



**BC Association for  
CRANE SAFETY**

# Crane Operator Qualification

## INDUSTRY WORKSHOP REPORT

**MOBILE CRANE TASK GROUP MEETING #2**  
*WorkSafeBC, Richmond British Columbia*  
*December 7, 2005*

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<b>In Attendance:</b>	Rob Magee	GWIL Industries
	Rod Griffiths	Griffiths Pile Driving Inc.
	Larry Sinclair	Marine & Pile Driving (Work Group Coordinator)
	Gordon Lindberg	Operating Engineers local 115
	Bob MacMillan	GWIL Industries
	Mike Maitland	Sterling Crane
	Michael Pelletier	Emil Anderson Construction
	Russ Dowedswell	BC Wood
	Fraser Cocks	BCACS (Executive Director)
	Betty-Ann Lee	WorkSafeBC (Recorder)
	Kathy Sheppard	WorkSafeBC
	Chris Bywater	Fulford Harbour Consulting (Facilitator)

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## Part 1. Certification structure

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### 1.1 Description

The certification structure refers to the organization by which the different levels of mobile crane operator certification are identified and associated competencies (both theoretical knowledge and practical skills) are assigned. Once all of the different levels and associated competencies are identified, the certification structure also shows what competencies are common across each level as well as the path an operator can follow move from one certification to another.

### 1.2 Purpose

The mobile crane operator occupation spans a number of industries and a variety of equipment types including hydraulic and lattice booms as well as lifting capacities ranging from less than 40 tons to over 125 tons. In developing a certification structure it is important to strike a balance between certification requirements that ensure a safe and competent level of operation and one that does not impose an inappropriate number and/or level of competencies for the different levels of required work.

### **1.3 Results**

During the workshop, a certification structure emerged that identified a base level of competency and then a division of the certification levels by major crane type (hydraulic and lattice boom) and by lifting capacity. Completion of all of the individual certifications would collectively constitute the Red Seal certification for mobile crane operator.

Appendix A contains the diagram of the competency structure proposed for mobile crane operators.

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## **Part 2. Review of competency profile**

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At the previous mobile crane workshop participants identified a list of mobile crane operator competencies by reviewing a compilation of source documents from other jurisdictions. At the second workshop the participants were presented with a summary competency profile compiled from the headings of the more detailed competency list from the previous workshop.

Workshop participants reviewed the summary competency profile to refine the overall list of competencies and to also identify those competencies that are core to all mobile crane operators. In identifying the core competencies it was determined that the majority of the competencies listed be included as core but at a more simplified level of detail. More detailed levels within the competency areas will be incorporated in the higher certification levels.

