PROGRAM OUTLINE

Tower Crane Operator
TOWER CRANE OPERATOR
PROGRAM OUTLINE

APPROVED BY INDUSTRY
OCTOBER 2016

BASED ON
NOA 2012
AND
CCDA HARMONIZATION
RECOMMENDATIONS 2015

Developed by
Industry Training Authority
Province of British Columbia
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Section 1
INTRODUCTION
Tower Crane Operator
Foreword

This Program Outline is used to guide competency-based training of crane operators who operate Tower Cranes.

This Program Outline contains both Theory and Practical standards of competence. Theory standards may be achieved outside the performance of the learner’s regular work; for example, in a classroom or through self-study of learning resources. Practical standards build upon the theory and allow learners to gather naturally occurring evidence of workplace performance while they work.

Typically credit for theory standards will be achieved through learning sponsored by the Industry Training Authority (ITA). The theory standards described in this document define the desired knowledge outcome for learners to achieve. Industry wishes learners to have options for achieving credit for these theory standards, including using a variety of non-traditional learning methodologies such as distance education and self-study.

Safe working practices, though not always specified in each of the competencies, are a part of the safe working and learning conditions underlying all these standards and will be required in the presentation of evidence to meet these standards.

This Program Outline includes a list of recommended reference textbooks that are available to support achievement of the standards.

SAFETY ADVISORY

Be advised that references to the WorkSafeBC safety regulations contained within these materials do not/may not reflect the most recent Occupational Health and Safety Regulation (the current Standards and Regulation in BC can be obtained on the following website: http://www.worksafebc.com). Please note that it is always the responsibility of any person using these materials to inform him/herself about the Occupational Health and Safety Regulation pertaining to his/her work.
Acknowledgements

The Program Outline was prepared with the advice and direction of Industry Subject Matter Experts retained to assist in the development and review of Program Outline content:

- Ken Morland
  Branch Manager, Sterling Crane
- Ryan Burton
  Managing Partner, Bigfoot Crane Company
- Clinton Connell
  Branch Manager, Eagle West Truck & Crane
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- Shawn Lynch
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- Jason Gilmore
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- Corey Sedgwick
  Group Leader Mobile Lift Group, Teck Metals
- Gordon Lindberg
  Owner/trainer, GL Training Services Ltd.
- Jeff Gorham
  Administrator, IUOE

The Industry Training Authority would like to acknowledge the dedication and hard work of all the industry representatives appointed to identify the training requirements of the Tower Crane Operator occupation.
How to Use this Document

This Program Outline has been developed for the use of individuals from several different audiences. The table below describes how each section can be used by each intended audience.

<table>
<thead>
<tr>
<th>Section</th>
<th>Training Providers</th>
<th>Employers/ Sponsors</th>
<th>Apprentices</th>
<th>Challengers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Credentialing Model</td>
<td>Communicate program length and structure, and all pathways to completion</td>
<td>Understand the length and structure of the program</td>
<td>Understand the length and structure of the program, and pathway to completion</td>
<td>Understand challenger pathway to Certificate of Qualification</td>
</tr>
<tr>
<td>OAC</td>
<td>Communicate the competencies that industry has defined as representing the scope of the occupation</td>
<td>Understand the competencies that an apprentice is expected to demonstrate in order to achieve certification</td>
<td>View the competencies they will achieve as a result of program completion</td>
<td>Understand the competencies they must demonstrate in order to challenge the program</td>
</tr>
<tr>
<td>Training Topics and Suggested Time Allocation</td>
<td>Shows proportionate representation of general areas of competency (GACs) at each program level, the suggested proportion of time spent on each GAC, and percentage of time spent on theory versus practical application</td>
<td>Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application</td>
<td>Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application</td>
<td>Understand the relative weightings of various competencies of the occupation on which assessment is based</td>
</tr>
<tr>
<td>Program Content</td>
<td>Defines the objectives, learning tasks, high level content that must be covered for each competency, as well as defining observable, measurable achievement criteria for objectives with a practical component</td>
<td>Identifies detailed program content and performance expectations for competencies with a practical component; may be used as a checklist prior to signing a recommendation for certification (RFC) for an apprentice</td>
<td>Provides detailed information on program content and performance expectations for demonstrating competency</td>
<td>Allows individual to check program content areas against their own knowledge and performance expectations against their own skill levels</td>
</tr>
<tr>
<td>Section</td>
<td>Training Providers</td>
<td>Employers/Sponsors</td>
<td>Apprentices</td>
<td>Challengers</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------------------</td>
<td>--------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Training Provider Standards</td>
<td>Defines the facility requirements, tools and equipment, reference materials (if any) and instructor requirements for the program</td>
<td>Identifies the tools and equipment an apprentice is expected to have access to; which are supplied by the training provider and which the student is expected to own</td>
<td>Provides information on the training facility, tools and equipment provided by the school and the student, reference materials they may be expected to acquire, and minimum qualification levels of program instructors</td>
<td>Identifies the tools and equipment a tradesperson is expected to be competent in using or operating; which may be used or provided in a practical assessment</td>
</tr>
</tbody>
</table>
Section 2

PROGRAM OVERVIEW

Tower Crane Operator
Program Overview

Program Credentialing Model

C of Q = Certificate of Qualification
C of A = Certificate of Apprenticeship

Tower Crane Operator Level 2
ITA Standardized Practical Assessment
Interprovincial Red Seal Exam
ITA Level 2 Standardized Written Exam
Crane-Related Experience*: 2,650 hours
(of which 500 hours is rigging time, 24 hours is operating time with a certified tower crane operator and 500 hours is operating time†)
BC Crane Safety Electronic Logbook Signoff
Technical Training: 140 hours

Mobile Crane Operator and Tower Crane Operator Level 1
ITA Level 1 Standardized Written Exam
Crane-Related Experience*: Accumulate hours
Technical Training: 210 hours

*Crane-related experience as entered in the operator's BC Crane Safety electronic logbook
†Actual operation of the crane

CROSS-PROGRAM CREDITS
Individuals who hold certification or partial credit in a crane program and plan to move to an alternate crane program

Mobile Crane Operator and Tower Crane Operator Level 1
Level 1 Technical training; ITA Level 1 Standardized Written Exam

Mobile Crane Operator - Lattice Boom Friction Crane
Level 1 Technical training; ITA Level 1 Standardized Written Exam

Mobile Crane Operator - Lattice Boom Hydraulic Crane
Level 1 Technical training; ITA Level 1 Standardized Written Exam

Mobile Crane Operator - Hydraulic Unlimited Tonnage Crane
Level 1 Technical training; ITA Level 1 Standardized Written Exam

Level 1 Technical training; ITA Level 1 Standardized Written Exam

Level 1 Technical training; ITA Level 1 Standardized Written Exam
**Program Overview**

## Occupational Analysis Chart

### TOWER CRANE OPERATOR

**Occupation Description:** “Tower Crane Operator” means a person who operates tower cranes (including luffing jib and articulated jib tower cranes) to perform lifts and hoist loads, and has experience with rigging practices and procedures.

<table>
<thead>
<tr>
<th>SAFETY</th>
<th>TYPES AND TERMINOLOGY</th>
<th>SYSTEMS AND COMPONENTS</th>
<th>WIRE ROPE AND RIGGING</th>
<th>LIFT PLANNING</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Comply with regulations, policies, and manufacturers' manuals</td>
<td>Define types of cranes</td>
<td>Describe the components and functions of carrier systems, outrigger systems, and turntable assemblies</td>
<td>Specify types of wire rope and their uses</td>
</tr>
<tr>
<td>A</td>
<td>Maintain a safe working environment</td>
<td>Define crane classifications</td>
<td>Describe the components and functions of power plants and drive systems</td>
<td>Follow wire rope installation procedures</td>
</tr>
<tr>
<td>A1</td>
<td>Follow emergency procedures</td>
<td>Use crane terminology</td>
<td>Describe the components and functions of pneumatic systems, hydraulic systems, and electrical systems</td>
<td>Inspect wire rope, slings, and rigging hardware</td>
</tr>
<tr>
<td>A2</td>
<td>Be aware of power line hazards</td>
<td>Describe the components and functions of steering systems and braking systems</td>
<td>Describe the components and functions of hoisting systems and attachments</td>
<td>Specify types of slings, rigging hardware, and their uses</td>
</tr>
<tr>
<td>A3</td>
<td>Practice effective worksite communications</td>
<td>Describe the functions of safety components, devices, and aids</td>
<td></td>
<td>Use rigging techniques</td>
</tr>
<tr>
<td>A4</td>
<td></td>
<td></td>
<td></td>
<td>Maintain and store wire rope, slings, and rigging hardware</td>
</tr>
<tr>
<td>A5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Program Overview

<table>
<thead>
<tr>
<th>CRANE APPLICATIONS</th>
<th>Interpret operator manuals</th>
<th>Perform a pre-operational inspection</th>
<th>Perform a pre-operational setup</th>
<th>Demonstrate hoisting techniques</th>
<th>Operate a 20-80 tonne telescoping boom crane</th>
<th>Operate a tower crane</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRANE MAINTENANCE</td>
<td>Use tools for basic crane maintenance</td>
<td>Perform basic crane maintenance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRANSPORTING A CRANE</td>
<td>Define Commercial Transport Regulations</td>
<td>Prepare a crane for travel</td>
<td>Prepare a crane for transport</td>
<td>Assemble and disassemble a crane</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LIFT PLANNING – HAMMERHEAD TOWER CRANE</td>
<td>Conduct a site assessment for a hammerhead tower crane</td>
<td>Use a crane capacity chart for a hammerhead tower crane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HAMMERHEAD TOWER CRANE OPERATIONS</td>
<td>Interpret operating manuals for a hammerhead tower crane</td>
<td>Perform a pre-operational inspection for a hammerhead tower crane</td>
<td>Perform a pre-operational setup for a hammerhead tower crane</td>
<td>Perform hoisting techniques for a hammerhead tower crane</td>
<td>Operate a hammerhead tower crane</td>
<td>Leave a hammerhead tower crane unattended</td>
</tr>
</tbody>
</table>

- **F1**: Interpret operator manuals
- **F2**: Perform a pre-operational inspection
- **F3**: Perform a pre-operational setup
- **F4**: Demonstrate hoisting techniques
- **F5**: Operate a 20-80 tonne telescoping boom crane
- **F6**: Operate a tower crane
- **F7**: Leave a crane unattended
- **G1**: Define Commercial Transport Regulations
- **G2**: Prepare a crane for travel
- **G3**: Prepare a crane for transport
- **G4**: Assemble and disassemble a crane
- **H1**: Use tools for basic crane maintenance
- **H2**: Perform basic crane maintenance
- **I1**: Conduct a site assessment for a hammerhead tower crane
- **I2**: Use a crane capacity chart for a hammerhead tower crane
- **J1**: Interpret operating manuals for a hammerhead tower crane
- **J2**: Perform a pre-operational inspection for a hammerhead tower crane
- **J3**: Perform a pre-operational setup for a hammerhead tower crane
- **J4**: Perform hoisting techniques for a hammerhead tower crane
- **J5**: Operate a hammerhead tower crane
- **J6**: Leave a hammerhead tower crane unattended
Program Overview

LIFT PLANNING – LUFFING JIB TOWER CRANE

- Conduct a site assessment for a luffing jib tower crane
- Use a crane capacity chart for a luffing jib tower crane

LUFFING JIB TOWER CRANE OPERATIONS

- Interpret operating manuals for a luffing jib tower crane
- Perform a pre-operational inspection for a luffing jib tower crane
- Perform a pre-operational setup for a luffing jib tower crane
- Perform hoisting techniques for a luffing jib tower crane
- Operate a luffing jib tower crane
- Leave a luffing jib tower crane unattended

SPECIALIZED OPERATIONS

- Operate a suspended work platform
- Perform engineered lifts
- Perform multiple crane lifts

CLIMBING CRANES

- Follow assembly and raising procedures for a bottom climbing tower crane
- Follow assembly and raising procedures for a top climbing tower crane
## Program Overview

### Training Topics and Suggested Time Allocation – Level 1

**MOBILE CRANE OPERATOR AND TOWER CRANE OPERATOR – LEVEL 1**

<table>
<thead>
<tr>
<th>Line</th>
<th>Topic</th>
<th>% of Time Allocated to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>% of Time</td>
</tr>
<tr>
<td><strong>Line A</strong></td>
<td><strong>SAFETY</strong></td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td>Comply with regulations, policies, and manufacturers’ manuals</td>
<td>7%</td>
</tr>
<tr>
<td>A2</td>
<td>Maintain a safe working environment</td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>Follow emergency procedures</td>
<td></td>
</tr>
<tr>
<td>A4</td>
<td>Be aware of power line hazards</td>
<td></td>
</tr>
<tr>
<td>A5</td>
<td>Practice effective worksite communications</td>
<td></td>
</tr>
<tr>
<td><strong>Line B</strong></td>
<td><strong>TYPES AND TERMINOLOGY</strong></td>
<td></td>
</tr>
<tr>
<td>B1</td>
<td>Define types of cranes</td>
<td>2%</td>
</tr>
<tr>
<td>B2</td>
<td>Define crane classifications</td>
<td></td>
</tr>
<tr>
<td>B3</td>
<td>Use crane terminology</td>
<td></td>
</tr>
<tr>
<td><strong>Line C</strong></td>
<td><strong>SYSTEMS AND COMPONENTS</strong></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>Describe the components and functions of carrier systems, outrigger systems, and turntable assemblies</td>
<td>12%</td>
</tr>
<tr>
<td>C2</td>
<td>Describe the components and functions of power plants and drive systems</td>
<td></td>
</tr>
<tr>
<td>C3</td>
<td>Describe the components and functions of pneumatic systems, hydraulic systems, and electrical systems</td>
<td></td>
</tr>
<tr>
<td>C4</td>
<td>Describe the components and functions of steering systems and braking systems</td>
<td></td>
</tr>
<tr>
<td>C5</td>
<td>Describe the components and functions of hoisting systems and attachments</td>
<td></td>
</tr>
<tr>
<td>C6</td>
<td>Describe the functions of safety components, devices, and aids</td>
<td></td>
</tr>
<tr>
<td><strong>Line D</strong></td>
<td><strong>WIRE ROPE AND RIGGING</strong></td>
<td></td>
</tr>
<tr>
<td>D1</td>
<td>Specify types of wire rope and their uses</td>
<td>10%</td>
</tr>
<tr>
<td>D2</td>
<td>Follow wire rope installation procedures</td>
<td></td>
</tr>
<tr>
<td>D3</td>
<td>Inspect wire rope, slings, and rigging hardware</td>
<td></td>
</tr>
<tr>
<td>D4</td>
<td>Specify types of slings, rigging hardware, and their uses</td>
<td></td>
</tr>
<tr>
<td>D5</td>
<td>Use rigging techniques</td>
<td></td>
</tr>
<tr>
<td>D6</td>
<td>Maintain and store wire rope, slings, and rigging hardware</td>
<td></td>
</tr>
<tr>
<td><strong>Line E</strong></td>
<td><strong>LIFT PLANNING</strong></td>
<td></td>
</tr>
<tr>
<td>E1</td>
<td>Follow site assessment procedures</td>
<td>22%</td>
</tr>
<tr>
<td>E2</td>
<td>Determine load weights</td>
<td></td>
</tr>
<tr>
<td>E3</td>
<td>Determine crane lifting capacity</td>
<td></td>
</tr>
<tr>
<td>E4</td>
<td>Determine rigging requirements</td>
<td></td>
</tr>
</tbody>
</table>
## Program Overview

