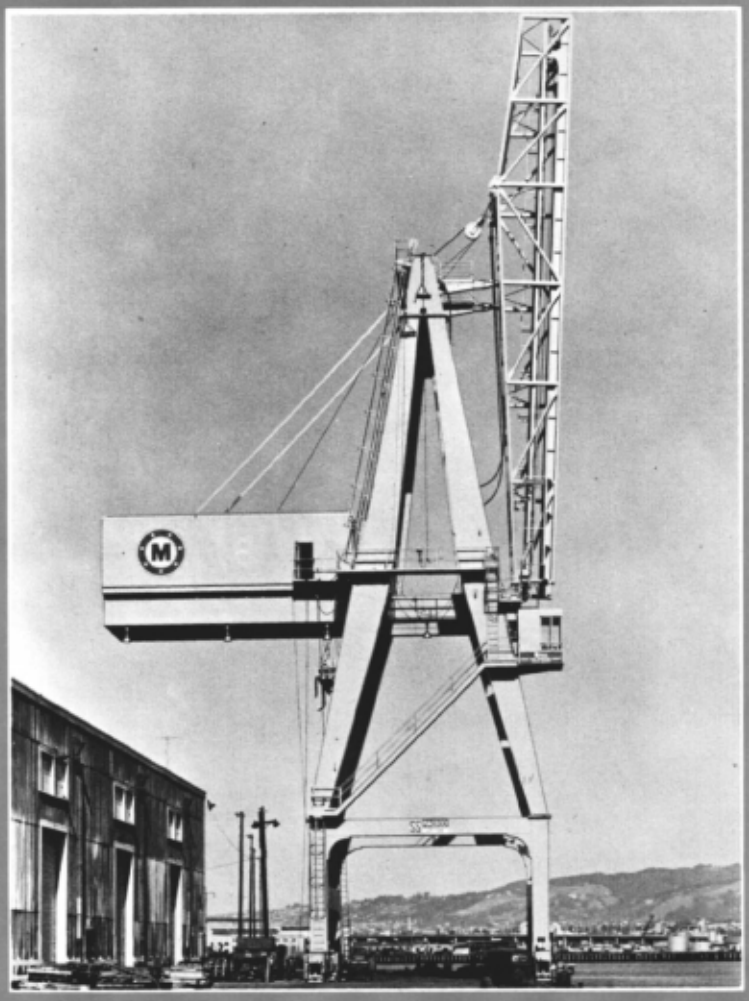
*The American Society of Mechanical Engineers*
*Dedicates an International Historic Mechanical Engineering Landmark*



*The PACECO Container Crane*
*The World's First High Speed, Dockside, Container Handling Crane*

*Encinal Terminals — Alameda, California*
*May 5th, 1983*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SS PACECO

# INTRODUCTION

Surprising as it may seem, the method of handling ship cargo in the early nineteen-fifties was not so different from that used during the time of the Phoenicians. The time and labor required to load and unload ships increased substantially with the size of the ship causing them to spend more time in port than at sea.

BEGINNINGS

PAST

In 1959, a significant event occurred. A ship's turnaround time (the time required to load and discharge cargo) was cut from as much as 3 weeks to as little as 18 hours. Admittedly, many factors contributed to this accomplishment. One element, however, stands out as a major contributor. The development of the PACECO Container Crane, the world's first high-speed, dockside, container handling crane.

# PURPOSE

The purpose of this occasion is to honor those who contributed to the development of this crane, which has aided in the improvement of the standard of living worldwide. It played a major roll in moving large quantities of products more efficiently and at lower costs due to less handling, less damage and less pilferage.

