



Mobile Crane Operator **On-the-Job Training Guide**

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Recognition:

To promote transparency and consistency, this document has been adapted from the 2021 Mobile Crane Operator Red Seal Occupational Standard (Employment and Social Development Canada).

A complete version of the Occupational Standard can be found at www.red-seal.ca

STRUCTURE OF THE ON-THE-JOB TRAINING GUIDE

To facilitate understanding of the occupation, this on-the-job training guide contains the following sections:

Description of the Mobile Crane Operator trade: an overview of the trade's duties and training requirements.

Essential Skills Summary: an overview of how each of the nine essential skills is applied in this trade.

Harmonization: a brief description on the pan-Canadian Harmonization Initiative for the Mobile Crane Operator trade.

Task Matrix: a chart which outlines graphically the major work activities, tasks and sub-tasks of this standard detailing the essential skills and the level of training where the content is covered.

Major Work Activity (MWA): the largest division within the standard that is comprised of a distinct set of trade activities.

Task: distinct actions that describe the activities within a major work activity.

Sub-task: distinct actions that describe the activities within a task.

On-the-Job and In-school Training Content for the Mobile Crane Operator Trade: a chart which outlines on-the-job examples for apprentices to achieve relevant work experience to prepare for topics of technical training.

DESCRIPTION OF THE MOBILE CRANE OPERATOR TRADE

Mobile crane operators operate mobile cranes to lift, move, position and place materials and equipment. They perform pre-operational inspections. They calculate crane capacities, determine load weight, and set up, position and stabilize the crane before the lift. Mobile crane operators have the additional responsibilities of disassembling, traveling and transporting mobile cranes. They may also participate in rigging procedures. They also perform some routine maintenance and housekeeping of the crane equipment such as lubricating and cleaning.

Mobile cranes are used in many industry sectors. They are very commonly used in the construction of buildings and the assembly of large equipment. They are used in locations such as construction sites, warehouses, factories, mines, oil rigs, refineries, railway yards, ships, windmill farms and ports. Mobile crane operators may be employed by rental companies, construction firms, manufacturers, public utilities, transport sector companies, ship builders, cargo-handlers, airports, railways and mines.

Mobile cranes come in different types such as crawlers, truck-mounted, rough-terrain and all-terrain. The boom of the crane may be lattice or telescopic. Some mobile cranes are fitted with equipment, including piledriver, clamshell, dragline, wrecking ball, magnet and personnel basket, which can perform specialized functions. They may be outfitted with heavy lift attachments, tower attachments and luffing jibs.

Some mobile crane operators specialize in different crane functions. In some cases, an operator may work for years on a single large site, operating a single type and size of mobile crane. Mobile crane operators working for rental companies may rarely work on the same site more than once and may routinely perform a variety of tasks with different types and sizes of mobile cranes.

The majority of the work in this trade is outdoors. Key attributes for people entering the trade are strong communication skills, mechanical aptitude, mathematical ability, excellent visual and depth perception and a high degree of hand-foot-eye coordination. The operation of some mobile cranes is physically demanding as is the handling of accessories. Mobile crane operators interact with other tradespeople, contractors and customers.

The skills of mobile crane operators are transferable to operating other heavy equipment. With experience, mobile crane operators may move into careers such as business owners, supervisors, trainers and job coordinators.

Training Requirements: 5400 hours (3 years) including in-school technical training sessions. An apprentice must successfully complete the required technical training and compile enough on-the-job experience to total at least 1800 hours each year.

Examination required for proficiency certificates: Boom truck operator "A"; Boom truck operator "B".

Journeyman to apprentice ratio for this trade is: 1:2

The information contained within this pamphlet serves as a guide for employers and apprentices. Apprenticeship training is mutually beneficial to both employer and apprentice. The employer's investment in training apprentices results in skilled and certified workers. The pamphlet summarizes the tasks to be covered by the apprentice during the on-the-job portion of apprenticeship training. An apprentice spends approximately 85% of the apprenticeship term training on-the-job.

