Annex A

Factsheet on Case Study on TR 48 : 2015 on *Bunker Mass Flow Metering*

About TR 48

Launched in 2016, TR 48[1] was the first standard in the world covering a set of core requirements for metering system qualification, installation, testing, procedures and documentation of bunker custody transfer using the Coriolis MFM system. These requirements aim to provide a fair basis for custody transfer between a bunker supplier and buyer in the Port of Singapore. Users of TR 48 include stakeholders of the bunker supply chain such as shipowners, ship charterers, bunker tanker owners and operators, bunker surveyors, maritime arbitrators and vendors of the Coriolis MFM system.

MPA mandated the implementation of MFM for the delivery of residual fuels and distillates with effect from 1 January 2017 and 1 July 2019 respectively.

Case study on TR 48

The TR 48 case study was initiated by the Singapore Chemical Industry Council, on behalf of Enterprise Singapore, in April 2019 and was successfully completed in February 2020.

The objective of the case study was to determine the quantitative and qualitative benefits of TR 48 to three key groups of stakeholders – bunker suppliers, ship owners/operators and the Implementing Authority (MPA). The study would then assess and evaluate the impact of TR 48 on the Singapore bunkering ecosystem. However, the changes in operations were not uniformly applied by all stakeholders due to differences in internal practices and would account for the ranges in the benefits shown[2].

The industry boundaries of the TR 48 case study cover the delivery of bunker fuel from the bunker vessel to the receiving vessel during custody transfer of marine fuel oil (MFO).

Financial outcomes

1. The implementation of TR 48 resulted in annual potential net savings of between S$80.6 million and S$199.4 million[3] for the bunkering ecosystem, including:

    a. A 66.3%-76.0% reduction in operation costs for bunker suppliers and shipowners in manpower savings and process efficiency;

---

[1] Refer to https://www.nas.gov.sg/archivesonline/data/pdfdoc/20140415004/factsheet_(bunkering-final).pdf for a comparison between the old and new bunkering processes.

[2] Individual stakeholders could realise the full potential of the benefits of TR 48 in deciding to dispense with operational practices e.g. with tank sounding that would no longer be required. The extrapolated financial benefits for the bunkering ecosystem are based on estimates of what the potential benefit could be, if all stakeholders had similar internal practices.

[3] Converted from USD at an exchange rate of S$1.36/USD

b. 33.9%-25.6% fewer disputes between bunker suppliers and shipowners over the quantity of transferred fuel; and
c. A 0.6%-2.3% increase in cost for bunker suppliers and MPA to verify the test results for mass flow meters and equipment maintenance respectively. (Note: The focus of the study was on the bunkering process and does not include the mass flow meter installation and commissioning processes.)

Semi-Quantitative outcomes[4]

1. For bunker suppliers surveyed, it was reported that operational turnarounds have increased. A number surveyed also reported that crew could be involved in duties other than directly in the sounding of bunker tanks.
2. For crew management, some ship owner respondents reported that they had reduced their spot checks of their on-board fuel inventory.
3. Data-handling benefits were seen by the MPA which had reported significant time savings of up to 90% in the handling of bunkering data.

Qualitative outcomes

1. The adoption of TR 48 led to improved scheduling for most bunker suppliers.
2. TR 48 also resulted in enhanced inventory management for some shipowners. Other shipowners continued to rely on remaining on board (ROB) checks for bunker delivery.
3. TR 48 contributed to the digitisation of the bunkering process with the use of modern measuring and data processing equipment.
4. Ship owners and suppliers surveyed reported the increase in transparency of bunkering data as well as improved data integrity with TR 48.

Additional Information

1. The introduction of TR 48 is supported by the International Bunker Industry Association (IBIA) Asia and the Singapore Shipping Association (SSA).
2. Singapore Standard, SS 648 has been mandated since 1 May 2020. TR 48: 2015 will cease to be applied by the Implementing Authority by 30 Nov 2020.
2. TR 48 was upgraded to SS 648 with an expansion of the scope of the standard to include distillate fuels and bunkers that meet IMO regulations. The updated content included the new requirements for multi meter installation, the enhancement of zero verification procedure and better clarity on the role of bunker surveyors in MFM bunkering regime. There were no major changes for SS 648 so the benefits observed with TR 48 are not expected to be impacted when it replaces TR 48.

[4] Semi-Quantitative outcomes refer to impacts which cannot be converted to financial impacts as they depend on additional measures that companies need to implement.

Quotes on TR 48

1. **Mr Lee Wai Pong, Chairman, Working Committee for TR 48**, said, "The validation of the benefits of the TR 48 which was based on the ISO Methodology for the Economic benefits of standards has further strengthened Singapore's position as a thought leader in bunkering industry standards. Though TR 48 has been revised to SS 648, there were no major changes for SS 648 so the benefits observed with TR 48 are not expected to be impacted when it replaces TR 48."

2. **Ms Caroline Yang, President of the Singapore Shipping Association**, said, "The case study has demonstrated the transparency and system integrity that TR 48 has effected for the smooth and efficient running of bunkering operations, as well as bolstering the assurance of quantity ordered and delivered. Savings in time for bunkering processes and dispute resolution have also been experienced by a number of our members."

3. **Mr Timothy Cosulich, CEO, Fratelli Cosulich Group and Chairman, IBIA Asia**, said, "The benefits of TR 48 validated through this case study would be useful when shared with the bunkering industry stakeholders outside of Singapore as the economic benefits as well as the improved efficiency, productivity and transparency demonstrated, will facilitate the implementation of the MFM system by countries who wish to adopt TR 48. The new TR 80: 2020 will further strengthen the supporting infrastructure for the MFM system while the new SS 660: 2020 will help in obtaining similar MFM system benefits further up the chain with both standards expected to assist the overseas bunkering industry as well."