

Safe use of cranes: An overview and areas of concern



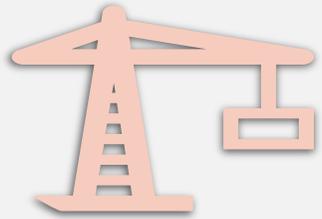
MINISTRY OF
MANPOWER

Bernard Kwok
Ministry of Manpower, Singapore

5 Oct 2023

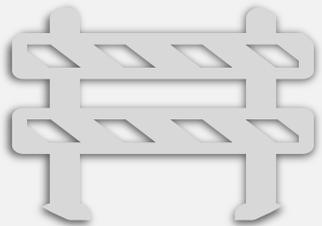


Ensuring safe use of cranes



Equipment

- Manufacturer/supplier to ensure machine safe when properly used
- Approved crane contractors to install, repair, alter or dismantle
- Authorised examiner to test and examine before use
- Owner to maintain, check and test at regular intervals



Use

- Assess risk and establish controls
- Develop lifting plan to manage the lifting operation
- Implement permit-to-work to ensure control measures in place
- Properly supervise lifting operations



Personnel

- Appoint trained and competent lifting crew
 - Operator
 - Lifting supervisor, rigger, signalman





Incident Reporting

Reminders

- WSH Alert



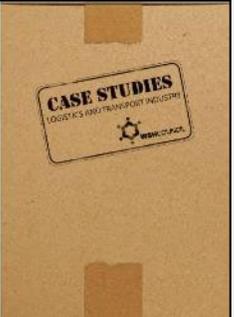
Review Policies

- Circulars
- Guidelines

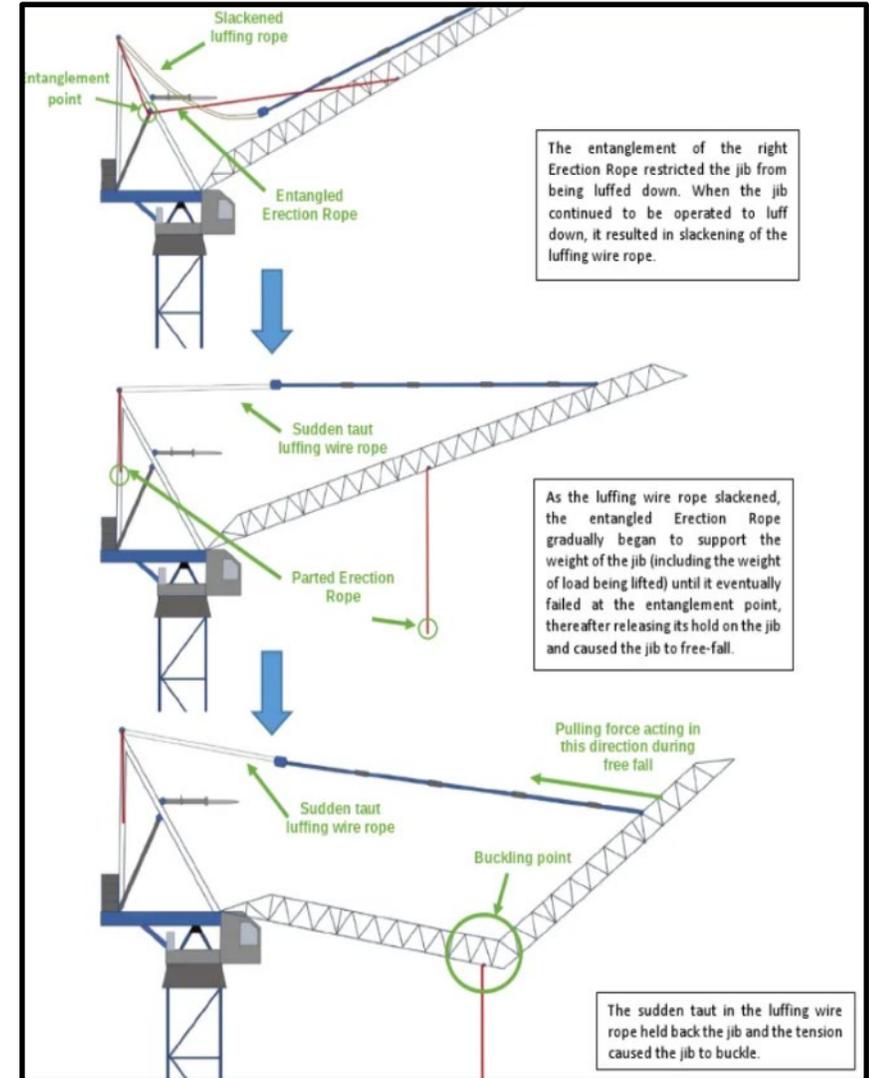
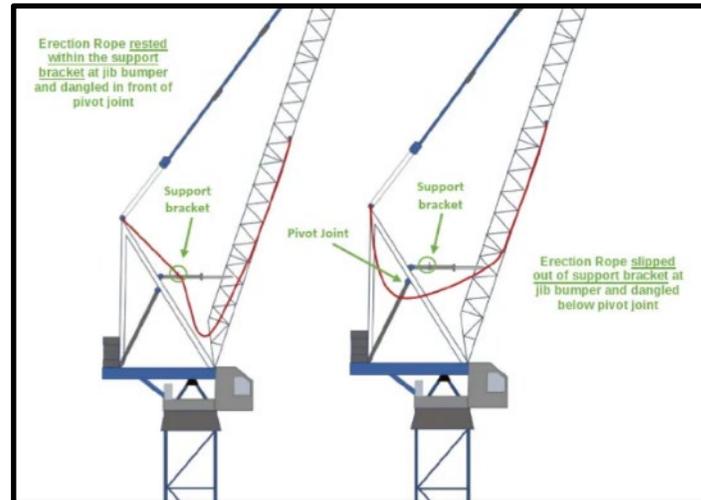
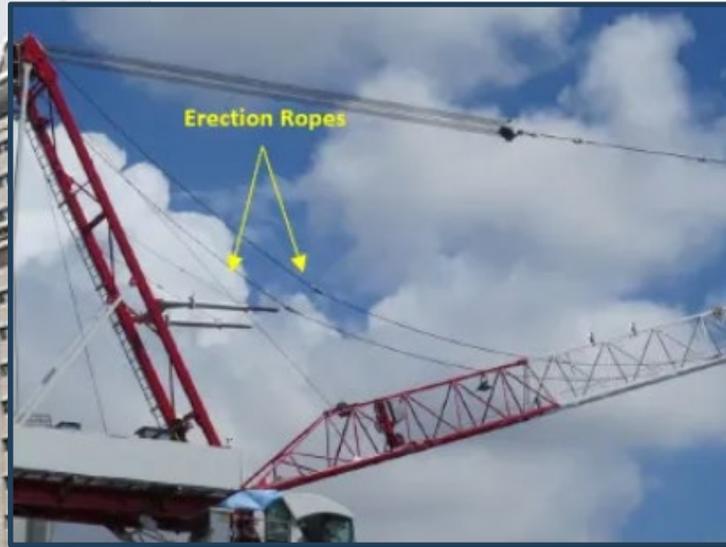


