



**Proposed US Postage Stamp  
Commemorating Malcom P. McLean**

# The World in a Box

By: Geoff Uttmark\*

Who has changed the world more, Betty Boop or Malcom McLean? Thirty or so postmasters general would undoubtedly vote for Betty because that's roughly the number of countries that have honored the sexy cartoon character on a postage stamp. But if 20 million containers could vote, Malcom would win, because that's the number of "boxes" in constant motion around the world thanks to him. Containers, alas, do not vote so Mr. McLean has yet to make his postal debut anywhere.

This article starts off with what a US postage stamp commemorating Mr. McLean might look like because one would think that perhaps the country where his revolution began, the largest trading nation in the world, might break a date with pop culture, get a little serious and attach a more profound message to the stuff that still moves around in envelopes. Maybe there's room in places like the Comoros Islands, Gambia and Mongolia, to name a few of Betty's haunts, for Malcom too.

## Where it Began

Fifty years have passed since the *Ideal X* (Figure 1) sailed from Port Newark bound for Houston with fifty-eight aluminum truck bodies onboard. The date was 26 April 1956. *Ideal X* was a T-2 tanker fitted with a spar deck onto which the trailer vans sans bogies were placed by a crawler crane. Five days later the ship sailed into Houston, the vans were off-loaded onto waiting wheeled chassis and delivered to their consignees straightaway. The radical experiment in transporting unitized cargo begun that day was so successful it culminated in what now is referred to as the "container revolution". Malcom P. McLean (1914 – 2001) is universally credited as the father of containerization, but the numerous awards and accolades he received during and after his lifetime do not adequately describe the monumental importance of his achievement. But what exactly was his achievement?



Figure 1

Notably, Malcom McLean did not invent containerization and he never said he did. Many of the articles that touch on this point claim that containerization first emerged during World War II. In fact, the US Army first experimented with small containers, called security boxes, in World War I. Between the world wars, US railroads, and even some venerable steamship companies, also experimented with containers, but it was always done small scale and incrementally relative to conventional shipping methods. As experience showed, this assured failure.

McLean's breakthrough was in his single-minded big thinking. He was first a trucker so he understood the importance to shippers and consignees of door-to-door service. As a newcomer to ship owning via purchase of the bankrupt Pan-Atlantic Steamship Company, he had no motive to protect what he viewed as antiquated equipment, so he started with the proverbial clean sheet of paper. Taking no half measures, the company that one day would be named Sea-Land Service would commit 100 percent to container transport *only*. That meant using 35' vans, the largest then permitted on US highways, that were never opened in transit between shipper and consignee and that were transferable on an intermodal basis, among trucks, ships and railcars. To accomplish this meant converting McLean's four-ship fleet to efficiently accommodate vans that could easily detach from and re-attach to chassis, and figuring out how to load them on and off the ships. Amidst all this, McLean had to convince less visionary port administrators and cajole hostile labor unions to go along with his plans. As depicted in a 1979 cartoon, labor peace was eventually purchased by sharing the economic gains of containerization with the longshoremen, making them one of the wealthiest classes of industrial workers in the world. The caption in Figure 2 reads "So what'll we do today, unload it or buy it?"



Figure 2

Placing his personal fortune at risk and supported by some brave bankers, McLean applied extraordinary leadership skills and indefatigable determination to successfully commercialize container shipping. This was no mean feat since by itself the container could not have launched a transportation revolution. To McLean belongs the radical idea of an integrated, mechanized system in which the same trailer van travels on rail, truck, and ship. McLean's goal was to reduce cargo handling to a minimum, but in the process he transformed and expanded global trade on a scale that even he would probably find mind-boggling today.

If the revelation that the "Father of Containerization" was more adoptive than biological disturbs anyone, comfort can be found in the fact that Malcom McLean is in some very elite company: Cornelius Vanderbilt did not invent railroads; Henry Ford did not invent automobiles, Aristotle Onassis did not invent oil tankers and Fred Smith did not invent cargo jets. A trait all the giants of transport innovation seem to share is the innate ability to imagine possibilities on a very large scale, the willingness to take huge risks in pursuit of a better way, the ability to "get it right" and unflinching determination. British statesman David Lloyd George (1863 – 1945) described the process best when he said, "Don't be afraid to take a big step if one is indicated. You can't cross a chasm in two small jumps." McLean's big step was a giant stride for the world.

## Containerization Today

Attaching numbers to McLean's innovation is daunting, but it is safe to say he is a member of a small club of people throughout history who profoundly and progressively changed the world in their own lifetimes. What would support such a grand pronouncement? Look no further than the growth rate of the highly integrated global economy and the concomitant dispersion in the rise of living standards today and compare this to the growth rate of container shipping over the same few decades. Then try to imagine this taking place in the absence of containerization. It would simply not be physically possible. In the U.S. alone, for instance, each and every day of the year almost 30,000 marine containers enter and depart ports to service the nation's foreign trade. The container shipping industry today employs over 3,000 purpose-built ships that keep the global pool of containers in perpetual motion. During 2006, about 20 million containers made over 200 million trips across the globe. Remarkably, the figures are expected to double by 2020.

