

Workshop T2

Tuesday, October 28, 1:30–3:00 p.m. and 3:30–5:00 p.m.

BEST PRACTICES FOR ELIMINATING CRANE LOSSES

Presented by



Peter G. Furst
Director of Contracting
Liberty Mutual Group

Recent catastrophes involving cranes have created a renewed awareness of the potential dangers on a construction project. Contractors need to establish crane safety procedures, even if all crane work is performed by subcontractors. This workshop outlines best practices for contractors in eliminating crane losses.

- Describes key causes of crane-related accidents.
- Reviews key elements of a crane safety program, including subcontractor selection, training and certification, and technology-based precautions.
- Outlines safety procedures for avoiding crane accidents.

NOW AVAILABLE!



ConsensusDOCS™

The New Voice of the Industry



Introducing ConsensusDOCS™—the new, united voice representing the project's best interest.

Owners have worked together with designers, contractors, subcontractors and surety professionals to transform the industry through newly published comprehensive construction contracts. Owner insight and perspective were key elements of the drafting process. ConsensusDOCS represents the best practices in the industry.

Order Today!
Visit www.agc.org/bookstore

ConsensusDOCS™ proudly endorsed by the following:



Peter G. Furst
Technical Director of Contracting
Liberty Mutual Group

Mr. Furst is presenting Workshop T2, "Best Practices for Eliminating Crane Losses," on Tuesday afternoon. He is Technical Director of Contracting Services in the Western United States for Liberty Mutual in Pleasanton, California. He is responsible for the Pacific, West, and Northwestern regions (13 states); as well as the Pacific Rim countries served by the company's International Division. As technical director, he provides specialist support for field customer service efforts in the Contracting Service areas. Mr. Furst works directly with field loss prevention consultants as well as customer personnel to ensure superior quality and innovative consulting solutions. He consults on Lean Processes, Six Sigma, behavior management, and organizational systems and scorecards. He has consulted with numerous customers, helping them improve their organizational systems, business processes, and operational procedures to more effective levels, thereby substantially increasing operating efficiencies, internal alignment so as to reduce their cost of risk.

Mr. Furst has 20 years of construction experience with a multinational general contractor. He served as estimator, project engineer, superintendent, and project manager on numerous projects varying in size from \$5 million to \$350 million, involving hundreds of craftsmen and subcontractors. He also had overall safety responsibility for projects amounting to more than \$450 million annually. Under his leadership, on average, the EMR hovered at or below 0.50. Mr. Furst has also consulted with numerous contracting, industrial, architecture, and engineering firms in operations and safety management, as well as consulting on lean project delivery systems, safety in design, sustainability, and other innovative organizational solutions.

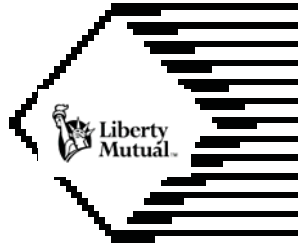
He is a Registered Architect, Certified Safety Professional, an Associate in Risk Management, and a Registered Environmental Assessor. Mr. Furst has a master's degree in business administration with emphasis in management, a bachelor of architecture, and a bachelor of science in construction. He has taught organizational management, construction management, and safety courses at UCLA, USC, UC Berkeley, Cal Poly Pomona, Cal State Long Beach, and Cal State East Bay Universities. He is a nationally recognized motivational speaker in both the United States and Canada speaking on topics dealing with organizational management, lean thinking, Six Sigma, Balanced Scorecards, Safety in Design, Enterprise Risk Management, leadership, as well as safety management. Some of the organizations at whose national conferences he has spoken, in addition to IRMI, are RIMS (Risk and Insurance Management Society), ASSE (American Society of Safety Engineers), NSC (National Safety Council), CSC (Construction Safety Council), IIE (Institute of Industrial Engineers), American Industrial Hygiene Association, BSN (Behavior Safety Now), NeoCon World Trade Show, ACI (American Concrete Institute), CSI (Construction Specification Institute), US (Utility Safety), WoC (World of Concrete), and AGC (Associated General Contractors). He has also spoken numerous times at regional conferences such as the Alaska, Oregon, Alabama, and Hawaii Governor's Conferences, as well as state-level conferences for the AGC, ABC, and CEA.