Share Lessons

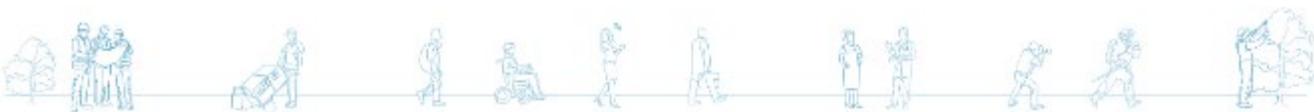
- Case Studies
- Learning Reports



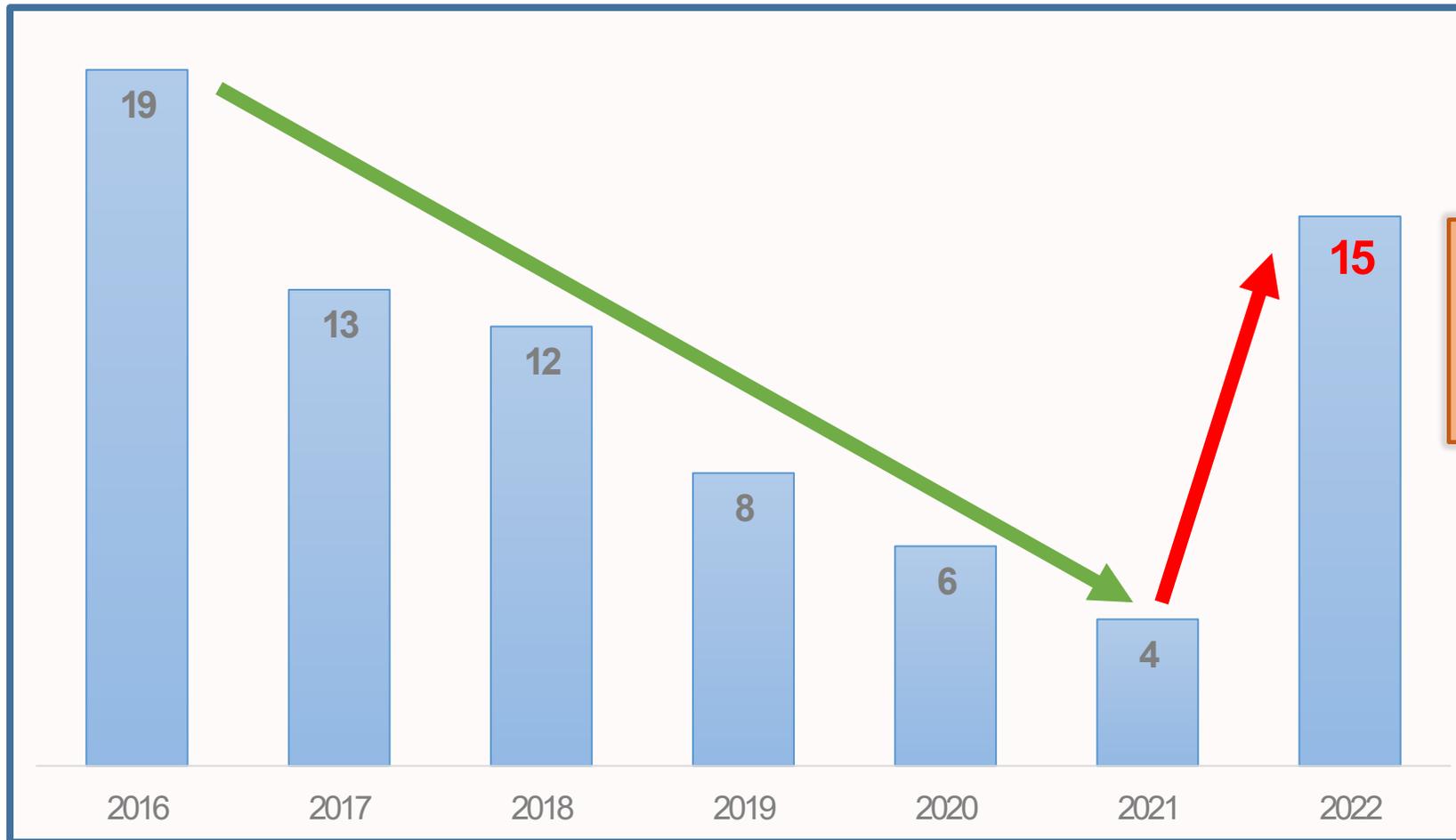
Failure of Luffing Jib Tower Crane



WSH Performance



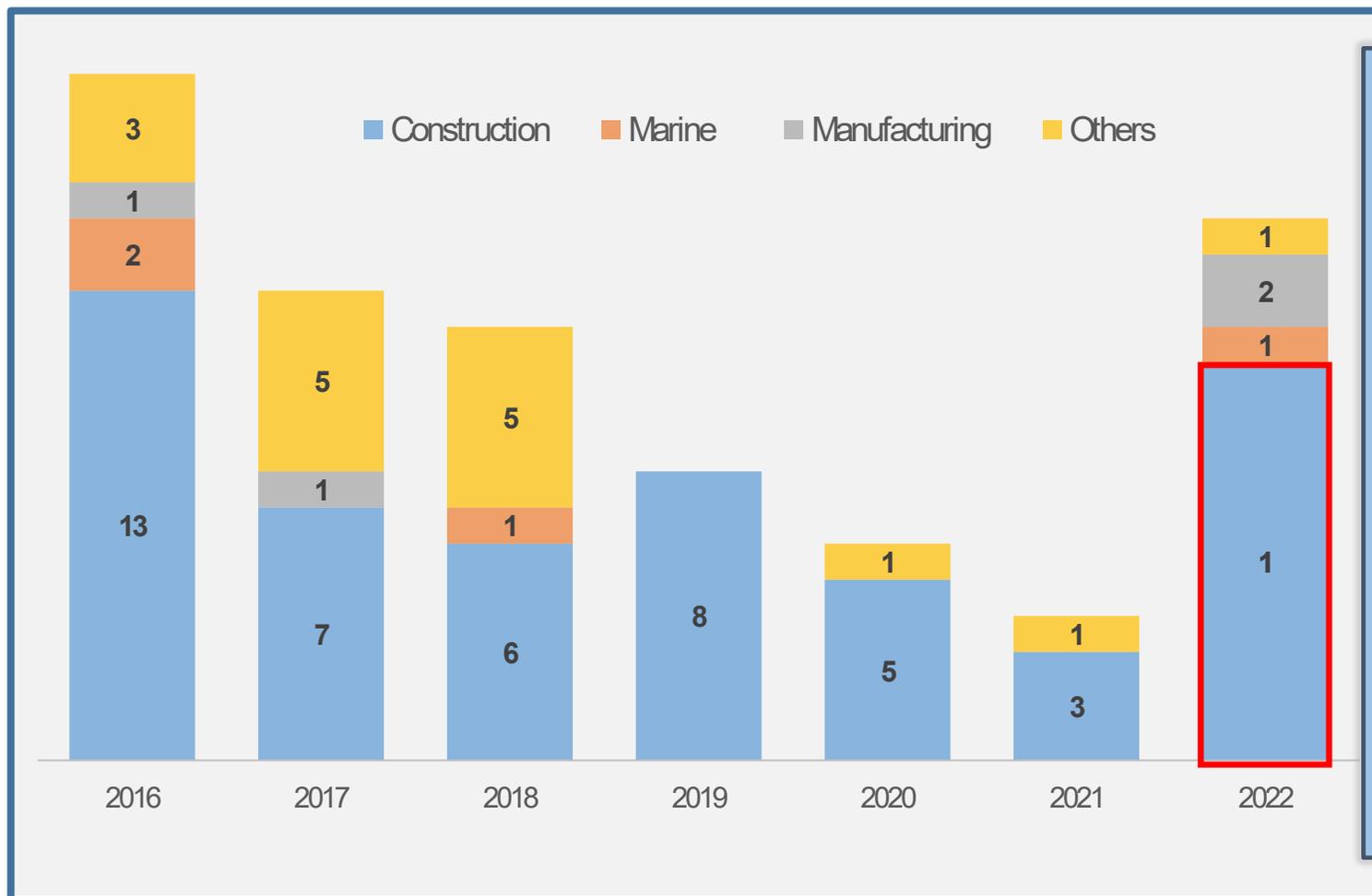
Crane-related Dangerous Occurrences



