

Concrete ship

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Concrete ships are built of steel and ferrocement (reinforced concrete) instead of more traditional materials, such as steel or wood. The advantage of ferrocement construction is that materials are cheap and readily available, while the disadvantages are that construction labor costs are high, as are operating costs. (Ferrocement ships require thick hulls, which means extra mass to push and less space for cargo.) During the late 19th century, there were concrete river barges in Europe, and during both World War I and World War II, steel shortages led the US military to order the construction of small fleets of ocean-going concrete ships, the largest of which was the SS *Selma*.^[1] Few concrete ships were completed in time to see wartime service during World War I, but during 1944 and 1945, concrete ships and barges were used to support U.S. and British invasions in Europe and the Pacific. Since the late 1930s, there have also been ferrocement pleasure boats.

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History

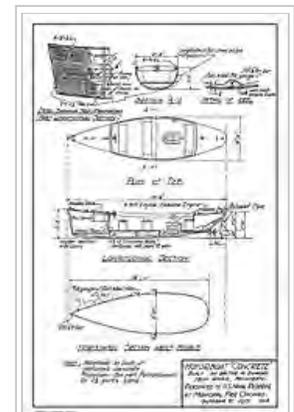
The oldest known ferrocement watercraft was a dinghy built by Joseph-Louis Lambot in Southern France in 1848. Lambot's boat was featured in the Exposition Universelle held in Paris in 1855.

Beginning in the 1860s, ferrocement barges were built in Europe for use on canals, and around 1896, an Italian engineer, Carlo Gabellini, began building small ships out of ferrocement. The most famous of his ships was the *Liguria*.^[2]

Between 1908 and 1914, larger ferrocement barges began to be made in Germany, United Kingdom,^[3] the Netherlands, Norway, and California.^[4] The remains of a British ship of this type, the auxiliary coaster *Violette* (built 1919), can be seen at Hoo, Kent, England.^[5]

On August 2, 1917, Nicolay Fougner of Norway launched the first self-propelled ferrocement ship intended for ocean travel. This was an 84-foot (26 m) vessel of 400 tons named *Namsenford*. With the success of this ship, additional ferrocement vessels were ordered, and in October 1917, the U.S. government invited Fougner to head a study into the feasibility of building ferrocement ships in the United States.^{[6][7]} The Fougner Concrete Shipbuilding Company, Flushing Bay, New York, reported calculated cost was of \$290 per deadweight ton for the *Cape Fear* (List of shipwrecks in 1920 "10.21 30 October") and the *Sapona* which they presumably built.^[2]

About the same time, the California businessman W. Leslie Comyn took the initiative to build ferrocement ships on his own. He formed the San Francisco Ship Building Company (in Oakland, California), and hired Alan Macdonald and Victor Poss to design the first American ferrocement ship, a 6,125-ton steamer named the SS *Faith*. *Faith* was launched March 18, 1918. She cost \$750,000 to build. She was used to carry bulk cargo for trade until 1921, when she was sold and scrapped as a breakwater in Cuba.^[2]



Blueprints for a concrete boat



Concrete boat constructed by Walter Dowsey hauled out in Chicago

On April 12, 1918, President Woodrow Wilson approved the Emergency Fleet Corporation program which oversaw the construction of 24 ferrocement ships for the war. However, when the war ended in November 1918, only 12 ferrocement ships were under construction and none of them had been completed. These 12 ships were eventually completed, but soon sold to private companies who used them for light-trading, storage, and scrap.^[2]

Other countries that looked into ferrocement ship construction during this period included Canada, Denmark, Italy, Spain, Sweden^[4] and the United Kingdom.

Between the world wars, there was little commercial or military interest in concrete ship construction. The reason was that other shipbuilding methods were cheaper and less labor-intensive, and other kinds of ships were cheaper to operate. However, in 1942, after the U.S. entered World War II, the U.S. military found that its contractors had steel shortages.