Mr. Furst is a past member of the San Francisco and Los Angeles chapters of the American Institute of Architects (AIA), and the National Safety Council, a member of CSI, ASSE, and AUA. He has served on the California AGC Safety, Labor Relations, Transportation, and Environmental Committees. Mr. Furst also serves as a Commissioner for the California State Board of Architectural Examiners. He is a member of a number of ANSI committees and subcommittees.

Notes

This file is set up for duplexed printing. Therefore, there are pages that are intentionally left blank. If you print this file, we suggest that you set your printer to duplex.

BEST PRACTICES FOR ELIMINATING CRANE LOSSES ***EFFECTIVE CRANE MANAGEMENT PRACTICES***



Peter G. Furst
Liberty Mutual Group

Session Objectives

- Craning Issues
- Crane Basics
- Best Practices
- Crane Operations Management

CRANING ISSUES

Crane Accidents

- Factors in mobile crane accidents
- Factors in tower crane accidents

Cause of Accidents

Ineffective planning

Little, no, or poor risk assessment

Delegation without control

Schedule pressures

Setup, movement, removal

Lifting operations

Operator/Rigger/Signaler

Other causes

How To Avoid Incidents

General understanding of crane operations

Contractor selection

Risk assessment

Planning and control

Competence

Other measures

Understanding Craning

Types of Cranes

Mobile

Mobile types

Boom trucks

Carrier mounted

Crawler

Rough terrain

Mobile crane components

Carrier

Upper works

Counterweight

Tower

Tower types

Static

Mobile

Tower crane components

Foundation

Tower

Jib

Counterweight

Other Construction Cranes

Locomotive

Barge or floating

Side load

Straddle

Derricks

Others

Crane Physics

Crane Operations

Crane Management

Other Factors

Booms

Jibs

Safety devices/Warning systems

Securing idle crane

Crane Standards and Information

ANSI

Power Crane and Shovel Association

Society of Automotive Engineers (SAE)

OSHA/MSHA

Military (Army Corps of Engineers, Navy, etc.)

Manufacturer

Consultants and engineers

Safety organizations

Industry practice

CRANE BASICS

Leverage

Weight

Lever Arm

Support

Center of Rotation

Impacts Crane's Center of Gravity

Movement of Boom

Other Factors

Center of Gravity (CG)

Carrier

Counterweight

Boom

Quadrant of Operations

Over the Front

Over the Side

Plumb/Level

Impact on Capacity

Initial setup

During service

Other time frame

Stable Support

Operational Practices

Other Factors

Setup

On tires

On outriggers

Cribbing

Importance to distributing the load

Soil conditions

Size of cribbing

Managing crane operation

Influencing the process

Owner

Contractor

Subcontractor

Erector

Vendor

Operator/Rigger/Signaler

Others

General Craning Risks

The machine

Crane certifications

Crane history

Safety devices

Metal fatigue

Mechanical parts

Inspections

Maintenance

Secure idle crane

Load management

Weight

Center of Gravity

Sail area

Sling/Accessory selection

Inspection

Personnel competence

Management and supervision

Overall criteria

Basic craning knowledge

Operator

Certification

General experience

Familiar with crane

General health

Rigger

Rigging knowledge

Experience

Signaler

Mobile Crane Risks

Assembly/disassembly (boom)

Plan

Room

Travel path

On-site relocation

Obstructions

Setup

Level and plumb

Support factors

Compaction

Underground utilities

Tower Crane Risks

Assembly/Disassembly

Jacking or climbing

Bolts

Proper strength

Torque

Base issues

Foundation

Ballast

Building tie

BEST PRACTICES

Foundational Considerations

Craning

Crane selection

Production expectations

Operating criteria (speed, stop-start, swing, etc.)

