Liftech Consultants Inc. is a consulting engineering firm, founded in 1964, with special expertise in the design and procurement of dockside container handling cranes and other complex structures. We provide structural, mechanical, and electrical engineering services.

The images above are captioned below:

Bigge Power Constructors Large Capacity Derrick Crane, San Leandro, California

Staples Center, Los Angeles, California

Port Everglades Department of Broward County Low Profile Cranes, Fort Lauderdale, Florida

Cemex Wharf Design, West Sacramento, California

WETA Downtown San Francisco Ferry Terminal, San Francisco, California

Goliath Crane Repair, Upgrade, and Replacement Study

Manzanillo International Terminal Crane Raises, Republic of Panama

Balance Crane Design


History
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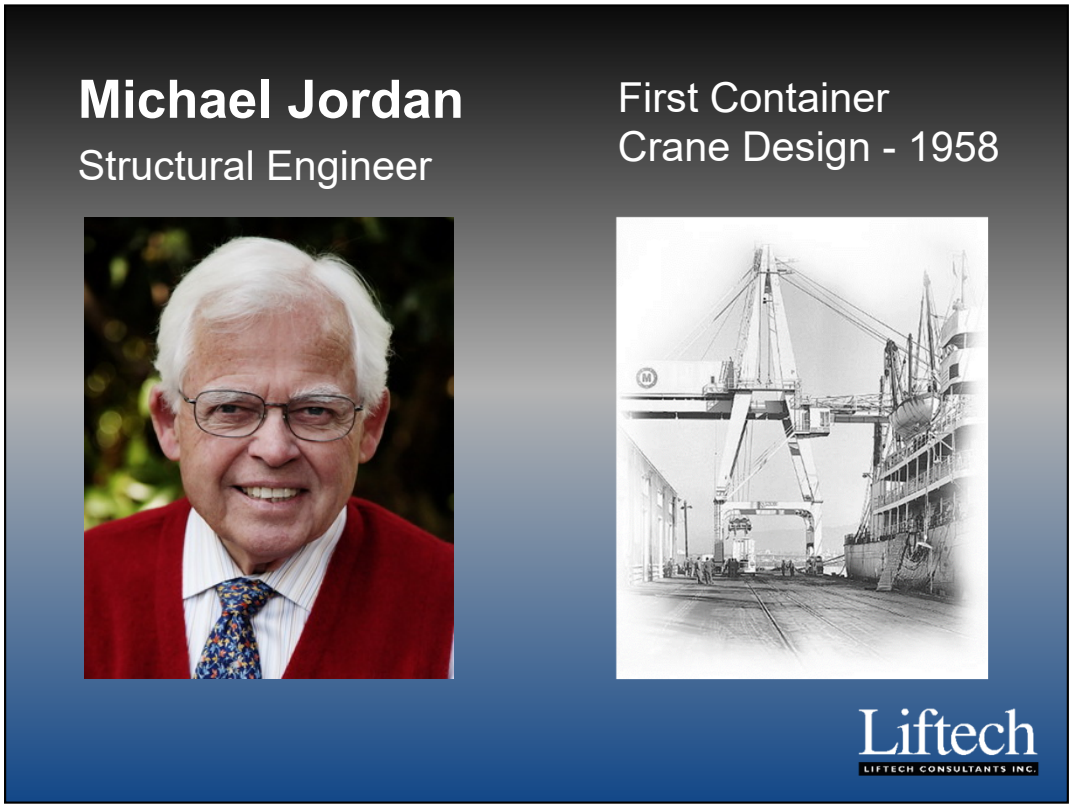

Mike Jordan of Liftech designed the structure for the world's first modern container crane that was built by Paceco in Alameda, California. Mike and Liftech have been an integral part of the evolution of container cranes since then.

1964	Michael Jordan Consulting Engineer
1974	Jordan/Casper/Woodman/Dobson
1977	Liftech Consultants Inc.
2022	McKay International Engineers joined Liftech Consultants Inc.

Today we have 31 staff including 20 engineers. Our main office is in Oakland, California, but we have four employees in Shanghai and one at Port Everglades.

Liftech is a small niche business specializing in equipment, marine structures, and heavy lift systems.


Projects
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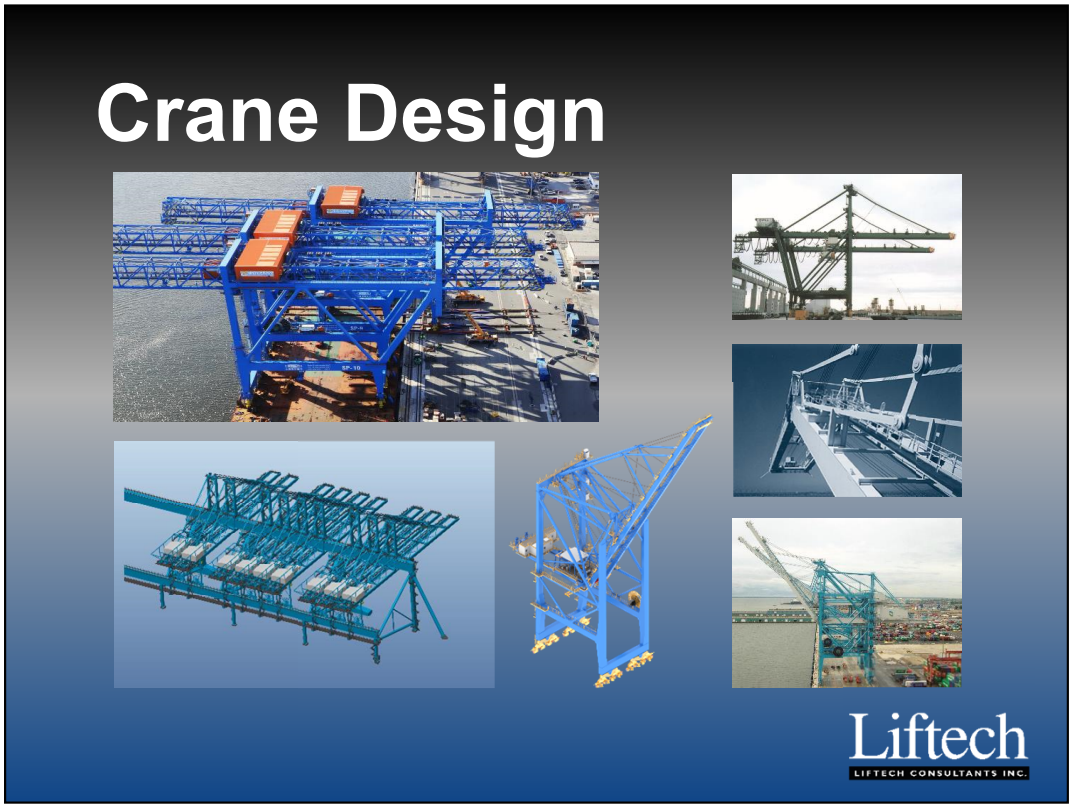


