



U. S. Department of Labor
Occupational Safety and Health Administration
Directorate of Science, Technology & Medicine
Office of Science and Technology Assessment

Overhead Launching Gantry Crane
Safety and Health Information Bulletin

Safety and Health Information Bulletin

SHIB 05-01-2006

Purpose

The purpose of this Safety and Health Information Bulletin (SHIB) is:

1. To inform overhead launching gantry crane users of the hazards associated with deviating from the manufacturer's guidelines on the use of overhead launching gantry cranes, such as unanticipated movement or collapse of the structure during use;
2. To highlight that all employers using overhead launching gantry cranes in segmental or similar bridge construction must comply with all manufacturer's guidelines, including proper anchoring of the cranes during launching, to prevent transversal or longitudinal movement of the structure; and
3. To provide information that employers can use to address these hazards.

Background

OSHA's Toledo, Ohio, Area Office investigated a fatal accident involving the collapse, during a launch sequence, of an overhead launching gantry crane used during segmental bridge construction. The equipment involved was an overhead truss with a self-launching under-bridge (overhead launching gantry) manufactured by Paola De Nicola of Italy for the construction of the Maumee River Crossing in Toledo, Ohio (see Figures 1 and 2).

This Safety and Health Information Bulletin is **not** a standard or regulation, and it creates no new legal obligations. The Bulletin is advisory in nature, informational in content, and is intended to assist employers in providing a safe and healthful workplace. Pursuant to the *Occupational Safety and Health Act*, employers must comply with hazard-specific safety and health standards promulgated by OSHA or by a state with an OSHA-approved state plan. In addition, pursuant to Section 5(a)(1), the General Duty Clause of the Act, employers must provide their employees with a workplace free from recognized hazards likely to cause death or serious physical harm. Employers can be cited for violating the General Duty Clause if there is a recognized hazard and they do not take reasonable steps to prevent or abate the hazard. However, failure to implement any recommendations in this Safety and Health Information Bulletin is not, in itself, a violation of the General Duty Clause. Citations can only be based on standards, regulations, and the General Duty Clause.

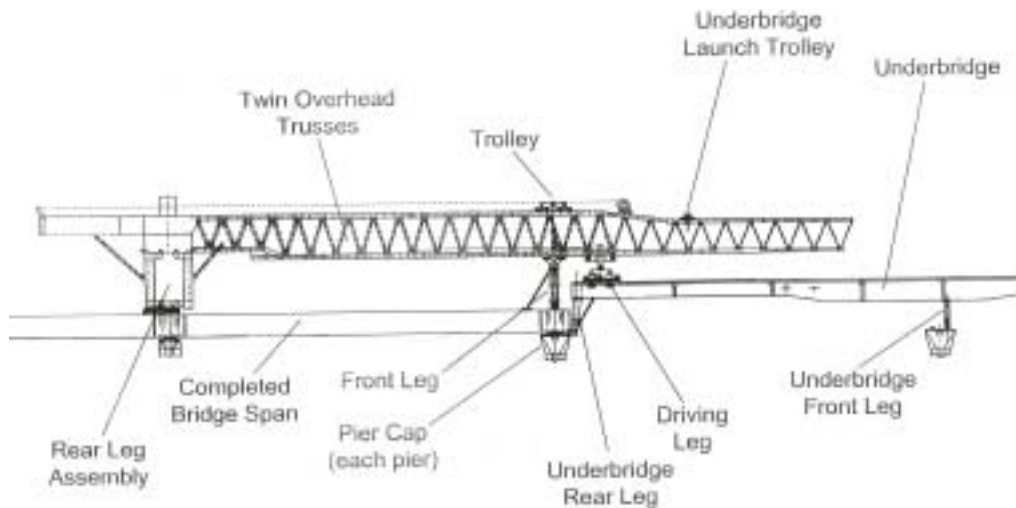


Figure 1: General Configuration of the Overhead Launching Gantry Manufactured by Paola De Nicola for the Maumee River Crossing.



Figure 2: Two Launching Gantries Side-by-side.

The launching gantry is used to place concrete bridge and pier segments for elevated roadways and bridges by spanning the distance between a finished road segment and the next roadway pier or column. While spanning this distance, the launching gantry picks up each bridge segment and suspends the segments from beneath the overhead truss moving the segments into place. The segments are then epoxied together and post-tensioned into place. Following the successful placement of the roadway segments beneath the overhead truss, the entire launching gantry is then moved forward to the next span along its previously launched under-bridge. The under-bridge provides a temporary bridge over the span for the front leg of the launching gantry to travel and position the structure over the next span. (See Figure 3)



Figure 3: Launching Gantry with Suspended Segments.

For this particular design, the manufacturer required the use of four anchoring bars for each of the four rear legs (sixteen total anchoring bars) and two anchoring bars for each of the two telescoping front legs (four anchoring bars total). The anchoring bars in the rear were designed to be pre-stressed to 600 kilo-Newton's per bar (approximately 135,000 pounds of force per bar) to provide resistance to the longitudinal and transversal forces primarily during the launching of the under-bridge. The front leg anchors were to be pre-stressed to resist transversal forces, such as those created by wind.

Accident Investigation

The accident investigation revealed that the employer had not designed the pier segments to accommodate each of the anchoring locations, reportedly because of congestion in the segments with other items such as stressing cables. It was further determined that the employer used only a few anchoring bars during the initial launches and as work progressed began using fewer and fewer anchoring bars. On the day of the accident, there were no anchoring bars for the four rear legs and only one anchoring bar in each of the front legs. Additionally, the front leg anchors had not been stressed to the appropriate force and were only tightened with a wrench. A few months prior to the collapse of the launching gantry, the employer had experienced a movement of about 2 centimeters at the rear legs during a launch when using a total of only two rear-leg anchoring bars. The manufacturer's instructions provided that such movement could lead to a collapse of a launching gantry.



Figure 4: View of the Launching Gantries after the Accident

Conclusions

- OSHA's Cranes and Derricks standard, 29 CFR 1926.550(a)(1) requires employers to comply with the manufacturer's specifications and limitations applicable to the operation of any and all cranes and derricks.
- In the event that manufacturer's specifications are not available, the limitations assigned to the equipment shall be based on the determination of a qualified engineer competent in the field; such determinations must be appropriately documented, recorded and available for review, as necessary, by affected parties and any authorities having jurisdiction.

Reference Standard

29 CFR 1926.550(a)(1) - The employer shall comply with the manufacturer's specifications and limitations applicable to the operation of any and all cranes and derricks. Where manufacturer's specifications are not available, the limitations assigned to the equipment shall be based on the determinations of a qualified engineer competent in this field and such determinations will be appropriately documented and recorded. Attachments used with cranes shall not exceed the capacity, rating, or scope recommended by the manufacturer.