HEAVY LIFT & RIGGING SERVICES

Liftech Consultants Inc.

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COMPANY OVERVIEW
HEAVY LIFT AND RIGGING

Liftech Consultants Inc. has provided structural engineering services since 1964. McKay International Engineers merged into Liftech in 2022 and has provided mechanical and electrical engineering services since 1969. Our experience includes the design of cranes, heavy lift and rigging systems, wharves, floats, buildings, and other specialized systems.

We have special expertise in the design of container handling cranes and other heavy equipment including design of dynamically loaded steel structures, high duty cycle winch and rail machinery, and mobile heavy equipment power, control, and automation systems.

Our approach to projects and experience with cranes and other unusual systems allows us to produce creative and practical solutions to unusual problems, tailored to the specific needs of our clients. Collaboration among our engineering staff and with our clients ensures our designs are reliable, functional, efficient, environmentally sound, and cost effective over the entire life of the system.

We work with national and international clients including contractors, crane manufacturers, construction companies, government agencies, port authorities, shipping companies, terminal operators, and crane maintenance companies.

Heavy Lift

Liftech provides engineering for lifts and lifting systems including design, review, developing lift procedures, developing design criteria, and hardware specifications.

We are experienced in a wide range of lifting applications; examples include nuclear power plant lifts and lift systems, offshore platforms, large floating and land-based cranes, and blimp hangar repairs.

We have significant experience in the design and review of large floating and land-based cranes. We helped design and review crane designs with capacity up to 12,000 t. Examples include assistance with the design of the 1,700 t floating crane that erected the major components of the San Francisco-Oakland Bay Bridge self-anchored suspension span and the Bigge AFRD land-based ringer cranes. We have worked on several other specialized, confidential crane systems that have major impacts in their marketplace.

Moving Heavy Objects

We have designed systems for moving dockside cranes and other heavy objects. We are familiar with and design systems that incorporate dollies and heavy haul trailers, air or Teflon pad skid systems, and Hilman rollers. We design crane move systems that lift and move cranes with little out-of-service time for the crane.

Rigging

Liftech provides services to contractors specializing in heavy rigging and iron work. We help with a variety of engineering; examples include modifying cranes, repairing damaged cranes, skidding or rolling heavy objects, securing large structures for sea transportation, and designing lifting and erection schemes.

We provide engineering for designing erection schemes for lifting and jacking heavy structures. We are familiar with designs that incorporate rigging tackle and equipment including strand jacks, can jacks, cranes, lifting brackets, slings, wire rope, strand, reeving, jacks, etc.

Services Overview

Design and Specifications

Review including Peer Review

Criteria including Seismic Criteria and Analysis

Structural Upgrades and Repairs

Fatigue Analysis, Design, and Evaluation

Inspection Programs

Lifting Procedures

Crane Commissioning Program

Crane Decommissioning Program

For more information, please visit our website: www.Liftech.net

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OFFSHORE WIND FARMS

Liftech has extensive expertise with the following, making us well suited for supporting offshore wind farm engineering efforts:

Heavy lift engineering: large floating and land-based cranes, lift plans and procedures, and heavy rigging systems including hardware

Wharf engineering: the design and evaluation of wharf structures

We are a small, nimble company that can readily fit into a larger team and help provide structural, mechanical, or electrical engineering services. We have assisted with the design of large lift systems, designed and reviewed major lifts, performed peer review, and handled smaller portions of large projects.

Please contact Sugi Loni (sloni@liftech.net) or Erik Soderberg (esoderberg@liftech.net) to discuss how we can help.

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SELECTED HEAVY LIFT AND RIGGING PROJECTS

Client & Project Location	Year	Project Description
DP World Canada South Carolina to Saint John	2022	Container Crane Upper Works Raising/Lowering: Peer review of Hyundai container crane upper works raising and lowering design for bridge passing. Checked stresses and deflection in the crane structure and the associated structural details.
SSA Atlantic Jacksonville, Florida	2022	Container Crane Upper Works Raising/Lowering: Peer review of ZPMC container crane upper works raising and lowering design for bridge passing. Checked stresses and deflection in the crane structure and the associated structural details.
Maher Terminals LLC Elizabeth, New Jersey	2022	Container Crane Upper Works Raising/Lowering: Peer review of Liebherr container crane upper works raising and lowering design for bridge passing. Checked stresses and deflection in the crane structure and the associated structural details.
Power Engineering Construction Company San Francisco, California	2022	Designed custom lift system and procedure for lifting a large ferry ramp. Lift system uses an anchored post and cantilevered beam structures with torqued high strength threaded rods.
Internal (Liftech R&D)	2021	Concept design of system for extending container crane booms in-place, i.e., without removing the existing booms or using land cranes. See: https://www.liftech.net/liftech_publications/in-situ-boom-extension-process/
South America (Confidential)	2021-22	Designed lifting procedure including a lifting frame to remove a severely damaged shiploader boom. Removal was complicated due to only one crane available with limited lift height and capacity.
Everport Terminal Services Port of Tacoma and Port of Oakland	2020-22	Jacking Frame and Rollback Equipment Design Review: Peer review of ZPMCs jacking frame for crane raises of ZPMC cranes.
Modern Terminals Ltd. Hong Kong	2018-22	Jacking Frame Design Review: Peer review of ZPMCs jacking frame for crane raises of ZPMC and Noell cranes. Peer review of ZPMC's boom extension rig that is mounted on the ZPMC and Noell trolleys.
Power Engineering Construction Company Port of Oakland	2021	Engineering for container crane demolition including confirming wharf capacity for crawler and mobile crane loads, overall dismantling procedure, and lifting plan for articulated boom removal.
Pacific Crane Maintenance Company, LP Port of Oakland	2021	Engineering for container crane demolition including confirming wharf capacity for crawler and mobile crane loads, overall dismantling procedure, and lifting plan for boom removal.
Power Engineering Construction Company San Francisco, California	2021	Engineering for lift points and associated reinforcing of dump truck bucket for four-point lifting with a floating crane.