Consequently, the U.S. government contracted McCloskey & Company^[8] of Philadelphia, Pennsylvania to build 24 self-propelled concrete ships. Construction started in July 1943. The shipyard was at Hookers Point in Tampa, Florida, and at its peak, it employed 6,000 workers.

^[9] The U.S. government also contracted with two companies in California for the construction of concrete barge ships.^[9] Barge ships were large vessels that lacked engines to propel them. Instead, they were towed by tugs.

In Europe, ferro cement barges (FCBs) played a crucial role in World War II operations, particularly in the D-Day Normandy landings, where they were used as part of the Mulberry harbour defenses, for fuel and munitions transportation, as blockships,^[10] and as floating pontoons. Some were fitted with engines and used as mobile canteens and troop carriers. Some of these vessels survive as abandoned wrecks in the Thames Estuary; two remain in civil use as moorings at Westminster. One notable wartime FCB, previously beached at Canvey Island, was destroyed by vandals on May 22, 2003.^[11]

In 1944 a concrete firm in California proposed a submarine shaped freighter which they claimed could achieve speeds of 75 knots. The war ended any more research into the project. In retrospect many believe the claims were greatly overstated.^[12]

Concrete barges also served in the Pacific during 1944 and 1945.^[13] From the Charleroi, Pennsylvania, *Mail*, February 5, 1945:

Largest unit of the Army's fleet is a BRL, (Barge, Refrigerated, Large) which is going to the South Pacific to serve fresh frozen foods — even ice cream — to troops weary of dry rations. The vessel can keep 64 carloads of frozen meats and 500 tons of fresh produce indefinitely at 12°F. Equipment on board includes an ice machine of five-ton daily capacity and a freezer that turns out more than a gallon of ice cream a minute. Three of the floating warehouses, designed for tropical warfare, have been built of concrete at National City, Calif., and cost \$1,120,000 each. In the crew of the 265-ft. barges are 23 Army men.

One concrete barge under tow by *Jicarilla* (ATF-104) was lost off Saipan during a typhoon, and another barge damaged the Moreton Bay Pile Light in Brisbane,^[14] but the rest served admirably.^[15]

Today

Modern hobbyists also build ferrocement boats (ferroboats),^[16] as their construction methods do not require special tools, and the materials are comparatively cheap. A pioneer in this movement is Hartley Boats, which has been selling plans for concrete boats since 1938.^[17] Meanwhile, since the 1960s, the American Society of Civil Engineers has sponsored the National Concrete Canoe Competition.^[18]

In Europe, especially the Netherlands, concrete is still used to build some of the barges on which houseboats are built.^[19]

Remaining wartime ships

Surviving wartime concrete ships are no longer in use as ships. Several live on in various forms, mostly as museums or breakwaters.

Americas



The American concrete oil tanker *Palo Alto*, originally meant for merchant service in the first World War, but completed in 1919. (Naval History and Heritage Command - Photo NH 799)

The largest collection is at Powell River, British Columbia,

49.865238°N 124.555821°W﻿ (https://tools.wmflabs.org/geohack/geohack.php?pagename=Concrete_ship¶ms=49.865238_N_-124.555821_E_) where a lumber mill uses ten floating ferrocement ships as a breakwater.^[20]

The Kiptopeke Breakwater in Chesapeake Bay, Virginia

37.164267°N 75.991402°W﻿ (https://tools.wmflabs.org/geohack/geohack.php?pagename=Concrete_ship¶ms=37.164267_N_-75.991402_E_) is formed by nine sunken concrete ships built in World War II.^[21]

San Pasqual, a former oil tanker, lies off the coast of Cayo Las Brujas, Cuba ,

22.623439°N 79.22327°W﻿ (https://tools.wmflabs.org/geohack/geohack.php?pagename=Concrete_ship¶ms=22.623439_N_-79.22327_E_) where it served as a hotel, then as a base for divers. Currently, the *San Pasqual* is abandoned.^[22]

The wreckage of SS *Atlantus* (commissioned in 1919, sunk in 1926), is visible off Cape May, New Jersey.

