CRANE TRANSFER AND RAIL SERVICES

Liftech Consultants Inc.

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ABOUT US

Liftech Consultants Inc. has provided structural engineering services since 1964. We are at the forefront of marine terminal technology and strive to develop new technology that improves terminal productivity and safety. We are recognized worldwide as experts in the design of container handling cranes and other equipment. Our experience also includes the structural design of wharves, maritime buildings, heavy lift structures, and other special structures. Our international clients include owners, engineers, operators, manufacturers, contractors, consultants, riggers, and architects.

HELPING CRANES NAVIGATE NON-LINEAR BERTHS

Many wharves have non-linear berths that meet at a corner. It is often economical to share cranes between these berths; but to share, the cranes must transfer between them. This is no simple task. Transfer methods range from shuttle systems that move the cranes between the berths to curved rails on which the cranes gantry.

The most popular method has been the curved rail. This seemingly simple method is actually quite complicated to design but has many options for the owner. Larger curve radii use up valuable yard space. Smaller radii may require a side shift mechanism in the gantry system to accommodate gage change. Working to the corner requires switches and a power transfer method.

The best transfer method depends on the situation. If many cranes must be transferred, it is usually more economical to use a shuttle or turntable system, both of which require little or no modification of the gantry system of the cranes. If only a few cranes require transfer, it is usually more economical to use the cheaper curved rail system and modify the gantry system of the cranes.

Liftech has provided crane transfer design and review services on many projects worldwide. We provide specifications for cranes that transfer between non-linear berths using a curved rail. The optimum curved rail layout is not circular but a varying radiused curve. In all cases, the optimal curve reduces the offset between the leading and following wheel paths and rail. In most cases, side shift of the gantrying components relative to the sill beam is not required. We have developed a unique computer program that calculates the optimum rail path for a given gantrying system geometry, gage, angle between rails, and average curve radius. Our program also calculates the cable drop or collector plough paths. Calculating the optimal paths saves on the initial costs of side shift mechanisms and future maintenance costs due to wear.

We design and review curved rail switch systems for conditions where the cranes must also operate at the curve location. We have designed other crane transfer systems including a below grade shuttle system at the Port of Oakland and a turntable system in New Jersey.

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ATTACHMENTS

The following documents are related to Liftech's Crane Transfer and Rail Services.

- Key Project Sheet
- Selected Curved Rail and Crane Transfer Projects
- Selected Articulated Gantry Travel System Projects

For information about design considerations of transferring container cranes around curved rails, click here: http://www.liftech.net/transferring-container-cranes-around-curved-rails-design-considerations/

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

CONTACT INFORMATION

For additional information, please contact:

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Crane Transfer System Design, Berth 30
Port Everglades, Florida

Many wharves have nonlinear berths that meet at a corner. It is often economical to share cranes between these berths. To share, cranes must transfer between them. Transfer methods range from shuttle systems that move the cranes between the berths to curved rails that the cranes gantry on. Recently, the most popular method has been the curved rail. This seemingly simple method is actually complicated to design and has many options for the owner. Larger curve radii use up valuable yard space. Smaller radii may require a side shift mechanism in the gantry system to accommodate gage change. Extending straight rails to the corner requires switches and a power transfer method.

Liftech assisted with the wharf design for a 900-foot berth extension. As subconsultant to Sverdrup, Liftech designed the curved rail, switches, and frogs to enable crane transfer between adjacent perpendicular wharves.