Number of Dangerous Occurrences has risen significantly



By Industry



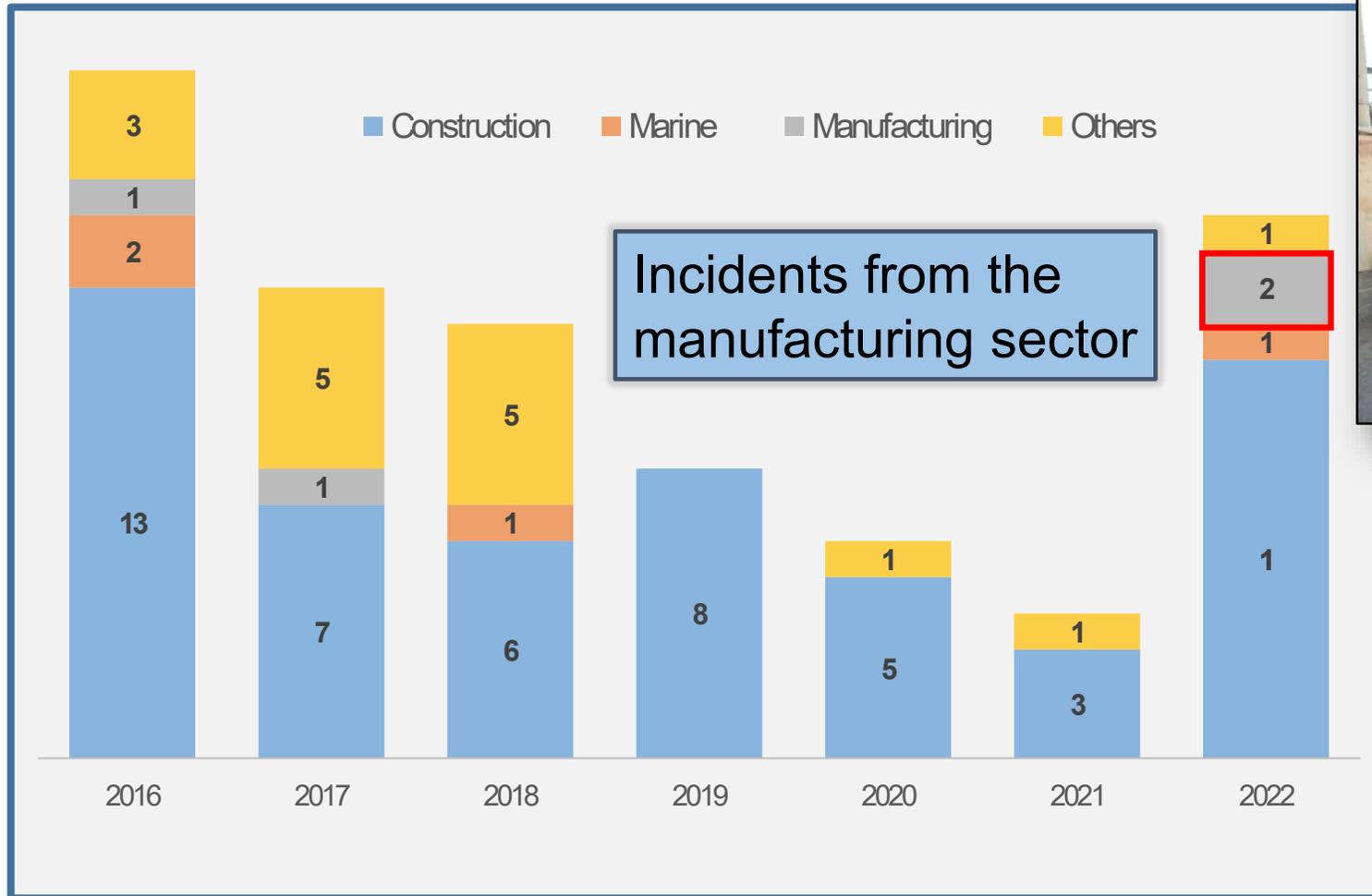
Majority from construction sector

- Sustained demand in 2022
- Demand to remain strong in 2023
- Total demand between S\$27 billion and S\$32 billion, similar to 2022 projection

