1-1-2007

CRANIUM: Device for Improving Crane Productivity and Safety

Purdue ECT Team
Purdue University, ectinfo@ecn.purdue.edu

DOI: 10.5703/1288284315914

Follow this and additional works at: <https://docs.lib.purdue.edu/ectfs>

Part of the [Civil Engineering Commons](#), and the [Construction Engineering and Management Commons](#)

Recommended Citation

ECT Team, Purdue, "CRANIUM: Device for Improving Crane Productivity and Safety" (2007). *ECT Fact Sheets*. Paper 205.
<http://dx.doi.org/10.5703/1288284315914>

This document has been made available through Purdue e-Pubs, a service of the Purdue University Libraries.
Please contact epubs@purdue.edu for additional information.

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 Figure1). 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

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.

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.

POINTS OF CONTACT

Everett, John G., Asst. Prof. of Civil and Envir. Eng., Univ. of Michigan,

Email everett@engin.umich.edu

Slocum, Alexander H., Assoc. Prof. of Mech. Eng., Massachusetts Inst. of Tech.,

Phone: (617) 253-0012, Email slocum@mit.edu

REFERENCES

1. Everett, John G. and Slocum, Alexander H., Cranium: Device for Improving Crane Productivity and Safety, Journal of Construction Engineering and Management, Vol.119, No. 1, March 1993.

REVIEWERS

Peer reviewed as an emerging construction technology

DISCLAIMER

Purdue University does not endorse this technology or represents that the information presented can be relied upon without further investigation.

PUBLISHER

Emerging Construction Technologies, Division of Construction Engineering and Management, Purdue University, West Lafayette, Indiana