Reference:
Sverdrup Civil, Inc.
Edison, New Jersey, USA

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SELECTED CURVED RAIL AND CRANE TRANSFER PROJECTS

Client	Year	Project Description
Matson	2016	Provided concept study of a curved rail for a terminal in Hawaii.
Halcrow Group Ltd.	2006	Designed curved rail geometries for a wharf at Dames Point at Jaxport.
Gantry SGM	2005	Designed curved rail geometries for Bremerhaven Container Terminal.
Moffatt & Nichol	2005	Designed curved rail geometries for Port of Tampa Berth 213.
Modern Terminals Ltd.	2004	Designed curved rail geometries for a terminal in Taicang, China.
Port of Tanjung Pelepas	2003	Designed curved rail geometries and calculated the geometry of the lowest guide on the crane for the power cable.
Modern Terminals Ltd.	2002	Designed curved rail geometry for an asymmetrical curve for Terminal CT9 that required clearing stowage hardware. Reviewed switch system design while assisting manufacturer with its design.
Port of Oakland	2002	Designed curved rail between Berth 59 and Berth 60, including concepts for switching between conductor bar supplied power and cable supplied power. Designed the end of Berth 59 to facilitate the future curve.
Seaside Transportation Services, LLC	2002	Optimized curved rail geometries that reduced the required curve radius from 68 meters to 20 meters for Port of Los Angeles Evergreen Terminal.
Amsterdam Port Authority	1999	Designed curved rail geometry and switch design for transferring cranes from the typical berths and the “ship in a slip” berth perpendicular to the typical berths.
Sverdrup Civil, Inc.	1998	Designed curved rail and switch for 900’ berth extension for Port Everglades Berth 30. Designed method and structures for handling the power cables when transferring the cranes.
Tampa Port Authority	1997	Designed curved rail geometries.
Port Authority of Guam	1997	Designed curved spur rail to transfer three cranes behind main wharf. Project included design of curve, rail girder, rail switch, and frog. Modification of three cranes to go around the curve.
Port of Oakland	1988	Shuttle system to transfer Sea-Land cranes around a corner.
Port Everglades	1987	Reviewed curved rail at Berths 31 and 32 to transfer four post-Panamax low profile cranes around the corner. Reviewed the curved rail for Samsung Heavy Industries, the crane supplier.
Port of Long Beach	1986	Provided concept study of a curved rail at the Port of Long Beach for Moffatt & Nichol.

