ASMI 27th Workplace Safety & Health Convention

15 May 2025

Resources

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BREAKOUT SESSION

MORE INFO

TRACK 1

@ LEVEL 1
TRAINING ROOM T1C

2.50 PM

Dust Explosion
by Mr. Oh Hong Jia, Ministry of Manpower

3.20 PM

High-Risk Machinery (Cranes & Lifting Machines)
by Mr. Abdul Fadhil, Ministry of Manpower

3.50 PM

Business and Workforce Transformation through Company Training Committee (CTC)
by Mr. Ivan Lee, NTUC

TRACK 2

@ LEVEL 1
AUDITORIUM

Heat Stress Solutions for the M&OE Sector
by Mr. Soh Zhen Yao, WSH Institute

Introduction to WSH Guidelines on Personal Flotation Devices (Life Jackets)
by Capt. Mohamad Salleh, Workplace Safety and Health Council

Sharing on Recent Years' Fatalities/Accidents
by Mr. Dzul Fazly, Ministry of Manpower

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15 May 2025

Preventing Dust Explosions

Er. Oh Hong Jia

OSHD, Major Hazards Department

Ministry of Manpower

Empowered *Workforce*,
Thriving *Workplaces*

Agenda

1. Understanding Combustible Dust Explosion
2. Updates in Regulatory Requirements
3. Risk Management
4. Case Study
5. Key Takeaways and Resources

What is combustible dust

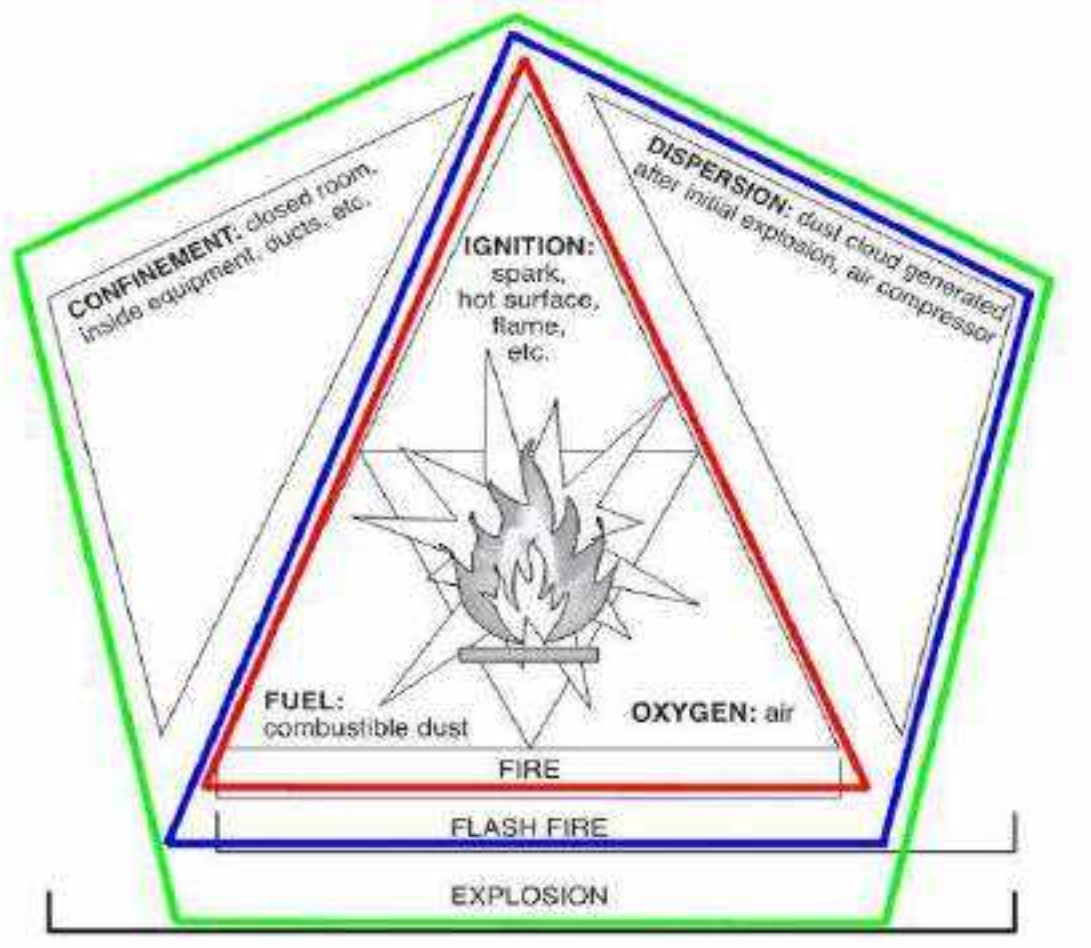
"Combustible dust refers to any finely divided combustible particulate solid (regardless of size, shape, or chemical composition) when processed, stored, or handled in the facility, that presents a flash fire hazard or an explosion hazard when suspended in air or the process-specific oxidising medium over a range of concentrations."

This includes substances listed in the Fourth Schedule of WSH (General Provisions) Regulations.

Possible combustible dusts in marine workplaces (non-exhaustive list here) include:

- Organic dusts, found in cargo holds: Grain flour, wood dust, sugar, starch, cocoa powder, coffee grounds, tea dust, charcoal, and dried food products
- Metal dusts, gathered during abrasive blasting, grinding: Aluminum powder, iron filings, magnesium shavings, zinc dust, and titanium particles

Dust Explosion Pentagon



Red – 3 elements for a fire

Blue – 4 elements for flash fire

Green – 5 elements for combustible dust explosion

Source: https://www.hallam-ics.com/blog/combustible-dust-fundamentals-nfpa-652

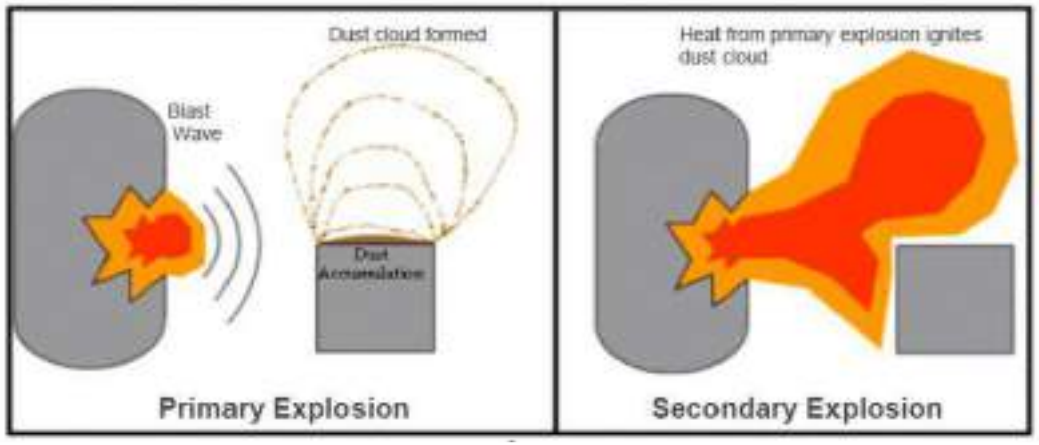
Secondary Explosion

A primary explosion in an area where fugitive dust has accumulated may shake loose more accumulated dust or damage a containment system (such as a duct, vessel, or collector).

The additional dust dispersed into the air may cause one or more secondary when ignited. These can be far more destructive than a primary explosion due to the increased quantity and concentration of dispersed combustible dust.

Examples:

- Imperial Sugar incident, 2008 (14 fatalities, 28 injured)
- Kunshan Zhongrong Metal Product Company, 2014 (146 fatalities, 114 injured)
- Stars Engrg Pte Ltd, 2021 (3 fatalities, 7 injured)



Areas/Works where dust hazards can be found:

- Confined Spaces like storage hulls in ships previously used to store organic solids e.g. grains or coal.
- Dust collectors for organic powders, metal dust, wood dust.
- Abrasive blasting, grinding, polishing and wood working areas

Updates in Regulatory Requirements since Jan 2025

asiaone

Combustible dust, high-risk machinery: MOM introduces more measures to strengthen workplace safety in manufacturing

THE STRAITS TIMES SINGAPORE

New rules in place to protect workers handling higher-risk machinery, combustible dust

Sharon Salim

UPDATED NOV 29, 2024, 08:02 PM

SINGAPORE – From Jan 1, 2025, companies must follow new rules to ensure safer use of higher-risk machinery and combustible dust.

Following a 2021 Tuas explosion that killed three workers, suppliers and manufacturers dealing with combustible dust must label related packages or containers to communicate its dangers and how to use it safely, said the Ministry of Manpower (MOM) on Nov 29.

From 1 January 2025, the list of hazardous substances in the Fifth Schedule of the WSH Act is expanded to include combustible dust. Duties of manufacturers and suppliers will also be extended to include combustible dust.

- **Labelling for combustible dust**: Statement "Warning: May form explosible dust-air mixture if dispersed" needs to be explicitly stated on the label.
- **Notification on use of combustible dust:** Factories that handle, sort, pack, store, process, manufacture or use combustible dust specified in the Fourth Schedule of the WSH (General Provisions) Regulations at or above the prescribed threshold quantity will be required to notify MOM and the owner of the factory such as the building owner or landlord.

1. Provision of information for hazard communication

A label is required on all containers of combustible dusts in any workplace, to:

- Warn of combustible dust hazard
- Communicate precautionary measures to be taken

A. For organic^ (in packages of 25kg or more), non-hazardous# chemical or plastic combustible dusts

^ Examples of organic dust include potato starch, flour, cocoa powder etc.

 # Non-hazardous refers to substances not classified as hazardous under GHS e.g. lactose, polyethylene

Labels to warn of combustible dust hazard to include:

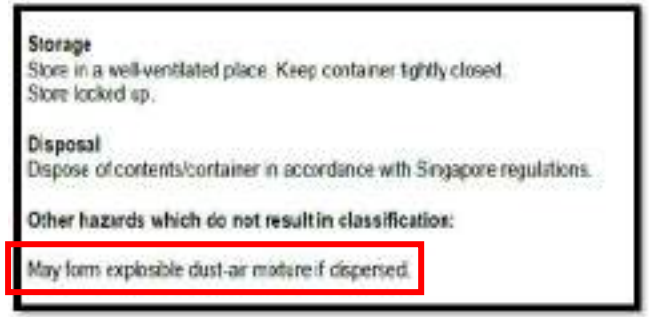
"Warning: May form explosible dust-air mixture if dispersed"

B. For metal, other chemical or plastic combustible dusts

A warning statement is required on the GHS* label and in the Safety Data Sheet* (SDS).

*e.g. A GHS **label** for combustible dust*

e.g. SDS excerpt, from the Hazard Identification section



* For more info, refer to:

Singapore Standard 586 on Specification for hazard communication for hazardous chemicals and dangerous goods – Part 2: Globally harmonised system of classification and labelling of chemicals – Singapore's adaptations

– Part 3: Preparation of Safety Data Sheets (SDSs)

2. Notify MOM and building owners on use of combustible dusts

Factories[#] handling the prescribed list of combustible dusts^ that meet or exceed the respective threshold quantities, are required to notify MOM and building owners:

a) At least one month before the use of combustible dusts in the premises
b) Not later than 1 month after ceasing the use of all combustible dust in the premises

Details of combustible dust notification to MOM

Combustible dust info to include:

1) The types of combustible dust and
2) The respective quantities used within the premises

The workplace **combustible dust notification** is

- Via MOM's eService portal;
- A part of factory notification / registration; and
- Applicable to both new and existing factories
  - ✓ Existing factories – add combustible dust info to their factory licence details.
  - ✓ New factories – include combustible dust info when applying for factory notification/registration.
- Changes to combustible dust info: Factories to provide updates in their factory details, via the eService portal.

Refer to user guide to assist company on how to submit combustible dust notification using the eService portal

User guide

[#] Factories defined under the Fourth Schedule of the Workplace Safety and Health Act

^ Refer to the 4 tables on the next slide, for metal, organic, plastic, and chemical combustible dusts and their respective threshold quantities

Combustible Dust listed in Fourth Schedule

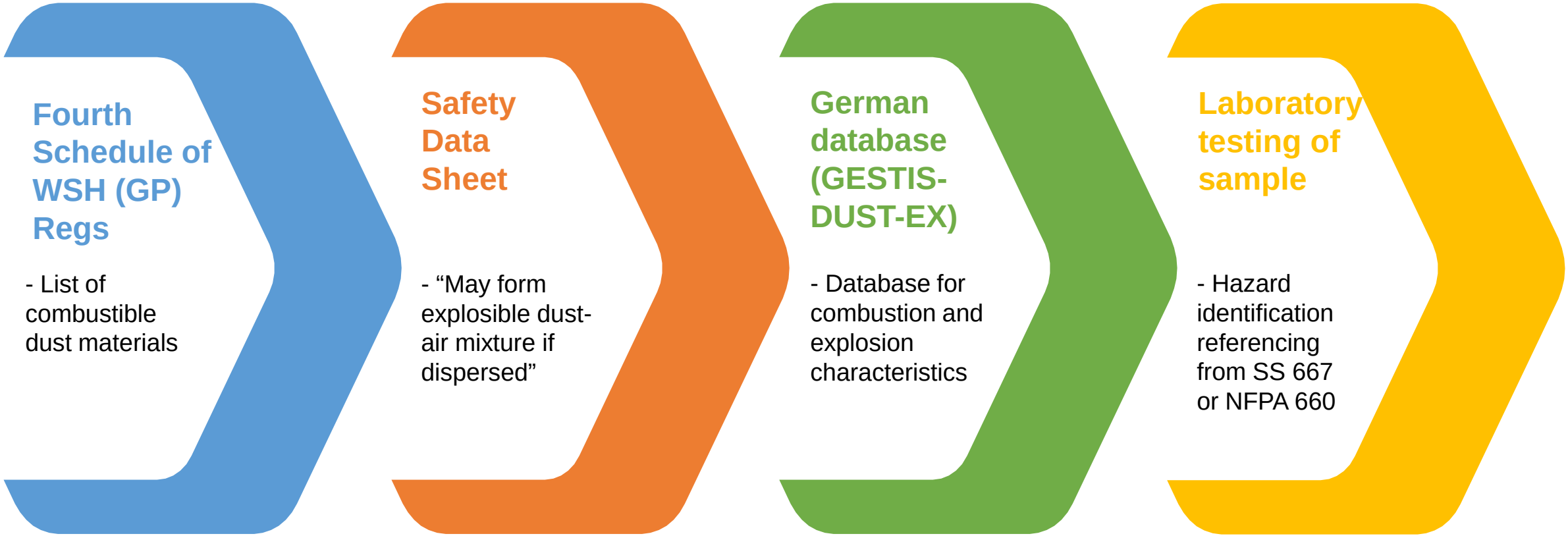
Organic Combustible Dusts			Threshold quantity per substance
1. Alfalfa 2. Apple 3. Beetroot 4. Carbon black 5. Carrageenan 6. Carrot 7. Cereals (for example, barley, corn, oat, rice, rye and wheat) and their derivatives 8. Charcoal 9. Coal 10. Cocoa 11. Coconut and its derivatives 12. Coffee 13. Coke 14. Cotton and its derivatives	15. Egg white 16. Garlic 17. Grains (malted) 18. Grains (spent) 19. Grass 20. Hops 21. Lemon peel or pulp 22. Linseed 23. Locust bean gum 24. Milk and its derivatives 25. Olive pellet 26. Onion 27. Parsley 28. Peach	29. Peanut 30. Peat 31. Potato and its derivatives 32. Soot 33. Soybean and its derivatives 34. Spice 35. Sugar 36. Sunflower seeds 37. Tapioca 38. Tea 39. Tobacco 40. Walnut 41. Xanthan gum 42. Yucca seeds	100 kg
43. Cellulose	44. Cork	45. Wood	25kg

Plastic Combustible Dusts	Threshold quantity per substance
1. Epoxy resin 2. Ethylene-vinyl acetate copolymer 3. Melamine 4. Polyacrylamide 5. Polyacrylonitrile 6. Polyethylene 7. Polypropylene 8. Polyvinyl acetate 9. Polyvinyl alcohol 10. Polyvinyl butyral 11. Polyvinyl chloride 12. Terpene-phenol resin 13. Urea-formaldehyde-cellulose	100 kg
14. Phenolic resin 15. Polymethyl acrylate	25kg

Chemical Combustible Dusts		Threshold quantity per substance
1. Adipic acid 2. Ascorbic acid 3. Calcium acetate 4. Calcium stearate 5. Carboxy methyl cellulose 6. Dextrin 7. Lactose	8. Lead stearate 9. Methyl-cellulose 10. Paraformaldehyde 11. Sodium ascorbate 12. Sodium stearate 13. Sulphur	100 kg
14. Anthraquinone		Any quantity

Metal Combustible Dusts			Threshold quantity per substance
1. Bronze 2. Copper 3. Iron	4. Iron carbonyl 5. Manganese 6. Silicon	7. Tantalum 8. Titanium 9. Zinc	100 kg
10. Aluminium	11. Magnesium	12. Niobium	Any quantity

Managing Dust Risks: Hazard Identification



Risk Evaluation – Dust Hazards Analysis (DHA)

DHA is a systematic review to identify and evaluate fire and explosion hazards, and identify control measures for risk reduction

The DHA, led by a competent person,

- Identifies hazardous scenario
- Provides a link between hazards and specific control measures

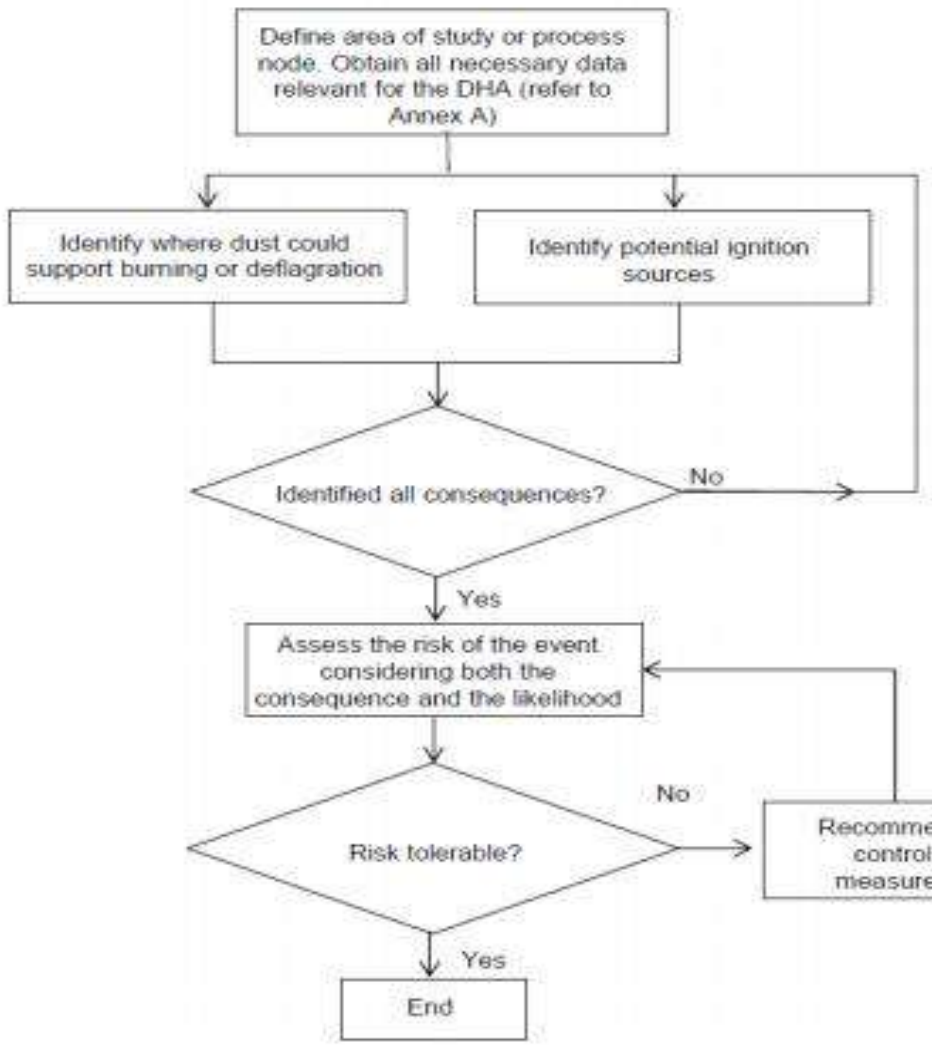
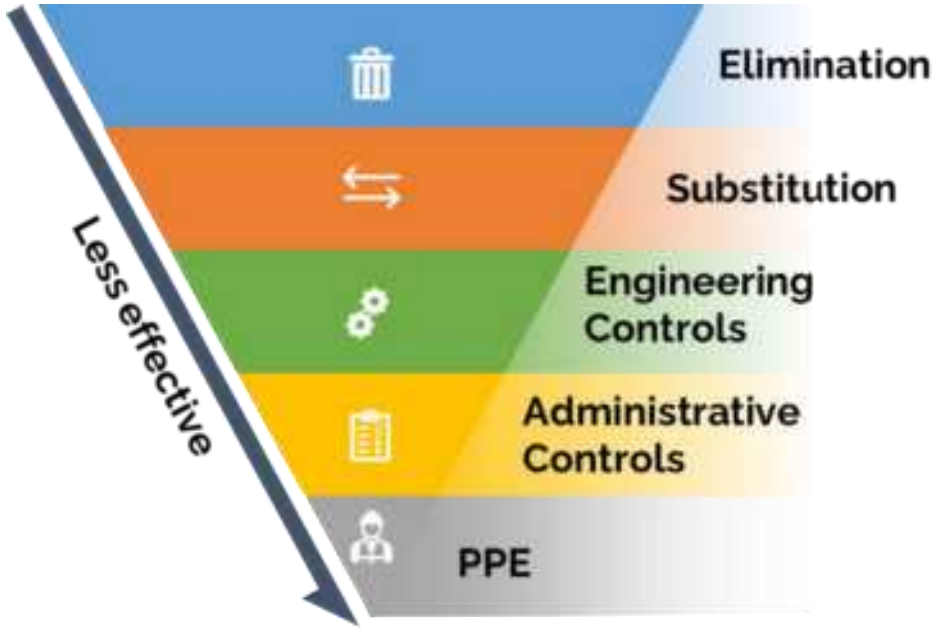