It is the employer’s or journeyperson’s training responsibility to supervise an apprentice’s practical skills development until a satisfactory level of proficiency has been reached.

EMPLOYER TRAINING RESPONSIBILITY

- promote a safety-conscious workplace
- provide mentored, hands-on practice in the use of rigging equipment
- demonstrate calculations of the load weights, rigging capacities and crane capacities
- demonstrate set-up of cranes
- provide the opportunity for apprentices to perform minor maintenance on cranes
- further the apprentice’s ability to complete pre-operational inspections, checks and regular inspections
- ensure that the apprentice can perform craning operations

Employers should make every effort to expose their apprentices to work experience in as many areas of the trade as possible.

In the On-the-Job Training Guide, in-school instruction is listed first; on-the-job suggestions to help employers assist the apprentice to prepare for in-school training are listed next.

The content of the training components is subject to change without notice.

Entrance Requirements for Apprenticeship Training

Your grade twelve transcript (with no modified classes) or GED 12 is your guarantee that you meet the educational entrance requirements for apprenticeship in Saskatchewan. In fact, employers prefer and recommend apprentices who have completed high school. This ensures the individual has all of the necessary skills required to successfully complete the apprenticeship program and receive journeyperson certification.

Individuals with “modified” or “general” classes in math or science do not meet our entry requirements. These individuals are required to take an entrance assessment prescribed by the SATCC.

English is the language of instruction in all apprenticeship programs and is the common language for business in Saskatchewan. Before admission, all apprentices and/or “upgraders” must be able to understand and communicate in the English language. Applicants whose first language is not English must have a minimum Canadian Language Benchmark Assessment of six (CLB6).

Note: A CLB assessment is valid for a one-year period from date of issue

Designated Trade Name	Math Credit at the Indicated Grade Level ^❶	Science Credit at Grade Level
Mobile Crane Operator	Grade 10	Grade 10
<p>^❶ - (One of the following) WA – Workplace and Apprenticeship; or F – Foundations; or P – Pre-calculus, or a Math at the indicated grade level (Modified and General Math credits are not acceptable.).</p> <p>*Applicants who have graduated in advance of 2015-2016, or who do not have access to the revised Science curricula will require a Science at the minimum grade level indicated by trade.</p> <p>For information about high school curriculum, including Math and Science course names, please see: http://www.curriculum.gov.sk.ca/</p> <p style="text-align: center;">Individuals not meeting the entrance requirements will be subject to an assessment and any required training</p>		

ESSENTIAL SKILLS SUMMARY

Essential skills are needed for work, learning and life. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Through extensive research, the Government of Canada and other national and international agencies have identified and validated nine essential skills. These skills are used in nearly every occupation and throughout daily life in different ways.

A series of CCDA-endorsed tools have been developed to support apprentices in their training and to be better prepared for a career in the trades. The tools can be used independently or with the assistance of a tradesperson, trainer, employer, teacher or mentor to:

- understand how essential skills are used in the trades;
- learn about individual essential skills strengths and areas for improvement; and
- improve essential skills and increase success in an apprenticeship program.

The tools are available online or for order at: www.canada.ca/en/services/jobs/training/initiatives/skills-success

The application of these skills may be described throughout this document within the skills and knowledge which support each sub-task of the trade. The most important essential skills for each sub-task have also been identified. The following are summaries of the requirements in each of the essential skills, taken from the essential skills profile. A link to the complete essential skills profile can be found at www.red-seal.ca.

READING

In their daily work, mobile crane operators read and comprehend several types of texts. These include safety and work procedures as well as more complex hoisting regulations and manufacturers' operating manuals.

DOCUMENT USE

Mobile crane operators use workplace documents such as logbooks, load charts, hazard assessments and workplace policies and procedures to carry out their job. They must be familiar with regulations relating to hoisting, rigging and safe work environments. They must have the ability to read and interpret manufacturers' specifications and load charts for the model of crane they are using. Depending on site-specific requirements, they may obtain information from engineered and construction drawings and plans.

