

Collapse of Concrete Placement Boom

A group of workers was jacking up the support structure of a concrete placement boom (CPB) when the welded connections in the support structure failed. The CPB and its support structure collapsed but its fall was broken by adjacent structures, allowing the workers to escape with minor injuries.

The CPB, which is used for efficient concrete distribution at great heights or in hard-to-reach areas, had been mounted via the support structure within the core wall of a building under construction.

Good welding is critical to the integrity of support structures. Defective welds can result in weak connections that compromises structural stability, resulting in its failure and collapse. It is essential for welders to be adequately trained, follow proper procedures, and apply thorough quality assurance/quality control (QA/QC) throughout the manufacturing process.

Figure 1: Illustration of the concrete placement boom and its steel support structure.

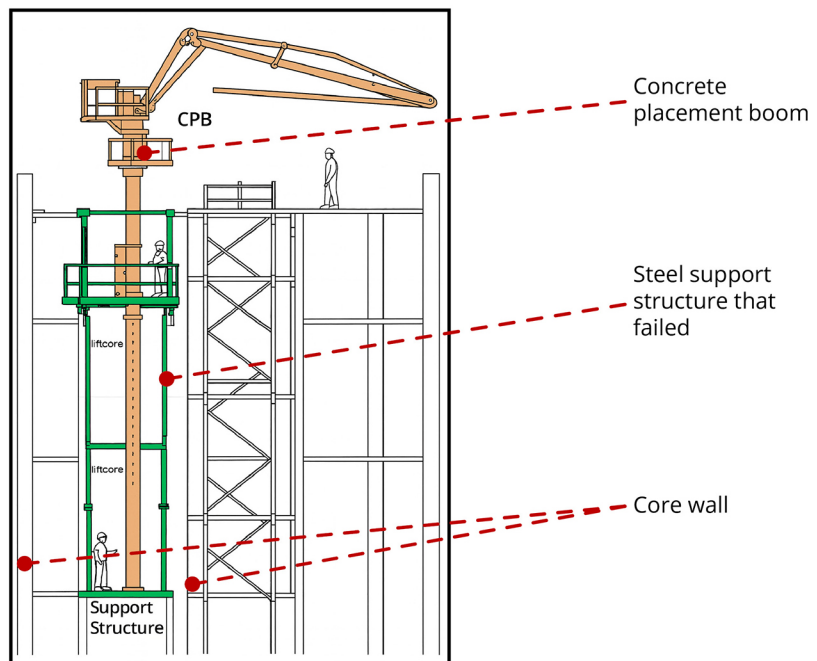
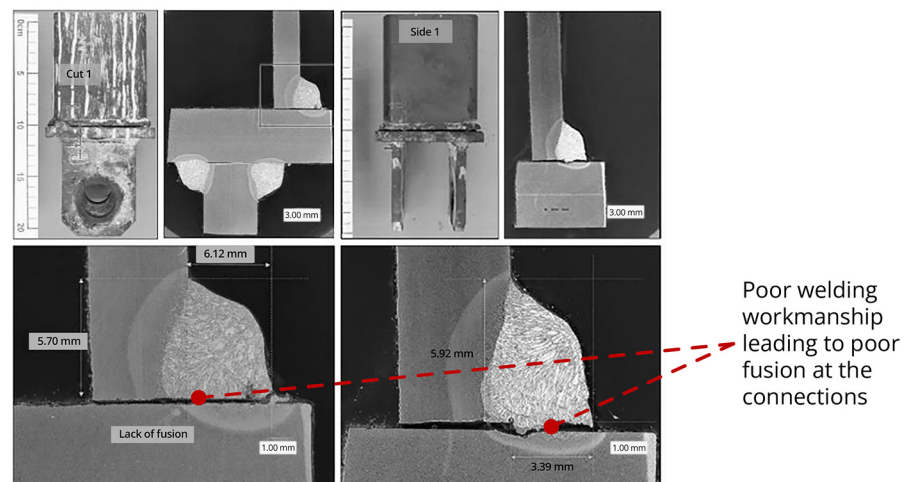


Figure 2: Metallographic examinations on the connections that led to the failure of steel support structure.



Support structures, typically constructed from timber, steel or concrete, are commonly used in workplaces to support plants, containers, heavy machinery or other structures. Poorly constructed support structures can lead to serious incidents.

The WSH Council urges all companies that manufacture, supply or use support structures to review their QA/QC processes and implement robust verification systems. These should include random on-site sampling and spot checks through destructive or non-destructive testing to ensure the structures meet quality standards and are safe for their intended purpose.

What companies should do

Companies should assess and ensure their WSH management systems include the following measures and checks:

- **Manufacturers and suppliers of support structures** should implement a comprehensive quality management system which includes (non-exhaustive):
 - Establish and implement QA/QC regimes for the manufacturing of structural components.
 - Maintain proper documentation, including material mill certificates, welding procedures, and welder qualifications.
 - Engage accredited third-party testing bodies to verify welding quality through destructive and/or non-destructive testing.
 - Conduct sampling checks on support structures, especially for critical structural components.
 - Perform load testing where applicable before delivery.
- **Companies using support structures should (non-exhaustive):**
 - Verify certification, QA/QC records and load testing documentation before accepting delivery.
 - Conduct risk assessments and implement safe work procedures before installation or maintenance.
 - Implement preventive maintenance schedules according to manufacturers' recommendations.
 - Implement inspection regimes to detect structural issues such as:
 - Improper alignment
 - Component deterioration
 - Improperly secured mountings, especially at critical connection points

- Maintain records of inspection, maintenance and repair works.
- Ensure all workers involved in installation or maintenance are trained and competent before deployment.

For more information, refer to MOM's [circular on Traceability and Reusability of Formwork Structures and Scaffolds](#) and the WSH Council's [Code of Practice on WSH Risk Management](#).

Under the WSH Act, first-time corporate offenders may be sentenced to the maximum fine of \$500,000 whilst individuals can either be sentenced to the maximum fine of \$200,000 and/or an imprisonment not exceeding 2 years. Read more on the [WSH Act penalties](#).

This WSH Lessons has been generalised and anonymised purely for educational purposes, and no inference should be drawn about any person or company. The recommendations provided here are not exhaustive and are meant to enhance workplace safety and health so that a recurrence may be prevented. The information and recommendations provided are not to be construed as implying liability on any party nor should it be taken to encapsulate all the responsibilities and obligations under the law.

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