Port Everglades Large Low Profile Cranes and Wharf Expansion Design

Numerous container terminals have significant height restrictions caused by proximity to airports. Low profile ship-to-shore container cranes (LPCs) are vital to these terminals. LPCs have been around since the 1970s. However, the latest generation LPCs are significantly larger, to service today's ultra-large container vessels. They are heavy and complex and present a myriad of new challenges for crane and wharf designers. Three of the world's largest LPCs were delivered to Port Everglades in Florida on November 17, 2020, when the ship carrying the 'next generation' LPCs arrived at the port to support the largest expansion project in the port's history.

Port Everglades operates seven 1990s, Samsung 46.5-LT capacity LPCs at their Southport terminal for servicing vessels up to 16 containers across. The port will serve vessels up to 22 containers across with up to 8 high on deck with these newly procured ZPMC 65-LT capacity cranes. As the port's consulting engineers working on the project since 2013, Liftech Consultants Inc. and subconsultant McKay International Engineers developed the procurement technical specifications and conceptual design of the cranes, and participated in the detailed design with crane supplier ZPMC. Liftech, including Liftech Shanghai personnel, also audited the crane manufacturing quality in China, which was a sizeable task, considering boom camber and tight tolerances for boom and trolley travel. Liftech was also retained to upgrade the lift capacity of the existing cranes to 65-LT and upgrade the crane structures to comply with current wind code requirements. The upgrade will require replacing the existing DC main hoist drive.

To simplify maintenance, the main hoist, trolley, boom hoist, and gantry DC drives on the existing cranes will be replaced with new AC drives. Liftech's team, including multiple subconsultants, is also part of the project that included design of new wharf crane girders and extensive wharf expansion to support the larger, heavier cranes. Prior to design, Liftech performed studies to determine parameters for the new cranes and establish design loading from the cranes, to identify required infrastructure upgrades.

Liftech designed approximately 5,000 feet (1,524 meters) of new wharf crane girders, which includes (1) about 3,500 feet (1,067 meters) for the 120 feet rail span new cranes at existing Berths 30-32 and part of the new Berth 30 extension, and (2) an additional 1,500 feet (457 meters) at the Berth 30 extension for the 100 feet rail span existing cranes.

The girders for the new cranes are offset from the existing girders to permit continued operations of the existing cranes during construction, and to suit a larger rail span to reduce the required crane ballast for stability. The wharf crane girder systems include cable trenches, power vaults, crane tie-down and stowage pin hardware, rail frogs, and compact crane stops. Other infrastructure work included a two-story building to house switchgear for a 13.2 kV power supply. WPD

PED cranes arriving from China.