



SUN SHIPBUILDING AND DRY DOCK COMPANY



The Sun 400 lifts the bow up to the deck of a vessel under construction.

Sun Ship began its industrial life in 1905 on 50 acres of slunk cabbage on the banks of the Delaware river. Within a year's time, this undeveloped site in Chester, Pennsylvania had been transformed into a major commercial shipyard with inclined ways, shops and store houses. Sun Shipbuilding came into being because its parent company, the Sun Company, needed ships to transport crude oil from its Texas fields to its Marcus Hook refinery. The new shipyard was built at a cost of five million dollars.

On a rainy Tuesday in October 1917, Sun Hull No. 1, the S.S. CHESTER SUN, was launched. The 10,600 dead-weight ton tanker "glided majestically down the ways at 12:15 P.M." according to a contemporary newspaper account. More than 600 ships have followed the CHESTER SUN down the ways since that time.

In the 60-odd years since its founding, Sun Ship has played a major economic role in the Delaware Valley through its employment of local workers and its purchase of goods and services from other Delaware Valley businesses.

Shipbuilding is a labor intensive industry and is reflected in Sun Ship's role as a major employer in the region over the years.

During the Second World War, 35,000 people worked at Sun Ship building ships for the war effort. Over the past five years, the shipyard has employed an average of 4,000 people.

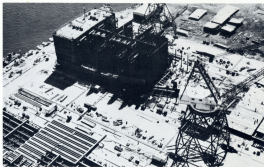
Ships are the biggest self-sufficient mobile structures manufactured, and building them requires a multitude of skills. This complex process requires workers on all levels from skilled craftsmen to technical workers to professionally trained people. The entire shipbuilding cycle from design to delivery takes several years. Three quarters of the workforce at the shipyard is involved in the production aspect of shipbuilding. This group includes such crafts as welding, burning, rigging and shipfitting. The yard also employs engineers, draftsmen and a wide range of other white-collar workers. An estimated 80% of the workforce is drawn from the immediate Delaware County area. The remainder come from Philadelphia and other adjacent Pennsylvania counties as well as the states of Delaware and New Jersey.

Although the building and repairing of ships are the yard's primary business, Sun has engaged in opportunities for work in non-marine areas since its founding. These are areas in which the company's

facilities and the skills of its employees can be readily adapted. Scotch boilers and reciprocating steam engines were made in the shipyard not only for ships being built here but for vessels being constructed in other yards as well. In 1923, as the reciprocating engines and Scotch boilers passed out of use, Sun bought the rights to manufacture the General Diesel engine. The yard not only manufactured the engines, but produced spare parts for the engines after they were installed.

This work helped keep the yard busy during the twenties and thirties. Railway equipment for Sun Oil Company as well as other petroleum companies was manufactured here. The yard constructed traction-towing towers, agitators, shroffers, and heat exchangers. The famous Housley catalytic cases came from this shipyard. The company also did large and small machining jobs and pressure vessels of all sizes were manufactured here. Ironically, one of Sun Ship's most important contributions to the maritime industry originated with the substitution of the weld for the rivet on a pressure vessel.

The first "all-welded" ship dates from 1932 with the construction of the S.S. WHITE FLASH. Prior to this, ships were riveted together. This ship, and the larger



Construction of sections of a 125,000-ton ecology tanker proceeds at the company's construction ship. This square ship is 700 feet on each side and is capable of building ships to 400,000 tons.

results which followed it, marked a new era in ship construction. The all-welded method of construction resulted in considerable savings in time and steel and yielded a stronger ship. The development of the all-welded ship also made it possible during World War II for the U.S. shipbuilding industry to produce more than three times the tonnage that could have been produced by the riveted method.

During the war, Sun Ship delivered 260 ships, which included 40% of all the U.S. tankers. Wartime growth of the work force made Sun Ship the largest shipyard in the whole world at the time. With its 28 ways, Sun Ship averaged construction of a ship a week during that war years. Most of these ships were the famous T-2's, developed by the shipyard in cooperation with the U.S. Maritime Commission. Although built under emergency conditions, this ship class proved so successful that many of the T-2's have been jumboized and are still sailing today.