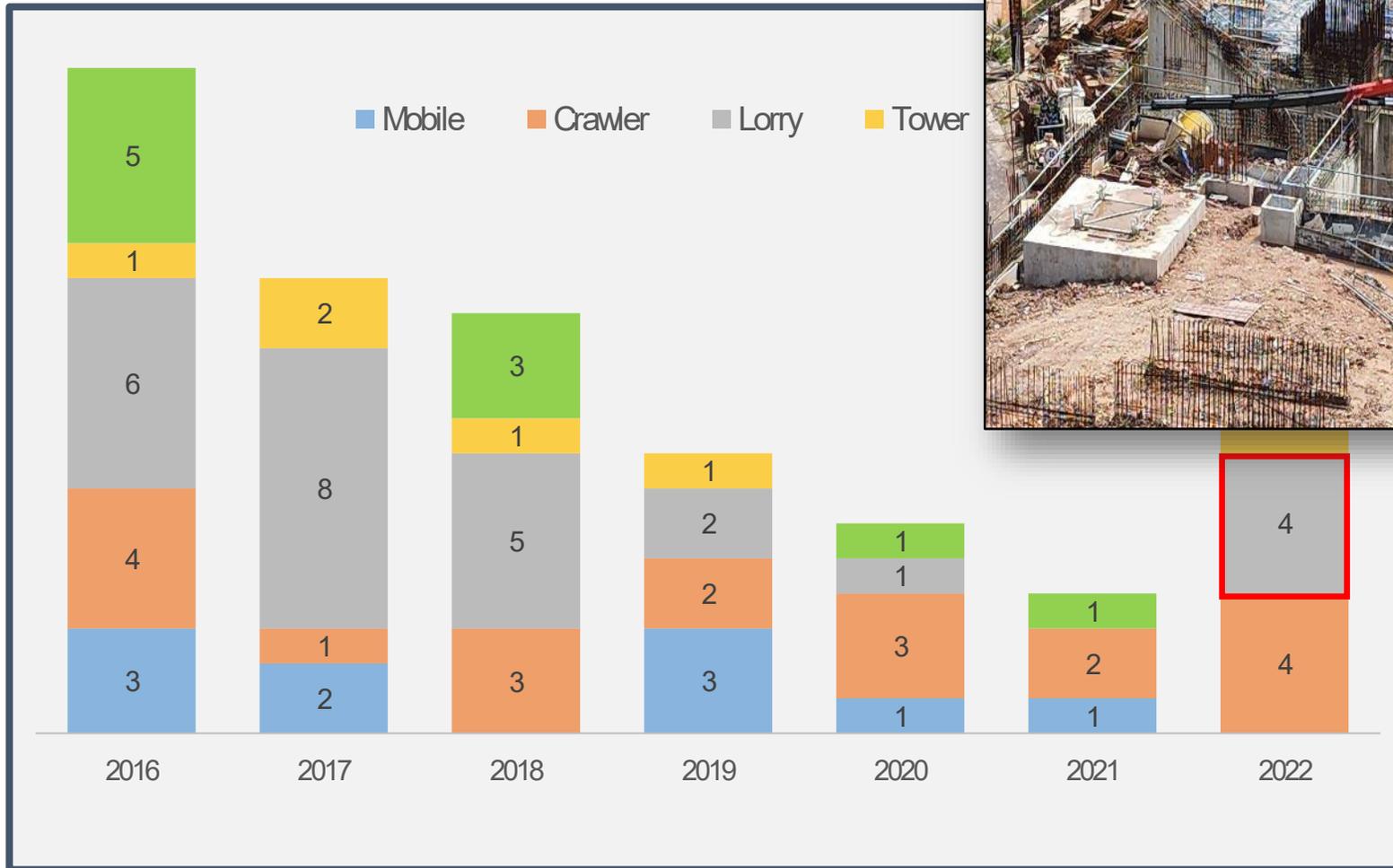
Source: BCA media releases
26 Jan 2022, 12 Jan 2023



By Industry