Figure 2 – Dust hazard analysis (DHA)

Reference: SS 667 : 2020, Figure 2

Preventing Dust Explosions

- To prevent dust explosions, workplaces can remove one or more elements from the pentagon
- Always aim for higher-level controls where possible
- Higher-level controls provide more reliable and sustainable protection
- Multiple controls can be used together for better protection



Control and Management of Combustible Dust

Enclosure	• Do not store materials in the open • Enclose equipment with sufficient safety features to prevent combustible dust explosion
Dust control	• Local exhaust ventilation system (flame-proof) • Proper housekeeping (no dry sweeping)
Ignition source control	• Effective grounding and bonding • Use of non-sparking tools • Use suitable flame-proof equipment e.g., flame-proof forklift, flame-proof dust collectors
Explosion prevention and protection	• Provide explosion vent • Install spark detectors
Training	• Provide training on combustible dust hazard • Communicate the precautionary measures to be taken
PPE	• Workers working with combustible dust to be equipped with necessary PPE e.g., fire retardant clothing, static dissipative safety shoes

EX-proof flood lights

ATEX rated vacuum cleaner

Grounding points

Bonding points

Flame-proof forklift

Case Study: Stars Engrg Pte Ltd

24 February 2021

Tuas, Singapore

Potato starch powder

3 fatalities, 7 injuries

Source: Report of the Inquiry Committee for the accident at Stars Engrg Pte Ltd on 24 Feb 2021

Case Study: The Production Process

Fire Clay Making

- Mixer machine to heat up water in mixing chamber.
- Add potato starch and other ingredients with heated water in mixing chamber till pasty consistency is achieve

Fire Clay Processing

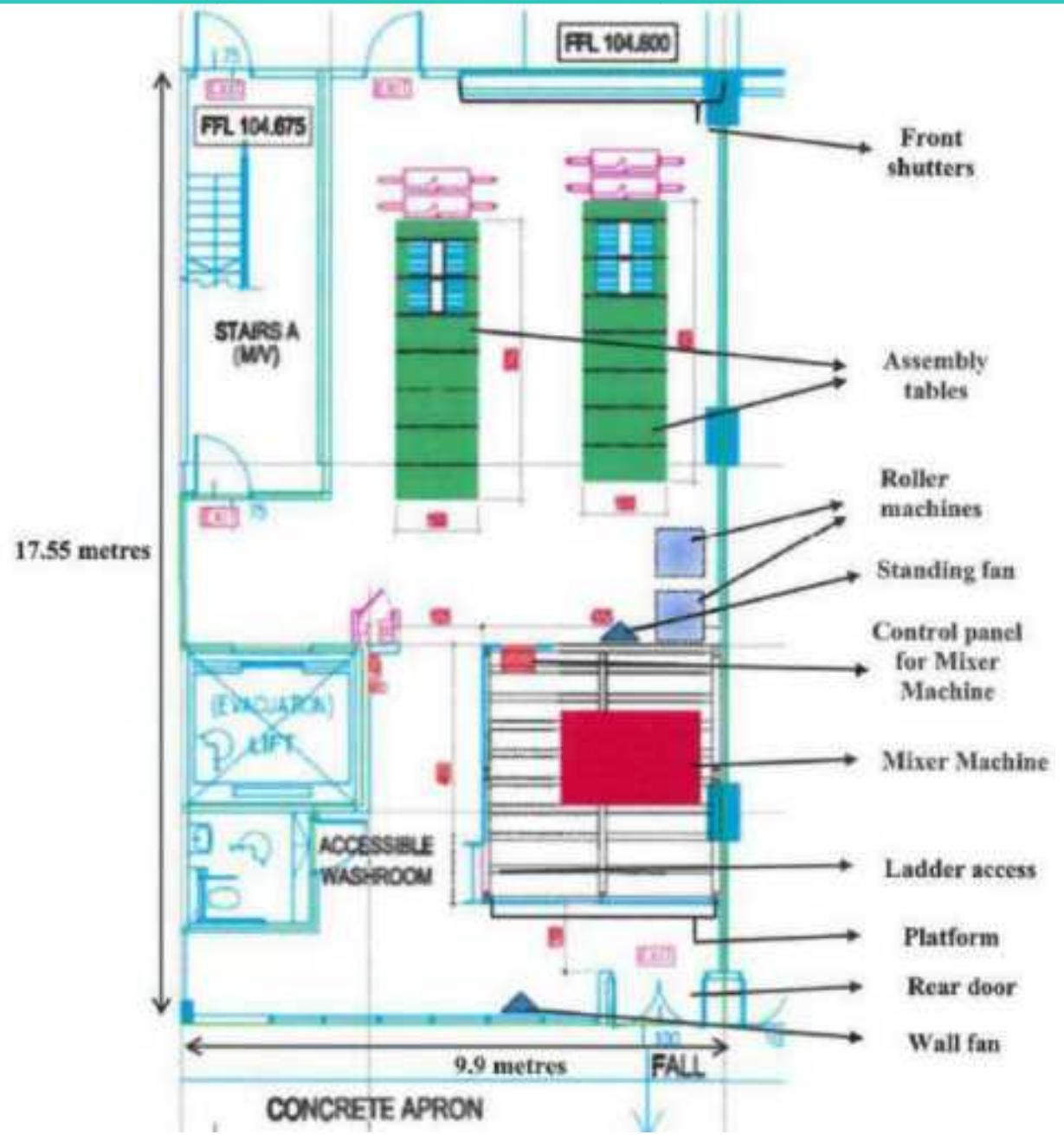
- Pour out fire clay from mixer machine and laid out on the platform and subsequently transfer to ground floor
- Workers at flatten fire clay to 10mm with roller machine
- Passed to next roller machine to further flatten fire clay to 5mm

Fire Wrap Assembly

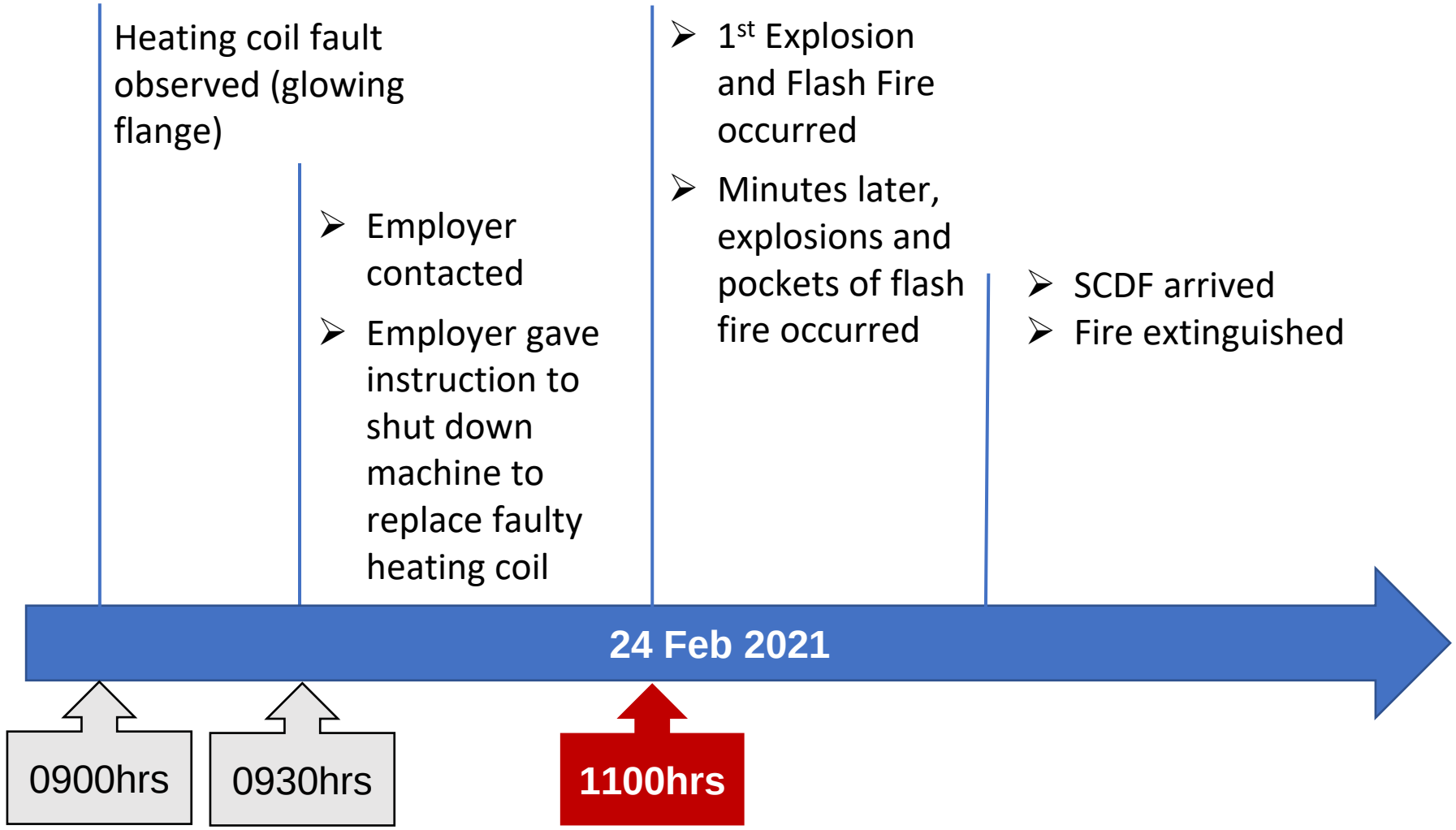
- Two sheets of aluminum roll are cut and taped to create a width of 1.1m for fire wrap
- Layers of fire clay and other ingredients are placed on the aluminum sheet
- The layers are enfolded with the plastic sheet and shrink-wrapped with heat

Case Study: The Layout

- The worksite measured about 17.55m by 9.90m
- Mixer machine and its control panel was placed on a raised platform
- 2 roller machines were located between the assembly tables and the platform
- 2 assembly tables were placed near the front shutters



Case Study: Sequence of Events



Case Study: Incident Analysis

- Mixer machine was used in overheated conditions as a closed system, leading to mechanical rupture
- Oil vapours were expelled and ignited due to the sudden rupture, leading to the **primary explosion** and the **subsequent secondary flash fires.**
- Secondary flash fires were most likely due to the ***combustion of potato starch powders***.

Source: Report of the Inquiry Committee for the accident at Stars Engrg Pte Ltd on 24 Feb 2021

Case Study: Aftermath of Incident

Source: Report of the Inquiry Committee for the accident at Stars Engrg Pte Ltd on 24 Feb 2021

Case Study: Safety Lapses

- No risk assessment and safe work procedure for mixing activities and for use and storage of combustible dust
- No proper training provided to workers for safe use of mixer machine
- No emergency evacuation plan was developed
- No toolbox meeting was conducted to discuss general work activities or highlight hazards that workers were exposed to.
- Failed to provide a local exhaust ventilation system to prevent the accumulation of the combustible starch powders in the workplace
- Improper housekeeping methods by dry sweeping.
- No fire-resistant PPE provided to workers

Key Takeaways to Preventing Dust Explosions

- Never underestimate the risks of dust explosion – the consequences can be severe!
- Regular housekeeping is a simple and critical control measure for preventing and mitigating secondary explosions.
- Maintain the effectiveness of control measures, e.g.
  - Check protective equipment, including PPE; Oil stains affecting the effectiveness of fire resistance of overalls
  - Maintenance of engineering controls e.g. explosion prevention devices, ATEX equipment and grounding/bonding systems

Source: Dust Safety Science

Resources

- MOM webpage on safe use of machineries and combustible dust

- List of FAQs on machinery safety and combustible dust

- Upcoming WSH Guidelines on Combustible Dust

Resources

- Approved Codes of Practice
  - *SS 667 - Code of Practice for handling, storage and processing of combustible dust*
  - *SS 658 - Code of Practice for design, operation, testing, and maintenance of local exhaust ventilation systems*
  - *SS 537 - Code of Practice for safe use of machinery*
  - *SS 586 – Specification for Hazard Communication for hazardous chemicals and dangerous goods*
  - *Code of practice on Workplace Safety and Health (WSH) Risk Management*
- WSH Guidelines on Management of Hazardous Chemicals Programme
- MOM Circular on Hazards and Controls of Combustible Dusts
- WSH Council Publication on 6 Basic WSH Rules for Handling Combustible Dust

Thank you

Ministry of Manpower

Empowered *workforce*, Thriving *workplaces*

Heat Stress Solutions for Marine and Offshore Energy Sector

MINISTRY OF MANPOWER
SINGAPORE

15 May 2025

by Soh Zhen Yao

Manager, WSH Technology, Workplace Safety and Health Institute

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Ensuring Workplace Safety and Health @ Work

Vision

A Healthy Workforce in Safe Workplaces;
A Country Renowned for Best Practices in Workplace Safety and Health

Mission

To Prevent All Work-related Death, Injury & Ill-health

Occupational Safety And Health Division (MOM)

Ministry of Manpower

WSH Institute

REGULATOR
Legislation, Policies & Enforcement

SOLUTIONING
Provide Data Insights, WSH Assessment Tools & Tech Solutions to Address Current & Emerging WSH Trends & Issues

Workplace Safety and Health Council

WSHCOUNCIL

INDUSTRY PARTNER
Educate & Engage Stakeholders, Set Standards, Promote WSH

Promote technology-enabled WSH is one of the key strategies to achieve WSH 2028 goals

Reduce and sustain Singapore's workforce **fatality rate at less than 1 per 100,000 workers by 2028,** in line with the safest countries in the world.

Partner key stakeholders to grow the WSH tech ecosystem in Singapore and scale adoption of mature WSH tech

WSHI works with different stakeholders in the technology ecosystem, based on technology readiness level of WSH solutions, and scale-worthiness of the tech.

WSH Tech Ecosystem

Industry
"Problem Owner"

Identifies WSH issues, defines problem statements

Research Institutes
"Researcher"

Conducts R&D for emerging WSH challenges / solutions

Government as
"Facilitator"

Provides funding support and platforms for solution development and adoption

Tech Vendors
"Solution Provider"

Productise and commercialise solutions while continually improve solutions

What is heat stress and how does it occur

Heat stress occurs when the accumulation of heat in the body exceeds the body's ability to remove excess heat

Main heat gain mechanism

- Environment
- Metabolic heat

Heat accumulation > Heat removal

Dependent on workers' clothing, humidity and ventilation

Main heat loss mechanism

- Sweat evaporation

Source: WSHC

Heat stress can cause heat-related illnesses

Heat Exhaustion

- Headache
- Nausea
- Dizziness
- Weakness
- Irritability
- Thirst
- Heavy sweating
- Elevated body core temperature
- Decreased urine output
- Cramps (abdomen & limbs)
- Cool, pale, clammy skin
- Fast and weak pulse

Heat Stroke

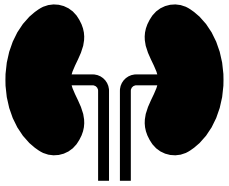
- Loss of consciousness
- Confusion, slurred speech
- Hot, dry skin or profuse sweating
- High body core temperatures (>40°C)
- Seizures
- Throbbing headache
- Rapid and strong pulse

Heat exhaustion can lead to heat stroke

Heat stroke can cause death or permanent disability if emergency treatment is not given

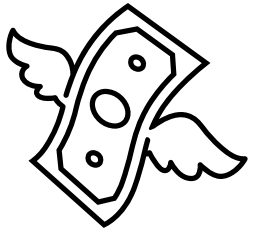
Source: NIOSH and National Weather Service

Other impacts due to heat stress at workplace



Working under heat stress can lead to chronic kidney disease with long latency periods

Worker productivity declines exponentially with each 1°C rise in wet bulb globe temperature (WBGT)



Companies face financial losses due to manhours loss and heat-related illness compensation claims

Mental fatigue from heat exposure increases the risk of workplace errors and accidents

Source: ILO

Worker groups more susceptible to heat stress

1. **Unacclimatised worker**: new or returning workers from countries with cold climate
2. **Worker with history of heat injury**: they are more susceptible to future heat injuries
3. **Obese worker**: they have higher metabolic heat production and lower rate of heat loss
4. **Worker with medical condition/illness**: worker with chronic illness like heart disease or diabetes; or worker with acute illness like diarrhoea or respiratory infection are more at risk
5. **Worker on medication**: certain medication may interfere with normal hydration, affecting the body's ability to retain water
6. **Inexperienced worker**: worker may not know how to adapt to the pace of work in a new or hotter environment
7. **Highly motivated worker:** worker may ignore signs of heat stress until heat stroke occurs
8. **Worker with inadequate rest/sleep**: impaired decision making, and reduced ability to properly regulate heat when one is tired
9. **Worker with inadequate nutrition**: poor nutrition generally decreases one's immunity and affects heat tolerance
10. **Worker with low fitness level**: physiological strain is expected to be higher and body sweating mechanism may be less efficient

(Non-exhaustive)

Source: WSHC

Workers exposed to outdoor work or high temperature environments

Abrasive blasting

Thermal spray coating

Tank cleaning

Painting

Welding

Images: Ash Marine, Bestec Marine Engineering, ITW Offshore

First aid treatment for heat-related illness using the 7R approach

Recognize symptoms	Recognise symptoms of heat stress and report early
Rest casualty	Get the worker to sit or lie down in a cool shaded area with good ventilation
Remove clothing	Loosen or remove excess clothing as appropriate (while preserving the modesty of the worker)
Reduce temperature	Reduce body temperature as fast as possible by applying ice packs, wet towels or cool water. Other measures include use of cooling blankets or subject the water to cold water immersion.
Rehydrate	Rehydrate by providing fluids. Do not provide fluids by mouth if casualty is unconscious.
Resuscitate	If worker is unconscious, call for help immediately and resuscitate using the principles of cardiopulmonary resuscitation if first-aider is trained to do so.
Rush to hospital	Rush worker to the near hospital if the worker is unconscious.

