MOM/OSHD/2021-07

To: All Proprietary Table Formwork Manufacturers, Suppliers, Designers, Contractors and Other Interested Persons

16 Nov 2021

Proprietary Table Formwork Safety

Between 30 Jul 2021 and 6 Aug 2021, three proprietary table formwork structures overturned (refer to Annex A - WSH Bulletin published on 25 Aug 2021) at three different worksites during re-positioning. Although no one was injured, the incidents could have been catastrophic as the structures had overturned from high elevations and could have landed on people below them.

2. The Ministry of Manpower (MOM) is sending out this circular to remind all parties undertaking the manufacture, supply, design, installation and supervision of proprietary table formwork structures of their obligations to ensure the safety of the structures.

3. **Design and Documentation**

a) Discuss and evaluate all design risks including any risk involving work at height and formwork instability. Pay attention to possible site constraints, obstructions or unsound supporting elements, etc that can undermine the stability of the formwork structures. The evaluation should be done jointly by the formwork designers and the Design for Safety (DfS) review team.

b) Design all proprietary table formwork structures to support a minimum of 2.0 factor of safety for strength and stability, for the most adverse of loads and load combinations.

c) Detail all manufacturer's recommendations critical to the method and sequence of work including safe erection, lifting, repositioning and dismantling in the design or drawings.

d) Delineate all bracings and tie-backs essential to provide strength and stability against unbalanced forces in the formwork drawings, with clear annotation with regards to their make, size, position and anchorage (to a structural support) as appropriate.

e) Consult the designer or Professional Engineer ("PE") for approval if deviations to the design are required. Include clear instructions of such deviations as well as the approved method and sequence of work into the formwork drawings.

f) Include all formwork elements in the design even if the elements are not part of the proprietary table formwork e.g., beam side formwork. Check that the PE certificate(s) for safe use cover the complete table formwork setup including such non-proprietary elements.

4. **Training and Risk Communication**

a) Document any residual risks in the DfS Register and communicate these risks and their control measures to contractors for action and awareness.

b) Train erectors and supervisors on the procedures and any limitation of the table formwork as indicated in the manufacturer's training syllabus.

c) Brief the erectors and supervisors on all project specific conditions and expected constraints during erection, lifting and repositioning.

5. **Method and Sequence of Work During Erection, Lifting and Repositioning**

a) Use only equipment approved by the proprietary table formwork manufacturer for erection, lifting and repositioning in accordance with the manufacturer's recommended procedures.

b) Incorporate manufacturer's recommendations pertaining to the mode of lifting, rigging point locations and the type of lifting gears into the lifting plans. Ensure sufficient clearance is provided between the load and any potential encumbrances along its path.

c) As a general guide, place **lifting points at the top of the load**. Avoid tilting of the lifted load by designing out any load eccentricity during lift. Where practicable, consider appropriate lifting tools such as lifting forks.

d) Adhere to manufacturer's recommendations on **Height-to-breadth ratio (h:b)** of tower table formwork and **travelling speed** during repositioning.

e) Adhere to safe work procedures for working-at-height during rigging or unrigging operations of the table formwork.

6. Further Information

More information can be obtained from the following:

a) Workplace Safety and Health Act (Chapter 354A);
b) Workplace Safety and Health (Construction) Regulations 2007;
c) Workplace Safety and Health (Risk Management) Regulations;
d) Workplace Safety and Health (Design for Safety) Regulations;
e) SS 580 : 2020 Code of Practice for Formwork;

f) BS EN 12812:2008 Falsework – Performance Requirement and General Design;

g) Code of Practice on WSH Risk Management; and

h) MOM Advisory for Professional Engineers on Formwork Safety dated 18 Jan 2014

Yours faithfully,

SEBASTIAN TAN
for COMMISSIONER FOR WORKPLACE SAFETY AND HEALTH
OCCUPATIONAL SAFETY AND HEALTH DIVISION
MINISTRY OF MANPOWER

WSH Bulletin

25 August 2021, Ref: 2122034

Overturning of tableforms at multiple construction worksites

Three incidents of tableforms overturning and falling from height occurred between 30 July and 6 August 2021 at three different construction worksites. They resulted in some property damage and could have led to the loss of lives.

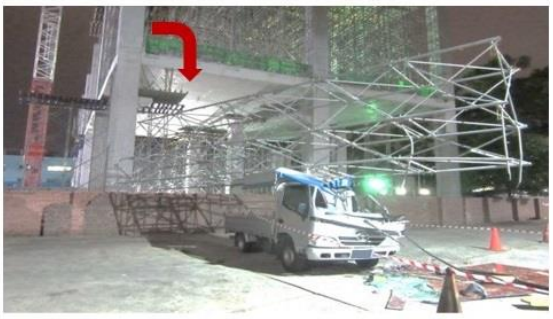
The first incident occurred on 30 July. A tableform erected between the 5th and 6th storey of a building under construction overturned and fell to the ground level while it was being repositioned on-site.

The second happened on 3 August with a tableform erected at the top storey of a multi-storey carpark being constructed. It overturned and fell to the ground level when it was lifted into position and released from the lifting gears.

The third incident occurred on 6 August where a tableform similarly overturned and fell off a building under construction. It was struck by another tableform that had been tangled with a third tableform being lifted. The tableform fell on an empty lorry.

Incident scene
(30 July)

Incident scene
(3 August)



Incident scene
(6 August)

Occupiers, employers, principals and tableform manufacturers and suppliers should adopt the following risk control measures to prevent similar incidents:

Safe tableform erection, lifting and repositioning

• Use method(s) recommended by tableform manufacturers for safe erection, lifting and repositioning of tableforms/formworks.

• If other methods are needed due to site constraints, a new method statement must be co-developed with and endorsed by the manufacturer before proceeding with site-

specific Risk Assessment (RA) and development of a Safe Work Procedure (SWP). The RA and SWP must be communicated to workers before work.

This is because unapproved methods, especially tableforms with high height-to-breadth aspect ratios, are prone to instability during repositioning, which can result in overturning.

Safe tableform installation
• Deploy only trained and competent workers for the tableform work.
• Ensure that workers are familiar with the SWP before starting work. Otherwise, provide refresher training for the workers.
• Provide on-site supervision to workers to ensure compliance with the SWP.
• Secure the tableform/formwork structure with tie-backs once it is in position and before the lifting gears are released to prevent overturning.

Safe tableform lifting
• Establish and implement a lifting plan to ensure lifting operations can be carried out safely.
• Such a plan, amongst other things, must indicate how the tableform/formwork structure is to be rigged before the lift. Use only rigging points recommended by the manufacturer. Consult the manufacturer if the recommended rigging points are not suitable due to operational or site constraints.

Unsafe lifting of tableform/formwork structures can potentially create a chain reaction. For instance, a collapsing structure can strike other nearby materials or structures and cause them to cascade down.

Refer to Part IX: Formwork Structures of the Workplace Safety and Health (Construction) Regulations 2007 and Singapore Standard SS 580: 2020 Code of Practice for Formwork for legislative requirements and best practices for the safe erection, use, transfer, alteration and dismantling of formwork structures.

Design for Safety (DfS)
Developers should ensure that DfS review meetings are attended by temporary works designers to address temporary works issues such as formwork design risks.

Temporary works designers should eliminate design risks via design enhancements. If the risks cannot be eliminated via design, they must provide precautionary measures and clear instructions/warnings to the affected stakeholders who will be performing the works.

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