### % of Time Allocated to:

<table>
<thead>
<tr>
<th>Line</th>
<th>CRANE APPLICATIONS</th>
<th>% of Time</th>
<th>Theory</th>
<th>Practical</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>Interpret operator manuals</td>
<td>35%</td>
<td>20%</td>
<td>80%</td>
<td>100%</td>
</tr>
<tr>
<td>F2</td>
<td>Perform a pre-operational inspection</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F3</td>
<td>Perform a pre-operational setup</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F4</td>
<td>Demonstrate hoisting techniques</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F5</td>
<td>Operate a 20-80 tonne telescoping boom crane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F6</td>
<td>Operate a tower crane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F7</td>
<td>Leave a crane unattended</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Line</th>
<th>TRANSPORTING A CRANE</th>
<th>% of Time</th>
<th>Theory</th>
<th>Practical</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>Define Commercial Transport Regulations</td>
<td>7%</td>
<td>30%</td>
<td>70%</td>
<td>100%</td>
</tr>
<tr>
<td>G2</td>
<td>Prepare a crane for travel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G3</td>
<td>Prepare a crane for transport</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G4</td>
<td>Assemble and disassemble a crane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Line</th>
<th>CRANE MAINTENANCE</th>
<th>% of Time</th>
<th>Theory</th>
<th>Practical</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>Use tools for basic crane maintenance</td>
<td>5%</td>
<td>30%</td>
<td>70%</td>
<td>100%</td>
</tr>
<tr>
<td>H2</td>
<td>Perform basic crane maintenance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Percentage for Mobile Crane Operator and Tower Crane Operator Level 1: 100%
### Program Overview

#### Training Topics and Suggested Time Allocation – Level 2

**Tower Crane Operator – Level 2**

<table>
<thead>
<tr>
<th>Line</th>
<th>Training Topics</th>
<th>% of Time</th>
<th>Theory</th>
<th>Practical</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>LIFT PLANNING – HAMMERHEAD TOWER CRANE</td>
<td>12%</td>
<td>30%</td>
<td>70%</td>
<td>100%</td>
</tr>
<tr>
<td>I1</td>
<td>Conduct a site assessment for a hammerhead tower crane</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>I2</td>
<td>Use a crane capacity chart for a hammerhead tower crane</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>HAMMERHEAD TOWER CRANE OPERATIONS</td>
<td>28%</td>
<td>20%</td>
<td>80%</td>
<td>100%</td>
</tr>
<tr>
<td>J1</td>
<td>Interpret operating manuals for a hammerhead tower crane</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>J2</td>
<td>Perform a pre-operational inspection for a hammerhead tower crane</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>J3</td>
<td>Perform a pre-operational setup for a hammerhead tower crane</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>J4</td>
<td>Perform hoisting techniques for a hammerhead tower crane</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>J5</td>
<td>Operate a hammerhead tower crane</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>J6</td>
<td>Leave a hammerhead tower crane unattended</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>LIFT PLANNING – LUFFING JIB TOWER CRANE</td>
<td>12%</td>
<td>30%</td>
<td>70%</td>
<td>100%</td>
</tr>
<tr>
<td>K1</td>
<td>Conduct a site assessment for a luffing jib tower crane</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>K2</td>
<td>Use a crane capacity chart for a luffing jib tower crane</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>LUFFING JIB TOWER CRANE OPERATIONS</td>
<td>28%</td>
<td>20%</td>
<td>80%</td>
<td>100%</td>
</tr>
<tr>
<td>L1</td>
<td>Interpret operating manuals for a luffing jib tower crane</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>L2</td>
<td>Perform a pre-operational inspection for a luffing jib tower crane</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>L3</td>
<td>Perform a pre-operational setup for a luffing jib tower crane</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>L4</td>
<td>Perform hoisting techniques for a luffing jib tower crane</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>L5</td>
<td>Operate a luffing jib tower crane</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>L6</td>
<td>Leave a luffing jib tower crane unattended</td>
<td></td>
<td>✓</td>
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<tr>
<td>M</td>
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<td>30%</td>
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<td>Operate a suspended work platform</td>
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<td>✓</td>
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<tr>
<td>M2</td>
<td>Perform engineered lifts</td>
<td></td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>M3</td>
<td>Perform multiple crane lifts</td>
<td></td>
<td>✓</td>
<td>✓</td>
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</tr>
<tr>
<td>N</td>
<td>CLIMBING CRANES</td>
<td>5%</td>
<td>100%</td>
<td>0%</td>
<td>100%</td>
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<tr>
<td>N1</td>
<td>Follow assembly and raising procedures for a bottom climbing tower crane</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>N2</td>
<td>Follow assembly and raising procedures for a top climbing tower crane</td>
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<td>✓</td>
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Program Overview

% of Time Allocated to:

<table>
<thead>
<tr>
<th>% of Time</th>
<th>Theory</th>
<th>Practical</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Percentage for Tower Crane Operator Level 2</strong></td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section 3

PROGRAM CONTENT

Tower Crane Operator
Level 1

Mobile Crane Operator and Tower Crane Operator
Program Content
Level 1

Line (GAC): A SAFETY
Competency: A1 Comply with regulations, policies, and manufacturers’ manuals

Objectives
To be competent in this area, the individual must be able to locate information related to crane operations from government regulations, manufacturers’ manuals and training provider references and policies.

LEARNING TASKS

1. Describe the format and general content of books, manuals and sources of information related to crane operations
   - WorkSafeBC regulations
   - Canadian Standards Association (CSA) Z150 and Z248
   - Commercial Transport Regulations
   - IHSA Hoisting and Rigging Safety Manual
   - Manufacturers’ manuals including user and maintenance manuals
   - Training provider training references and policies
   - ASME standards

2. Locate specific items of information in documents related to crane operations
   - Safe operating practices
   - Safety devices
   - Crane load charts
   - Crane setup instructions

Achievement Criteria
Performance The individual will be able to locate and understand information in various sources of information related to crane operation.
Conditions To be assessed during technical training.
Criteria The individual is able to demonstrate that he/she can locate specific information in various documents.
Program Content
Level 1

Line (GAC): A SAFETY
Competency: A2 Maintain a safe working environment

Objectives
To be competent in this area, the individual must be able to work safely at the work site in accordance with Occupational Health and Safety Regulations and the training provider policy.

LEARNING TASKS

1. Describe unsafe workplace conditions, including hazards and obstructions
   - Energy source hazards
     - Hydraulic
     - Electrical
     - Pneumatic
   - Overhead hazards
     - Power lines
     - Cranes/other equipment
     - Obstructions
   - Mobile machinery hazards
     - Trucks
     - Cranes
     - Mobile equipment
   - Rotating equipment hazards
     - Belts
     - Pulleys
     - Sheaves
     - Sprockets
     - Chains
     - Pinch points
     - Barriers

2. State the procedures for notifying local utilities when operating near utility lines or potential hazards
   - WorkSafeBC regulations

3. Describe when barriers are required
   - Swing hazards
   - Shear hazards
   - Traffic
   - Pedestrians

4. Explain the procedure for reporting incidents
   - Report form completion
   - Report form processing
   - Report within allotted time

5. Describe operating procedures during different environmental conditions
   - Load Moment Indicator (LMI)
   - Operator aids
   - Slow operation
LEARNING TASKS

6. State the operator’s responsibilities in maintaining a safe work environment

- Qualified operator
- Full control of equipment controls
- Hoist within limits
- Safe handling of loads
- Secure loads

7. Wear, maintain, and remove from service personal protective clothing and equipment as appropriate

- Hard hat
- Boots
- Eyewear
- Hearing protection

8. Use the 3-point contact method when mounting and dismounting cranes and other heavy equipment

- Manufacturer specific access systems
- Handholds and step ladders
- Security of components
- Safe access to equipment

9. Complete a report to record an incident

- Reporting procedures
- Report within allotted time
- OHS requirements
- Employer requirements

Achievement Criteria

Performance The individual will be able to:

- Work safely around hazards and in various environmental conditions
- Record and report incidents
- Wear proper Personal Protective Equipment (PPE)

Conditions To be assessed during technical training.

Criteria The individual is able to demonstrate that he/she can follow safe work procedures in accordance with WorkSafeBC regulations and training provider policy.
Line (GAC): A SAFETY
Competency: A3 Follow emergency procedures

Objectives
To be competent in this area, the individual must be able to follow emergency procedures in accordance with Occupational Health and Safety Regulations and the training provider policy.

LEARNING TASKS
1. Describe recommended fire safety procedures
2. Describe various types of firefighting equipment normally found on a worksite
3. State the requirements for fall protection training on the worksite
4. State the procedure for an emergency rescue from a crane (e.g., tower crane operator station, crane incident, fire)

CONTENT
- Fire extinguishers
  - Types and capacities
  - Servicing
  - Use
- Fighting electrical fires
  - Power isolation
  - Appropriate firefighting equipment
- Fire emergency response and evacuation procedures in accordance with industry practice
- Fire extinguishers
  - Types and capacities
  - Servicing
  - Use
- WorkSafeBC regulations
- Company policy
- High angle rescue procedure
- Call 911

Achievement Criteria
Performance The individual will be able to:
- Describe fire safety equipment and procedures
- Describe the requirements for fall protection
- Describe emergency rescue procedures

Conditions To be assessed during technical training.

Criteria The individual is able to demonstrate that he/she can follow emergency procedures and requirements in accordance with WorkSafeBC regulations and training provider policy.
Line (GAC): A SAFETY
Competency: A4 Be aware of power line hazards

Objectives
To be competent in this area, the individual must be able to operate a crane around simulated high voltage equipment in accordance with Occupational Health and Safety Regulations, utility regulations, and other government legislation and the training provider policy.

LEARNING TASKS
1. State the procedures for operating in proximity of electrical sources
   • Limits of approach
   • Required documentation
   • Assurance in writing
   • Tag lines
2. State safe limits of approach to electrical sources
   • WorkSafeBC regulations
3. Describe the procedures recommended in the event of contact with high voltage
   • Safe exit (if possible)
   • Remain at a safe distance
   • Contact proper authorities
4. State the procedure for reporting contact with high voltage
   • WorkSafeBC regulations
   • Call owner of the power system
5. Interpret signage related to high voltage
   • Limits of approach signage
   • Line voltage

Achievement Criteria
Performance The individual will be able to work safely around power line hazards and describe procedures in the event of contact with high voltage.
Conditions To be assessed during technical training.
Criteria The individual is able to demonstrate that he/she can follow procedures for working around power lines in accordance with WorkSafeBC regulations, utility regulations, and training provider policy.
Program Content
Level 1

Line (GAC): A SAFETY
Competency: A5 Practice effective worksite communications

Objectives
To be competent in this area, the individual must be able to communicate with the work site supervisor, colleagues and trade personnel using recommended signals or other communication devices in accordance with Occupational Health and Safety Regulations and the training provider policy.

LEARNING TASKS

1. Explain the requirements for a signaller
   - Accurate descriptions
   - Identification and interpretation
   - Signal relaying for a blind lift

2. Describe personnel involved in crane operations
   - Site supervisor
   - Crane operator
   - Rigger
   - Signal person
   - CSO – construction safety officer

3. Demonstrate and interpret standard hand signals used during crane operations
   - WorkSafeBC regulations

4. Demonstrate the use of two-way electronic voice communication devices
   - Basic functions of the radio communication devices
   - Language and terminology
     - Short form words and phrases
     - Use of 12 o’clock (clock face positioning reference) to aid in direction giving and interpreting
   - Requirement to stop operation due to lost contact or interference

5. Demonstrate effective oral communications
   - Tact
   - Diplomacy
   - Assertiveness

6. Demonstrate effective written communications
   - Report writing
   - Recording
   - Communication plan

7. Interpret worksite audio signals
   - Horn signals

Achievement Criteria
Performance The individual will be able to demonstrate proper oral, written, and hand signals.
Conditions To be assessed during technical training.
Criteria The individual is able to demonstrate that he/she can communicate effectively using all forms of workplace communication.
Line (GAC): B TYPES AND TERMINOLOGY
Competency: B1 Define types of cranes

Objectives
To be competent in this area, the individual must be able to identify common crane types.

LEARNING TASKS
1. Identify various types of cranes

CONTENT
• Boom trucks
• Mobile cranes
• Tower cranes
• Self-erect cranes

Achievement Criteria
Performance The individual will be able to identify types of cranes.
Conditions To be assessed during technical training.
Criteria The individual is able to demonstrate that he/she can identify various types of cranes.
Line (GAC): B TYPES AND TERMINOLOGY
Competency: B2 Define crane classifications

Objectives
To be competent in this area, the individual must be able to categorize cranes using a variety of classifications.

LEARNING TASKS
1. Categorize various types of cranes

CONTENT
- Carrier types (e.g., crawler, rubber, tower, self-erect)
- Hoist mechanisms (e.g., hydraulic, friction, electrical)
- Boom types (e.g., lattice, hydraulic, folding/knuckle, luffing)
- Heavy lift cranes (e.g., super lift, ringer)

Achievement Criteria
Performance The individual will be able to categorize various types of cranes.
Conditions To be assessed during technical training.
Criteria The individual is able to demonstrate that he/she can categorize various types of cranes.
Line (GAC): B TYPES AND TERMINOLOGY
Competency: B3 Use crane terminology

Objectives
To be competent in this area, the individual must be able to interpret crane terminology commonly used in the working environment.

LEARNING TASKS
1. Define terms related to craning

CONTENT
- Wire rope
- Fittings
- Drums
- Hooks
- Sheaves
- Winch
- Slew
- Hoist
- Luffing
- Capacity
- Gross Load
- Net load
- Boom length
- Boom angle
- Jibs
- Pick and carry

Achievement Criteria
Performance The individual will be able to use crane terminology.
Conditions To be assessed during technical training.
Criteria The individual is able to demonstrate that he/she can use proper crane terminology.
Line (GAC): C  SYSTEMS AND COMPONENTS
Competency: C1  Describe the components and functions of carrier systems, outrigger systems, and turntable assemblies

Objectives
To be competent in this area, the individual must be able to describe the carrier, outrigger, and turntable components on a variety of crane types.

LEARNING TASKS
1. List carrier/undercarriage components
   • Suspension systems
   • Carbody
   • Wheels
   • Tires
   • Tracks

2. State the function of carrier/undercarriage components
   • Propel equipment
   • Base for upperworks

3. Identify carrier/undercarriage components
   • Suspension systems
   • Car body
   • Wheels
   • Tires
   • Tracks

4. Recognize defects or malfunctions of the carrier/undercarriage
   • Cracked frame
   • Cracked welds
   • Broken drive line shafts
   • Damaged wheels
   • Damaged differentials
   • Loose/broken fasteners, bolts, washers
   • Worn components

5. List the outrigger and stabilizing equipment
   • Outrigger beams
   • Outrigger jacks
   • Outrigger pads
   • Retaining pins for outrigger pads
   • Hydraulic hoses
   • Holding valves
   • Correct outrigger beam extension and marking(s)
   • Maintenance

6. State the function of outriggers and stabilizing equipment
   • Increase lifting capacity
   • Provide a stable base
   • Levelling
<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
</table>
| 7. Identify outrigger and stabilizing equipment | • Outrigger beams  
• Outrigger jacks  
• Outrigger pads  
• Retaining pins for outrigger pads  
• Hydraulic hoses  
• Holding valves  
• Correct outrigger beam extension and marking(s) |
| 8. Recognize defects or malfunctions of outrigger and stabilizing equipment | • Cracked welds  
• Bent beams  
• Damaged hoses  
• Damaged cylinders  
• Hydraulic oil leaks |
| 9. List the components of a turntable and/or turret | • Swing circle  
• Bearings  
• Hook rollers  
• Bolts  
• Gears  
• Swing gear |
| 10. State the function of turntable and/or turret components | • Base for mounting boom  
• Method of attaching upperworks to carrier  
• Enables upperworks to rotate |
| 11. Identify the components of the turntable and/or turret | • Swing circle  
• Bearings  
• Hook rollers  
• Bolts  
• Gears  
• Swing gear |
| 12. Recognize defects or malfunctions of the turntable and/or turret components | • Loose, cracked, missing bolts and/or incorrect bolts  
• Structural cracks  
• Gear wear  
• Bearing wear  
• Deformation and distortions  
• Worn components |
Achievement Criteria

Performance  The individual will be able to describe the components, functions, defects, and malfunctions of carrier systems, outrigger systems, and turntable assemblies.