Source: WSHC

Tech solutions can augment current measures to better protect workers due to rising temperature

Two construction workers in King George's Avenue wear helmets secured with cardboard to shield them from the afternoon sun. ST PHOTO: SHINTARO TAY

Monitoring of environmental heat stress with WBGT meter

Who to monitor

Construction sites (with contract sums of $5 million or more), shipyards and the process industry, are required to have a WBGT meter on-site for localised measurements.

Where to monitor

WBGT meter should always be located near work areas so that measurements will be representative of the environmental conditions that workers are exposed to.

Important points to obtain accurate readings

1. Check that WBGT meter is in good condition
2. Mount the WBGT meter on a tripod approximately one metre above ground level. Stay clear from the meter to prevent interference with the temperature and airflow sensors
3. After setting up, allow the meter to reach an equilibrium with environmental conditions before taking any readings.
4. WBGT meter should be placed under direct sun exposure and not blocked by buildings or shade.
5. Measurements should be taken at locations where ground surfaces are similar to areas where work is carried out.

Source: MOM

Heat stress measures for adverse weather conditions

Scan the QR code for details on heat stress measures for outdoor work

Source: MOM

Images: The Straits Times

Ice slushies is an effective way to prevent heat stress

Ice slushies is :

- recommended under WSH Guidelines to induce greater internal cooling for workers on hot days
- proven in Sports science, and supported by NUS Project HeatSafe research and scientific papers

Effects of ice slushies – *in consultation with A/Prof Jason Lee (Director, Heat Resilience and Performance Centre, NUS)*

- **Improve heat tolerance**
  - ✓ More efficient than drinking cold water.
  - ✓ Ice particles within the body induces heat sink that cools the body core temp. by half a degree
- **Reduce risk of heat induced accidents**
  - ✓ Heat stress can lead to loss of focus and fatigue, poorer mental and physical performance.
- **Improve morale and work efficiency**
  - ✓ Workers with increased endurance are more productive.

WSHI's trial showed ice slushies were effective at mitigating heat stress and workers were receptive


SINGAPORE

Ice slurries one option being tested to keep construction workers cool

Workers at an outdoor construction site in Yishun have an ice slurry made from a dispenser during a break in July 2022.

Source: The Straits Times

Trial in July 2022

i. >200 workers participated in 2-week trial
ii. ~900L of ice slushies consumed
iii. Less than 5% sugar

Results

i. ~80% of workers said ice slushies helped their work
ii. Workers:
    - found work less strenuous
    - felt cooler after consuming ice slushies
    - preferred ice slushies over other cold drinks

Slushies is not replacement for water hydration and should complement other heat stress measures

1. **Effectiveness of ice slushies is about an hour**

Distribute ice slushies during hotter periods of the day, as body core temperature would normalize within an hour.

2. **Minimum serving size of 200 ml**

A min. serving size of 200 ml is required to see effect. Ice slushies must be consumed in icy form for effectiveness.

3. **Avoid high sugar content in slushies**

High sugar content in slushies can have dehydrating effect. Hence sugary drinks are not suitable, e.g. soft drink and fruit syrups. Not all isotonic drinks have less than 5% sugar content.

4. **Not replacement for water hydration**

Workers should continue to drink water to stay hydrated. Water helps to rinse away sugar residue on teeth, which may lead to dental issues.

Cooling vests can lower risk of heat injury

Cooling vests is :

- recommended under WSH Guidelines to regulate the body temperature of workers in the safe range
- backed by scientific research and shown to result in lower rise of core body temperature and heart rate during physical activities.

Effects of cooling vests

- improved concentration and reduced fatigue, leading to fewer heat-related accidents and injuries
- increased heat tolerance, lowering risk of heat stress

Applications

- Worn during work to provide thermal comfort
- Worn during break to cool down and aid in recovery

Athletes

Outdoor workers

Workers in full body PPE

Confined space workers

5 types of cooling vest and their cooling effectiveness based on studies

Cooling vest type	Liquid	Evaporative	Air	Hybrid (Evaporative + PCM)	PCM (Phase Change Material) inserts
Cooling mechanism	Heat transfer to cold circulating water	Saturated with water for evaporation to remove heat	Compressed cool air	Evaporation of water and heat transfer to PCM inserts	Heat transfer to PCM inserts
Illustration of cooling vests					
***Increasing heat tolerance**	1	2	3	4	5
***Reducing exertion**	2	1	4	3	5

*Effectiveness rating from 1 – 5, with 5 being most effective

Images: AlphaCool, Bullard

Based on a study by Jozef Stefan Institute in 2023

Cooling vest maintenance and upkeep

1. **Recharging of cooling vests**

Always ensure that the cooling vest is charged and ready before use. (e.g. freezing phase change material (PCM) inserts, recharging battery packs for powered cooling vests.) Follow manufacturers' instructions for recharging.

2. **Cleaning and storage**

Cooling components could be removed and recharged separately, and the vest itself could be handwashed with mild detergent and air dry completely before next use.

3. **Visual inspection**

Inspect the vests before each use to ensure that cooling components work properly, check for tears or loose stitching, check PCM inserts or water bladders for leakage. Replace damaged cooling components promptly.

4. **Monitor cooling effectiveness**

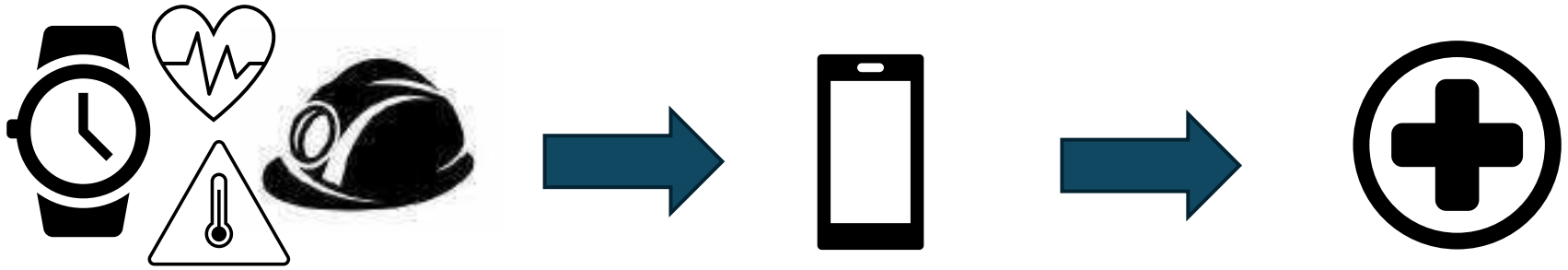
Replace cooling components promptly when cooling efficacy decreases

Smart wearables for heat stress monitoring

Smart wearables are equipped with sensors to continuously monitor vital signs (heart rate, temperature) to provide early warnings for workers at risk.

Wearable solutions such as smartwatches and smart helmets are integrated with safety management apps to offer real-time data transmission and automated alerts.

How it works



When a worker's heart rate is abnormal or body temperature exceeds specified threshold value

An alert is triggered in the system and supervisor is notified

Locate the affected worker and apply cooling measures as needed

Beyond heat stress monitoring, some wearables also carry location tracing, fall detection, geofencing features

Features

- Centralised dashboard for real-time monitoring
- Real-time alerts for workers and supervisors
- Early detection of heat stress symptoms and other irregularities (e.g. abnormal heart rate, worker standstill)
- Trend analysis capabilities
- Customisable alert thresholds

Other common safety features

- Worker location tracing
- Fall detection
- Panic button
- Geofencing alert for hazardous areas

Source: ViAct and BeeInventor

Refresh pods improve recovery during rest breaks

Refresh pods and cold drinks: How Changi Airport helps workers beat the heat

Source: The Straits Times

Key Features

- Can accommodate up to 5 workers
- Cool air circulates within the pod for 3.5 minutes per cycle
- Doubles as a dryer for workers to dry themselves after rain exposure

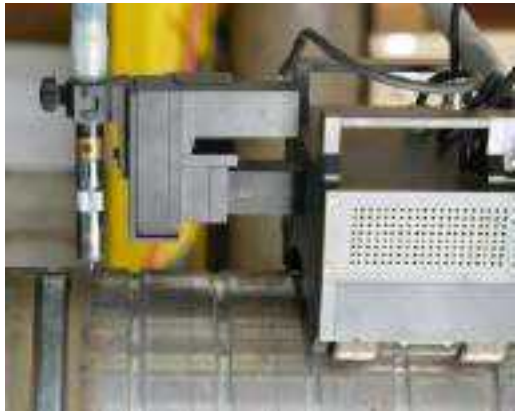
Applications

- Suitable for large worksites with limited rest areas
- Can complement other preventive measures as part of a comprehensive heat stress management system

Benefits

- Improves rest recovery
- Improves worker morale and productivity
- Provides quicker access to cooling when needed

Robotic or drone-based solutions can reduce workers' exposure to environmental conditions



Welding robot

Hydroblasting robot

Confined space monitoring drone

Robotic solutions and drones can automate specific tasks, mitigating heat stress risks for workers.

Other benefits:

- Reduce worker exposure to other risks such as falling from height, exposure to hazardous gas, work-related musculoskeletal disorders
- Improved productivity, lesser manpower required and more cost effective in the long run
- Workers can be trained as robot operators for career development

Source: Robot++, Viscoy

NTUC Company Training Committee (CTC) Grant can provide funding support for industry adoption of heat stress solutions

Business outcomes

- Enhancement in business capabilities, and/or
- Productivity gains

Worker outcomes (for local workers: SC/SPR)

- Wage increase
- Recurrent skills allowance or one-time allowance
- Career development plan implementation

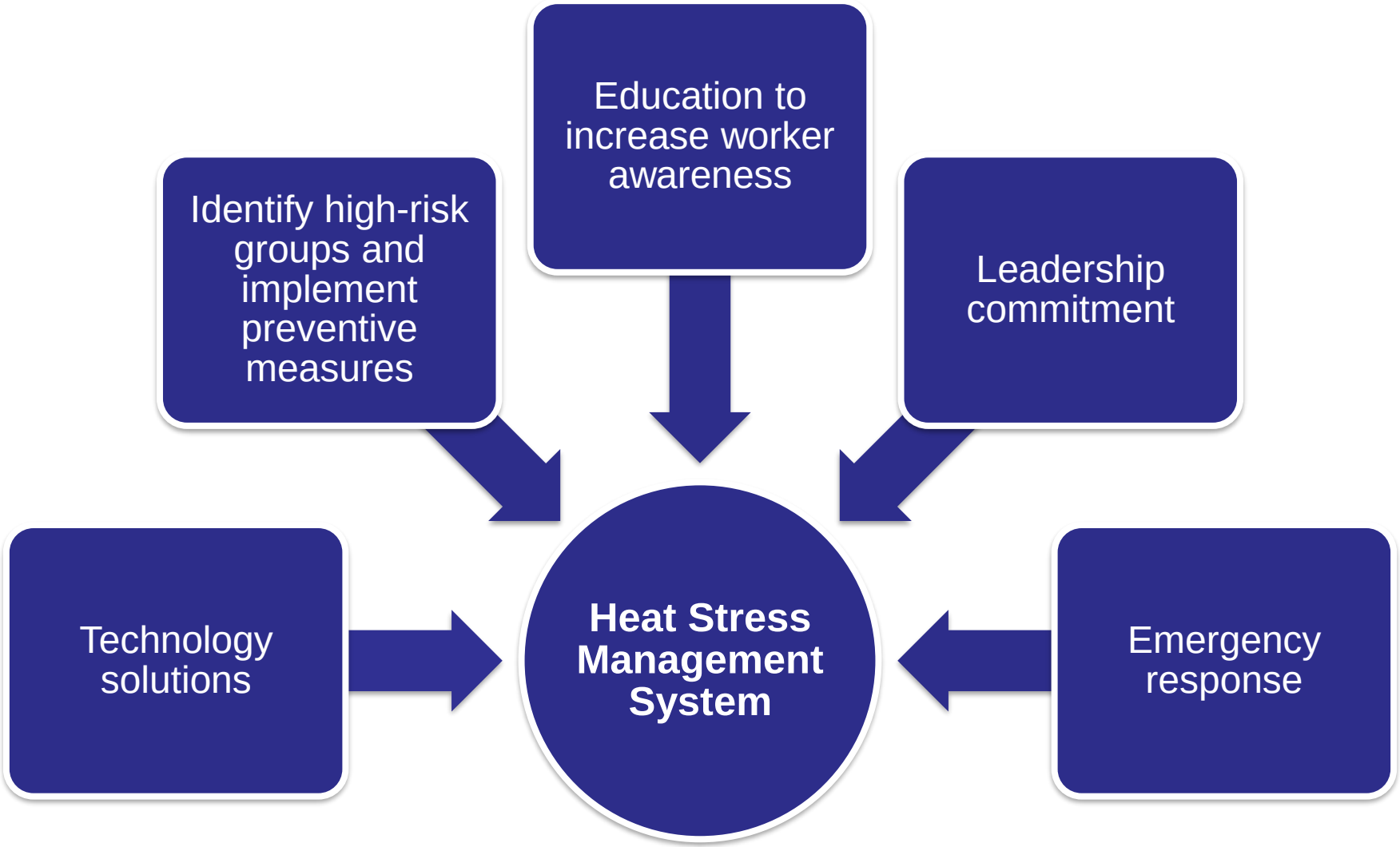
Company Training Committee (CTC) Grant supports entities that have formed CTC to implement transformation plans that would lead to better worker and business outcomes. Receive funding support of up to 70% of qualifying cost for each project.

From 1 Aug 2024, projects that enhance WSH are recognised as enhancements to business capabilities, fulfilling the enterprise transformation criteria of the CTC Grant.

Scan QR code or click the link for more details

NTUC Company Training Committee (CTC) Grant

An effective heat stress management system incorporates various elements



Ministry of Manpower

Thank you

High-Risk Machinery: Cranes & Lifting Machines

ASMI 27th WSH Convention on 15 May 2025

Abdul Fadhil

Principal Specialist

OSH Specialist Department

Ministry of Manpower

Empowered *Workforce*, Thriving *Workplaces*

Presentation Outline

1. Common Types of Lifting Machines
2. Overview of Regulatory Framework for Lifting Machines based on Life-cycle Approach
    a. Import
    b. Installation
    c. Operation
    d. Dismantling & Storage
3. Lessons Learnt from Past Incidents
4. Key Takeaways

Common Types of Lifting Machines

Types of Lifting Machines

- Tower crane
- Mobile crane (crawler, lorry, wheeled, etc.)
- Fixed crane (pillar, gantry, overhead, portal, etc.)
- Piling machine
- Lifting platform (MEWP, MCWP etc.)

Lifting Machine (LM, LP, R21)

Overview of Regulatory Framework in SG

Regulatory Framework for LE in Workplaces

WSH Act

- Duties of Occupier, Employer, Principal
- Duties of Manufacturers, Suppliers and Installer

WSH Subsidiary Legislation

- Workplace Safety and Health (General Provisions) Regulations
- Workplace Safety and Health (Operation of Cranes) Regulations
- Workplace Safety and Health (Construction) Regulations
- Workplace Safety and Health (Shipbuilding and Ship-Repairing) Regulations

Approved Codes of Practices

- Approved Code of Practice (ACOP) on Safe Lifting Operations at Workplaces
- SS 536: CP for Safe Use of Mobile Cranes
- SS 559: CP for Safe Use of Tower Cranes
- SS 497: CP for Design, Safe Use and Maintenance of Gantry Cranes, Overhead Travelling Cranes and Monorail Hoists
- SS 616: CP for Safe Use of Mobile Elevating Work Platforms

Industry Guidelines

- Technical Advisories, Guidelines and Compliance Assistance Toolkits and Collaterals on matters pertaining to Crane Operations

A Life Cycle Approach

WSH Regulatory Framework

- Adopts a **Life Cycle Approach**; from Import → Installation → Operation & Maintenance → Dismantling & Storage

Import	Installation	Operation & Maintenance	Dismantling & Storage
• Manufacturers & Suppliers • Owners	• Occupiers • Owners • Equipment Contractors	• Occupiers • Owners • Operators / Users • Equipment & Maintenance Contactors • Competent Persons	• Occupiers • Owners • Equipment & Maintenance Contractors





Import of Lifting Equipment

Import for Use

- Manufacturers & Suppliers

- Section 16 of WSH Act
  - **Information about the safe use** is available for use at work
  - **Equipment is safe** & without risk when properly used
  - **Tested & examined** that it is safe

Installation

- Approved Crane Contractors
- Occupiers
- Owners

- Section 17 of WSH Act
- Safe erection / installation
- Registration of LE

Registration Requirements

- All lifting equipment must be registered before use.

- The owner must engage an Authorised Examiner (AE) to register the lifting equipment.

- The AE will
  - ➢ Conduct the necessary tests and examinations;
  - ➢ Register the lifting equipment;
  - ➢ Submit a lifting equipment examination report; and
  - ➢ Issue the certificate of test and examination.

Registration Requirements

Ministry of Manpower

WORKPLACE SAFETY AND HEALTH ACT

CERTIFICATE OF TEST AND EXAMINATION OF LIFTING EQUIPMENT[1]

LE Registration No.: **LM0000000Z**

Max. Safe Working Load: **10000 kg**

Certificate Expiry Date: **15/04/2026**

OWNER AND WORKPLACE DETAILS

OWNER NAME	: Crane Experts Pte. Ltd.	OWNER UEN	: 202399999Z
WORKPLACE ADDRESS	: MK00-00000X at Tripartite Way	WORKPLACE NO.	: 202399999Z0001

PARTICULARS OF LIFTING EQUIPMENT

EQUIPMENT CLASS	: 551 Fixed Crane - Tower Crane (Horizontal Boom)	OWNER'S REFERENCE / VEHICLE REG. NO.	: TC1
		MAX. BOOM LENGTH / SPAN	: 20.0 m
BRAND AND MODEL	: Tower Lifter A10T	FLY JIB / EXTENSION LENGTH	: 5.0 m
DISTINCTIVE NO.[2]	: TLFTR1234	ENERGY SOURCE	: Electricity
YEAR OF MFG	: 2023	REGISTRATION DATE	: 26/07/2023
COUNTRY/REGION OF MFG	: Singapore	TYPE APPROVAL NO.	: TCA23999

LAST LOAD TEST DETAILS

Load Test Date : **16/04/2025** | Maximum Test Load (kg) : **12500**

	(1)	(2)	(3)	(4)	(5)	(6)
Radius (m) :	**5.0**	**20.0**				
Test Load (kg) :	**12500**	**1250**				
Safe Working Load (kg) :	**10000**	**1000**				

COMMENTS / OBSERVATIONS

Safety devices tested and found to be in good working condition.

I certify that on **16/04/2025** the lifting equipment described in this certificate was examined thoroughly by me, as far as its construction permits, and that the above is a true report of my examination.

I further certify that the lifting equipment is found to be in compliance with the requirements stipulated in the Workplace Safety and Health Act and its subsidiary legislation, and is safe for use.

AUTHORISED EXAMINER'S SIGNATURE[3]

Digitally signed by
JOSEPHINE TAN
16 Apr 2025, 12:00:00 AM SGT

Explanatory Notes
[1] Lifting Equipment refers to lifting gear, lifting appliance, lifting machine, lift and hoist as defined under the Workplace Safety and Health (General Provisions) Regulations.
[2] Distinctive No. refers to the identification or serial number assigned to the equipment by the manufacturer.
[3] This certificate is digitally signed and current status of the lifting equipment is verifiable through the QR code.

SAMPLE

Circular No: MOM/OSHD/2023-05: WSH e-Services System with Enhanced Features for Management of LE

- Addition of Registration Summary
- Digitally signed-off by AEs w/o wet-ink signatures or company/personal stamps
- Hardcopy of original certificates replaced with e-version
- QR code to MOM's webpage

Registration Requirements

Ministry of Manpower

Occupational Safety and Health Division

Registration of Statutory Equipment

REGISTRATION SUMMARY	
Registration No. :	**LM0000000Z**
Statutory Equipment Type :	Lifting Equipment
Owner Name :	Crane Experts Pte. Ltd.
Brand and Model :	Tower Lifter A10T
Distinctive No. :	TLFTR1234
Scan for Details :	LM0000000Z

This is a computer-generated document that requires no signature.