Today, superlatives are heaped upon ships like *Emma Maersk*, currently the world's largest containership capable of transporting up to 12,000 TEUs (twenty-foot equivalent units, Figure 3). But Figure 4 confirms she is headed, like her predecessors, for ordinary status quite soon, thanks to the relentless demand for lower freight rates that is accomplished by economies of scale of ever larger vessels (Figure 5).



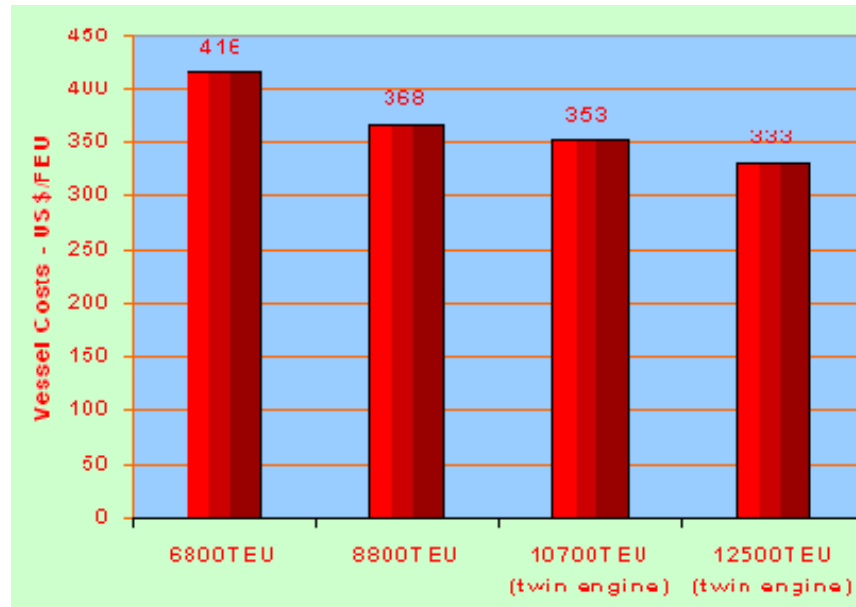
*Emma Maersk*

Figure 3

Built	Name	Length Overall m	Beam m	TEU	GRT	Owners
2006	MSC Pamela	337	45.6	9200	107,200	MSC
2005	Colombo Express	335	42.87	8700	93750	Hapag-Lloyd
2004	CSCL Europe	334	42.8	8498	99500	China Shipping Container Line
2003	OOCL Shenzhen	323	42.8	8063	89097	OOCL
2003	Axel Maersk	352	42.8	7226	93496	Maersk Line
1997	Sovereign Maersk	347	42.8	6600	91500	Maersk Line
1996	Regina Maersk	318	42.8	6000	80500	Maersk Line
1995	OOCL Hongkong	276	40	5344	66046	OOCL
1991	Hannover Express	294	32.3	4639	53783	Hapag-Lloyd
1988	Marchen Maersk	294	32.22	4300	53600	Maersk Line
1984	Louis Maersk	270	32.3	3390	53300	Maersk Line

Compiled by: TransTech Marine Co.

Figure 4



Source: Lloyd's Register

Figure 5

The story of containerization is interesting, but in 2007 it is not new. The equipment afloat and ashore is well-proven - it doesn't change radically, mostly it just gets bigger. Operational labels like TEU, rail plan, seamless integration plus countless others have stuck. Academics and financial managers have extracted the abstract from the "new math" of productivity, scale economies, fixed cost absorption and operating leverage. All of these parts of the story are written with the benefit of hindsight, knowing that containerization worked. Perhaps the more interesting story is to consider what Malcom McLean himself might tell us about the early days of containerization if he were alive today.

## Ridding the World of the Cargo Hook

Accounts of McLean's development of container ships describe him as a young truck driver awaiting his turn to unload at a crowded marine terminal. Inspirationally, he grasps the logic of loading the entire trailer van aboard the ship, rather than unload it piecemeal just to re-stow its contents as break bulk cargo inside the ship's hold. The process required gangs of longshoremen brandishing lethal-looking cargo hooks and wearing "West Coast Stetsons" (white caps to enable the winch operator on deck to see them) to fill a single hold. Romantic: yes; efficient: no.

True as the story may be, two decades separated the impatient trucker from putting his revelation to the test. McLean was a pragmatic, methodical planner and there were at least two poignant studies on methods to improve marine transportation productivity - in particular cargo handling - that he and his design team were aware of when the

time came to convert the *Ideal X* and her three sisters to what were referred to at the time trailerships:

*“Economic Importance of Coastwise Shipping to the Port of New York”* studied means to reestablish coastwise shipping services that had been interrupted by the Great Depression and World War II. Among other findings, this 1946 study specifically noted the use of containers by AGWILINES (Atlantic Gulf West Indies Lines), a coastwise carrier, and American-Hawaiian Steamship Company, an intercoastal carrier, as methods to speed up port cargo handling operations and reduce costs. Both companies used smaller containers than the 35’ vans adopted by McLean’s Pan-Atlantic Lines, but the basic idea of handling unit loads directly between truck and ship is irrefutably evidenced in the report’s photos.

