



Practice Analysis (2016)

Technical Report Summary

Certified Rigger and Signaler (CRS)



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Background

The CITF designates the Carpenters International Certification Council (CICC) as a strategic partner to develop and manage certification programs targeted to UBC members. The mission of the CICC is to improve performance, reduce workplace risk, and safeguard personnel by overseeing that only trained, skilled and qualified individuals complete the work. Toward this end, the CICC has an operating code and policies and procedures to safeguard independence in the following decisions: eligibility standards; the development, administration, and the scoring of assessment instruments; selection of personnel; and operational processes. To avoid any conflicts of interest between the CICC program and CITF training functions, the CICC members and volunteers shall not to be involved in the development of corresponding educational/training programs or courses of study leading to the certification. Similarly, curriculum development staff will not be involved in the corresponding certification program.

Method

When conducting programmatic practice analyses in a series, it is important to pay special attention to identifying the areas of change. In this, the second job analysis for the CRS program there is a very strong foundation from which to build. That is, the majority of the focus can be turned from the generation of task, knowledge, and skill statements *in general* to the identification of tasks, knowledge, and skills that are either new to, or no longer, a part of the job.

Following best practice (Cascio & Aguinis, 2011), six SMEs, representative of the universe of job holders in race, gender, location, shift, assignment composition, and experience and knowledgeable of all aspects of the job being analyzed (Gatewood, Feild, & Barrick, 2011), comprised the panel. In a meeting held in Las Vegas, Nevada from March 7-11, 2016, SMEs and two CPS HR consultants prepared the Practice Analysis Questionnaire. From there, the analysis was completed over another four meetings concluding in October 2016.

Develop and Review Task and KS Statements

Before beginning to review and revise the previous analysis' task and knowledge and skill (KS) statements, the group was asked to review and provide feedback on the existing job dimensions (i.e., groupings of task statements) and competencies (i.e., groupings of KS statements). The three job dimensions (Rigging and Equipment Components, Rigging Procedures, and Rigging Safety) were unchanged through this process. Following the job dimension and competency review, the panel of SMEs evaluated the list of existing task and KS statements as a group and modified the statements as necessary. Training on how to develop and review task and KS statements was included in the Job Analysis PowerPoint presentation. Panel discussions were held to determine any changes to the task statements.

At the conclusion of the previous job analysis, there were 141 task statements. From the previous job analysis, 13 statements were edited for clarity and precision, four items were removed for lack of relevance (three of these were designated as more appropriate for the CMRS/LD program), and two new statements were added. In all, 139 task statements were approved for the questionnaire.

At the conclusion of the previous job analysis, there were 173 KS statements. From the previous job analysis, eight statements were edited for clarity and precision, one item was designated as more appropriate for the CMRS/LD program, and no new statements were added. In all, 172 KS statements were approved for the questionnaire.

Final Practice Analysis Questionnaire

CPS HR staff developed the final version of the questionnaire using an online survey provider (<http://www.qualtrics.com>), and the questionnaire was only available to respondents online. The survey used the finalized list of task and KS statements, as well as a revised set of demographic/background questions. The Practice Analysis Questionnaire included three sections: 13 background information questions, 139 task statements (grouped into three job dimensions), and 172 knowledge and skill statements.

Task rating scales. The *CPS HR Practice Analysis Guidelines* (CPS HR, 2008) recommends two scales for rating task statements: Frequency and Importance. Frequency was rated with a 6-point scale with a response range from 1 (*Not part of the job*) through 6 (*Performed every few hours to daily*). A response of 2 indicated the task is part of the job but not performed. Each of the three remaining responses was accompanied by a phrase that described how often a task is performed, with the larger values indicating greater frequency. Importance was rated by a 4-point scale with a response range from 1 (*Not important to successful job performance*) through 4 (*Very important to successful job performance*). Each of the two remaining responses was accompanied by a phrase that describes a level of importance to successful job performance, with the larger value indicating greater importance.