Liftech has designed many new crane systems. For container handling cranes, in addition to designing the structure of the world's first crane, we designed the structures of the first low profile and articulating boom cranes.

This slide also includes some of the more recent systems we have developed including APMT's FastNet and our articulating balance crane that significantly reduces storm wind wheel loads.

Low Profile Crane Design, Port Everglades, Florida

Machinery-on-Trolley Crane Design, Port of Singapore Authority

Articulating Boom Design

FastNet Crane Design, APM Terminals

Balance Crane Design

Elevating Girder Crane Design, Virginia Port Authority

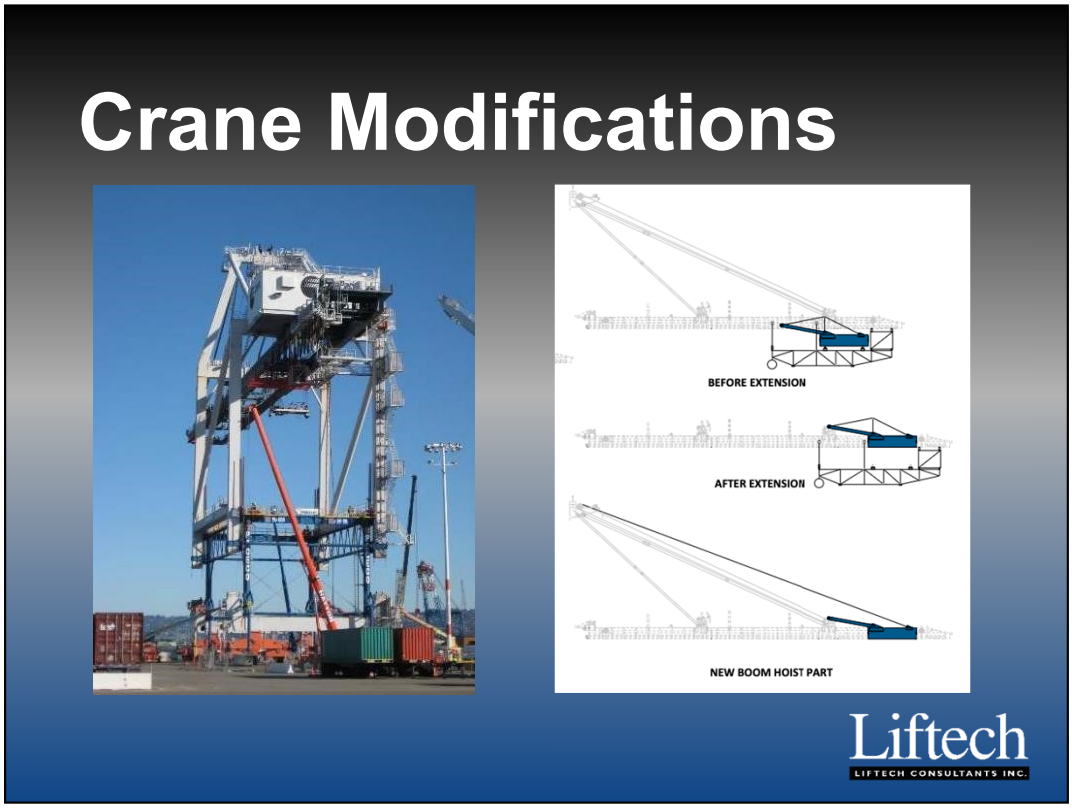
Procurement services are many including performance specifications, concept design, bid evaluation, design review, fabrication review, voyage bracing, on/offload review, and commissioning. Services include bulk equipment in addition to container cranes.

