design Analysis

Role:

Structural Engineer

Resources:

Code checking by Mathcad & hand calculations

Description:

Projects: Evergreen Cilinders for knuckle boom crane, shipyard Paxocean H1006 & H1008, offshore support vessel; Fjero A/S cylinders 77235HMS-G-D-250/185X2540-G, 77240HMS-G-D-280/225X2915-G & 77359 F1-FFL-D-125/63X2000-C-5-R-SP, shipyard Samsung 2071 'Brava Star'; Fjero A/S cylinders for shipyard Lamprell Energy 114 'Seajacks Hydra'; PMC cylinders for shipyard Mitsubishi; Nurmi cylinders for shipyard Jurong, Palfinger OSC.

ELR Employment Projects - Confidential

Date:

1990-1996
2013-2015

Org:

Lloyd's Register
American Bureau of
Shipping

Sector:

Lifting

Project:

Lifeboat Davit, Free-Fall Ramp, Winch

Detail:

Equipment Structures

Activity:

Design Analysis

Role:

Structural Engineer

Resources:

Code checking using Mathcad & long-hand calculations

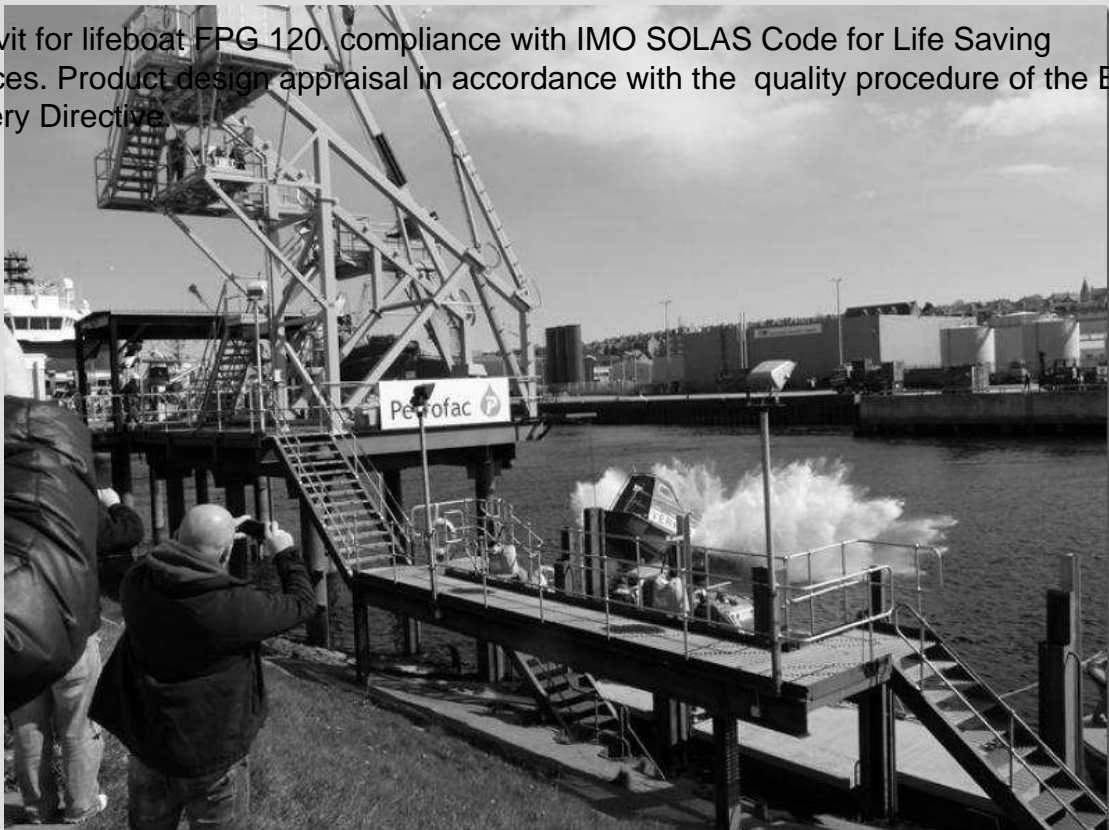
Description:

General. lifeboat & rescue boat davits appraised to international maritime organisation, Safety of Life at Sea (SOLAS) requirements. They are at times mis-interpreted as being basic engineering equipment and the structural design does not always reflect the safety critical nature of their function. Innovations are being made in the arrangements and function of davits but equivalent attention is not always focussed on the structural - engineering aspects. Failures do occur and the engineer has responsibility for contributing to improving the safety of these and other equipment types.

Direct communication with client companies on technical negotiations.