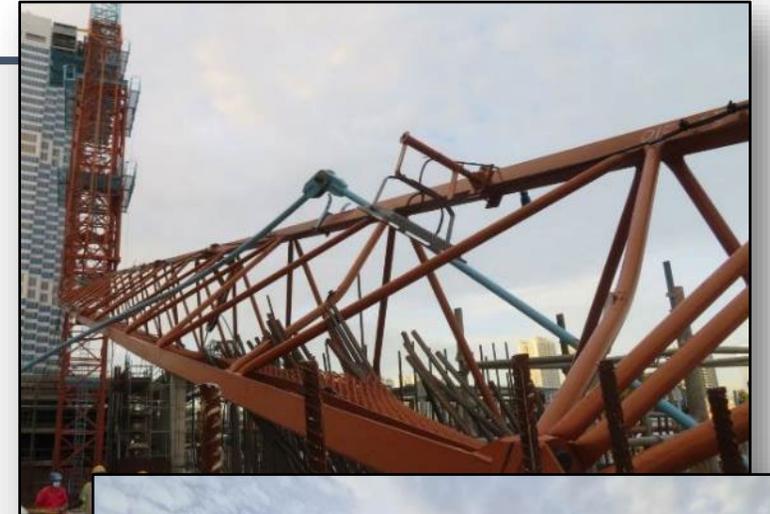
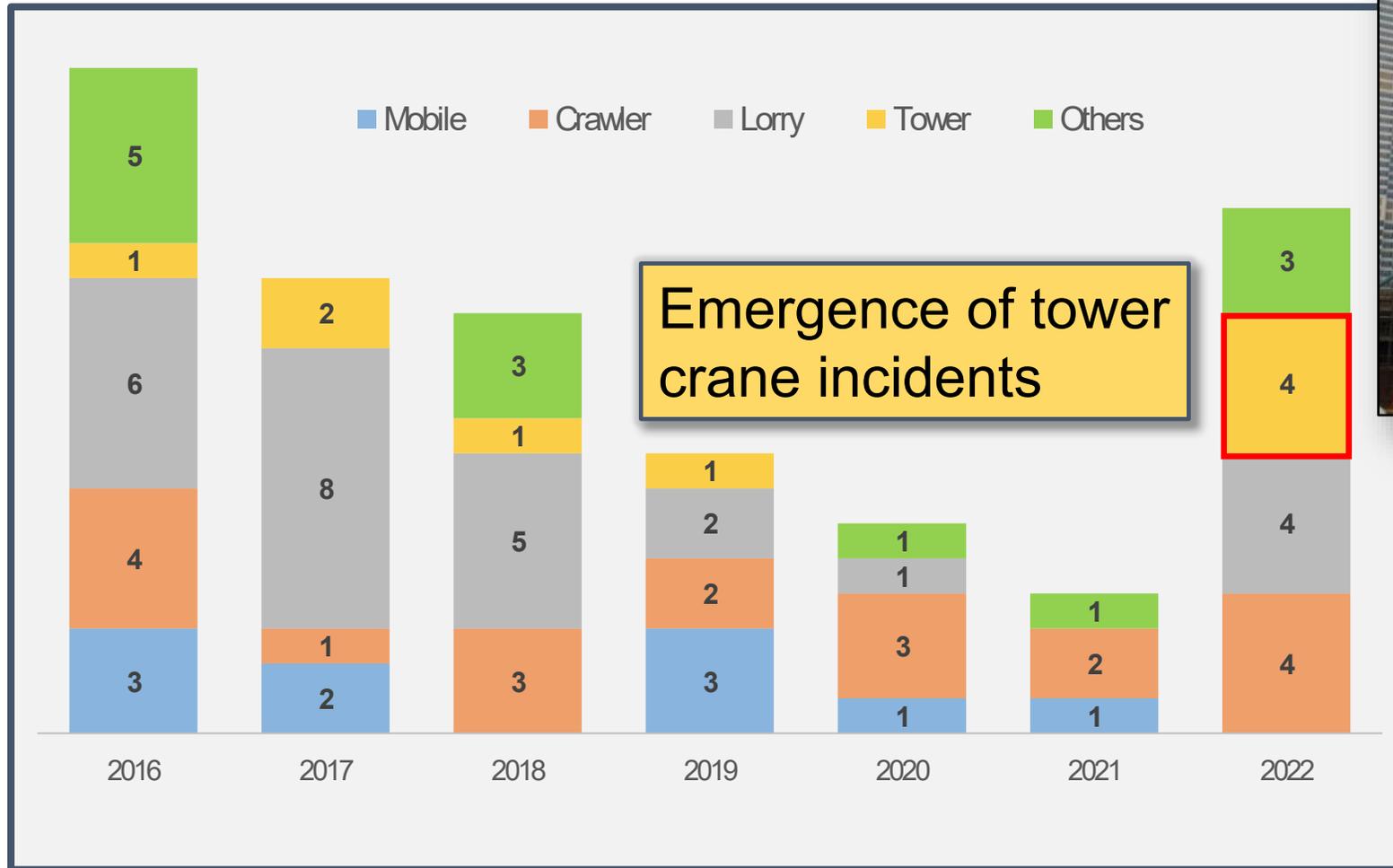
By Equipment Type