Client & Project Location	Year	Project Description
Power Engineering Construction Company California	2021	Concept design for a 100 ft long bridge for container reach stackers including hoisting tower and system.
Maher Terminals LLC Elizabeth, New Jersey	2016-21	Jacking Frame and Rollback Equipment Design Review: Peer review of ZPMCs jacking frame and rollback equipment for crane raises of ZPMC and Fantuzzi cranes.
Modern Terminals Ltd. Hong Kong	2020	Designed input for a platform attached to a MOT trolley to extend the boom tips of Noell cranes 2 m. The platform supported the boom extension pieces, workers, and a service crane.
Power Engineering Construction Company Port of Oakland	2020	Engineering for container crane demolition including confirming crawler and mobile crane loads on existing low-capacity wharf, boom lowering procedure using crawler crane, and beam system for supporting crawler crane on existing wharf.
Manzanillo International Terminal, Republic of Panama	2020	Design assistance including peer review and design development to increase the lift height of a container crane using a jacking frame and strand jacks.
Doosan Heavy Industries Vietnam	2020	Reviewed wharf structure for container crane offload.
Power Engineering Construction Company Richmond, California	2020	Designed collars for lifting long 60-inch diameter piling.
DP World Canada Vancouver	2020	Container Crane Upper Works Raising/Lowering: Peer review of ZPMC container crane upper works raising and lowering design for bridge passing. Checked stresses and deflection in the crane structure and the associated structural details.
Everport Terminal Services Port of Oakland	2019	Container Crane Upper Works Raising/Lowering: Peer review of ZPMC container crane upper works raising and lowering design for bridge passing. Checked stresses and deflection in the crane structure and the associated structural details.
Power Engineering Construction Company San Francisco, California	2019	Design up to 500 t floating crane lifts to erect marine facilities including pier superstructure, access ramp, and steel float.
Port of Oakland	2018-20	Reviewed wharf deck at multiple terminals for crane offloads and for equipment for raising container cranes.
Manzanillo International Terminal, Republic of Panama	2018	MIT decided to build their own jacking system for the raise contractors to use during the crane raise construction. Liftech worked with Global Rigging & Transport to design the jacking frame and connections to the existing crane structures. The jacking frame is designed to raise a 1,650-t upper structure approximately 20 m. The system design considered the size and configuration of several STS crane designs being considered for raises.

Client & Project Location	Year	Project Description
		Liftech also reviewed the crane raise procedures and jacking frame erection/relocation methods.
Power Engineering Construction Company Moffett Field, CA	2014-16	Designed a variety of support and lift systems for shoring and repairing 1940s wooden blimp hangar structure including: 120 ft tall adjustable pipe shoring/jacking system. Rolling access tower with platform to provide access for workers and equipment to install jacking space truss beams and repair hangar structure damage. 85 ft long jacking space truss beam with hydraulic screw jacks to provide a jacking system to lift the damaged roof to its original undamaged position. Strand jack system including support towers to erect and disassemble the access tower. Jacking system to raise 220 ft x 22 ft x 21 ft wooden box beam to restore it to its original position. System included hydraulic and screw jacks and low friction pads to allow lateral movements. Concept design for strand jack system including structures and connections for lowering wooden box to ground.
Bigge Power Constructors San Leandro, California	2010-16	Peer review or design assistance for various heavy lift projects.
Sarens	2014	Design refurbishment for 270 T capacity lift block trunnion.
Global Rigging & Transport	2013	Engineering for relocation of a container crane through different wharves including wharf structure review and design of support beams.
Paceco Corp. Hayward, California	2012	Upgrades to Jacking Frame: Design upgrades to jacking frame for raising cranes originally designed for Bickerton Iron Works in 1996.
Bigge Power Constructors San Leandro, California	2011	Heavy Lift Crane for Large Scale Modular Construction: Assisted Bigge engineering team with the design of the boom, mast, and carriage assemblies of the new crane, and structural analysis of the crane assembly. The crane is rated for 4,000 short tons at a radius of 240 ft from the center of rotation.
Global Rigging & Transport Nevada	2010	Round Mountain Tunnel Relocation: Designed a special purpose transporter assembly to relocate four concrete tunnel sections, each weighing up to 1,100 tons.
Bickerton Iron Works Torrance, California	2008	Paceco 962 Crane Gage Modification: Designed a rigging system to raise the landside of the crane, cut the landside legs under the portal beam, and rotated the legs over five ft to the new gage position.

Client & Project Location	Year	Project Description
Bickerton Iron Works Los Angeles, California	2008	Hitachi Cranes 14, 16, and 17 Modification and Relocation: Designed a jacking system to raise the cranes to install a full length cap below the existing sill beams. The system used an existing truss system to move the cranes on to and off a barge. Cranes were relocated from Los Angeles to Guam.
Bickerton Iron Works Various	2006	Crane Move System: Designed an easy-to-ship-and-assemble crane move system for moving container cranes. The system reduced impact on crane downtime and impact to operations.
Siemens Westinghouse Talbot County, Georgia	2002	Transformer Offload: Peer review of cranes and rigging for the offload of a transformer at Talbot Energy Facility.
Siemens Westinghouse Blythe, California	2002	Equipment Offload: Peer review of cranes and rigging for the offload and transport of gas turbines and generators.
Bechtel Power Haddam Neck, Connecticut	2000	Connecticut Yankee Nuclear Plant Decommissioning: Analysis, review, inspection program, and documentation to recommission the existing polar crane.
Rigging International Haddam Neck, Connecticut	1999	Connecticut Yankee Nuclear Plant Decommissioning: Supported the rigging contractor in the analysis and design of components for an 800T lift for removal of a nuclear reactor and cask.
Bickerton Iron Works Los Angeles, California	1999	Staples Center: Structural engineering to assemble, erect, and rig the roof structure.
Bickerton Iron Works Various	1996	Designed a jacking system to increase the lift height of container cranes, the first of its kind. The system is mounted on the cranes to avoid loading the wharf structure.
Rigging International Mihama, Japan	1994	Analysis and design of polar crane structure for replacement of 350 ton steam generators at nuclear power plant.
Rigging International Palisades, Pennsylvania	1990	Analysis and design of jack trolley hardware, rotating spreaders, and support beams for replacement of 350 ton steam generators.
Paceco Corporation Various	1970s & 1980s	Structural design of nuclear power plant polar and gantry cranes.