Port Everglades Low Profile Cranes, Fort Lauderdale, Florida

Virginia Port Authority NIT Crane, Norfolk, Virginia

Dual-Hoist, Tandem-Lift Crane Procurement, China and Singapore

Unloader Structural Design Review, South America (Client: Confidential)

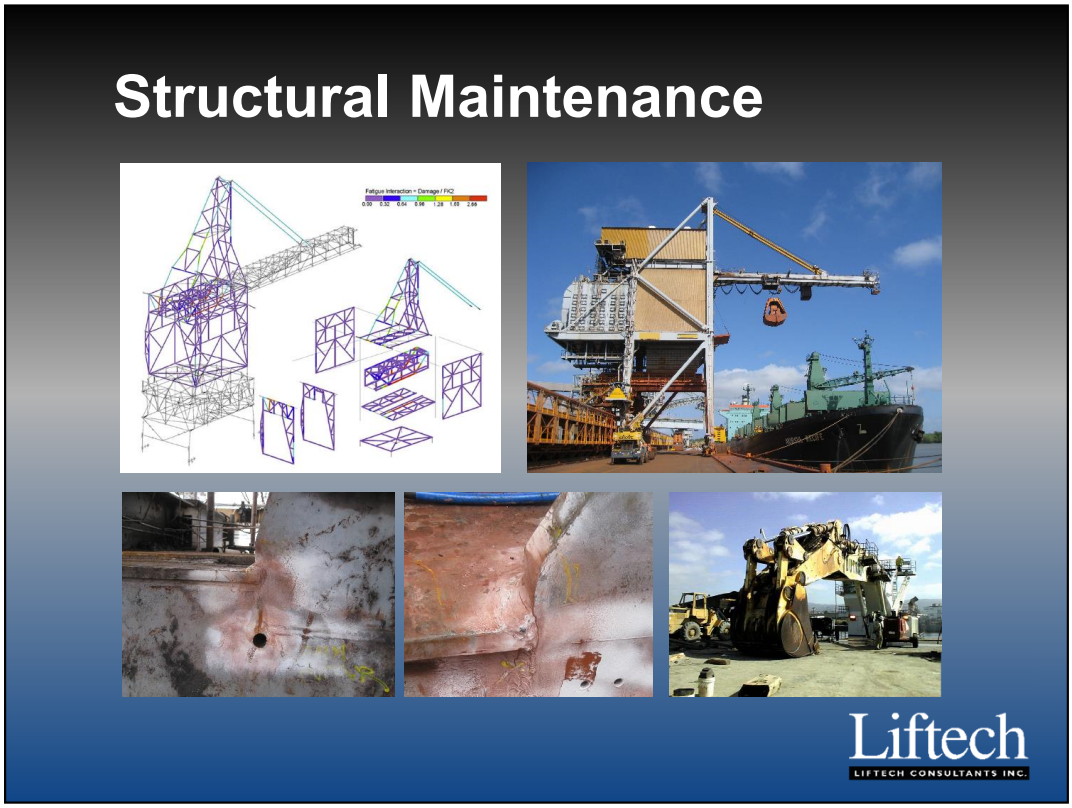


Modification engineering includes the design of modification systems such as jacking and boom extension systems, as well as design or design review and fabrication review of the modifications.

This slide shows the original STS crane jacking frame we designed for Bickerton Iron Works in the late 1990s, which was later sold to Paceco, and our boom extension concept that does not require boom removal.

We help with accident repairs including investigation, damage review including design of temporary securing, and design and oversight of the repairs. We have provided engineering and performed repairs as a design-build team on dozens of projects. We are familiar with what repair methods are practical such as heat straightening and repair requirements, for example, plate flatness, straightness, crane frame alignment, boom alignment, wheel alignments.

Field measurements are sometimes performed on projects with equipment having unacceptable deflections, fatigue cracking, or both. We have designed measurement and testing programs that have determined the cause and identified practical solutions. Measurements typically include strain gages, accelerometers, and the equipment control system data. Measurement methods have also included other methods including dial gages and linear potentiometers.



Structural maintenance services include the following:

1. Condition evaluation of the structure to identify damage including fatigue cracking, corrosion, past accidents.
2. Design repairs to restore or improve the structure.
3. Analysis of the structure:
    a. To identify fracture critical members (FCMs), tension members whose failure would result in major damage, e.g., dropping the load, collapse or partial collapse of the system.
    b. To calculate fatigue damage and fatigue reliability based on past and future design fatigue loading spectrums.
    c. To provide upgrade recommendations to significantly improve reliabilities.
4. Developing structural maintenance programs that specify the required NDT inspection locations, methods, and intervals to maintain a chosen structural reliability. These programs focus inspection where it is most worthwhile, e.g., locations with greater fatigue damage with more probability of cracking, fracture critical members whose failure is more significant.
5. Design of strain monitoring systems that record stresses, calculate fatigue damage, and warn the operator of excessive stresses. The data can be downloaded remotely, reviewed, and inspections specified.

Liftech has designed significant portions of many floating cranes including these.

Top Left: AmClyde floating cranes, two vessels, one with twin 6,000 t and one with twin 7,000 t capacity cranes. Liftech assisted AmHoist with the boom designs.

Top Right: Left Coast Lifter, 1,700 t floating crane. Liftech provided design assistance and review services to American Bridge/Fluor Enterprises. The crane is used to build bridges including the San Francisco-Oakland Bay Bridge and New York's Tappan Zee Bridge.

Bottom Left: Matson barge crane used to deliver containers in the Hawaiian Islands.

Bottom Right: Various ship-mounted cranes with ZPMC ranging in capacity from 4,000 t to 20,000 t.

We are familiar with lifting and moving hardware and designing heavy lift and move systems. We have designed systems for lifts up to 12,000 metric tons and are developing a lift system concept for erecting wind turbines.

The top left photograph is of a containerized crane move system that used dollies to move container cranes. Top right is the Bigge 125D AFRD with maximum 4,000 short ton lift capacity. Two of these were built to construct nuclear plants, one in Georgia and one in Florida.

Bottom left is the roof erection for the Staples Center. Bottom right is a move system for a mining tunnel segment.

We have designed voyage bracing for STS cranes, RTGs, bridge sections, and other large components. Our designs consider the stresses in the braced structure and the shipping vessel and the load paths between them.

Barranquilla Container Terminal, Kocks Low Profile Crane Relocation, Miami to Barranquilla, Colombia

Kocks Low Profile Crane Modification and Relocation, Port of Oakland to Massachusetts Port Authority

MES Crane Modification and Relocation, Taiwan to Alaska, APL Limited

Bulk equipment experience is similar to container cranes, i.e., including procurement, assessment, modification, repair, seismic response.

