



• Posted: Thu, Apr 24 2008, 10:24 PM IST

IIT professors' collapsible container design could change the cargo trade

Ocean carriers end up spending about \$16 billion a year on repositioning empty containers

P. Manoj

Bangalore: More than 52 years after Malcolm McLean, a trucking entrepreneur from North Carolina, US, pioneered the use of containers for carrying cargo, two Indian Institute of Technology (IIT) professors have designed a collapsible container that could change the dynamics of the trade forever.

The new container, designed by Anoop Chawla and Sudipto Mukherjee from the mechanical engineering department of IIT, Delhi, can be collapsed or erected in less than four minutes. A special platform, or base station, folds the containers hydraulically to one quarter its size.

The process needs just one or two unskilled or semi-skilled persons.



McLean's container, a reusable steel rectangular box for carrying cargo, is an industry standard that makes it easy to move these between specially-adapted container ships, trains and trucks. His idea led to a revolution in cargo transportation and international trade, but it also spawned a new problem—of moving back empty containers.

"About 20-23% of the world movement of containers is that of empties," says Avinder Bindra, a former banker who spent 26 years at Citigroup Inc. and four years with HSBC Holdings Plc.

"The containers go loaded from Asia to the Americas, Europe and West Asia and come back empty. This involves tremendous cost and adds to the traffic at ports," he said.

One in four containers now moving through major US ports is an empty container being repositioned

Attracted by the huge potential in designing a container that could improve the logistics of moving empty containers, Bindra approached the IIT, one of India's best engineering schools, about three-and-a-half years ago when he was still in Hong Kong.

He agreed to fund the project if IIT could take on the challenge of designing a collapsible container. The institute would hold some of the intellectual property

rights and share part of the revenue with him. The team has now filed applications for patenting the design both domestically and internationally.

World container traffic scaled 141 million twenty-foot equivalent units, or TEUs, in 2007. A TEU is the standard size of a container and is a measure of capacity in the container business. Global container traffic has seen five consecutive years of average double-digit growth, according to London-based **Drewry Shipping Consultants Ltd.** At this rate, global container traffic is estimated to reach 350 million TEUs by 2024.

But amid this growth, empty containers accounted for an estimated 20% of the ocean container movement a decade ago, which cost the industry about \$3.5 billion (Rs14,000 crore) a year.

The percentage of empty container movement remained the same in 2003, but the cost escalated to \$11 billion a year, excluding the cost of keeping idle containers at depots and land repositioning.

The shifting of empty containers to locations where they are in demand is known as repositioning in trade jargon. Because of an imbalance in the two main Asian trades with Europe and North America, many containers are sent back empty, resulting in increased re-positioning and storage costs.

About 2.5 million TEUs of empty containers are stored in yards and depots around the world. In the US alone, there are about 300,000-400,000 empty containers. At least 100,000 of these lying in storage yards around the Port of Jersey belong to container leasing firms, and another 50,000 are owned by ocean carriers.

It is also not unusual for entire ships to be hired for shifting empty containers from surplus to deficit regions.

Ocean carriers end up spending about \$16 billion a year on repositioning empty containers to the point of their next cargo, out of a total \$100 billion spent on operating container assets, according to International Asset Systems, a firm that specializes in data on transport and logistics.

One in four containers currently moving through major US container ports is an empty container being repositioned, with no cargo revenue to offset the cost of the move. In 2005, six million of the 20.6 million containers passing through five important US container ports were empty.

In effect, the average container is idle or is being repositioned empty for more than 50% of its lifespan, according to International Asset Systems.

"Empty containers are a long-standing fact of life within the shipping industry and this (the new design) is a creative and extremely interesting way of solving this problem," said an official at one of the world's top container cargo handling ports. To recover the cost of empty returns, shipping firms levy heavy surcharges on loaded containers exported from industrialized nations. These surcharges vary from \$100 to \$1,000 per TEU and form a big chunk of the ocean freight rates from industrialized nations to destinations in Asia, Africa and the Caribbean.

This, in turn, increases the cost of goods imported by developing countries.

The IIT team's collapsible container, which opens upward to allow top loading of both soft and hard bulk commodities, offers a potential solution. The two professors built a proof of concept by taking a six-or seven-year-old container and re-engineering it. The design took more than three years to take shape.

"With our design, ships will be able to carry four containers in the space occupied by one. This means 75% less trailers or ships are required and much faster turnaround of ships," said IIT's Chawla. "It also means less traffic and so less pollution, not to mention tremendous reduction in costs to shippers."

The collapsible container, which has been shown to some of the world's top container shipping companies such as Maersk Line, logistics firms and port operators, has attracted positive feedback.

Earlier attempts to design collapsible containers did not succeed because the folding was manual. The dismantling and assembling took too long, and the containers were not structurally strong, leading to high maintenance costs.

"The new design will not require any additional equipment or redesign of existing equipment such as cranes or trailers, because four folded containers stacked against each other will be the exact size of a regular container," said Mukherjee, the other designer.

According to the team's estimate, if 75% of the empty containers shipped are foldable by 2010, it would save some 25 million equivalent TEUs a year in ocean transportation, or 50% of the total volume of empty containers shipped.

Commercially, this would translate to a saving of more than \$1,000 per empty container—a considerable sum to shippers, particularly in the industrially developing countries where empty container movement accounts for 30-40% of all containers shipped.

"Folding containers will definitely reduce the quantum of space required and thus reduce the cost of transportation of empties. Shippers will also benefit from lower repositioning costs of empties," said S.R.L. Narasimhan, secretary, Western India Shippers Association, a body representing exporters and importers in the country's western region.

The initial cost for the new container will be higher than for a normal container. A normal one costs \$2,000 globally and about Rs2 lakh locally, but a foldable container would cost 10-15% more when produced in bulk. The price of the special platform will be about the cost of two containers.

Bindra, Chawla and Mukherjee intend to license out the manufacturing of the new container, which conforms to the International Organization for Standardization, both locally and globally.

But, they will first have to get the collapsible container certified by global agencies such as Lloyds Register and Bureau Veritas, a requirement for any equipment that goes to sea.