38.944322°N 74.972083°W﻿ (https://tools.wmflabs.org/geohack/geohack.php?pagename=Concrete_ship¶ms=38.944322_N_-74.972083_E_)^[22]

The tanker SS *Selma* is located northwest of the fishing pier at Seawolf Park in Galveston.

29.344249°N 94.786343°W﻿ (https://tools.wmflabs.org/geohack/geohack.php?pagename=Concrete_ship¶ms=29.344249_N_-94.786343_E_). The ship was launched the same day Germany signed the Treaty of Versailles, ending the war, so it never saw wartime duty and instead was used as an oil tanker in the Gulf of Mexico.^[1]

The SS *Palo Alto*, a concrete tanker that was launched May 29, 1919, was purchased and turned into an amusement pier, and is still visible at Seacliff State Beach, near Aptos, California.

36.969704°N 121.913947°W﻿ (https://tools.wmflabs.org/geohack/geohack.php?pagename=Concrete_ship¶ms=36.969704_N_-121.913947_E_)^[22]

The SS *McKittrick*, launched in 1921 in Wilmington, N.C. later became the SS *Monte Carlo*, a gaming ship off Coronado, California that ran aground on December 31, 1936. The wreck is periodically exposed by strong storm tides.^[23]

The vessel aground in the surf at Shipwreck Beach on the north shore of Lanai, Hawaii is ex-YOGN 42,

20.921299°N 156.910139°W﻿ (https://tools.wmflabs.org/geohack/geohack.php?pagename=Concrete_ship¶ms=20.921299_N_-156.910139_E_) a concrete gasoline barge built for the US Navy in 1942 and placed in service in 1943. The wreck is often misidentified as a Liberty ship.^[24]

The remains of the *Col. J. E. Sawyer* can be seen near the USS Yorktown in Charleston Harbor,

32.798761°N 79.906863°W﻿ (https://tools.wmflabs.org/geohack/geohack.php?pagename=Concrete_ship¶ms=32.798761_N_-79.906863_E_) SC.^[25]



Schooner Larinda, launched in 1996, also has a concrete hull



At Powell River



At Kiptopeke



SS Atlantus



SS Selma



SS Palo Alto



SS Monte Carlo



YOGN 42

Europe

One of the few ships used in World War I, the SS Creteboom, lies abandoned in the River Moy,

54.135515°N 9.138452°W﻿ (https://tools.wmflabs.org/geohack/geohack.php?pagename=Concrete_ship¶ms=54.135515_N_-9.138452_E_) just outside the town of Ballina, County Mayo, Ireland and is considered of much interest to the area's many tourists.

A concrete barge, the Cretetree is beached in the harbour of the Isle of Scalpay near Tarbert, Harris, Scotland.

57.876873°N 6.699965°W﻿ (https://tools.wmflabs.org/geohack/geohack.php?pagename=Concrete_ship¶ms=57.876873_N_-6.699965_E_) She was built by Aberdeen Concrete Ships, and completed in 1919.^[26]

The collection of vessels intentionally beached at Purton during the first half of the twentieth century - as a method to prevent coastal erosion - includes eight ferro-concrete barges.

51.737178°N 2.455798°W﻿ (https://tools.wmflabs.org/geohack/geohack.php?pagename=Concrete_ship¶ms=51.737178_N_-2.455798_E_)^[27]

A large collection of abandoned concrete barges are seen at River Thames in Rainham, London.

51.498608°N 0.18202°E﻿ (https://tools.wmflabs.org/geohack/geohack.php?pagename=Concrete_ship¶ms=51.498608_N_0.18202_E_)



SS Creteboom



At Purton



At Rainham

During the German occupation of Greece (in 1942 to 1944) during World War II the German Army built 24 concrete cargo vessels for transporting goods, to various Greek islands including Crete. These were constructed in the Perama shipbuilding area of Piraeus. After the war many of the vessels were used as piers (e.g. in Rafina

38.022056°N 24.010368°E﻿ (https://tools.wmflabs.org/geohack/geohack.php?pagename=Concrete_ship¶ms=38.022056_N_24.010368_E_) and breakwaters (e.g. in Agios Georgios, Methana 37.638340°N 23.394544°E﻿ (https://tools.wmflabs.org/geohack/geohack.php?pagename=Concrete_ship¶ms=37.638340_N_23.394544_E_)).