Contact MDM at 6438 5122 or mom_oshd@mom.gov.sg for any clarification or feedback.

SAMPLE

Operation & Maintenance

- Occupiers, Employers, Principals, Owners
- Lifting Personnel
- Contractors, Competent Persons

- Safe operation - Mandatory RA, SWP, PTW, lifting plan, compliance with MOM Circulars
- Mandatory training - crane operator, lifting supervisor, rigger, signalman
- Maintenance in accordance with manufacturer instructions
- Mandatory inspections by AEs

Risk Assessment & Safe Work Procedures

- WSH (Risk Management) Regulations: Employer, Self-employed Person, Principal

- **Continuous** process of evaluating the probability and consequences of injury or illness from exposure to an identified hazard and determining **appropriate** risk control measures.

- **Specific** to the work activity (e.g. mob/de-mob, installation/dismantling, lifting operation) and equipment used.

- Review and revise once every 3 years or where there is significant **change in work practices or procedures.**

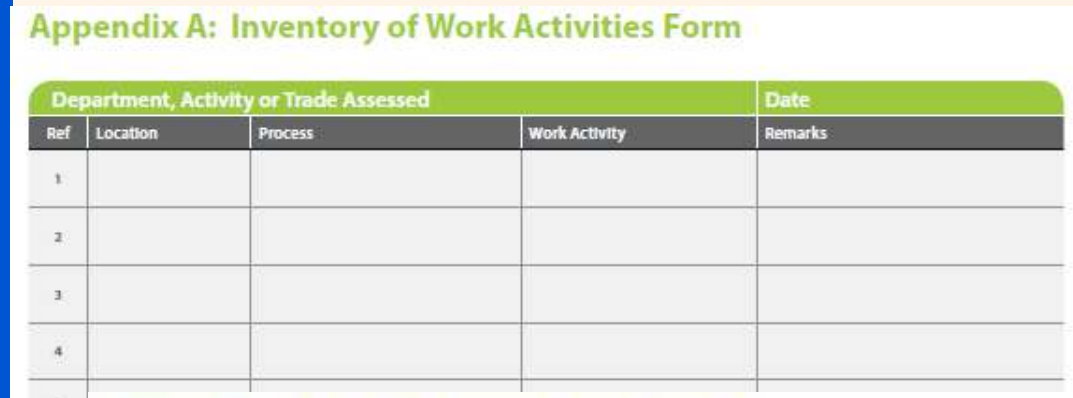
Risk Assessment & Safe Work Procedures

Examples of hazards associated with cranes and lifting machines:

- Struck by falling objects;
- Struck by machines or moving parts;
- Collision of machines
- Crushing;
- Overturning of machines;
- Parts failure; etc.

Risk Assessment & Safe Work ocedures

https://www.tal.sg/wshc/resources/publications/codes-of-practice/code-of-practice-on-wsh-risk-management



Appendix A: Inventory of Work Activities Form

Department, Activity or Trade Assessed				Date
Ref	Location	Process	Work Activity	Remarks
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Note:
1. Co

Appendix B: Risk Assessment Form

Department				Risk Leader				Approved by				Reference Number				
Person				Risk Member 1				Signature								
Activity/Location				Risk Member 2												
Assessment Date				Risk Member 3				Name								
Last review Date				Risk Member 4				Designation								
Next review Date				Risk Member 5				Date								
Hazard Identification				Risk Evaluation				Risk Control								
Ref	Sub-Activity	Hazard	Possible Injury/ Ill-health	Existing Risk Controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks		
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																

Notes:

Page ____ of ____ page(s)

- WSH (Operation of Cranes) Regulations: Responsible Person, Lifting Plan
- **Any** lifting operation involving the use of **any crane**
- **Specific** to the lifting operation and crane used. In accordance with **principles of safe and sound practice.**

Planning for Lifting Operations

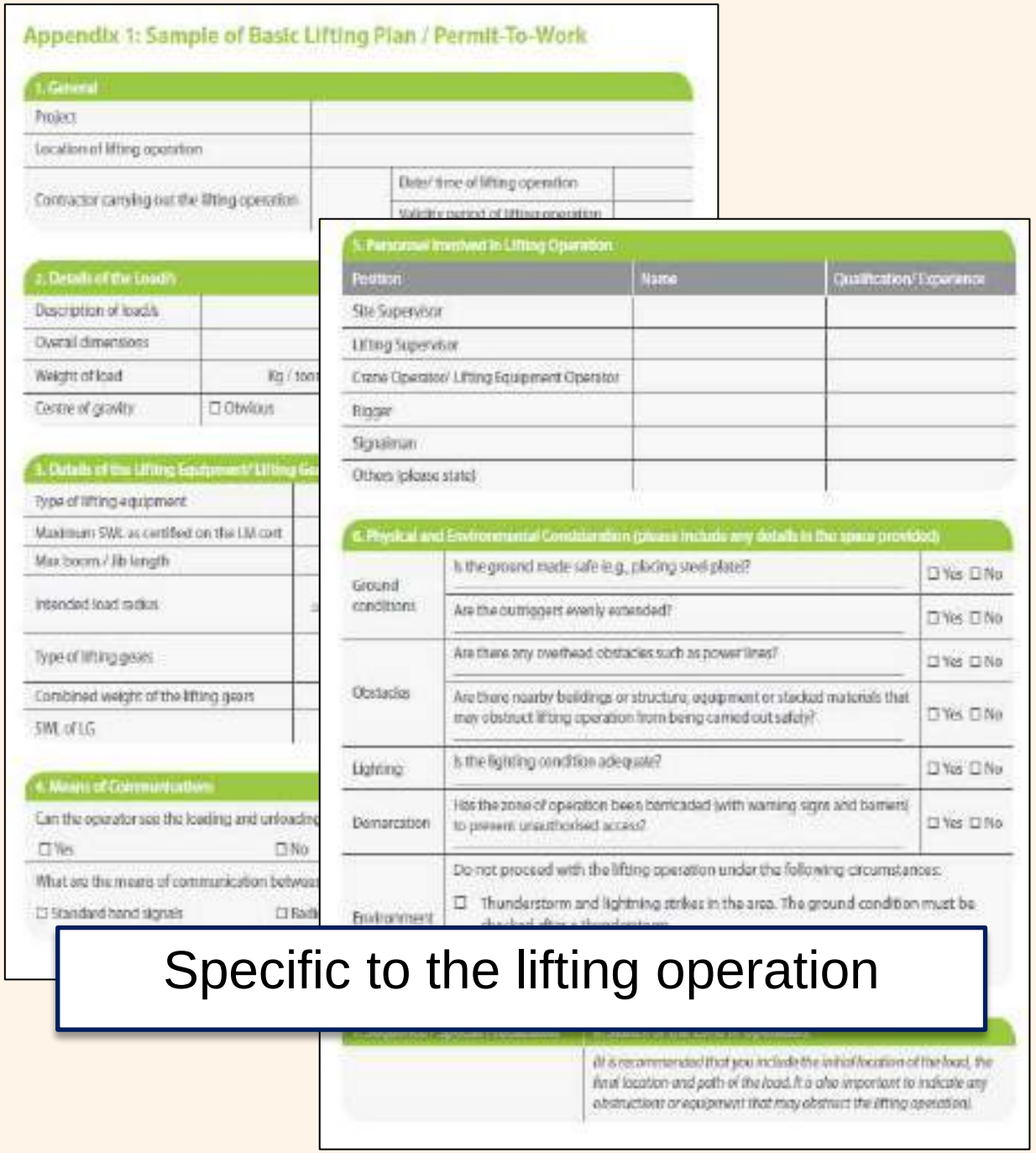
- **Factors** affecting safe lifting operations:

➢ Machine
➢ Material
➢ Medium
➢ Man
➢ Method

- **Elements** of a lifting plan include:

➢ Personnel involved;
➢ Load;
➢ Rigging methods;
➢ Equipment (SWL and working radius);
➢ Physical and environmental factors;
➢ Means of comms;
➢ Sequence/special precautions;
➢ Sketch of zone of operation, etc.

Planning for Lifting Operations


Appendix 1: Sample of Basic Lifting Plan / Permit-To-Work

1. General

Project

Location of lifting operation

Contractor carrying out the lifting operation

Date/ time of lifting operation

Validity period of lifting operation

2. Details of the Load(s)

Description of load/s

Overall dimensions

Weight of load

Centre of gravity

☐ Obvious

3. Details of the Lifting Equipment/ Lifting Ge

Type of lifting equipment

Maximum SWL as certified on the LM cert

Max boom / jib length

Intended load radius

Type of lifting gears

Combined weight of the lifting gears

SWL of LG

4. Means of Communication

Can the operator see the loading and unloading

☐ Yes ☐ No

What are the means of communication betwee

☐ Standard hand signals

5. Personnel Involved in Lifting Operation

Position	Name	Qualification/ Experience
Site Supervisor		
Lifting Supervisor		
Crane Operator/ Lifting Equipment Operator		
Rigger		
Signalman		
Others (please state)		

6. Physical and Environmental Consideration (please include any details in the space provided)

Ground conditions	Is the ground made safe (e.g., placing steel plate)?	☐ Yes ☐ No
	Are the outriggers evenly extended?	☐ Yes ☐ No
Obstacles	Are there any overhead obstacles such as power lines?	☐ Yes ☐ No
	Are there nearby buildings or structure, equipment or stacked materials that may obstruct lifting operation from being carried out safely?	☐ Yes ☐ No
Lighting	Is the lighting condition adequate?	☐ Yes ☐ No
Demarcation	Has the zone of operation been barricaded (with warning signs and barriers) to prevent unauthorised access?	☐ Yes ☐ No
Environment	Do not proceed with the lifting operation under the following circumstances: ☐ Thunderstorm and lightning strikes in the area. The ground condition must be	

(It is recommended that you include the initial location of the load, the final location and path of the load. It is also important to indicate any obstructions or equipment that may obstruct the lifting operation)

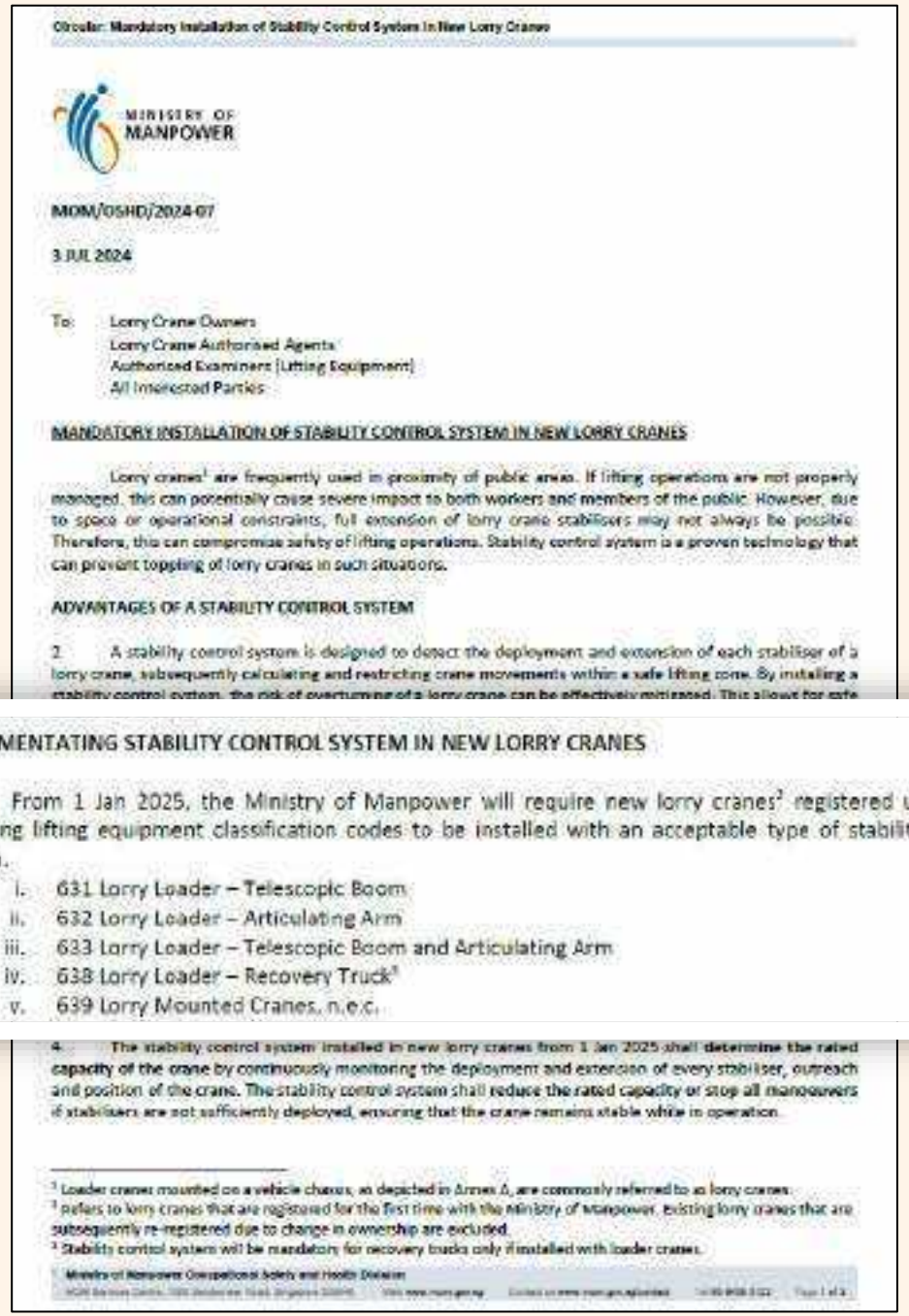
Specific to the lifting operation

Planning for Lifting erations

https://www.tal.sg/wshc/resources/publications/codes-of-practice/code-of-practice-on-safe-lifting-operations-in-the-workplaces

Compliance with MOM Circulars

MOM/OSHD/2024-07



Circular: Mandatory Installation of Stability Control System in New Lorry Cranes

MINISTRY OF MANPOWER

MOM/OSHD/2024-07

3 JUL 2024

To: Lorry Crane Owners
Lorry Crane Authorised Agents
Authorised Examiners (Lifting Equipment)
All Interested Parties

MANDATORY INSTALLATION OF STABILITY CONTROL SYSTEM IN NEW LORRY CRANES

Lorry cranes[1] are frequently used in proximity of public areas. If lifting operations are not properly managed, this can potentially cause severe impact to both workers and members of the public. However, due to space or operational constraints, full extension of lorry crane stabilisers may not always be possible. Therefore, this can compromise safety of lifting operations. Stability control system is a proven technology that can prevent toppling of lorry cranes in such situations.

ADVANTAGES OF A STABILITY CONTROL SYSTEM

2 A stability control system is designed to detect the deployment and extension of each stabiliser of a lorry crane, subsequently calculating and restricting crane movements within a safe lifting zone. By installing a stability control system, the risk of overturning of a lorry crane can be effectively minimised. This allows for safe

IMPLEMENTATING STABILITY CONTROL SYSTEM IN NEW LORRY CRANES

3 From 1 Jan 2025, the Ministry of Manpower will require new lorry cranes[2] registered under the following lifting equipment classification codes to be installed with an acceptable type of stability control system.

i. 631 Lorry Loader – Telescopic Boom
ii. 632 Lorry Loader – Articulating Arm
iii. 633 Lorry Loader – Telescopic Boom and Articulating Arm
iv. 638 Lorry Loader – Recovery Truck[3]
v. 639 Lorry Mounted Cranes, n.e.c.

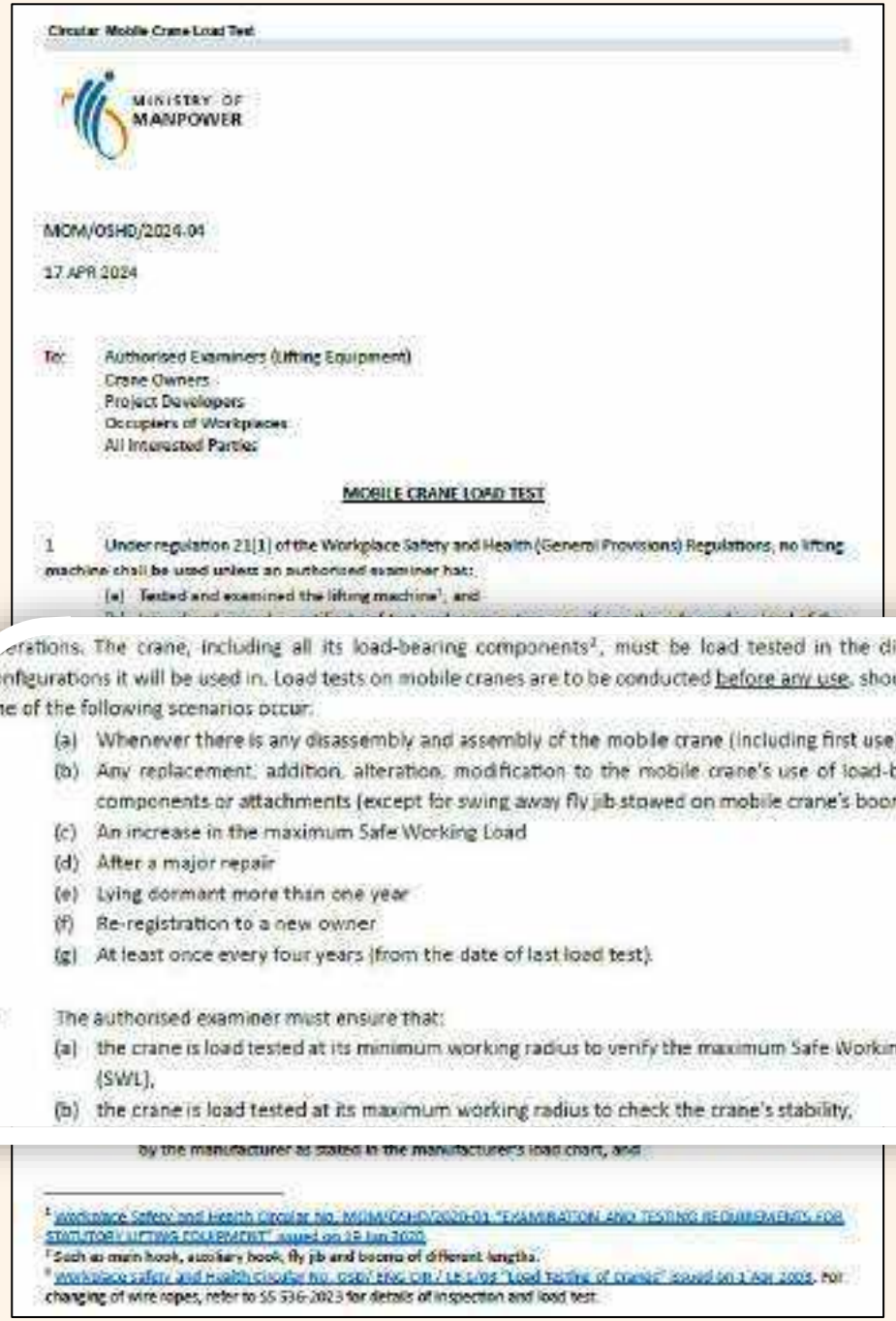
4 The stability control system installed in new lorry cranes from 1 Jan 2025 shall determine the rated capacity of the crane by continuously monitoring the deployment and extension of every stabiliser, outreach and position of the crane. The stability control system shall reduce the rated capacity or stop all manoeuvers if stabilisers are not sufficiently deployed, ensuring that the crane remains stable while in operation.

[1] Loader cranes mounted on a vehicle chassis, as depicted in Annex A, are commonly referred to as lorry cranes.
[2] refers to lorry cranes that are registered for the first time with the ministry of manpower. Existing lorry cranes that are subsequently re-registered due to change in ownership are excluded.
[3] Stability control system will be mandatory for recovery trucks only if installed with loader cranes.

