



The St. Lawrence  
Seaway Management  
Corporation

Corporation de Gestion  
de la Voie Maritime  
du Saint-Laurent

# IBJ AWARDS 2018

INNOVATIVE TECHNOLOGY AWARD ▶ HANDS FREE MOORING

▶ INTRODUCTION

# THE ST. LAWRENCE SEAWAY MANAGEMENT CORPORATION [SLSMC]

The St. Lawrence Seaway Management Corporation (SLSMC) operates the Canadian sections of the St. Lawrence Seaway, a waterway that connects over 40 ports within the 3,700 km Great Lakes / St. Lawrence Seaway System with the Atlantic Ocean.

THE GREAT  
LAKES/ST.  
LAWRENCE  
SEAWAY SYSTEM

ACCESS TO  
150 MILLION  
CUSTOMERS



The Seaway has 15 locks, 13 within the Canadian portion (including 3 sets of twinned locks) and two within the US portion. These locks can lift a vessel over 170 meters (over 550 feet) from Sea level.

The Seaway is considered the gateway to North America's Heartland, but it is also part of a very competitive transportation business. In its effort to increase competitiveness and reduce its operating costs, the SLSMC had to look at technology in order to leverage its productivity and efficiency, and ensure its sustainability for the long term.

In researching different technologies to achieve this, the SLSMC had to align with the interests of its stakeholders who use the system, to ensure that gains are also realized on their side.

### The “modernized” Seaway had to be:

- ▶ as safe or safer to transit through;
- ▶ as fast or faster to transit through;
- ▶ able to reduce the need for manual labour during lockages and improve staff efficiency; and
- ▶ able to alleviate some of the requirements for specific Seaway fittings in order to potentially allow more vessels access into the Seaway



▶ HANDS FREE MOORING

# HANDS-FREE MOORING [HFM] SOLUTIONS FOR LOCKS

The SLSMC in concert with its supplier, Cavotec, developed the first ever Hands-Free Mooring (HFM) solution for locks, an innovation using vacuum pads to secure ships in position during the filling or emptying of a lock chamber.

The passage of a vessel through a lock normally involves the deployment of mooring wires from the vessels onto the bollards fixed on the lock walls. Large vessels need to be equipped with steel wires and rollers in order to be allowed into the Seaway System. The lockage is labour intensive, slow and at times hazardous. It is one of the most demanding parts of transiting into the Great Lakes.

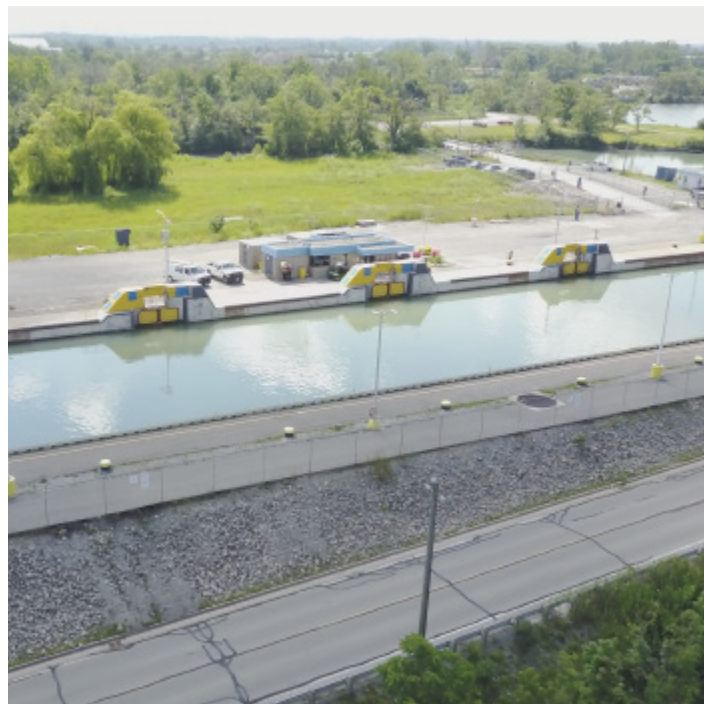
The use of HFM, which uses vacuum technology, only requires the push of buttons in order to secure and detach vessels, without any manual labour. **This eliminates the need for vessels to equip themselves with steel wires and rollers in order to come into the Seaway, therefore allowing more vessels into the system without the need for costly conversions.**

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**THE PREVIOUS METHOD OF TYING UP OF VESSELS WAS TIME CONSUMING; A NORMAL LOCKAGE COULD TAKE 40-50 MINUTES. WITH THE USE OF HFM, AN AVERAGE SAVING OF 5-6 MINUTES PER LOCK ON A TWO-WAY TRANSIT IS BEING ACHIEVED.**

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The handling of mooring wires is not a desirable task in the marine world, as it can lead to serious injury and/or fatalities when wires are over tensioned and break. In the Seaway System, prior to implementing HFM, a wire broke **EVERY 10 DAYS ON AVERAGE**, potentially injuring employees on the lock or on the deck of vessels. Since every year approximately 3000 transits go through up to 13 locks, requiring wires handled by deck personnel and lock personnel, the hazards and frequency of occurrence was very concerning.



