



Media Release

Singapore, 11 October 2024

Biennial Oil Spill Exercise Tests Operating Procedures and New Oil Spill Response Technologies

The 16th Joint Oil Spill Exercise (JOSE) was held this morning in conjunction with the 23rd Singapore International Bunkering Conference, organised by the Maritime and Port Authority of Singapore (MPA). Conducted since 1998, the biennial exercise aims to test inter-agency and industry coordination and response to oil spill incidents in the Port of Singapore.

2. Over 100 personnel from 18 agencies and companies participated in JOSE 2024, which included a table-top exercise and a seaward deployment exercise at the Western Anchorage, off Pasir Panjang Terminal. Representatives from various nature and community groups were invited to observe the seaward deployment exercise. See Annex A for the full list of participating agencies and companies.

3. As part of this year's exercise, terminal operators on Jurong Island and Pulau Bukom activated their emergency protocols. The operators' company-owned craft were deployed to spray "dispersants", complementing the MPA patrol craft deployed at the exercise site. Protective booms were also deployed by several operators to facilitate clean-up operations and minimise operational disruption.

4. MPA also tested new technologies which could support oil spill response. The technology demonstrations, carried out at ONE°15 Marina Sentosa Cove, included the KOBOT, a compact remote-operated oil recovery robot developed by South Korea-based KOAI Co., Ltd. and supported by Hyundai Corporation, as well as a laser oil-stain cleaning device from Singapore-based BKR Engineering.

5. Measuring 4.5 by 1.5 meters and weighing about 160 kilograms, the KOBOT is designed for use in shallow, confined waters such as marinas and canals. It can be deployed by a lightweight crane and remotely operated by a single person. Its agility would allow it to better reach areas that are not easily accessible by conventional oil skimmers.

6. The laser cleaning device from BKR Engineering uses intense light beams to break down and vaporise oil stains. It has the potential to complement high-pressure water jets during the final phase of clean-up work for shore infrastructure, such as canal walls and rock bunds, where precise cleaning is required to remove residual



stains or oil spots.

7. In collaboration with the Technology Centre for Offshore and Marine Singapore (TCOMS) and ST Engineering's Commercial Aerospace, MPA is also testing hyperspectral imagery at the TCOMS facility to assess the feasibility of detecting oil slicks below the water surface. Unlike conventional electro-optical cameras, which rely on visible and near-infrared light, hyperspectral cameras capture a broad spectrum of wavelengths. This would allow them to better distinguish oil from water, improving spill detection in challenging environments, including low-light conditions. These areas still require substantial development work before the capability can be operationalised, including being deployed by drone.

8. The technology demonstration and testing are part of ongoing efforts to explore new technologies which have the potential to enhance incident management capabilities, including oil spill response, and provide opportunities for innovators to testbed their technologies. See Annex B for the list of technologies.

<End of Release>

About the Maritime and Port Authority of Singapore (MPA)

MPA was established on 2 February 1996 with the mission to develop Singapore as a premier global hub port and international maritime centre, and to advance and safeguard Singapore's strategic maritime interests. MPA is the driving force behind Singapore's port and maritime development, taking on the roles of port authority, maritime and port regulator and planner, international maritime centre champion, national maritime representative and a champion of digitalisation and decarbonisation efforts at regional and international fora such as at the International Maritime Organization. MPA partners industry, research community and other agencies to enhance safety, security and environmental protection in our waters, facilitate maritime and port operations and growth, expand the cluster of maritime ancillary services, and develops maritime digitalisation and decarbonisation policies and plans, R&D and manpower development. MPA is responsible for the overall development and growth of the maritime domain and Port of Singapore. In 2023, Singapore's annual vessel arrival tonnage crossed 3 billion Gross Tonnage and remains the world's busiest transshipment hub, with a total container throughput of 39.0 million 20-foot equivalent units (TEUs).