WRITING

Mobile crane operators use writing skills to record comments or notes in logbooks or work records. They write messages to colleagues or management to give work details or reply to requests for technical information. They may also write longer descriptions and explanations for various reporting and data collection forms.

ORAL COMMUNICATION

Mobile crane operators use oral communication skills to coordinate work with site crews. Clear communication of technical and complex information is very important to avoid injuries and promote efficiency. Mobile crane operators also use communication skills when instructing apprentices, co-workers and on-site work crews. Good listening and visual skills are also required to communicate with riggers, signallers and other operators during lifts. Operators use verbal communication and hand signals to communicate the speed of lift movements and precise positioning of loads.

NUMERACY

Mobile crane operators use a range of math skills in their daily work. These include mathematical and physics concepts such as conversions, geometry, algebraic calculations, measurement and calculation of load and lift requirements. They use code books, load charts and manufacturers' specifications to further determine procedures, limits and the necessary equipment for rigging and hoisting.

THINKING

Mobile crane operators must use decision-making skills to perform work planning and prioritizing. The decisions they make about the sequence of work have implications for everyone on site. Mobile crane operators require strong analytical skills to effectively use their equipment.

Mobile crane operators use problem solving skills to choose setup locations and crane configurations for specific jobs. During lifts mobile crane operators make operational decisions to start, stop and vary the speed and direction of lifts to ensure safe movement and placement of a load. They evaluate the safety of lifts before and during lifts, and stop work if necessary.

WORKING WITH OTHERS

To be effective, mobile crane operators must establish close and ongoing job-task coordination with other workers on the job site. They work closely with clients to plan lifts and ensure that their activities are coordinated with those of on-site crews. They are in close communication with riggers, signallers and supervisors to coordinate lifts and load placements. Mobile crane operators work in close coordination with other operators when performing multiple crane lifts and when in close proximity with other cranes and heavy equipment.

DIGITAL TECHNOLOGY

Mobile crane operators are increasingly required to interpret electronic data transmitted from LMI, anemometers and electronic scales to a display located in the cab of the crane. Controls for the mobile crane may also involve computerized applications.

CONTINUOUS LEARNING

As construction methods and crane technology are advancing, mobile crane operators must keep abreast of these developments. There are requirements for site or crane specific training and regulatory changes that may require additional certification and ongoing learning to ensure compliance and safe working conditions.

ELEMENTS OF HARMONIZATION FOR APPRENTICESHIP TRAINING

At the request of industry, the Harmonization Initiative was launched in 2013 to *substantively align* apprenticeship systems across Canada by making training requirements more consistent in the Red Seal trades. Harmonization aims to improve the mobility of apprentices, support an increase in their completion rates and enable employers to access a larger pool of apprentices.

As part of this work, the Canadian Council of the Directors of Apprenticeship (CCDA) identified four main harmonization priorities in consultation with industry and training stakeholders:

1. Trade name

The official Red Seal name for this trade is Mobile Crane Operator.

2. Number of levels of apprenticeship

The number of levels of technical training recommended for the Mobile Crane Operator trade is three.

3. Total training hours during apprenticeship training

The total hours of training, including both on-the-job and in-school training for the Mobile Crane Operator trade is 5400.

4. Consistent sequencing of training content (at each level) using the most recent occupational standard

Implementation for harmonization took place progressively and is now complete. Level one was implemented in 2016/2017, level two in 2017/2018 and level three in 2018/2019.

MOBILE CRANE OPERATOR TASK MATRIX CHART

This chart outlines the major work activities, tasks and sub-tasks from the 2021 Mobile Crane Operator Red Seal Occupational Standard (RSOS). Each sub-task details the corresponding essential skill and level of training where the content is covered. *

* Sub-tasks with numbers in the boxes is where the content will be delivered in training. Harmonization for the Mobile Crane trade has been fully implemented for each level of technical training.