Conditions  To be assessed during technical training.

Criteria  The individual is able to demonstrate that he/she understands the components, functions, defects, and malfunctions of carrier systems, outrigger systems, and turntable assemblies.
Line (GAC): C SYSTEMS AND COMPONENTS
Competency: C2 Describe the components and functions of power plants and drive systems

Objectives
To be competent in this area, the individual must be able to describe the power plants and drive systems on a variety of crane types.

**LEARNING TASKS**

<table>
<thead>
<tr>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.</strong> List the components of an electrical, diesel, and gas power plant system</td>
</tr>
<tr>
<td>• Block</td>
</tr>
<tr>
<td>• Pistons</td>
</tr>
<tr>
<td>• Connecting rods</td>
</tr>
<tr>
<td>• Camshafts</td>
</tr>
<tr>
<td>• Rotors</td>
</tr>
<tr>
<td>• Stators</td>
</tr>
<tr>
<td><strong>2.</strong> State the function of the power plant components</td>
</tr>
<tr>
<td>• Convert combustion energy to electrical power</td>
</tr>
<tr>
<td>• Provide power to propel the crane</td>
</tr>
<tr>
<td>• Provide power to operate the crane</td>
</tr>
<tr>
<td><strong>3.</strong> Identify the components of the power plant systems</td>
</tr>
<tr>
<td>• Block</td>
</tr>
<tr>
<td>• Pistons</td>
</tr>
<tr>
<td>• Connecting rods</td>
</tr>
<tr>
<td>• Camshafts</td>
</tr>
<tr>
<td>• Rotors</td>
</tr>
<tr>
<td>• Stators</td>
</tr>
<tr>
<td><strong>4.</strong> Recognize defects or malfunctions of the power plant system</td>
</tr>
<tr>
<td>• Loose, cracked, missing bolts and/or incorrect bolts</td>
</tr>
<tr>
<td>• Structural cracks</td>
</tr>
<tr>
<td>• Worn components</td>
</tr>
<tr>
<td>• Oil leaks</td>
</tr>
<tr>
<td>• Low operating oil pressure</td>
</tr>
<tr>
<td><strong>5.</strong> List the components of the drive system</td>
</tr>
<tr>
<td>• Clutch</td>
</tr>
<tr>
<td>• Transmission</td>
</tr>
<tr>
<td>• Differentials</td>
</tr>
<tr>
<td>• Power take-offs</td>
</tr>
<tr>
<td>• Hydraulic motors</td>
</tr>
<tr>
<td>• Drive lines</td>
</tr>
<tr>
<td><strong>6.</strong> State the function of the drive system components</td>
</tr>
<tr>
<td>• Supply and/or transfer of power to drive systems</td>
</tr>
</tbody>
</table>
LEARNING TASKS
7. Identify the components of the drive system

CONTENT
- Clutch
- Transmission
- Differentials
- Power take-offs
- Hydraulic motors
- Drive lines

8. Recognize defects or malfunctions of the drive system

CONTENT
- Loose, cracked, missing bolts and/or incorrect bolts
- Structural cracks
- Worn components
- Oil leaks
- Low operating oil pressure

Achievement Criteria
Performance The individual will be able to describe the components, functions, defects, and malfunctions of power plants and drive systems.

Conditions To be assessed during technical training.

Criteria The individual is able to demonstrate that he/she understands the components, functions, defects, and malfunctions of power plants and drive systems.
Program Content
Level 1

Line (GAC): C
SYSTEMS AND COMPONENTS
Competency: C3 Describe the components and functions of pneumatic systems, hydraulic systems, and electrical systems

Objectives
To be competent in this area, the individual must be able to describe pneumatic systems, hydraulic systems, and electrical systems used in crane operations.

LEARNING TASKS

1. List the components of the pneumatic system
   - Brakes
   - Compressor
   - Governor
   - Horn
   - Seats
   - Boom pawl
   - Boom cut-out
   - Control levers

2. State the function of the pneumatic components
   - Provide power to air systems
   - Provide a method of controlling air systems

3. Identify the components of the pneumatic system
   - Brakes
   - Compressor
   - Governor
   - Horn
   - Seats
   - Boom pawls
   - Boom cut-out
   - Control levers

4. Recognize defects or malfunctions of the pneumatic system
   - Loose, cracked, missing bolts
   - Structural cracks
   - Leakage
   - Low operating air pressure
   - Moisture in air system
   - Oil in air system

5. List the components of the hydraulic systems
   - Hydraulic fluid
   - Filters
   - Lines
   - Pumps
   - Motors
   - Fittings
   - Control levers
<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
</table>
| 6. State the function of the hydraulic system components | • Convert mechanical force to hydraulic power  
• Convert fluid energy to mechanical force  
• Convert fluid power into linear motion |
| 7. Identify the components of the hydraulic systems | • Hydraulic fluid  
• Fluid reservoir  
• Filters  
• Lines  
• Pumps  
• Motors  
• Fittings  
• Control levers |
| 8. Recognize defects and malfunctions of the hydraulic system | • Loose, cracked, missing bolts  
• Structural cracks  
• Worn components  
• Oil leaks  
• Low operating oil pressure  
• High operating temperature  
• Damaged hoses  
• Controls sticking |
| 9. List the components of electrical systems | • Alternator  
• Starter  
• Regulator  
• Wiring  
• Fuses  
• Electric motor  
• Switches  
• Limit switches  
• Batteries |
| 10. State the function of the electrical system components | • Provide power to electrical systems  
• Provide method of controlling electrical systems |
| 11. Identify the components of the electrical system | • Alternator  
• Starter  
• Regulator  
• Wiring  
• Fuses  
• Electric motor  
• Switches |
LEARNING TASKS

12. Recognize defects or malfunctions of the electrical system

CONTENT

- Limit switches
- Batteries
- Electrical shorts
- Damaged fuses
- Bare wires
- Belt tension
- Battery electrolyte level

Achievement Criteria

Performance  The individual will be able to describe the components, functions, defects, and malfunctions of pneumatic systems, hydraulic systems, and electrical systems.

Conditions  To be assessed during technical training.

Criteria  The individual is able to demonstrate that he/she understands the components, functions, defects, and malfunctions of pneumatic systems, hydraulic systems, and electrical systems.
Line (GAC): C

SYSTEMS AND COMPONENTS

Competency: C4 Describe the components and functions of steering systems and braking systems

Objectives
To be competent in this area, the individual must be able to describe steering systems and braking systems used on a variety of crane types.

LEARNING TASKS

1. List the components of a steering system
   - Axles
   - Tie rods
   - Steering box
   - Sliding jaw clutch
   - Ball joints
   - Steering pump
   - Motors
   - Hoses
   - Operating controls

2. State the function of the steering system components
   - Manufacturers’ manuals
   - Provide power to steering system
   - Provide method of controlling steering system

3. Identify the components of the steering system
   - Axles
   - Tie rods
   - Steering box
   - Sliding jaw clutch
   - Ball joints
   - Steering pump
   - Motors
   - Hoses
   - Operating controls

4. Recognize defects or malfunctions of the steering system components
   - Loose, cracked, missing bolts
   - Structural cracks
   - Worn components
   - Oil leaks
   - Low operating pressure
   - Adjustment
   - Alignment
   - Lack of lubrication

5. List the components of the braking system
   - Air compressor
<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Governor</td>
</tr>
<tr>
<td></td>
<td>• Brake chambers</td>
</tr>
<tr>
<td></td>
<td>• Drums</td>
</tr>
<tr>
<td></td>
<td>• Brake bands</td>
</tr>
<tr>
<td></td>
<td>• Brake shoes and pads</td>
</tr>
<tr>
<td></td>
<td>• Slack adjusters</td>
</tr>
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<td></td>
<td>• Parking brakes</td>
</tr>
<tr>
<td>6. State the function of the braking system components</td>
<td>• Provide power to braking system</td>
</tr>
<tr>
<td></td>
<td>• Provide method of controlling braking system</td>
</tr>
<tr>
<td>7. Identify the components of the braking system</td>
<td>• Air compressor</td>
</tr>
<tr>
<td></td>
<td>• Governor</td>
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<tr>
<td></td>
<td>• Brake chambers</td>
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</tr>
<tr>
<td></td>
<td>• Parking brakes</td>
</tr>
<tr>
<td>8. Recognize defects or malfunctions of the braking systems</td>
<td>• Brake adjustment</td>
</tr>
<tr>
<td></td>
<td>• Loose, cracked, missing bolts and/or incorrect bolts</td>
</tr>
<tr>
<td></td>
<td>• Structural cracks</td>
</tr>
<tr>
<td></td>
<td>• Low operating pressure</td>
</tr>
<tr>
<td></td>
<td>• Worn components</td>
</tr>
<tr>
<td></td>
<td>• Air leaks</td>
</tr>
<tr>
<td></td>
<td>• Moisture in air system</td>
</tr>
<tr>
<td></td>
<td>• Out of adjustment</td>
</tr>
</tbody>
</table>

**Achievement Criteria**

**Performance**  The individual will be able to describe the components, functions, defects, and malfunctions of steering systems and braking systems.

**Conditions**  To be assessed during technical training.

**Criteria**  The individual is able to demonstrate that he/she understands the components, functions, defects, and malfunctions of steering systems and braking systems.
Line (GAC): C SYSTEMS AND COMPONENTS
Competency: C5 Describe the components and functions of hoisting systems and attachments

Objectives
To be competent in this area, the individual must be able to describe hoisting systems and attachments used on a variety of crane types.

LEARNING TASKS
1. List the components of the hoisting system
   - Drums
   - Hook block/ball
   - Sheaves
   - Winch
   - Brakes and clutches
   - Trolley
   - Rollers
   - Hoist line

2. State the function of the hoisting system components
   - Provide power to hoisting system
   - Provide method of controlling hoisting system

3. Identify the components of the hoisting system
   - Drums
   - Hook block/ball
   - Sheaves
   - Winch
   - Brakes and clutches
   - Trolley
   - Rollers
   - Hoist line

4. Recognize defects or malfunctions of the components of a hoisting system
   - Loose, cracked, missing bolts and/or incorrect bolts
   - Structural cracks
   - Worn components
   - Security of components
   - Oil leaks
   - Low operating pressure

5. List a variety of attachments
   - Boom extensions
   - Boom stabilizers
   - Jibs
   - Suspended work platforms
   - Heavy lift attachments
LEARNING TASKS

6. State the function of each attachment

7. Identify the attachments

8. Recognize defects or malfunctions of an attachment

CONTENT
- Dragline
- Clamshell
- Drilling unit
- Pile driving unit (drop hammer, diesel hammer)
- Extraction unit
- Manufacturers’ manuals
- Boom extensions
- Boom stabilizers
- Jibs
- Suspended work platforms
- Heavy lift attachments
- Dragline
- Clamshell
- Drilling unit
- Pile driving unit (drop hammer, diesel hammer)
- Extraction unit
- Loose, cracked, missing bolts
- Structural cracks
- Worn components
- Oil leaks
- Damaged components
- Damaged cable

Achievement Criteria

Performance The individual will be able to describe the components, functions, defects, and malfunctions of hoisting systems and attachments.

Conditions To be assessed during technical training.

Criteria The individual is able to demonstrate that he/she understands the components, functions, defects, and malfunctions of hoisting systems and attachments.
Line (GAC): C  SYSTEMS AND COMPONENTS
Competency: C6  Describe the functions of safety components, devices, and aids

Objectives
To be competent in this area, the individual must be able to describe various safety components, devices, and aids for a variety of crane types.

LEARNING TASKS

1. List the safety components, devices, and aids for a variety of crane types
   - Safety guards
   - Covers
   - Load weighing devices
     - Load Moment Indicator (LMI)
     - Load indicator
     - Rated capacity indicator
     - Rated capacity (load) limiter
   - Anti-two block devices
   - Boom length indicator
   - Boom angle indicator
   - Boom hoist limiter
   - Drum rotation indicator

2. State the function of safety components, devices, and aids for the crane
   - Manufacturers’ manuals
   - Prevent overloading of crane components

3. State the action to be taken when safety devices are not functioning
   - Company policy
   - Manufacturers’ recommendations
   - WorkSafeBC regulations

4. Identify the safety components, devices, and aids for the crane
   - Safety guards
   - Covers
   - Load weighing devices
     - Load Moment Indicator (LMI)
     - Load indicator
     - Rated capacity indicator
     - Rated capacity (load) limiter
   - Anti-two block devices
   - Boom length indicator
   - Boom angle indicator
   - Boom hoist limiter
   - Drum rotation indicator

5. Identify on-board crane operator aids and ensure that they are applicable, legible, and current for the crane
   - Load charts
   - Operator’s manual
   - Log book
LEARNING TASKS

6. Program the Load Moment Indicator (LMI) using appropriate crane configuration and lift data

7. Recognize defects or malfunctions of safety devices, components, and aids for the crane

CONTENT

- Counterweight configuration
- Outrigger configuration
- Boom length
- Parts of line
- Attachments
- Mounting configuration
- Structural cracks
- Damaged components
- Electrical malfunction
- Damaged wiring

Achievement Criteria

Performance  The individual will be able to describe the types, functions, defects, and malfunctions of safety components, devices, and aids.

Conditions  To be assessed during technical training.

Criteria  The individual is able to demonstrate that he/she understands the types, functions, defects, and malfunctions of safety components, devices, and aids.
Line (GAC): D WIRE ROPE AND RIGGING
Competency: D1 Specify types of wire rope and their uses

Objectives
To be competent in this area, the individual must be able to describe various types of wire rope used in crane operations.

<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. List various types of wire rope</td>
<td>• Conventional construction wire rope</td>
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<tr>
<td></td>
<td>• Anti-rotational wire rope</td>
</tr>
<tr>
<td></td>
<td>• Types of cable construction</td>
</tr>
<tr>
<td></td>
<td>• Slings</td>
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<tr>
<td></td>
<td>• Duty cycle wire rope</td>
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<tr>
<td></td>
<td>• Hoist line</td>
</tr>
<tr>
<td></td>
<td>• Trolley line</td>
</tr>
<tr>
<td>2. State the characteristics of each type of wire rope</td>
<td>• Working load limit (WLL) of wire rope</td>
</tr>
<tr>
<td></td>
<td>• Design factors</td>
</tr>
<tr>
<td>3. State the uses of each type of wire rope</td>
<td>• Slings</td>
</tr>
<tr>
<td></td>
<td>• Duty cycle wire rope</td>
</tr>
<tr>
<td></td>
<td>• Boom hoist line</td>
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<tr>
<td></td>
<td>• Load hoist line</td>
</tr>
<tr>
<td>4. Identify various types of wire rope</td>
<td>• Conventional construction wire rope</td>
</tr>
<tr>
<td></td>
<td>• Anti-rotational wire rope</td>
</tr>
<tr>
<td></td>
<td>• Types of cable construction</td>
</tr>
<tr>
<td></td>
<td>• Slings</td>
</tr>
<tr>
<td></td>
<td>• Duty cycle wire rope</td>
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<td></td>
<td>• Hoist line</td>
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<tr>
<td></td>
<td>• Trolley line</td>
</tr>
</tbody>
</table>

Achievement Criteria
Performance The individual will be able to describe the types, characteristics, and uses of wire rope.
Conditions To be assessed during technical training.
Criteria The individual is able to demonstrate that he/she understands the various types of wire ropes and their uses.
Line (GAC): D  WIRE ROPE AND RIGGING
Competency: D2  Follow wire rope installation procedures

Objectives
To be competent in this area, the individual must be able to ensure that the wire rope is installed in accordance with manufacturers’ recommendations.