Increase in lorry crane incidents

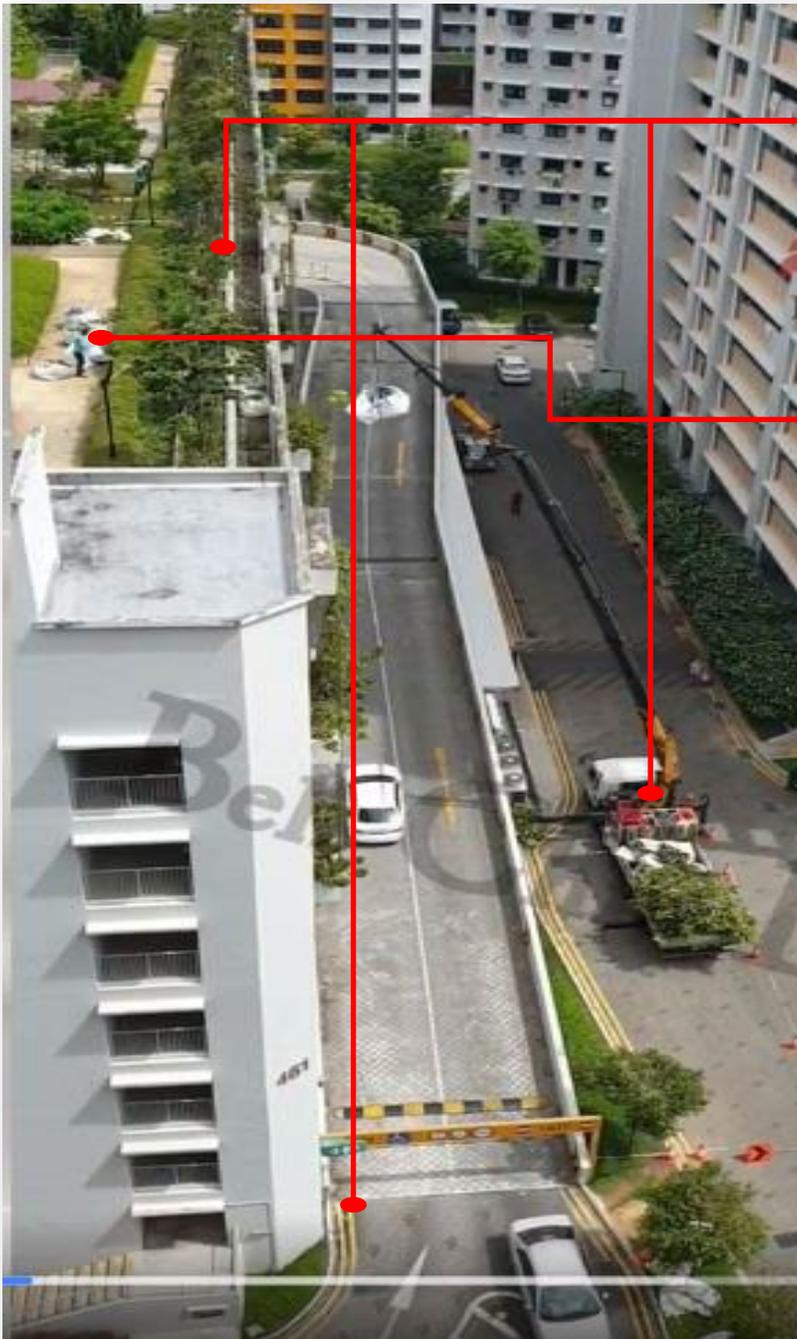


By Equipment Type



Areas of Concern





- Traffic controllers and crane operator had no means to communicate with each other
- Lost control of the traffic on ramp

- Signalman was also rigging loads
- Unable to see the crane operator nor the condition on the ramp

- No lifting plan
- RA not relevant to the lifting operation over public road

Need for proper planning & preparations for safe execution

FATAL ACCIDENT

Worker struck by crane boom

On 13 December 2022, a worker was on the bed of a lorry crane assisting in the unloading of steel bars from the lorry crane when the crane boom suddenly fell and struck him. The worker died at the scene.