Ministry of Manpower Occupational Safety and Health Division

Compliance with MOM Circulars

MOM/OSHD/2024-04



Circular: Mobile Crane Load Test

MINISTRY OF MANPOWER

MOM/OSHD/2024-04

17 APR 2024

To: Authorised Examiners (Lifting Equipment)
Crane Owners
Project Developers
Occupiers of Workplaces
All Interested Parties

MOBILE CRANE LOAD TEST

1 Under regulation 21(1) of the Workplace Safety and Health (General Provisions) Regulations, no lifting machine shall be used unless an authorised examiner has:

(a) Tested and examined the lifting machine[1], and

erations. The crane, including all its load-bearing components[2], must be load tested in the different configurations it will be used in. Load tests on mobile cranes are to be conducted before any use, should any one of the following scenarios occur:

(a) Whenever there is any disassembly and assembly of the mobile crane (including first use)
(b) Any replacement, addition, alteration, modification to the mobile crane's use of load-bearing components or attachments (except for swing away fly jib stowed on mobile crane's boom)
(c) An increase in the maximum Safe Working Load
(d) After a major repair
(e) Lying dormant more than one year
(f) Re-registration to a new owner
(g) At least once every four years (from the date of last load test).

3 The authorised examiner must ensure that:

(a) the crane is load tested at its minimum working radius to verify the maximum Safe Working Load (SWL),
(b) the crane is load tested at its maximum working radius to check the crane's stability,

by the manufacturer as stated in the manufacturer's load chart, and

[1] workplace Safety and Health circular no. MOM/OSHD/2020-01 "EXAMINATION AND TESTING REQUIREMENTS FOR STATUTORY LIFTING EQUIPMENT" issued on 15 Jun 2020.
[2] Such as main hook, auxiliary hook, fly jib and booms of different lengths.
[3] workplace safety and health circular no. osh/ Hoc Cir / LE 2/05 "Load Testing of Cranes" issued on 1 Apr 2005. For changing of wire ropes, refer to SS 536:2023 for details of inspection and load test.

Compliance with MOM Circulars

MOM/OSHD/2024-04

(d) the configurations the load test was conducted for (such as fly jib, main hook, auxiliary hook, whichever are applicable) are clearly stated on the certificate of test and examination.

4 The authorised examiner may conduct additional tests as necessary to validate load test results. He/she is however, not permitted to reduce or replace stipulated tests in the preceding paragraph.

5 After the load tests, the authorised examiner must examine the crane to check that there are no visible cracks, permanent deformations or damages, loose or damaged connections, or other visible conditions that could affect the function and safety of the crane.

Updating the Crane's Load Chart

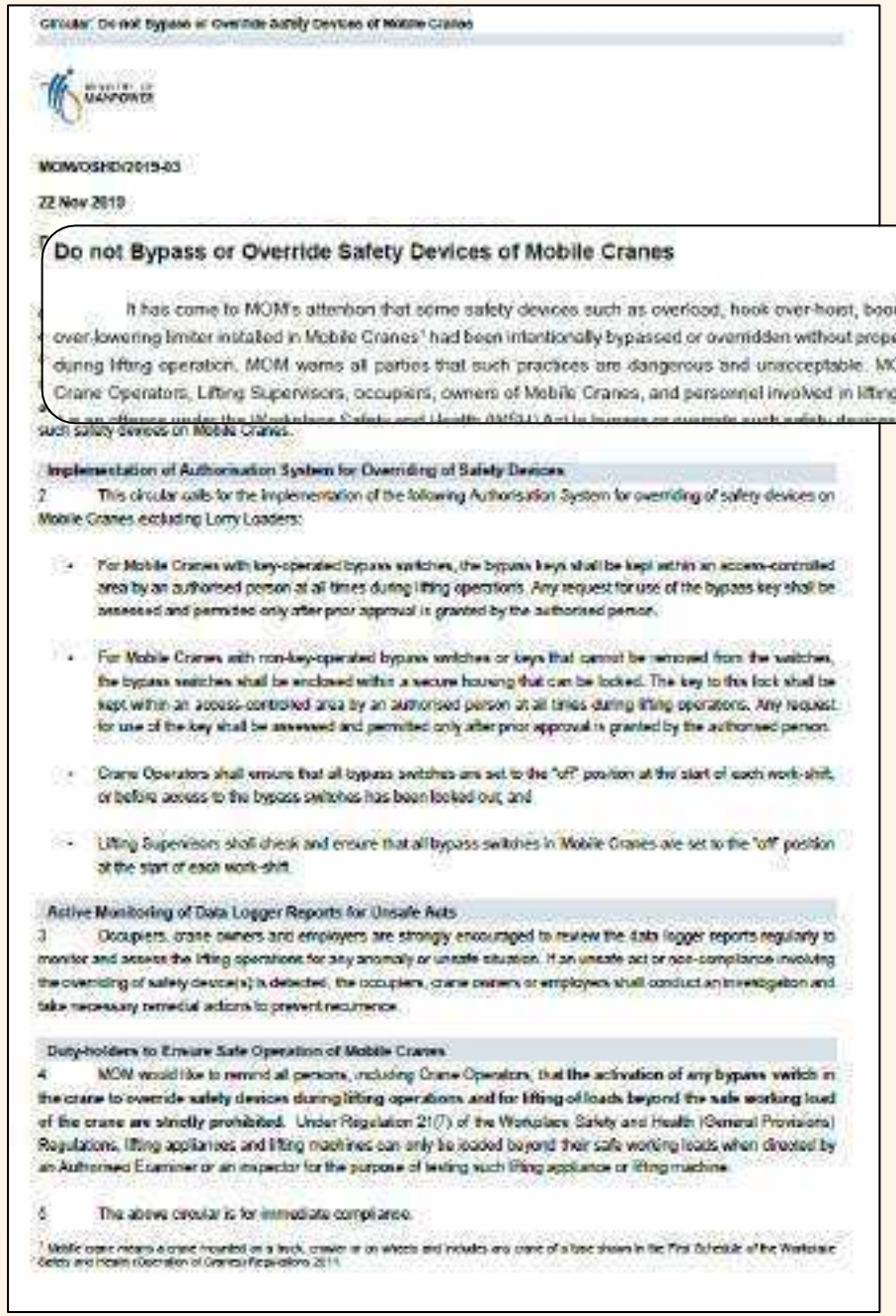
6 If the crane is not load tested to its full operation or capacity range as stated in the manufacturer's load chart, the authorised examiner shall make the necessary revisions to the crane's load chart to clearly show the permitted operation and capacity range based on the test loads conducted, and communicate this information to the crane owner. The load chart shall be made available to the crane operator e.g. displayed in the crane's cabin.

JAIME LIM
for Commissioner for Workplace Safety and Health
Occupational Safety and Health Division
Ministry of Manpower

Date of Issue:	Classification:	Circular No:
17 APR 2024	Lifting Equipment	MOM/OSHD/2024 - 04

Compliance with MOM Circulars

MOM/OSHD/2019-03



Circular: Do not bypass or override safety devices of Mobile Cranes

MINISTRY OF MANPOWER

MOM/OSHD/2019-03

22 Nov 2019

Do not Bypass or Override Safety Devices of Mobile Cranes

It has come to MOM's attention that some safety devices such as overload, hook over-hoist, boom over-hoist or over-lowering limiter installed in Mobile Cranes[1] had been intentionally bypassed or overridden without proper authorisation during lifting operation. MOM warns all parties that such practices are dangerous and unacceptable. MOM reminds all Crane Operators, Lifting Supervisors, occupiers, owners of Mobile Cranes, and personnel involved in lifting operation that [illegible] such safety devices on Mobile Cranes.

Implementation of Authorisation System for Overriding of Safety Devices

2 This circular calls for the implementation of the following Authorisation System for overriding of safety devices on Mobile Cranes excluding Lorry Loaders:

- For Mobile Cranes with key-operated bypass switches, the bypass keys shall be kept within an access-controlled area by an authorised person at all times during lifting operations. Any request for use of the bypass key shall be assessed and permitted only after prior approval is granted by the authorised person.
- For Mobile Cranes with non-key-operated bypass switches or keys that cannot be removed from the switches, the bypass switches shall be enclosed within a secure housing that can be locked. The key to this lock shall be kept within an access-controlled area by an authorised person at all times during lifting operations. Any request for use of the key shall be assessed and permitted only after prior approval is granted by the authorised person.
- Crane Operators shall ensure that all bypass switches are set to the "off" position at the start of each work-shift, or before access to the bypass switches has been locked out; and
- Lifting Supervisors shall check and ensure that all bypass switches in Mobile Cranes are set to the "off" position at the start of each work-shift.

Active Monitoring of Data Logger Reports for Unsafe Acts

3 Occupiers, crane owners and employers are strongly encouraged to review the data logger reports regularly to monitor and assess the lifting operations for any anomaly or unsafe situation. If an unsafe act or non-compliance involving the overriding of safety device(s) is detected, the occupiers, crane owners or employers shall conduct an investigation and take necessary remedial actions to prevent recurrence.

Duty-holders to Ensure Safe Operation of Mobile Cranes

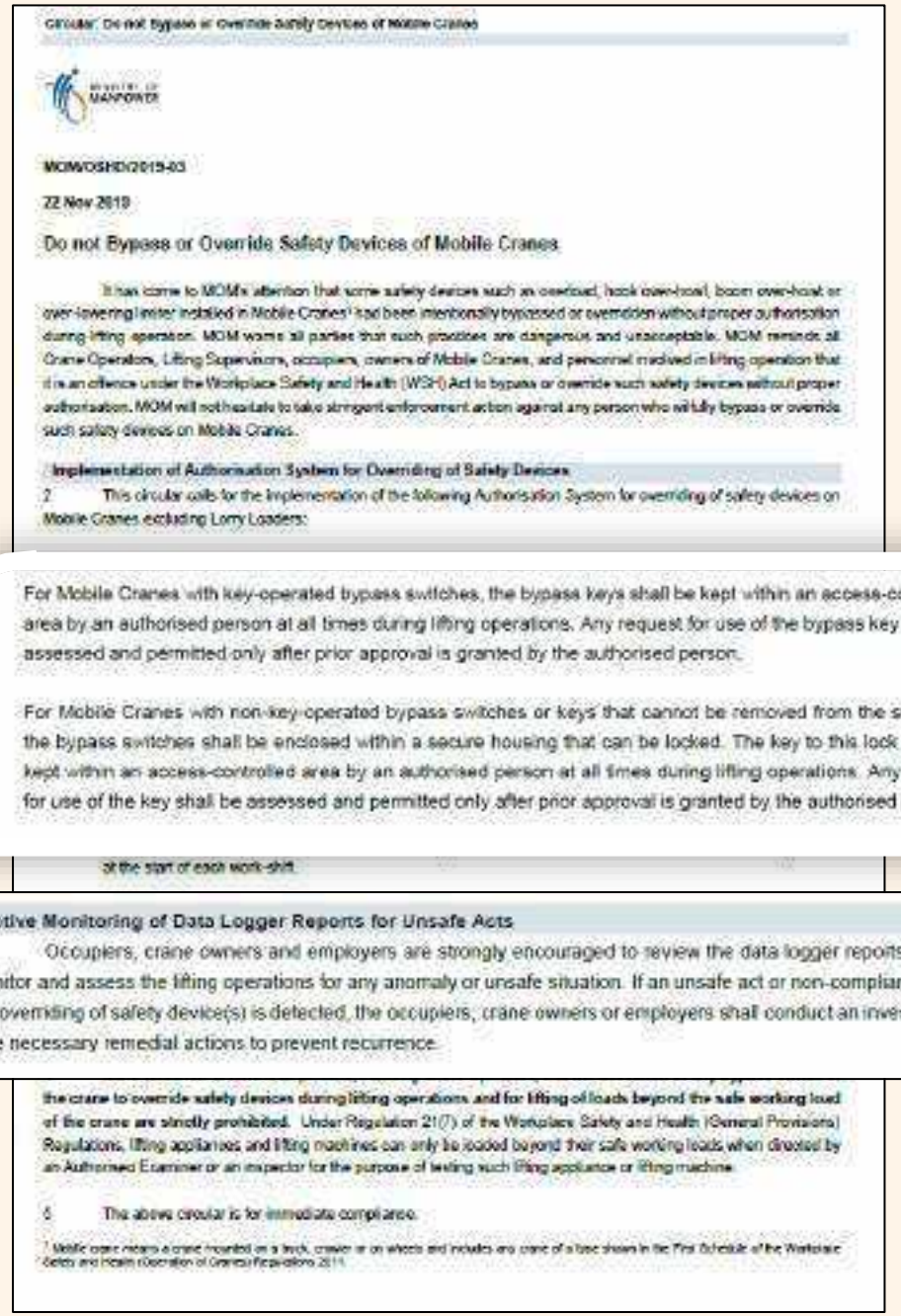
4 MOM would like to remind all persons, including Crane Operators, that **the activation of any bypass switch in the crane to override safety devices during lifting operations and for lifting of loads beyond the safe working load of the crane are strictly prohibited.** Under Regulation 21(7) of the Workplace Safety and Health (General Provisions) Regulations, lifting appliances and lifting machines can only be loaded beyond their safe working loads when directed by an Authorised Examiner or an inspector for the purpose of testing such lifting appliance or lifting machine.

5 The above circular is for immediate compliance.

[1] Mobile crane means a crane mounted on a truck, crawler or on wheels and includes any crane of a type shown in the First Schedule of the Workplace Safety and Health (Operation of Cranes) Regulations 2011.

Compliance with MOM Circulars

MOM/OSHD/2019-03



Circular: Do not bypass or override safety devices of Mobile Cranes

MINISTRY OF MANPOWER

MOM/OSHD/2019-03

22 Nov 2019

Do not Bypass or Override Safety Devices of Mobile Cranes

It has come to MOM's attention that some safety devices such as overload, hook over-hoist, boom over-hoist or over-lowering limiter installed in Mobile Cranes[1] had been intentionally bypassed or overridden without proper authorisation during lifting operation. MOM warns all parties that such practices are dangerous and unacceptable. MOM reminds all Crane Operators, Lifting Supervisors, occupiers, owners of Mobile Cranes, and personnel involved in lifting operation that it is an offence under the Workplace Safety and Health (WSH) Act to bypass or override such safety devices without proper authorisation. MOM will not hesitate to take stringent enforcement action against any person who wilfully bypass or override such safety devices on Mobile Cranes.

Implementation of Authorisation System for Overriding of Safety Devices

2 This circular calls for the implementation of the following Authorisation System for overriding of safety devices on Mobile Cranes excluding Lorry Loaders:

- For Mobile Cranes with key-operated bypass switches, the bypass keys shall be kept within an access-controlled area by an authorised person at all times during lifting operations. Any request for use of the bypass key shall be assessed and permitted only after prior approval is granted by the authorised person.
- For Mobile Cranes with non-key-operated bypass switches or keys that cannot be removed from the switches, the bypass switches shall be enclosed within a secure housing that can be locked. The key to this lock shall be kept within an access-controlled area by an authorised person at all times during lifting operations. Any request for use of the key shall be assessed and permitted only after prior approval is granted by the authorised person.

at the start of each work shift.

Active Monitoring of Data Logger Reports for Unsafe Acts

3 Occupiers, crane owners and employers are strongly encouraged to review the data logger reports regularly to monitor and assess the lifting operations for any anomaly or unsafe situation. If an unsafe act or non-compliance involving the overriding of safety device(s) is detected, the occupiers, crane owners or employers shall conduct an investigation and take necessary remedial actions to prevent recurrence.

the crane to override safety devices during lifting operations and for lifting of loads beyond the safe working load of the crane are strictly prohibited. Under Regulation 21(7) of the Workplace Safety and Health (General Provisions) Regulations, lifting appliances and lifting machines can only be loaded beyond their safe working loads when directed by an Authorised Examiner or an inspector for the purpose of testing such lifting appliance or lifting machine.

5 The above circular is for immediate compliance.

[1] Mobile crane means a crane mounted on a truck, crawler or on wheels and includes any crane of a type shown in the First Schedule of the Workplace Safety and Health (Operation of Cranes) Regulations 2011.

Mobile crane or tower crane

- No person shall operate a mobile crane (not being a lorry crane) or tower crane unless he is a registered crane operator.
- 2-year validity
- Medical exam requirements (>=50 years)

Lorry crane

- No person shall operate a lorry crane in a workplace unless he has successfully completed a training course acceptable to the Commissioner.
- 5-year validity

Training Requirements

Overhead, gantry, pillar or portal crane

- Operator to attend a customised training conducted by the manufacturer or supplier of the equipment or a competent person authorised by the manufacturer to conduct the training.
- Maintain details of training records.

MEWP

- Operator to attend and pass a MEWP training course conducted by MOM ATP specific to the type of MEWP (BL, SL, VPP)
- Familiarisation training on model of MEWP
- 5-year validity

Training Requirements

Lifting supervisor

- Successfully complete a training course acceptable to the Commissioner to equip the person to be a lifting supervisor.
- To be appointed before any lifting operation involving the use of **any crane**.

Rigger & signalman

- Successfully complete a training course acceptable to the Commissioner to equip the person to be a rigger/signalman.
- To be appointed before any lifting operation involving the use of **any mobile crane or tower crane.**
- While not mandatory to be appointed for other cranes, the persons carrying out the required work (i.e. rigging and signalling) shall be **trained and competent.**

Training Requirements

Refer to WSH (Operation of Cranes) for respective duties of crane operator, lifting supervisor, rigger and signalman.

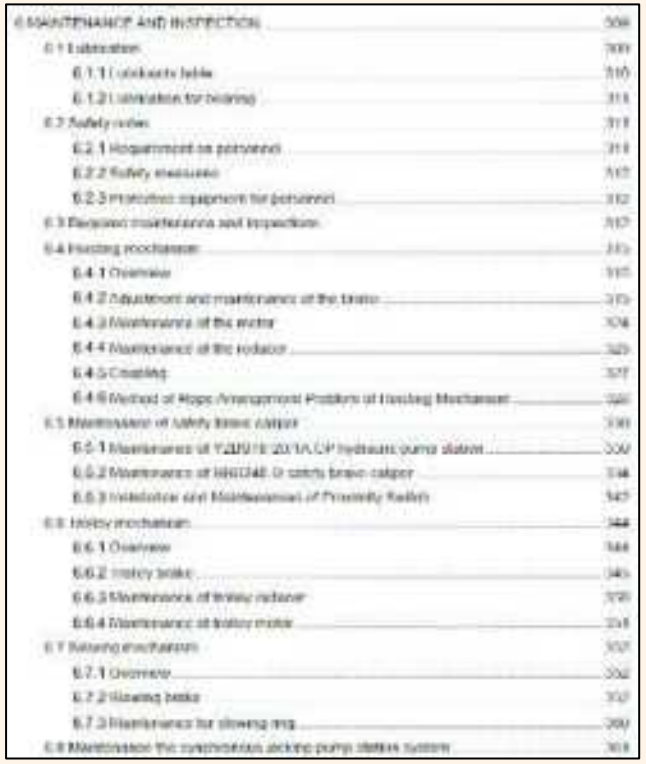
Maintenance of Lifting Equipment

WSH (General Provisions) Regulations:

(16) It shall be the duty of the owner of a lifting appliance or lifting machine to ensure that it is —

(*a*) of good mechanical construction, sound material and adequate strength; and

(*b*) properly maintained.



