Useful Tips for Operators

- The forklift operator should belt up. The seatbelt ensures that the operator remains within the cabin should the forklift overturn
- Forklifts should be operated with forks at low position at all times
- Forklifts should not be made to turn and raise the load simultaneously
- No sudden sharp turns to be made
- The brakes should not be applied suddenly especially when the forklift is loaded
- Keep to low speeds
- Watch out for overhead obstructions such as pipes and beams
- Slow down and horn when approaching corners or blind spots
- Apply the handbrake before disembarking from the forklift truck
- Travel in reverse when front vision is blocked
- Conduct daily inspection of the forklift using the checklist
- Apply the handbrake before disembarking from the forklift truck

The Singapore Standard is available from:

SPRING Singapore
Information Resource Centre
2 Bukit Merah Centre
#04-00 S159835
Tel: (65) 6279 3920

The Guidelines on Risk Assessment is available for download from www.mom.gov.sg

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Occupational Safety & Health Technical Advisory
Safe Operation of Forklift Truck
Technical Advisory for Safe Operation of Forklift Truck

This Technical Advisory (TA) provides general information regarding the management, safe operation and maintenance of forklifts (called “forklifts” in short) at workplaces. The risks associated with working with forklifts and how the risks can be managed is also highlighted in this TA. Through this TA, we hope to raise awareness on the safe operation of forklifts and prevent accidents involving forklifts.

1 Background

In the year 2006, nine workers were killed in work-related forklift accidents. In these accidents, the cause of death is as follow:
- The workers were fatally crushed by the forklifts which overturned;
- Workers were crushed in between objects and a fork lift;
- Workers were run over by the forklift; and
- Workers were struck by moving forklifts.

Forklift accident investigations revealed the following factors:
- The forklift operators had not undergone proper training in forklift operations but were able to gain access to a forklift.
- Forklifts were often left unattended with the ignition key left on the forklift.
- Lack of a proper control system made it feasible for an untrained person to easily gain unauthorised access to a forklift.
- No clearly demarcated walkways for pedestrians and designated routes or pathways for forklifts. In such instances, the risk of pedestrians being knocked down and run over by forklifts is high.

2 Case Studies

Case Study 1

Forklift operator killed by falling timber

A worker was operating a forklift to transfer some timber from one storage area to another. During the transfer, the bundle of timber that was placed on the forks of the forklift truck hit another pile of timber (stacked up about 4m in height) that was placed along its path. This caused some timber (from the stack of timber) to fall and hit the worker. The worker died on the spot.

Investigations revealed:
- The timber on the fork was not secured.
- The area was too congested for forklift operations.
- The forklift operator had not attended the forklift driver’s training course.

Case Study 2

Reversing forklift collapses shelter and kills worker

A worker had started a forklift truck and engaged the reverse gear. He reversed without keeping a proper lookout and crashed into the steel beam of a nearby warehouse. The warehouse shelter collapsed and a steel rafter struck a co-worker. The co-worker subsequently succumbed to his head injuries in hospital.

Investigations revealed:
- The forklift operator had not attended the forklift driver’s training course.
- The forklift truck was not properly maintained.

3 Hazards of Forklift Trucks

People are often mistaken about forklifts. These seemingly harmless powered vehicles may look like a golf cart, but a more apt comparison would be a dump truck that is compacted into a much smaller size. Thus, having such a vehicle in your workplace would require tight controls.

Local and overseas accident statistics have shown that forklifts are among the most commonly cited agents in workplace fatal accidents and injuries. It is known that forklifts can overturn when it makes a sudden turn or when it is traveling with raised load or forks. Forklift operators would not have sufficient time to react and stop the forklift if it was travelling at high speed. The likely consequence of the above could be injuries to the operator, a person being hit by the forklift and/or property damage.
These accidents can be prevented if employers conduct a risk assessment on forklift operations to identify the risks/hazards. Effective control measures such as having trained operators, systematic traffic management, well maintained forklifts, safe working conditions and effective supervision can be implemented to manage the risks.

4 Risk Management

Employers and contractors are legally required to manage the risks they create under the Workplace Safety and Health (Risk Management) Regulations. Firstly, they have to assess the risks in the workplace and then take all reasonably practicable steps to eliminate any foreseeable risks to ensure the safety and health of workers.