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SELECTED FLOATING CRANE DESIGN AND REVIEW PROJECTS

Client	Year	Capacity	Project Description
McLean Contracting Co.	2021	400 ft above water	High-reach floating crane: Developed the design criteria, assisted with developing a conceptual jib erection scheme, reviewed crane system strength and stability, and developed stay and strut concepts.
ZPMC	2010	12,000 t	Ocean-going vessel, revolver crane: Design review of boom, A-frame strut, stays, and base. Optimized tub and collar structure.
ZPMC	2009	8,000 t	Ocean-going vessel, shear leg derrick: Design review of boom, A-frame strut, stays, and base.
ABF	2008	1,700 t	Barge, shear leg derrick: Design review of boom, shear leg, stays, barge reinforcement, tackle hardware, and boom skidding scheme.
ZPMC	2005	4,000 t, 7,000 t	Ocean-going vessel, revolver crane: Boom structure design and miscellaneous consulting.
Bickerton Iron Works	2000	300 t	Self-propelled barge, revolver crane: Study to extend the boom length of the crane initially designed for Paceco.
The Dutra Group	2000	400 t	Self-propelled barge, revolver crane: Feasibility review to upgrade the operating range of a 400 t derrick barge crane.
Enron Eng.	1998	600 t	Ocean-going vessel, derrick barge: Reviewed damage and design repair procedures.
Crowley Maritime	1998	3,000 t	Twin barge system: Conceptualize a twin barge floating crane scheme to remove abandoned offshore platforms.
AmClyde	1992	2 @ 750 t	Barge: Designed the conversion of a land-based stiff leg derrick to a floating crane derrick to handle liquid natural gas tanks.
Westmont Industries	1990	100 t	Revolver cranes on US Navy ships: Reviewed structural design of numerous cranes.
AmHoist	1986	2 – 7,000 t @ 35 m 2 – 475 t @ 110 m	M-6000 twin-luffing derricks on a semi-submersible for offshore work: Design and drawings for booms and jibs.
AmHoist	1985	2 – 6,000 t @ 35 m 2 – 425 t @ 110 m	M-5000 twin-luffing derricks on a semi-submersible for offshore work in North Sea: Design and drawings for booms and jibs.
Paceco and Smith Rice	1985	150 t to 300 t	Barge revolver cranes: Structural design of crane components and foundation.
Matson Navigation	1985	40 t	Container vessel/revolver crane: Reviewed structural design of Mitsui cranes to load and offload containers in Hawaii.

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Bigge Heavy Lift Cranes

Bigge Power Constructors built large capacity derrick cranes intended for large scale modular construction of nuclear power plants.

Each crane rolls on a circular track. This particular application required a capacity of 4,000 short tons at a radius of 240 feet from the center of rotation, 836 short tons at 640 feet, and 500 short tons at 790 feet. This layout allows the crane to reach multiple locations within a plant, eliminating the need to relocate the crane during the project's construction.

Liftech assisted Bigge's engineering team with the design of the boom, mast, and carriage assemblies of the new cranes, and structural analysis of part of the crane assembly. Liftech also provided peer review and engineering support for some other aspects of the project.

Reference:
Bigge Power Constructors
San Leandro, California, USA

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8,000 t Floating Crane Design Review

ZPMC supplied an 8,000 t double boom shear leg floating crane to Samsung Heavy Industries Company Limited. The crane has 8 main hooks, each with a 1,000 t capacity. The crane is rated for 8,000 t at 82 m from boom heel.

Liftech assisted ZPMC with developing the overall concept and layout, and designing various crane structural components.

Client:
ZPMC
Shanghai, China

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Columbia Giant Specialty Derrick Crane
Columbia, Washington

With a lifting capacity of 660 tons, the Columbia Giant meets the safety requirements for the Atomic Energy Commission heavy lifting projects.

The derrick sits on a steel grillage on an existing dock so it can be slid out of the way when not in use. The pipe compression struts are above grade and can be disassembled. The boom and poles can be removed or reused for other derrick or gin pole applications.

Liftech's services included review and design of reinforcing for the transshipping barge, and design of the derrick including connections, backstay supports, dock modifications, and review and design of additional pile supports for the dock.

Mobile Giant Specialty Derrick Crane
Mobile, Alabama

The twin booms of the derrick reach 300 feet above the dock, have the lifting capacity of 1,600 tons, and can be hoisted separately or in tandem. The derrick was designed to meet the requirements for the Atomic Energy Commission heavy lifting projects.

Liftech's services included design and detailing of all the major elements including the boom, mast, holdback foundation, holddown, and access tower.

Reference:
Rigging International
USA

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4,000 t Floating Crane Design Review
Guangdong Salvage Bureau, China

Liftech provided structural design assistance and review services to ZPMC and assisted them in developing the overall concept and layout arrangement. Liftech also provided preliminary design of the boom tip and typical details of the boom structure, checked member sizes, reviewed design drawings of typical details, and provided suggestions for improvement.

The crane has a 4,000-t capacity at 40-m radius on the main hook. It has two auxiliary hooks with capacities of 800 t and 150 t. The top of the boom measures 21 m above the water line at the 40-m radius. ZPMC built the floating crane, which will be used for heavy lift work.

Reference:
ZPMC
Shanghai, China

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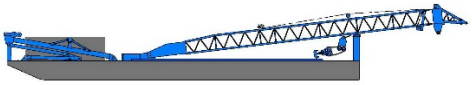

1,700 t Floating Crane Design Review
"Left Coast Lifter"
American Bridge/Fluor Enterprises

Liftech provided design assistance and review services to American Bridge/Fluor Enterprises (ABF) for procurement of a shear leg derrick. The derrick is used to erect the major components of the San Francisco-Oakland Bay Bridge self-anchored suspension span.

The crane with a 100-m boom has 1,700 t capacity at 60 degrees. The crane has two auxiliary hooks with capacities of 100 t and 10 t. The boom is configured to lay down for transport within the USA river system. The 100 ft wide x 400 ft long barge has removable floats for increased stability. The derrick and barge floats are made by ZPMC in China. The barge was fabricated by US Barge LLC in the United States and towed to ZPMC for mounting the crane.

Liftech's services included development of the technical specifications, design review and assistance, and fabrication review assistance.

This project has received three awards. In 2010, it was awarded the Structural Engineers Association of Northern California Excellence in Structural Engineering Award in the Study/Research Guidelines category.

Also in 2010, it was awarded the Structural Engineers Association of California Excellence in Structural Engineering Award in the Special-Use Structures category.