Critical lifts

Hours of operation

Effective Preplanning

Operational plan

Risk assessment

Contingency options/Procedures

Oversight and control

Logistics

Coordination

Communication protocol

Personnel Competence

Management

Operator

Rigger

Signaler

Load Management

Weight

Center of Gravity

Sail area

Swing

Stop/Start

Critical Times

Preconstruction

Select the “right”:

Contractor

Subcontractor

Erector

Crane

Establish expectations

Require detailed planning

Active management and control

Job Start

Confirm preconstruction items

Expectations

General approach still relevant

Assess staff competence

Understand preplanning process

Risk assessment and control plan

Active management process

Phase of Work

Preplanning meeting

Reaffirm expectations

Understand specific operational plan

Revisit risk assessment and control plan

Assess sub's staff competence

Understand chain of command/control

Operator/Rigger experience/Training

Review field management process

Devise contingency plan

CRANE OPERATIONS MANAGEMENT

Daily Operations

Safety Checks

Review Daily Plan

Rigging Review

Summary

- Craning Issues
- Crane Basics
- Best Practices
- Crane Operations
 - Risk Management
 - Planning
 - Control

The illustrations, instructions, and principles contained in the material are general in scope and, to the best of our knowledge, current at the time of publication. No attempt has been made to interpret any referenced codes, standards, regulations, principles, or concept. All of this information is public knowledge and readily available in books and trade journals.

Cranes

Information

Mobile Cranes

- **Boom trucks**
- Carrier mounted
- Crawler
- Rough terrain

Mobile Cranes

- Boom trucks
- **Carrier mounted**
- Crawler
- Rough terrain

Mobile Cranes

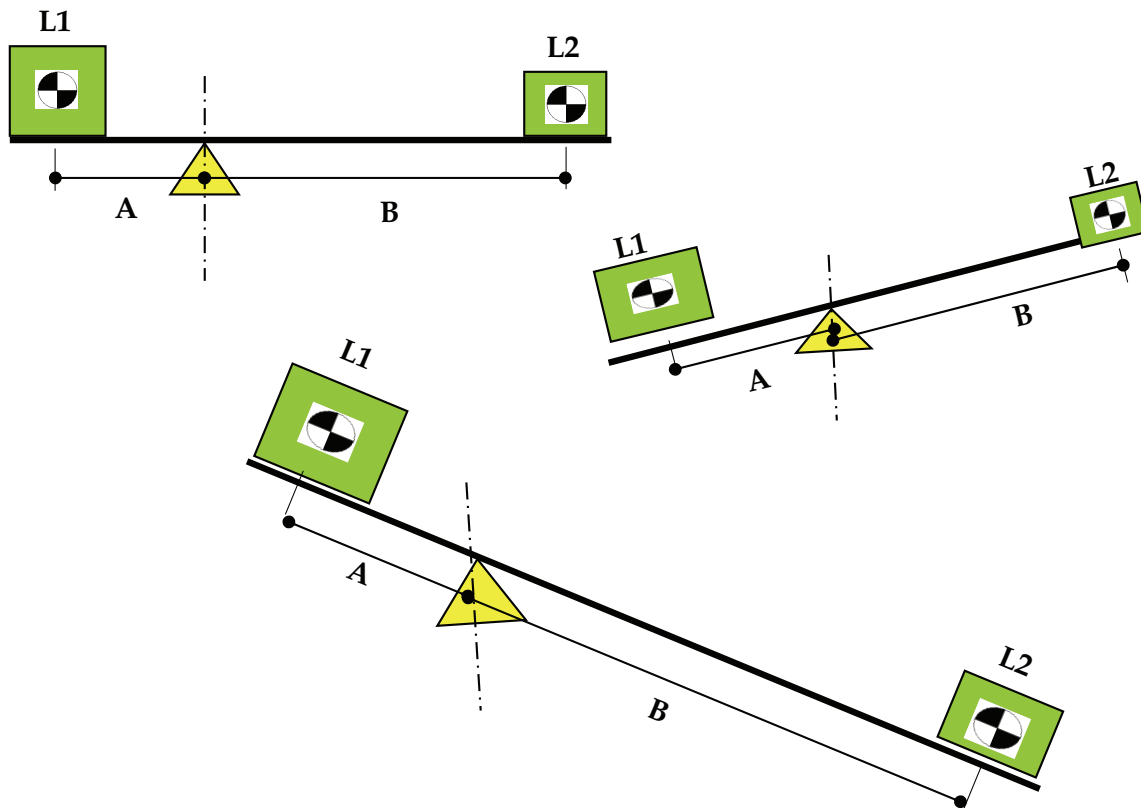
- Boom trucks
- Carrier mounted
- **Crawler**
- Rough terrain

Mobile Cranes

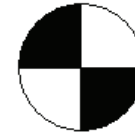
- Boom trucks
- Carrier mounted
- Crawler
- **Rough terrain**