Maintenance of Lifting Equipment

Maintenance/inspection intervals	Task to be performed
Check when starting up the crane and before every erection.	Slewing ring③: Grease the ball track and gear teeth
	Check the wire ropes and rope end fittings
	Check the hook⑥
	Telescoping equipment④: Grease the Pins and guide section rollers
	Check the twist compensator during every erection
	Grease all Pins during every erection
	Check each framework part and connective part
	Check each electric control implement and security implement
	Check the quality and quantity of the oil in the reducer of hoisting mechanism
	Check the quality and quantity of the oil in the climbing mechanism
Daily check	Slewing mechanism ② brake
	Trolley mechanism ⑤ brake
	Hoisting mechanism ① brake
	Travelling mechanism brake
	Rope release implement
Weekly maintenance	Slewing ring③—Grease the gear teeth, see Fig. 6-1
	Check the electric control implement, cable and electric wire
	Check the security implement (load moment limiter, load limiter, trolling limiter, slewing limiter, hoisting limiter)
Monthly maintenance	Grease the wire ropes
	Grease the rope pulleys
	Grease the winch drum bearing
	Fill with hydraulic oil in the climbing pump station
	Inspect the high-tensile bolt connections 1 month after erection
	Travel gear: Grease the wheel bearings and the inside face of the flanges
	Hoisting gear①: Fill the reducer with Oil
	Check the stability of the vital framework, important weld and connection parts (bolts and pins)

Maintenance/inspection intervals	Task to be performed
Half-yearly maintenance	Grease all lubricating nipples
	Check the twist compensator
	Motor bearing: change oil after 1500 operation hours, once a year at least
Yearly maintenance	Inspect the high-tensile bolt connections and grease the bolt
	Check the hook⑥
	Check freedom of the movement of the hinged joint of front window of the cabin and lubricate it regularly
After 2000 operation hours	Oil change in the reduction of slewing mechanism②
	Oil change in the reduction of hoist mechanism①
	Oil change in the reduction of trolley mechanism⑤
	Oil change in the brake of hoisting mechanism ①
	Oil change in the trolley travel reducer
	Oil change in climbing mechanism④ after 2400 operation hours

Dismantling and Storage

- Occupiers
- Approved Crane Contractors
- Manufacturers & Suppliers
- Owners

- Safe dismantling by approved crane contractors
- Proper storage

Lessons Learnt from Past Incidents

Case 1 : Crawler Crane

The crane was positioned between 2 vessels. After lifting a pipe onto 1 vessel, the operator was slewing the crane to face the yard when the boom collapsed backwards.

For the boom and fly jib to avoid colliding with the vessel, the crane had to be operated at a minimum radius of about 7.5m. However, the minimum radius that the crane could function was 8.5m.

- Inadequate planning
- Use of bypass limit switch

Case 2 : Mobile Crane

After completing a lifting operation, the operator retracted the boom. About 30 mins later, he was instructed to relocate the crane to another lifting area.

The operator then retracted the outriggers when the boom was about 60 deg. He accidentally slewed the boom to the side, causing the crane to overturn.

- Failure to extend outriggers
- No proper procedures for mob/demob

Case 3 : MEWP

2 workers were using a boom lift to perform grit blasting works when the 2nd boom section of the boom lift buckled at a point near the end of the 1st boom section.

- Inadequate RA
- Poor maintenance regime, use of standard checklist not aligned with manufacturer's instructions on internal components.

Key Takeaways

- Regulatory framework for LE is based on a **life-cycle approach:**
  - Import → Installation → Operation & Maintenance → Dismantling & Storage

- Associated **hazards** include:
  - Struck by falling objects, machines or moving parts
  - Crushing
  - Overturning of machines
  - Parts failure.

- **Preventive** actions are critical safeguards
  - Adequate planning prior to lifting
  - Safety checks
  - Management of lifting operations
  - Maintenance schedules
  - Training and competency

Thank you

Ministry of Manpower

WSHCOUNCIL
Tripartite Alliance for Workplace Safety and Health

Staying Afloat:
Selection, Inspection, Use, and Maintenance of Life Jackets

15 May 2025

Capt Mohd Salleh A Sarwan

Co-Chair

Working Group (Personal Flotation Devices)

Workplace Safety and Health Council

Key takeaways

- **Selection**: Choose life jackets suited to different work environments.
- **Inspection**: Conduct a pre-use visual inspection to ensure the life jacket is in good condition and can be relied upon in the event of an emergency.
- **Use & Maintenance**: Apply good practices for proper life jacket usage and upkeep.

Case Studies 1

Technician fell into the sea while crossing from tanker to service boat using an accommodation ladder

Accident Description

- On 17 May 2022, a technician fell overboard when he disembarked from a tanker to a service boat.
- He went out of sight and his body was recovered four days later.

Accident Findings

- The technician was wearing a manually inflated life jacket, but it was not inflated at the time of accident.
- It is unclear if the technician was disoriented or in a state of panic, unfamiliar with how to manually inflate the lifejacket, or influenced by the misleading label, which included instructions for both manual and automatic activation lifejacket.

Case Studies 2

Shore technician fell into the sea when disembarking a vessel to board a launch boat using a pilot ladder

Accident Description

- On 16 February 2021, while disembarking from a vessel to board a launch boat via a pilot ladder, a Shore Technician (ST) fell into the sea.
- The ST was brought out of the water after some time and was sent to the hospital where he was pronounced dead.

Accident Findings

- The lifejacket worn by the ST may have been equivalent to life jacket of performance level 100, meant for sheltered or calm waters.
- The life jacket was unsuitable for non-swimmers, stated in the manual.
- The ST carried a backpack of about 8kg, which might have affected the ST's ability to stay afloat.

Case Studies 3

Worker drowned after falling into river

Accident Description

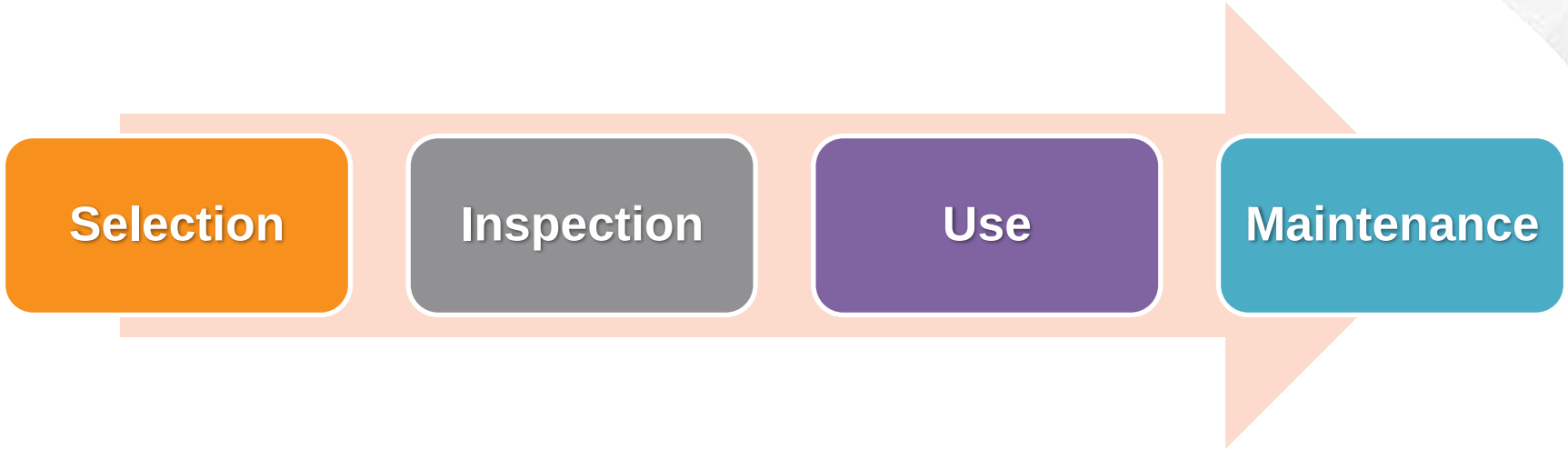
- On 12 March 2019, two river cruise workers were on night shift duty to berth and charge the electric boats at the jetty.
- One of them was found missing and his body was found floating on the water 16 hours later.

Accident Findings

- The worker did not know how to swim and was not wearing a life jacket.
- The worker likely exited the work area through an unsafe path.

Managing Life Jackets

Systematic Approach



Selection

Introduction

- Personal Flotation Device (PFD), when correctly worn and used, provides buoyancy and increases the likelihood of survival should a person fall into water.

- Life jacket is a type of PFD.

- The life jacket maintains the user in a face-up flotation position, with various levels of performance suitable for sheltered and non-sheltered waters.

- Types of life jacket:
  - Foam Type
  - Automatic/ Manual Gas Inflation Type

Selection

Performance Level

- Employers and life jacket users are advised to conduct a thorough risk assessment that is specific to their nature of their work before selecting a life jacket of appropriate performance level for the work activity.

Performance level *(determined using risk assessment)*	100	For use in sheltered or calm waters (e.g., swimming pools, reservoirs, or ponds). Not suitable for rough water condition or when there is wave splash.
	150	For use in non-sheltered (e.g., anchorages), rough or offshore waters.
	275	For use in offshore under severe weather or sea conditions.

Selection

Mandatory ISO 12402 life jacket accessories

Performance Level	Reflective Material	Whistle	Lifting Loop
100	✓	✓	✗
150	✓	✓	✓
275	✓	✓	✓

Inspection

Examples of defective or worn life jackets

- Discoloured and torn foam life jacket
- Damaged stitches on an inflatable life jacket
- Corroded gas cartridge

Use

Ensure Life Jacket is of a Good Fit

- Choose the right size life jacket
- Follow the manufacturer’s instructions to put it on
- Adjust the straps for a snug fit
- Ensure no more than a fist’s width between your body and the buckle.

Maintenance

- To prolong the lifespan of a life jacket, clean it before storage and to store it in an environment that does not cause the life jacket material(s) to degrade; e.g., to air-dry the life jacket in a well-ventilated area.

- To ensure that the life jacket is reliable and functions properly during emergencies, regular life jacket maintenance (specified by the manufacturer) is crucial.

- Inflatable life jackets typically need yearly servicing at an authorized service station.

For more information, refer to:

- Workplace Safety and Health Act
- WSH (General Provisions) Regulations
- WSH (Risk Management) Regulations
- Code of Practice on Workplace Safety and Health Risk Management
- Code of Practice for Working Safely at Heights
- ISO 12402: 2020 Personal Flotation Devices (Life jackets and Buoyancy Aids)
- International Convention for the Safety of Life at Sea (SOLAS), 1974
- LSA Code - International Life-Saving Appliance Code – Resolution MSC.48(66)
- Maritime And Port Authority's Guidelines for Safe Transfer of Persons Between Vessels at Anchorages
- WSH Council's Guide to WSH for Service Providers on Safe Working on Ships at Anchorages
- WSH Council's Guide to WSH Obligations for Shipmasters and Contractors for Anchorage Works
- WSH Council's Case Studies on Working in and Around Water
- SS 701:2023 Code of Practice for inland and open water sporting activities

Thank you

TAKE TIME TO TAKE CARE
of Each Other's Safety and Health

National Trades Union Congress

NTUC Training and Placement Ecosystem

Powered by:

Training and Transformation

e2i

LearningHub

OTC

Supporting the Marine & Offshore Energy Sector for Workforce & Business Transformation

#EVERY WORKER MATTERS

MEMBERSFIRST WORKERSALWAYS

Supporting Workforce and Business Transformation With Total Training & Placement Solutions

Speaker: Mr Ivan Lee, Assistant Director, NTUC Training and Transformation

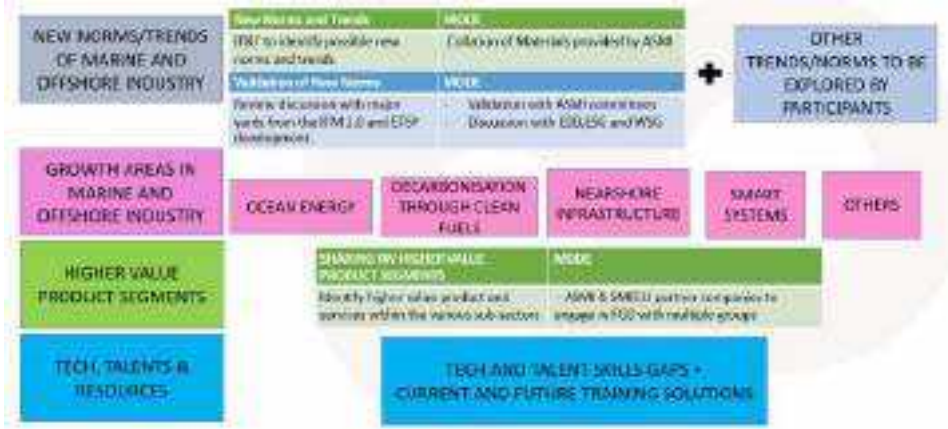
For more information, visit our website by scanning the QR code or email to ivan_lee@ntuc.org.sg

www.bitly.com/NTUCT&T

Find out more here

Sectorial Collaboration with ASMI – SMEEU supported by NTUC Training & Placement Ecosystem

M&O Capability Building Roadmap



Youth Mentorship Programme

Marine & Offshore Transformation Initiative (MOTI)

- Marine Décarbonisation Champion
- Marine Digitalisation Champion

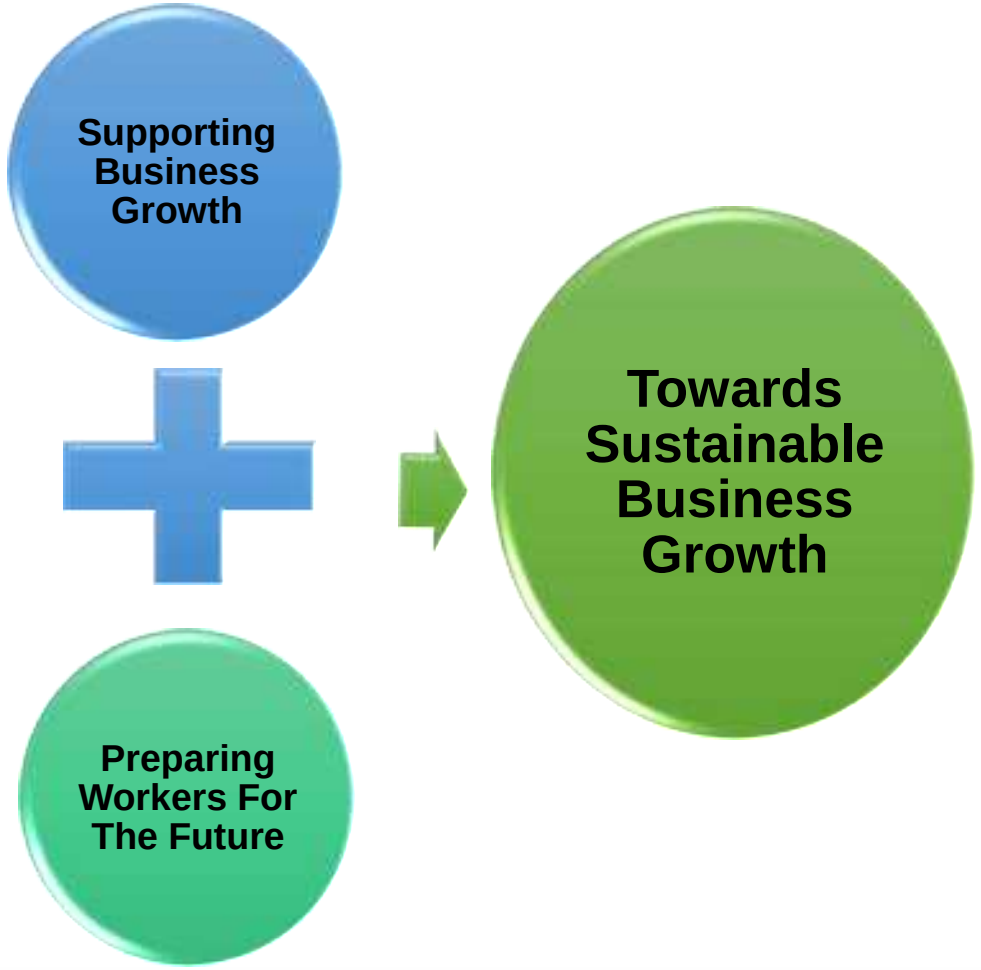
Here are some of the success stories made possible by CTC...

Company Training Committee (CTC) Partnership

Partnership between Company and NTUC to:

- **Develop roadmap** for growth and transformation
- **Upgrade capabilities** and **redesign jobs**
- **Upskill workforce** for business and industry changes
- **Leverage tools and resources** for implementation

To-date, over 2700 Companies have embarked on CTC partnership with NTUC.



NTUC Training and Placement Ecosystem
Supporting Companies and Workers in Business and Workforce Transformation

Strategy Planning
Assess readiness and develop robust transformation plans through **Operation and Technology Roadmap (OTR)**

Skills Training
Build competencies in line with business and industry needs with **customised learning solutions and funding support**

Capabilities Upgrade
Enhance productivity and redesign jobs through **Company Training Committee (CTC) Grant**

Job Matching
Attract and match suitable talent from within and across sectors, with **career conversion programmes**

Bipartite Partnership
Strengthen labour management partnership to support transformation, with **customised labour-management programmes**

NTUC Training and Placement Ecosystem

Powered by:

e2i Better Jobs For Life Employment and Employability Institute | ntuc LearningHub | ntuc Training and Transformation | OTC

Assess Your Organisation's Readiness to Transform and Achieve Sustainability Goals

Through ESG Assessment for Sustainability Transformation (EAST)

ESG Assessment for Sustainability Transformation – EAST (Full Assessment)

Scan to register

For companies who wish to have a comprehensive assessment with **ESG Certificate and Performance Benchmark** (for large companies only), you may scan to register for **EAST (Full Assessment)**.

NTUC Sustainability Team / Grant Thornton will follow up on the administration process.

Additional (Optional)

ESG Survey

ESG Score + Performance Benchmark

Complimentary

ESG Certificate

Action Plan

Assess Your Organisation's AI Maturity & Readiness

Through AI Readiness Index (AIRI)

What is AI Readiness Index (AIRI)?

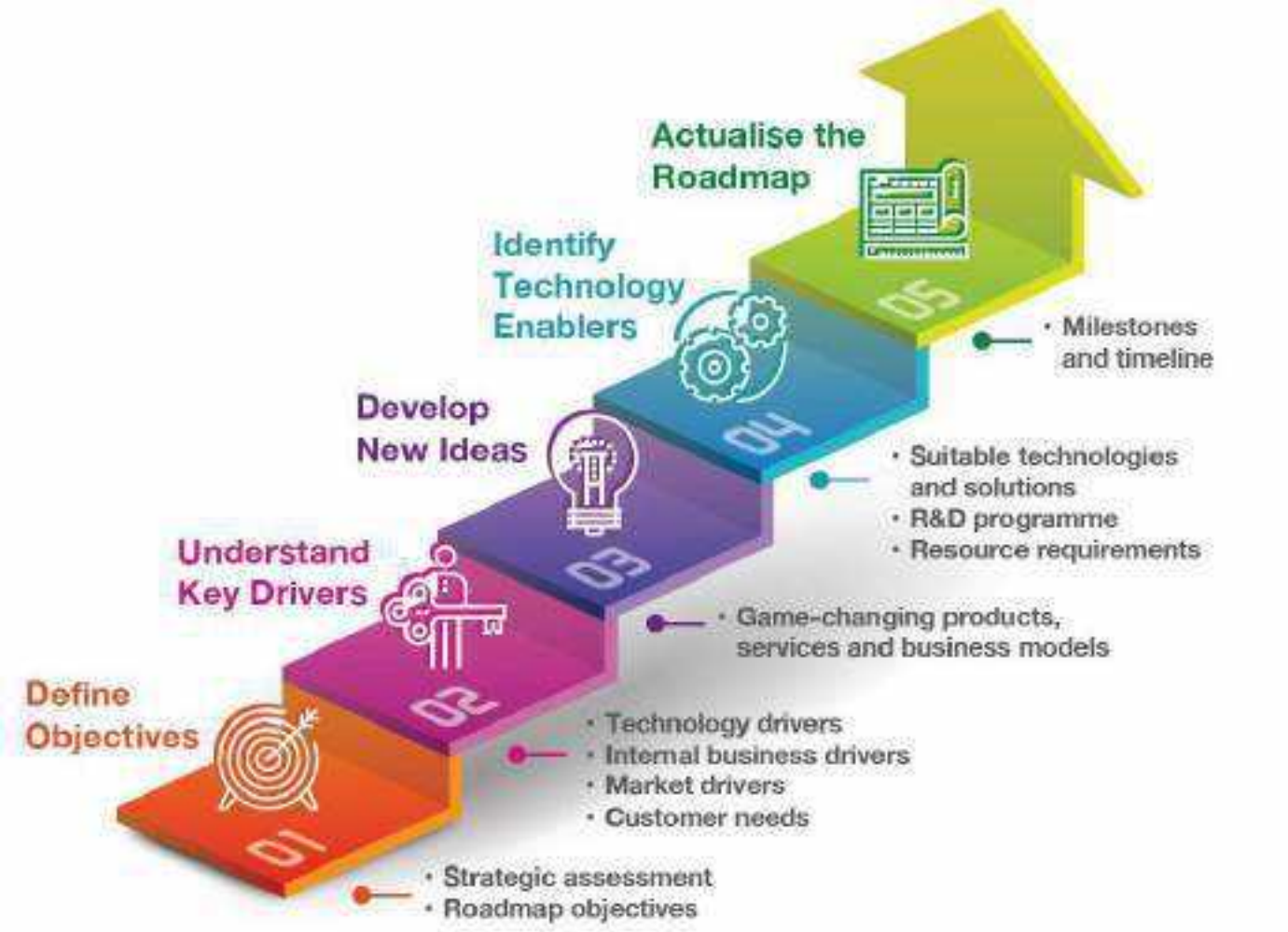
- An industry-focused AI readiness assessment framework developed by AI Singapore (AISG)
- AIRI crystallises and distils the critical success factors for AI adoption across different industries, sizes, and AI readiness
- NTUC and AISG partners to support organisations to **understand current situation and identify ways to begin AI transformation, regardless of where the organisation is**

Co-Create Business & Workforce Transformation Plan

Through Operation & Technology Roadmap (OTR)

Developing a Customised Transformation Roadmap at Company Level

Leveraging Operation & Technology Roadmap (OTR) Methodology



- Ensures that investment in growth and upgrade is of **strategic value**
- **Build collective ownership** cross-functional company management and union leaders / workers representatives
- **Structured planning workshops** facilitated by Industry Training Officers (ITOs)
- **Fully subsidised** for companies with Company Training Committee (CTC) partnership

Your Transformation Support Journey

CTC Partnership

Formalise partnership between your business and NTUC to transform business and upgrade workforce

Check-In

Discussion on your business priorities

Where We Are Today

AI Readiness Index (AIRI)

Assessment and joint planning on leveraging AI to upgrade operations and workforce

ESG Assessment for Sustainability Transformation (EAST)

Assessment and joint planning on transforming sustainability and meeting ESG goals

Operation & Technology Roadmap (OTR)

Develop a holistic future-ready roadmap with drivers, new strategy, products / services and new capabilities

How Should We Move Forward?