In 2011, it was awarded the National Council of Structural Engineers Associations (NCSEA) Excellence in Structural Engineering Award, Outstanding Project, in the Other Structures category. The Outstanding Project Award is the highest honor in the NCSEA Excellence in Structural Engineering Awards program.

Reference:
American Bridge Company
Coraopolis, Pennsylvania, USA

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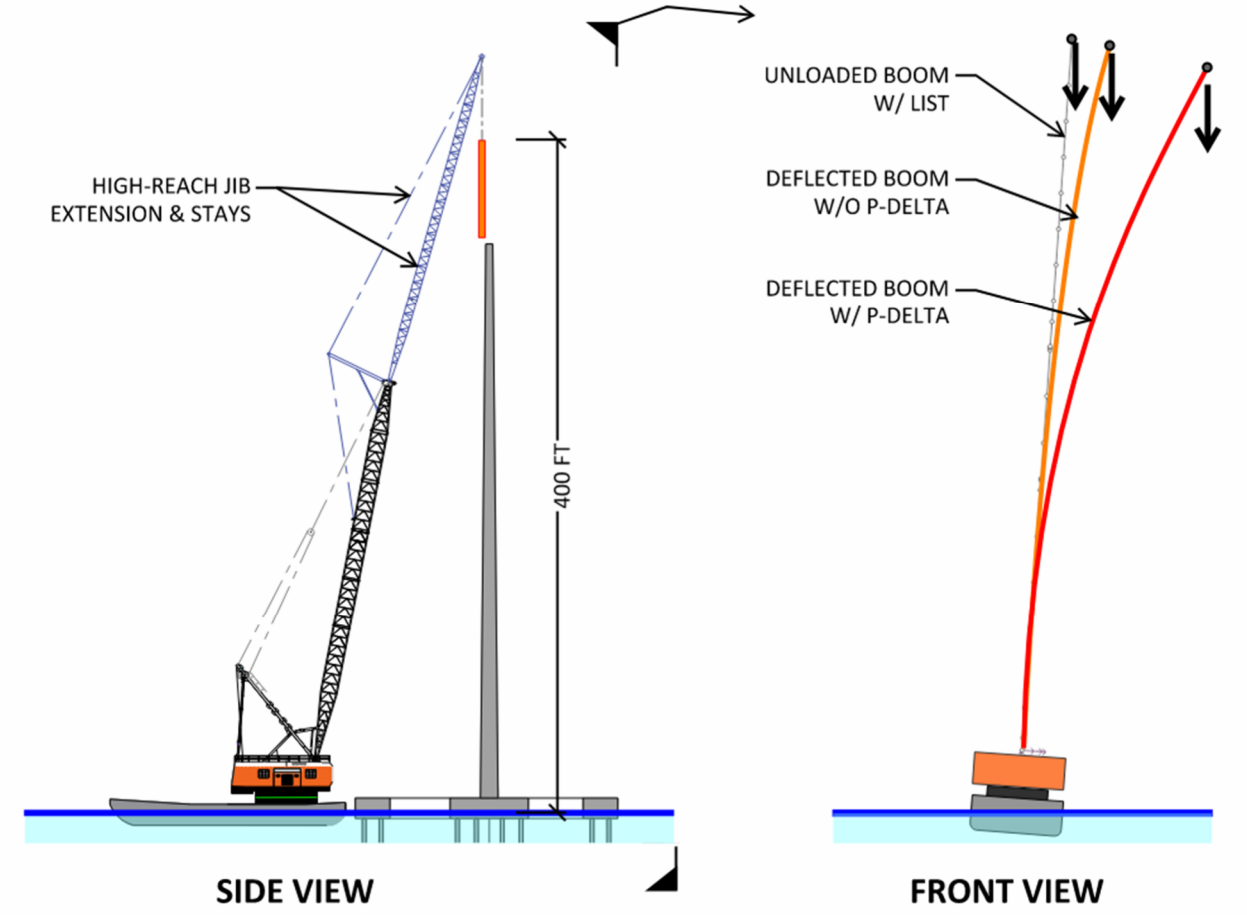

McLean High-Reach Floating Crane Feasibility Study
Glen Burnie, Maryland

McLean Contracting Company needed a high-reach floating crane to install offshore power line supports in Baltimore. The highest lift was 400 feet above water. Liftech evaluated the feasibility of retrofitting their 400T Baltimore floating crane with a long jib to perform the lifts.

Liftech developed the design criteria, assisted with developing a conceptual jib erection scheme, reviewed crane system strength and stability, and developed stay and strut concepts.

For this type of system, 2nd order (P-Delta) effects, or the increase in displacement caused by the loading eccentricity, are significant. Advanced analyses were used that accounted for this phenomenon.

Naval architect Argonautics Marine Engineering, Inc. performed a peer review of vessel stability analysis.

Reference:
McLean Contracting Company
Glen Burnie, Maryland, USA

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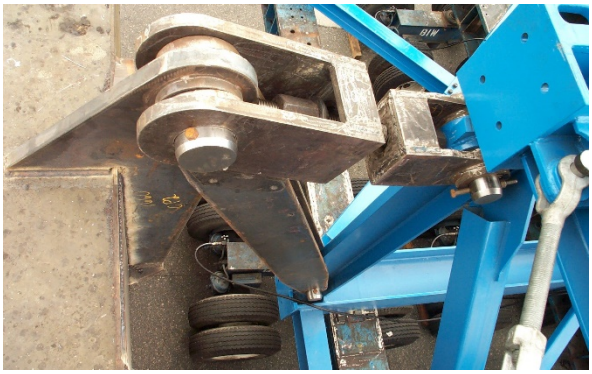

Crane Move System

Liftech designed a crane move system for moving container cranes that was easy to ship and assemble.

Liftech designed a modular system with container sized components for shipping. The system can be assembled away from a crane, allowing the crane to continue working until it is moved. The container crane is secured to the system with four pins and lifted for transport.

The crane move system can move 50 ft to 100 ft gage cranes that weigh up to 1,600 t on wharf decks that are designed for 1,000 psf live loads.