A – Performs common occupational skills

6%

Task A-1 Performs safety-related functions	1.01 Maintains a safe work environment 1, 2, 3	1.02 Uses personal protective equipment (PPE) and safety equipment 1, 2, 3	1.03 Uses documentation 1, 2, 3
Task A-2 Uses communication and mentoring techniques	2.01 Use communication techniques 1, 2, 3	2.02 Uses mentoring techniques 1, 2, 3	

B – Performs hoisting calculations

18%

Task B-3 Determines load weights	3.01 Identifies weight 1, 2, 3	3.02 Calculates weight 1, 2, 3
Task B-4 Calculates crane capacity	4.01 Determines radius and crane configuration 1, 2, 3	4.02 Interprets load charts 1, 2, 3
Task B-5 Performs rigging calculations	5.01 Performs sling angle calculations 1, 2, 3	5.02 Performs working load limit (WLL) calculations 1, 2, 3

C – inspects and maintains crane

13%

Task C-6 Performs pre-operational checks and regular inspections	6.01 Inspects engine systems 1, 2, 3	6.02 Inspects air systems 1, 2, 3	6.03 Inspects electrical systems 1, 2, 3	6.04 Inspects hydraulic systems 1, 2, 3	6.05 Inspects chassis/car body and running gear components 1, 2, 3
	6.06 Inspects outriggers and counterweights 1, 2, 3	6.07 Inspects boom components and attachments 1, 2, 3	6.08 Inspects hoisting systems 1, 2, 3		
Task C-7 Performs operational and continual checks	7.01 Checks operating controls 1, 2, 3	7.02 Inspects monitoring and warning systems 1, 2, 3	7.03 Monitors running lines, hoist lines and standing ropes 1, 2, 3	7.04 Monitors gauges and warning systems 1, 2, 3	7.05 Monitors support base 1, 2, 3
	8.01 Changes oil and filters 1	8.02 Greases crane 1, 2, 3	8.03 Lubricates wire ropes 1, 2, 3	8.04 Makes adjustments and replacements 1, 2, 3	
Task C-8 Performs minor crane maintenance					

D – Performs rigging

12%

Task D-9 Inspects, maintains and stores slings and hardware	9.01 Lubricates slings and hardware 1, 2, 3	9.02 Identifies deficiencies in slings and hardware 1, 2, 3	9.03 Disposes of damaged slings and hardware 1, 2, 3	9.04 Stores slings and hardware 1, 2, 3
	10.01 Selects required rigging 1, 2, 3	10.02 Rigs load 1, 2, 3	10.03 Monitors rigging 1, 2, 3	
Task D-10 Follows rigging procedures				

E – Plans lift, prepares site and sets up crane

15%

Task E-11 Performs pre-lift planning	11.01 Participates in routine, engineered and specialty lift planning 1, 2, 3	11.02 Evaluates risks and hazards 1, 2, 3	
Task E-12 Sets up crane	12.01 Performs final site inspection 2, 3	12.02 Positions crane 2, 3	12.03 Completes setup 2, 3

F – Assembles, disassembles and transports crane

13%

Task F-13 Loads and unloads components for transport	13.01 Loads crane and components 2, 3	13.02 Unloads and crane and components 2, 3			
Task F-14 Drives cranes on public roadways	14.01 Performs pre-trip planning 1, 2, 3	14.02 Prepares crane for transport 2, 3	14.03 Drives cranes 2, 3		
Task F-15 Assembles and disassembles lattice boom cranes	15.01 Installs tracks on car body (lattice boom) 1, 2, 3	15.02 Installs superstructure/upperworks (lattice boom) 1, 2, 3	15.03 Installs outrigger boxes (lattice boom) 1, 2, 3	15.04 Installs boom base (lattice boom) 1, 2, 3	15.05 Assembles counterweights (lattice boom) 1, 2, 3
	15.06 Assembles main boom, tip and boom attachments (lattice boom) 1, 2, 3	15.07 Installs hook blocks and overhaul ball (lattice boom) 1, 2, 3	15.08 Removes hook blocks and overhaul ball (lattice boom) 1, 2, 3	15.09 Disassembles main boom, tip and boom attachments (lattice boom) 1, 2, 3	15.10 Removes counterweights (lattice boom) 1, 2, 3
	15.11 Removes boom base (lattice boom) 1, 2, 3	15.12 Removes superstructure/upperworks (lattice boom) 1, 2, 3	15.13 Removes tracks from car body (lattice boom) 1, 2, 3	15.14 Removes outrigger boxes (lattice boom) 1, 2, 3	