Verhoef LSA. Compliance with Norsok & IMO SOLAS Code for Life Saving Appliances. Product design appraisal in accordance with the quality procedure of EC Machinery Directive.

NED davit for lifeboat FPG 120. compliance with IMO SOLAS Code for Life Saving Appliances. Product design appraisal in accordance with the quality procedure of the EC Machinery Directive.



ELR Employment Projects - Confidential

Date:

1990-1996
2013-2015

Org:

Lloyd's Register
American Bureau of
Shipping

Sector:

Lifting

Project:

Loose Gear

Detail:

Equipment Structures

Activity:

Design Analysis

Role:

Structural Engineer

Resources:

API Code checking by Mathcad & long-hand calculations

Description:

Direct communication with client companies on technical negotiations.

Hoist Blocks. Projects: Mohr Hebetchnik 15t hoist blocks PDA for OSCs; Ropeblock 165t hoist block PDA; Ropeblock 5t for shipyard Hudong-Zhonghua; Ropeblock 75t hoist blocks for shipyard Daewoo.

Telescopic & rotating lifting beam (50t). shipyard project Daewoo 3623 3624. Direct communication with client companies on technical negotiations.

Pipe Gripper Yokes (20"). Shipyard project Jurong.

ELR Employment Projects - Confidential

Date:

1990-1996
2013-2015

Org:

Lloyd's Register
American Bureau of
Shipping

Sector:

Lifting

Project:

Offshore Cranes

Detail:

Crane Structures

Activity:

Design Analysis

Role:

structural engineer

Resources:

Crane loading & other programs, procedures, Mathcad & long-hand calculations for stress analysis & Code checking

Description:

General Description.

These cranes were for installation on LR & ABS Classed offshore installations or vessels and design reviewed for compliance with the Societies' Design Codes for Lifting Appliances. For project vessels with Drillship Notation (CDS), additional review was to relevant parts of Societies' Design Guide for Drilling Systems. API RP 2C requirements, referenced in the ABS Guides, were considered as specified. A significant amount of extra work is involved in design analysis for operations in higher sea-states offshore. For these conditions, derating charts are normally provided. These must be development for the operating range of crane geometric configuration. This requires evaluation of: crane stiffness; various velocities & accelerations; loadings applied to critical components (that limit crane capacity); hoist factors & associated SWLs.

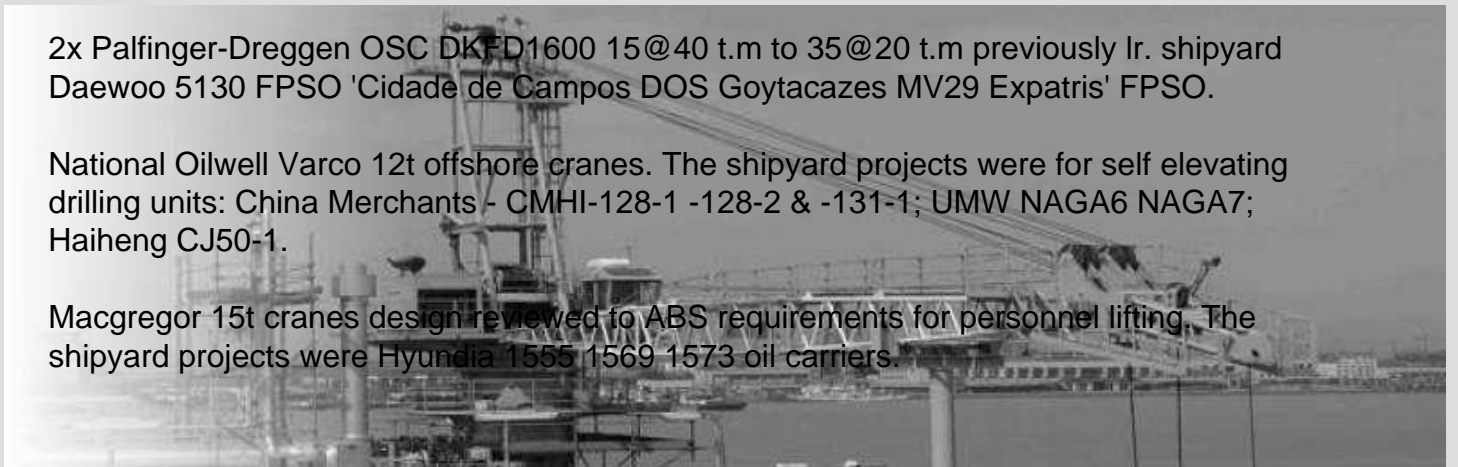
The role included: representing the company in client facing meetings on technical & scope of work issues; being authorised to liaise directly with the client company on technical enquiries.