Client:
Bickerton Iron Works
Torrance, California, USA

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Round Mountain Tunnel Relocation, Nevada, USA

Global Rigging & Transport, LLC (GRT) was retained to relocate four concrete tunnel sections within the Round Mountain gold mine facility in Nevada. Each tunnel section, weighing up to 1,100 tons, was lifted using a special purpose transporter, moved along approximately 1.5 kilometers of the terrain with slopes of up to 5%, and set at the new location.

GRT conceptualized the transporter scheme and retained Liftech to design the transporter assembly and verify the tunnel structure for the transport loads. The transporter was supported on 28 hydraulically connected dollies to provide a three-point support. Each tunnel section was lifted using rods that were supported on jacks mounted on top of beams spanning over tubular columns.

For traveling on an inclined grade, each tunnel section was held in position with longitudinal rods attached between the tunnel bottom and the transporter bottom. Long cylinders with jacks between the tunnel and the transporter in the transverse direction kept the transporter frame from spreading and overloading the dolly wheels. The tension in the longitudinal rods and the transverse jacks was continually adjusted as the tunnel section was raised or lowered.

The tunnel lift rods were attached to brackets mounted on each side of the tunnel walls at four locations with bolts drilled through the 27-inch-thick walls.

Reference:
APL Limited
Los Angeles, California, USA

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Kocks Crane Modification and Relocation
Port of Oakland to Massachusetts Port Authority

Massachusetts Port Authority (Massport) purchased two Kocks low profile cranes from the Port of Oakland for capacity expansion of their Conley Terminal. The Oakland post-Panamax Kocks cranes were a near-perfect match for the Conley Terminal.

Low profile cranes, also known as shuttle boom cranes, are used where overall height is restricted because of aircraft clearance requirements. Because of their unique nature and limited demand, the cost of new low profile cranes is about 50% more than for a typical quay crane. Reuse of an existing crane is more attractive.

Liftech surveyed the condition of the cranes before the purchase and developed construction documents for modification and transport of the cranes from the Port of Oakland to Massport. We also provided bid review assistance and construction support services.

Structural modifications required for the Massport location were limited to minimal frame strengthening for higher storm winds, addition of a boom latch, installation of an 11.5” riser at the landside equalizer system, gantry bumper modifications, and gantry stowage pin modifications.

Liftech provided the procurement services to the Port of Oakland for the original Kocks crane purchase and assisted with the structural design of the cranes.

Client:
Fay, Spofford & Thorndike, Inc.
Burlington, Massachusetts, USA

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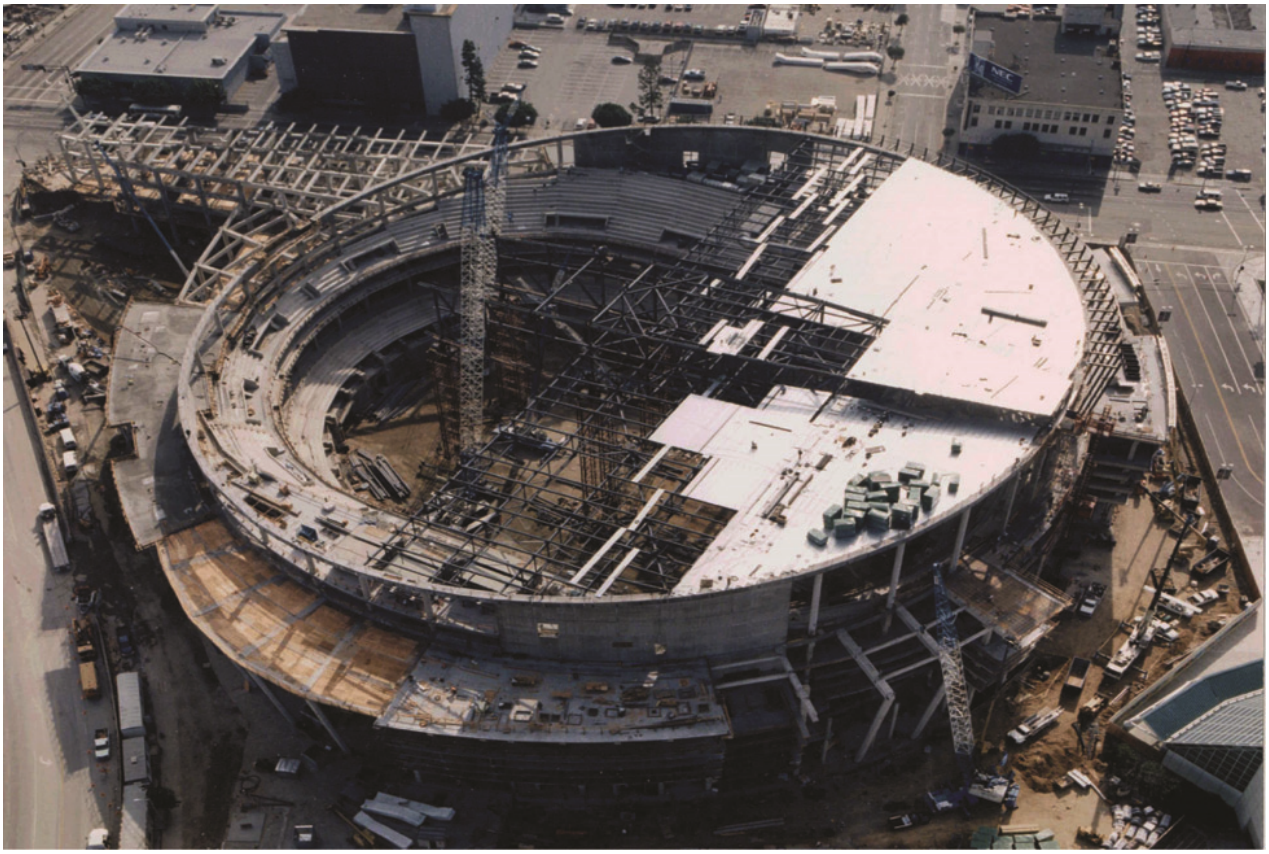

Staples Center
Los Angeles, California

Staples Center, completed in 1999, is the home of the LA Lakers, Clippers, and Kings. Bickerton Iron Works was the rigging contractor selected to assemble, erect, and rig the roof structure. Liftech was retained by Bickerton as the structural engineer.