KS rating scales. The *CPS HR Practice Analysis Guidelines* (CPS HR, 2008) recommends including two scales for rating KS statements as part of the practice analysis questionnaire: Importance and Needed at Certification. In the practice analysis survey, Importance was rated on a 4-point scale with a response range from 1 (*Not important to successful job performance*) through 4 (*Very important to successful job performance*). Needed at Certification was rated by a 2-point scale where 1 signified the knowledge or skill is not needed at the time if certification and where 2 signified the knowledge or skill is needed at the time of certification.

Data Analysis

Three-hundred and twenty-one (321) surveys were used in the final analysis. Surveys that were not 100% complete were not used, and surveys where the respondent reported not rigging or signaling as part of their job were removed.

Critical Tasks. Of the original 139 tasks in the final questionnaire, eight unique statements (5.8%) were flagged for review; no tasks were deleted initially. Five statements were flagged as being close to or under the frequency threshold, two statements were flagged as being close to or under the importance rating, and three statements were flagged *a priori* in the review phase to examine once data had been collected. The SMEs were also shown the breakdown of responses by job title (supervisor vs. non-supervisor) and craft to better understand the data when necessary. Consensus was required on all judgments; when SMEs did not agree, the matter was discussed until consensus was attained. Overall, 16 (12%) of the original task statements were deleted for the CRS program, resulting in 123 (89%) task statements for further use in examination development.

Critical Knowledge and Skills. Of the original 172 knowledge and skill statements in the Practice Analysis Questionnaire, 17 unique statements (9.5%) were flagged for review; no tasks were deleted initially. Seven statements were flagged as being close to or under the Needed at Certification threshold, 15 statements were flagged as being close to or under the importance rating, and five statements were flagged *a priori* in the review phase to examine once data had been collected. The SMEs were also shown the breakdown of responses by job title (supervisor vs. non-supervisor) and craft to better understand the data when necessary. The flagged KS statements were discussed by SMEs until they came to consensus on whether to retain or delete the knowledge or skill statement for further use in examination development. Overall, 15 (9%) of the original knowledge and skill statements were deleted, resulting in 157 (91%) knowledge and skill statements for further use in examination development.

Knowledge and Skills to Job Dimension Linkage

CPS HR used a combination of the task- and worker-oriented approaches to conduct the practice analysis. In a task-oriented approach, the important tasks are first delineated through a process of SME input and judgments through practice analysis questionnaires (as described above). Frequently, assessment exercises are derived directly from the task statements. In a worker-oriented practice analysis, the important knowledge and skills are obtained through the input and ratings of SMEs. These knowledge and skills can also be used to develop assessment exercises.

Because two approaches were used, CPS HR conducted a linkage exercise to identify the requisite knowledge and skills to perform the important tasks. Expert judgments in the form of linkages are used to explicitly document these associations.

For each of the linkage ratings the panel provided, CPS HR staff tallied the number of linkage ratings that were given a 1 (indicating the knowledge or skill is “Needed” to do the task). For a knowledge or skill statement to be retained, it had to show at least one cell with *at least* 60% of the SMEs agreeing it was needed (rating of 1) for performing that task. Each knowledge or skill linked to one or more task domain.

Test Plan Development

Written Test. The CPS HR project consultant calculated the preliminary test plan, which consisted of estimated weights for each of the practice analysis competencies. The test plan weights were based on the number of task statements linked to each knowledge and skill statement rated as important, needed upon completion of the certificate program, and appropriate to test in a multiple-choice format.

During an in-person meeting in September 2016, the CPS HR consultant provided an overview of the definition, purpose, and considerations in an examination plan. This was followed by a discussion and review among the CPS HR consultant, a CICC representative, and ten SMEs of the quantitatively-derived linkage weights (i.e., examination plan presented in Table 1) in order to obtain rational feedback and judgments from the SME panel to guide the final decisions regarding the linkage weights (i.e., examination plans). This discussion was necessary to ensure the examination plans made sense and were appropriate to cover the content of the job of a rigger and signaler.