Noreqacta HSC 700-125-30 crane for shipyard Lamprell Energy 114 'Seajacks Hydra'.

2x Palfinger-Dreggen OSC DKFD1600 15@40 t.m to 35@20 t.m previously Ir. shipyard Daewoo 5130 FPSO 'Cidade de Campos DOS Goytacazes MV29 Expatriis' FPSO.

National Oilwell Varco 12t offshore cranes. The shipyard projects were for self elevating drilling units: China Merchants - CMHI-128-1 -128-2 & -131-1; UMW NAGA6 NAGA7; Haiheng CJ50-1.

Macgregor 15t cranes design reviewed to ABS requirements for personnel lifting. The shipyard projects were Hyundai 1555 1569 1573 oil carriers.



ELR Employment Projects - Confidential

Date:

1990-1996
2013-2015

Org:

Lloyd's Register
American Bureau of
Shipping

Sector:

Lifting

Project:

Offshore Knuckle Boom Cranes

Detail:

Crane Structures

Activity:

Design Analysis

Role:

structural engineer

Resources:

Crane loading program and other programs, procedures, Mathcad & long-hand calculations for stress analysis & code checking

Description:

The role included: liaise directly & representing the company in client facing meetings on technical issues.

4x Macgregor 250t HMC4240 AHC cranes design reviewed to ABS & USCG requirements. the shipyard projects were Eastern SB Hull 241 242 + Leevac 369 370.

Macgregor 150t HMC3568 AHC crane design reviewed to ABS & USCG requirements. The shipyard projects were Halter 1804 'The Dove' tug.

National Oilwell Varco 250t knuckle boom offshore cranes. The shipyard projects were BAe Inc. 113 I2766; Eastern 249 250 I2739 I2745.

National Oilwell Varco 165t knuckle boom offshore cranes. The shipyard projects were Daewoo 3623, Daewoo 3624, Samsung QGOG3. Samsung West Vela, Hyundai Rowan4, Hyundai Rowan3, Samsung West Saturn.

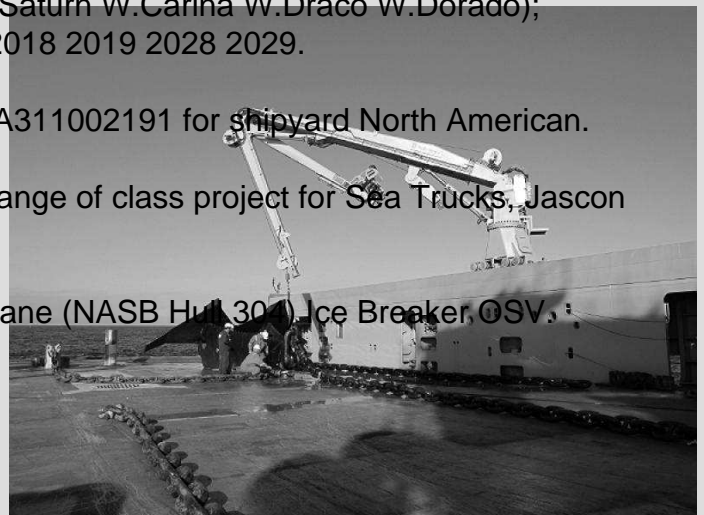
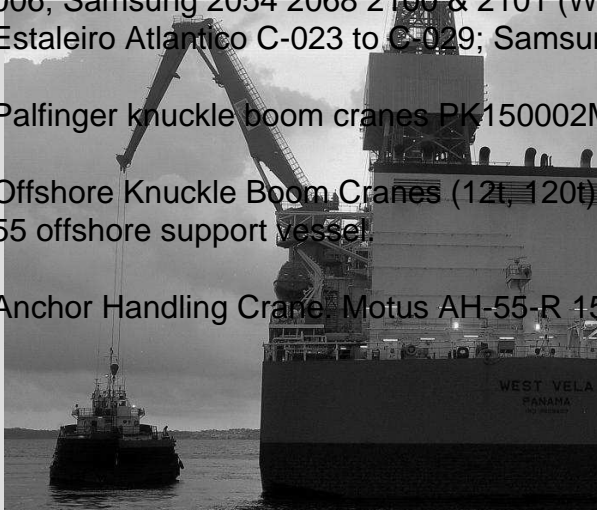
National Oilwell Varco 100t knuckle boom offshore cranes. The shipyard project was HHI 2563 Rowan Reliance.

NOV 85t Knuckle Boom Offshore Cranes. The shipyard projects were: Enseada EEP 001 to 006; Samsung 2054 2068 2100 & 2101 (West Saturn W.Carina W.Draco W.Dorado); Estaleiro Atlantico C-023 to C-029; Samsung 2018 2019 2028 2029.