The 435-foot-diameter roof of the arena is supported in the middle by a 64 ft wide x 45 ft deep cigar-shaped truss called the Supertruss. At every Supertruss bay, secondary trusses span from the Supertruss to the arena walls. The Supertruss was assembled more than 100 feet in the air in five sections using shoring towers. Once each Supertruss section was lifted onto its shoring towers, the secondary trusses were put into place, then the roofing and mechanical systems were installed. This method allowed all disciplines to work simultaneously. When the entire roof assembly was erected, the jacks on the Supertruss shoring towers were lowered until the Supertruss carried the weight of the roof. The Supertruss passed the test of carrying 80 tons of staging, in addition to the roof, for the Grammy Awards.

Reference:
Bickerton Iron Works
Torrance, California, USA

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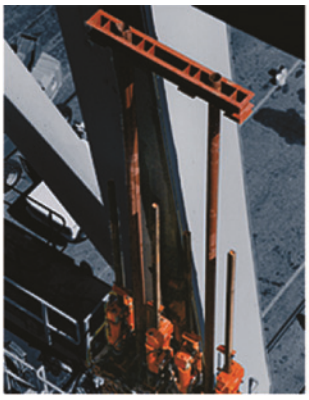

Jacking Frame for Raising Container Cranes
Various Locations

The existing jacking equipment for raising container cranes required a long time to set up and disassemble. Some equipment imposed unacceptable loads on the dock. Liftech designed a jacking frame that enables BIW to raise cranes in less than a week. The frame is capable of raising cranes 30 feet, can withstand up to 75 mph winds with the crane raised, and is supported on crane sill beams.

The assembly is used for projects in the United States and overseas.

Reference:
Bickerton Iron Works
Torrance, California, USA

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Manzanillo International Terminal Crane Raises
Republic of Panama

Manzanillo International Terminal (MIT) hired Global Rigging and Transport (GRT) to increase the lift height of eight ZPMC ship-to-shore (STS) cranes located in Panama, and potentially for other terminals in Mexico and Chile.

Liftech provided design review for structural modifications to increase the lift height of two STS crane designs.

Earlier, Liftech assisted MIT with the initial procurement of these cranes, including providing technical specifications and structural design review.

MIT decided to build their own jacking system for the raise contractors to use during the crane raise construction.

Liftech worked with GRT to design the jacking frame and connections to the existing crane structures. The jacking frame is designed to raise a 1,650-t upper structure approximately 20 m. The system design considered the size and configuration of several STS crane designs being considered for raises.

Liftech also reviewed the crane raise procedures and jacking frame erection/relocation methods.

Reference:
Manzanillo International Terminal
Colon Free Zone
Republic of Panama

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Paceco Crane Gage Change and Relocation
Long Beach to Manzanillo, Mexico

SSA Mexico relocated a 50’ gage Paceco crane from the Port of Long Beach, California, to Manzanillo, Mexico.

The crane was built around 1980 and was raised in the late 1980s. Liftech provided engineering to change the gage from 50’ to 55’ and for the associated rigging work. The frame was strengthened for higher wind loads, and new stowage brackets and tie-downs were added.

Reference:
SSA Mexico
Manzanillo, Colima, Mexico

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Hitachi Crane Modification and Relocation
Los Angeles to Guam

Horizon Lines and Matson Navigation purchased three Hitachi cranes located in Los Angeles, California, for relocation to Guam. The cranes were upgraded and strengthened for typhoon winds. Upgrades included a lift height increase of 8 feet, new drives and controls, diesel power, and new tie-downs.

Liftech provided the structural design for upgrade and relocation, assisted with bid evaluations, and reviewed the contractor's work.

Liftech also provided the design of the Guam wharf improvements in the crane stowage area.

References:
Horizon Lines, LLC
San Ramon, California, USA

Matson Navigation Company
Oakland, California, USA

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Port of Oakland Crane X437 Demolition Plan
Oakland, California

Liftech provided engineering to demolish the articulated boom Crane X437 at Port of Oakland Berth 37, including review of the associated wharf loads.

Power Engineering Construction Co. used their DB Pacific floating crane, a Liebherr LR1300 crawler crane, and a hydraulic mobile crane. The crawler and mobile cranes imposed large, localized loads on the wharf structure.

Liftech's scope included wharf review for the land-based crane loadings and submittal calculations; development of the dismantling plan including strength and stability review, boom lowering procedure, rigging arrangements and details; and construction support with site visits. The boom removal procedure takes advantage of the articulation linkages that simplified removal by lowering the waterside boom segment to a vertical position.

Reference:
Power Engineering Construction Company
Alameda, California, USA

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Port of New Orleans Wharf Analysis
Port of New Orleans, Louisiana

Global Rigging & Transport unloaded two Doosan cranes at the Port of New Orleans using a dolly system.

Liftech reviewed the wharf structure to determine its adequacy to support the dolly loads and helped select the offload location.

Reference:
Global Rigging & Transport, LLC
Virginia Beach, Virginia, USA

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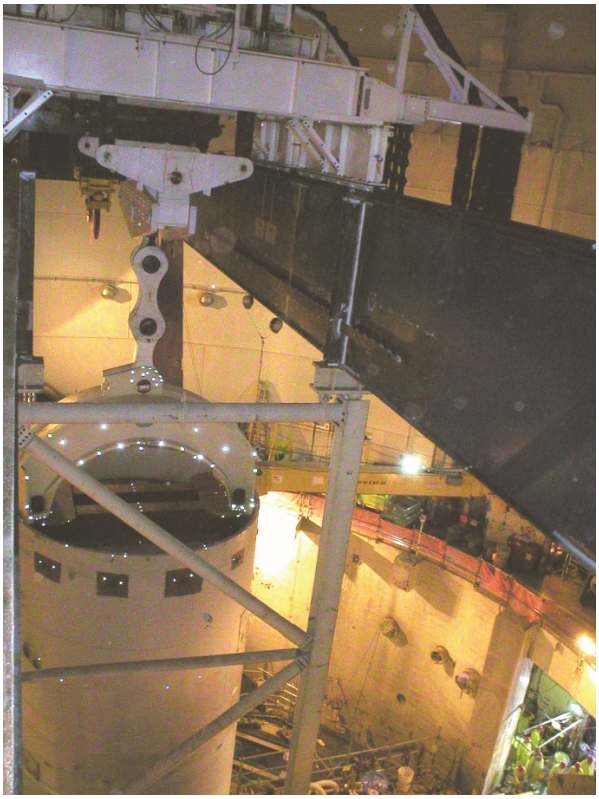

Nuclear Reactor Vessel Removal
Haddam Neck, Connecticut

Bechtel Power Corporation executed the decommissioning of the Connecticut Yankee Nuclear Power Plant. The reactor vessel was removed for offsite disposal. Rigging International was a subcontractor for the reactor vessel removal. Liftech assisted Rigging International and Bechtel Power Corporation.