Tower Cranes

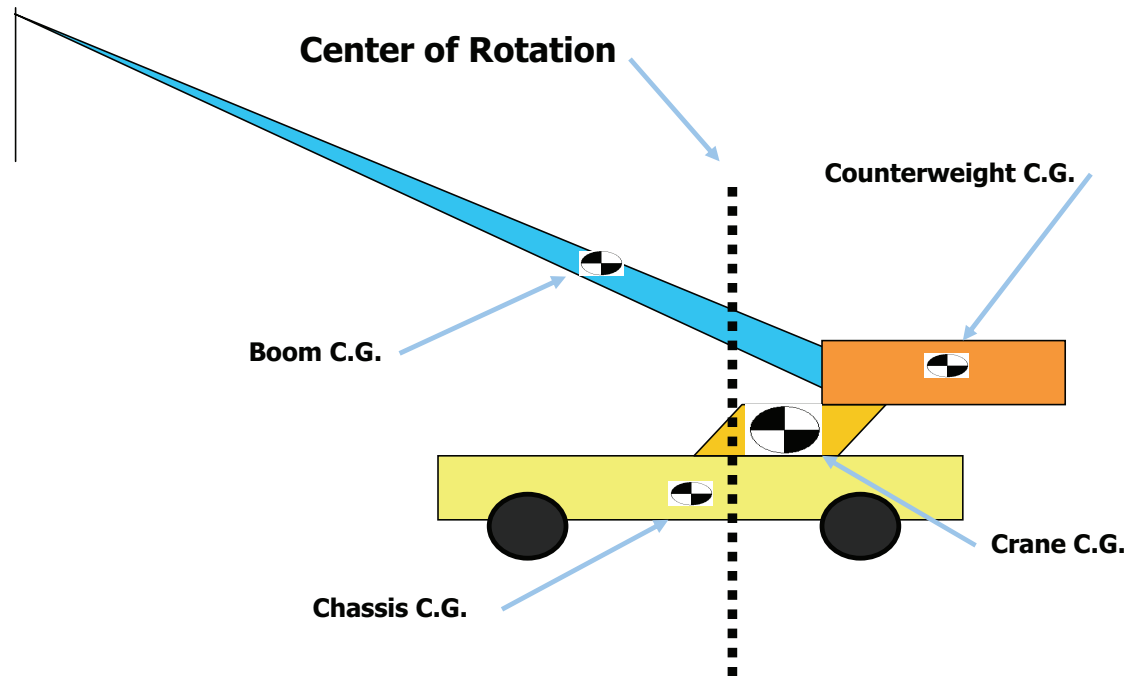
Leverage



Center of Gravity



25



Quadrant of Operations

- Most wheel mounted cranes do not have the same capacity as it swings.

THE NATIONAL COMMISSION FOR THE CERTIFICATION OF CRANE OPERATORS

NCCCCO formed January 1995

CRANE OPERATOR CERTIFICATION AND LICENSING ORGANIZATION

AVAILABLE CERTIFICATION

Mobile Cranes

- Lattice Boom Truck (LBT)
- Lattice Boom Crawler (LBC)
- Large Telescopic (TLL)
- Small Telescopic (TSS)

Tower Cranes

Overhead (Gantry) Cranes

WRITTEN EXAMS

Four Knowledge Areas

- Site
- Operation
- Technical knowledge
- Load charts

PRACTICAL EXAMS

Nationwide exam sites

By crane type

MEDICAL EVALUATION

By certified physician

CCO form or DOT medical examiner's certificate

NEW PROGRAMS

Signalperson Certification

- Testing begins October 1, 2008
- Covers mobile cranes and tower cranes standard signals
- Hand and voice signals tested

Rigger Certification

- Ready for rollout Q1 2009
- 3 levels: Basic, Intermediate, Advanced

State Adoption of NCCCCO

- West Virginia (2001)
- Hawaii (2003)
- New Jersey (2004)
- California (2005)
- Montana (2005)
- New Mexico (2007)
- Minnesota (2007)
- Nevada (2007)
- Utah (2007)
- Washington (2010)

Crane Resources:

WEB Sources

Construction Safety Association of Ontario

Hoisting & Rigging Safety Manual—http://www.csaio.org/images/pfiles/4_M035.pdf

ANSI Standards—<http://www.asse.org/>

eCLOSH—http://www.cdc.gov/elcosh/docs/hazard/safety_cranes.html

OSHA—<http://www.osha.gov/SLTC/cranehoistsafety/mobilecrane/mobilecrane.html>
—<http://www.mhia.org/industrygroups/osha>

NIOSH—<http://www.cdc.gov/niosh/docs/2006-142>

Washington State—<http://www.lni.wa.gov/safety/topics/atoz/cranes/default.asp>

The University of Tennessee, Construction Industry Research & Policy Center, “Preventing Crane Fatalities in the Construction Industry”—<http://bus.utk.edu/cirpc/Research/index.htm>

The Center for Construction Research and Training, “Crane-Related Deaths in Construction and Recommendations for Their Prevention”—<http://www.cpwr.com/>

CraneAccidents.com

Written Sources:

Construction Safety Association of Ontario (CSAO) —www.TIRC.net

74 Victoria Street, Toronto, Ontario, Canada M5C 2A5

Crane Handbook

Mobile Crane Handbook

Rigging Handbook

Cranes & Derricks, 3rd ed., Howard Shapiro, McGraw-Hill, www.TIRC.net

Crane Hazards and Their Prevention, David MacCollum, source, www.asse.org

PCSA NO. 4 - Mobile Power Crane and Excavator and Hydraulic Crane Standards

(replaces PCSA No. 1 and PCSA No. 2)

Power Crane and Shovel Association (PCSA)

Marine Plaza-Suite 1700, 111 East Wisconsin Ave., Milwaukee, WI 53202

Training & Inspection Resource Center

9428 Old Pacific Hwy.

Woodland, WA 98674

(888) 567-8472 (*ask for their catalog of books and videos*)

www.tirc.net

Bob's Rigging & Crane Handbooks, by Bob De Benedictis

Wire Rope Users Manual, by Wire Rope Technical Board

Wire Rope Sling Users Manual, by Wire Rope Technical Board

Suggested—Safe Crane Management Requirements

1. Contractor must submit its safe crane management plan 30 days before start of work. Specific project and site requirements must be incorporated into a project site-specific safe crane management plan, which is to be submitted as well..
2. All manufacturer's, industry best practices, ANSI, PCSA, OSHA, and other pertinent requirements must be factored into the safe crane management plan.
3. Before going into service on-site every crane is to be inspected to ensure that it meets the manufacturer's inspection requirements. Documentation to that effect must be submitted. All other inspection documentation or certification must also be submitted along with the plan.
4. All crane operators must be certified and have prior experience operating the selected crane.
5. Preplanning crane operations is a requirement with a meeting to be held 30 days in advance of the start of operations. Critical lift meetings are also required 1 week prior to start of those lifts.
6. A pre-lift meeting must be held before start of lift operations to review deviations from submitted plans.
7. Any lift exceeding 75 percent of the crane's rated capacity shall be considered a "critical lift." Critical lift plans must be submitted with the site-specific plan or 2 weeks in advance of the operation for review and evaluation.
8. All lift plans must evaluate rigging configuration, weights, and requirements, which are to be included in the site-specific safe crane management plan.
9. All critical lift must reevaluate and confirm rigging requirements.
10. The contractor's project manager, superintendent, lift supervisor, and crane operator must attend the meeting.
11. The contractor must bring to the meeting a plan depicting the setup location(s) of the crane, as well as the heaviest load and longest reach for each setup location. All calculations are to be reviewed at the meeting.
12. The contractor must sign off on the meeting discussions and agreements.
13. The movement of mobile cranes on-site must be planned and written documentation of this must be submitted for review.
14. The contractor must take into account site conditions for each crane set-up and must submit requirements as well as a written plan prior to start of work.
15. A list of qualified riggers must be submitted for review 10 days before start of work.
16. Contractor must submit a rigging management plan along with all other required submissions.
17. The use of crane suspended personnel platforms are prohibited unless the contractor has exhausted all other means. The contractor must submit a detailed plan addressing the risk and controls planned for the operation. The plan must include crane configuration, additional safety features and controls, platform design, and construction loading and safety requirements, as well as specific rigging signaling and safety considerations.

Notes

This file is set up for duplexed printing. Therefore, there are pages that are intentionally left blank. If you print this file, we suggest that you set your printer to duplex.