Unloader Design Review, South America (Client: Confidential)

Rio Tinto Alcan Unloader Structure Assessment, Montreal, Quebec, Canada

Unloader Condition Survey, South America (Client: Confidential)

Port of Long Beach, Pier G Ship Loader

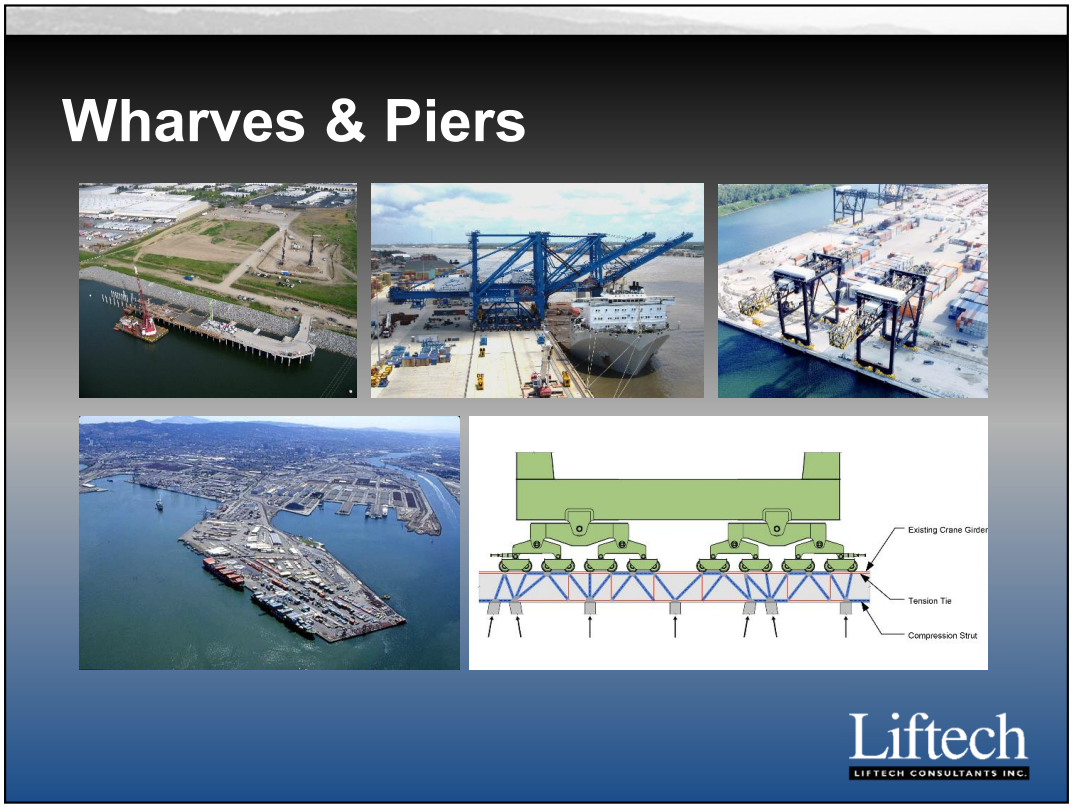
Related to our heavy lift experience, we have designed shoring and access systems including those shown in this slide for repair of a timber blimp hangar that was collapsing. Systems designed for this project include:

1. Pipe shoring struts with adjustable bearing locations for supporting the truss at the intersection of member centerlines to avoid eccentricities and local bending. The shoring struts were stabilized using ties made from high strength threaded rod.

2. Work and shoring tower on Hillman rollers for moving the tower through the hangar as repairs were made working from the two upper decks. The glulam beam decking supported a variety of manlifts, spider cranes, and jacked shoring pipes during the repair work.

3. Strand jack stands that were about 60 ft tall for erecting the tower. The stands were stabilized using ties made from high strength rods.

4. Steel space truss arch that was installed between the timber arch truss and spanned about 80 ft between inboard pipe shoring struts. Screw jacks were installed along the length of the space truss arch for supporting and lifting the damaged portion of truss and roof. The truss arch was built in segments that were bolted together working from the tower.