The lifting scheme took advantage of the existing polar crane. A shoring tower provided an additional support for the polar crane during the lift of the reactor vessel.

Liftech also analyzed the polar crane, designed the stiffening required to strengthen the structure, and provided Bechtel with a report for the qualification of the polar crane for use after the lifts were complete. This report included a detailed crane history and crane analysis.

Reference:
Rigging International
Beachwood, Ohio, USA

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Moffett Field Hangar, Overall Project
Mountain View, California

At more than 1,000 feet long, 250 feet wide, and 170 feet tall each, two blimp hangars constructed in the 1940s at Moffett Field are among the world's largest clear-span timber structures. One of these hangars had significant damage to many of its timber truss arches, and the damage was progressing along the length of the hangar to the extent that there was concern the hangar, or portions of it, could collapse. Power retained Liftech to design systems to stabilize and provide access so Power could safely perform repairs. Some of these systems include:

An adjustable pipe shoring system extending from the hangar concrete floor to multiple points on the lower chord of the truss arches to support the deformed trusses.

An access shoring tower that was pulled through the hangar on channel tracks and steel rollers, so workers could shore the arches and access them for repairs.

Strand jack towers for assembling the access shoring tower inside the hangar.

A jacking procedure and system for lifting and repairing a 20-foot x 22-foot x 200-foot timber box beam over the 120-foot-tall hangar doors.

A variety of timber emergency repair details.

Reference:
Power Engineering Construction Company
Alameda, California, USA

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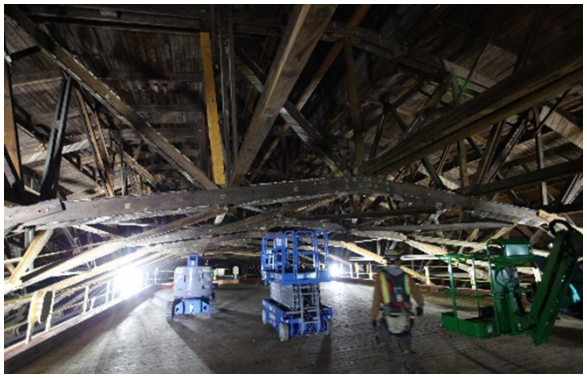

Moffett Field Hangar, Access Shoring Tower System
Mountain View, California

Liftech designed an access shoring tower system and strand jack assembling system. The access system is 80 feet x 80 feet x 130 feet tall. It is designed to shore and jack the hangar roof from its deck and facilitate access to the roof with an array of equipment on its deck including lifts and cranes. It is designed for asymmetric shoring, can resist large lateral loads, and can tip onto one side in an earthquake.

It has an overhead crane mounted under its upper deck, a construction elevator, ladders, and stairs. It is moved on steel rollers on channel tracks.

Lightweight pipe shores with adjustable bases were attached to the deck to shore the hangar roof during the repair work.

The access system was assembled in three parts using a strand jack tower assembling system consisting of a T-frame and diagonal high strength rods connected to brackets anchored into the hangar concrete wall.

Reference:
Power Engineering Construction Company
Alameda, California, USA

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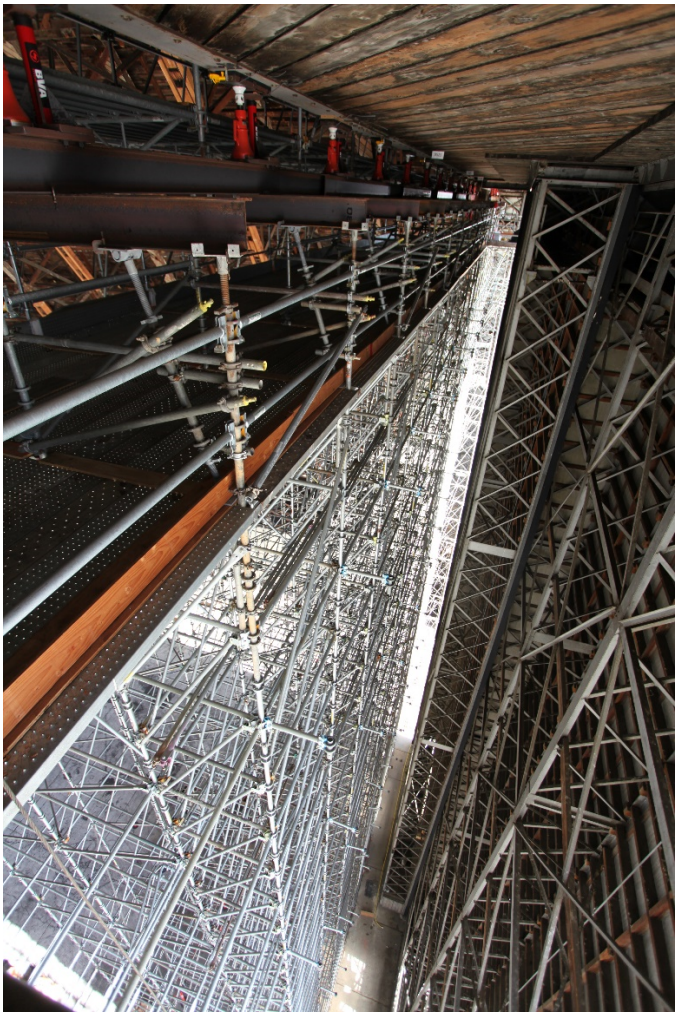

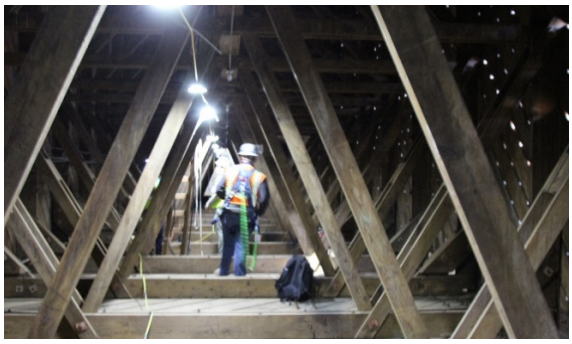

Moffett Field Hangar, Beam Jacking Procedure
Mountain View, California

A 20-foot-wide, 22-foot-tall, 200-foot-long wooden box beam above the hangar doors had deteriorated and sagged down onto the nested sliding door system. Liftech designed a jacking procedure and jacking system so Power could raise and repair the box beam.

