


BUNKERSPOT

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- 
- **ISO 8217 Issues**
 - **Ship Arrest**
 - **Fuel Hedging**
 - **Panama Profile**
 - **People and Places**
 - **News and Events**

**IN-LINE METERING:
Buffalo leads the charge**

Accurate, automated b

Steve Jones of Emerson Process Management and Robert Blakeney of Nautical Control Solutions report on how a new marine fuel delivery system is utilising modern technology to provide 'unprecedented accuracy, reliability, and maintainability'

Over the last eight years, Emerson Process Management has made major investments in its Micro Motion Coriolis mass flow meter technology to meet the specific demands of the global bunkering industry. The decision by A.P. Moller – Maersk to install Micro Motion Coriolis meters for bunker measurement has been previously detailed in this magazine (see *Bunkerspot*, February/March, page 37). However, this is only part of the story. More players are beginning to reap the rewards of this technology and not just at the vessel end of the supply chain.

In the spring of 2007, Emerson Process Management's Micro Motion division, based in Boulder, Colorado, and Nautical Control Solutions (NCS) of Houston, Texas, manufacturer of the *FuelTrax* marine fuel management system, first combined engineering talent and advanced technology to address the overall concerns of the bunkering industry: that is, irrefutable confidence in fuel mass delivered, increased process efficiency, and improved safety. The result of these combined efforts is the Coriolis-based bunker-metering solution outlined later in the article.

As background, the initial design outlined two eight-inch – 20 centimetre (cm) – diameter Coriolis meters in parallel to handle a bunker flow rate of 1,500 metric tonnes (mt) an hour. A portable skid was developed to hold the two meters plus a FuelTrax-based electronics unit utilising a touch screen user interface. The original goal was to be able to move the skid from barge to barge. The prototype skid, electronics, and software were tested with water by a third party certification company at the **Port of Houston** and were declared accurate.

The next step was a field test and barge operator **Buffalo Marine Service Inc.** agreed to provide industry expertise and a barge for field-testing. Established in Houston in 1935, Buffalo has grown to become the premier bunker transportation company at the Port of Houston.

'We have a very large positive displacement meter on one barge that we have attempted to use through the years,' said Chuck King, Vice President of Buffalo. 'For it to work reliably, we had to add it to our routine maintenance schedules. For air entrainment, we had to

add an air eliminator and for particulates we had to add a strainer, which also has to be serviced. Additionally, we must pay a third party company to frequently test and certify the meter. The simplicity, reliability, and no-maintenance aspects of mass flow meters are very appealing and should save us time and money in the long term.'

Anthony George, CEO of NCS, commented: 'As we advanced development on the prototype it became clear that one appropriately sized Coriolis meter could handle the anticipated flow rates in most delivery scenarios and the skid idea was set aside as more appropriate for a terminal installation.'

'Discussions with the **US Coast Guard (USCG)**, which has jurisdiction over the safe installation of electronics on fuel-carrying barges, identified certain restrictions and roadblocks in the skid design that would prevent approval. The final design removed the skid entirely and piped the Coriolis meter directly into the barge's discharge header.'

'Additionally, we moved the electronics, printer, and user-friendly touch-screen to the tug wheelhouse to solve several operational and engineering hurdles which then also supported the Class I Division II safety certification required by the Coast Guard for electronics. In the end, the production version is simple and elegant.'

Commercial version and first bunkering

With the new design in hand and a green light from Buffalo, Micro Motion and NCS established a production and delivery schedule on *Buffalo 401k*, a 90.5 metre (m) double-hulled barge with a capacity of 30,000 barrels. Installation of the meter was straightforward and took four workdays at one shift per day. The FuelTrax electronics cabinetry and bunker delivery receipt printer were installed on-board the *San Joaquin*, a 23 metre (m) tug rated at 2,000 horsepower (hp).

The first field test of this automated metering system took place on 26 August at the Port of Houston. The *Maersk Wyoming*, a 292 m container ship, pulled into Barbours Cut at 13:00 hours. The *Buffalo 401k* was waiting with an order of 1,500 mt of 500 centistoke (cst) fuel oil. After properly connecting the supply boom hose, the barge crew began pumping at the rate of about 250 mt per hour, as shown live by the