## ▶ HANDS-FREE MOORING

# THE SEAWAY IS THE FIRST TO USE VACUUM TECHNOLOGY IN A LOCK ENVIRONMENT.

The successful implementation of Hands Free Mooring at all the deep locks (2017) enables the remote operation of locks from any location, increasing personnel efficiency and safety, both for the Seaway and its customers. By increasing its customer base, thus improving Seaway traffic the SLSMC's competitiveness solidifies its sustainability for years to come.

The Seaway is the FIRST to use this vacuum technology in a lock environment. The Seaway started this development in 2007 with key input from regular stakeholders. The challenges resided in the fact that the Seaway's locks either raise or lower vessels approximately 14 meters in 8-10 minutes, and the equipment needs to secure the vessels throughout the lockage.

This was never done anywhere in the world. The use of vacuum pads secures the vessels efficiently and prevents the large movements normally witnessed in vessels secured with wires, and has eliminated the incidents where vessels make contact with the lock structures such as the concrete walls or ship arresters.

In addition, a function of warping a vessel forward was designed for moving the vessels to their Final Mooring Positions using the vacuum pads mounted on horizontal hydraulic cylinders, instead of using vessel engines or using the mooring wires for re-positioning the vessels. This "caterpillar" sequence of attach-move-detach-return steps enables a robust method of final positioning of vessels, while being controlled by the vacuum pads.

This **\$95 million** (Canadian) dollar investment, spanning 5 prototypes and constant involvement from customers is the new normal way of transiting the Seaway. Transit times are now faster, safer and more cost efficient for both the SLSMC and System stakeholders. We have achieved our goal of creating a productive and efficient technology ensuring our sustainability for the long term.

### SEE HANDS FREE MOORING IN ACTION

- ▶ Watch the video of Cavotec HFM in action  
<https://youtu.be/SHpJGZCY40I>
- ▶ Watch the Hands Free Mooring position a 30,000 tons vessel  
<https://youtu.be/CWzLpn3Vhg>



▶ HANDS-FREE MOORING BENEFITS

# HFM PROVIDES TIME, SAFETY & MONETARY BENEFITS TO CARRIERS & THE SLSMC, VERIFYING ITS SUCCESS

*“The investment in the Hands Free Mooring System will reduce the overall cost of vessel transits, which in turn will help ensure that the St. Lawrence Seaway remains a competitive alternative to the U.S. East Coast and Gulf ports, where cargoes are delivered by rail and/or truck”*

-- Michael Broad, President  
Shipping Federation of Canada



### SAVES TIME

Vessels using HFM can transit the Welland Canal 40-48 minutes faster. Customers also realize a monetary savings as they save time.



### \$95 MILLION DOLLAR INVESTMENT

Over \$95 million (Canadian) dollars invested in the full implementation of the Hands Free Mooring units. The project began in 2007 and included 5 years of development and 5 years of deployment.



**8000+** POTENTIAL VESSEL CALLS

HFM expands the number of potential vessels calls to System from 800 vessels to 8000+ vessels. Reduction of Seaway fittings has led to an increase in the number of vessels that can now call the Seaway System.



### IMPROVED SAFETY FOR ALL EMPLOYEES

With no worries of wires breaking during the vessel lockage process with HFM, Seaway employees and vessel crews are working in a safer environment.



### OVER 90% TRANSITS PROCESSED WITH HFM

Over 90% of transits utilize the Hands Free Mooring units at all of the Seaway deep locks.



### TIME SAVINGS CAN EQUAL ONE EXTRA VOYAGE PER NAVIGATION SESSION\*

Time savings related to HFM could add up to one extra voyage per navigation season

\*based on 24hr voyage and 32 voyages per navigation season.



### LABOUR SAVINGS

HFM means that there is only one employee needed per lock (locally or remotely operated) as compared to 3 employees at each lock. This also translates into better productivity for vessel crews as they are no longer required to tend to mooring wires on deck while transiting the locks.





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