



**RICHARD
L. KRABBENDAM**

Compulsory Bring:

Scientific Calculator and Ruler
as this will be a Theory and
Hands-On Training.
A Geometry set will be helpful
as well but not compulsory.

**ADVANCED HEAVY LIFT AND TRANSPORTATION
with Offshore Lifting and Installation Techniques
& Heavy Lift Shipping**

*Best Practices and Standards in Management, Calculation,
Application and Safety*

7th – 9th November 2016 Brisbane, Australia

Biography of Richard L. Krabbendam

Richard Krabbendam started his Heavy Transport and Lifting career as a Heavy Lift Transport Engineer with Big Lift, Dordrecht, The Netherlands in 1973. By 1979, he was awarded the largest contract in Big Lift's history by Saudi Aramco.

After Big Lift was taken over by Mammoet Transport, half a year later he then co-founded ITREC, and joined forces with Huisman Special Lifting Equipment focusing on the sales of the new crane concepts for offshore lifting and working as a Heavy Transport and Lifting Consultant.

A Master of Mechanical Engineering from Delft University of Technology, he has also worked with Van Seumeren Holland B.V and Mammoet. Richard has also spent a significant amount of years with Jumbo Offshore, where he was involved in the development of its super heavy lift carrier fleet, the J-Class, which uses two 900 ton mast cranes for subsea installation works and since 2009 has been equipped with a newly installed deepwater lowering system enabling Jumbo to transport and install heavy loads in up to 3000 m water depths. Aside that, Richard was also responsible for the "Total Transport Projects" which involved the transportation of the heavy lifts from workshop floor until placed onto foundation on the jobsite. Other projects involved beachlandings on remote islands in Indonesia and Malaysia as well as crossing the Andes.

The founder of Krabbendam Advies Service, Richard is now a Heavy Lift Consultant and conducts trainings all over the world with the mission to improve the safety and knowledge in the Heavy Lift & Transport Industry.

Up to date Richard has presented a total of 85 Seminars in 23 countries all over the world.

- General Knowledge and Introduction
- Forces, Mass and Center of Gravity
- Heavy Transport with Hydraulic Platform Trailer
- Lifting of Loads with Two or More Cranes
- Maintenance and Inspection
- Skidding, Jacking and Moving Techniques
- Set up of a Project Planning
- Preparation of a Cost Estimate
- Load-outs of Extreme Heavy Lifts
- Safety and Risk Analysis
- Heavy Lift Shipping
- Offshore Lifting and Installation Techniques
- Accidents and how to avoid them
- The Do's and Don't of Lifting
- Competency Exam

Meet the Practitioner

A specialist and industry expert on Land and Offshore, Richard is a globally renowned trainer in Heavy Lifting, Transport, Shipping and Offshore and has 42 years of experience.

Key Takeaways:

- Building a lift plan
- Choosing the right crane
- Using a tail crane
- Selecting the right platform trailer or SPMT
- Estimating forces in lifting sling
- Calculating the average ground load under an SPMT or Hydraulic Platform trailer
- Avoiding accidents and improving safety
- Calculating the center of gravity properly
- Selecting the right spreader beam
- Calculating saddle loads
- Trailer stability guidelines
- Staying in control of weights

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Workshop Overview

This course offers a platform for your Heavy Transport and Lifting Projects on land as well as offshore and at sea. Attention is dedicated to safety, accident analysis and discussions on how accidents can be avoided and dealt with.

Who Should Attend

- CEOs and Company owners
- Expert Riggers
- Lifting Engineers
- Operations Managers
- Construction Engineers
- Onshore / Offshore Project Managers & Planners
- Construction managers
- Transport & Lifting supervisors
- Marine Warranty Surveyors
- Cargo Superintendents
- Freight forwarders
- Sales engineers
- Offshore Installation Engineers
- Naval Architects / Marine Engineers
- Structural Engineers
- HSE Managers & Engineers

Industries That Should Attend

- Shipyards
- Module Fabrication Yards
- EPCI Contractors
- Freight Forwarding
- Construction Contractors
- Crane Rental and Transport Contractors
- Civil Construction Industry
- Power Plant builders
- Renewables
- Heavy Transport contractors
- Salvage contractors
- Project logistics Companies
- Wind Turbine Erectors
- Offshore fabrication yards
- SURF Contractors
- Insurance companies
- Consultants
- Oil Companies

Customisation:

The programme will be further customised to fit your priorities through the pre-course questionnaire (PCQ).

