

SUCCESS STORY

TOPIC NUMBER: N05-157

SBIR INVESTMENT: \$784,466

PHASE III FUNDING: \$2,087,797



DYNAMIC POSITIONING AND MOTION CONTROL DURING CARGO TRANSFER OPERATIONS

Craft Engineering Associates, Inc. designed, fabricated and installed a modular column to support the testing of a crane to transfer equipment and supplies at sea.

Craft Engineering Associates, Inc.

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THE CHALLENGE

In order to provide equipment and supplies for Sailors and Marines at sea, an innovative, portable, dynamic positioning and motion control system was needed to enable the transfer of cargo via crane from a supply ship to a landing craft. This positioning and motion control system needed to minimize the pitch, yaw and roll movements of the landing craft vessel when transferring cargo in a Sea State 3 environment that includes small to moderate waves. The system needed to be configured with minimal manpower and time to execute. This system could not be a permanent change to the landing craft, as the landing craft must be able to return to its original configuration or undeployed state for the purpose of stowage. Additionally, the installation of this portable system could not reduce the payload capacity of the landing craft.

THE TECHNOLOGY

Craft Engineering Associates designed and fabricated a modular column support structure for a crane that could be rapidly installed in two adjacent 40-foot cells in a container ship. The system consists of two base units, spacer frames, main deck frames and modular column sections. This structure supports a crane which is able to move intermodal containers between two large vessels.

THE TRANSITION

Originally, Craft Engineering developed the technology for testing the High Capacity Alongside Sea Base Sustainment (HiCASS) crane concept through the Office of Naval Research (ONR). The ONR HiCASS program supports the Navy's Sea Power 21 Sea Base Vision. One of the challenges the HiCASS program was tasked to solve was to provide the means to move materials and equipment between two large vessels in heavy seas.

Craft Engineering's current Phase III contract is for services and materials to conduct research and development under SBIR research topic "Dynamic Positioning and Motion Control During Transfer Operations." Since this initial Phase III award, the potential end date of the contract has been extended from October 2023 to August 2024 and the potential award value has increased 26 percent from \$2,087,797.00 to \$2,620,585.00.

THE NAVAL BENEFIT

The crane's modular column can be easily transported and installed in the cells of a container ship, allowing a marine pedestal crane to be mounted on an otherwise non-self-sustaining container ship. By leveraging the vessel's propulsion system and using pitch and roll in the algorithm to design the system, cargo can be transferred between two large vessels in Sea State 3.

THE FUTURE

Craft Engineering continues to work with the Navy to develop logistics and sustainment technologies. These technologies include improving the performance of hydraulic marine cranes in dynamic offshore environments. Craft Engineering has been involved with developing a ship roll simulation system to test crane enhancements and provide realistic training for crane operators and deck crews while at the pier. Additionally, Craft Engineering developed a ship-launched aerial delivery system to autonomously deliver cargo from ship to shore.