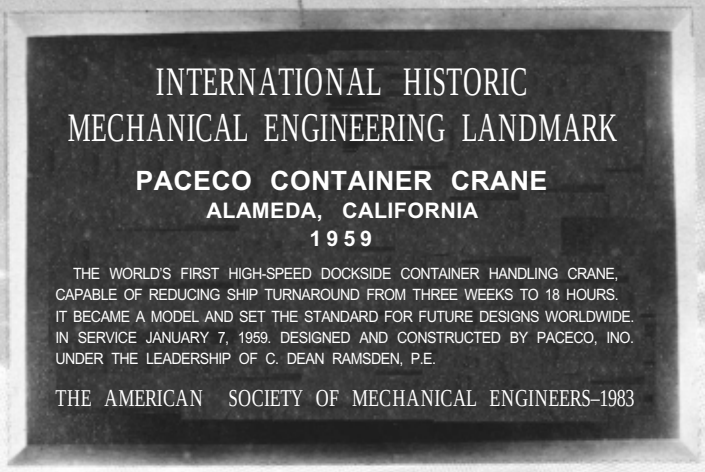
PRESENT

# DEDICATION PROGRAM
# PACECO CONTAINER CRANE

**Thursday May 5, 1983**
**Encinal Terminals — Alameda, California**

| | |
|---|---|
| **Opening Remarks** | Dr. Richard G. Folsom, P.E.<br>Past President ASME |
| **Welcome to the Dedication Ceremony** | Don Roth, P.E.<br>Chm. San Francisco Sect. ASME |
| **Welcome to Alameda** | Chuck Corica, Mayor Alameda |
| **Welcome to Encinal Terminals** | Chengben (Peter) Wang<br>President Encinal Terminals |
| **Introduction of Honored Guests** | James D. Woodburn, P.E.<br>V.P. Region IX ASME |
| **The ASME Historical Landmark Program** | Dr. R. Carson Dalzell, P.E.<br>Chm. National History & Heritage Committee |
| **The Birth of the Container Revolution & the Development of Worldwide Container Systems** | Les Harlander, president<br>L.A. Harlander & Associates |
| **Design & Construction of the World's First Container Crane** | C.H. Zweifel, P.E.<br>Assistant to the President Engineering<br>PACECO, Inc. |
| **Presentation of Commemorative Plaque** | Dr. Serge Gratch, P.E.<br>National president ASME |
| **Acceptance of Plaque** | Mr. John Martin, President<br>PACECO, Inc.,<br>Gulfport, Mississippi |
| **In Conclusion** | Dr. Richard G. Folsom, P.E. |

**Reception Following**



# CONCEPT

The idea of shipping goods in intermodal containers (truck vans that detach from their carriage or chassis for stacking on ships or rail cars) was first developed in 1956 by Sea-Land Services Inc. of New Jersey, then known as Pan-Atlantic Steamship Company, followed by Matson Navigation Company in 1958.

The new containerization concept drastically reduced the labor costs as well as the time required to unload and reload the trucks at either end of the route; additionally, the number of ship-to-shore lifts for each truck load was reduced from as many as 20 small lifts to only two heavy lifts. Containerizing also reduced pilferage and cargo damage, resulting in the additional benefit of lower insurance rates.

Containerization, as a cargo handling concept, would soon prove to be a giant leap forward for those who had vision. At the time, however, the concept was a long way from being perfected or being accepted by the shipping community.

One of the major problems facing the containerization concept was that during the mid-fifties most ports were not equipped to handle the heavy containers except by mobile-type revolving cranes and even then many of the cranes did not have the capacity to lift the container.

These cranes, at best, were extremely inefficient in that at least two to three minutes of loading cycle was lost to poor control at the points of pickup and discharge.

Since the cycle would be repeated thousands of times each year; cutting the length of the cycle would have a direct and easily measured impact on productivity. For example, if the cycle could be accomplished in two minutes rather than five minutes, the productivity would more than double. The economic implications were astounding.

Knowing the economic potential, both Matson and Sea-Land proceeded to develop ship-to-shore systems independently of each other and unique to their own needs. For Sea-Land, because its ships served many ports, shipboard cranes were more cost effective. On the other hand, Matson operated a number of ships serving only a few ports. Because one crane could serve many ships, dockside cranes were more cost effective for Matson's operation.

In July of 1957, Matson's Engineering Staff, under the leadership of Mr. Les Harlander, commissioned a study of existing crane types, to determine the state of the art and identify the type which could best meet the following requirements:

**In General:**

**Load vans (containers) between ship and shore as rapidly as possible, to keep the turnaround time of a containership to a minimum.**

**Specifically:**

1. Handle 24-foot vans weighing a maximum of 25 short tons.
2. Load one van and unload one van in an average time cycle of five minutes or less.
3. Be able to service deck loads on existing ships, converted container-ships, and future container-ships of special design.
4. Serve either truck and/or rail traffic on shore, and provide optimum conditions for coordination of freight movement on the dock.
5. Crane components to be designed for trouble-free, continuous use.
6. Hoist and control equipment so designed as to minimize operator responsiblity and fatigue.
7. Overall scheme of crane and related equipment (lifting beams, etc.) to require a minimum of operating personnel.

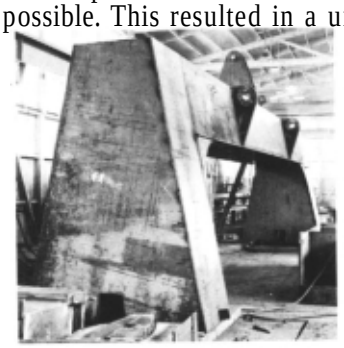
During the course of the study, which was conducted by Don Harlander and Murray Montgomery, then employed by Vietsch Engineering, the problem was discussed with engineering staffs of several leading crane manufacturers. Pacific Coast Engineering Company (PACECO), a previous employer of Don Harlander, Montgomery and Vietsch, was among those consulted.