Internal Training:

This programme is available as an internal training.
Email us to find out more at: lim.joandee@olygen.com

Estimated Time Schedule

0830 – 0900	Registration
0900 – 1030	First Morning Half
1030 – 1045	Morning Break
1045 – 1230	Second Morning Half
1230 – 1330	Lunch
1330 – 1500	First Afternoon Half
1500 – 1515	Afternoon Break
1515 – 1700	Second Afternoon Half

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More About the Trainer- Richard L. Krabbendam

Partial List of Companies who benefited from Richard's training

- Bay Crane & Rigging New York , Norway and the Netherlands
- Larsen & Toubro Ltd India.
- Sevan Marine APL Norway
- Yew Choon Singapore
- Agility Transoceanic Netherlands
- Shell Netherlands
- Eurorigging Netherlands
- IHC Merwede
- Westdijk Exceptional Transport
- Wagenborg-Nedlift
- Ravenstein Netherlands
- Allseas Engineering Netherlands
- Lloyds Register Rotterdam
- Broekman Freight Forwarders
- Workfox Hoofddorp
- Bluewater Hoofddorp
- Bertling Freight Forwarders London
- Fracht AG Frankfurt
- Alstom Switzerland
- Huisman Fujian Steel Manufacturing China
- Sarilar Crane & Transport Turkey
- MELI (Middle East Logistics Institute for Training), part of the Al Majdouie Group of Companies
- DHL Industrial Projects
- LV Shipping
- Power Grid Corporation of India
- Hollandia Steel Structures Holland
- Coordinadora Internacional De Cargas Spain
- TTS Norway

Testimonials

"I have enjoyed every moment listening to your presentation and sure learned a lot of things."

Jacobs Engineering

"Very experienced, knowledgeable and willing to share."

Defense, Science and Technology Agency (DSTA)

"Very detailed in explanations and examples which are based on experiences."

Petronas

"Highly Recommended for his generosity towards sharing of his past experiences as well as his vast experience in Heavy Lift."

Shell

"The information is excellent as well as his experience and expertise."

BP

"You have enlightened my lifting knowledge and understand the force and actual weight of every lifts."

Singapore Refining Company

"One of the best courses I've attended in my 15 years experience; combined technical and its application perfectly. Gave me what I needed to do my job better."

LKC

"Great presentation skills and his knowledge is excellent."

INPEX

"Excellent and very knowledgeable."

Foster Wheeler

"He is the worlds best Heavy Lift Specialist."

BDP International

"He has in depth knowledge and experience to train people like us."

Chevron

"Massive Experience and Knowledge."

Petroleum Development Oman

"Lots of experience in various fields and clear explanations. Excellent."

PTTEP

"Very experienced in the field and good at explaining the theories."

Bechtel

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Projects



Transport & shipment of a 93 m long and 725 ton heavy CO2 splitter from Pt. Marghera, Italy to the Quatum Refinery in Houston, USA.



Shipment and Transport of Heavy Columns for TPI Refinery Rayong, Thailand



Transport and lifting work for Saudi Aramco



Transport of a 725 Tons column



Load-out of two compression modules (1750 Ts + 1865 Ts) for Shell / Petronas Malaysia



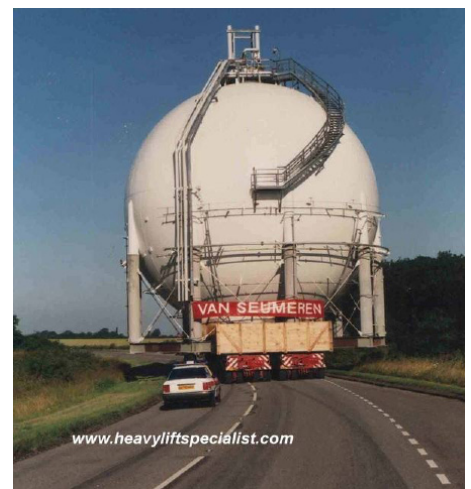
Load-out of 2x700 tons Offshore desk at Hindustan Shipyard in Visakapatnam, India



Erection of a 220 Tons column with an unguided lift gantry in Kerteh Malaysia, project was carried out in close co-operation with freight forwarder Kontena Nasional