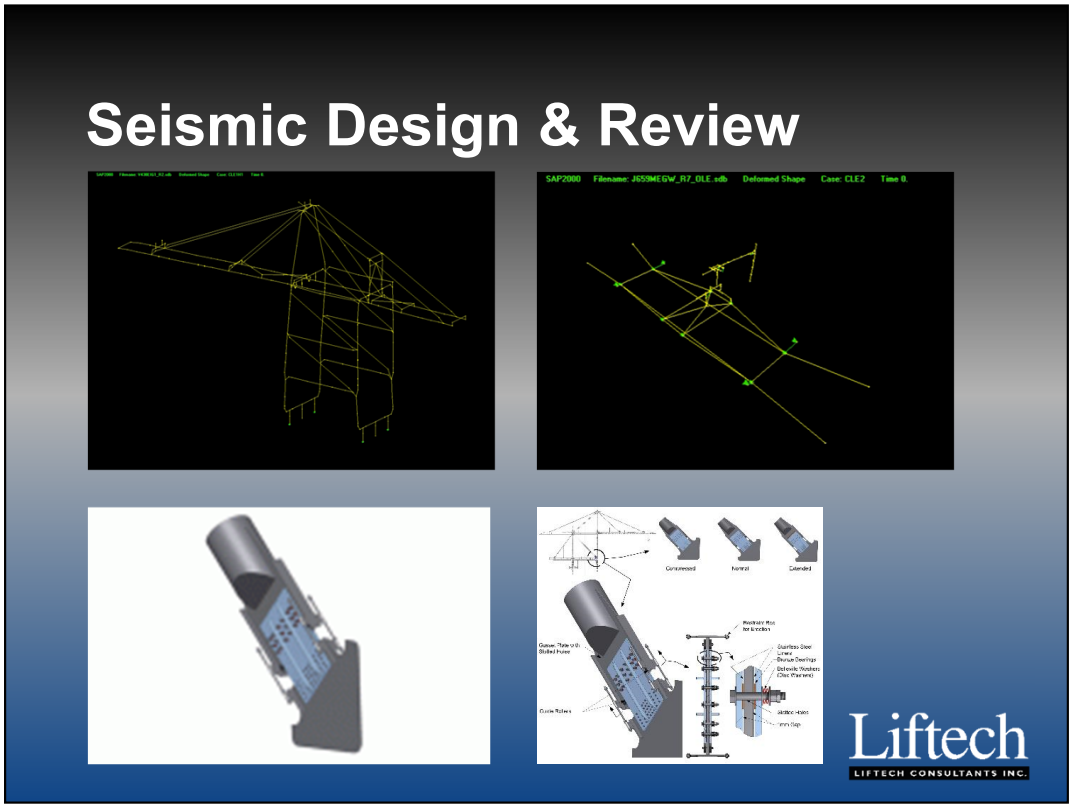


We have designed and reviewed many wharves and piers. Most of our design work has been in the Bay Area as part of competitive design-build teams. We are finishing a large crane girder project with over 10,000 linear feet of girder including stowage hardware and electrical vaults at Port Everglades in Florida.

Common reviews are for unusual large loads such as for offloads.

We have performed many girder capacity studies including two comprehensive studies for the Port of Oakland and the Virginia Port Authority. Girder capacity studies typically result in justifying additional girder capacity, often significantly more than current rated capacities.

We started designing ferry terminals in the Bay Area as part of competitive design-build teams and have designed over a dozen ferry float systems. We also recently designed a floating fire station for the City of San Francisco shown in the rendering on the bottom right.

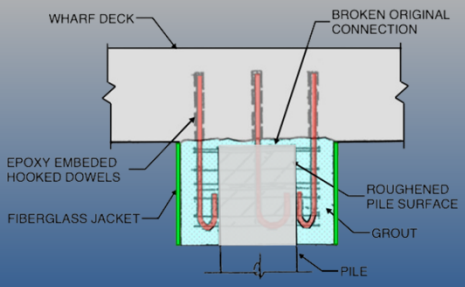


We have analyzed dozens of systems including container handling equipment and a cement unloader. We have developed performance specifications suitable for equipment systems. We have developed isolation and damping systems to mitigate equipment response such as the friction damper shown at the bottom of this slide that was implemented at Port of Los Angeles Pier 300.