*“S.S. Warrior – An Analysis of an Export Transportation System from Shipper to Consignee”* is a comprehensive analysis of each and every cost of operating a C-2 break-bulk cargo ship, an industry workhorse of the time, in the U.S. foreign trade. Released in 1954 by the National Academy of Sciences, the report was aimed at reducing the amount of time ships spent in port. The *Warrior* study did not endorse any specific method to accomplish this objective but did conclude that “... the ideal system of transport for any unit of cargo is one in which no interruptions occur in movement. In such a system, the generation of ton-miles, which is the object of transportation, would be continuous.” Figure 6 is taken from the *Warrior* study and documents that fully 61 percent of the door-to-door freight bill was the sum of domestic movement + cargo receipt & storage + vessel loading. The appeal of containerization was its promise to simultaneously lower all three costs while providing superior service to shippers.

<b>Door-to-Door Freight Cost 1954 Dollars / Long Ton</b>		
	<b>\$ / LT</b>	<b>%</b>
Domestic Movement	17.74	37
Receipt & Storage	2.96	6
Vessel Loading	8.23	18
Voyage	5.44	12
Veessel Discharging	3.63	8
Receipt & Handling	2.58	5
Foreign Delivery	<u>6.79</u>	<u>14</u>
	47.37	100

Figure 6

## The Dark (in)Side of Boxes

By the classical definition of transportation efficiency (TE = [(payload x speed) / power]) containerships are not necessarily more efficient than break-bulk freighters, though they are many times more productive. This is demonstrated in Figure 7\* where the TE of a (now obsolete) C-3 break-bulk freighter is in fact higher than the TE of a 10,000 TEU, 25 knot containership. Note, however, that TE makes no provision for vessel loading / unloading time and other production losses.

	<b>Breakbulk C-3</b>	<b>Containership 10,000 TEU</b>
CDWT	15,000	200,000
Vs	16	25
BHP	8500	120000
<b>TE</b>	<b>194</b>	<b>183</b>

Figure 7

It stands to reason that a lot of space must be “wasted” in a ship designed to carry rectangular boxes in a hull that is almost completely devoid of right angles, where the containers themselves incur broken stowage and have mass which subtracts from cargo deadweight. Concurrent with the many advantages of containers are very large cost center for ship operators. This introduces the effect of operating leverage on the ship’s break-even load factor. Higher fixed costs that attach to containerships raise the break-even load factor. Thanks to lower variable costs, profits beyond break-even are magnified, but so are losses, if the break-even cargo volume is not reached. Break-bulk freighters are exactly the opposite: lower fixed costs in turn lower the break-even load factor, however, the higher variable costs attached to cargo handling operations, plus lower overall productivity, squeeze profit margins.

The greater productivity of a ship that turns around quickly in port more than compensates for reduced efficiencies elsewhere. The genius of a containership is that it works for the shipper customer and it works for the ocean carrier in a way that enables freight to move smoothly between modes under a single bill of lading. The advantages are so profound that in the span of fifty years, equivalent to no more than two ship replacement cycles, containerships are now the standard when describing general cargo ships. Traditional break-bulk freighters have mostly been relegated to regional trades in undeveloped parts of the world where cargo volumes are too small to support the investment in infrastructure to serve containerships.

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\* In Figure 7, CDWT = payload, Vs = service speed, BHP = brake horsepower.



## Through the Looking Glass

To his unending credit, Malcom McLean got everything right where others had shown that just one error, including timorousness, could condemn the best laid plans. McLean got the timing of containerization right; he got the strategy right; he got the scale right, and he got the marketing and management systems right. And he also had good fortune on his side. His original plan also called for transporting bulk oil aboard *Ideal X*, but US Coast Guard rules forbade the transport of general cargo and bulk petroleum aboard the same vessel. Deleting that part of the plan required concentrating on the side of the business that would soon evolve into Sea-Land Service, the leading container shipping company for decades to come. In 1999 Sea-Land was acquired by Copenhagen-based A.P. Møller - Mærsk Line.

In 1817 economist David Ricardo wrote *Principles of Political Economy and Taxation* in which he demonstrated that both Portugal and England would gain by specializing in producing products in which each country had a comparative advantage. His premise was that only production costs mattered - the shipping and port costs of transporting Portuguese wine to England and English cloth to Portugal did not enter his analysis. These are egregious errors in the real world where transportation and cargo handling costs are as much a part of the production function as capital and labor. It required Malcom McLean's genius and the better part of two centuries to render Ricardo's omission a moot point. It should not take that long for the world beyond shipping to understand and appreciate the profound importance of what began in earnest on 26 April 1956.

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