Lifting of a 330 tons CO2 tower at NSM in Sluiskil



Transport of a 260 tons Gassphere from Belgium to Immingham

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Course Outline

PLEASE BRING!
Scientific Calculator
Ruler

1. General Knowledge and Introduction (16pages)

- Different Lifting- & Transport types
- Transport Means
- Cranes
- Largest Mobile Cranes available
- Mammoet Platform Twin Ring Containerized (PTC200-DS)
- Various cap. Charts and applications of PTC-DS-140 and DS-200
- Various moving techniques shown in one project
- Conventional Trailers
- Various Heavy Transport / Trailers types
- Platform trailers
- Different Crane Types
- Various Types of Heavy Lift Vessels
- Offshore installation vessels available
- Terms & Abbreviations
- Some definitions:
Min. Break load, Safe Working Load, Working Load Limit, Test load, Mass and weight, lifting capacity, max. allowable ground load, safety factors, etc.

2. Forces, Mass and Center of Gravity (34 pages)

- Difference between mass (kg) and force (N)
- Newtons three laws of motion
- First Law of Newton (Law of Inertia)
- Second and Third Law of Newton (Force Changes Motion)
- Forces acting on a body
- Some formulas to calculate forces
- Calculation of Centrifugal Forces
- Standard triangles
- Something about forces
- Videos illustrating "No control of forces"
- Composing of forces
- Head-Tail Method (Summary of composing of forces)
- Summary (composing of Forces)
- Principle of moment (moment equation)
- Principle of Center of Gravity
- Calculating Outrigger Loads of a crane
- Wind force (video shots on accidents due to wind force)
- Wind Force (Scale of Beaufort) + Video Milwaukee Accident)
- Wind force
- Water force
- Accelerations and decelerations
- Friction forces (when sliding)
- Forces on vessels
- Important sling angles
- Calculation of weights
- Estimating of Weight of different loads
- Essential information for Transport & Lifting Projects

3. Heavy Transport with Hydraulic Platform trailer (52 pages)

- Difference between platform trailers and standard flatbed trailers
- USA Dolly compared to Platform trailer
- Principle of a hydraulic platform trailer
- Capacity / Specification of Conventional platform trailers
- Platform Trailer selection for 466 Tons load
- Platform Trailer selection for 810 Tons load
- Capacity / Specification of Self Propelled Modular Transporter (SPMT)
- Example of 1050 Tons reactor on SPMT's
- Platform Trailer selection for 495 Tons load
- Stability of Trailers (Hydraulic Stability)
- Stability of Trailers (Tipping Lines)
- Stability: 3- and 4- point suspension system, pro's- and con's
- A load placed on a flat bed trailer
- Stability of a SPMT 3-point versus 4-point suspension
- Symmetrical and A-symmetrical Stability of SPMT's (double wide)
- Alternative 3-Point stability system of Platform trailers (SPMT's or Conventional)
- Critical Stability of a single SPMT used in dolly configuration with turntables

- Tipped Transport Combination
- Conventional Platform Trailer with load tipped over
- Stability of a Conventional Hydraulic Platform Trailer
- Axle loads (A-Symmetrical suspension)
- Calculation of axle loads
- Calculating of average ground pressure
- Realistic ground pressure profile
- Load on ground surface or steel deck
- Goldhofer Faktor 5 Girder trailer configuration video
- Principle of Steering (Conventional)
- Principle of Steering (SPMT's)
- Video: Different steering modes of SPMT's
- Heavy Duty tractor versus required pulling force
- Video: 230 tons Generator roll-on and roll off example
- Calculating the required needed pulling force in Tons
- Estimation of pulling force of a HD Tractor
- Choice of Trailer configuration for 520 tons load
- Video: Transport of 420 tons column by barge and SPMT's
- Job site preparation
- Choice of Trailer configuration for a load (illustrated with Video footage)
- How many tractor units are needed for a particular load?
- Choice of Trailer configuration for a 16 m diameter Sphere 260 Ton
- Choice of Trailer configuration for a load
- The Transport Plan
- Recommendations

