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Modernization of Conrail's Pier 124 Nears Completion

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A major milestone in the modernization of Conrail's export coal pier 124, located in South Philadelphia, was recently achieved in the assembly of a gargantuan travelling shiploader weighing about 1,400 tons. This machine is designed to load vessels at a rate of 5,000 t/h, by means of an 84 inch wide belt conveyor having a shuttling head end with about 35 ft of travel.

The shiploader will be equipped with a telescopic chute attached to the head end of the shuttle. A unique automatic control system will maintain a head of material within the telescopic chute, thus minimizing free fall and resultant degradation of sized material. This control system has not been previously employed in the high rate loading of a vessel through a telescopic chute. The design was made more complex by Conrail's requirement that the shiploader handle sized anthracite and bituminous coal for stoker boilers and that it have additional flexibility to handle coke and fluxing stone for metallurgical use.

A major engineering consideration was that the pier should remain operational during the construction and commissioning of the new facility. The contruction program of the shiploader, therefore, provided for major components to be preassembled offsite and barged to the pier for final assembly, which was completed on July 7th, 8th and 9th. However, the bridge, due to its massiveness, was preassembled offsite in sections that could be readily handled. Final assembly was performed in place while pier operations continued.

Final assembly of the major subassembled parts was carefully planned out and checked to assure that no major fit up problems would be encountered. Sunship's 800 ton barge mounted crane, one of the largest of its type in the United States, was employed to make the final major lifts for the assembly of the boom and mast (Figs. 1 and 2). The barge mounted crane was utilized in combination with a Manitowoc 4100 to erect the mast and back stay and another 4100 was employed to stabilize the initial lifting of the mast and boom by the Sunship 800 (Figs. 3 and 4).

The shiploader is supported on 32 fully equalized wheels at the front support and 16 fully equalized wheels at the rear. The top of the mast, which weighs approximately 130 tons, is about 170 ft above the top of the shiploader rails (Figs. 5, 6 and 7).

