

Watching an evolution

Tug-barge transportation on the Great Lakes gets nod from U.S. fleet



An Andrie tug pushes a tank barge.

SOURCE: PATRICK LAPINSKI

PATRICK LAPINSKI
Senior Videographer
Online Products and User Experience
Capella University

Until the past few decades, a tug-barge on the Great Lakes was something of a maritime oddball. Today, though, every fleet on the American side of the Great Lakes operates a tug-barge and the concept is looking like the leading edge of a trend.

The April 11 christening of the self-unloading articulated tug-barge (ATB) *Ken Boothe Sr.* (the tug) and *Lakes Contender* (the

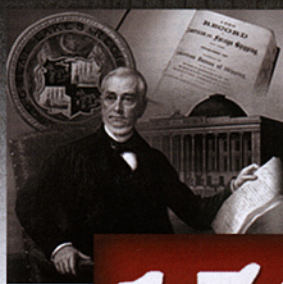
barge) in Erie, Pennsylvania was another clear indication of the growing acceptance of this configuration in Great Lakes shipping. The tug-barge is owned by SEAJON, LLC, a partnership between SEACOR Holdings Inc. and Donjon Marine Co., Inc. Boland and Cornelius Incorporated, a subsidiary of the American Steamship Company, will operate the vessels.

The ATB was the first of its kind to be built in Erie since the *Presque Isle* was launched in 1972. The launch perhaps dealt another blow to the continued use of older steamers, as well as hopes for single body, new-build construction for the American

Great Lakes fleets.

Historically, the tug-barge on the Lakes was a carryover from the early days of the Erie and Welland canals, where special flat-hulled craft were developed for the shallow waterways. Among these craft were small wooden schooners, a design that spread onto the Great Lakes in the 1840s. A scant two decades later, these ships became the connection between the early days of sail on the Great Lakes—sail's golden years—and the beginning of the steam era.

In 1869, the *R. J. Hackett*, considered the first bulk freighter built on the Lakes, was launched. The following year the *Forest City*,



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a new schooner-barge, was built for towing behind the *Hackett*. Generally, smaller craft were towed behind steam-powered freighters as barely manned barges, their masts shortened to offer some general independent maneuverability in an emergency. The consort arrangement allowed owners to increase the amount of cargo they could haul with little additional costs in fuel.

Ships heading to Duluth to unload coal or load ore would frequently drop their barges at anchor off Two Harbors. Once the steamer resumed course, the barges would be taken to the dock by the tug *Edna G.* to load ore and then re-anchored to await the return of the steamer. The sequence was reversed on the bottom end of the Lakes where ports like Chicago, Milwaukee, Cleveland and Detroit bustled with harbor tugs.

The arrival age of steam meant that when the smaller schooners were gone, the

The consort arrangement allowed owners to increase the amount of cargo they could haul with little additional costs in fuel.

larger ones were relegated to the end of a tow. The rapid rise of the number of schooner consorts told the story of commercial sailing vessels—sail was losing. During their peak, an estimated 25,000 sailing vessels operated on the Lakes, most of them being reduced to barges in the 1880s. By 1887, it was reported only about 300 of those vessels remained.

During the early 1890s, in the midst of the scow schooner era, a Twin Ports shipyard was building new steam-powered steel vessels as well as un-powered steel barges to tow behind. Alexander MacDougall brought the tug-barge concept to the modern shipyard, but because of design deficiencies, the whaleback was short-lived and soon eclipsed by the era of Great Lakes steam. The growth in size of the modern steamship also did away with any need for a string of tow barges. With the arrival of the new generation of steamer, the scow schooner was a thing of the past.

Diesel moves into the Lakes. The big steamers dominated the industry for the next half century, carrying the country



SOURCE: PATRICK LAPINSKI

ATB Joseph H. Thompson/Joseph H. Thompson Jr. moves cargo on Lake Superior.

through depression, war and economic boom. The marine steam plant had no serious competition until the mid-to-late-60s when diesel engines began appearing. Experimentation began on developing a tug-barge combination in which the tug was principally used to push a stern-notched barge, as shown in the photo below.