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CRANE TRANSFER AND RAIL SERVICES
IMAGES OF SELECT PROJECTS

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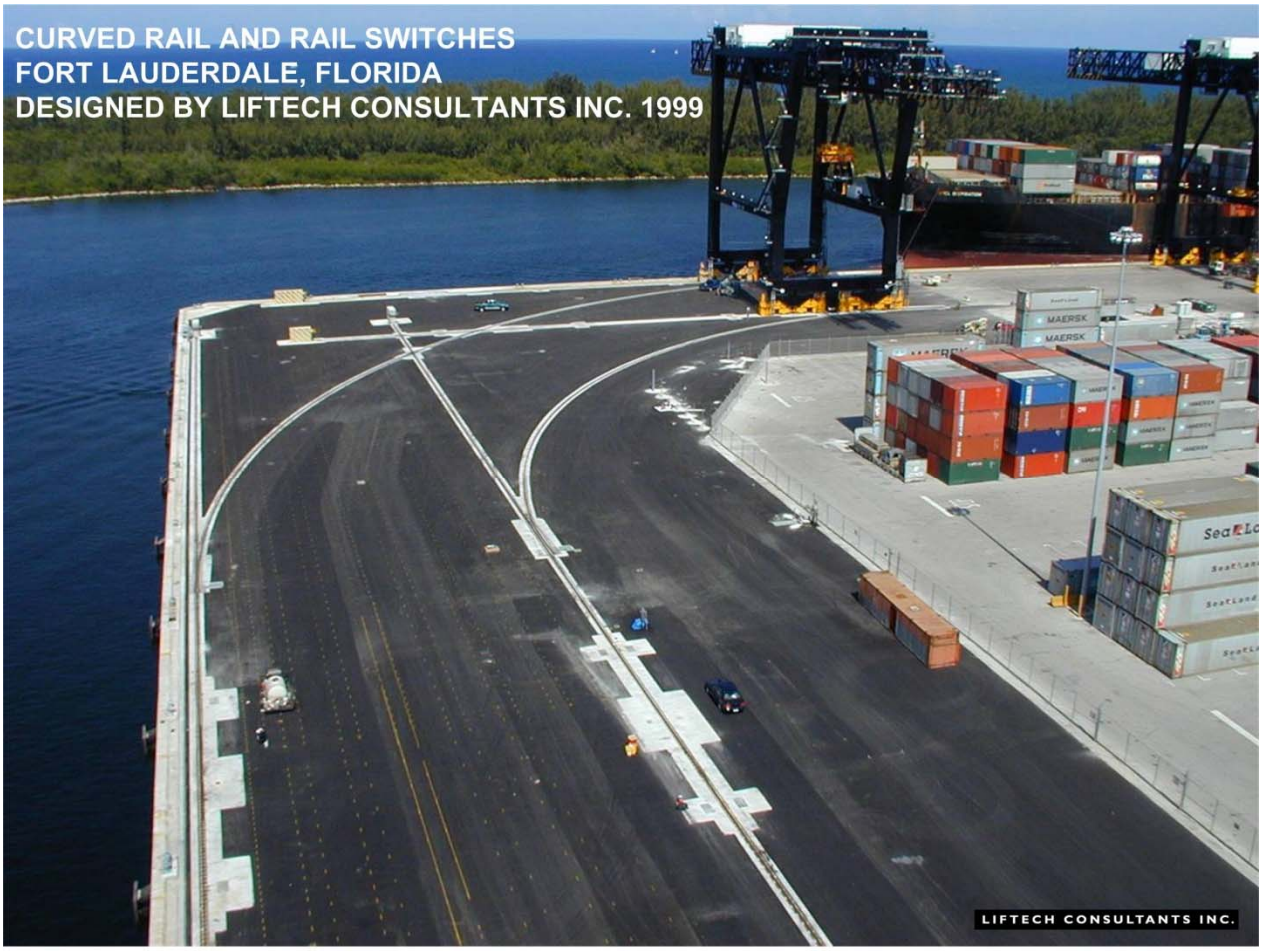
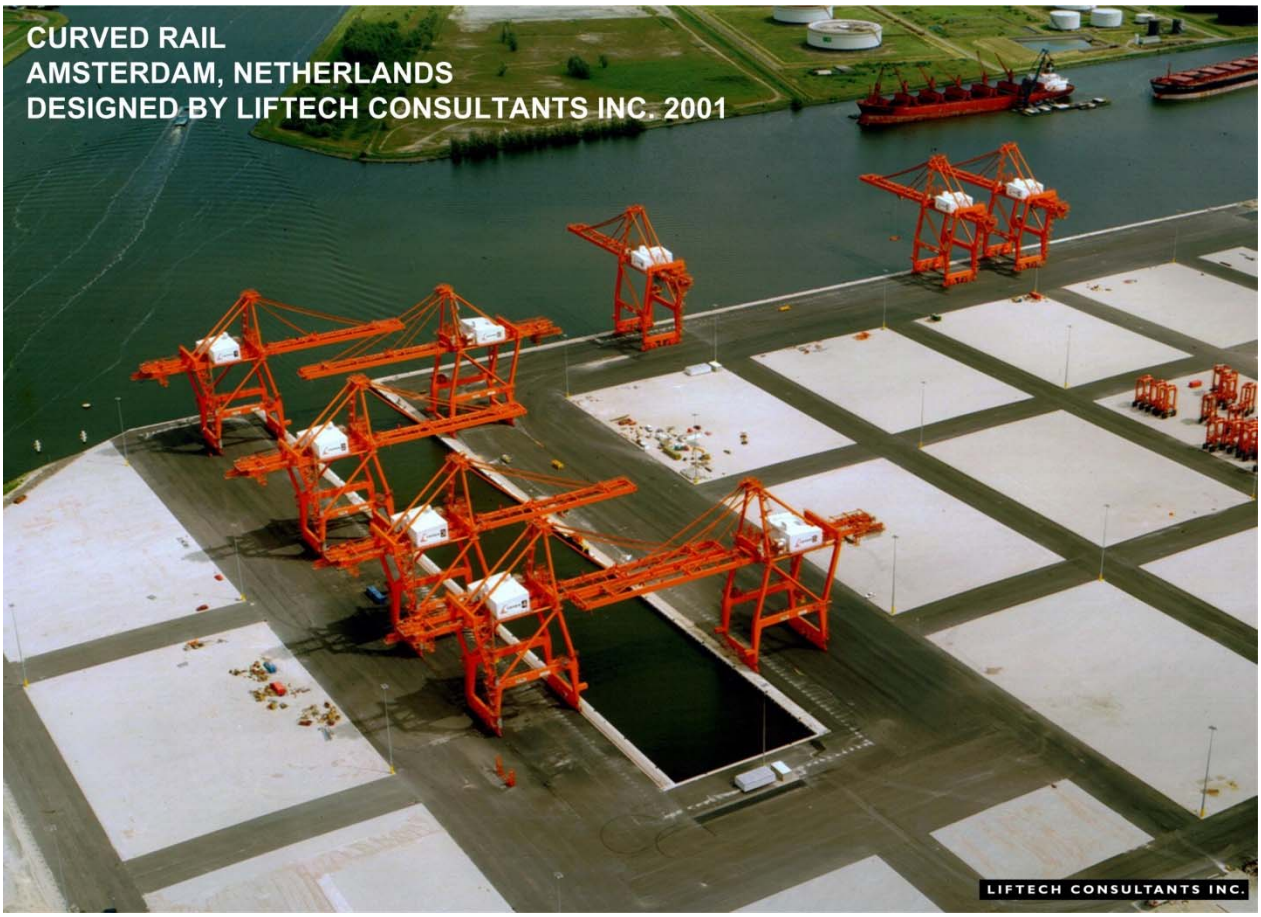
CRANE SHUTTLE (SHUTTLE TRENCH SHOWN)
OAKLAND, CALIFORNIA
DESIGNED BY LIFTECH CONSULTANTS INC. 1986
LIFTECH CONSULTANTS INC.


