

Case 370. 34-year-old production control laborer died when he was struck by the manifold of a prototype aluminum fuel distribution system that exploded.

A 34-year-old production control laborer died when he was struck by the manifold of a prototype aluminum fuel distribution system that exploded. Firm 1 was contracted by a business consortium to “spearhead” the fabrication and manufacture of their prototype aluminum fuel distribution system (system). Firm 1 “hired” the decedent’s employer (Firm B) to fabricate the system, which consisted of eight, 6-foot long by 6-inch diameter aluminum tubes containing activated carbon “hockey pucks” in a sleeve. The tubes were welded side by side to a 4-foot 7-inch-wide manifold. The development of the system was under pressure to get the job finished so it could be displayed at an upcoming convention. The system had not been tested hydrostatically prior to the pneumatic testing. To test the system, Firm B built an approximately 7-foot-wide by 8-foot long by 2-foot high “tank” constructed of ½-inch plywood and 2 x 6s. The tank was positioned in an east-west orientation. Inside of the tank was a liner and the tank was filled with water. To test the fuel system, the system was strapped to a steel plate and lowered into the tank by a forklift. Argon gas was introduced through an intake valve welded on the manifold. The system had failed four tests; the system leaked around the manifold seam and bolts before the desired pressure was reached. The incident occurred while performing the 5th test. The decedent was one of four individuals at the test site; one individual from Firm 1 and three from Firm B. The manifold was positioned to the west and the aluminum tubes to the east. At approximately 600 psi, leakage around the manifold and bolts was observed. A representative from Firm 1 was planning to perform a deflection test of the metal. It appears the prototype was raised to allow for deflection measurements. The argon gas was turned off so the system could be depressurized so another measurement could be performed. The decedent was positioned on the west side of the tank and another Firm B employee was walking toward the decedent to help unscrew the argon line when the system exploded. The west side of the tank collapsed when the manifold and aluminum tubes separated. The decedent was struck by the manifold and thrown approximately 60 feet to the west. The aluminum tubes became projectiles to the east, with one causing a deflection of a steel beam and one landing approximately 135 feet away after impacting other objects. Emergency response was called and the decedent was taken to a nearby hospital where he died shortly after arrival.

The MIOSHA General Industry Safety and Health Division issued the following Serious citations to the firm at the conclusion of its investigation:

Serious: GENERAL PROVISIONS, GI PART 1

- RULE 408.10011(a):

The employer shall provide training to each newly assigned employee regarding the operating procedures, hazards, and safeguards of the job.

Employees were not trained in safe operating procedures, particular hazards, or appropriate safeguards for duties relating to the pressure testing of prototype aluminum vessels using argon gas.

- RULE 408.10036(6):

An employee shall be protected by guards or location when pressure tests are being performed on materials or equipment where rupture or failure would create a hazard.

Employees were not protected by guards or location during pressure testing of prototype aluminum vessels using argon gas.