Some Sun-built vessels that achieved wartime fame include the S.S. OHIO, built in 1940. This tanker ran the gauntlet of aerial and submarine attacks to deliver desperately needed oil to the beleaguered island of Malta. Another World War II standout is the CIMARRON (built in

1939), a Navy oiler which participated in every major Navy action in the Pacific. This vessel fueled more ships than any other oiler. Although bombed several times, this vessel never sustained a casualty among its crew.

The shipyard's contribution to the war effort went beyond the construction of ships. The shipyard was inundated with orders for oil refinery equipment for domestic and foreign use. Sun's products found their way to Russia, the Middle East, and South America. In three war years, Sun Ship manufactured towers, tanks, reactors, kilns and cracking cases for 23 refinery units. 90% of all the aviation gasoline made during the war for the Allied cause by the catalytic cracking method was manufactured in equipment built by Sun Ship. Nonmarine work reached a company high during the Second World War.

The glut of vessels resulting from wartime production precipitated an abrupt decline in ship orders after the war. Twenty-five vessels were delivered in the last years of the forties.

The fifties were a lean decade for American shipyards. There were few orders for ships. During this period, however, Sun produced some 22 vessels,

including the first "Maestros" ships, 15 tankers and the USNS-COMET, a Roll-on/Roll-off military vessel.

With the sixties came orders for cargo ships for Moore-McCormack Lines, American Export Lines, U.S. Lines and Grace Lines, Inc. There were 33 ships delivered during this decade.

With the 60's also came the aggressive search for sea-marine work and the decision to hire shipyard management to develop the capability for fabricating the new sophisticated metals. The Aero/Hydro-space and Industrial Products Department was established at this time. Spectacular products came from Sun's efforts in these areas. Sun's modern retoolings, advanced welding techniques, special tooling facilities and precision machining enabled the shipyard to produce:

- Anchor components for the Verrazano Narrows Bridge, connecting Staten Island and Brooklyn, N.Y. This is the world's largest suspension bridge.
- A 2,247 foot long shock tube for the Naval Weapons Lab.
- A test chamber for NASA's "Launch Phase Simulator" at the Goddard Space Flight Center.
- Solid propellant rocket motor cases for NASA.



S.S. "KIPPA" under construction.

- Biphenyl pressure hull for the Deep Quest.
- Four hold-down clamps for the 7.5 million pounds of thrust of a Saturn V first stage rocket during static firing.
- A giant wind tunnel for the Boeing Vertol Company in Ridley Park.
- A 662-ton pole for a radio telescope in Virginia.

One of the most far-reaching jobs in the last twelve was the conversion of the MANHATTAN into an icebreaking tanker to test the feasibility of transporting Alaskan crude oil to the U.S. East Coast via the Northwest Passage. This was the first successful transit of the Northwest Passage by a commercial vessel.

The states also marked the delivery of the ADM. WM. M. CALLAGHAN, a gas-turbine powered military Ro/Ro naval. On one of its early voyages, the CALLAGHAN set a world's record by crossing the North Atlantic in only four days. Concurrent with construction of the CALLAGHAN, Sun Ship developed its own design "tailship," a general cargo ship that extended the commercial application of the Roll-On/Roll-Off concept to include the waterborne carriage of highway trailers and other over-the-road vehicles. Sun Ship has built ten "tailships" to date,

and is the acknowledged world leader in the design and construction of this vessel type.

Thus far the seventies have seen the shipyard participate in a wide range of activities. The MODEL ARCTIC, the largest ship built in the United States at the time of its construction, was delivered in 1970. This ship measures 940 feet in length and has a cargo carrying capacity in excess of 129,000 deadweight tons.

In the area of aerospace and hydro-space construction, Sun Ship built the prototype pressure hull for the Deep Submergence Rescue Vehicle (DSRV) in the early 1970's. The development of this underwater vehicle was the result of the Thresher tragedy. It was designed to provide the U.S. Navy with a fast-reaction undersea rescue capability anywhere in the world. Light enough and compact enough to be transported to a submarine emergency within four hours, it is capable of operating at 3,500 foot depths for as long as 12 hours. Its crew of three has the capability to rescue 24 survivors at a time from a stricken submarine.