Palfinger knuckle boom cranes PK150002M KA311002191 for shipyard North American.

Offshore Knuckle Boom Cranes (12t, 120t) change of class project for Sea Trucks, Jascon 55 offshore support vessel.

Anchor Handling Crane Motus AH-55-R 15t crane (NASB Hull 300) Ice Breaker, OSV.



ELR Employment Projects - Confidential

Date:

1990-1996
2013-2015

Org:

Lloyd's Register
American Bureau of
Shipping

Sector:

Lifting

Project:

Overhead Runway Cranes

Detail:

Crane Structures

Activity:

Design Analysis

Role:

Structural Engineer

Resources:

Long-hand calculations & Mathcad

Description:

Appraised to the LR LAME Code or Offshore requirements.

Transverse loading is often found to be significant to runway beam adequacy and the means of fixing trolley wheels.

Monorail Hoist. Client Teekay Shipping, Shipyard IHH 3015 'Polar Spirit' gas carrier.

ELR Employment Projects - Confidential

Date:

1990-1996
2013-2015

Org:

Lloyd's Register
American Bureau of
Shipping

Sector:

Lifting

Project:

Telescopic Boom Cranes

Detail:

Crane Structure

Activity:

Design Analysis

Role:

Structural Engineer

Resources:

General crane program, Mathcad & long-hand calculations for stress analysis & Code checking

Description:

Particular care is required when assessing jib telescope details, that is hydraulic cylinders stability, end fittings strength and jib sliding details.



ELR Employment Projects - Confidential

Date:

2006

Org:

Lloyd's Register

Sector:

Lifting

Project:

Self-Unloader

Detail:

Crane Structure

Activity:

Design Analysis

Role:

Structural Engineer

Resources:

Crane analysis programs, mathcad, spreadsheets and hand calculations

Description:

Design appraisal to the LR LAME Code



ELR Employment Projects - Confidential

Date:

2007

Org:

Allseas Engineering BV

Sector:

Lifting

Project:

Pioneering Spirit
Heavy Lift Crane

Detail:

Lifting System Structures

Activity:

Design Analysis

Role:

Structural Engineer

Resources:

Self-developed program for system mechanical loading & input data; hand calculations

Description:

30000t Topside Lifting System.

Mechanical loads acting in the lifting system

Advising on the design of the lifting system structure in accordance with static strength & fatigue criteria

Advising on the analysis of highly loaded rail/wheel contact

Liaising with subcontract engineering design company and acting as point of contact

Writing scopes of work & reviewing reports and design drawings



ELR Employment Projects - Confidential

Date:

2010

Org:

Gusto MSC

Sector:

Lifting

Project:

Heavy Lift Cranes

Detail:

Temporary Works
Development

Activity:

Design Analysis

Role:

Structural Engineer

Resources:

Hand Calculations, Mathcad

Description:

Design of fixed platforms to support jib during installation

Investigation into causes of sagging hoist ropes using catenary analysis

Writing of installation procedure for crane hoist ropes

Comparison of the requirements of two national crane design codes

Development work on in-house crane analysis program



ELR Employment Projects - Confidential

Date:

2010

Org:

PD&MS Energy (Wilton)

Sector:

Lifting

Project:

Subsea7 Pipe-Lay Vessel

Detail:

Structures of Crane & Lifting Appliances

Activity:

Design Analysis

Role:

Structural Engineer

Resources:

In-house program, long-hand calculations

Description:

Development of vessel motion data

10t pipe handling gantry crane internal loads

10t pipe handling gantry crane - design substantiation. crane traverses over pipe rack & feeds pipes to a conveyor system in way of the firing line

1000t pipe rack

Traversing field coating station

ELR Employment Projects - Confidential

Date:

2013-2015

Org:

American Bureau of Shipping

Sector:

Lifting

Project:

Heavy Lift Crane

Wind Turbine Installation

Detail:

Crane Structures

Activity:

Design Analysis

Role:

Structural Engineer

Resources:

In-house crane program, ABS Code checking by Mathcad & long-hand calculations

Description:

The role included: representing the company in client facing meetings on technical & scope of work issues; being authorised to liaise directly with the client company on technical enquiries.

Client company Huisman A10-52000 Heavy Lift Crane for Wind Turbine Installation (380t), Project to extend certification of crane to include use with 380t capacity 'boom lock' for wind turbine installation work. Shipyard La Naval Sestao S/Y (IHC 723), Vessel Neptune, Self Elevating Unit. Direct communication with client companies on technical negotiations.

Hoist Stabiliser. Client company High Wind. Project to certify mechanical equipment to increase stability of load during precision offshore lifting operations. As fitted Vessel Neptune.