For more information, please visit www.mpa.gov.sg/

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Annex A: List of Participating Agencies and Companies

- Maritime and Port Authority of Singapore
- Building and Construction Authority
- JTC
- National Environment Agency
- National Parks Board
- PUB, Singapore's National Water Agency
- Sentosa Development Corporation
- Singapore Food Agency
- Singapore Land Authority
- Singapore Salvage Engineers Pte Ltd
- Avetics Global Pte. Ltd.
- Skyscapist Pte Ltd
- Advario Helios Singapore Pte. Ltd.
- ExxonMobil Asia Pacific Pte. Ltd.
- Shell Singapore Pte. Ltd.
- Vopak Terminals Singapore Pte Ltd
- Equatorial Marine Fuel
- ITOPF Limited (Singapore)



Annex B: Description of Technologies

Technology for Oil Spill Response at Sea

KOBOT Oil Recovery Robot

About

KOBOT, by KOAI Co., Ltd., is a remotely operated compact oil recovery robot that acts as a first responder solutions in the event of an oil spill.

KOAI Co., Ltd., which stands for Korea Oceanic A.I., is a Korean company specialising in marine pollution control.

On 10 October 2024, Hyundai Corporation supported KOAI Co., Ltd to conduct the first international demonstration of the KOBOT in Singapore, at ONE°15 Marina Sentosa Cove. Hyundai Corporation is a publicly-listed South Korean multinational import and export trading house headquartered in Seoul, South Korea. Outside of trading, Hyundai Corporation partners and invests in SMEs to grow internationally using their network of over 40 global offices. Hyundai Corporation and KOAI have a Memorandum of Understanding to expand globally, outside of Korea.

Details

KOBOT uses patented Hydrophilic Ratchet Technology, made of a composite nanomaterial foam structure that is superabsorbent, and capable of separating oil and water.

The skimmer can recover oil of high and low viscosity, making it convenient to deploy in most oil spills.

The skimmer can recover 0.2 – 0.5 tonnes of oil per hour in a detachable storage bag (0.7 tonnes) that can be swapped out upon maximum capacity. It is battery powered (up to 3-hour operation capacity) with swappable deep cycle batteries.

The size of KOBOT (with storage bag) is 4.5m (L) x 1.5m (W) x 1.17m (H), or 1.7m (L) x 1.3m (W) x 0.7m (H) without storage bag, weighing approximately 160 kilograms. KOBOT can operate in wave heights of approximately 1– 2 metres, with a maximum speed of 3 knots in extreme marine environments.

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Using Hyperspectral Cameras to Augment Oil Spill Detection Capabilities

Details

Electro-optical sensors are imaging devices that capture light, primarily in the visible spectrum, and convert it into electronic signals for visual representation. They are commonly used in photography, video, and surveillance. Some EO sensors can also detect light beyond the visible range, such as near-infrared. Conventional electro-optical cameras often require clear daylight conditions to detect oil at sea and can be hampered by sun glare from the sea surface.

In contrast, hyperspectral cameras are advanced imaging systems that capture hundreds of narrow spectral bands across a broad range of wavelengths, ranging from visible to infrared. This allows one to determine the specific type or composition of a material by analysing its unique light reflection or absorption patterns. As such, fitting hyperspectral cameras with varying polarisation settings on drones could help detect weathered oil floating just beneath the sea water surface. It may also enable night surveillance operations for oil spill.

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Technology for Oil Spill Response on Land

BKR Engineering: Pioneering Eco-Friendly Laser Cleaning Solutions in Singapore

About

BKR Engineering Pte Ltd (“BKR”) offers an efficient, effective and precise cleaning solution by removing and vaporising contaminants on surfaces without generating secondary waste. Laser cleaning is gentle on the substrate, ensuring no damage during the cleaning process whilst also being an environmentally sustainable alternative.

Details

Laser cleaning involves using focused light energy to energise the contaminant layer such as oil, rust, coating or soot, which is then ejected from the substrate surface, leaving a clean surface without any damage to the underlying material. This approach eliminates the need for abrasive or chemical cleaners, resulting in less hazardous waste.

A low power, 220V single-phase pulsed laser was used for the cleaning of oil residue on 10 October 2024. The entire set-up weighs less than 70kg and is highly portable. The pulsation of the laser (as opposed to continuous laser operation) ensures that the temperature of the material remains low, preventing heat damage to the underlying surface, whilst delivering high energy laser pulses to effectively remove contaminants.

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Annex C: Photos and Videos of JOSE Ground Deployment Exercise

For photos and footages of the technology demonstration and JOSE Ground Deployment Exercise, please refer to the following link:
<https://tinyurl.com/MPAJOSE2024>.

The link will expire on 15 October 2024.