Preliminary investigations indicated that the crane boom fell when it was lifting some steel bars. The lifting operation was not carried out by a proper lifting team and there was no lifting plan.



Position of the worker just before the boom failure

Scene of the accident.

Unsafe Position
working under suspended load

Workers

Operator

Why?

Importance of planning and preparation

Recognise that various factors could affect judgement

Stability Control System (SCS)

THE STRAITS TIMES

Crane operation to be safer with use of technology and new MOM guidelines



Minister of State for Manpower Zaqy Mohamad (background) during a demonstration of stability control system, which can detect the position of outriggers and compute the safe operating zone for cranes. PHOTO COURTESY OF MANPOWER



See-Ann Tan

PUBLISHED: JAN 16, 2020, 5:02 PM SGT
The Straits Times 15 Jan 2020

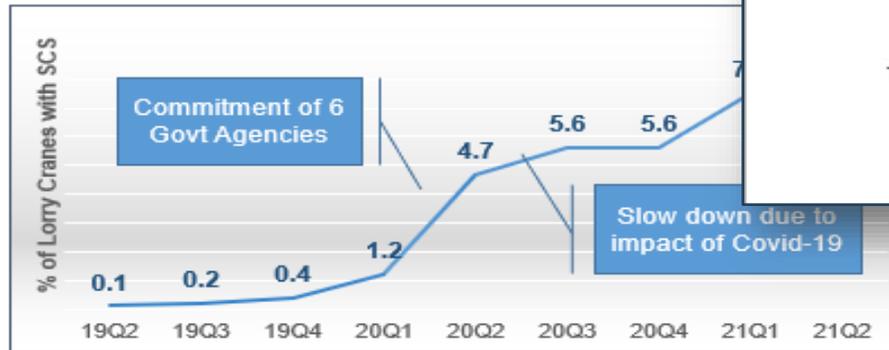
SINGAPORE - Increasing the use of technology and safety guidelines should not be overlooked, says Manpower Zaqy Mohamad on



WSH Symposium on Cranes 2020

- SCS can detect the position of outriggers and compute the safe zone for crane operations.
- 6 government agencies committed to encourage adoption of SCS.

Adoption of SCS



- Increase in lorry cranes with SCS.
- Requirements have been cascaded to partners and stakeholders.

07 June 2022

WSH ALERT

FATAL ACCIDENT

Worker died after being pinned under metal shaft

On 27 May 2022, a lorry loader (commonly known as "lorry crane") toppled to its side while it was unloading a metal shaft from a trailer. Consequently, another metal shaft which was on the lorry crane bed, rolled off the side of the lorry crane and struck a worker standing between the lorry crane and trailer. The worker was rescued and sent to the hospital where he passed away.