The study concluded that no crane then on the market satisfactorily filled all of Matson's requirements, and that an ore-unloading type crane with a horizontal boom and through-leg trolley came closest to meeting these requirements.

# DESIGN & CONSTRUCTION

Early in 1958, performance specifications were finalized and put out for bid. PACECO, one of eleven bidders, was awarded the contract to do the detailed engineering and final design work.

Following its philosophy that the best design has the fewest number of pieces, PACECO, under the leadership of then-President Dean Ramsden, Chief Engineer, Chuck Zweifel, and Assistant Chief Engineer, Murray Montgomery (now back with PACECO), began developing conceptual drawings paying particular attention to aesthetics. Trusses, which were used by most manufacturers at that time, were replaced with all-welded box girders wherever possible. This resulted in a unique and extremely clean-looking A-frame configuration, for which PACECO later became famous. Each function was carefully analyzed and simplified to promote ease of access, operation and maintenance.



Tip of PACECO A-frame design.

The operator's cab was mounted in full view of the operation with all controls at the operators' fingertips. Every consideration was given to enhanced operator control and safety. Limit switches were placed throughout the crane's power system to prevent overloading or unsafe operation.

After months of intense work and countless conferences with Matson's Engineering Manager, the final configuration was agreed upon and the order to begin construction was issued.

Erection — Fall 1958

On August 31,1958, Matson Navigation Company commenced its containership operations in the West Coast —Hawaii Trade. On January 7, 1959, the worlds first container crane was put into service at the Encinal Terminals in Alameda, California.

Previously in Matson's operation, one longshore gang handled approximately nine tons of cargo per hour using ship's burtoning gear. In comparision, this new container crane operating on a three-minute cycle, with an average container weight of twenty tons, resulted in a productivity of 400 tons per hour. At this rate, the amount of time a ship spent in port could be cut from as much as three weeks to as little as eighteen hours. The crane performed well from the outset and as a result, Matson contracted for two more cranes. PACECO, because of its experience and competitive pricing, received the contract for both cranes which were installed in 1960 at Los Angeles and Honolulu.

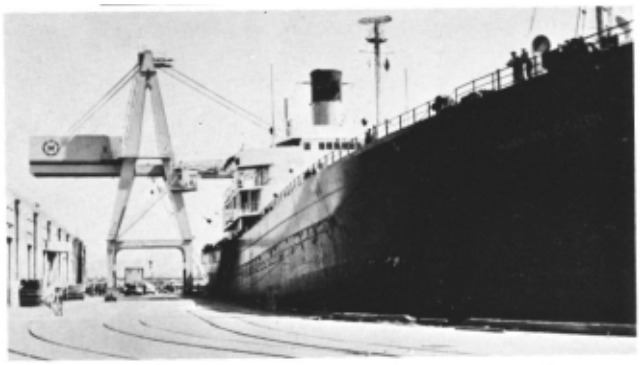
In 1961, the International Standards Organization (ISO) formed a container section to develop a family of uniform container sizes, dimensional tolerances, basic strength requirements and corner fittings.

By 1964, shipping companies the world over had become aware of the many advantages of containerization. Investors and lending institutions were committing funds for the development of new ships and port facilities. By 1966, Pan-Atlantic, now Sea-Land Services Inc., had commissioned sixteen PACECO Container Cranes. The cranes were capable of transferring containers weighing 27.5 short tons (55,000 lbs.) at the unheard of rate of one every minute and a half. What followed was a virtual containerization explosion.

The original container crane which PACECO built for Matson at Encinal Terminals in 1959 not only became a model, but set the standards for container crane design for dozens of manufacturers around the world. Although there have been many significant improvements, all modern container cranes are direct descendants of this first crane, and the design of later cranes has remained relatively unchanged.

The original crane, which is still in operation, was modified in 1963-64 and again in 1974-75. The extended outreach, height and width enabled it to serve new, larger container ships. The modifications and the upgrading of lifting capacity from 25 to 30 short tons were accomplished with a mimimum of re-engineering. The crane, now capable of handling 20 foot and 40 foot containers, is presently owned and operated by Encinal Terminals of Alameda, California.

By the end of 1980, there were at least 737 ship-to-shore container-handling cranes of the PACECO type operating in over 200 ports around the world. Of the 737 cranes listed, 283 (38%) were PACECO Portainer® cranes. (Containerisation International, September 1981)



The Hawaiian Citizen, the world's first dedicated containership being serviced at Encinal Terminals during the early 60s.

# PRESENT AND FUTURE

The success of containerization and the PACECO Container Crane not only accelerated the shipment of goods but created a demand for a different breed of ship and container terminals. To keep pace with this demand Encinal Terminals, now owned by Chengben (Peter) Wang, embarked on an ambitious modernization program in 1977 that has drawn the attention of shipping companies throughout the world.