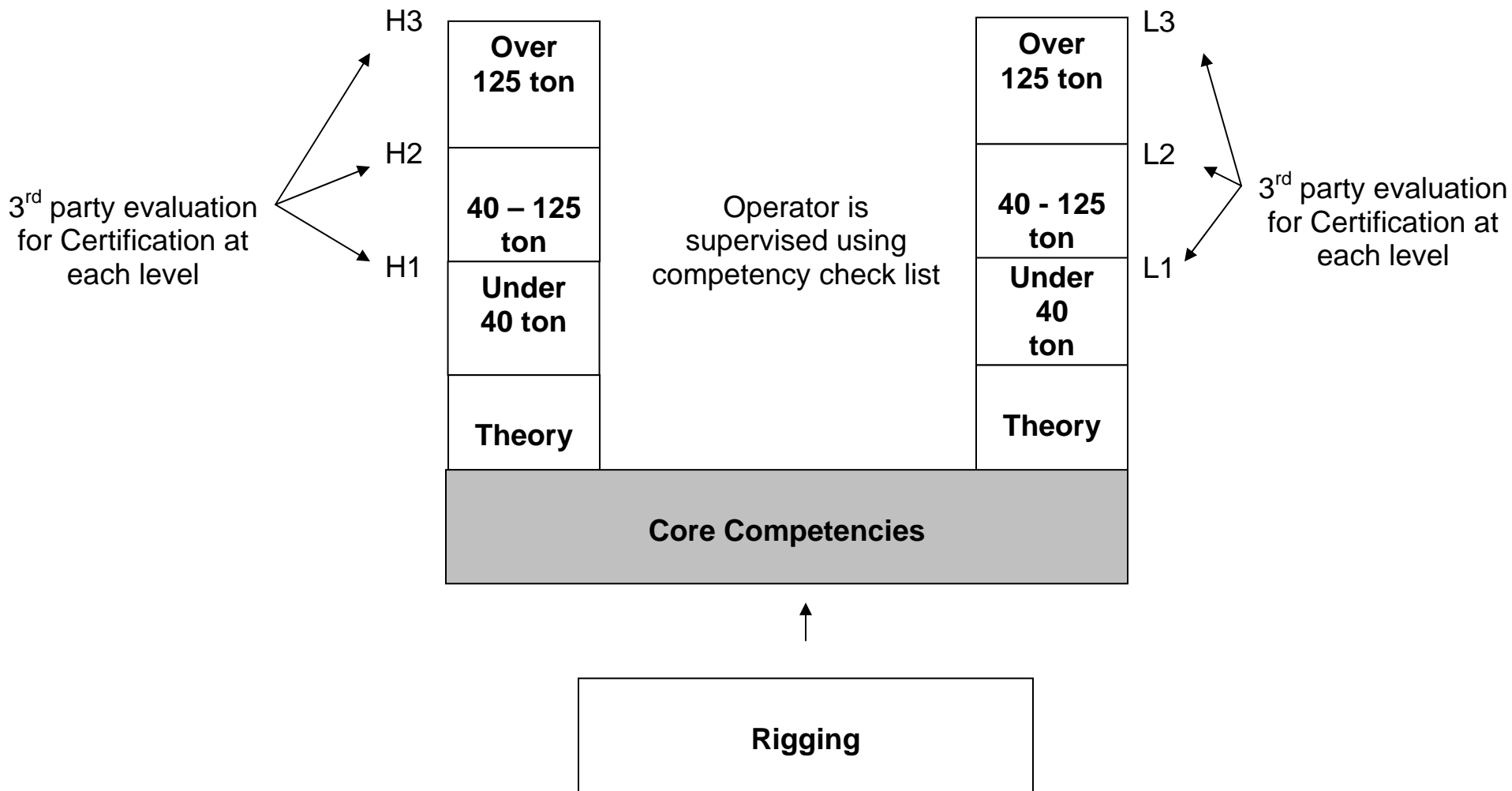
The result of the competency profile refinement exercise is listed in Appendix B.

Appendix A – Draft Certification Structure

**Red Seal Certification**

**Hydraulic**

**Lattice Boom**



Appendix B – Competency Profile

Level 1  
Competencies

Mobile Crane Operator – Profile Chart

<p><b>1. Identify various mobile cranes</b></p>	<p><b>1.01</b> Explain structural &amp; operational characteristics of a hydraulic crane</p>	<p><b>1.02</b> Explain structural &amp; operational char. of lattice boom cranes</p>	<p><b>1.03</b> Identify and describe uses for attachments</p>		
<p><b>2. Basic Trade Math</b></p>	<p><b>2.01</b> Perform basic load calculations using accepted industry formulas</p>				
<p><b>3. Load Chart Reading</b></p>	<p><b>3.01</b> Interpret load charts</p>	<p><b>3.02</b> Explain difference between gross capacity vs net capacity</p>	<p><b>3.03</b> Explain difference between gross load vs net load</p>	<p><b>3.04</b> Determine % of capacity load from chart</p>	<p><b>3.05</b> Determine capacity limited by structural or stability</p>
	<p><b>3.06</b> Determine area of operation</p>	<p><b>3.07</b> Determine boom lengths</p>	<p><b>3.08</b> Determine boom angles</p>	<p><b>3.09</b> Determine load radius</p>	<p><b>3.10</b> Identify and calculate load hoist lines</p>
	<p><b>3.11</b> Interpret range diagrams</p>	<p><b>3.12</b> Use load charts to configure crane upper structure &amp; lower structure</p>	<p><b>3.13</b> Calculate main boom capacities (no attachments)</p>	<p><b>3.14</b> Calculate main boom capacities (attachment)</p>	<p><b>3.15</b> Calculate boom extension capacities</p>
	<p><b>3.16</b> Identify and determine jib capacities</p>	<p><b>3.17</b> Describe crane factors influencing capacity</p>	<p><b>3.18</b> Describe site factors that influence capacity &amp; safe operation</p>	<p><b>3.19</b> Describe principles of leverage</p>	

<b>4. Pre-Lift Planning and Task &amp; Field Level Risk Assessment</b>	<b>4.01</b> Inspect access to site - compaction, graded, free of hazards	<b>4.02</b> Determine crane configuration and attachments	<b>4.03</b> Demonstrate proper crane set-up	<b>4.04</b> Assess ground stability
	<b>4.05</b> Demonstrate proper procedures to level crane	<b>4.06</b> Set-up mobile crane per manuf. instructions	<b>4.07</b> Explain and interpret lift study drawings	