4. Lifting of loads with two or more cranes (72 pages)

- Differences in Lifting of Loads
- Crane Capacity rating (Load moment)
- Quick Reference capacity Chart for Hydraulic cranes
- Different Boom (crane) types
- Setting up of a Lift plan (work drawing: side-view, top-view, back-view)
- Set-up of a lift plan for the erection of a 320 tons reactor
- Excel Program "Boom clearance"
- Set-up of a Lift plan for erection of a reactor
- Video: Lifting of a 320 Tons reactor
- The Moment equation and the application in the field
- The load in each crane depends on the location of CoG and angle with horizon
- Location of CoG in relation to the lift points (various examples)
- The 10 Golden rules for Lifting a Load
- Mobile Crane Hand signals
- Tail crane and distribution of load between tail crane and main lift crane
- Excel program for calculating Tail load and main lift crane load
- Lifting of a Load with two or more cranes (position of cranes)
- The lifting of two large refinery columns with 3 cranes
- The inclinometer (Continue lifting a two refinery columns with 3 cranes)
- Video: Lifting 520 tons column
- Sling Plan and forces in lifting slings
- Top angle never more then 120°
- Standard triangles
- The Cog is always suspended straight under the hook
- Calculation of the force in each sling (equal and unequal lengths)
- Use the graphical method in defining sling forces
- Calculate sling forces S1 and S2 at Different elevations of the lift points
- Calculate the sling length with an a-symmetrical location of CoG
- Define the force in each sling
- Calculate the forces in the spreader beam
- Calculate the forces in slings and spreader beam
- The Stability criteria of a crane
- Stability of a load to be lifted
- The Stability Range
- The Stability Moment of the load to be lifted
- The Stability of the Load to be Lifted
- The Stability of the load with 3 lift points below the CoG
- The Stability of the load to be lifted