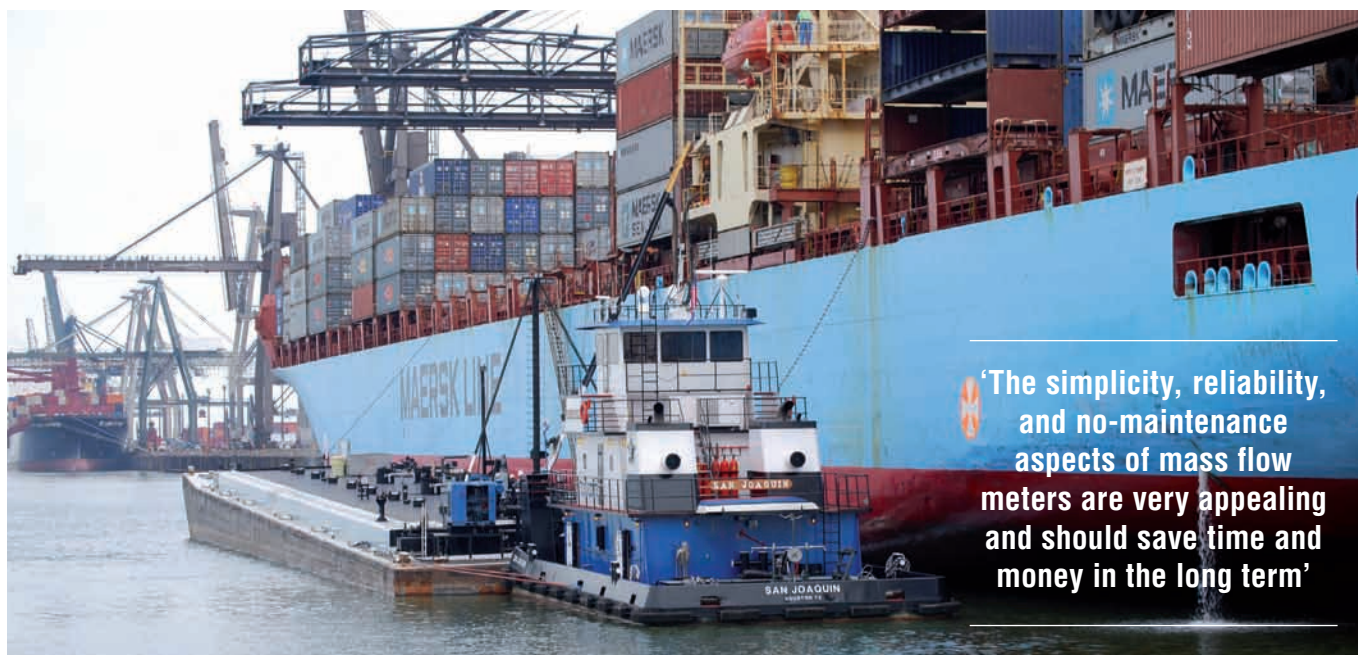
Contacts:

Steve Jones
Director of Business Development
Emerson Process Management
Micro Motion Division
Tel: +1 303 530 8166
Fax: +1 303 530 8459
Email: steve.jones@emerson.com
Web: www.emerson.com

Robert Blakeney
Business Development Manager
Nautical Control Solutions LP
Tel: +1 281 209 3900
Fax: +1 281 209 3901
Email: rblakeney@fueltrax.com
Web: www.fueltrax.com

Tom Marian
Buffalo Marine Service Inc.
Tel: +1 713 923 5571
Fax: +1 713 923 5304
Email: tom@buffalomarine.com
Web: www.buffalomarine.com

unkering



'The simplicity, reliability, and no-maintenance aspects of mass flow meters are very appealing and should save time and money in the long term'

FuelTrax monitor in the wheelhouse. Mass, volume, density, and temperature readings from the Micro Motion Coriolis meter were being displayed simultaneously on the touch screen monitor. When all the fuel had been delivered, the crew of the *San Joaquin* touched the 'print' button on the screen, the bunker delivery receipt was printed, and the event was completed.

The ship was crucial to the success of this first test. At the *Bunkering Symposium* in Antwerp in December 2008, Maersk announced that it had begun installing Micro Motion Coriolis meters on some of their ships, including the *Maersk Wyoming*. The model and specifications were identical to the one installed on *Buffalo 401k*. So how did the results compare? Both meters were within 0.1% of each other; a difference so small that all involved considered it insignificant. The *Maersk Wyoming's* Chief Engineer, Michael E. Buckley III, was pleased to see that he was getting the fuel he ordered and commented: 'Real-time, accurate tracking of our bunker operations made all the difference, giving me instant accuracy of soundings and flow rates, which in the past was relied on by manual soundings and calculations. Eliminating this manual process, and using precise Coriolis measurement, meant the company paid for the fuel it received.' Buffalo was pleased to be able to meet its customer needs and at the



same time provide an accurate, timely service with no complaints on the amount delivered.

Pat Studdert, President of Buffalo, put it this way: 'Historically, chief engineers and terminal managers have always been wary of bunkering accuracy. The supplier is convinced he or she loaded every barrel ordered and the Engineer aboard the vessel receiving bunkers is convinced that the ship will be short changed if the crew does not double check every step of the transfer process. FuelTrax provides Buffalo crews with a fail safe way to meet the customer's bunker orders. Moreover, Buffalo bunker barges can reliably deliver multiple orders from the same barge; thereby eliminating the one-job-one-load inefficiencies inherent with the old way of conducting business. In short, FuelTrax provides precise measurements, simple back-up documentation in the form of a meter ticket and overall satisfaction that

every drop of bunker fuel that has passed through the meter is aboard the vessel.'

Buffalo's system utilises geosynchronous positioning and **Iridium** satellite antennas on the *San Joaquin* for electronics and Coriolis meter diagnostics during the field-testing phase of this project. Uploading of the bunkering event information to the NCS data centre for review by all parties represents the next phase in commercial deployment. FuelTrax customers can already review fuel management data on a vessel using the *FuelNet* web portal, so adding bunkering events provides access to the transaction for review and approval in a total end-to-end business solution. The terminal, bunkering agent, and shipowner would each review the transaction, verify that it was accurate, and provide an electronic signature online. No paperwork at the ship would be needed, unless physical signatures are required.

Summary

Emerson's Micro Motion division continues to work with numerous customers to prove the flow meter's performance in all major ports around the world, for ship, barge, and terminal installations. Additionally, work with internationally accredited weights and measures agencies and port authorities is on-going, with the goal of achieving an 'irrefutable' bunker measurement.