CURVED RAIL AND RAIL SWITCHES
FORT LAUDERDALE, FLORIDA
DESIGNED BY LIFTECH CONSULTANTS INC. 1999
MAERSK
MAERSK
LIFTECH CONSULTANTS INC.


CURVED RAIL
AMSTERDAM, NETHERLANDS
DESIGNED BY LIFTECH CONSULTANTS INC. 2001
LIFTECH CONSULTANTS INC.


CURVED RAIL
HONG KONG, CHINA
DESIGNED BY
LIFTECH CONSULTANTS INC. 2003
LIFTECH CONSULTANTS INC.

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SELECTED ARTICULATED GANTRY TRAVEL SYSTEM PROJECTS

Client	Year	Project Description
Multiple projects at locations worldwide	Various	Reviewed crane design with articulated gantry travel system.
Modern Terminals Ltd.	2002	Designed optimal curved rail geometry for an asymmetrical curve for Terminal CT9 that required clearing stowage hardware. Reviewed the crane design, including the articulated gantry travel system.
Port of Oakland	2002	Designed optimal curved rail geometry. Reviewed the cornering cranes, including the articulated gantry travel system.
Amsterdam Port Authority	1999	Designed optimal curved rail geometry. Reviewed crane supplier's articulated gantry travel system and provided design assistance.
Port Authority of Guam	1997	Designed optimal curved rail geometry and modification of three cranes to go around the curve.
Port Everglades	1987	Reviewed curved rail at Berths 31 and 32 to transfer four post-Panamax low profile cranes around the corner. Designed the articulated trucks and equalizers for Samsung Heavy Industries, our client and the crane supplier.