Post Earthquake Recovery

Rapid review of crane and wharf damage including crane-wharf interface

Rapid development of stabilization and repair procedures



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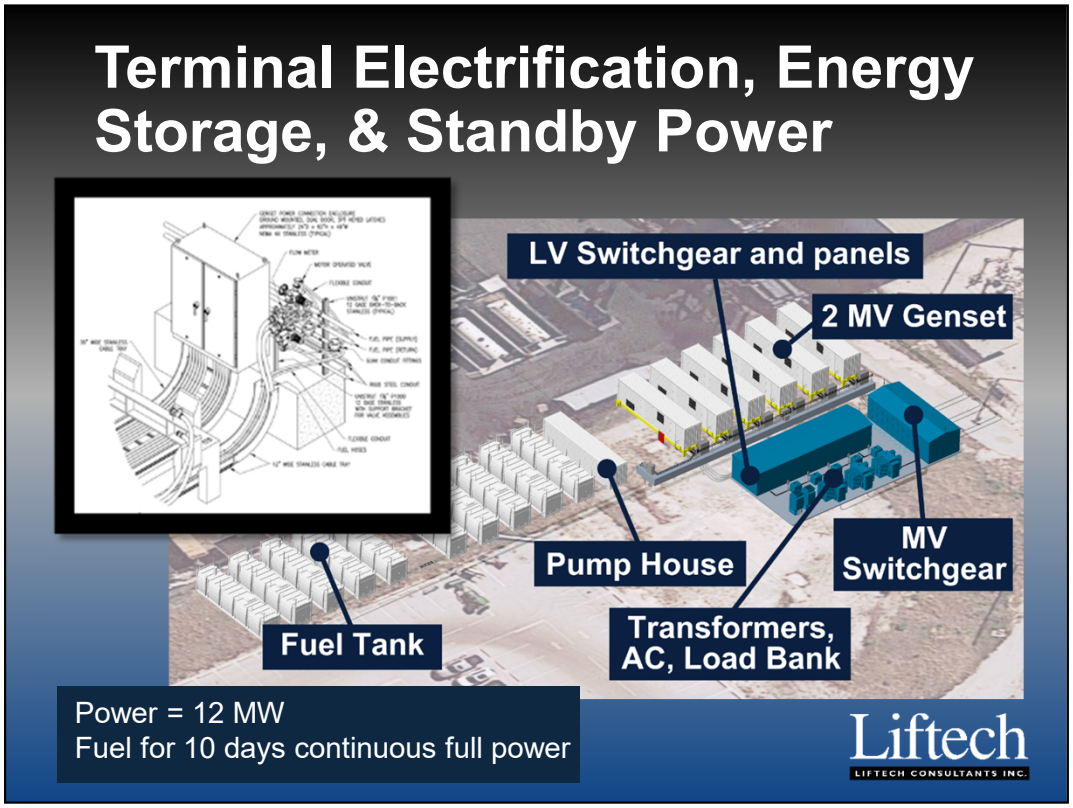
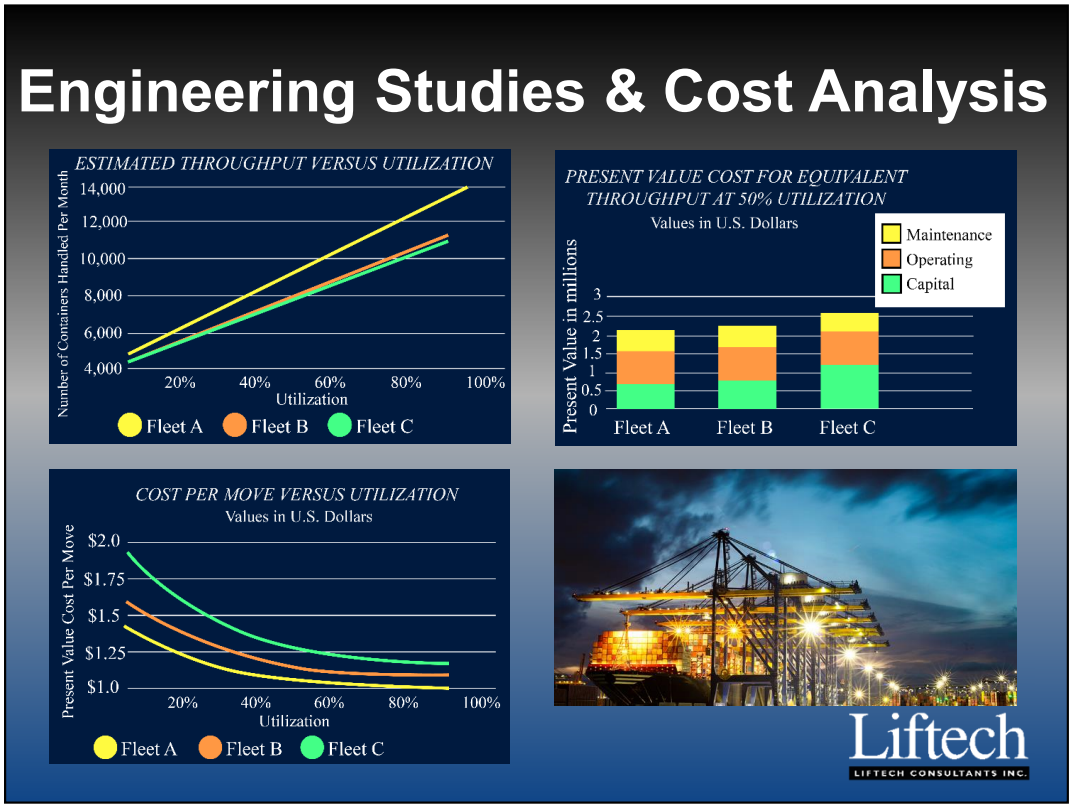
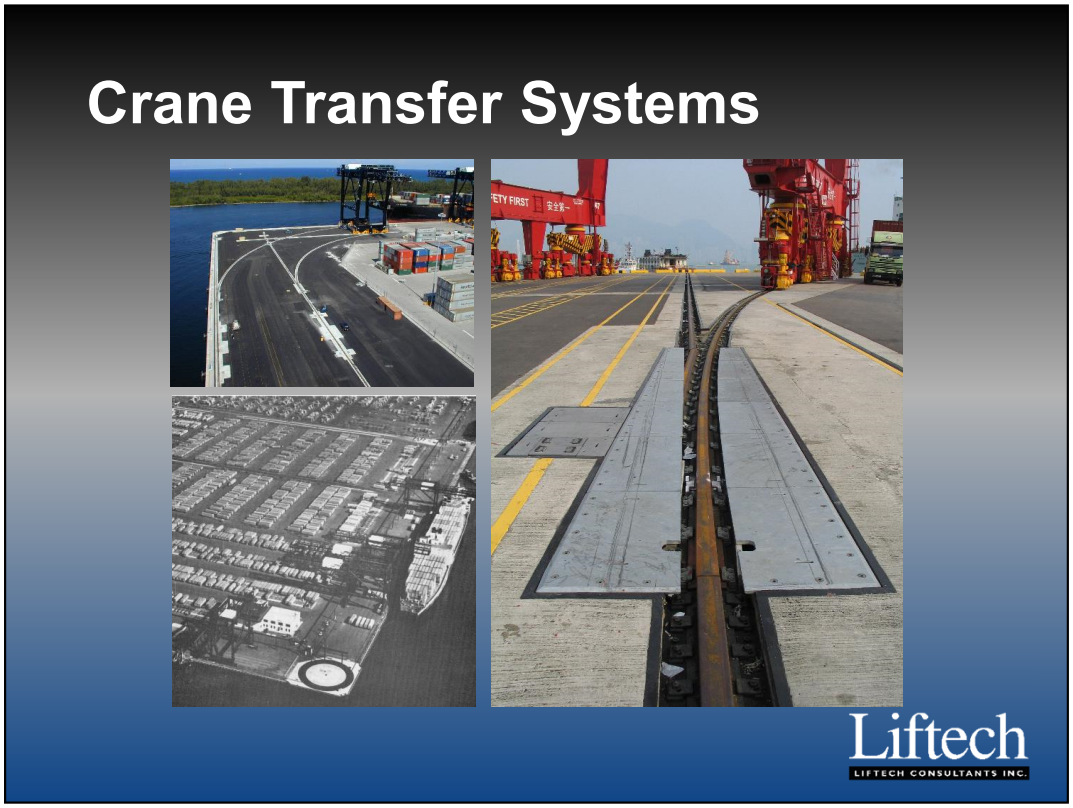
We are familiar with crane damage and repairs as well as expected wharf earthquake damage and repairs. We provide rapid evaluation and, if needed, stabilization, and have rapidly developed repair designs to limit downtime.