4.1 Three steps of risk assessment

Prior to work commencement, a risk assessment consisting the following steps should be conducted in relation to the safety and health risks posed to any person carrying out the work:

Step 1: Identification of hazards

A non-exhaustive list of hazards that can arise from forklift operations is as follows:

- Unauthorised operation of forklifts
- Untrained forklift operators
- Lifting of persons on the forks
- Body/limbs caught in moving parts of the forklift, e.g. between the frame and the mast
- Speeding
- Pedestrians and forklifts moving in the same vicinity
- Forklift traveling on gradients
- Obstruction in the path e.g. overhead obstruction, blind corners
- Raised forks
- Poor ground conditions e.g. slippery, uneven, potholes
- Tires in bad condition e.g. without thread markings
- Falling loads
- Overloading of forklifts
- Electrocution (Battery operated forklift)

Step 2: Assessing the level of risks involved

The level of risks is dependent on the severity and likelihood of the risk.

Step 3: Prioritising measures to control the hazards and to reduce the risks

It is useful to refer to the hierarchy of hazards control when carrying out the risk assessment. In general, the hierarchy is as follows:

First - Remove the hazard by designing it out
This could involve designing the permitted routes and operating zones for forklift operations such that they will never come in contact with any pedestrian or worker.

Second - Guard the remaining hazards to prevent the accident from occurring
For any hazard that cannot be removed, it has to be guarded against. This can be carried out by erecting physical barriers next to a walkway to prevent the forklift from coming into contact with pedestrians.

Third - Mitigate the impact of the hazards
Studies have shown that wearing an appropriate seat belt can save the life of an operator when the forklift overturns. The potential for the forklift to overturn during operation must be assessed and if such a possibility exists, then a forklift fitted with a seat belt must be provided and the operator instructed to use the belt. Another way to mitigate the impact of an accident would be to limit the speed of the forklift. With lower speed, the operator is better able to react to avoid an accident.

A risk assessment must be done for every task that the forklift is likely to perform so as to identify the risk and control measures. By understanding the hazards and risks involved in forklift operations, control measures and safe work procedures can be established. Some possible hazards and control measures for forklift operations can be found in Annex A.


4.2 Responsibility for managing the risks

Occupiers and employers

- Workplace occupiers have the duty to provide a safe workplace by ensuring that the pedestrians and forklifts pathways are segregated.
- Employers have the duty to provide an effective management and control system for the use and operation of forklifts, including safe work procedures (SWPs).
- Employers have the duty to provide forklifts with adequate safety. This can include ensuring the procurement of forklifts with seatbelts and suitable intelligent safety systems (e.g. speed limiter, seat's presence sensor).
- Employers have the duty to ensure that the forklift operators are adequately trained and certified before they are allowed to operate the forklifts.
- Employers have to ensure that forklifts are properly maintained and inspected at regular intervals for safe and efficient operation.

Operators

- Forklift operators have the duty to follow the appropriate SWP when carrying out their work.
- Forklift operators have the duty to use the forklift safety features available (e.g. horn, seatbelt).

4.3 Control measures - Traffic management plan

A traffic management plan is the key to addressing many of the risks related to the use of forklifts in workplaces. Effective traffic management plans separate pedestrians, forklifts and other vehicles, reducing the risk of forklift-related injuries and fatalities.

Steps in developing a traffic management plan

- Consult with the employer, management, safety personnel, forklift operators and workers when developing a traffic management plan to ensure that the plan addresses all the hazards and is supported by all parties.
- Consider the flow of the work process and the movement of people, forklifts, loads, forklift braking distance, stability, height and type of load being handled when developing the plan.
- Identify any safety and health hazards and assess the level of risks involved and prioritise measures to control the hazards and reduce the risks.
- Risk control measures include:
  - Identifying the most efficient routes and traffic flows
  - Reducing the frequency of interaction with hazards and planning zones where pedestrian access to forklift operating areas are either eliminated or minimised
  - Separating pedestrian walkways and forklift routes and operating zones
- Identifying safety zones for truck drivers
- Including safety barriers
- Incorporating containment fences
- Incorporating speed limiting devices
- Putting up adequate warning signs

- Adequately instruct visitors and all employers at the workplace of the site’s traffic management plan.
- Review the plan when work processes or site plans change.

**An effective traffic management plan should include the following:**

- An organised pedestrian access such that pedestrians do not take shortcuts through vehicle routes and operating zones.
- Separate pedestrian walkways and forklift routes and operating zones. There should be proper demarcation of pedestrian walkways and forklift routes and operating zones with proper clearance for load. Yellow or white paint can be used to mark the walkways.
- Walkways with sufficient width for the number of people expected to use them at any one time.
- Vehicle routes of adequate width to prevent vehicular collision or collision with fixed obstacles.
- Pedestrian's crossing, if necessary, must be properly marked.
- Separate doors that are marked and provided for pedestrians.
- Signs at appropriate positions like at all entry points to a forklift operation area, intersection of walkway and roadway and overhead obstructions.
- Placement of mirrors at blind corners and intersections.
- Speed limit signs for forklifts and other vehicles should be incorporated and forklift operators informed to keep within the speed limits. Traveling at a lower speed will allow the forklift operator to react faster and appropriately to any changes.
- Use of high visibility vest for pedestrians.
- Well lit workplaces. Use of forklift lights should be encouraged when necessary.
- Procedures on when pedestrians and forklifts must give way to each other.
- Provision for safe parking of forklifts in approved locations.