LEARNING TASKS

1. Describe procedures for installing wire rope on a hoist drum
   • Winding direction (over/under)
   • Method of drum termination
   • Proper spooling on drum
   • Wire rope system components
     o Rope guides
     o Drums
     o Blocks
     o Hooks
     o Sheaves

2. Describe reeving multi-part crane blocks
   • Wedge and socket termination
   • Install wedge sockets
   • Reeving blocks

3. Identify hoisting system components
   • Rope guides
   • Drums
   • Blocks
   • Hooks
   • Sheaves
   • Wedge and socket termination

4. Interpret manufacturers’ certificate of origin
   • Manufacturer’s literature

Achievement Criteria
Performance  The individual will be able to identify hoisting system components and install wire rope.
Conditions  To be assessed during technical training.
Criteria  The individual is able to demonstrate that he/she can install wire rope in accordance with manufacturers’ recommendations.
Line (GAC): D WIRE ROPE AND RIGGING

Competency: D3 Inspect wire rope, slings, and rigging hardware

Objectives
To be competent in this area, the individual must be able to inspect wire rope, slings, and rigging hardware in accordance with manufacturers' recommendations and WorkSafeBC regulations.

LEARNING TASKS

1. Describe the inspection procedure for wire ropes
   • WorkSafeBC regulations
   • Manufacturers’ specifications
   • ASME standards

2. State the criteria to remove damaged or defective wire rope from service
   • Lubrication
   • Excessive wear
   • Bird caging
   • Kinking
   • Flattening
   • Proper spooling
   • Broken wires
   • Distortion

3. State the process to remove damaged or defective wire rope from service
   • Company policy
   • Manufacturer policy

4. Examine wire rope for defects
   • Lubrication
   • Excessive wear
   • Bird caging
   • Kinking
   • Flattening
   • Proper spooling
   • Broken wires
   • Distortion

5. Examine drum for proper installation of the wire rope
   • Winding direction (over/under)
   • Proper spooling on drum
   • Drum termination
   • Tension required

6. Record inspection and defects in log book
   • Inspection recording
   • Documentation of defects

7. Report defects and deficiencies to appropriate personnel
   • Requirements for reporting defects
   • Company policy
   • WorkSafeBC regulations
LEARNING TASKS

8. Describe the inspection procedure for slings and rigging hardware

9. State the criteria for removing slings and rigging hardware from service

10. State the procedure for replacing various types of safety clips

11. State the process for removing slings and rigging hardware from service

12. State when repair to slings and rigging hardware is acceptable

13. Examine slings and rigging hardware for defects

14. Report defects and deficiencies to appropriate personnel

CONTENT

- Manufacturers’ specifications
- WorkSafeBC regulations
- Manufacturers’ specifications
- Lubrication
- Excessive wear
- Bird caging
- Kinking
- Flattening
- Broken wires
- Distortion
- Missing components
- Illegible capacity information
- Manufacturer policy
- Company policy
- Manufacturer policy
- WorkSafeBC regulations
- Damage
- Cracks
- Safety clips
- Lubrication
- Excessive wear
- Bird caging
- Kinking
- Flattening
- Broken wires
- Distortion
- Missing components
- Illegible capacity information
- Requirements for reporting defects
- Company policy
Achievement Criteria

Performance The individual will be able to:
- Inspect wire rope, slings, and rigging hardware and remove damaged or defective parts from service if required
- Follow proper recording and reporting procedures

Conditions To be assessed during technical training.

Criteria The individual is able to demonstrate that he/she can inspect wire rope, slings, and rigging hardware in accordance with manufacturers’ recommendations and WorkSafeBC regulations.
## Line (GAC): D  WIRE ROPE AND RIGGING

**Competency:** D4  Specify types of slings, rigging hardware, and their uses

### Objectives

To be competent in this area, the individual must be able to describe slings and rigging hardware used in crane operations.

### LEARNING TASKS

<table>
<thead>
<tr>
<th>TASK</th>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. List the various slings</td>
<td>• Chain</td>
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<tr>
<td></td>
<td>• Wire rope</td>
</tr>
<tr>
<td></td>
<td>• Metal mesh</td>
</tr>
<tr>
<td></td>
<td>• Synthetic web</td>
</tr>
<tr>
<td></td>
<td>• Synthetic rope</td>
</tr>
<tr>
<td></td>
<td>• Synthetic round</td>
</tr>
<tr>
<td>2. Describe the various hitch configurations</td>
<td>• Vertical</td>
</tr>
<tr>
<td></td>
<td>• Choker</td>
</tr>
<tr>
<td></td>
<td>• Basket</td>
</tr>
<tr>
<td></td>
<td>• Bridle</td>
</tr>
<tr>
<td>3. State the use of slings</td>
<td>• Working load limit (WWL)</td>
</tr>
<tr>
<td></td>
<td>• Capacity required</td>
</tr>
<tr>
<td></td>
<td>• Uses and limitations</td>
</tr>
<tr>
<td>4. Interpret specific information on slings from manufacturers' and rigging manuals</td>
<td>• Correct usage</td>
</tr>
<tr>
<td></td>
<td>• Capacities</td>
</tr>
<tr>
<td></td>
<td>• User warnings</td>
</tr>
<tr>
<td></td>
<td>• Temperature restrictions</td>
</tr>
<tr>
<td>5. Identify a variety of slings used in crane operations</td>
<td>• Chain</td>
</tr>
<tr>
<td></td>
<td>• Wire rope</td>
</tr>
<tr>
<td></td>
<td>• Metal mesh</td>
</tr>
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<td></td>
<td>• Synthetic web</td>
</tr>
<tr>
<td></td>
<td>• Synthetic rope</td>
</tr>
<tr>
<td></td>
<td>• Synthetic round</td>
</tr>
<tr>
<td>6. List the various rigging hardware</td>
<td>• Hooks</td>
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<tr>
<td></td>
<td>• Shackles</td>
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<tr>
<td></td>
<td>• Eye bolts</td>
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<tr>
<td></td>
<td>• Hoist rings</td>
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<tr>
<td></td>
<td>• Turnbuckles</td>
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<tr>
<td></td>
<td>• Cable clamps</td>
</tr>
<tr>
<td></td>
<td>• Softeners/sling protection</td>
</tr>
<tr>
<td></td>
<td>• Lifting clamps</td>
</tr>
</tbody>
</table>
LEARNING TASKS

7. State the use of rigging hardware

8. Interpret specific information on rigging hardware from manufacturers’ and rigging manuals

9. Identify a variety of rigging hardware used in crane operations

CONTENT

- Lifting beams
- Spreader bars
- Equalizer beams
- Manufacturers’ manuals
- Capacity required
- Limitations
- Correct usage
- Capacities
- User warnings
- Temperature restrictions
- Hooks
- Shackles
- Eye bolts
- Hoist rings
- Turnbuckles
- Cable clamps
- Softeners/sling protection
- Lifting clamps
- Lifting beams
- Spreader bars
- Equalizer beams

Achievement Criteria

Performance The individual will be able to:
- Identify slings and rigging hardware and state their function
- Interpret specific information on slings and rigging hardware from manuals

Conditions To be assessed during technical training.

Criteria The individual is able to demonstrate that he/she can identify and use slings and rigging hardware.
**Line (GAC):** D  **WIRE ROPE AND RIGGING**  
**Competency:** D5  Use rigging techniques

### Objectives
To be competent in this area, the individual must be able to assemble appropriate rigging for a load in accordance with manufacturers' recommendations.

### LEARNING TASKS

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Describe lifting theory and forces as they apply to lifting loads</td>
<td>Centre of gravity</td>
</tr>
<tr>
<td></td>
<td>Tension on slings and hardware when used at an angle</td>
</tr>
<tr>
<td>2. Select appropriate slings and hardware for a load</td>
<td>Weight of load</td>
</tr>
<tr>
<td></td>
<td>Size of load</td>
</tr>
<tr>
<td></td>
<td>Angle of loading (sling tension)</td>
</tr>
<tr>
<td>3. Establish safe and efficient rigging procedures for a lift</td>
<td>Written lift plan</td>
</tr>
<tr>
<td></td>
<td>Critical lift plan</td>
</tr>
<tr>
<td></td>
<td>Company/site requirements</td>
</tr>
</tbody>
</table>

### Achievement Criteria

- **Performance**: The individual will be able to select appropriate slings and rigging hardware and use proper rigging techniques.
- **Conditions**: To be assessed during technical training.
- **Criteria**: The individual is able to demonstrate that he/she can assemble appropriate rigging for a load in accordance with manufacturers’ recommendations.
Line (GAC): D  WIRE ROPE AND RIGGING
Competency: D6  Maintain and store wire rope, slings, and rigging hardware

Objectives
To be competent in this area, the individual must be able to maintain and store wire rope, slings, and rigging hardware in accordance with manufacturers’ recommendations.

LEARNING TASKS

1. Describe how to perform routine maintenance on various types of wire ropes
   • Manufacturer policy
   • Company policy
   • Environmental conditions

2. Describe how to perform routine maintenance on various types of slings
   • Manufacturer policy
   • Company policy
   • Environmental conditions

3. Describe how to perform routine maintenance on various types of rigging hardware
   • Manufacturer policy
   • Company policy
   • Environmental conditions

4. State the criteria for lubricating wire rope
   • Manufacturer policy
   • Company policy
   • Environmental conditions

5. Describe how to perform rigging hardware lubrication
   • Manufacturer policy
   • Company policy
   • Environmental conditions

6. Describe procedures for cutting wire rope
   • Manufacturer policy

7. State the criteria for storing wire rope
   • Manufacturer policy
   • Company policy
   • Environmental conditions

8. State the criteria for storing slings and rigging hardware
   • Manufacturer policy
   • Company policy
   • Environmental conditions

9. Identify wire ropes requiring lubrication
   • Visual inspection

10. Lubricate wire rope using the appropriate application method
    • Manufacturer policy
    • Company policy

11. Record the routine maintenance in the log book
    • Manufacturer policy
    • Company policy
    • WorkSafeBC regulations
Achievement Criteria

Performance  The individual will be able to:
  • Properly maintain and store wire ropes, slings, and rigging hardware
  • Record maintenance in the log book

Conditions  To be assessed during technical training.

Criteria  The individual is able to demonstrate that he/she can maintain and store wire rope, slings, and rigging hardware in accordance with manufacturers’ recommendations.
Objective
To be competent in this area, the individual must be able to inspect a job site to ensure a safe and efficient operation in accordance with a pre-lift plan.

Learning Tasks

1. State the elements of a lift plan
   - Routine to move load
   - Crane capacity requirements to pick, move and place the load
   - Maximum allowable travel grade according to crane manufacturer specifications
   - Travel path
   - Signal person
   - Rigging required
   - Signed by operator
   - Signed by supervisor
   - Signed by rigger
   - Critical lift
   - Tandem lift

2. State the purpose of site blueprints in preparing a lift plan
   - Placement of load
   - Placement of crane
   - Grade to be travelled on
   - Ground bearing capacity of the area
   - Operating hazards
   - Underground services
   - Overhead obstructions
   - Sufficient room for assembly

3. State the purpose of an engineered drawing in preparing a lift plan
   - Placement of load
   - Placement of crane
   - Grade to be travelled on
   - Ground bearing capacity of the area
   - Operating hazards
   - Underground services
   - Overhead obstructions
   - Load details
   - Routine to move load
   - Crane capacity requirements to pick, move and place the load
**LEARNING TASKS**

<table>
<thead>
<tr>
<th>Task</th>
<th>CONTENT</th>
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</thead>
<tbody>
<tr>
<td>4. Establish the location of the crane</td>
<td>• Rigging required</td>
</tr>
<tr>
<td></td>
<td>• Accessibility of site</td>
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<td></td>
<td>• Grade of the site</td>
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<td>• Soil conditions</td>
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<td></td>
<td>• Distance to embankments</td>
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<td></td>
<td>• Where the load is initially located</td>
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<td></td>
<td>• Where the load is to be placed</td>
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<td></td>
<td>• Proximity to other equipment</td>
</tr>
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<td></td>
<td>• Overhead obstructions</td>
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<td></td>
<td>• Distance to electrical power sources</td>
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<td></td>
<td>• Known underground hazards</td>
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<td>• Environmental conditions</td>
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<td></td>
<td>• Other potential hazards</td>
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<td>5. Determine blocking/mats required for various load-bearing surfaces</td>
<td>• Proper blocking methods</td>
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<td>• Ground bearing capability</td>
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<td>• Suspended slab</td>
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<td>• Uneven supporting surface</td>
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<td>6. Determine the requirement for communications, signal persons,</td>
<td>• WorkSafeBC regulations</td>
</tr>
<tr>
<td>signallers, traffic control, barriers, grounding and bonding</td>
<td>• Company policy</td>
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<td></td>
<td>• Operating clearance</td>
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<tr>
<td></td>
<td>• Traffic control</td>
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<td></td>
<td>• Pedestrian traffic</td>
</tr>
</tbody>
</table>

**Achievement Criteria**

**Performance** The individual will be able to:
- Understand the purpose of various documentation required to prepare lift plans
- Determine requirements for location, blocking/mats, and communications

**Conditions** To be assessed during technical training.

**Criteria** The individual is able to demonstrate that he/she can inspect a job site to ensure a safe and efficient operation in accordance with a pre-lift plan.
Line (GAC): E LIFT PLANNING
Competency: E2 Determine load weights

Objectives
To be competent in this area, the individual must be able to calculate the combined weight of the crane’s gross load for a lift.

LEARNING TASKS

1. Demonstrate the functions of a scientific calculator to perform mathematical calculations
   - Manufacturers’ instructions

2. Perform fundamental mathematical functions
   - Rounding off of numbers
   - Add and convert fractions to decimals
   - Convert between metric and imperial units of measure
   - Determine circumference of a circle
   - Determine the perimeter of an object
   - Calculate the surface area of an object
   - Calculate the sine of an angle
   - Use the Pythagorean theorem

3. Calculate load weights
   - Volume of an object
   - Weight of a cubic unit of an object
   - Weight of components
   - Gross weight of a load

4. Verify load weights
   - Engineer’s drawing
   - Blueprint
   - Bill of lading
   - Calculation

Achievement Criteria

Performance
The individual will be able to perform mathematical calculations to calculate load weights

Conditions
To be assessed during technical training.

Criteria
The individual is able to demonstrate that he/she can calculate the combined weight of the crane’s gross load for a lift.
**Program Content**

**Level 1**

**Line (GAC):** E  
**LIFT PLANNING**

**Competency:** E3 Determine crane lifting capacity

**Objectives**

To be competent in this area, the individual must be able to determine that the lifting capacity of the crane is sufficient when the required configuration is considered.