The earliest example of a tug-barge with noted success was the *Carport*. Built in 1950 at Christy Corporation in Sturgeon Bay, Wisconsin, the *Carport* (tug) and *G1* (barge) was designed to carry grain and liquid oils (linseed) for its owner Cargo Carriers, Inc., under the auspice of Cargill, from the Lake Superior district through the New York State Barge Canal to the East Coast. The connection involved a tongue and groove arrangement locked with tumblers. The tug did not ride independently of the barge, so it was essentially considered an integrated tug barge (ITB). One of the more unique features of the *Carport* was the use of an articulated pilot house, built to allow the tug to pass beneath the bridges along the Canal.

A little over a decade later, Fraser-Nelson Shipyard at Superior, in contract with Wilson Marine Transit, began the conversion of the aging steamer *Horace S. Wilkinson* into a tug-barge unit. The forward cabins were stripped away and the entire engine room and after cabins removed. The stern was sealed in the shape of a notch so a tug could be lashed to the barge (*Wiltranco I*) with cables. Because of restricted waters, the tug would push the barge. While on the open Lakes, the barge would be repositioned to tow the barge. After nearly a century of rel-

ative absence from the Lakes, the tug-barge had returned.

Ultimately, neither the *Carport* nor the *Wiltranco I* met with long-term success. In competing with traditional tug-barges, the *Carport* was not effectively faster in the canal due to speed and draft restrictions. In the open Lake, the *Carport* performed to the expectations of its owners, but no additional units were built.

The *Wiltranco I*, on the other hand, was never deemed a success. It was paired with an underpowered tug, which had difficulty

staying tightly connected with the barge. Switching between pushing and towing was time consuming and dangerous. Under tow, the *Wiltranco I* was sluggish and slow. Within a year of its inaugural season, the vessel was laid up. Unlike the *Carport*, the *Wiltranco I* was classified as a tug-barge.

Defining vessels. The classification of tug-barges is based upon how the vessels are coupled. An ITB, such as the *Presque Isle*, is locked together so the two main components ride together as if they are one ship. If separated, neither unit could func-



SOURCE: PATRICK LAPINSKI

A stern notch system shown from above.



SOURCE: PATRICK LAPINSKI

The tug *Jane Ann IV* uses a hawser sailing on Lake Superior.

tion well independently.

An ATB is classified based on the unit being coupled with a pin or gear system. While the tug is locked to the barge, it retains some independent vertical movement. In addition, the tug is able to be fully functional as a tug without the barge. The independent barge, for its part, could either be pushed by a conventional tug attached with wires, which would define it as a tug-barge, or towed. While the technical differences hardly seem relevant in respect to the cargoes they carry, they make a significant distinction in comparison to a single hull vessel

when it comes to the crew.

Crew needs for tug-barges was a contentious issue between shipowners, the maritime unions and the U.S. Coast Guard for years. In the 1950s, the *Carport* carried a smaller crew than a regular self-propelled vessel and reduced manning played a role in the removal of the *Carport* from active service in 1963. In the early 1970s, when the *Presque Isle* came onto the Lakes, its owners were hoping for a much larger reduction in crew size than they were finally granted. It set off a renewed debate regarding the manning of tugs and barges. The

principal issues were resolved in 1981 with the approval of new rules set forth by the Coast Guard in NAVIC 2-81, regulations which distinguish between Push-Mode ITBs and Dual-Mode ITBs (also referred to as ATBs).

Decades later, reduced manning of vessels remains a well discussed topic among Great Lakes mariners. Broadly speaking, tug-barges usually require about one-third less crew than a self-propelled vessel. On average, an ATB will carry a complement of 11 to 12, while a typical laker has a crew of 18 to 21 aboard. Foremost among the arguments posed by mariners is the belief that smaller crew sizes will lead to an overall increase in accidents due to extended work hours and fatigue.

Seeing the next wave. After nearly 40 years, the *Presque Isle* remains the only large-scale ITB operating on the Great Lakes, but the ATB, its cousin if you will, has made strides toward growth in the industry. Part of this change is due to the refinement of the marine diesel engine. Today's marine diesel engines are powerful and efficient, capable of producing enough horsepower to move large cargoes and maintain an acceptable rate of speed. This fact alone has contributed to the decline in the cost effectiveness of steam-powered vessels. New diesel engines are also cutting fuel consumption by nearly 50 percent—with reduced emissions. As a result, several trends have emerged.

One has been pairing the cargo section of old steamers with new EPA-compliant



SOURCE: PATRICK LAPINSKI

Rebecca Lynn pairs with a tanker barge owned by Marathon Oil on the Rouge River in Michigan.