<b>5. Introduction to Operating Procedures</b>	<b>5.01</b> Identify respon. of each person re: operating procedures	<b>5.02</b> Determine weights of loads using available means	<b>5.03</b> Identify centre of gravity of the load	<b>5.04</b> Demonstrate correct set-up and use of outriggers	<b>5.05</b> Demonstrate use of boom angle indicators
	<b>5.06</b> Identify reasons for slack rope on drums & uneven spooling	<b>5.07</b> Define and describe static vs dynamic load	<b>5.08</b> Describe the results and causes of overloading	<b>5.09</b> Identify ground stability for operation of the crane	<b>5.10</b> Identify a critical lift
	<b>5.11</b> Demonstrate proper set-up for rubber tired mobiles	<b>5.12</b> Demonstrate procedures for rigging up or down ???	<b>5.13</b> Describe & demo. procedures for leaving crane unattended	<b>5.14</b> Describe how to protect personnel in vicinity of crane	<b>5.15</b> Interpret regs. for working by high voltage equipment

<b>5.16</b> Demonstrate communications and signaling procedures	<b>5.17</b> Describe effect of boom contacting an obstruction	<b>5.18</b> Describe how two-blocking occurs and how to prevent	<b>5.19</b> Demonstrate procedures for telescoping booms	<b>5.20</b> Describe cold weather operation (below -20 C)
<b>5.21</b> Describe reasons for backward collapse of booms	<b>5.22</b> Describe procedures for using/not using "on rubber" lifting	<b>5.23</b> Describe & demo how to pick and carry loads per manuf. specs	<b>5.24</b> Describe proced. for lifting loads with swing or house lock on	<b>5.25</b> Describe procedures/precautions when working with jibs
<b>5.26</b> Describe the importance of areas of operation	<b>5.27</b> Describe multi-crane lifts and reasons for reduced loading			

<b>6. Rigging &amp; Equipment Accessories</b>	<b>6.01</b> Describe construction, types & functions of wire rope	<b>6.02</b> Identify grades of chain	<b>6.03</b> Identify and demonstrate use of rigging hardware & tools	<b>6.04</b> Identify accessories and interpret related regulations	<b>6.05</b> Calculate safe working loads for slings
	<b>6.06</b> Demonstrate proper use of slings	<b>6.07</b> Describe types and function synthetic slings	<b>6.08</b> Inspect rigging and id. Criteria for taking out of service	<b>6.09</b> Interpret and describe rope lay	<b>6.10</b> Interpret sizes, grades and classification grp. Of wire rope
	<b>6.11</b> Demonstrate procedures for reeving & lacing load	<b>6.12</b> Demonstrate advanced rigging techniques			

<b>7. Inspection and maintenance</b>	<b>7.01</b> Maintain an equipment log book	<b>7.02</b> Complete maintenance checklist (engine off)	<b>7.03</b> Complete maintenance checklist (engine on)	<b>7.04</b> Maintain equipment as specified by manufacturer	<b>7.05</b> Perform routine inspections & maintenance of hydraulic systems
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<b>8. Hydraulics &amp; Applications to Machine Control</b>	<b>8.01</b> Describe principles of power transfer	<b>8.02</b> Describe basic pneumatics systems	<b>8.03</b> Describe basic hydraulic systems	<b>8.04</b> Describe operation of hydraulic system components	<b>8.05</b> Describe qualities of hydraulic fluids
	<b>8.06</b> Describe relation of electric to hydraulic systems	<b>8.07</b> Describe principles of hydraulic systems for each crane type			

<b>9. Engines &amp; Power Systems</b>	<b>9.01</b> Identify common engines for mobile cranes	<b>9.02</b> Identify engine lubrication system	<b>9.03</b> Describe components of electrical system	<b>9.04</b> Describe components of the air system	<b>9.05</b> Describe engine cooling system and servicing procedures
	<b>9.06</b> Describe air intake systems	<b>9.07</b> Describe components of fuel systems	<b>9.08</b> Identify types and grades of oils	<b>9.09</b> Identify and inspect monitoring devices	

<b>10. Rules and Regulations for the Mobile Crane Operation</b>	<b>10.01</b> Follow regulations in BC OH&S	<b>10.02</b> Understand environ regs and emergency procedures	<b>10.03</b> Describe major elements of WHMIS	<b>10.04</b> Describe classes or fires and control procedures	<b>10.05</b> Understand/ follow transportation rules and regulations
	<b>10.06</b> Demonstrate ability to transport crane to the site				