**LEARNING TASKS**

<table>
<thead>
<tr>
<th>CONTENT</th>
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<tbody>
<tr>
<td>Class 1 lever</td>
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<tr>
<td>Class 2 lever</td>
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<tr>
<td>Class 3 lever</td>
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<tr>
<td>Centre of gravity</td>
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<tr>
<td>Boom length</td>
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<td>Boom angle</td>
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<td>Attachments</td>
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<td>Radius</td>
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<td>Quadrant of operation</td>
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<td>Operating notes</td>
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<td>Deductions from capacity</td>
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<td>Range diagram</td>
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<tr>
<td>Outrigger position</td>
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<tr>
<td>Counterweight configuration</td>
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<tr>
<td>Gross capacity</td>
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<tr>
<td>Net capacity</td>
</tr>
<tr>
<td>Gross load</td>
</tr>
<tr>
<td>Net load</td>
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<tr>
<td>Crane load chart</td>
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<tr>
<td>Crane configuration</td>
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<tr>
<td>Load weight</td>
</tr>
<tr>
<td>Load configuration</td>
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<tr>
<td>Weight of load handling devices</td>
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<tr>
<td>Boom length</td>
</tr>
<tr>
<td>Boom angle</td>
</tr>
<tr>
<td>Radius</td>
</tr>
<tr>
<td>Hook height</td>
</tr>
<tr>
<td>Quadrants of operation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Explain the fundamentals of leverage as they apply to crane operations</td>
</tr>
<tr>
<td>2. State the elements of a basic crane capacity chart</td>
</tr>
<tr>
<td>3. Describe capacities</td>
</tr>
<tr>
<td>4. Describe load calculations</td>
</tr>
<tr>
<td>5. Determine whether the lift can be done within manufacturers’ specifications</td>
</tr>
<tr>
<td>6. Establish optimum boom configurations</td>
</tr>
<tr>
<td>7. Locate the specific information from a basic crane capacity chart</td>
</tr>
</tbody>
</table>
### LEARNING TASKS

<table>
<thead>
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<tbody>
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<td>Range diagram</td>
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</tr>
<tr>
<td>Counterweight configuration</td>
</tr>
</tbody>
</table>

8. Select a configuration appropriate for lifting the load

<table>
<thead>
<tr>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radius</td>
</tr>
<tr>
<td>Parts of line</td>
</tr>
<tr>
<td>Height</td>
</tr>
<tr>
<td>Combined weight of the load and rigging</td>
</tr>
</tbody>
</table>

9. Verify the crane configuration is appropriate for the lift

<table>
<thead>
<tr>
<th>CONTENT</th>
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</thead>
<tbody>
<tr>
<td>Crane load chart</td>
</tr>
<tr>
<td>Load weight</td>
</tr>
<tr>
<td>Load configuration</td>
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<tr>
<td>Weight of load handling devices</td>
</tr>
<tr>
<td>Quadrant of operation</td>
</tr>
<tr>
<td>Length of boom</td>
</tr>
<tr>
<td>Load radius</td>
</tr>
<tr>
<td>Attachments</td>
</tr>
</tbody>
</table>

### Achievement Criteria

**Performance**
The individual will be able to:

- Determine whether the lift can be done within manufacturers’ specifications based on capacities, fundamentals of leverage, and load calculations
- Select and verify the appropriate configuration for lifting the load

**Conditions**
To be assessed during technical training.

**Criteria**
The individual is able to demonstrate that he/she can determine that the lifting capacity of the crane is sufficient when the required configuration is considered.
Line (GAC): E LIFT PLANNING
Competency: E4 Determine rigging requirements

Objectives
To be competent in this area, the individual must be able to select slings and rigging hardware to safely lift a load in accordance with manufacturers’ recommendations and WorkSafeBC regulations.

LEARNING TASKS
1. State the criteria to select the appropriate slings and rigging hardware
   • Weight of load
   • Size of load
   • Load configuration

2. State the criteria to select the appropriate safety devices
   • WorkSafeBC regulations
   • Manufacturers’ manuals
   • Company policy

3. Determine the load configuration
   • Calculation
   • Visual

4. Verify characteristics of the load
   • Height
   • Width
   • Length
   • Weight

5. Calculate/verify the centre of gravity of the load
   • Stamped on load
   • Mathematical formula
   • Blueprint

6. Verify any special lift instructions
   • Lift plan
   • Supplier specifications

7. Calculate the Working Load Limit (WLL) for slings and rigging hardware
   • Manufacturers’ manuals
   • Mathematical formulas

8. Calculate the load on slings and rigging hardware of equal and unequal lengths
   • Manufacturers’ manuals
   • Mathematical formulas
Achievement Criteria

Performance

The individual will be able to:

- Select the appropriate slings, rigging hardware, and safety devices
- Calculate working load limit (WLL), load on slings and rigging hardware, and centre of gravity
- Verify characteristics of the load and special lift instructions

Conditions

To be assessed during technical training.

Criteria

The individual is able to demonstrate that he/she can select slings and rigging hardware to safely lift a load in accordance with manufacturers’ recommendations and WorkSafeBC regulations.
Line (GAC): F CRANE APPLICATIONS
Competency: F1 Interpret operator manuals

Objectives
To be competent in this area, the individual must be able to apply inspection, setup, operating, and maintenance information from the manufacturers’ manuals.

LEARNING TASKS

1. Locate specific information in a manufacturer’s manual
   - Inspection
   - Setup
   - Operation
   - Safety
   - Maintenance

2. Interpret specific information in a manufacturer’s manual
   - Inspection
   - Setup
   - Operation
   - Safety
   - Maintenance

Achievement Criteria

Performance The individual will be able to locate and interpret specific information in a manufacturer’s manual.

Conditions To be assessed during technical training.

Criteria The individual is able to demonstrate that he/she can apply inspection, setup, operating, and maintenance information from the manufacturers’ manuals.
Objectives
To be competent in this area, the individual must be able to safely and efficiently perform a pre-operational inspection in accordance with manufacturers’ recommendations, WorkSafeBC regulations, and training provider policy.

LEARNING TASKS

1. State the sequence of inspection procedures recommended for a crane
   - Manufacturers’ manuals
2. Verify that all the operator aids for the crane are in place
   - Manufacturers’ manuals
3. Confirm that all reports are completed and filed
   - Periodic inspections
   - Erection reports
   - WorkSafeBC regulations
   - Training provider
4. Confirm that all safety and emergency devices are in place and operational
   - Manufacturers’ manuals
   - WorkSafeBC regulations
5. Locate all controls and system gauges
   - Manufacturers’ manuals
6. Perform a pre-operational inspection for a crane
   - Manufacturers’ procedures
   - Company policy
7. Perform a function test on the operating controls
   - Manufacturers’ procedures
8. Perform basic repairs and maintenance
   - Manufacturers’ manuals
   - Company policy
9. Report any defects or deficiencies to the supervisor
   - Manufacturers’ manuals
   - Company policy
   - WorkSafeBC regulations
10. Record any defects or deficiencies in the crane log book
    - Company policy
    - WorkSafeBC regulations
11. Record all repairs or maintenance in the appropriate crane log book
    - Company policy
    - WorkSafeBC regulations

Achievement Criteria

Performance The individual will be able to ensure all components are in place and operational prior to crane operation.

Conditions To be assessed during technical training.

Criteria The individual is able to demonstrate that he/she can safely and efficiently perform a pre-operational inspection in accordance with manufacturers’ recommendations, WorkSafeBC regulations, and training provider policy.
Program Content
Level 1

Line (GAC): F CRANE APPLICATIONS
Competency: F3 Perform a pre-operational setup

Objectives
To be competent in this area, the individual must be able to set up a crane in accordance with manufacturers’ recommendations.

LEARNING TASKS

1. State the setup procedure
   • Manufacturers’ specifications
   • Safety device programming to ensure safety while lifting

2. Identify hazards in the lift area
   • Overhead obstructions
   • Underground hazards
   • Electrical sources

3. Ensure that the supporting surface is sufficient
   • Type of blocking and mats
   • Size of blocking and mats
   • Types of soil
   • Load bearing capacity

4. Program or adjust safety devices according to manufacturers’ recommendations
   • LMI (load monitoring and indicating systems)
   • Anti-two block systems
   • Boom angle indicators
   • Manufacturers’ manuals

Achievement Criteria
Performance The individual will be able to check the supporting surface, identify hazards, and program or adjust safety devices.
Conditions To be assessed during technical training.
Criteria The individual is able to demonstrate that he/she can set up a crane in accordance with manufacturers’ recommendations.
Objectives
To be competent in this area, the individual must be able to perform hoisting operations in a safe and efficient manner in accordance with the manufacturers' recommendations.

LEARNING TASKS

1. Describe a pick and carry procedure

- Slow travel speed
- Shortest boom length possible
- Load as low as possible
- Boom oriented as specified by the manufacturer
- Load restrained from swinging

2. Describe the procedure for operating in the vicinity of high voltage equipment

- Assurance in writing
- WorkSafeBC regulations
- Limits of approach
- Required documentation
- Tag lines

3. Describe the procedures for doing a blind lift

- Use of radio when signal person not visible
- Use of second signal person when one is not visible
- Company policy

4. Describe the procedure for lifting a crane suspended work platform

- Trial lift
- Safety factor of rigging
- Fall protection requirements
- Crane capacity to be downrated when lifting personnel (safety factor required)
- Platforms must be engineered to meet standard
- Anti-two block system
- Critical lift requirements
- WorkSafeBC regulations
- Manufacturers' manuals

5. Operate a crane with and without a load

- Reference to load chart
- Use of outriggers/stabilizers
- Levelling crane
- Booming up and booming down
- Swinging/slewing clockwise and counterclockwise
LEARNING TASKS

6. Adjust procedures according to environmental conditions
   • Operator aids
   • Slow operation

7. Maintain control of the hook block in a safe manner during all functions
   • Booming up/down
   • Swinging/slewing
   • Travelling with a load
   • Slow travel speed
   • Shortest boom length possible
   • Load as low as possible
   • Boom oriented as specified by the manufacturer
   • Load restrained from swinging

8. Perform a pick and carry lift
   • Assurance in writing
   • WorkSafeBC regulations
   • Limits of approach
   • Required documentation
   • Tag lines
   • Safety watcher

9. Perform a lift in proximity to simulated high voltage equipment
   • Use of radio when signal person not visible
   • Use of second signal person when one is not visible
   • Company policy

10. Perform a blind lift
Achievement Criteria

Performance: The individual will be able to perform hoisting techniques while maintaining control of the hook block.

Conditions: To be assessed during technical training.

Criteria: The individual is able to demonstrate that he/she can perform hoisting operations in a safe and efficient manner in accordance with the manufacturers’ recommendations.
Line (GAC): F CRANE APPLICATIONS
Competency: F5 Operate a 20-80 tonne telescoping boom crane

Objectives
To be competent in this area, the individual must be able to lift a load using a 20-80 tonne telescoping boom crane in accordance with manufacturers’ recommendations.

LEARNING TASKS

1. Plan the lift
   - Assessment of area and soil condition
   - Blocking/mats required
   - Assessment of hazards
   - Assessment of obstacles
   - Underground utilities
   - Travel path
   - Traffic control established
   - Load weight
   - Rigging required, rigging weight, rigging certified
   - Qualified personnel
     - Lift supervisor
     - Operator
     - Rigger
     - Signal person
   - Crane capacity sufficient for load throughout the lift
   - Critical lift
   - Tandem lift
   - Signalling and barrier signage

2. Assess the lift site
   - Assessment of area and soil condition
   - Assessment of hazards
   - Assessment of obstacles
   - Overhead hazards
   - Underground utilities
   - Travel path

3. Perform a pre-operational inspection of the crane
   - Accurate inspection
   - Place, location and verification of operator aids
   - Inspection and erection reports

4. Set up the crane
   - Manufacturers’ manuals
   - Overhead obstructions and underground hazards
LEARNING TASKS

5. Rig the load
   - Sufficient supply of blocking/mats considering the load requirements and surface conditions to level the crane
   - Safety device programming and adjustment to ensure accuracy and safety while lifting

6. Hoist/lower the load
   - Load weight determination
   - Selection of hitch and sling arrangement
   - Use of correct hitch configuration
   - Working load limit (WLL) calculations of slings and rigging hardware
   - Sling and rigging hardware angle loading calculations
   - Reduction of sling and rigging hardware Working load limit (WLL) when used at an angle

7. Monitor equipment performance
   - Safe hoisting/lowering procedures
   - Procedures for operating in the vicinity of high voltage equipment
   - Blind lift
   - Unusual noises/vibrations
   - Operator aids

8. Troubleshoot equipment problems
   - Manufacturers’ manuals

9. Move the load to the intended destination
   - Safe load lifting and placement
   - Secure load before unhooking

10. Perform a post-operational procedure
    - Company policy

Achievement Criteria

Performance
The individual will be able to use proper inspection, setup, rigging, and hoisting techniques to safely operate a 20-80 tonne telescoping boom crane.

Conditions
To be assessed during technical training.

Criteria
The individual is able to demonstrate that he/she can lift a load using a 20-80 tonne telescoping boom crane in accordance with manufacturers’ recommendations.
Line (GAC): F  CRANE APPLICATIONS
Competency: F6  Operate a tower crane

Objectives
To be competent in this area, the individual must be able to lift a load using a tower crane in accordance with manufacturers' recommendations.

LEARNING TASKS

1. Plan the lift
   • Assessment of area
   • Assessment of hazards
   • Assessment of obstacles
   • Travel path
   • Traffic control established
   • Load weight
   • Rigging required, weight of rigging, rigging certified
   • Qualified personnel
     o Lift supervisor
     o Operator
     o Rigger
     o Signal person
   • Crane capacity sufficient for load throughout the lift
   • Critical lift
   • Tandem lift
   • Signalling and barrier signage

2. Assess the lift site
   • Assessment of area
   • Assessment of hazards
   • Assessment of obstacles
   • Travel path

3. Perform a pre-operational inspection of the crane
   • Accurate inspection
   • Place, location and verification of operator aids
   • Inspection and erection reports

4. Rig the load
   • Load weight determination
   • Selection of hitch and sling arrangement
   • Use of correct hitch configuration
   • Working load limit (WLL) calculations of slings and rigging hardware
   • Sling and rigging hardware angle loading calculations
LEARNING TASKS

5. Hoist/lower the load

6. Monitor equipment performance

7. Troubleshoot equipment problems

8. Move the load to the intended destination

9. Perform a post-operational procedure

CONTENT

- Reduction of sling and rigging hardware working load limit (WLL) when used at an angle
- Safe hoisting/lowering procedures
- Procedures for operating in the vicinity of high voltage equipment
- Blind lift
- Unusual noises/vibrations
- Operator aids
- Manufacturers’ manuals
- Safe load lifting and placement
- Secure load before unhooking
- Company policy

Achievement Criteria

Performance The individual will be able to use proper inspection, rigging, and hoisting techniques to safely operate a tower crane.

Conditions To be assessed during technical training.

Criteria The individual is able to demonstrate that he/she can lift a load using a tower crane in accordance with manufacturers’ recommendations.
**Line (GAC):** F CRANE APPLICATIONS  
**Competency:** F7 Leave a crane unattended

### Objectives

To be competent in this area, the individual must be able to prepare a crane to be left unattended for short or long periods of time in accordance with manufacturers’ recommendations.

### LEARNING TASKS

<table>
<thead>
<tr>
<th>No.</th>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
</table>
| 1.  | State the procedure for leaving a crane unattended for short periods of time (e.g. lunch breaks) | - No load on the hook  
- Hook elevation  
- Ignition off and removal of key  
- Power source turned off  
- Swing brake application (if applicable)  
- Swing lock application (if applicable) |
| 2.  | State the procedure for leaving a crane unattended for long periods of time (e.g. overnight, weekends) | - No load on the hook  
- Boom lowered to blocking or in cradle  
- Boom angle  
- Telescoping boom retracted  
- Hook elevation  
- Ignition off and removal of key  
- Power source turned off  
- Swing brake application (if applicable)  
- Swing lock application (if applicable)  
- Weathervaning |
| 3.  | Perform shutdown procedure                                                   | - Clean wheels/track and attachments  
- Park equipment in appropriate location  
- Shut down and secure equipment as per manufacturer and site policy  
- Housekeeping tasks  
- Post-operational inspection |

### Achievement Criteria

**Performance**  
The individual will be able to perform the shutdown procedure and leave the crane unattended for both short and long periods of time.

**Conditions**  
To be assessed during technical training.

**Criteria**  
The individual is able to demonstrate that he/she can prepare a crane to be left unattended for short or long periods of time in accordance with manufacturers’ recommendations.
Line (GAC): G TRANSPORTING A CRANE
Competency: G1 Define Commercial Transport Regulations

Objectives
To be competent in this area, the individual must be able to state the criteria for the travel or transport of a crane on public roads in accordance with Commercial Transport Regulations.

