Safe Replacement of Offshore Cranes in the Cook Inlet - Challenges and Lessons

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Project Synopsis

Safely Remove and Replace (2) Offshore Platform Cranes

- **Erect Temporary Crane**
  - 35 Ton Capacity
  - 120 ft Boom

- **Remove and Replace (1) Pedestal**
  - 26 Ton x 50 ft

- **Remove and Replace (2) Pedestal Cranes**
  - 31.5 Ton Capacity
  - 70ft Radius
Project Challenges

Environmental

- **Cook Inlet Tidal Currents**
  - 14-Knot Peak Flow
  - Reverse Direction Twice Daily
- **Solution**
  - Plan Lifts for Slack Tide
  - 1-2 hour Window

- **Winter Ice**
  - 6 months
- **Solution**
  - Execute April-September

March 2013
Project Challenges

Existing Crane Load Limitations
- South Crane Capacity
  - 28,000 lbs @ 35ft Radius
- New Crane Component Weights
  - 40,000 lbs Machinery House

Work Boat Logistics
- Locate and Secure Contract
  - Mobilize from Gulf of Mexico
  - 105ft x 30ft Deck Space

Solutions
- Temporary Crane
  - 27,000 lbs Skid Beams
  - Pre-Engineered Lift Plans
- Boat Loading Plans
  - Equipment Weights
  - Crane Capacity

June 2013
Mobilize Temporary Crane

Transportation to Cook Inlet

Houston to Seattle
- Trucks w/ Trailers

Seattle to Anchorage
- Barge w/ Trailers

Anchorage to Docks
- Trucks w/ Trailers

Docks to Platform
- M/V w/ Components

Lift Plan
- Boat Captain
- Crane Operator

ECR-12000 Skid Beam Lift Plan
Split Load

- Reduce Risk of Injury
- Decrease Congestion
- Reduce Risk of Equipment Damage

Contingency Plan

- Spare Boom Section at On-Shore Base
Pre-Engineered Lift Plans

- **ECR-12000**
- **Unload & Install**
- **Skid Beams-Max Lift**
  - 27,500lb each
- **Unit Crane Load Radius**
  - Dynamic - 35 Feet
  - Static – 50 ft
- **Boat Location**
  - Max Lift at Centerline
  - 20 ft to platform edge
  - 35 feet to platform legs

**Lift 1.** Use Unit to install ECR-12000 (ex. Boom) over WR 2; skid north skid beam to grid line C (27,500 lb max lift for skid beams)
Project Challenges

Safely Working Over the Water

Rig and Remove Existing Pedestal
- 26 Ton x 50 ft long

Rescue Boat
- Supply Vessel Maintains Position Down Current

Work Basket
- Static Load Test Prior to Use

2 Man Work Crew
- Full Body Flotation Suits

July 2013
Project Challenges

Safely Rotate Pedestal from Vertical to Horizontal Position

Problem
- Single Crane Lift with Limited Deck Space

Solution
- Design and Fabricate Pivot Plate for Lay Down
- Vertical Lift with Spreader
- Pin to Pivot Plate
- Lower to Deck
Project Challenges

Minimize Offshore Installation Costs and Schedule

Collaboration Solution
- Pre-Fabricate New Pedestal and Landing Onshore
- Pre-Fit Stairs and Landings Onshore
- Pre-Rig all Components Onshore
- Tilt-up New Pedestal with Pivot Plate
Risk Mitigation

Safety

- Crane Rigging Management Procedure
  - Engineering Analysis
  - Experienced Crane Rigging Lead
  - Operations Job Safety Analysis

Contingency Planning

- Crew Rotations
- Extra Equipment
- Well Defined Scope of Work
- Team Approach to Problem Solving
Lessons Learned

Notable Successes

- Safe transfer of new pedestal from horizontal to vertical position
- Pre-fabricated landing provided safe access for welding
- Minimized offshore welding on new South Crane pedestal
Lessons Learned

Project Shortcomings & Solutions

Problem: Commissioning revealed hydraulic problems not found at factory
Solution: A rigorous FAT to expose and repair deficiencies at the factory shop

Problem: Field service from hydraulic vendor was not available when required
Solution: Plan ahead to have factory representatives on site during commissioning

Problem: Crane delivery was schedule driven requiring completion on the job
Solution: Allow sufficient time to meet customer specifications and test final product
Project Summary

“Project will not be successful if there is a single lost time accident”

Key to Project Success….Plan, Implement, Audit, Empower

- Plan overall project, schedule, and engineer months ahead considering work scope, work site location, project contingencies, logistical issues, and safety considerations
- Implement group safety meetings to create an “incident free culture”
- Audit each others daily activities to ensure the task is being performed safely
- Empower each individual with the ability and responsibility to shut down the job if they feel the task is not being done safely.

Results

- >23,000 Man Hours w/o LTA

We plan. We engineer. We deliver. You succeed.