SOURCE: PATRICK LAPINSKI

The James L. Kuber is a laker converted into an articulated tug-barge.

diesel-powered tugs. In these instances, the cargo capacity of the hull was maintained with significant savings in operating expenses from the elimination of the steam plant and reduced manning.

Some examples of recent conversions are the ATBs *James L. Kuber* (Reserve) and the *Lewis J. Kuber* (Buckeye, Sparrows Point). In addition to making regular runs between Silver Bay and Cleveland with taconite pellets, these vessels are also busy working the stone and hydro coal trade on the lower Lakes, moving frequently between ports like Fairport, Sandusky, Ashtabula and Lorain on Lake Erie, to Chicago, Milwaukee, Muskegon or Green Bay on Lake Michigan.

Another example is the *Pathfinder*, the hull section of the former *J. L. Mauthe*, and the tug *Dorothy Ann*, built for the conversion project. Cargo capacity is a critical factor for vessel owners when considering whether to re-power or convert to an ATB. The Interlake Steamship Company of Cleveland was looking for a vessel to dedicate for its "upriver" business on the Cuyahoga River. The company looked at several of its vessels with the option of converting them to ATBs. An early consideration was the *Lee A. Tregurtha*. Fleet engineers determined that a large tug would be needed to maintain the *Tregurtha's* cargo capacity and overall speed. The size of tug required would place the vessel upwards of 900 feet, which would take it out of several key market areas for the company. The steamer *J. L. Mauthe* was, however, an ideal candidate. At 647 feet in length, conversion of the *Mauthe* to an ATB would only put the vessel at 700 feet, main-

tain its cargo capacity, upgrade the vessel to self-unloading capability and put a highly maneuverable tug in control. With the only Z-drive on the Great Lakes, the *Dorothy Ann/Pathfinder* is the longest vessel to transit the Cuyahoga River and has been a great success for the company.

When new makes sense. New-build construction is another alternative. One state of the art ATB coming onto the Lakes recently, besides the *Lakes Contender*, is the *Great Lakes Trader*. The hull was newly fabricated and an existing tug, *Joyce L. VanEnkevort*, upgraded to work with the barge.

A few tug-barge combos are in use in Canadian fleets too, with one arriving this spring from the Gulf Coast. But in recent years, Canadian Great Lakes shipowners have opted for single-body new-build construction to augment their fleets.

As with any vessel on the Great Lakes, the ATBs are involved in many of the same trade patterns as the larger 1,000-foot vessels. The advantage the ATBs have over the larger vessels is their ability to serve areas the large vessels are unable to reach. Upriver docks along the Cuyahoga, the Saginaw or the Calumet River, as well as small ports like Huron, Holland or Green Bay, where draft is a factor, are more readily reached by ATBs with smaller cargoes of stone and coal. The ATBs also supplement the steel industry by supplying limestone from Calcite, Port Inland or Stoneport for the numerous mills on the Lake Michigan.

The transportation of petroleum products on the Lakes is also big business and fleet operators are taking full advantage of ATBs to move their cargoes. In statistics re-

leased in 2006 by the U.S. Army Corps of Engineers "there are over 100 waterside refineries, tank farms, pipelines, docking facilities and terminals in the basin, which shipped or received petroleum or petroleum products by tanker/barge in 2005." McAsphalt Marine Transportation Ltd. and Andrie, Inc. are two companies putting new ATBs to use in this market.

In 2002, McAsphalt paired the tug *Everlast* with the barge *Norman McLeod* and later paired the tug *Victorious* with the specialty barge *John J. Carrick*. The barges and tugs are designed to be interchangeable, adding to their flexibility. The high powered tugs, (5,300 hp for the *Victorious*) can maintain an average speed of 10-12 mph and operate with a crew of 11.

Andrie, Inc. which has experience operating two dry bulk ATBs for LaFarge North America, recently converted its tug *Karen Andrie* for pairing with a 50,000-barrel heated asphalt barge built at Jeffboat LLC. The oil-barge *Endeavour* is 360-feet in length with a beam of 60-feet and is 24-feet deep. In addition to its heating system for the petroleum products, the hull is strengthened to meet late-season ice season operation and is capable of operating year-round.

The days of the multi-vessel consort are not likely to return, but the use of tug-barges in cross lake movement of commodities is significant on the Great Lakes. Like the schooner-barge consorts of a century ago, the modern ATB can be viewed as yet another adaptation to the economics of the industry and the region. The ability to adapt has long been one of the hallmarks of the Great Lakes maritime industry. ■