We are familiar with equipment power requirements and terminal electrification, energy storage, and standby power including fuel generators and battery systems. This slide presents a backup generator system designed for an island port.



We are familiar with container handling equipment costs and schedules and have contributed to studies to estimate values and evaluate options.

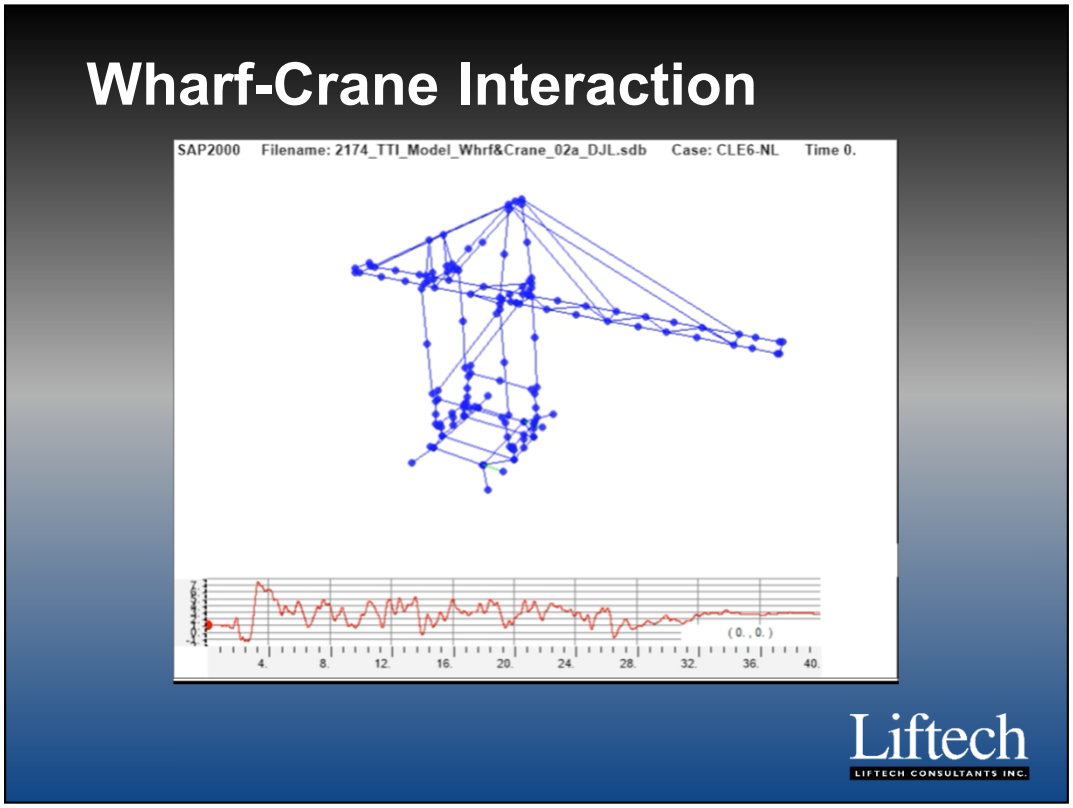


We are familiar with a variety of crane transfer systems having designed dozens of curves, the crane system articulation, rail switches, a turntable system, and a shuttle carrier system. We are familiar with related design considerations such as power transfer.

Crane Transfer System Design, Berth 30, Port Everglades, Florida

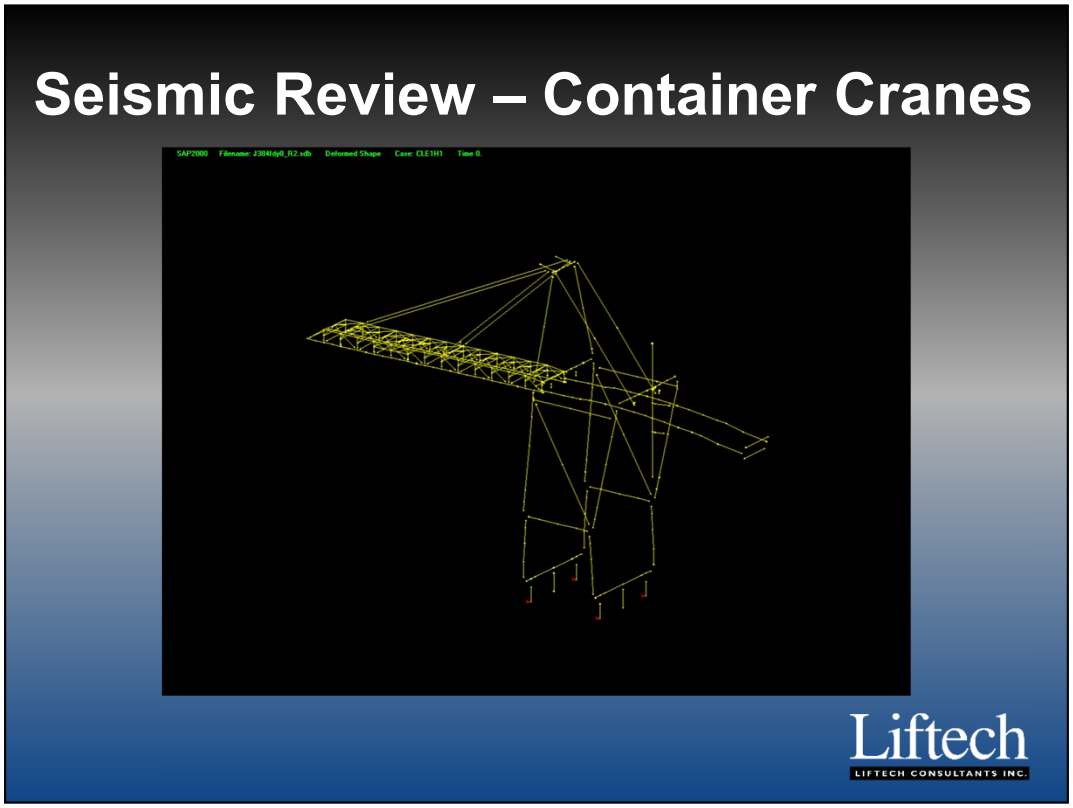
Crane Rail Switch System, Modern Terminals, Hong Kong

