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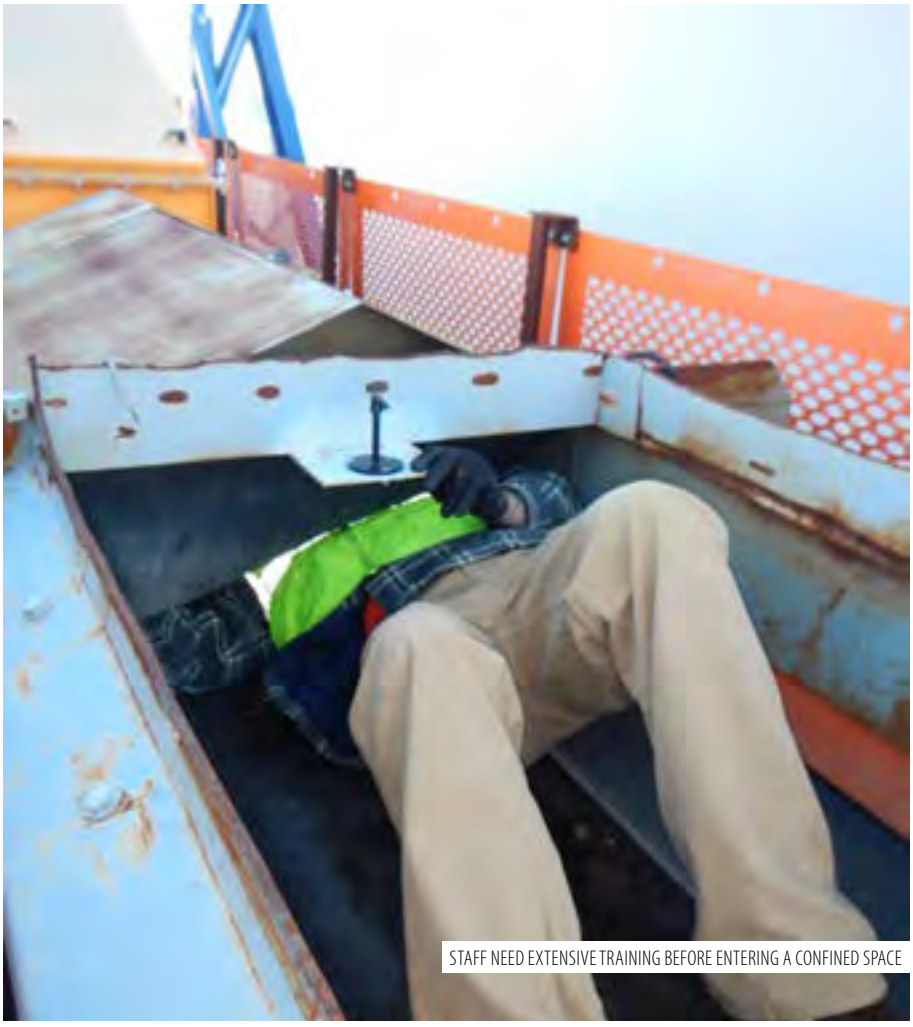
ROOM TO MANOEUVRE

Confined spaces continue to present challenges for bulk terminal operators and shipowners alike, but training and technology can cut the casualties



STAFF NEED EXTENSIVE TRAINING BEFORE ENTERING A CONFINED SPACE

An estimated 7% of the US fatalities recorded by the Mine Safety and Health Administration (MSHA) between 1995 and 2011 occurred in a confined space. To reduce that number, conveyor operators should understand exactly how a confined space is defined and to consider what they can do to prevent serious injuries.

Many factors can cause bulk materials to adhere to the sides of chutes, silos and hoppers – including humidity, moisture content, size/texture of the raw material or increased production volume – resulting in lost capacity or clogging. Ongoing accumulation reduces flow and eventually stops production in order to address the issue, causing expensive downtime and requiring extra labour to clear the obstruction.

"Clearing extensive buildup often involves confined space entry, but the consequences of untrained staff entering a chute, silo or hopper can be disastrous, including physical injury, burial and asphyxiation," says Martin Engineering product engineer Daniel Marshall. "Without proper testing, ventilation and safety measures, entering vessels containing combustible dust could even result in a deadly explosion."

What is Confined Space Entry?

The US Occupational Safety and Health Administration (OSHA) defines "confined space" as an area not designed for continuous employee occupancy and large enough for an employee to enter and perform assigned work, but with limited or restricted means for entry or exit.

"Permit-required confined space" means a confined space that has one or more of the following characteristics:

- The vessel contains or has the potential of containing a hazardous atmosphere such as exposure to explosive dust, flammable gas, vapour, or mist in excess of 10% of its lower flammable limit (LFL).
- Atmospheric oxygen concentration is below 19.5% or above 23.5%.
- There is the potential for material to engulf, entrap or asphyxiate an entrant by inwardly converging walls or by a door which slopes downward and tapers to a smaller cross-section.
- Contains any other recognized serious safety or health hazards.
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Entering a Confined Space

Working in confined spaces typically requires:

» Special personnel training.
» Safety harness and rigging.
» Extensive preparation
» Added personnel for a "buddy system".

"Systems designed to minimise permit-required confined spaces can provide a significant return on investment and the best time to reduce the amount of confined-space entry for component maintenance and replacement is during the specification and design stages of a project," Marshall says.

Many manufacturers offer systems and products that can reduce the need for confined space entry. Examples would include:

» Modular chute designs with abrasion-resistant liners.
» Chutes that hinge open and lay down for liner replacement.
» Skirtboards with external liners.
» Belt cleaners that can be serviced without confined space entry.
» Flow aids such as air cannons and vibrators to reduce buildup.
» Modular air cleaners for specific locations rather than centralised dust collection.