Several large changes were made from the previous exam plan during this phase. Most notably, the total number of items was reduced from 100 to 80. This change was driven by the SMEs exposure to the test content since the first job analysis. Through item writing, item review, and exam creation, it became apparent to them that 100 items were not required to cover the necessary content domain; and, 80 items were sufficient for full coverage of all necessary material. The second largest change was that two of the sub-dimensions were collapsed into one. Specifically, the Critical Hoist and Planning sub-dimension was combined with the Site Awareness and Personnel Safety sub-dimension.

Table 1. Final Examination Plan for the Written Exam

Dimension	Exam plan from 2012-2016	<i>Initial</i> Exam Plan for 2017+ based on 100 items	<i>Final</i> Exam Plan for 2017+ based on 80 items
Rigging and Equipment Components			
Inspection	15	23	18
Selection	30	28	16
Rigging Procedures			
Hitch Configuration	14	17	15
Application	14	15	14
Signaling	7	6	5
Rigging Safety			
Critical Hoist/Planning	5	1	7
Site Awareness/Personnel Safety	10	7	0
Load Stability	5	3	5
Total	100	100	80

Practical Assessment

The content design plan of the practical examination was derived from 157 knowledge and skill statements that SMEs identified as being best suited for a practical assessment, rather than a written, knowledge-based assessment.

Following a procedure identical to that used for the written exam, the knowledge and skill statements that SMEs identified as being best suited for a practical assessment were linked to task sub-dimensions, and the initial exam plan shown in Table 2 was developed.

Table 2. Practical Examination Plans Derived from Linkage Analysis

Dimension	Number of Linkages	Competency Weight	Percent of Test
Rigging Procedures			
Hitch Configuration	15	0.227	23%
Application	38	0.576	58%
Signaling	13	0.197	20%
Total	66	1	100%

Review and Update of the Existing Practical Exam. The revisions to the practical exam began with a guided discussion where the SMEs that also administer the practical test presented their positive and constructive feedback on the existing practical exam. In general, it was agreed that the existing test offered candidates sufficient opportunity to demonstrate the requisite knowledge and skills. This review also included discussing where unforeseen ambiguities in the behaviorally anchored rating scale (BARS) were noticed in practice and how the exercise performed in relation to how it was designed to perform. From this review, several the BARS were edited for clarity and to address real issues exam proctors were facing while trying to rate candidates.

In addition, one portion of the test was determined to be redundant and remediation strategies were suggested. In summary, the revised exam consists of two parts:

- Making a hoist of the rigging prop using a three-point asymmetrical hitch using voice signals
- Making a one-point rollover hoist of the rigging prop using hand signals

Through these two parts, the candidates are evaluated on 10 tasks (e.g., proper hoisting technique, proper voice signals).

Examination Matrix. The linkage between the written and practical examinations and the practice analysis is maintained over time by ensuring that each form of the written examination is developed according to the examination plan, which was developed directly from the data derived from the practice analysis, as described above. This is accomplished using an examination matrix, which outlines the

content of the job for examination development. This matrix includes linkages to each examination dimension and provides and outlines structure for tracking item bank content representation. Each item within the item bank is assigned a matrix number. Each matrix number provides details on the content sampling for the item, potential source materials, and most importantly, a linkage back to the knowledge and skill statements identified in the practice analysis. Not only does the examination matrix facilitate in ensuring the content validity for each item on the examination, but it also provides meaningful diagnostics for tracking content within the item bank for proper sampling.

Conclusion

This technical report documents the second practice analysis study for the Certified Rigger and Signaler (CRS) program. It detailed the steps undertaken for the task and KS statement review, ratings, linkage results, and test plan development processes. The practice analysis and test plan development 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 reviewed relevant literature and worked comprehensively with SMEs to develop a practice analysis questionnaire to assess the tasks, knowledge, and skills required to perform the job duties of a rigger and signaler. The linkage analysis was facilitated by a CPS HR consultant and conducted by the participating SMEs. The CRS written examination plan was assembled based on the weightings calculated by the linkages developed from the practice analysis and was then finalized based on SME input and judgments. The content sampling plan for the CRS practical assessment was derived from 144 unique knowledge and skill statements that SMEs identified as being best suited for a practical assessment.

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