

Mobile Crane Operator Job Analysis

Executive Summary

Crane Institute of America, the leading crane operator training company in the nation; contracted with 4ROI, a highly experienced assessment company; to conduct a comprehensive job analysis in the fall of 2007 to formalize the tasks, knowledge, skills and abilities needed by mobile crane operators to perform successfully and safely on the job. The primary duties of mobile crane operators are to operate mobile cranes to lift, move, position and place materials and equipment.

The purpose for conducting this job analysis was to refine a series of crane operator certification programs, including the certification program for operators of the following types of cranes:

- ◆ Telescoping Boom, 20 Tons or less
- ◆ Telescoping Boom, 21 through 75 Tons
- ◆ Telescoping Boom Over 75 Tons
- ◆ Lattice Boom, Carrier Mounted
- ◆ Lattice Boom, Crawler Mounted

Crane Institute of America has set up a completely independent division, Crane Institute Certification Division (CIC) to be responsible for objectively developing and administering its crane operator certification programs.

The mobile crane operator certification programs include the following elements:

1. Multiple-choice General Knowledge Examination
2. Multiple-choice Crane-specific Supplemental Examination
3. Hands-on Crane-specific Practical Examination

All three components must be passed for certification in a particular crane type to be granted. Furthermore, for recertification purposes, the following are included:

1. Multiple-choice Crane-specific Recertification Examination
2. Hands-on Crane-specific Practical Examination (same as above or 1000 documented hours of crane operation in the crane type)

Based on the input of industry Subject Matter Experts (SMEs), it was determined that the degree of ongoing change in technology within the Crane Operator trade warranted re-certification at the relatively moderate interval of every 5 years.

Development and Distribution of the Job Analysis Questionnaire

The purpose of a job analysis is to:

- ◆ Determine the content areas that must be assessed through the examination process;
- ◆ Document the job-relatedness of the resulting assessment instrument

4ROI consultants reviewed existing job analysis materials and worked with SMEs to create the job analysis questionnaire.

The Job Analysis Questionnaire was distributed by participating organizations to their employees, trainees or clients. These organizations reflected crane operator training, crane rental, utilities, crane inspection and the military. They were asked to distribute the questionnaires to individuals that had 3 or more years of crane operating experience.

The Job Analysis Has an Adequate Database

Well over a hundred questionnaires were obtained. The background of the respondents is highly consistent with the background typical of individuals practicing the crane operating trade and represents broad geographic diversity.

Nearly two-thirds (59%) of the respondents were from the Construction industry, however, a great variety of other industries were represented including Energy, Manufacturing, the Military and Mining. The majority were crane operators at the present time, the rest supervised crane operators. They were highly experienced and averaged 13 years of job experience. Nearly all of those responding were male with an average age of 43. Most were Caucasian. Most were high school graduates with some college or vocational training. In addition, there were respondents from 28 different states representing the Northeast, Midwest, Southern and Western regions of the United States.

From a demographic standpoint, the background of the respondents is highly consistent with the background typical of individuals practicing the crane operating trade. A very positive finding is the geographic diversity represented by the respondents which suggests that the results are representative of crane operation across the U.S.

The Job Analysis is Comprehensive

The job analysis research resulted in a job model composed of 55 Tasks, 200 Knowledge Statements, 88 Skills and 96 Abilities.

On average, respondents indicated that the job tasks in the questionnaires represented 90% of the tasks required of a crane operator. This is consistent with ratings obtained from the subject matter experts who helped design the job analysis questionnaire.

The results of this job analysis were used to:

1. Develop test specifications
2. Categorize existing General Knowledge and Telescoping Boom exam questions
3. Drive new item development and
4. Direct practical exam design and development

Test Specifications

Based on the results of the job analysis the following assessment domains on the written exams were recommended:

Assessment Domains	General Knowledge Exam	Supplemental Crane-Specific Exam	Crane-Specific Recertification Exam
	<i>Proposed %</i>	<i>Proposed %</i>	<i>Proposed %</i>
Site Evaluation & Crane Setup	25%	5%	15%
Technical Information	25%	15%	20%
Load Charts	25%	40%	33%
Crane Operation	25%	40%	33%
Total Percent	100%	100%	15%

The practical exams measure the following skills:

- ◆ Operating controls to raise and lower the load
- ◆ Operating controls to swing crane
- ◆ Operating controls to raise and lower the boom
- ◆ Controlling the load
- ◆ Picking and carrying load
- ◆ Communicating with signaler
- ◆ Securing the crane when finished.

Based on the results of the job analysis the following assessment domains on the practical exams were recommended:

- ◆ Accuracy and depth perception 35%
- ◆ Hand signals 16%
- ◆ Ability to control a load 50%
- ◆ Securing the crane 4%

Examinations Derived From This Job Analysis are Content Valid

Validity refers to the degree to which the exams measure what they are intended to measure. In particular, content validity refers to the degree to which the items or tasks on the exams are consistent with the expert opinion of subject matter experts in the field about the knowledge, skills and abilities (KSAs) needed to be an effective crane operator. A content validation strategy is a legitimate and defensible approach when developing certification examinations. The foundation of a credible content validation strategy is a thorough job analysis.

The job analysis that was conducted, involved the identification of a comprehensive list of the tasks performed on the job by crane operators and of the domain of significant knowledge, skills and abilities (KSAs) needed to successfully perform the crane operator job. Based on this information, a job analysis questionnaire was distributed to be rated by subject matter experts to determine the significance of the tasks and KSAs towards successful performance on the job.

By properly sampling the domain of significant KSAs, exams were developed that ensure that the passing candidates have achieved mastery of the significant knowledge, skills and abilities needed to operate a crane.

Conclusion

This executive summary addresses commonly asked questions concerning the Job Analysis for the Mobile Crane Operator. There is strong evidence to support the content validity and statistical adequacy of the job analysis.

The primary purpose of the mobile crane operator certification programs is to certify that a mobile crane operator possesses the required knowledge, skills, and abilities necessary to successfully perform essential job duties to operate the particular crane in question.

The job analysis and exam development procedures described were developed in accordance with professionally-acceptable methodologies, and the resulting certification program is in compliance with applicable professional and legal standards, such as: the Civil Rights Act of 1991; the Americans with Disabilities Act (ADA); Age Discrimination Legislation; the *Uniform Guidelines for Employee Selection Procedures*; the *Standards for Educational and Psychological Testing*; and the *Principles for the Validation and Use of Personnel Selection Procedures*.

4ROI consultants are confident that the certification program described in this report is consistent with state and federal legislation governing content-valid certification examinations, and that the Mobile Crane certification programs accurately reflects the depth and breadth of knowledge, skills, and abilities needed to successfully perform the mobile crane operator job duties for this type of crane.