Capabilities Upgrade

Tap on funding and resources to bring in new technologies, redesign jobs and upskill workforce

TAP ON THE NTUC CTC GRANT FOR YOUR TRANSFORMATION PROJECT

What is the NTUC CTC Grant?

The NTUC CTC Grant supports companies that have formed CTCs to implement transformation plans that will lead to better worker and business outcomes. It provides funding support of up to 70% of the qualifying cost for each project, for items such as equipment, software, consultancy etc.

Who can apply for the NTUC CTC Grant?

Entities[1] legally registered or incorporated in Singapore i.e. companies, societies, non-profit organisations such as charities and social service agencies are welcome to apply.

What are the objectives that the transformation project needs to achieve?

1. Enterprise transformation: Enhanced business capabilities, innovation and/or productivity.
2. Workforce transformation: Improved employment outcomes for local workers (SC/SPR) through efforts such as job redesign. Commitment to worker outcomes include:
(i) wage increase; and/or (ii) implementation of Career Development Plan (CDP) for staff.

[1] Government bodies, statutory boards, organs of state and wholly-owned subsidiaries are not eligible.

What Can Be Supported Under the Grant?

Components can be supported if they are related to the transformation project, achieving business and worker outcomes.

They include:

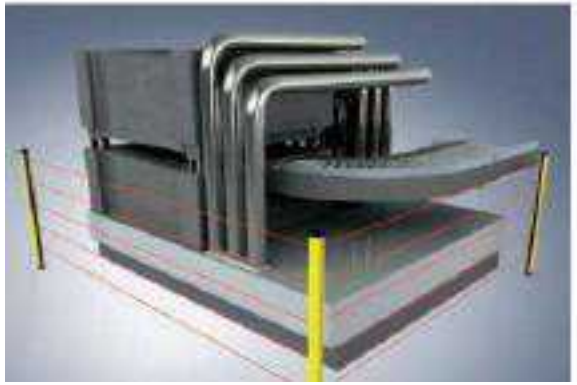
- Equipment
- Software

- Consultancy

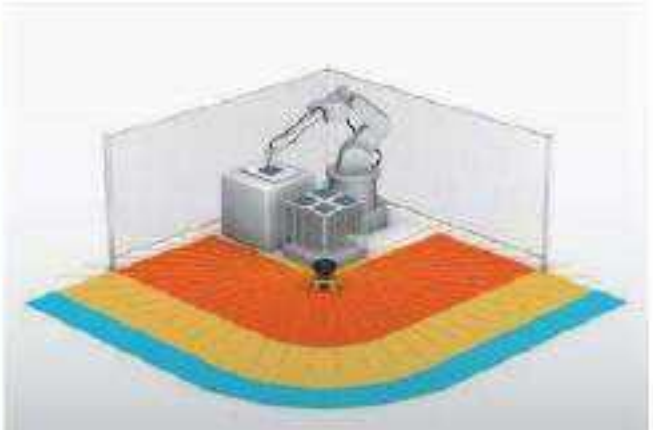
- Training

CTC Grant for Machine Barrier Solutions

Safety light curtains



Safety laser scanners



Fences with Interlock devices

-adapted from WSH Institute

CTC Grant for Video Analytics

Example of VA scenarios

Geofencing

PPE detection

Open edge detection

Worker under lifting load

Smoke detection

Worker near vehicle or machinery

Slips, Trips and Falls

Housekeeping

-adapted from WSH Institute

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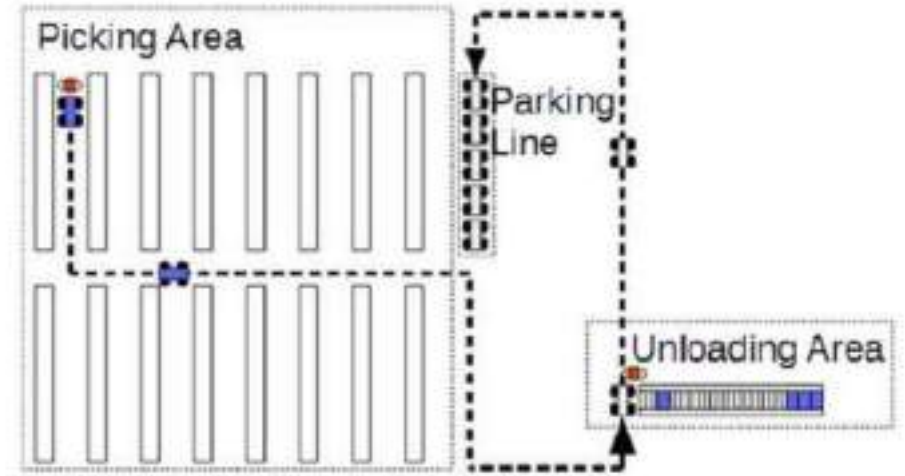
CTC Grant for Robotic Solutions

Lifting pallet goods without on-site human operators



Source: TAG Industrial

-adapted from WSH Institute

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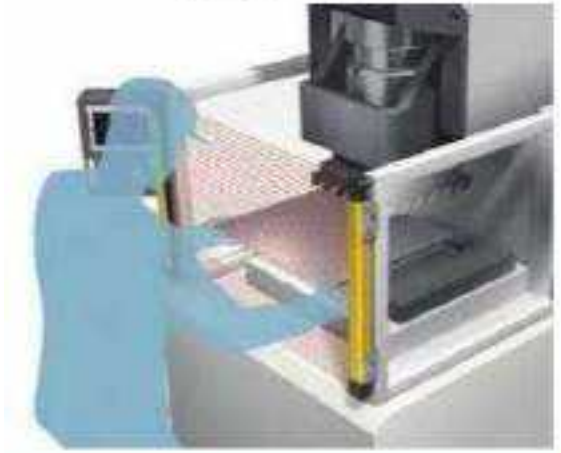
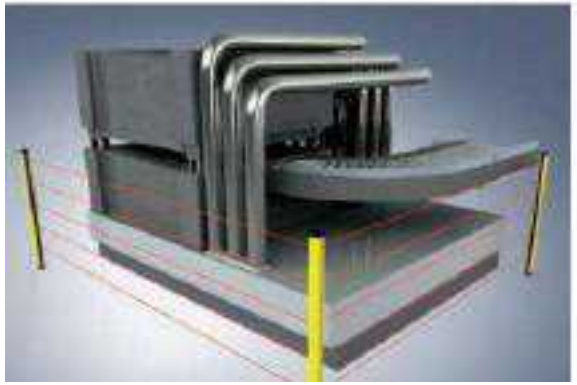
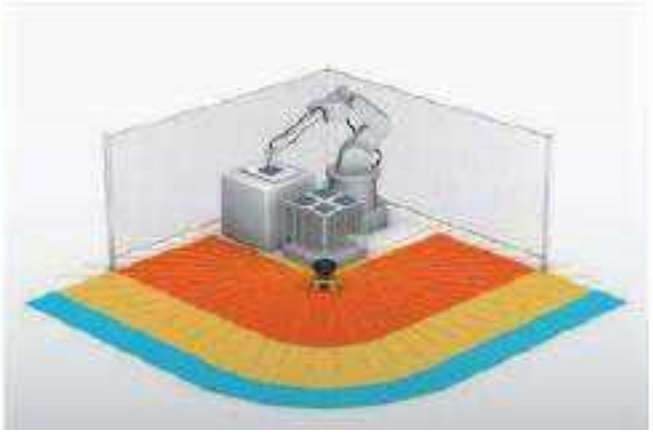
CTC Grant for Machine Barrier Solutions

Safety light curtains





Safety laser scanners



Fences with Interlock devices

-adapted from WSH Institute

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Many M&O Companies Supported By NTUC Through CTC Partnership...

National Trades Union Congress

Thank You

#EVERY WORKER MATTERS

MEMBERSFIRST WORKERSALWAYS

WSH Performance and Common WSH Contraventions for Marine Industry

ASMI 27th WSH Convention

Mr. Dzul Fazly, Senior WSH Inspector, Occupational Safety and Health Inspectorate

Ministry of Manpower

Empowered *Workforce*,
Thriving *Workplaces*

Contents

Duty Holders under WSH Act

Ministry of Manpower

Duty Holders under WSH Act for Marine Industry

The Workplace Safety and Health Act (WSHA) *came into effect on 1 March 2006, replacing the former Factories Act*

Major accidents in 2004

Key Principles

- **Reduce Risks at Source**
- **Impart Greater Industry Ownership of WSH Outcomes**
- **Prevent Accidents through Higher Penalties for Poor WSH Management**

Principals
e.g. Ship Agents

Occupiers
e.g. Ship Operator/Manager, Shipyards

Employers
e.g. Shipyards, Marine/Diving Contractors

Employees
e.g. Divers, Marine workers

Duty Holders
Persons who have duties and responsibilities

Erectors & Installers

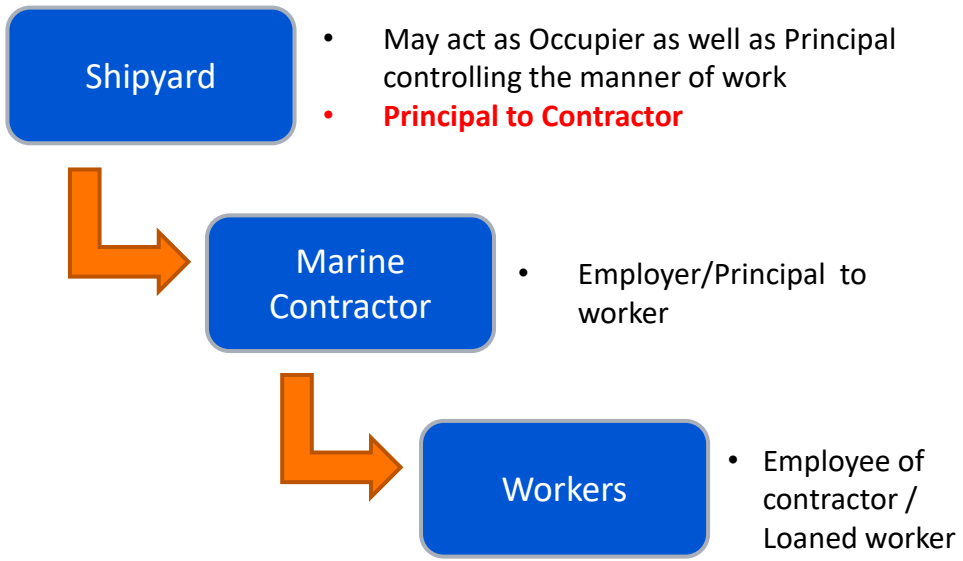
Self-employed
e.g. Divers

Manufacturers & Suppliers

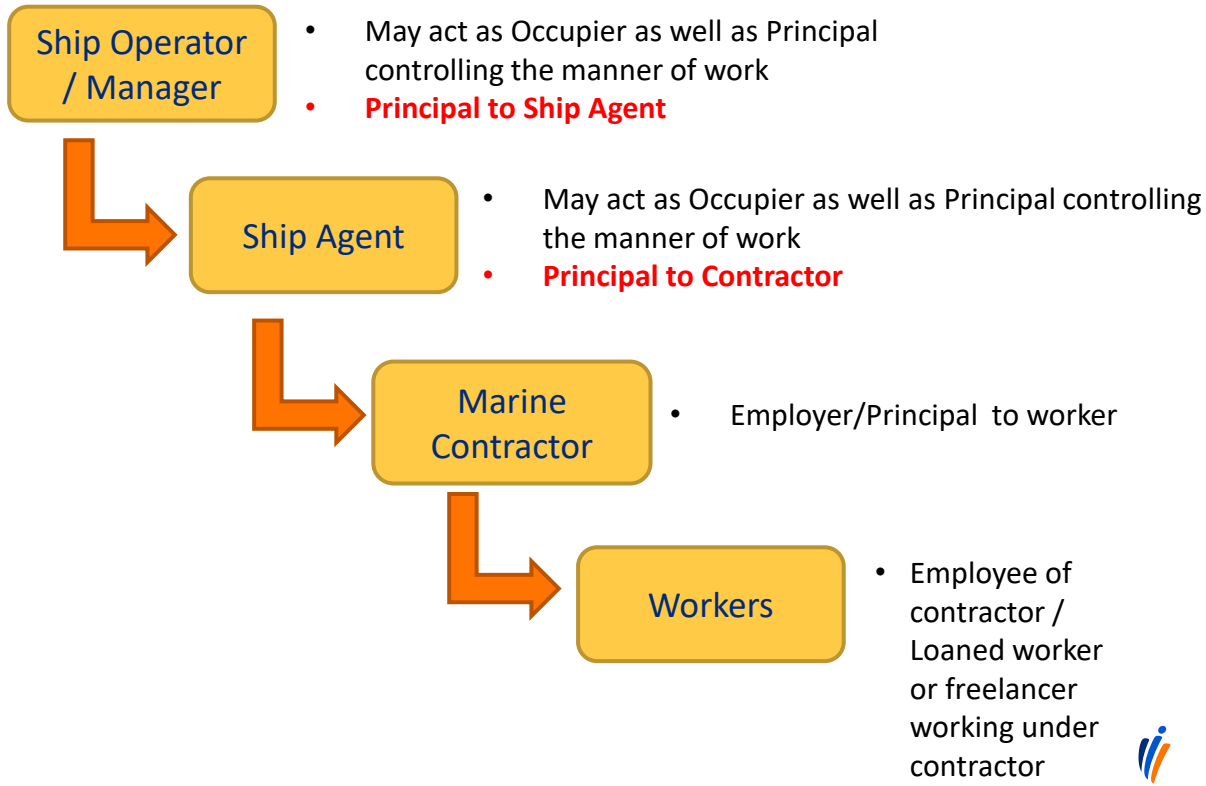
Relationship between various stakeholders in Marine Industry

The WSH relationship between various stakeholders can come in various permutations:

<u>Relationship 1</u>



<u>Relationship 2</u>



Responsibilities of Various Duty-holders under WSH Act

Types of Duty-holders	Duties under the WSH Act
Occupier (s11)	Ensure that: (a) the workplace; (b) all points of access and egress; and (c) all items kept within the workplace are safe and pose no health risks to any person (including visitors and members of the public) on the premises.
Employer (s12)	The Employer or Principal must safeguard the safety and health of all workers (including employees, loaned workers and freelancers) working under their direction, as well as any persons who may be affected by their work activities (such as members of the public).
Principal (s14) - Direct the manner of work carried out by workers.	
Principal (s14A) - Does **not** direct the manner of work carried out by workers.	Ensure that all contractors possess the necessary expertise and implement sufficient WSH measures to execute their works and verify the training qualifications and competency of their workers.

Responsibilities of Various Duty-holders under WSH Act

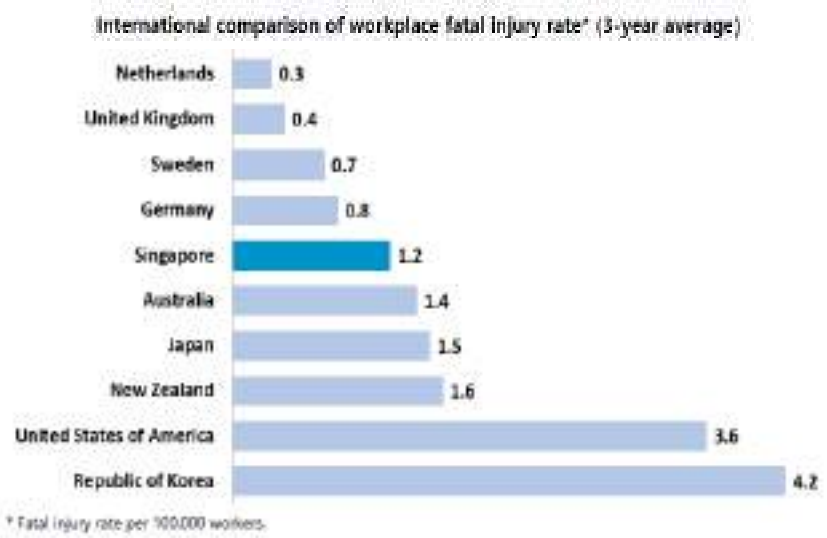
Delegation of Responsibilities on Duty-holders
1) A person may **simultaneously hold two or more duty-holder positions**, and consequently, the WSH Act may impose corresponding duties or liabilities upon that person.
2) The WSH Act may **simultaneously impose identical duties or liabilities on two or more persons**, regardless of whether they serve in the same or different capacities.
3) A duty or liability imposed by the WSH Act on any person **remains undiminished and fully enforceable**, even when the same obligation is imposed on others, regardless of their capacities.