Another aerospace/hydro-space product, the commercial submarine GUPPY, was finished in 1972. The GUPPY, a two-man tethered vehicle, was used in an under-

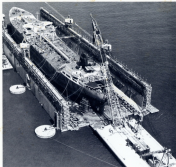
water survey of the Gulf of Alaska.

The ship construction that brought the shipyard its greatest notoriety was the HUGHES GLIMAN EXPLORER. Built expressly to perform deep-ocean mining operations, the GLIMAN EXPLORER became the headline story of newspapers around the world when it was revealed that the Sun-built vessel had been used to lift a Russian submarine from the floor of the Pacific Ocean.

Sun Ship celebrated its fifth anniversary in 1979 with a \$45 million capital improvement and expansion program. This major capital improvement program enhanced the shipyard's ability to build the larger and more sophisticated commercial vessels that will comprise merchant marine fleets of the future. Sun Ship now has the capability to build ships up to 1,300 feet long and 197 feet wide. With this capability, the shipyard could conceivably build vessels as large as 400,000 dead-weight-ton tankers.

An important element in the expansion program was the addition of another four dry dock to the yard's facilities. This two-section dry dock, the largest on the U.S. East Coast, has an overall lifting capacity of 70,000 tons.

The shipyard's present production facil-



The S.S. "PENNSYLVANIA SUN" undergoes repairs in the company's new section floating dry dock.

ties also include an automatic plate burning installation, fabrication shops, building ways, heavy lift equipment and two criss-crossing piers.

The yard's heavy lift equipment includes the SUN 800, a floating derrick capable of lifting 800 tons. When not involved in shipyard construction programs, the SUN 800 provides outside customers with a complete, mobile heavy lift service for use in a wide range of applications including construction, marine salvage and cargo handling.

Observers of the Philadelphia Port scene are familiar with the Port's use of the SUN 800 to supplement its own cargo handling capacity. Recently, the SUN 800 made the biggest lift it has ever made when it placed a 768-ton davidgean in position on the Benjamin Harrison Bridge in Hopewell, Virginia.

The shipyard also offers a full scope of engineering services including the design of new vessels, ship repair and conversion and product development for industrial, aerospace and hydrospace applications.

Since its establishment in 1921, the yard's ship repair department has repaired thousands of vessels. The yard is in the latter stages of a major overhaul of the USS POWHEE, a U.S. Navy amphibious

vessel.

The shipyard's industrial construction activity is abetted by its location on the Delaware River since many industrial products are invented and must be shipped by water to their ultimate point of delivery and installation.

Sun Ship also provides a wide variety of non-marine products for government and private interests. The shipyard is completing an order for 20 components for nuclear reactors. These reactors are to be used by public utilities to generate nuclear power for commercial purposes.

The shipyard's current new construction workload includes two Liquefied Natural Gas (LNG) ships for Pacific Marine Associates, two product tankers for Sun Company and a 720-foot container ship for Matson Navigation Company. The shipyard is currently completing work on the second of two "ecology" class tankers for Standard Oil of Ohio (SOHIO). The first vessel, the TON-3804, was delivered during the first half of May, while the second tanker, the 3804M was christened on June 3 and is slated for delivery later this year.

These 800-foot vessels will carry crude oil from Valdez, Alaska to Pacific coast ports. The Sun-designed vessels incor-

porate several environmental safeguards. The double hull space, combined with other ballast spaces in the ends of the ship provide the tanker with a clean ballast capacity of 43,000 tons. High strength steel has been used in the upper deck plating and sheer strake areas to enhance structural stack resistance in cold weather service. A sewage storage and treatment system is provided on the ship. Oil-water separators clean the bilge water and cargo tank washings before discharge overboard.

Sun Ship hopes to add to its construction backlog and is actively pursuing business in the new ship construction, ship repair and industrial areas.

Looking ahead, it's readily apparent that Sun Ship and the Port of Philadelphia are, in many respects, partners. Basically, Sun Ship's and the Port's relationship is a mutually supportive one. The shipyard's economic well-being is inextricably tied to the region's talented labor pool and the continuing vitality of the Port of Philadelphia. In turn, as the last modern commercial shipyard on the banks of the Delaware River, Sun Ship is a major industrial resource capable of generating significant business for the Port and the entire Delaware Valley region.



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Chester, Pennsylvania
