



Certified Master Rigger and Signaler/Lift Director
(CMRS/LD)

2017 Practice Analysis

Summary Technical Report



TABLE OF CONTENTS

- Practice Analysis Study 2
 - Overview 2
 - Method 2
 - Identifying Changes since Previous Practice Analysis 3
 - Review and Edit Task and KS Statements 3
- Practice Analysis Results 3
 - Link KSs to Task Domains 4
 - Test Plan Development 5
- Conclusion 5

Practice Analysis Study

Overview

In 2017, CPS HR worked with the CICC to conduct a second practice analysis study for the CMRS/LD program. The practice analysis study described in this report complies with all relevant professional and legal guidelines for the development of certification examinations, such as the *Standards for Educational and Psychological Testing* (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 2014), the *Principles for the Validation and Use of Personnel Selection Procedures* (Society for Industrial and Organizational Psychology, Inc., 2003), and the *Uniform Guidelines on Employee Selection Procedures* (Federal Register, 1978) and the *National Commission for Certifying Agencies (NCCA) Standards for the Accreditation of Certification Programs* (ICE, 2014).

Method

Due to the small population of Master Riggers/ Lift Directors in the USA and Canada (i.e., estimated at 1,400), a panel-based practice analysis approach was employed. Best practice was followed to ensure the group of SMEs on the panel were representative of the trade in terms of race/ethnicity, gender, location, shift, assignment composition, and experience (Cascio & Aguinis, 2011) and knowledgeable of all aspects of the job being analyzed (Gatewood, Field, & Barrick, 2011). It is also supported by the *Standards for Educational and Psychological Testing* (1999, p. 11), which specifies that “expert judgments” can provide validity evidence to support test content.

Presented below is an overview of the steps taken to perform the CMRS/LD practice analysis study.

- Review and edit the task, knowledge, and skill statements from the previous job analysis (2012)
- Identification areas of change in the industry since the previous job analysis
- Determine which knowledge and skills are needed at the time of certification
- Guided exercises and literature review
- Confirm linkages between the Knowledge and Skills to the Job Tasks (task domains)
- Review and edit examination specifications, including the examination plan or blueprint
- Review and edit the examination matrix to guide test development
- Review and revise the reference material list
- Review and edit the Minimally Acceptable Candidate (MAC) profile

The practice analysis panel, which took place in March 2017, began with an orientation and PowerPoint presentation regarding the importance of practice analysis to certification programs and describing the process, as well as steps and guidelines for reviewing task, knowledge, and skill (KS) statements.

Identifying Changes since Previous Practice Analysis

When conducting programmatic practice analyses in a series, it is important to identify the areas of change in the industry over time. Thus, the focus for this second practice analysis study shifted from the *generation* of task, knowledge, and skill statements to the *identification* of task, knowledge, and skills that are new to or no longer a part of the job, as well as refining the statements from the prior practice analysis.

A two-step process was utilized in updating the practice analysis. First, the panel of SMEs were asked to identify changes in the job since the first study took place. The SMEs participated in three exercises (e.g., guided brainstorming, retrospection of a typical day at work, and critical incidents or anecdotes of job behavior that describe good and bad performance within the trade in general) and reviewed updated literature (e.g., training manuals, regulations). Second, a thorough search was conducted to identify any new sources of trade relevant information. Where possible, updated versions of all literature that formed the foundation for the previous practice analysis were collected (e.g., industry-recognized manuals, training manuals, handbooks on rigging and signaling, O*Net).

Review and Edit Task and KS Statements

Before beginning to review the task and KS statements from the previous study, the SMEs were asked to review and provide feedback on the existing job dimensions (i.e., groupings of task statements) and competencies (i.e., groupings of knowledge and skill statements). The two job dimensions (i.e., Rigging Procedures and Rigging Safety) were unchanged through this process.

The SMEs then reviewed the list of task statements (individually first, then as a group) for relevance, accuracy and clarity, appropriate terminology, completeness, inclusion of all general aspects of the job, inconsistencies, and redundancy. This activity was continued until the group believed they had compiled a comprehensive list of all job tasks that a CMRS/LD performs.

A similar process was used to review the existing knowledge and skills (KS) that CMRS/LDs need to perform the job tasks. From this review, additional KS statements were written and revised, and again a large number of KS statements were combined to reduce redundancies within the list. The activity continued until the SMEs believed that the list of KS statements represented an accurate and comprehensive list of the knowledge and skills that would be needed to perform the job tasks of a CMRS/LD. Similar to the first study, the SMEs agreed that the essential KSs are validly measured by a multiple-choice written exam.

Practice Analysis Results

The overwhelming conclusion from the previous steps in this practice analysis is that the job of a CMRS/LD is incredibly stable. Due to the fact this practice analysis is panel-based and the second such study for this position, the typical rating systems (e.g., importance, frequency, needed at certification) were not used and instead all statements—both task and KS—were reviewed by all SMEs and consensus-based decisions were made for each statement regarding retention, further edit (and then re-evaluation), or removal.