The jacking system included lifting and holding jacks. The lifting jacks had low friction bearings to allow the distorted box beam to rotate and shift laterally relative to the jacks as it was raised.

The procedure included vibrating the box steel angle chords to allow the chords and their bolted connections to slip relative to the wood walls and undistort to their original positions.

Reference:
Power Engineering Construction Company
Alameda, California, USA

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COMPANY PRINCIPALS

Erik Soderberg
President, Structural Engineer
Mr. Soderberg is a skilled designer and project manager. He is experienced in the design, review, repair, and modification of a variety of structural and crane related systems including wharves, container cranes, and bulk loader structures. Other structures include crane lift and transfer systems and concrete and steel floats. He oversees the technical and contractual aspects of Liftech's projects in addition to his design work.

Jonathan Hsieh
Vice President, Structural Engineer
Mr. Hsieh is experienced in design, review, analysis, and modification of container cranes, bulk handling cranes, and special structures. His expertise includes crane procurement, fatigue failure investigation and repair, and computer modeling and analysis. He has also worked on structural maintenance programs, seismic design of container cranes, crane instrumentation, and voyage bracing.

Arun Bhimani
Founding Principal, Past President, Structural Engineer
Mr. Bhimani is an expert in all phases of container crane and wharf design. He has developed innovative solutions to container crane design problems, including a technique for combining analysis with heat straightening for repairing damaged container crane booms, the first seafastening design for transporting fully erected container cranes on barges, and a structural maintenance program used to periodically inspect cranes.

Catherine Morris
Vice President, Structural Engineer
Ms. Morris has a wide range of experience in the design of container cranes, buildings, and miscellaneous special structures. She has worked on all facets of container crane design including designing new cranes, reviewing crane designs, designing modifications, and voyage bracing. She has also reviewed and designed reinforcing for barge structures for transport of various equipment, designed chassis storage racks, and analyzed and designed equipment to lift and replace steam generators in nuclear power plants.

Nicholas Grebe
Principal, Mechanical Engineer
Mr. Grebe has extensive experience performing conceptual and detailed designs of mechanisms and systems, analyzing dynamic mechanical systems, and developing designs and detailed drawings suitable for manufacture. He is responsible for developing purchase specifications and reviewing contractors' mechanical, hydraulic, and electrical designs for feasibility and contract compliance. He is experienced in reviewing heavy machinery and container crane controls including logic, interlocks, system architecture, and automation features. He provides project management, condition assessment, commissioning, troubleshooting, and acceptance testing of material handling equipment including container cranes and bulk loaders.

Sugiarto Loni
Principal, Structural Engineer
Mr. Loni has extensive management experience and design expertise with marine terminal structures including crane-wharf interface, container and intermodal yard structures, building facilities, and marine structures. He is responsible for contract negotiations, technical oversight, and quality assurance of project deliverables. His work includes managing a variety of engineering projects ranging from small projects with short duration to large projects with multi-discipline coordination. As project engineer, he performs civil and structural design of marine terminal facilities, seismic retrofit design of existing building structures, and civil and structural design of wharves and marine structures.

Kenton Lee
Principal, Structural Engineer
Mr. Lee is experienced in design, analysis, and project management of container cranes, floating cranes, rigging, and special structures. He specializes in container and floating crane procurement projects and crane modification projects. He is also involved in preparing structural maintenance programs. Some of the technical aspects of his work that are of special interest to him are steel connection design, wind effects on structures, wind tunnel testing, and structural fatigue of steel structures.

Patrick McCarthy
Principal, Professional Engineer
Mr. McCarthy is experienced in ship-to-shore and port yard container crane procurement, modification, reliability, and repairs. His work includes project management, condition assessment, and developing structural maintenance programs and repair procedures. He is Liftech's manager for developing crane technical specifications and helps clients with various aspects of the crane procurement process, including pre-bid assistance, post-award design and fabrication review, and post-delivery structural assessment. He also has expertise in wind provisions, has been involved in wind tunnel and other wind studies, and is an associate member of the Wind Load Subcommittee of ASCE 7.

Derrick Lind
Principal, Structural Engineer

Mr. Lind is experienced with project management, design, review, analysis, and modification of many types of structures, including container cranes, unique industrial equipment, buildings, wharves, and bridges. He specializes in all facets of crane modification, including crane raises, boom extensions, capacity upgrades, and wheel load feasibility studies. His work has included crane procurement, structural analysis and design, checking shop drawings, developing construction documents, and managing design teams and project budgets and schedules.

Anna Dix
Principal, Structural Engineer

Ms. Dix has experience in the design and analysis of various steel and concrete structures. Her focus is on ship-to-shore cranes and other structures that reside next to, in, or on top of the water, such as heavy lift and container handling equipment, wharves, and floating cranes. She likes earthquake and fatigue engineering topics and working with clients.

Leah Olson
Principal, Professional Engineer

Ms. Olson has managed multiple wharf and float projects, and has participated in the design, analysis, and modification of wharf and float structures, container cranes, steel barges, and other rigging structures. She has evaluated the behavior of various concrete and steel structures using finite element analysis (FEA) computer software. Her work includes project management, structural analysis and design, and site inspection and reporting.

Di Liu
Principal, Professional Engineer

Mr. Liu is an experienced designer and project manager. His work includes structural analysis, design review, modification review, and feasibility studies of container cranes, wharves, and other structures.

Tais Shiratsubaki
Principal, Professional Engineer

Ms. Shiratsubaki is experienced in project management and structural design, review, analysis, modification, and repair of various marine structures including container cranes, bulk material handling equipment, and special structures. She is involved in research and development and enjoys collaborating with clients to produce improved designs and solutions.