LEARNING TASKS

1. Locate related sections of the Commercial Transport Regulations
   • Criteria for special permits
     o Over height
     o Over weight
     o Over length
     o Gross vehicle weight

2. Interpret related sections of the Commercial Transport Regulations
   • Criteria for special permits
     o Over height
     o Over weight
     o Over length
     o Gross vehicle weight

3. State the criteria that would warrant special permits for travel or transport of a crane on public roads
   • Over height
   • Over length
   • Over width
   • Over weight

Achievement Criteria

Performance The individual will be able to interpret related sections of the Commercial Transport Regulations and state the criteria that would warrant special permits for travel or transport of a crane on public roads.

Conditions To be assessed during technical training.

Criteria The individual is able to demonstrate that he/she can state the criteria for the travel or transport of a crane on public roads in accordance with Commercial Transport Regulations.
Program Content
Level 1

Line (GAC): G TRANSPORTING A CRANE
Competency: G2 Prepare a crane for travel

Objectives
To be competent in this area, the individual must be able to prepare a rubber-tired truck crane for travel in accordance with manufacturers’ recommendations and Commercial Transport Regulations.

LEARNING TASKS

1. Determine the procedure to prepare a rubber-tired truck crane for travel
   • Requirements
     o Flags
     o Lights
     o Permits
     o Security of components
   • Procedure
     o Boom retraction
     o Outrigger beam retraction and pinning
     o Outrigger pad removal
     o Swing brake/lock application (if applicable)
     o Securement of block/ball
   • Correct and serviceable signage and signals
     o Commercial Transport Regulations
     o Flags
     o Flashers
     o Warning signs

2. Secure the components and/or load on a rubber-tired truck crane to prevent shifting during travel
   • Recommended securement procedures
   • Commercial Transport Regulations

3. Verify that all permits are in order for travel on a public highway
   • Permits required
   • Manufacturers’ manuals
   • Commercial Transport Regulations
   • Municipal regulations

Achievement Criteria
Performance The individual will be able to prepare a rubber-tired truck crane for travel, ensuring all permits are in order for travel on a public highway.
Conditions To be assessed during technical training.
Criteria The individual is able to demonstrate that he/she can prepare a rubber-tired truck crane for travel in accordance with manufacturers’ recommendations and Commercial Transport Regulations.
Line (GAC): G TRANSPORTING A CRANE
Competency: G3 Prepare a crane for transport

Objectives
To be competent in this area, the individual must be able to prepare a crane for travel on a transporter in accordance with manufacturers’ recommendations, municipal regulations, and Commercial Transport Regulations.

LEARNING TASKS

1. Describe the requirements of a transporter to transport a crane on public roads
   - Safe loading and securing of the crane and components for transporter travel
     - Manufacturers’ manuals
     - Commercial Transport Regulations
     - Security of components
   - Capacity of trailer
   - Length of trailer
   - Width of trailer

2. Describe the procedure for preparing a crane for transporter travel
   - Manufacturers’ manuals
   - Commercial Transport Regulations

3. Ensure the transporter is suitable to transport the crane and components
   - Capacity of trailer
   - Length of trailer
   - Width of trailer
   - Valid certification

4. Load and secure the crane and components on a transporter
   - Manufacturers’ manuals
   - Commercial Transport Regulations

5. Ensure that all flags, flashers and warning signs are in place and serviceable
   - Colour of flags
   - Size of flags
   - Legible signs

6. Verify that all permits are in order for the crane and transporter
   - Commercial Transport Regulations
   - Municipal regulations

7. Unload the crane and components from the transporter
   - Proper lifting devices
   - Attachment points
   - Sufficient crane capacity
   - Qualified personnel
Achievement Criteria

Performance The individual will be able to:
  • Prepare a crane for travel on a transporter, ensuring all components are in place and permits are in order.

Conditions To be assessed during technical training.

Criteria The individual is able to demonstrate that he/she can prepare a crane for travel on a transporter in accordance with manufacturers’ recommendations, municipal regulations, and Commercial Transport Regulations.
Line (GAC): G TRANSPORTING A CRANE
Competency: G4 Assemble and disassemble a crane

Objectives
To be competent in this area, the individual must be able to assemble and disassemble a crane in accordance with manufacturers’ recommendations.

LEARNING TASKS

1. Describe assembly/disassembly procedures as recommended by the manufacturer
   • Installation/removal of crane components
   • Installation/removal of attachments
   • Boom sections
   • Adjust undercarriage (where applicable)
   • Attach boom dolly (where applicable)
   • Pre-operational inspection
   • Inspection after assembly

2. Ensure area to be used for assembly or disassembly is secure and free of obstructions
   • Hazard assessment
   • Barricades

3. Position crane for assembly/disassembly
   • Assembly/disassembly plan

Achievement Criteria

Performance
The individual will be able to assemble and disassemble a crane in a secure area free of obstructions.

Conditions
To be assessed during technical training.

Criteria
The individual is able to demonstrate that he/she can assemble and disassemble a crane in accordance with manufacturers’ recommendations.
Line (GAC): H CRANE MAINTENANCE
Competency: H1 Use tools for basic crane maintenance

Objectives
To be competent in this area, the individual must be able to select appropriate tools to perform basic maintenance on a crane in accordance with manufacturers’ recommendations.

LEARNING TASKS

1. List the tools required to perform basic maintenance
   - Grease gun
   - Adjustable wrenches
   - Combination wrenches
   - Sockets
   - Mallets
   - Screwdrivers
   - Hammers
   - Vice grips
   - Pliers
   - Pry bars
   - Ladders
   - Measuring devices

2. State the function of the tools required for basic maintenance
   - Manufacturers’ manual
   - Supplier’s information

3. Identify the tools required to perform basic maintenance
   - Grease gun
   - Adjustable wrenches
   - Combination wrenches
   - Sockets
   - Mallets
   - Screwdrivers
   - Hammers
   - Vice grips
   - Pliers
   - Pry bars
   - Ladders
   - Measuring devices

4. Select the appropriate tools for an application
   - Manufacturers’ manual
   - Supplier’s information
### Achievement Criteria

**Performance**  
The individual will be able to identify and select the appropriate tools for an application.

**Conditions**  
To be assessed during technical training.

**Criteria**  
The individual is able to demonstrate that he/she can select appropriate tools to perform basic maintenance on a crane in accordance with manufacturers’ recommendations.
Line (GAC): H CRANE MAINTENANCE
Competency: H2 Perform basic crane maintenance

Objectives
To be competent in this area, the individual must be able to perform basic maintenance on a crane in accordance with manufacturers’ recommendations and WorkSafeBC regulations.

LEARNING TASKS

1. List factors that influence the operator’s maintenance responsibilities
   - Legalities
   - Location
   - Capabilities
   - Tool availability

2. Interpret maintenance information from manufacturers’ manuals
   - Inspection frequency
   - Servicing schedules

3. Select the correct fluids and lubricants
   - Manufacturers’ manuals
   - Company policy

4. Perform preventative crane maintenance
   - Grease fittings
   - Lubricate open gears
   - Add fluids
   - Adjust or replace belts
   - Check tire pressure
   - Service oil reservoir venting systems
   - Perform outrigger and stabilizer maintenance
   - Perform boom maintenance
   - Perform steering system maintenance
   - Drain air tanks
   - Slack adjusters
   - Rollers
   - Cables
   - Brakes
   - Clutches

5. Adjust control mechanisms

6. Perform structural maintenance
   - Bolts
   - Wedges
   - Cotter keys
   - Cotter pins
   - Guard rails

7. Clean crane components
   - Batteries
   - Cab
   - Windows
## LEARNING TASKS

<table>
<thead>
<tr>
<th>Task</th>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Repair or replace defective components</td>
<td>• Wheels</td>
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<tr>
<td></td>
<td>• Tracks</td>
</tr>
<tr>
<td>9. Report defects and deficiencies to supervisor</td>
<td>• Manufacturers’ manuals</td>
</tr>
<tr>
<td></td>
<td>• Company policy</td>
</tr>
<tr>
<td>10. Record maintenance performed and requested in the log book</td>
<td>• WorkSafeBC regulations</td>
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<tr>
<td></td>
<td>• Company policy</td>
</tr>
<tr>
<td></td>
<td>• Manufacturers’ manuals</td>
</tr>
</tbody>
</table>

## Achievement Criteria

**Performance**  
The individual will be able to:
- Perform maintenance and adjustments to crane components
- Repair or replace components as required
- Record maintenance and report defects and deficiencies

**Conditions**  
To be assessed during technical training.

**Criteria**  
The individual is able to demonstrate that he/she can perform basic maintenance on a crane in accordance with manufacturers’ recommendations and WorkSafeBC regulations.
Level 2

Tower Crane Operator
**Line (GAC):** I LIFT PLANNING – HAMMERHEAD TOWER CRANE  
**Competency:** I1 Conduct a site assessment for a hammerhead tower crane

### Objectives

To be competent in this area, the individual must be able to inspect a work site to ensure a safe and efficient operation in accordance with a pre-lift plan.

### LEARNING TASKS

<table>
<thead>
<tr>
<th>CONTENT</th>
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</thead>
<tbody>
<tr>
<td>1. Establish the location of the lift</td>
</tr>
<tr>
<td>2. Determine the requirement for communications, signaller, traffic control, barriers, grounding and bonding</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial location of the load</td>
</tr>
<tr>
<td>Load placement</td>
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<tr>
<td>Obstructions in the area</td>
</tr>
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<td>Location of electrical power lines</td>
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<td>Environmental conditions</td>
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<td>Other potential hazards</td>
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<td>Type of lift</td>
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<td>Electrical sources</td>
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<td>Method of communication</td>
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<tr>
<td>Video</td>
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<tr>
<td>Hand signals</td>
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</tbody>
</table>

### Achievement Criteria

**Performance**  
The individual will be able to assess the site and determine the requirement for communications, signaller, traffic control, barriers, grounding and bonding.

**Conditions**  
To be assessed during technical training.

**Criteria**  
The individual is able to demonstrate that he/she can inspect a work site to ensure a safe and efficient operation in accordance with a pre-lift plan.
Line (GAC): I LIFT PLANNING – HAMMERHEAD TOWER CRANE
Competency: I2 Use a crane capacity chart for a hammerhead tower crane

Objectives
To be competent in this area, the individual must be able to use a hammerhead tower crane capacity chart to determine the gross capacity and net capacity considering the configuration required for a lift.

LEARNING TASKS
1. Establish the hook radius required to lift a load
   - Crane load chart
   - Net weight of load
   - Gross weight of load
   - Parts of line
   - Gear capacity

2. State the elements of a crane capacity chart
   - Jib length
   - Attachments
   - Radius
   - Gear capacity
   - Parts of line

3. Locate the specific information from a crane capacity chart
   - Jib length
   - Attachments
   - Radius
   - Gear capacity
   - Parts of line

4. Determine whether the lift can be done within manufacturers’ specifications
   - Capacity chart for crane configuration
   - Weight of the load
   - Weight of the rigging
   - Line weight deduction (if applicable)
   - Gear capacity

Achievement Criteria
Performance
The individual will be able to:
- Select and verify the configuration for the lift
- Locate information on a crane capacity chart to determine whether the lift can be done within manufacturers’ specifications.

Conditions
To be assessed during technical training.

Criteria
The individual is able to demonstrate that he/she can use a hammerhead tower crane capacity chart to determine the gross capacity and net capacity considering the configuration required for a lift.
Line (GAC): J  HAMMERHEAD TOWER CRANE OPERATIONS
Competency: J1 Interpret operating manuals for a hammerhead tower crane

Objectives
To be competent in this area, the individual must be able to apply inspection and operating information from the manufacturers’ manuals of a hammerhead tower crane.

LEARNING TASKS
1. Locate specific information in a manufacturer’s manual
   • Inspection
   • Setup
   • Operation
   • Safety
   • Maintenance

2. Interpret specific information in a manufacturer’s manual
   • Inspection
   • Setup
   • Operation
   • Safety
   • Maintenance

Achievement Criteria
Performance The individual will be able to locate and interpret specific information in a manufacturer’s manual.
Conditions To be assessed during technical training.
Criteria The individual is able to demonstrate that he/she can apply inspection and operating information from the manufacturers’ manuals of a hammerhead tower crane.
Line (GAC): J  HAMMERHEAD TOWER CRANE OPERATIONS
Competency: J2  Perform a pre-operational inspection for a hammerhead tower crane

Objectives
To be competent in this area, the individual must be able to safely and efficiently perform a pre-operational inspection of a hammerhead tower crane in accordance with manufacturers’ recommendations and WorkSafeBC regulations.

LEARNING TASKS

1. State the recommended sequence of inspection
   • Manufacturer’s manual
2. Verify that all the operator aids for the crane are in place
   • Manufacturer’s manual
3. Confirm that all reports are completed and filed
   • Periodic inspections
   • Erection reports
   • WorkSafeBC regulations
   • Company policy
4. Confirm that all safety and emergency devices are in place and operational
   • Manufacturer’s manual
   • WorkSafeBC regulations
5. Locate all controls and system gauges
   • Manufacturer’s manual
6. Perform a pre-operational inspection
   • Manufacturer’s procedures
7. Perform a function test on the operating controls
   • Manufacturer’s procedures
8. Perform basic repairs and maintenance
   • Manufacturer’s manual
   • Company policy
9. Report any defects or deficiencies to the supervisor
   • Manufacturer’s manual
   • Company policy
   • WorkSafeBC regulations
10. Record any defects or deficiencies in the crane log book
    • Company policy
    • WorkSafeBC regulations
11. Record all repairs or maintenance in the appropriate crane log book
    • Company policy
    • WorkSafeBC regulations

Achievement Criteria

Performance  The individual will be able to ensure all components are in place and operational prior to crane operation.
Conditions  To be assessed during technical training.
Criteria  The individual is able to demonstrate that he/she can safely and efficiently perform a pre-operational inspection of a hammerhead tower crane in accordance with manufacturers’ recommendations and WorkSafeBC regulations.
Line (GAC): J  
**HAMMERHEAD TOWER CRANE OPERATIONS**

**Competency:** J3  Perform a pre-operational setup for a hammerhead tower crane

### Objectives
To be competent in this area, the individual must be able to perform a pre-operational setup for a hammerhead tower crane in accordance with manufacturers’ recommendations.

### LEARNING TASKS

<table>
<thead>
<tr>
<th>Learning Task</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. State the setup procedure</td>
<td>• Manufacturer’s specifications</td>
</tr>
<tr>
<td></td>
<td>• Sufficient counterweight/ballast for crane configuration</td>
</tr>
<tr>
<td></td>
<td>• Sufficient parts of line</td>
</tr>
<tr>
<td>2. Identify hazards in the lift area</td>
<td>• Overhead obstructions</td>
</tr>
<tr>
<td></td>
<td>• Underground hazards</td>
</tr>
<tr>
<td></td>
<td>• Electrical sources</td>
</tr>
<tr>
<td>3. Ensure that the supporting surface is adequate</td>
<td>• Type of blocking and mats (if applicable)</td>
</tr>
<tr>
<td></td>
<td>• Size of blocking and mats (if applicable)</td>
</tr>
<tr>
<td></td>
<td>• Travelling base level (if applicable)</td>
</tr>
<tr>
<td></td>
<td>• Types of soil</td>
</tr>
<tr>
<td></td>
<td>• Engineer’s report</td>
</tr>
<tr>
<td>4. Program or adjust safety devices according to manufacturers’ recommendations</td>
<td>• LMI (load monitoring and indicating systems)</td>
</tr>
<tr>
<td></td>
<td>• Anti two block systems</td>
</tr>
<tr>
<td></td>
<td>• Trolley limit switches</td>
</tr>
<tr>
<td></td>
<td>• Manufacturers’ manuals</td>
</tr>
</tbody>
</table>

### Achievement Criteria

**Performance**  
The individual will be able to check the supporting surface, identify hazards, and program or adjust safety devices.

**Conditions**  
To be assessed during technical training.

**Criteria**  
The individual is able to demonstrate that he/she can perform a pre-operational setup for a hammerhead tower crane in accordance with manufacturers’ recommendations.
Line (GAC): J  HAMMERHEAD TOWER CRANE OPERATIONS
Competency: J4  Perform hoisting techniques for a hammerhead tower crane

Objectives
To be competent in this area, the individual must be able to use a hammerhead tower crane to perform lift operations in a safe and efficient manner in accordance with manufacturers’ recommendations.