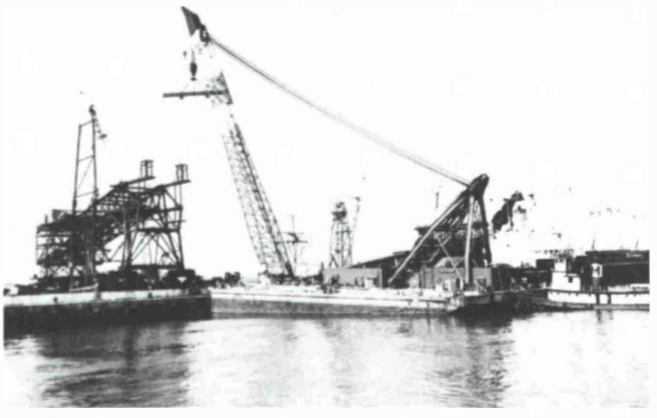

Fig. 1: Sunship 800 ton barge mounted crane

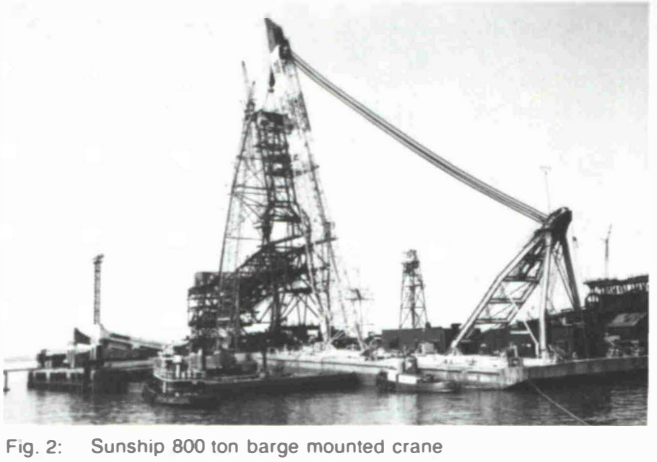

Fig. 2: Sunship 800 ton barge mounted crane

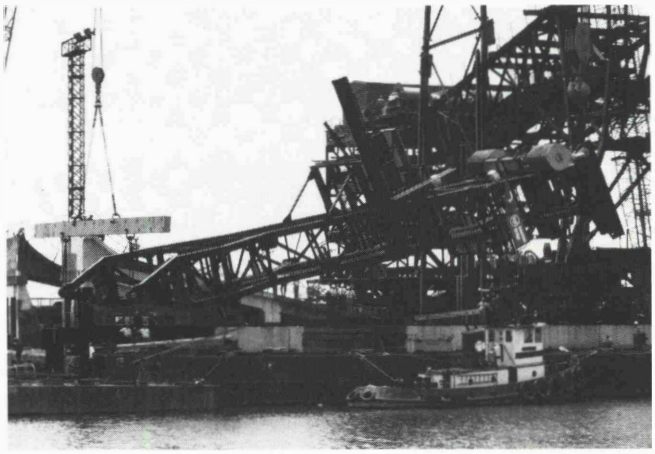

Fig. 3: Initial lifting of 130 ton mast assembly by Sun 800 and Manittowoc 4100

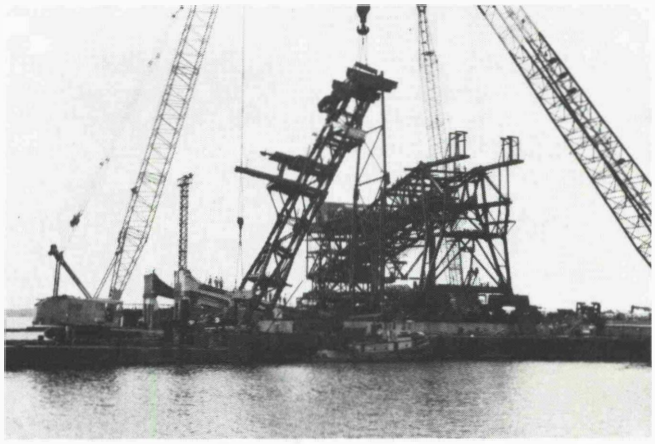

Fig. 4: Initial lifting of 130 ton mast assembly by Sun 800 and Manitowoc 4100

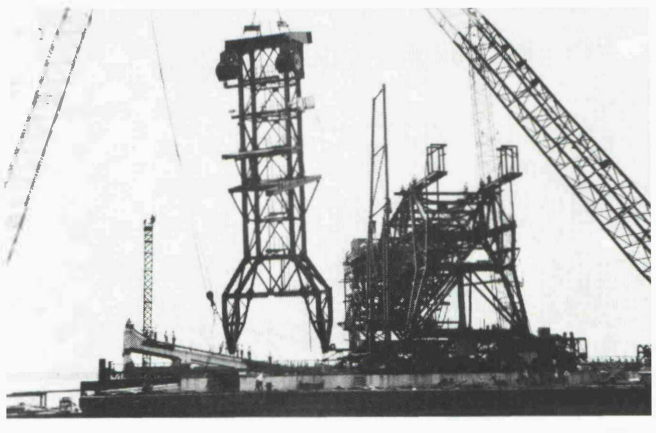

Fig. 5: Mast assembly suspended from Sun 800 barge mounted crane

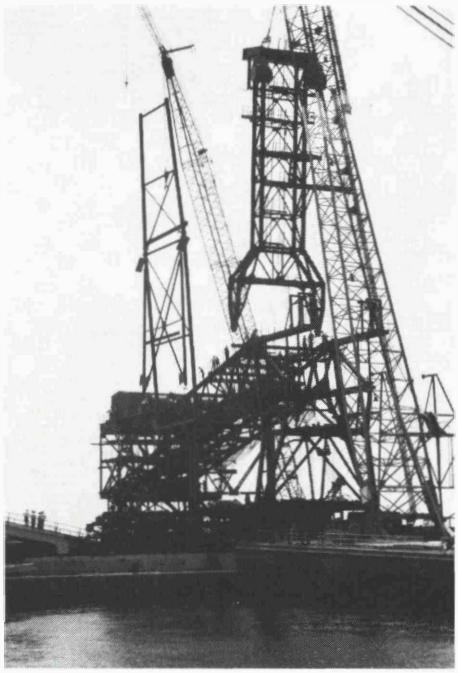

Fig. 6: Mast assembly suspended from Sun 800 barge mounted crane

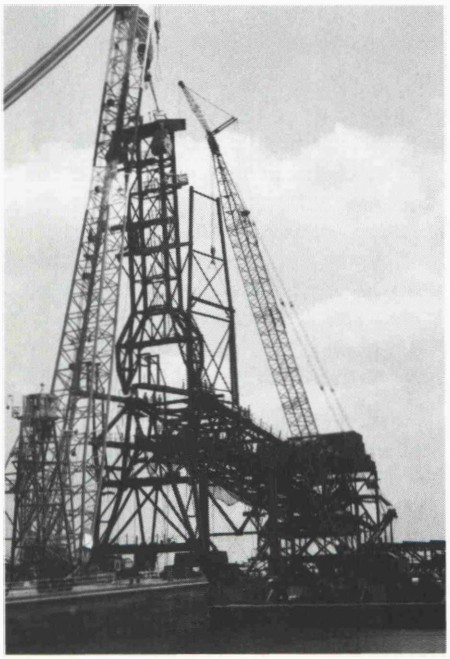

Fig. 7: Mast assembly suspended from Sun 800 barge mounted crane

The boom subassembly, which weighs approximately 300 tons, was raised into position by the Sunship 800. The boom was essentially suspended from the crane without supplemental support and maneuvered so that the connecting pins could be placed for attaching it to the bridge (Figs. 8, 9, 10, 11 and 12).

Fig. 8: Assembly of pin connected mast to bridge structure

Fig. 11: Assembly of pin connected boom to bridge structure

Fig. 9: Initial lifting of 300 ton boom assembly

Fig. 12: Final connection of boom assembly to bridge and mast structure

Fig. 10: 300 ton boom assembly being positioned for connection to bridge

The shiploader boom has an operating range of —10 to +10 degrees from the horizontal. It will be stowed at an angle of about 77 degrees from the horizontal so that all components clear a vertical projection of the pier fender line. Flexible geometry has been provided so that partial loading of ships up to 134 ft beam can be performed.

Conrail's Pier 124 was originally designed to support two independent, low capacity, mirror image shiploading systems. These consisted of two rotary dumpers with fixed shiploading booms for loading coal into relatively small vessels on opposite sides of the pier. The maximum total throughput of this system was about 5,000,000 t/year.

In late 1978, Conrail awarded a contract to Soros Associates to determine if and how this finger pier could be modernized to handle PANAMAX vessels and improve the throughput to about 10—12,000,000 tons annually.

Although the modernized system retains the existing rotary car dumpers, major reworking of hoppers beneath the dumpers has been incorporated in the system to accommodate mechanical lump breakers to reduce the size of any frozen lumps that might be encountered during winter