Rules regarding confined space entry vary greatly depending on the country, even down to the state, province or prefecture level. As always, regional and local codes should be identified and followed, but general rules can be drawn from regulations established in major industrial markets such as Australia / New Zealand, Canada and the United States.

Commonalities between governmental regulations provide employers with a measured approach to safety. These procedures include:

MAINTENANCE MUST BE PERFORMED WITH NON-TOXIC MATERIALS

Prior to Starting the Job

Review the permit and the job-specific work procedures.

» Gather and inspect all necessary personal protective equipment.
» Test and/or calibrate any safety gear, test instrumentation or communication tools.
» If a current Job Safety Analysis (JSA) or safety check list does not exist, perform a risk assessment.
» Hold a pre-job meeting making sure all workers are aware of the hazards and safe work practices.
» Conduct proper tests for toxins, vapour, dust levels, oxygen levels and material-specific hazards.
» Perform as much cleaning and maintenance as possible outside of the vessel.
» Post completed confined space entry permit outside of the vessel.
» Isolate contaminants and moving parts to prevent the accidental introduction of materials.
» Proper lock-out/tag-out/block-out/test-out procedures must be completed and documented prior to entry.

During Procedure

» Perform maintenance/cleaning using non-toxic substances such as water and avoid using heat/fire in the confined space. Never use oxygen to purge a confined space as this can create a fire and explosion hazard.
» Provide ventilation if possible.
» Select personal protective/ safety equipment such as safety helmet, gloves, hearing protectors, safety harness and lifeline and breathing apparatus.
» Assign a trained observer to monitor the procedure and internal conditions, and provide escape assistance if needed.
» Practice fast evacuation of the confined space.

"Over time, well-designed access improves safety and saves money," Marshall adds. "Safe access that is carefully located and adequately sized will increase dependability and also reduce the downtime and associated

labour required for maintenance."
He advises that companies consider equipment designs that minimise the need for confined space entry, including improved access doors, vibrators, air cannons or silo cleaning services.
"Conveyor systems that are properly outfitted with appropriate cleaning and material discharge equipment create a safer workplace, while experiencing longer life and less downtime,"
he concludes.

Conveyor products manager Dave Mueller adds that one of the problems is the time and paperwork it takes to get the permit. Then once the permit is secured, it takes multiple people to do the job.

"So in many cases, time is a big hurdle. A lone worker may be able to identify and resolve an issue quickly, but all the paperwork could cost him half a day. So he may just do the job as quickly as possible and hope no one sees him,"
he says.

Proper lock-out/tag-out/block-out/test-out procedures must be completed and documented prior to entry, he says. However conveyor downtime is expensive, frequently requiring production to stop, so there is a very real temptation to cut corners, he adds.

"Reaching past the "safety zone" for any reason is always a concern if the belt is running. But even with all appropriate precautions, dangers are inherent in any job requiring confined space entry. Using a welder or torch can cause problems, such as a fire within the confined space. Appropriate ventilation can be an issue, as well as dust inhalation.

"Managers often don't realise that designing systems to minimize permit-required confined spaces can provide a significant return on investment. Thoughtful design can improve access, reduce service time and minimise safety hazards."

SEND IN THE DRONES

Using drones to reduce the need for entering dangerous spaces is likely to increase going forward. Classification society Bureau Veritas (BV) has completed its first survey by drone and the survey was carried out in the holds of a bulk carrier in an Italian port.

The scope was an intermediate survey on a bulk carrier and consisted of close-up inspections and ultrasonic thickness measurements (UTM) conducted by the drone in two cargo hold spaces. The required prior agreement from the flag authority was confirmed – all the more necessary as the ship is subject to the IMO Code for the Enhanced Survey Programme (ESP).

Remote inspection techniques were reflected in BV's rules in 2019. The drone operator involved in this survey is certified by Bureau Veritas for both RIT and UTM.

Bureau Veritas has conducted tests and established "proof of concept" for the most advanced inspection techniques to confirm that the technologies are providing safer and even better quality evidence to conduct and support the survey process, while also offering benefits and advantages for shipowners and ship managers.

Compared to traditional survey practice, immediate benefits include the obvious reduction in time and cost in needing staging, raft surveys or rope access specialists in combination with the required thickness measurement capabilities.

BV has confirmed that aerial drones are now survey-ready on an operational basis and provide:

- Safer conditions for the surveyor and the operator, who are not exposed to the risks of working at height nor, necessarily, should they be required to enter into the confined spaces for the inspection.
- Time saving during the inspection.
- The potential for better quality evidence when assessing the condition of the hull.
- Optimised maintenance costs and planning by reducing ship's immobilisation and optimising the preparation before the repairs.

Senior vice-president of technical and operations Laurent Leblanc says: "This is another milestone in the Bureau Veritas global strategy of digital classification using digital technologies to transform the operating model of classification for the benefits of its clients. We are now ready to offer operational surveys using drones anywhere in the world.

We will continue to look for innovation and test new ideas, but drone surveys are now going to be part of everyday life for ship surveys.

"Above all drones provide a level of detail and new level of safety that will benefit both our clients and our surveyors.

"Drone surveys and our remote survey capability and service delivery are really just starting to make an impact on our clients. They are a vital development for the future of classification. Now we can both see and decide remotely,"
he concludes.

DRONE OPERATOR WITH BUREAU VERITAS SURVEYOR AND DRONE IN FLIGHT

AIRBORNE DRONE CONDUCTING ULTRASONIC THICKNESS MEASUREMENTS INSIDE THE HOLD OF A BULK CARRIER