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Course Outline

- Use of lifting- and spreader beams
 - Lift beam (800 Tons) and Spreader (1000 Tons)
 - Use of lifting- and spreader
 - Use of various Lifting beams
 - Loading directions of lifting points
 - Details of steel load spreading mat
 - Work factors (Safety Factors)
 - Sling capacities in various applications
 - Grommet capacities in various applications
 - Applying slings to a load
 - Calculate the loads in these two examples
- 5. Maintenance and inspection (9 pages)**
- Inspection criteria for Mobile Cranes
 - Maintain, Inspect, Check and Test
 - Inspection criteria for Lifting Equipment
 - Excessive wear on Crane sheaves
 - Maintenance recommendations for transport equipment
 - Work factors (Safety Factors)
 - Identification of CE Marks
- 6. Skidding, Jacking & Moving Techniques (24 pages)**
- Various Skidding & Moving techniques
 - Skidding Techniques
 - Stainless Steel on PTFE Blocks
 - Enerpac Skidding solutions
 - Hydra-Slide skidding systems
 - ALE Skid shoe system SKS-1000 (1000 T Cap.)
 - Skid system for extreme heavy loads
 - Load-out of 9,500 tons Utility Module on Skids
 - Skidding of 830 tons container crane
 - Skidding float pads of 200 tons each
 - Using Strand jacks as lifting devices
 - Working principle of Strand jacks
 - ALE's Super Crane SK-190/SK-350 using strand jacks
 - Jacking and skidding Methods
 - Jacking towers and hydraulic gantries
 - ALE's Mega Jacking systems (up to 40,000 tons) + Mammoet Push-Up System
 - Airbags, Water skates, Air Pallets
- 7. Set up of a Project planning (8 pages)**
- Making a Project Planning
 - What is a "Bar Chart" planning schedule
 - Example: Lifting a 320 Tons reactor
 - Example: Lifting an traffic gantry over a Highway
 - Critical path in a Planning Schedule
 - Another example
- 8. Preparation of a cost estimate (9 pages)**
- Why a Cost estimate
 - Essential to cost estimates
 - Make a Lift plan and Transport plan and find out what is needed
 - On basis of a plans make a Planning Schedule
 - Prepare cost estimate on basis of Planning Schedule
 - Example of Cost estimate
 - Recommendations
- 9. Load-outs of extreme Heavy Lifts (51 pages)**
- Various Ro-Ro operations
 - Necessary information for Ro-Ro operation
 - Something about Tide Tables and Tides
 - Make use of the tidal conditions
 - Roll-on to free floating barge (Tidal)
 - Roll-on to free floating barge (Non Tidal)
 - Roll-on via steel plates (Non Tidal)
 - Roll-on to barge fixed aground
 - Beach landing, barge fixed aground
 - Examples of a beach landing
 - Positioning of SPMT's under the load
 - Technical data of SPMT's (Scheuerle)
 - Technical data of Goldhofer SPMT's
 - Roll-off with a 2400 Tons HRSG Module
- Ro-Ro ramps or steel plates
 - Configure right Transport Combination for 1865 Tons Module
 - Configure right Transport Combination for 12,800 Tons Topside
 - Video: Load-out 12,800 Tons Topside: Transport beams-Sea fastening combined
 - Load-out of 12,800 Tons Module
 - Load-out of Special Structures
 - Transport & Load-out of a large Module (2350-4800 Ton)
 - Site Moves of Heavy Loads
 - Load diagrams of Platform trailers
 - Moving various Heavy Loads
 - Recommendations
 - Case Study: Kikeh Deepwater Pile installation project Moving various Heavy Loads
- 10. Safety and Risk Analysis (46 pages)**
- Video: BP Safety video
 - History of Jumbo's Safety Policy
 - Part of Jumbo's QHSE Policy Statement
 - Slips and Falls cause the majority of injuries on board ship
 - What is right and what is wrong in these pictures
 - Excessive Noise can Damage your hearing
 - Accidents still happen
 - Safety improvement Program
 - What is Safety: Culture, Planning, Procedures
 - Safety Awareness Culture Ladder
 - Safety Awareness Culture Ladder Explanation
 - The Iceberg Theory
 - How do we Record & Analyze?
 - Some Definitions
 - What are our goals?
 - Safety Culture and Awareness
 - How?
 - Use Proper PPE=Personal Protective Equipment
 - Reduce 20% of causes and you reduce 80% of all accidents
 - Keep Welding and Cutting equipment in Good Condition
 - Use proper PPE = Personal Protective Equipments
 - PPE and good accessible lifting points
 - Accident & Incident Reporting and Analysis
 - Video: Stay Focused
 - Safety Requirements & Procedures
 - Use a Risk Matrix
 - Risk Matrix. Frequency x Consequence = Risk
 - The theory of the Swiss Cheese
 - Guide line Job Hazard Analysis
 - Job Hazard analysis(JHA)
 - Safety Awareness Posters
 - Is it all OK?
 - Identification of Hazards
 - Why, When and How a "Toolbox Meeting"
 - Last Minute Risk Analysis (LMRA)
 - Co-operation with Client is essential
 - Examples of well secured Transport saddles
 - Examples of badly secured Transport saddles +Video
 - Conclusion: Things To Remember
- 11. Heavy Lift Shipping (52 pages)**
- Various Types of Heavy Lift Ships: Lo-Lo
 - Various Types of Heavy Lift Ships: Flo-Flo
 - Various Types of Heavy Lift Ships: Ro-Ro
 - Major Heavy Lift Ships, Crane Types: Lift-on / Lift-Off
 - Difference between Pedestal crane and Mast crane
 - Heavy Lift Mast Cranes: 900 tons on J-Type Jumbo
 - Cargo Types: Petrochemical, Offshore, Floating Equipment
 - Cargo Types: Pressure vessels, Modules, Gasturbines
 - How to lift a Heavy Load with a floating vessel
 - How to rig a Trafo to a Lifting Beam
 - Lifting 3 Bullet tanks over PS on board
 - How to prepare a Loading/Unloading Operation (Lo-Lo)
 - How to prepare a Loading/Unloading Operation (Lo-Lo)
 - Check Stability of the Load
 - Examples of Stability of the Load
 - Stability of Heavy Lift Ships - Basics

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Course Outline

- Stability of Heavy Lift Ships - Introduction
- Stability of Heavy Lift Ships - Definitions
- Calculation of Metacenter of a ship
- Calculation of GM Value
- Stability of Heavy Lift Ships: Free Surface Area
- Arm of Stability - Uprighting Moment
- Stability Range of a Heavy Lift Ship
- Stability Requirements of IMO
- Surface below Stability Curve
- Change of CoG of Ship due to cargo loading
- Heel Angle
- CoG of load when freely suspended in crane
- Use of Ballast water
- Sea fastening of Cargo on Heavy Lift Ships
- Motion Analysis of vessel
- Examples of Sea fastenings (Jumbo)(Lashing wires + Stoppers)
- Examples of Sea fastenings (Jumbo+SAL)(Lashing wires)
- How to lash a Harbor Crane (Jumbo) (Lashing wires + Stoppers)
- Lashing examples SAL: 1100 Tons Ship loader
- Calculation of Sea fastening Forces
- How to calculate the required number of lashings?
- Division of Forces over stoppers due to location of CoG
- Examples of Sea fastenings (Jumbo)(Lashing wires + Stoppers)
- How to lash a Heavy Pressure vessel (Lashing wires + Stoppers)
- Examples of Sea fastenings Calculations
- Lashing & Securing Methods
- Conclusion: Things to remember