It began with the installation of a new generation PACECO Portainer ® Crane, the big brother of the original (see photo left). The plan calls for the step-by-step modular expansion to a high performance MACH Transtainer ® yard system with the potential of becoming a fully automated container terminal in the future.

Today, Encinal has a highly competitive operation providing a complete range of shipping services fully computerized for handling containers, general cargo, non-petroleum liquids with warehouse and distribution facilities.

1959 and 1981 vintage PACECO container cranes as they appear today at Encinal Terminals.

PACECO MACH Transtainer systems for handling containers in the yard.

# CONTRIBUTORS

**Conceptual Design and Preparation of Contract Plans & Specifications**

**Les Harlander,** Manager, Engineering Development, Matson Navigation Co.

**Murray M. Montgomery,** Chief Engineer, Vietsch Engineering, Inc.

**Don Harlander,** Project Engineer, Vietsch Engineering, Inc.

C. Dean Ramsden

**Detailed Design and Construction**

**C. Dean Ramsden,** P.E., Fellow, ASME (deceased), President of PACECO, Inc.

**Charles H. Zweifel,** P.E., Fellow, ASCE, Chief Engineer, PACECO, Inc.

**Murray M. Montgomery,** Assistant Chief Engineer, PACECO, Inc.

**Norman Bell,** Project Engineer, PACECO, Inc.

**Hugh M. O'Neil** and **Michael Jordan,** Structural Designer, Hugh M. O'Neil & Company, Oakland, California.

**Richard Corey,** Chief Engineer, Rundel Electric Co.

## THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

The American Society of Mechanical Engineers (ASME) was founded in 1880 as an educational and technical society. ASME has consistently sought to provide an impetus for the continuing professional development of its individual members and advancement of the state-of-the-art of mechanical engineering.

**The principal goals and objectives of ASME are:**

- To provide a forum for the development, exchange and dissemination of technical information, particularly on mechanical engineering.
- To develop mechanical standards, codes, safety procedures and operating principles for industry.
- To encourage the personal and professional development of practicing and student engineers.
- To aid members of the engineering profession in maintaining a high level of ethical conduct.

The Society consists of more than 105,000 members, of whom between 15,000 and 20,000 are engineering students. ASME members are active in private engineering firms, corporations, academic and government service. A ten-member board governs the Society. Its headquarters are in New York City and it has five field offices; Chicago, Dallas, San Francisco, Danbury, Conn., and Burke, Virginia, plus a government relations office in Washington, D.C.

## THE HISTORY AND HERITAGE PROGRAM

The History and Heritage Landmark Program of the ASME began in September 1971. To implement and achieve the goals of the landmark program, ASME formed a History and Heritage Committee, composed of mechanical engineers, historians of technology, and a curator of mechanical engineering from the Smithsonian Institution who serves in an ex-officio capacity. The committee provides a public service by examining, noting, recording, and acknowledging mechanical-engineering achievements that were significant in their time.

The program, as with any study or record of history, illuminates our technological heritage. It also serves to encourage the preservation of the physical remains of historically important works; provides an annotated roster of landmarks for engineers, students, educators, historians and travelers; and calls attention to our industrial past. By dedicating mechanical engineering landmarks, we are establishing persistent reminders of where we have been, where we are and where we are going along the divergent paths of discovery.

## LANDMARK DESIGNATION

Mechanical engineering accomplishments that are proclaimed landmarks fall into three categories: regional, national, and international. International landmarks have been given this status because they represent a technology that has had a broad influence geographically. Such artifacts are designated in the United States as well as in other countries, recognizing either American contributions that have influenced foreign technology or vice versa.

Mechanical engineering landmarks are characterized by being unique, first ever, oldest extant, last surviving examples of once widely-used types of works, or possessing some other important distinction.

Of a total of 83 ASME Regional, National and International Historic Mechanical Engineering Landmarks, the PACECO Container® Crane is the 12th International Historic Mechanical Engineering Landmark to be designated since the program began in 1973.

For a complete list of the Society's Landmarks and information about the ASME History and Heritage Program, please contact:
The Public Information Department, ASME,
345 East 47th Street, New York, NY 10017
(212/705-7740).


## ACKNOWLEDGEMENTS:

The San Francisco Section of the ASME gratefully acknowledges the efforts of all who participated on the landmark dedication of the world's first high-speed dockside container-handling crane, particularly the officers and staff of PACECO, Inc. and Encinal Terminals.

The San Francisco section further acknowledges the support of the Materials Handling Engineering Division of ASME in designating this Landmark.

## SPECIAL THANKS TO:

Harold J. Leeds, ASME, Container crane consultant, for initiating this event. If it were not for his efforts, this achievement surely would have gone unrecognized.

Les A. Harlander, President, L.A. Harlander & Associates, for providing much of the documentation necesssary to make this occasion a reality.