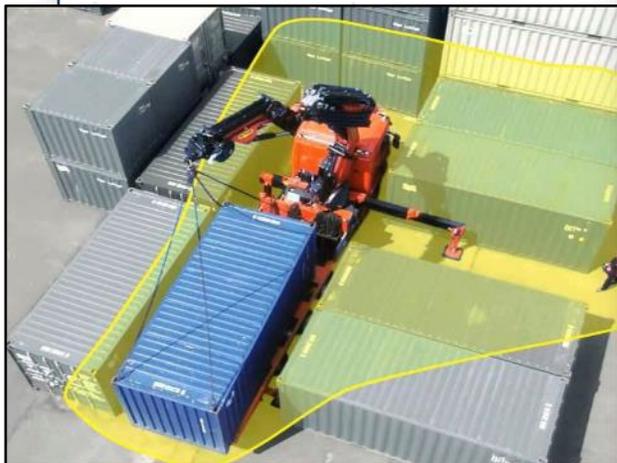


The initial position of the metal shaft on the bed of the lorry crane

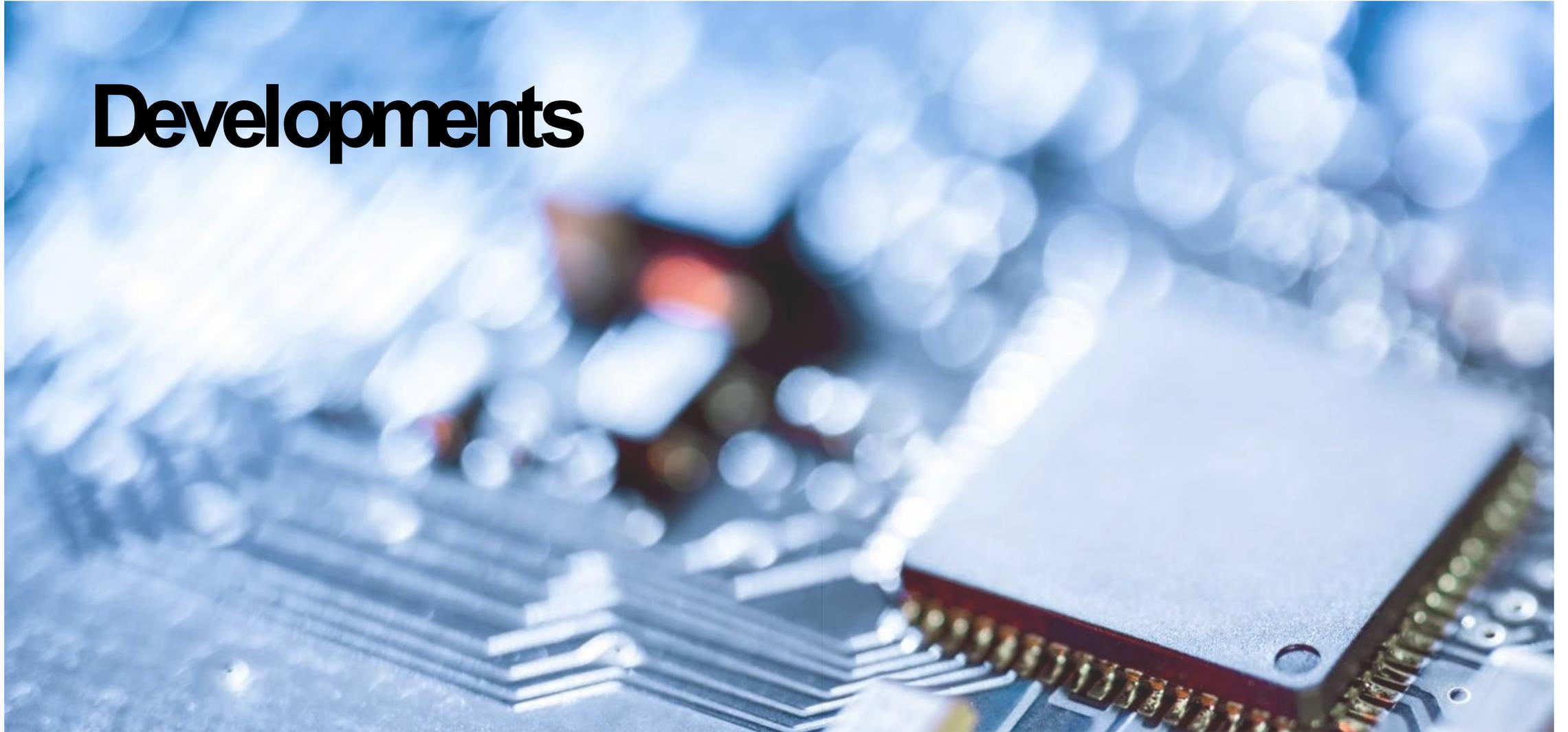
The metal shaft rolled off and landed on the worker's leg

Scene of the accident.

Grant to co-fund SCS



Developments



Heavier Loads, Bigger Cranes



Prefabricated Prefinished Metric Construction (PPVC)

- Large and heavy units of up to 30 tons
- Installation to heights of 40 storeys and above
- Guidance and training on lifting of PPVC



HDB Pilots Advanced Construction Technologies to Design and Build Flats in Further Push to Raise Construction Productivity

Source: HDB Press Release 11 Oct 2022

Autonomous Cranes

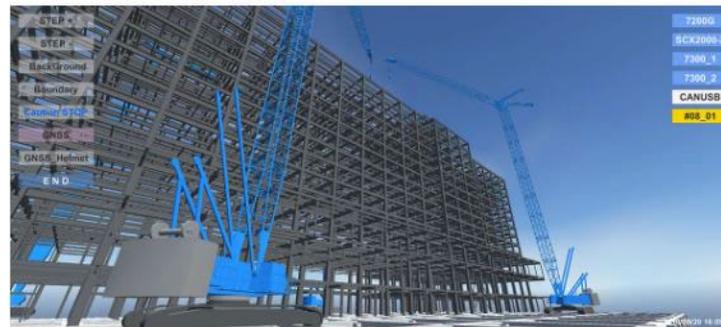
Remote Load Control Devices

4 Technology — Technology Development

Our Machine Guidance System Facilitates Crane Operation

We developed a Machine Guidance System that facilitates safe, efficient crane operation.

Obayashi Corporation has developed a Machine Guidance System that facilitates safe, efficient crane operation by utilizing BIM (Building Information Modeling) to create 3D models of construction sites and then linking with information from sensors attached to cranes to display information on the crane situation in real time for operators.



3D models of construction sites. Source: Obayashi Chronicle 130

HDB will also test innovations from construction firm Obayashi, including the use of artificial intelligence to optimise hoisting of precast components in tower crane operations.

Light detection and ranging technology will also be used to avoid collisions.

In the construction of multi-storey carparks, crawler cranes - largely manually operated at present - will be guided by technology onto optimum paths for lifting elements.

Instead of having workers manually guide components into place, HDB will also use the SkyJuster device to orientate and lower precast elements, reducing the manpower required.



On the left, a worker manually guides a precast component into place; on the right, the SkyJuster device does the same with precision and less manpower. (Photos: HDB (left) and Obayashi Corporation) Source: CNA 11 Oct 2022



Thank You

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