WSH Performance for Marine Industry

Ministry of Manpower

At national level, steady decline in workplace fatality rate over the years (2015-2024)

Number and rate of workplace fatal injuries, 2015-2024



However, there is an alarming increase in fatalities at anchorages

Marine industry recorded five fatalities in 2024, a significant increase from zero in 2023. 4 of the 5 fatalities (80%) occurred at anchorages

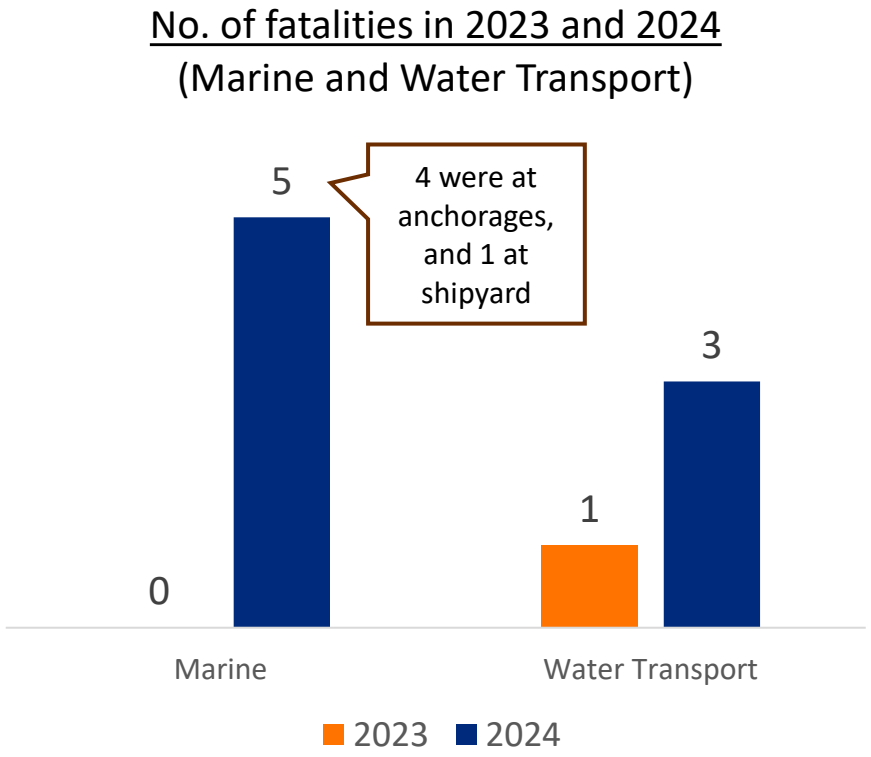
Number and rate of workplace fatal injuries for Marine Industry, 2017-2024

Incidents with higher fatality risk in Marine industry were attributed to workers struck by moving objects, falling from height and drowning

Common incident type (cause) for fatal and major injuries in 2024

Marine			
Type A		**Type B**	
Incident Type (Cause)	**2024**	**Incident Type (Cause)**	**2024**
Struck by Moving Objects	5	Slips, Trips & Falls	5
Falls from Height	3		
Suffocation/Drowning	2		
Vehicular Incidents	2		
Caught in/Between Objects	2		
Struck by Falling Objects	2		

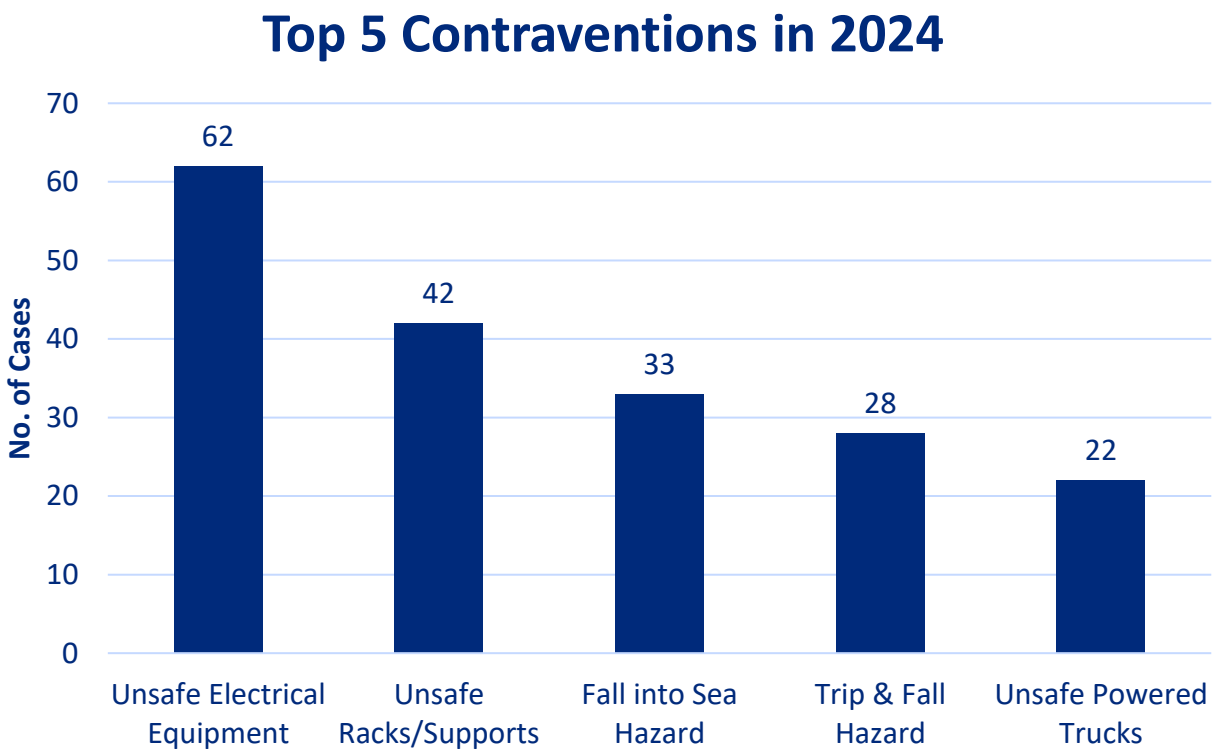
Other than the 4 fatalities at anchorages, 3 other fatalities occurred on water transport vessels



Locations	• 4 occurred at **anchorages** involving foreign-registered vessels. • 3 occurred on **water transport vessels**.
Direct causes	• 2 involved common hazards (fall through opening, oxygen deficiency in confined space) • 2 involved diving operations (failure to surface after expired diving time, entanglement with boat propellers during hull cleaning) • 3 were vessel-related (sinking of tugboats, falling overboard from single man craft)

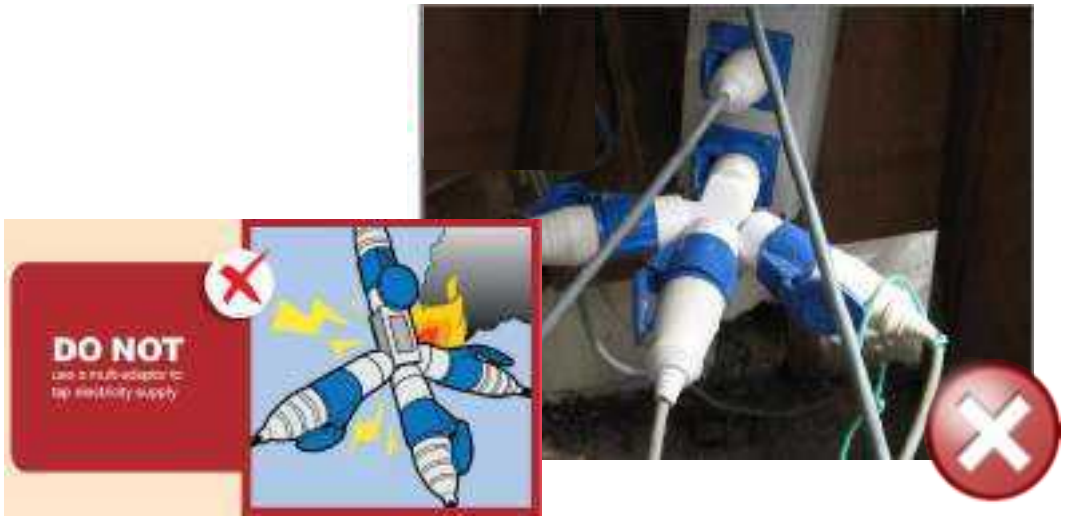
Marine Industry Inspections (2024)	
No. of Stop Work Orders	2
No. of Contraventions	537
Total fines issued	$62,350

Top Contraventions from Marine Industry Inspections



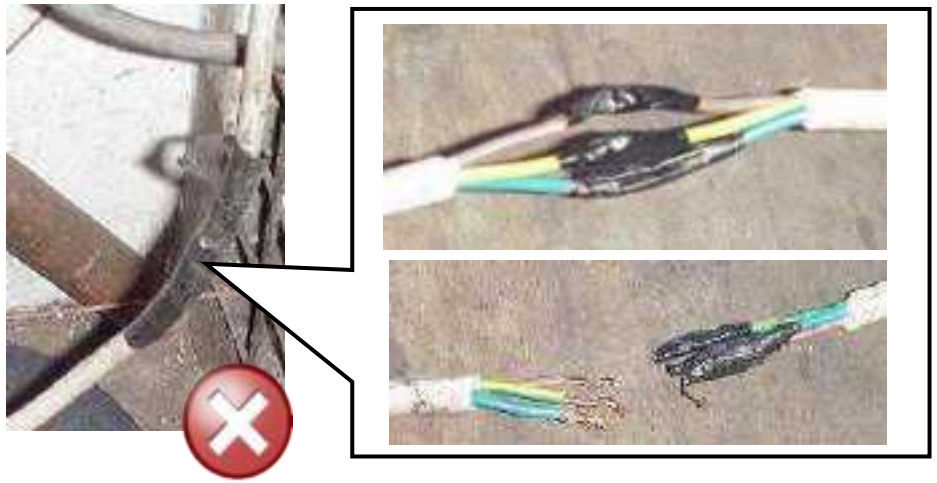
(1) Key Findings: Unsafe Electrical Equipment

Risk of fire hazards from use of multi-adaptor



No intermediate barrier

No PVC-taped joint is allowed.

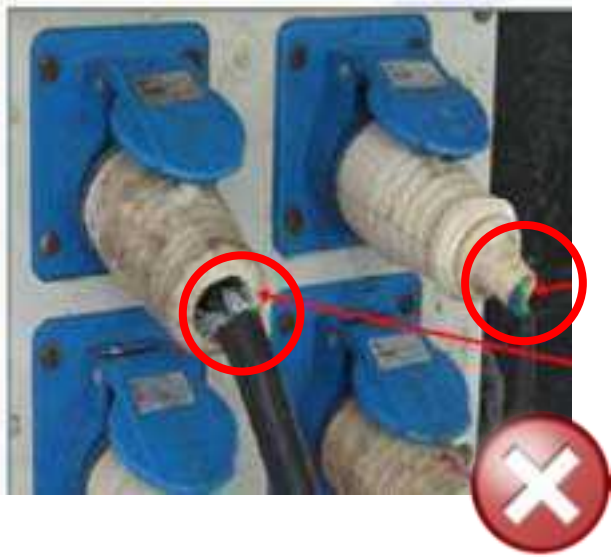


(1) Key Findings: Unsafe Electrical Equipment

Electric welder with exposed connectors (conductors)

Connectors covered with insulating shield

Flexible cable not secured



(2) Key Findings: Unsafe Supporting Structures

Safe Working Loads (SWLs) are not indicated on storage racks.

Safety pin missing from storage rack.

(3) Key Findings: Open Sides at Seafront/Vessels

Lack of or inadequate guardrails or barriers

(4) Key Findings: Trip & Fall hazards

Edges of metal plates protruding off the ground, which posed risk of trip and fall.

Electrical cables & hoses found lying haphazardly on the workshop's passageway

18

(5) Key Findings: Use of Powered Trucks

Worn-out Tyre

Damaged Signal Light

Missing (Proper) Fork Locking Pin

Case Study on Toppled Forklift

Ministry of Manpower

Case Study of Fatal Accident involving Toppled Forklift

Brief Facts

- In Mar 2022, the Deceased was operating a forklift down a ramp of the shipyard. The forklift was fitted with a boom attachment and was raised to about 3.5m high to suspend a steel receptacle (containing the said counterweights) via a lifting gear.

- The Deceased was travelling in a forward direction down the ramp when the forklift suddenly toppled onto its left.

- The Deceased was trapped under the forklift and was subsequently extricated by co-workers. He was conveyed to the hospital but succumbed to his injuries.

Case Study of Fatal Accident involving Toppled Forklift

Key Findings

- The forklift's mast had been elevated to a height of approximately 3.5m and was fitted with a boom attachment on its fork. It was used to lift the cage (filled with counterweights) using webbing sling connected to the cage

- The webbing sling lacked a valid certificate of examination and test from an authorised examiner.

- Deceased had also not fastened his forklift's seatbelt.

Case Study of Fatal Accident involving Toppled Forklift

Key Findings

- The boom attachment was fabricated by occupier which was not authorized or approved by forklift manufacturer/supplier. Hence, no revised forklift load chart available.

- Forklift operators not trained on the use of boom attachment or informed of its associated hazards.

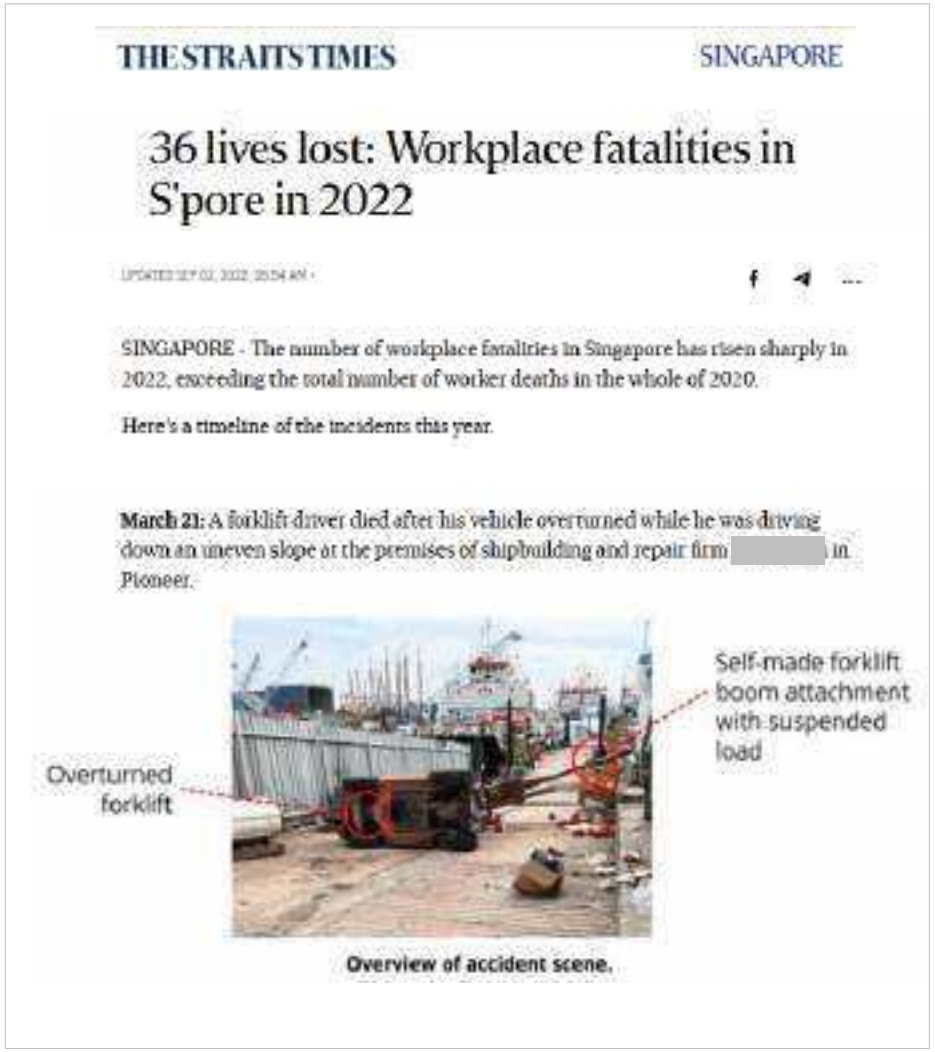
- Weights of boom attachment and cage were not determined or communicated to forklift operators before the lifting operation.

- No risk assessment had been conducted to evaluate additional hazards associated with slinging loads on the boom attachment, such as rigging and hoisting operations or travelling with suspended loads.

Case Study of Fatal Accident involving Toppled Forklift

Enforcement Actions Taken

- The company pleaded guilty and was convicted, receiving a fine of $180,000.
- The Workplace Safety and Health Officer (WSHO) was issued a composition fine of $2,500.



THE STRAITS TIMES SINGAPORE

36 lives lost: Workplace fatalities in S'pore in 2022

SINGAPORE - The number of workplace fatalities in Singapore has risen sharply in 2022, exceeding the total number of worker deaths in the whole of 2020.

Here's a timeline of the incidents this year.

March 21: A forklift driver died after his vehicle overturned while he was driving down an uneven slope at the premises of shipbuilding and repair firm [redacted] in Pioneer.

Overview of accident scene.

Safe Forklift Operation

Following the accident, the WSH Council issued an WSH Alert to raise industry awareness regarding safe forklift operation and necessary risk control measures to prevent similar incidents.

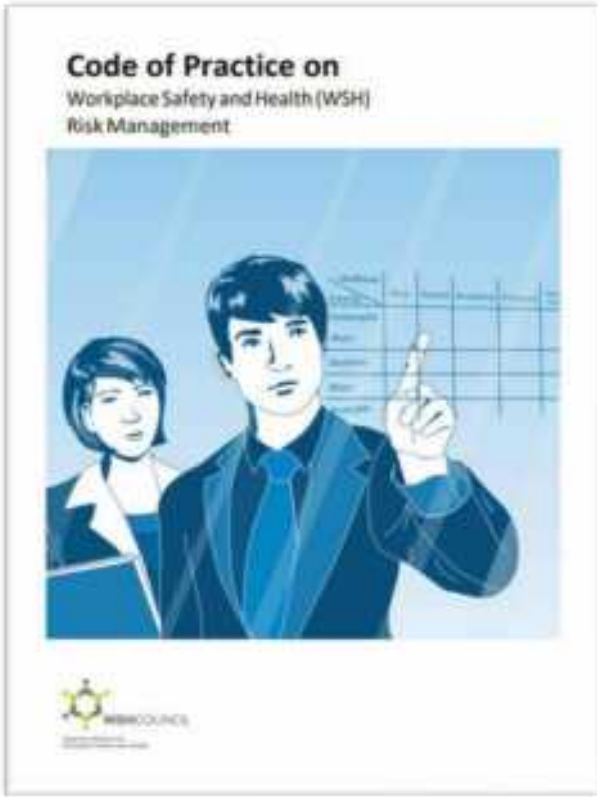
The key recommendations included:

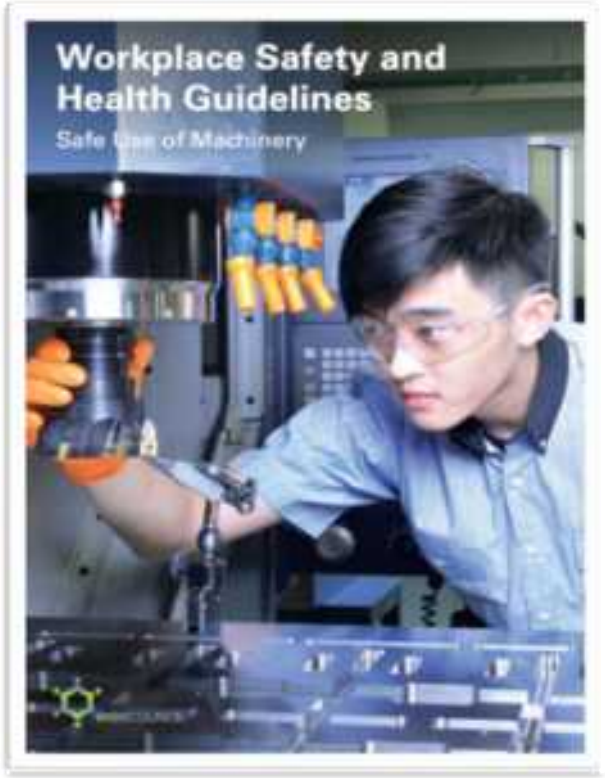
- Ensuring only competent, licensed and authorised operators are permitted to operate forklifts
- Prohibiting the suspension of loads from forklifts or their attachments unless manufacturer-approved
- Using only manufacturer-approved attachments
- Maintaining loads within the forklift's rated capacity
- Ensuring ground conditions are safe for operation
- Enforcing mandatory seatbelt use

WSHCOUNCIL

Tripartite Alliance for Workplace Safety and Health

Visit www.tal.sg/wshc for more resources





Thank you

Ministry of Manpower

ASMI 27th Workplace Safety & Health Convention

15 May 2025

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