Other

Several concrete ships were aground on the west beach of Iwo To (Iwo Jima) in Japan to make a breakwater by the US forces in 1945.

^[28] Most of them were broken by typhoon but one was used as a pier.

24.78238°N 141.293095°E﻿ (https://tools.wmflabs.org/geohack/geohack.php?pagename=Concrete_ship¶ms=24.78238_N_141.293095_E_) ^[29]

Japan built four concrete ships named *Takechi Maru* No. 1 to 4 (武智丸) during World War II. After the war, two of them turned into a breakwater in Kure, Hiroshima.

34.280089°N 132.756295°E﻿ (https://tools.wmflabs.org/geohack/geohack.php?pagename=Concrete_ship¶ms=34.280089_N_132.756295_E_)



At Iwo To



Takechi Maru No.2

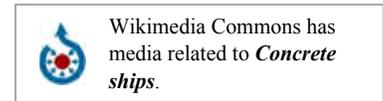
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- "Builders of Concrete Ships: WWII Construction Record" (<http://www.coltoncompany.com/shipbldg/ussbldr/wwii/merchantshipbuilders/concreteships.htm>)
- <http://www.usmm.org/concrete.html>
- Concrete Barge.co.uk (<http://www.concretebarge.co.uk/frames/index.htm>)
- "Concrete Liner" (https://books.google.com/books?id=mCYDAAAAMBAJ&pg=PA80&dq=Popular+Science+1931+plane&hl=en&ei=b0IkTfqeCoKBnAfU-bWiAQ&sa=X&oi=book_result&ct=result&resnum=10&ved=0CEcQ6AEwCTgo#v=onepage&q=Popular%20Science%201931%20plane&f=true) *Popular Science*, June 1944
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- "The World of Ferro-Cement Boats." (<http://www.ferroboats.com>)
- Hartley Boats (<http://www.hartley-boats.com/index.html>)
- "History of the Concrete Canoe Competition" (<http://www.asce.org/inside/nccc2004/history.cfm>)
- "Amsterdam Houseboat Trivia" (<http://www.xs4all.nl/~jheeck/boot1eng.html>)
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21. Concrete Ships: Kiptopeke Breakwater (<http://www.concreteships.org/ships/kiptopeke/>)
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29. Photos from Iwo Jima « Hot Air (<http://hotair.com/archives/2006/08/23/photos-from-iwo-jima/>)

External links

- History of ferro-concrete ships (http://www.mareud.com/Ferro-Concrete/fc_historygbr.htm)
- Comprehensive list of ferro-concrete builders (<http://www.mareud.com/Ferro-Concrete/f-c-list.htm>)
- Images of concrete vessels from the National Monuments Record ([http://viewfinder.english-heritage.org.uk/search/results.aspx?index=0&form=advanced&collection=Kooos%20\(concrete%20ships\)](http://viewfinder.english-heritage.org.uk/search/results.aspx?index=0&form=advanced&collection=Kooos%20(concrete%20ships))) Photographic record of the construction and launch of the *Cretemanor* at Preston and the Seacraft Concrete Co on the Mersey.
- "Pour in the Concrete and Take Out a Ship" (<https://books.google.com/books?id=7igDAAAAMBAJ&pg=PA73>), February 1919 *Popular Science*
- "*How Pour Ships Are Made*", June 1943, *Popular Science* (https://books.google.com/books?id=uicDAAAAMBAJ&pg=PA124&dq=popular+science+1943+brothers+under+the+skin&hl=en&ei=TXDOTLrHA42Snwe6-O3aDw&sa=X&oi=book_result&ct=result&resnum=1&ved=0CC8Q6AEwAA#v=onepage&q&f=true)



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