Crane Turntable, Elizabeth, New Jersey

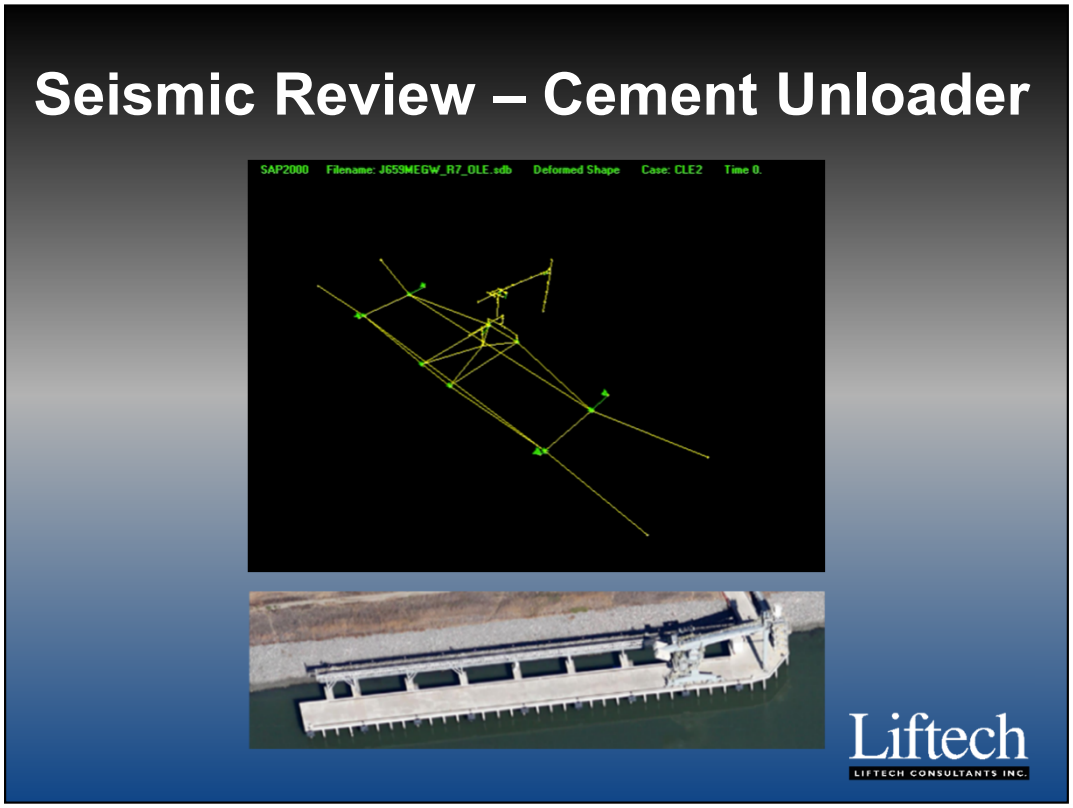


We have analyzed many crane and wharf systems to determine the effect of the crane loading on the wharf and to understand the crane response and performance.

We have crane design specifications to help ensure reasonable crane performance in large earthquakes.

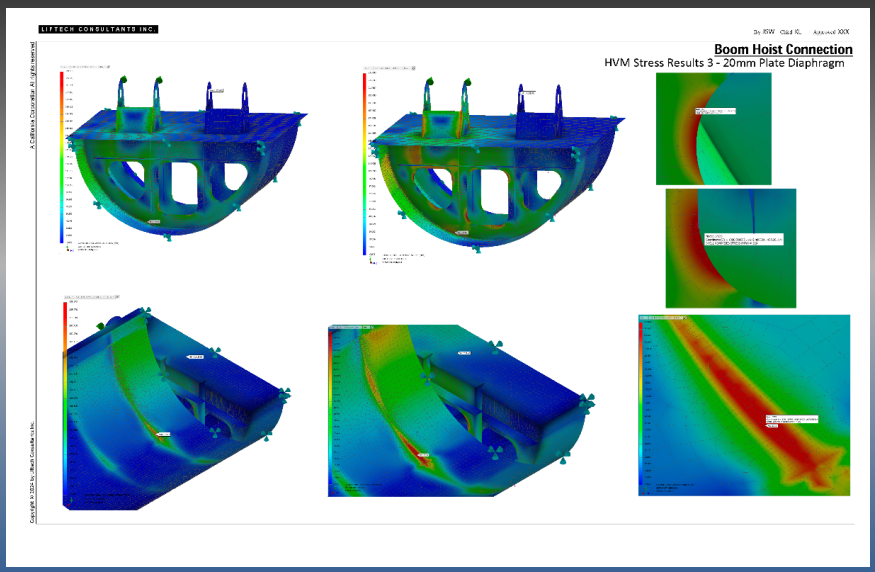


Another crane seismic analysis, but for a crane with 50 ft wheel span.



We have analyzed other crane-like systems including this cement unloader.

FEA Tools



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We are familiar with and use the latest analysis tools to design or review designs. These images are of an unusual boom structure.


Thank You
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