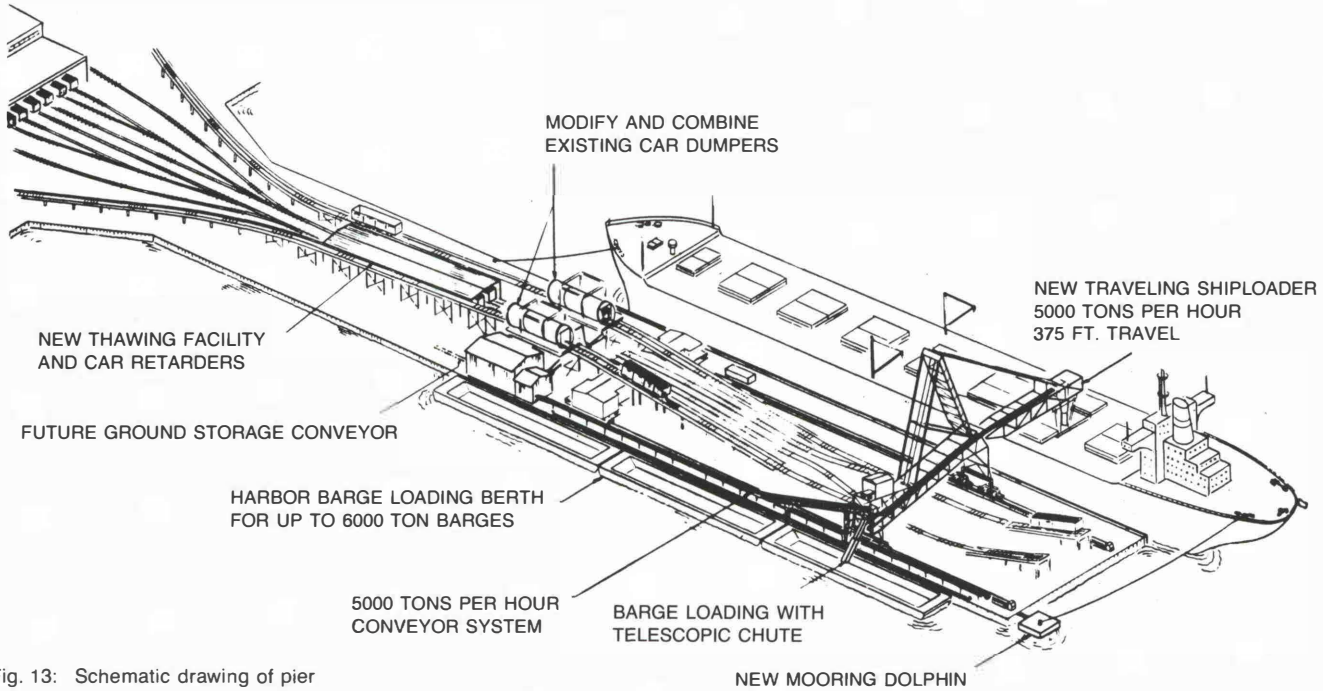

Fig. 13: Schematic drawing of pier

operations. A pair of high capacity vibrating feeders under each dumper meter out coal to a new transverse collecting conveyor that will feed the dock conveyor, delivering materials to the travelling shiploader (Fig. 13).

The modernization program provides for the north car dumper to continue loading of vessels along the north side of the pier until the south dumper, along with its improvements, the conveying system, and travelling shiploader are completed and become operational. Conrail anticipates that this part of the system will be functional some time in October of 1982. At that point, the north dumper will be shut down and the existing fixed shiploading boom removed. Other modifications will then be incorporated, including the extension of the collecting conveyor, that will result in the output of both dumpers being combined and fed to the travelling shiploader. This phase of the work is expected to be completed in the first quarter of 1983.

The modernized system also includes a new two track electric thawing facility, each of which has heating elements for simultaneous thawing of three cars and an additional soaking position to enhance free dumping of coal during winter operations. This portion of the system was put into operation in January of 1982.

Handling of loaded and empty railroad cars previously performed by car riders will be achieved by means of an automated retarder system. This new system will control the speed of cars entering the thawing facility, the release of cars from the thawing facility to the base of the ramps leading up to the car dumpers, positioning of cars within the car dumpers, and control of empty cars after dumping.

Basic design parameters were developed jointly by Conrail and Soros Associates, N.Y.C., with Soros performing final engineering for the thawing, material handling, and shiploading system and Conrail performing the design of a 3.7 million dollar system for automatic rail car delivery. Conrail awarded major construction contracts to Spearin, Preston & Burrows for shiploader foundations, American Bridge for the fabrication of structural steel and erection of machinery and steel, Harry F. Ortlip Co. for electrical work, and J. E. Brennemann for marine construction, plus some 45 other procurement and lesser construction contracts.

Project Management for the core 25 million dollar project was handled jointly by Conrail and Soros Associates, with Soros providing on-site and home office personnel to supervise contractor and vendor performance in technical matters. Conrail handled contracting, scheduling, cost control, coordination between construction and on-going pier operations and provided personnel to augment the Soros field staff.

The total cost of the modernization program is estimated to be approximately $ 37,000,000 including $ 5,000,000 on track, retarder and other work peripheral to the core project and $ 5,000,000 in engineering. The work will be completed in approximately 32 months from start of final engineering, which commenced in June of 1980.

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