12. Offshore Lifting and Installation Techniques (55 Pages)

- Introduction to the Offshore World
- Offshore Production Platform Types
- Field Development (Subsea Structures)
- Subsea Installation Techniques
- Types of Offshore Installation Vessels
- Largest Offshore Construction Vessel in the World „Pieter Schelte“
- Overview of the World largest Crane Vessels
- Largest Crane Vessel in The World SSCV Thialf (Heerema) + Saipem 7000
- Mono Hull Crane Vessel „Oleg Strashnov“
- Comparison Mast Crane - Pedestal Crane
- Monohull Crane + Pipe laying Vessel „Subsea7 Borealis“
- Monohull Crane + Pipe laying Vessel „Aegir“ (Heerema)
- Comparison 5000 Ts Mast Crane - 5000 Ts Pedestal Crane
- Catamaran Crane Vessel „Svaenen“ for Wind farm Construction
- Catamaran Crane Vessel „Rambiz“ for Windfarm Construction
- Pipe lay Methods and vessels
- S-Lay PipeLay Vessel Solitaire (Allseas)
- Reel Lay Spool base (Subsea 7)
- Reel Lay Pipe lay vessel Deep Blue (Technip)
- S-Lay Pipe lay Vessel Global Industries (Technip)
- Semisubmersible Transport Vessel (NMA-Cosco)
- Float over Techniques for extreme Topsides
- Float over North Rankin Field (Australia)
- Renewable Energy
- Jack-up Wind Turbine Installation vessels
- Installation Methods for Offshore Wind Turbines
- Case Study: Cascade Chinook Riser Installation
- Video Cascade Chinook Project (2700 m Water Depth)

13. Accidents and how to avoid them (54 pages)

- Tipping of Trailer with Load
- The Accident
- Accident Analysis
- Conclusion Accident
- The Salvage
- Some Transport accidents
- Rules on Trailer Stability needed or not??
- Video: Tipping of Transport Combination
- Some transport accidents
- Video: Trailer tipping over
- Transport Accidents
- Transport Accident Analysis

- Some transport accidents
- Some Crane accidents
- Collapse of Gantry crane
- Load-out of 1000 Tons module went wrong
- The Salvage
- Car over the side
- A similar case, but worse!
- Load-out of Living quarters and tipped over
- Mechanical Failure of support girders
- Tipping over of Hydraulic Gantry
- Roll-off with reactor from barge (weak bottom)
- Video: Roll-off with 790 Ts reactor and transport to job site
- Some recommendations to avoid accidents
- Lots of Success in your further career

14. The DO's & DON'TS in Lifting (30 Pages) (Summary)

- Content of Presentation
- The Do's & Don'ts in Lifting
- Compilation of Accidents (Videos)
- What Factors Might Reduce the Risk of a Crane Accident?
- How to quickly estimate Forces in Lifting Slings
- Lift Beam and Spreader
- Define the sling length and Force with the Graphical Method
- The Stability of a Crane (animation)
- Unloaded Crane can still tip over
- The Stability of the Load to be lifted
- The Stability Range
- The Stability of the Load to be lifted
- Fatal Crane Accident in Vung Tau, Vietnam
- Crane Tipped over in the UK and Holland
- Lifting a Boat out of the water with two ship cranes (Video)
- Know the weight of your load and select the right crane! (Video)
- Compilation of Accidents (Video)
- Lifting a 120 tons Rotor into a river barge went wrong
- Schematic of Forces in the Lifting Slings of Rotor
- How could it safely be rigged?
- This could have been the correct way
- Largest Mobile Cranes available today
- Mammoet Platform TwinRing Containerized (PTC-DS200 and DS-140)

***THERE WILL BE AN EVALUATION TEST AT THE END OF THE COURSE WHERE PARTICIPANTS WILL BE RATED ON THEIR DEPTH OF COMPETENCY**

***QUESTION AND ANSWER SESSIONS IN BETWEEN THE VARIOUS PRESENTATIONS**

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Partial List of Our Clients

