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CRANIUM: Device for Improving Crane Productivity and Safety

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CRANIUM: DEVICE FOR IMPROVING CRANE PRODUCTIVITY AND SAFETY

THE NEED

Cranes are the most important pieces of equipment on many construction sites. While technological advances have been made in crane hardware, the communication system used to coordinate the crane operator’s actions with other craftsmen has not changed in decades. Crane operators frequently cannot see the loads they are moving, so they rely on hand signals relayed among craftsmen.

THE TECHNOLOGY

CRANIUM is a video system designed to improve productivity and safety of crane operations by improving communications. A video camera mounted on the crane bottom transmits an image to the television monitor in the crane cab (see Figure 1). The operator has a real-time picture of the loads and craftsmen that might otherwise be out of the direct line of sight.

![Figure 1 CRANIUM Camera Housing with Damped Gimbaled Mount and Angle Adjustment Mechanism](http://dx.doi.org/10.5703/1288284315914)
**The Benefits**
Reduction of delay in communications leads to productivity improvements. Reduction of errors in communication leads to safe improvements. Experimental results show that for moderate and high precision lifts, productivity can be increased 16-21%. Crane safety is also improved. Both signal delays and signal errors can be reduced by using CRANIUM.

![Image of CRANIUM unit mounted on crane bottom]

**Figure 2 CRANIUM Unit Mounted on Crane Bottom**

The cost of the prototype CRANIUM, including all the components, is approximately $3,200. This figure is based on the retail prices for individual components, but does not account for labor to fabricate and assemble the components. Mass producing the CRANIUM would certainly lower the unit cost. In addition to direct labor and equipment savings, the CRANIUM may produce large indirect economic benefits. Crane operations are frequently found on the critical path of construction projects. By reducing the duration of critical path activities, the overall duration of the project is shortened. Improved safety also provides major economic, humanitarian, and social benefits to the contractor and the owner.

**Status**
A full-scale fully-operational prototype CRANIUM has been designed, fabricated, and extensively tested in the field.

**Barriers**
Up to the moment the primary consideration was to establish the technical feasibility and operational practicality of the CRANIUM. However, before the CRANIUM can be commercialized, it would require additional development.
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REFERENCES


REVIEWERS

Peer reviewed as an emerging construction technology

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