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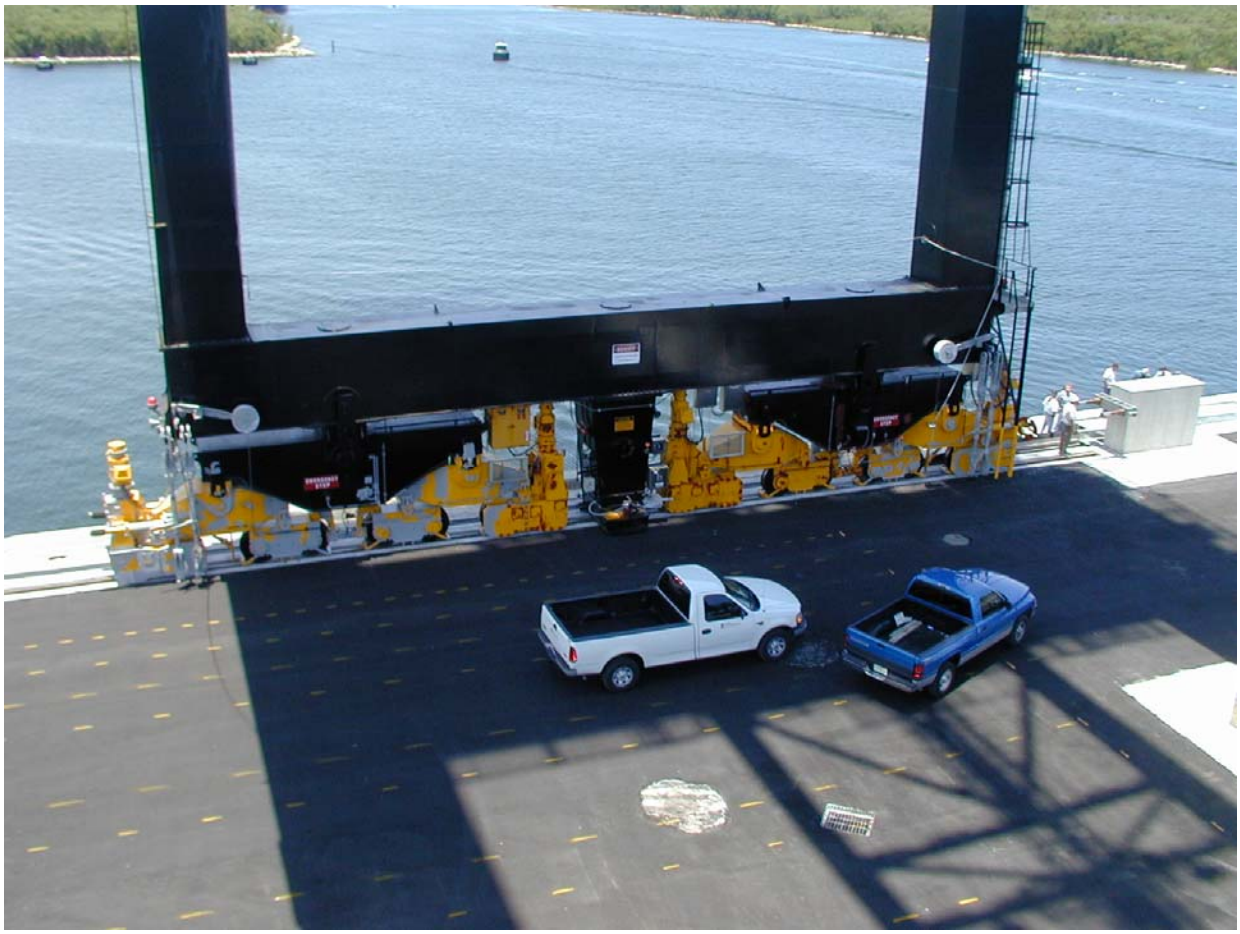
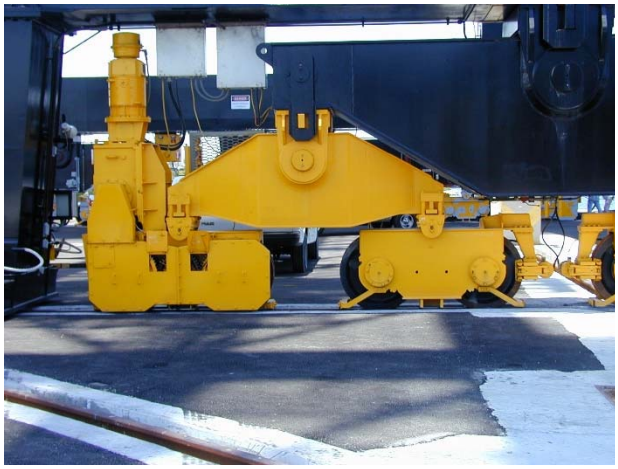
ARTICULATED GANTRY TRAVEL SYSTEM
IMAGES OF SELECT PROJECTS

Port Everglades, Fort Lauderdale, Florida





Modern Terminals Limited, CT9, Hong Kong, China

Port of Oakland, Oakland, California