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### 4.4 Safe work procedures

Following risk assessment, safe work procedures (SWP) must be developed and implemented to control the risks. Implemented SWP must include the following components:

- **Adequately trained and authorised operators**
  Before an operator is authorised to operate the forklift, he/she must undergo and pass an appropriate forklift driving course.

- **An effective system to control the use of forklifts**
  Only trained and authorised operators are permitted to operate a forklift. Employers should implement a control system to prohibit unauthorised use of forklifts. Workers should be briefed on the control system and only authorised forklift operators should be permitted to operate a forklift. Electronic systems such as swipe cards and pin code can help to control the use of forklifts.

- **Load and load handling**
  Operators should check any load for its weight, shape and size so that precautions for lifting the load can be taken. Do not exceed the rated load capacity. Always travel with the load and forks low to the ground. If the operator’s view from the forklift front is blocked, he should always travel in the reverse direction or have another worker to keep a look out for him. Always sound the horn and slow down when approaching corners, intersections and doorways.

- **Assessment of work environment**
  The working area of the forklift should be checked for overhead obstructions, uneven ground, puddles of oil or potholes etc.

- **Good operating condition of the forklift**
  Ensure that the operator has performed daily maintenance checks and the forklift is serviced in a timely manner according to the manufacturer’s recommendations. Poor conditions of the forklift such as worn tires or ineffective brakes will increase the risks of a forklift overturning or not stopping in time.

- **Safety Devices**
  Always use the seatbelts. Hold on firmly and stay within the cabin in the event of an overturn. Do not bypass the speed limiters or reversing beeping system.

- **Mobile phones and talking devices**
  Operators should not be using the mobile phone or other talking devices while operating a forklift.

- **Environmental conditions**
  Be extra careful when operating in conditions such as on gradient and near waterways. Travel slowly and keep away from the edges. Do not make a fast or sharp turn when operating on gradients.

- **Safety precautions**
  All workers should keep away from the forklift when it is operating.

Safe work procedures must be written, communicated and implemented to ensure the safety and health of workers involved. Forklift-related accidents can be prevented by having trained forklift operators, systematic traffic management, well maintained forklifts, safe working conditions and effective supervision.
5. Bibliography


f. Occupational Safety and Health Branch, Labour Department, Hong Kong, “Guidance Notes for Safe Use of Forklift Trucks”, January 2006


6. Useful Websites

i. The Japan International Center for Occupational Safety and Health (JICOSH) to learn more about forklift safety
http://www.jicosh.jp/english/cases/sact/saiga02e/saiga02e.htm

ii. The Victorian WorkCover Authority

Annex A: Some Hazards and Possible Control Measures Involving Forklift Operations

The following are some potential hazards involving forklift operations:

- Unauthorised operation of forklifts
- Untrained forklift operators
- Lifting of persons on the forks
- Body/limbs caught in moving parts of the forklift
- Speeding
- Pedestrians and forklifts moving in the same vicinity
- Forklift traveling on gradients
- Obstruction in the path e.g. overhead obstruction, blind corners
- Raised forks
- Poor ground conditions e.g. slippery, uneven, potholes
- Tires in bad conditions e.g. without thread markings,
- Falling loads
- Overloading of forklifts
- Electrocut (Battery operated forklift)

Possible Control Measures

- Ensure that forklifts are operated by trained and authorised operators
- Implement an effective control system for the use of forklift
- Conduct briefing on forklift operations
- Implement safe work procedures
- Implement effective traffic management plans
- Provide designated pedestrian crossings
- Provide a map for area management
- Practice good housekeeping
- Ensure that the workplace is adequately lit
- Display sufficient signs and warnings in the workplace
- Provide safety features (such as reverse warning lights and audio warning, rearview mirror, flashing lights) and inspect them regularly
- Provide three point contacts on forklifts (Steps with good footing, antislip surfaces and handles)
- Review operation procedures (E.g. the number of times operators have to get on and off their forklifts can be reduced)
- Consider an ergonomically designed forklift when procuring equipments
- Ensure that the forklifts are inspected daily (provide a inspection checklist)
- Ensure that the forklifts are well maintained

The information in this TA is intended for general use and the information presented is non-exhaustive. It should be use in conjunction with the Workplace Safety and Health Act and is not a definitive guide to the law.

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