# *Linked Intelligent Master Model*

## Synchronize Design & Manufacturing Tools to Signficantly Reduce Product Development Cost

*Our Client synchronized information in design and manufacturing to dramatically reduce product development cost using Wipro ITI's Linked Intelligent Master Model (LIMM) solution*

### Client Background

Our client is the second largest Asia-Pacific developer and manufacturer of port-handling equipment with 11 joint-operating plants. Their main products are portal cranes, bulk ship loaders and unloaders, floating cranes, and large-sized overhead cranes. Their customers are located throughout the Pacific Rim and North America.

### Industry Landscape

With increasing seaborne trade across the globe, the port equipment market is expected to grow from a $6.5 billion-dollar industry to a $9 billion-dollar industry by 2025. With rising trade activities vessel size and cargo volume are increasing resulting in an increased strain on ship berths and shipyards. Ports are incorporating smart solutions to optimize operations, reduce logistics costs, and enhance efficiency. Increasing awareness regarding carbon footprint and the inclination towards environmentally friendly transportation will contribute to the port equipment market growth. Government regulation limiting carbon emission from port equipment is leading to the adoption of equipment that utilizes alternative fuel.

The industry leader is dominant and able to deliver on very aggressive schedules while smaller, leaner competitors dominate on price. Increased competition and market dominance by the largest producer of port equipment mandates the rapid introduction of more product types to grow sales revenue, increase net income, and increase R&D investment. The future income growth rate will be through new products and services with services providing the highest level of ROI. Cost reduction will focus primarily on materials costs. Consequently, the ability to decrease time to market, reduce cost, and enable a lean product development process is critical to increase market share. Product development processes and technology improvements like LIMM help overcome current barriers.

### The Opportunity

The client receives a request for proposal, product requirements, and regulations as explicit documents and/or links to specific regional or wharf specific applications. The client is given twenty-one calendar days to prepare engineering concept drawings and provide a fixed price quote and schedule for delivery. The process is to select a previous design that closely matches the requirements for the new design, quickly run reports based on the existing design BOM to obtain the required cost data from recent purchases. Two-dimensional drawings are manually edited (text changes only) to characterize the product based on new requirements. The data are packaged, an executive review is conducted, and the numbers were finalized based on shipping, installation, insurance, and profit. Final numbers were reviewed by the company president and head of sales for final refinement. The result of this process caused several strategic issues:

1. The price would be too low, and the company would lose money on the project

2. The price would be too high, and they would lose the project to a competitor; and/or

3. The proposed delivery date was later than the competitors and they would lose the project.

The client was looking for a solution that would provide a rapid and efficient product development process that enabled a proposals cost to be based on the design.

### *Case Study*

***The benefits of such a system included decreased time and effort to produce accurate quotations that match product engineering, reduced material cost, improved business "win rate", and eliminated project financial losses due to underestimating manufacturing costs.***

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The client asked for quick results and decided on an incremental deployment where each increment was a different product line. The first product line selected is the container crane that is used to load and unload ships. The container crane product line consists of forty-eight structural configurations and each of these is configured based on other functional requirements and wharf loading limits. The goals of the project included moving the design into 3D, using the geometry to drive engineering analysis, material estimates, and BOM pricing. The objective was to generate a quote based on the design, refine the design and review cost multiple times during the twenty-one-day window; then delivery is based on the design for which the quotation is submitted.

### Solution

The client chose ITI as a strategic partner for the deployment of a new product development process and technologies. Qualifying criteria included proven process consulting expertise specifically in product development and a proven technology base to support information integration.

• ITI adopted an incremental and iterative process to deploy fully tested capabilities every three months.

• The 3D CAD models were configured with reuse and automation as a guide. One set of models is used to represent the many different structural configurations controlled programmatically and driven by the customer/regional/wharf specifications.

• The CAE models were connected so that changes in the CAD models that impacted geometry and topology were automatically updated. The CAE models were programmatically controlled based on inputs from the customer/regional/wharf specifications.

• Subsystem major components (motors, brakes, cables, etc.) were configured based on an analytic process to determine functional requirements, all available components meeting the functional specification were identified and presented to the user along with various cost parameters. The selected component was then loaded into the 3D CAD system and the associated cost parameters were captured.

• The CFD models were configured so that analysis was performed based on wind direction, wind speed, and crane status (partially installed, loaded, wave heights, etc.). In total over three hundred load-cases/ scenarios were processed during each design cycle.

• The cost models included information for major subsystem components, major subsystems, and an overall cost rollup. Cost modules were configured for installation, shipping, and insurance. Furthermore, the final cost numbers were presented so that the key executive management could adjust profit values to control the proposed final price.

• The deployment integrated the customer specification, regional regulations, wharf requirements, 3D CAD models, CAE models for deflection and model analysis, subsystem and subsystem major component functional analysis, cost models, and CFD models such that changes in one of these domains was reflected in all effected models.

### Business Impact

The client has realized significant benefits from the implementation of the solution by ITI:

• Reduction in steel cost by minimizing material usage based on analysis results – total product cost impact 8%-10%

• Time to generate the first full quote reduced from 21 days to 3 days, allowing the company to refine design concepts to reduce cost and time to market multiple times before submittal

• Revenue increases due to improved win rates.

• Project financial requirements more predictable due to cost based on actual engineering concepts and relevant data retrieved from recent purchasing activities.

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