LEARNING TASKS
1. Operate a crane with and without a load
   • Trolley in and out
   • Slew clockwise and counterclockwise
   • Hoist up and down

2. Maintain control of the hook block during all functions
   • Trolley in and out
   • Slew clockwise and counterclockwise
   • Hoist up and down

Achievement Criteria
Performance  The individual will be able to perform hoisting techniques while maintaining control of the hook block.
Conditions  To be assessed during technical training.
Criteria  The individual is able to demonstrate that he/she can use a hammerhead tower crane to perform lift operations in a safe and efficient manner in accordance with manufacturers’ recommendations.
Objectives

To be competent in this area, the individual must be able to operate a hammerhead tower crane to lift a load in accordance with the lift instructions and the manufacturers’ recommendations.

LEARNING TASKS

1. Assess the lift site
   - Assessment of area
   - Assessment of hazards
   - Assessment of obstacles
   - Travel path

2. Plan the lift
   - Assessment of area
   - Assessment of hazards
   - Assessment of obstacles
   - Travel path
   - Traffic control established
   - Load weight
   - Rigging required, weight of rigging, rigging certified
   - Qualified personnel
     - Lift supervisor
     - Operator
     - Rigger
     - Signal person
   - Crane capacity sufficient for load throughout the lift
   - Critical lift
   - Tandem lift
   - Signalling and barrier signage

3. Perform a pre-operational inspection of the crane
   - Accurate inspection
   - Place, location and verification of operator aids
   - Limit devices/overload prevention
   - Test blocks
   - Inspection and erection reports

4. Monitor equipment performance
   - Unusual noises/vibrations
   - Operator aids

5. Troubleshoot equipment problems
   - Manufacturers’ manuals

6. Move the load to the destination
   - Safe load lifting and placement
LEARNING TASKS

7. Perform a post-operational procedure

CONTENT

- Secure load before unhooking
- Company policy

Achievement Criteria

Performance  The individual will be able to plan the lift and safely operate a hammerhead tower crane.
Conditions    To be assessed during technical training.
Criteria      The individual is able to demonstrate that he/she can operate a hammerhead tower crane to lift a load in accordance with the lift instructions and the manufacturers' recommendations.
Line (GAC): J  HAMMERHEAD TOWER CRANE OPERATIONS
Competency: J6  Leave a hammerhead tower crane unattended

Objectives
To be competent in this area, the individual must be able to prepare a hammerhead tower crane to be left unattended for short or long periods of time, in accordance with manufacturers’ recommendations.

LEARNING TASKS
1. State the procedure for leaving a crane unattended for short periods of time (e.g. lunch breaks)
   - No load on the hook
   - Hook elevation
   - Power source turned off
   - Swing brake application (if applicable)
   - Weathervaning (if applicable)

2. State the procedure for leaving a crane unattended for long periods of time (e.g. overnight, weekends)
   - No load on the hook
   - Hook elevation
   - Power source turned off
   - Swing brake application (if applicable)
   - Weathervaning (if applicable)
   - Access prevention to crane

2. Perform shutdown procedure
   - Shut down and secure equipment as per manufacturer and site policy
   - Housekeeping tasks
   - Post-operational inspection

Achievement Criteria

Performance  The individual will be able to perform the shutdown procedure and leave the crane unattended for both short and long periods of time.

Conditions  To be assessed during technical training.

Criteria  The individual is able to demonstrate that he/she can prepare a hammerhead tower crane to be left unattended for short or long periods of time, in accordance with manufacturers’ recommendations.
Line (GAC): K LIFT PLANNING – LUFFING JIB TOWER CRANE
Competency: K1 Conduct a site assessment for a luffing jib tower crane

Objectives
To be competent in this area, the individual must be able to inspect a work site to ensure a safe and efficient luffing jib tower crane operation, in accordance with a pre-lift plan.

LEARNING TASKS
1. Establish the location of the lift
   - Accessibility of the site
   - Initial location of the load
   - Load placement
   - Obstructions in the area
   - Location of electrical power lines
   - Known underground hazards
   - Environmental conditions
   - Other potential hazards

2. Determine the requirement for communications, signaller, traffic control, barriers, grounding and bonding
   - WorkSafeBC regulations
   - Company policy
   - Operating clearance
   - Traffic control
   - Pedestrian traffic

Achievement Criteria
Performance The individual will be able to assess the site and determine the requirement for communications, signaller, traffic control, barriers, grounding, and bonding.
Conditions To be assessed during technical training.
Criteria The individual is able to demonstrate that he/she can inspect a work site to ensure a safe and efficient luffing jib tower crane operation, in accordance with a pre-lift plan.
**Line (GAC):** K  LIFT PLANNING – LUFFFFFF JIB TOWER CRANE

**Competency:** K2  Use a crane capacity chart for a luffing jib tower crane

### Objectives

To be competent in this area, the individual must be able to use a luffing jib tower crane capacity chart to determine the gross capacity and net capacity for hoisting applications.

### LEARNING TASKS

<table>
<thead>
<tr>
<th>Learning Task</th>
<th>CONTENT</th>
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</thead>
<tbody>
<tr>
<td>1. Establish the hook radius required to lift a load</td>
<td>• Crane load chart</td>
</tr>
<tr>
<td></td>
<td>• Net weight of load</td>
</tr>
<tr>
<td></td>
<td>• Gross weight of load</td>
</tr>
<tr>
<td>2. State the elements of a crane capacity chart</td>
<td>• Boom length</td>
</tr>
<tr>
<td></td>
<td>• Attachments</td>
</tr>
<tr>
<td></td>
<td>• Radius</td>
</tr>
<tr>
<td></td>
<td>• Parts of line</td>
</tr>
<tr>
<td>3. Locate the specific information from a crane capacity chart</td>
<td>• Boom length</td>
</tr>
<tr>
<td></td>
<td>• Attachments</td>
</tr>
<tr>
<td></td>
<td>• Radius</td>
</tr>
<tr>
<td></td>
<td>• Parts of line</td>
</tr>
<tr>
<td>4. Determine whether the lift can be done within manufacturers’ specifications</td>
<td>• Capacity chart for crane configuration</td>
</tr>
<tr>
<td></td>
<td>• Weight of the load</td>
</tr>
<tr>
<td></td>
<td>• Weight of the rigging</td>
</tr>
</tbody>
</table>

### Achievement Criteria

**Performance**  The individual will be able to locate information on a crane capacity chart and determine whether the lift can be done within manufacturers’ specifications.

**Conditions**  To be assessed during technical training.

**Criteria**  The individual is able to demonstrate that he/she can use a luffing jib tower crane capacity chart to determine the gross capacity and net capacity for hoisting applications.
Line (GAC): L LUFFING JIB TOWER CRANE OPERATIONS
Competency: L1 Interpret operating manuals for a luffing jib tower crane

Objectives
To be competent in this area, the individual must be able to apply inspection and operating information from manufacturers' manuals for a luffing jib tower crane.

LEARNING TASKS
1. Locate specific information in a manufacturer’s manual
   • Inspection
   • Setup
   • Operation
   • Safety
   • Maintenance
2. Interpret specific information in a manufacturer’s manual
   • Inspection
   • Setup
   • Operation
   • Safety
   • Maintenance

Achievement Criteria
Performance The individual will be able to locate and interpret specific information in a manufacturer’s manual.
Conditions To be assessed during technical training.
Criteria The individual is able to demonstrate that he/she can apply inspection and operating information from manufacturers’ manuals for a luffing jib tower crane.
**Program Content**

**Level 2**

**Line (GAC):** L  **LUFFING JIB TOWER CRANE OPERATIONS**

**Competency:** L2 Perform a pre-operational inspection for a luffing jib tower crane

**Objectives**

To be competent in this area, the individual must be able to safely and efficiently perform a pre-operational inspection of a luffing jib tower crane in accordance with manufacturers' recommendations and WorkSafeBC regulations.

### LEARNING TASKS

<table>
<thead>
<tr>
<th>CONTENT</th>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. State the recommended sequence of inspection</td>
<td>Manufacturer’s manual</td>
</tr>
<tr>
<td>2. Verify that the operator aids for the crane are in place</td>
<td>Manufacturer’s manual</td>
</tr>
<tr>
<td>3. Confirm that all reports are completed and filed</td>
<td>Periodic inspections</td>
</tr>
<tr>
<td></td>
<td>Erection reports</td>
</tr>
<tr>
<td></td>
<td>WorkSafeBC regulations</td>
</tr>
<tr>
<td></td>
<td>Company policy</td>
</tr>
<tr>
<td>4. Confirm that all safety and emergency devices are in place and operational</td>
<td>Manufacturer’s manual</td>
</tr>
<tr>
<td></td>
<td>WorkSafeBC regulations</td>
</tr>
<tr>
<td>5. Locate all controls and system gauges</td>
<td>Manufacturer’s manual</td>
</tr>
<tr>
<td>6. Perform a pre-operational inspection</td>
<td>Manufacturer’s procedures</td>
</tr>
<tr>
<td>7. Perform a function test on the operating controls</td>
<td>Manufacturer’s procedures</td>
</tr>
<tr>
<td>8. Perform basic repairs and maintenance</td>
<td>Manufacturer’s manual</td>
</tr>
<tr>
<td></td>
<td>Company policy</td>
</tr>
<tr>
<td>9. Report any defects or deficiencies to the supervisor</td>
<td>Manufacturer’s manual</td>
</tr>
<tr>
<td></td>
<td>Company policy</td>
</tr>
<tr>
<td></td>
<td>WorkSafeBC regulations</td>
</tr>
<tr>
<td>10. Record any defects or deficiencies in the crane log book</td>
<td>Company policy</td>
</tr>
<tr>
<td></td>
<td>WorkSafeBC regulations</td>
</tr>
<tr>
<td>11. Record all repairs or maintenance in the appropriate crane log book</td>
<td>Company policy</td>
</tr>
<tr>
<td></td>
<td>WorkSafeBC regulations</td>
</tr>
</tbody>
</table>

### Achievement Criteria

**Performance** The individual will be able to ensure all components are in place and operational prior to crane operation.

**Conditions** To be assessed during technical training.

**Criteria** The individual is able to demonstrate that he/she can safely and efficiently perform a pre-operational inspection of a luffing jib tower crane in accordance with manufacturers’ recommendations and WorkSafeBC regulations.
Line (GAC): L  LUSSING JIB TOWER CRANE OPERATIONS
Competency: L3  Perform a pre-operational setup for a luffing jib tower crane

Objectives
To be competent in this area, the individual must be able to perform a pre-operational setup for a luffing jib tower crane in accordance with manufacturers' recommendations.

Learning Tasks

1. State the setup procedure
   - Manufacturer's specifications
   - Safety device programming to ensure safety while lifting
   - Sufficient parts of line

2. Identify hazards in the lift area
   - Overhead obstructions
   - Underground hazards
   - Electrical sources

3. Ensure that the supporting surface is adequate
   - Type of blocking and mats (if applicable)
   - Size of blocking and mats (if applicable)
   - Travelling base level (if applicable)
   - Types of soil

3. Program or adjust safety devices according to manufacturers’ recommendations
   - LMI (load monitoring and indicating systems)
   - Anti two block systems
   - Limit devices
   - Manufacturers’ manuals

Achievement Criteria
Performance  The individual will be able to check the supporting surface, identify hazards, and program or adjust safety devices.

Conditions  To be assessed during technical training.

Criteria  The individual is able to demonstrate that he/she can perform a pre-operational setup for a luffing jib tower crane in accordance with manufacturers’ recommendations.
Line (GAC): L LUFFING JIB TOWER CRANE OPERATIONS
Competency: L4 Perform hoisting techniques for a luffing jib tower crane

Objectives
To be competent in this area, the individual must be able to use a luffing jib tower crane to perform lift operations in a safe and efficient manner in accordance with manufacturers’ recommendations.

LEARNING TASKS

1. Operate a crane with and without a load
   - Luffing up and down
   - Slewing clockwise and counterclockwise
   - Hoisting up and down

2. Maintain control of the hook block in a safe manner during all functions
   - Luffing up and down
   - Slewing clockwise and counterclockwise
   - Hoisting up and down

Achievement Criteria

Performance
The individual will be able to perform hoisting techniques while maintaining control of the hook block.

Conditions
To be assessed during technical training.

Criteria
The individual is able to demonstrate that he/she can use a luffing jib tower crane to perform lift operations in a safe and efficient manner in accordance with manufacturers’ recommendations.
Line (GAC): L LUFFING JIB TOWER CRANE OPERATIONS
Competency: L5 Operate a luffing jib tower crane

Objectives

To be competent in this area, the individual must be able to operate a luffing jib tower crane to lift a load in accordance with the lift instructions and manufacturers’ recommendations.

LEARNING TASKS

1. Assess the lift site
   - Assessment of area
   - Assessment of hazards
   - Assessment of obstacles
   - Travel path

2. Plan the lift
   - Assessment of area
   - Assessment of hazards
   - Assessment of obstacles
   - Travel path
   - Traffic control established
   - Load weight
   - Rigging required, weight of rigging, rigging certified
   - Qualified personnel
     - Lift supervisor
     - Operator
     - Rigger
     - Signal person
   - Crane capacity sufficient for load throughout the lift
   - Critical lift
   - Tandem lift
   - Signalling and barrier signage

3. Perform a pre-operational inspection of the crane
   - Accurate inspection
   - Place, location and verification of operator aids
   - Limit devices/overload prevention
   - Test blocks
   - Inspection and erection reports

4. Monitor equipment performance
   - Unusual noises/vibrations
   - Operator aids

5. Troubleshoot equipment problems
   - Manufacturers’ manuals

6. Move the load to the destination
   - Safe load lifting and placement
LEARNING TASKS

7. Perform a post-operational procedure

CONTENT

- Secure load before unhooking
- Company policy

Achievement Criteria

Performance The individual will be able to plan the lift and safely operate a luffing jib tower crane.

Conditions To be assessed during technical training.

Criteria The individual is able to demonstrate that he/she can operate a luffing jib tower crane to lift a load in accordance with the lift instructions and manufacturers’ recommendations.
Line (GAC): L  LUFFING JIB TOWER CRANE OPERATIONS  
Competency: L6  Leave a luffing jib tower crane unattended

Objectives
To be competent in this area, the individual must be able to prepare a luffing jib tower crane to be left unattended for short or long periods of time in accordance with manufacturers’ recommendations.

LEARNING TASKS

1. State the procedure for leaving a crane unattended for short periods of time (e.g. lunch breaks)
   - No load on the hook
   - Hook elevation
   - Boom angle
   - Power source turned off
   - Swing brake application (if applicable)
   - Weathervaning (if applicable)

2. State the procedure for leaving a crane unattended for long periods of time (e.g. overnight, weekends)
   - No load on the hook
   - Hook elevation
   - Boom angle
   - Power source turned off
   - Swing brake application (if applicable)
   - Weathervaning (if applicable)
   - Access prevention to crane

3. Perform shutdown procedure
   - Shut down and secure equipment as per manufacturer and site policy
   - Housekeeping tasks
   - Post-operational inspection

Achievement Criteria

Performance  The individual will be able to perform the shutdown procedure and leave the crane unattended for both short and long periods of time.

Conditions  To be assessed during technical training.

Criteria  The individual is able to demonstrate that he/she can prepare a luffing jib tower crane to be left unattended for short or long periods of time in accordance with manufacturers’ recommendations.
Objectives
To be competent in this area, the individual must be able to operate a tower crane with a suspended work platform in a safe and efficient manner in accordance with the lift instructions, manufacturers’ procedures, and WorkSafeBC regulations.