Critical Tasks. In reviewing the task statements from the first practice analysis, the SMEs determined that many of the task statements could be combined or removed since they are not distinct tasks for a CMRS/LD but rather are more appropriate for a Certified Rigger and Signaler (CRS). The rationale was two-fold: 1) to be eligible to take the CMRS/LD written test, candidates must successfully complete the CRS program, so they have already been tested on all of the content for that credential, and 2) A CMRS/LD oversees many tasks a CRS completes but does not actually do some of them. Reducing redundancy also allowed for a clearer focus to be placed on the specific content on which a CMRS/LD should be tested. By combining the task statements that require the same knowledge or skills, the SMEs added weight to the most important information. For example, five redundant task statements related to documentation from inspections from the first job analysis study were combined into one for the current study that states: “Creates and maintains documentation of periodic inspections performed on wire rope, chain, slings, rigging hardware, intermediate rigging equipment, and cranes to produce a record of maintenance history to ensure safe working conditions.” In total, 31 task statements out of 197 were retained.

Critical Knowledge and Skills. Similar to the task statement review, many of the KS statements from the first practice analysis study were combined or eliminated for use in test development. The SMEs’ rationale is that the CMRS/LD role is much more advanced than that of a CRS, and the schemas in a Master Rigger and Signaler/ Lift Director’s mind are further developed. SMEs stated that many of the KS statements for a CMRS/LD are broad topics that are more appropriate to be stated together rather than divided into distinct KS statements. For example, there was a skill statement about inspecting the many types of rigging equipment and a separate statement about inspecting the many types of rigging hardware. The two were combined to state, “Skill to visually and/or mechanically inspect wire rope, chain, slings, rigging hardware, intermediate rigging hardware, and cranes using manufacturer's specifications and industry standards before use, during use, and on a regular basis to increase their lifespan and improve the safety of rigging tasks.” As a result of this review process, a total of 26 KS statements out of 229 were retained.

Link KSs to Task Domains

CPS HR conducted a linkage exercise with the SMEs to identify the requisite knowledge and skills needed to perform the important tasks performed by a CMRS/LD. Expert judgment in the form of linkage ratings were used to explicitly document these associations. The linkage exercise meets the requirements of section 15C(3) in the Uniform Guidelines on Employee Selection Procedures (1978) which states: “The relationship between each knowledge, skill, or ability and each work behavior, as well as the method used to determine the relationship, should be provided (essential).”

Linkage ratings. Each SME individually evaluated a given KS statement in terms of its necessity for the performance of the tasks in each job domain. The SMEs were then trained to use a linkage rating worksheet, a matrix of 130 cells/ratings (26 knowledge and skill statements x 5 task domains), to record their linkage ratings. A binary rating was made using a 2-point scale in which 0 = Not Needed and 1 = Needed. Judgments were made independently and then averaged. For each of the 130 ratings, CPS HR staff tallied the number of linkage ratings that SMEs rated as 1. For a knowledge or skill statement to be retained, it had to show one cell with at least 60% of the SMEs agreeing it was needed (rating of 1) to perform the tasks in that dimension.

Test Plan Development

The resulting quantitatively derived linkage data (the number of task domains linked to each KS statement rated as important and needed at the time of certification) was used to calculate the preliminary test plan weights (the estimated weights for each exam dimension [exam section] and sub-dimension). The CPS HR consultant then facilitated a discussion with the SMEs to obtain rational feedback and judgments on the appropriateness of the test plan weights and to ensure the resulting exam plan was appropriate to cover the scope of the CMRS/LD job. Not only is it important to have enough items in each subscale to ensure reliable measurement of each dimension, but also to ensure that the important CMRS/LD content is adequately addressed in each dimension. As a result of the discussion, the SMEs slightly changed the number of items in each dimension to improve content coverage. The final weights assigned to the exam sub-dimensions are presented in Table 1 below.

Table 1. Comparative listing of CMRS/LD Examination Plans

| Dimension | CMRS/LD | | |
|---------------------------------|----------------------------------|--|--------------------------|
| | Exam Plan from 2012 Job Analysis | Linkage-Derived Exam Plan from 2017 Job Analysis | Final Exam Plan for 2017 |
| Rigging Procedures | 40 | 42 | 45 |
| Hitch Configuration | 24 | 15 | 15 |
| Application | 16 | 27 | 30 |
| Rigging Safety | 40 | 38 | 35 |
| Critical Hoist/Planning | 20 | 14 | 16 |
| Site Awareness/Personnel Safety | 16 | 14 | 15 |
| Load Stability | 4 | 11 | 4 |
| Total | 80 | 80 | 80 |

Conclusion

This technical report summarizes the 2017 practice analysis study, including the task and KS statement review and revision, linkage activity, and test plan review and revision for the Certified Master Rigger and Signaler/Lift Director (CMRS/LD) examination. The practice analysis and test plan revision process described in this report complies with all relevant professional and legal guidelines.

The practice analysis study included extensive SME involvement during all stages. CPS HR project staff worked with SMEs to review and heavily revise the task, knowledge, and skill statements of the trade from the prior practice analysis. The linkage activity was facilitated by a CPS HR consultant and conducted by the participating SMEs. The CMRS/LD written exam plan was revised based on the weightings calculated by the linkage analysis and was then finalized based on SME input and judgments.