LEARNING TASKS

1. Describe the operating procedure with a suspended work platform

   • WorkSafeBC regulations
   • Manufacturer’s manual
   • Company policy
   • Trial lift
   • Safety factor of rigging
   • Fall protection requirements
   • Crane capacity to be downrated when lifting personnel
   • Platforms must be engineered to meet standard
   • Platform inspection documentation
   • Anti-two block system
   • Critical lift requirements

2. Assess the lift site

   • Assessment of area
   • Assessment of soil conditions (if applicable)
   • Assessment of hazards
   • Assessment of obstacles
   • Overlapping zones
   • Vertical/lateral clearances
   • Underground utilities (if applicable)
   • Travel path

3. Plan the lift

   • Assessment of area
   • Blocking/mats required
   • Assessment of hazards
   • Assessment of obstacles
   • Underground utilities
   • Travel path
   • Traffic control established
   • All-up weight of suspended work platform
   • Personal Protective Equipment (PPE) required
LEARNING TASKS

CONTENT

• Rigging required, rigging certified
• Qualified personnel
  o Lift supervisor
  o Operator
  o Rigger
  o Signal person
• Crane capacity sufficient for load throughout the lift
• Trial lift
• Critical lift
• Signalling and barrier signage

4. Complete a critical lift plan

• WorkSafeBC regulations
• Company policy

5. Perform a pre-operational inspection of the crane

• Accurate inspection
• Place, location and verification of operator aids
• Inspection reports

6. Set up the crane

• Manufacturer’s manuals
• Overhead obstructions and underground hazards
• Sufficient supply of blocking/mats considering the load requirements and surface conditions to level the crane
• Safety device programming and adjustment to ensure accuracy and safety while lifting

7. Attach the suspended work platform

• WorkSafeBC regulations
• Manufacturer’s specifications

8. Hoist the suspended work platform

• Trial lift

9. Move the work platform to the intended destination

• Critical lift plan

Achievement Criteria

Performance The individual will be able to move the platform to the intended destination.
Conditions To be assessed during technical training.
Criteria The individual is able to demonstrate that he/she can operate a tower crane with a suspended work platform in a safe and efficient manner in accordance with the lift instructions, manufacturers’ procedures, and WorkSafeBC regulations.
Line (GAC): M  SPECIALIZED OPERATIONS
Competency: M2  Perform engineered lifts

Objectives
To be competent in this area, the individual must be able to perform an engineered lift in a safe and efficient manner in accordance with the lift instructions, manufacturers' recommendations, and WorkSafeBC regulations.

<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
</table>
| 1. Describe the procedure for an engineered lift | • Written lift plan  
• Critical lift plan |
| 2. Assess the lift site | • Assessment of area  
• Assessment of soil conditions (if applicable)  
• Assessment of hazards  
• Assessment of obstacles  
• Overlapping zones  
• Vertical/lateral clearances  
• Underground utilities  
• Travel path  
• Assessment of area  
• Assessment of soil conditions (if applicable)  
• Blocking/mats required  
• Assessment of hazards  
• Assessment of obstacles  
• Underground utilities (if applicable)  
• Travel path  
• Traffic control established  
• All-up weight of suspended work platform  
• Personal Protective Equipment (PPE) required  
• Weight of load  
• Rigging required, rigging weight, rigging certified  
• Qualified personnel  
  o Lift supervisor  
  o Operator  
  o Rigger  
  o Signal person  
• Crane capacity sufficient for load |
<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Perform a pre-operational inspection of the crane</td>
<td>throughout the lift</td>
</tr>
<tr>
<td></td>
<td>• Trial lift</td>
</tr>
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<td></td>
<td>• Critical lift</td>
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<td></td>
<td>• Signalling and barrier signage</td>
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<tr>
<td>5. Set up the crane</td>
<td>• Accurate inspection</td>
</tr>
<tr>
<td></td>
<td>• Place, location and verification of operator aids</td>
</tr>
<tr>
<td></td>
<td>• Inspection and erection reports</td>
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<tr>
<td>6. Rig the load</td>
<td>• Manufacturer’s manuals</td>
</tr>
<tr>
<td></td>
<td>• Overhead obstructions and underground hazards</td>
</tr>
<tr>
<td></td>
<td>• Sufficient supply of blocking/mats considering the load requirements</td>
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<td></td>
<td>and surface conditions to level the crane</td>
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<tr>
<td></td>
<td>• Safety device programming and adjustment to ensure accuracy and safety</td>
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<tr>
<td>7. Perform the engineered lift</td>
<td>• Load weight determination</td>
</tr>
<tr>
<td></td>
<td>• Selection of hitch and sling arrangement</td>
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<td>• Use of correct hitch configuration</td>
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<td>• Working load limit (WLL) calculations of slings and rigging hardware</td>
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<td>• Sling and rigging hardware angle loading calculations</td>
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<td>• Reduction of sling and rigging hardware Working load limit (WLL) when</td>
</tr>
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<td>used at an angle</td>
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<td>8. Move the load to the intended destination</td>
<td>• Written lift plan</td>
</tr>
<tr>
<td></td>
<td>• Critical lift plan</td>
</tr>
</tbody>
</table>

**Achievement Criteria**

**Performance** The individual will be able to move the load to the intended destination.

**Conditions** To be assessed during technical training.

**Criteria** The individual is able to demonstrate that he/she can perform an engineered lift in a safe and efficient manner in accordance with the lift instructions, manufacturers’ recommendations, and WorkSafeBC regulations.
Objectives
To be competent in this area, the individual must be able to perform a multiple crane lift in a safe and efficient manner in accordance with the lift instructions, manufacturers’ procedures, and WorkSafeBC regulations.

LEARNING TASKS

1. Describe the procedure for a multiple crane lift
   - WorkSafeBC regulations
   - Company policy
   - Professional Engineer certification

2. Calculate the load on each crane during a multiple crane lift
   - Attachment points
   - Centre of gravity
   - Mathematical formulas

3. Assess the lift site
   - Assessment of area and soil condition
   - Assessment of hazards
   - Assessment of obstacles
   - Overlapping zones
   - Vertical/lateral clearances
   - Underground utilities
   - Travel path

4. Plan a variety of lifts
   - Standing up a horizontal object
   - Laying down a vertical object
   - Lifting an object
   - Lift an object with offset centre of gravity

5. Perform a pre-operational inspection of the cranes
   - Accurate inspection
   - Place, location and verification of operator aids
   - Inspection reports

6. Set up the cranes
   - Manufacturer’s manuals
   - Overhead obstructions and underground hazards
   - Sufficient supply of blocking/mats considering the load requirements and surface conditions to level the crane
   - Safety device programming and adjustment to ensure accuracy and safety while lifting

7. Rig the load
   - Load weight determination
LEARNING TASKS

CONTENT

- Selection of hitch and sling arrangement
- Use of correct hitch configuration
- Working load limit (WLL) calculations of slings and rigging hardware
- Sling and rigging hardware angle loading calculations
- Reduction of sling and rigging hardware Working load limit (WLL) when used at an angle
- Centre of gravity

8. Perform the lift

- Safe hoisting procedures
- Procedures for operating in the vicinity of high voltage equipment
- Critical lift plan
- Written lift plan

9. Move the load to the intended destination

Achievement Criteria

Performance  The individual will be able to perform the procedures for a multiple crane lift to move a load to the intended destination.

Conditions  To be assessed during technical training.

Criteria  The individual is able to demonstrate that he/she can perform a multiple crane lift in a safe and efficient manner in accordance with the lift instructions, manufacturers’ recommendations, and WorkSafeBC regulations.
**Line (GAC):** N  **CLIMBING CRANES**  
**Competency:** N1 Follow assembly and raising procedures for a bottom climbing tower crane

### Objectives

To be competent in this area, the individual must be able to describe the procedures to assemble and raise a bottom climbing tower crane in accordance with manufacturers’ specifications.

### LEARNING TASKS

<table>
<thead>
<tr>
<th>Task</th>
<th>CONTENT</th>
</tr>
</thead>
</table>
| 1. Locate information in manufacturers’ manuals | • Assembly and raising procedures  
• Erection procedure and sequence  
• Balancing requirements during raising  
• Inspection of raising components  
• Wind speed limitations |
| 2. Interpret information in manufacturers’ manuals | • Assembly and raising procedures  
• Erection procedure and sequence  
• Balancing requirements during raising  
• Inspection of raising components  
• Wind speed limitations |
| 3. List the components of a bottom climbing tower crane | • Hydraulic components  
• Jacking components  
• Electrical system components  
• Tie-in assembly  
• Wedges  
• Safety devices |
| 4. Describe the assembly procedures for a bottom climbing tower crane | • Manufacturer’s manual  
• Erection procedure and sequence  
• Qualified personnel  
• Written procedure  
• Required inspection reports |
| 5. List the function tests that are required prior to operation | • Limiting devices  
  o Trolley  
  o Hoist  
  o Overload  
• Load weighing devices  
• Operator aids  
• Safety devices |
Achievement Criteria

Performance  The individual will be able to interpret information in manufacturers’ manuals and describe the procedures for assembling and raising a bottom climbing tower crane.

Conditions  To be assessed during technical training.

Criteria  The individual is able to demonstrate that he/she understands the procedures for assembling and raising a bottom climbing tower crane in accordance with manufacturers’ specifications.
Line (GAC): N  CLIMBING CRANES
Competency: N2  Follow assembly and raising procedures for a top climbing tower crane

Objectives
To be competent in this area, the individual must be able to describe the procedures to assemble and raise a top climbing tower crane in accordance with manufacturers’ specifications.

LEARNING TASKS

1. Locate information in manufacturers’ manuals
   - Assembly and raising procedures
   - Erection procedure and sequence
   - Balancing requirements during raising
   - Inspection of raising components
   - Wind speed limitations

2. Interpret information in manufacturers’ manuals
   - Assembly and raising procedures
   - Erection procedure and sequence
   - Balancing requirements during raising
   - Inspection of raising components
   - Wind speed limitations

3. List the components of a top climbing tower crane
   - Climbing frame
   - Hydraulic components
   - Electrical system components
   - Tie-in assembly
   - Safety devices

4. Describe the assembly procedures for a top climbing tower crane
   - Manufacturer’s manual
   - Erection procedure and sequence
   - Qualified personnel
   - Written procedure
   - Required inspection reports
   - Limiting devices
     - Trolley
     - Hoist
     - Overload
     - Boom cut-out
   - Load weighing devices
   - Operator aids
   - Safety devices

5. List the function tests that are required prior to operation
Achievement Criteria

Performance  The individual will be able to interpret information in manufacturers’ manuals and describe the procedures for assembling and raising a top climbing tower crane.

Conditions  To be assessed during technical training.

Criteria  The individual is able to demonstrate that he/she understands the procedures for assembling and raising a top climbing tower crane in accordance with manufacturers’ specifications.
Section 4

ASSESSMENT GUIDELINES
### Assessment Guidelines – Level 1

#### Level 1 Grading Sheet: Subject Competency and Weightings

<table>
<thead>
<tr>
<th>PROGRAM:</th>
<th>MOBILE CRANE OPERATOR AND TOWER CRANE OPERATOR LEVEL 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN-SCHOOL TRAINING:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LINE</th>
<th>SUBJECT COMPETENCIES</th>
<th>THEORY WEIGHTING</th>
<th>PRACTICAL WEIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Safety</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>B</td>
<td>Types and Terminology</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>C</td>
<td>Systems and Components</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>D</td>
<td>Wire Rope and Rigging</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>E</td>
<td>Lift Planning</td>
<td>23%</td>
<td>23%</td>
</tr>
<tr>
<td>F</td>
<td>Crane Applications</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>G</td>
<td>Transporting a Crane</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>H</td>
<td>Crane Maintenance</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

**Calculated by the Training Provider**
Mobile Crane Operator and Tower Crane Operator level 1 in-school theory & practical subject competency weighting

<table>
<thead>
<tr>
<th>Training Provider enters final in-school mark into ITA Direct Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
</tr>
</tbody>
</table>

All apprentices who complete Level 1 of the Mobile Crane Operator and Tower Crane Operator program with a FINAL level mark of 70% or greater will write the Mobile Crane Operator and Tower Crane Operator ITA Level 1 Standardized Written Exam as their final assessment.

ITA will enter the apprentices’ Mobile Crane Operator and Tower Crane Operator ITA Level 1 Standardized Written Exam mark in ITADA. A minimum mark of 70% on the examination is required for a pass.
Section 5

TRAINING PROVIDER STANDARDS
Facility Requirements

Classroom Area
- 400 square feet of classroom space (40 square feet per student).
- Temperature, noise, ventilation, and lighting are maintained at appropriate levels.
- Storage space is functional and sufficient for instructional materials, supplies, and equipment.
- Facilities have adequate floor area and ceiling height.
- Lighting control (windows and fixtures) for screen viewing.
- Tables, comfortable chairs.
- Whiteboards with marking pens and erasers.

Shop Area
- Has access to sufficient land necessary to operate multiple pieces of equipment at the same time (suggested minimum of 10 acres).
- A safety review of the program’s facility and equipment is conducted annually and meets applicable safety standards/regulations.
- Clear of all hazards (power lines, underground services, etc.)

Lab Requirements
- This section does not apply.

Student Facilities
- Facilities shall offer a safe and productive learning environment.
- Meets applicable zoning bylaws for technical instruction and education.
- Meets WorkSafeBC requirements.
- Meets Private Training Institutions Branch (PTIB) requirements.

Instructor’s Office Space
- Meets applicable zoning bylaws for technical instruction and education.
- Meets WorkSafeBC requirements.

Other
- This section does not apply.
Tools and Equipment

The crane and equipment used for training should be representative of the appropriate crane certification classification.

Personal Protective Equipment (PPE)
- Ear plugs
- Coveralls
- Face shields
- Safety glasses
- Gloves
- Hard hat
- Masks (particle/vapour)
- Safety boots
- High visibility vest

Safety Equipment
- Fire extinguishers
- First aid kit
- Spill kit
- Eyewash station

Hand Tools
- Adjustable wrench
- Combination wrenches
- Ratchet and socket set
- Pliers (various types)
- Screwdrivers (various types)
- Vice grips
- Hammers
- Pry bar
- Grease gun
- Tire pressure gauge
- Wear gauge (wire rope & sheave)
- Wire brush
- Cable cutter
- Shovel
Miscellaneous Props for Training

- Two-way radios
- Objects to lift
- Slings (various types)
- Rigging hardware (various types)
- Tag line
- Tape measure
- Carpenter level

Minimum Crane Requirements

- Minimum of three cranes, of which one must be:
  - Telescopic boom (of which one must be telescopic truck crane or rough terrain crane)
- Minimum lifting capacity 20-80 tonnes
- Tower crane with cab-mounted controls
Recommended Resources

  Publisher: Construction Safety Association of Ontario
- Mobile Craning Today
  Publisher: Operating Engineers Training Institute of Ontario, http://www.oetio.com
- IPT’s Crane and Rigging Handbook, by Ronald G. Garby
  Publisher: IPT Publishing and Training Ltd. http://www.iptbooks.com
- IPT’s Crane and Rigging Training Manual, by Ronald G. Garby
  Publisher: IPT Publishing and Training Ltd. http://www.iptbooks.com
- WorkSafeBC Occupational Health and Safety Regulation (OHSR)
- CAN/CSA Z150 Safety Code for Mobile Cranes
- ANSI Standard ANSI/ASME B30.5, Mobile and Locomotive Crane or ANSI/ASME B30.22
  Articulating Boom Crane
- ANSI Standard ANSI/ASME B30.9 Slings
- ANSI Standard ANSI/ASME B30.10 Hooks
Instructor Requirements

**Occupation Qualification**

The instructor must possess:

- Unrestricted Proof of Competence from BC Crane Safety and/or Interprovincial Red Seal Certificate appropriate to the crane classification for which they provide training.

**Work Experience**

Instructors must have a minimum of five years’ experience working as a journeyperson operator for the appropriate crane type(s).