Task F-16 Assembles and disassembles telescopic boom cranes	16.01 Installs tracks on car body (telescopic boom) 1, 2, 3	16.02 Installs outrigger boxes (telescopic boom) 1, 2, 3	16.03 Installs superstructure/upperworks (telescopic boom) 1, 2, 3	16.04 Installs main boom (telescopic boom) 1, 2, 3	16.05 Installs hook blocks and overhaul ball (telescopic boom) 1, 2, 3
	16.06 Installs counterweights (telescopic boom) 1, 2, 3	16.07 Installs jibs and inserts (telescopic boom) 1, 2, 3	16.08 Removes jibs and inserts (telescopic boom) 1, 2, 3	16.09 Removes counterweights (telescopic boom) 1, 2, 3	16.10 Removes hook blocks and overhaul ball (telescopic boom) 1, 2, 3
	16.11 Removes main boom (telescopic boom) 1, 2, 3	16.12 Removes outrigger boxes (telescopic boom) 1, 2, 3	16.13 Removes tracks from car body (telescopic boom) 1, 2, 3	16.14 Removes superstructure/upperworks (telescopic boom) 1, 2, 3	
Task F-17 Assembles and disassembles specialty equipment and attachments	17.01 Assembles specialty equipment and attachments 3	17.02 Disassembles specialty equipment and attachments 3			

G – Operates crane

23%

Task G-18 Performs common craning operations	18.01 Configures load moment indicator (LMI) 1, 2, 3	18.02 Mobilizes crane on jobsite 1, 2, 3
	19.01 Operates friction drive crawler-mounted lattice boom cranes 1, 2, 3	19.02 Operates friction drive truck-mounted lattice boom cranes 1, 2, 3
Task G-20 Operates hydraulic drive lattice boom cranes	20.01 Operates hydraulic drive crawler-mounted lattice boom cranes 1, 2, 3	20.02 Operates hydraulic drive truck-mounted lattice boom cranes 1, 2, 3

Task G-21 Operates telescopic boom cranes	21.01 Operates crawler-mounted telescopic cranes 1, 2, 3	21.02 Operates rubber-mounted telescopic cranes 1, 2, 3			
Task G-22 Performs specialty craning operations	22.01 Operates crane with piledriving equipment 2, 3	22.02 Performs duty cycle operations 2, 3	22.03 Operates cranes on floating platforms 3	22.04 Performs multi-crane lifts 2, 3	22.05 Uses personnel hoisting equipment 2, 3
Task G-23 Secures crane	23.01 Secures crane for short-term 1, 2, 3	23.02 Secures crane for long-term 1, 2, 3			

TRAINING PROFILE CHART

This Training Profile Chart represents Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training at the topic level.

Mobile Crane Operator technical training for levels 1 and 2 are provided in alternative delivery. This method uses a combination of in-class training and at-home course work between training sessions. As a result, hours are listed below for a specific training level, but not for individual courses.

Technical training for levels 1 and 2 are both equivalent to 8 weeks in length, while level 3 is a 2 week in-class session.

Level One	Hours
Safety/Tools and Equipment	
Rigging	
Mobile Crane Operations	
Load Charts I	
Load Weight Calculations	
	240

Level Two	Hours
Rigging	
Load Weight Calculations II	
Load Charts II	
Mobile Crane Setup	
Mobile Crane Operations	
Pre-operational Checks, Inspections and Maintenance	
	240

Level Three	Hours
Mobile Crane Operations	
Safety/Tools and Equipment	
Rigging	
Load Charts	
Load Weight Calculations	
Preoperational Checks, Inspections and Maintenance	
Mobile Crane Setup	
	80

ON-THE-JOB AND IN-SCHOOL TRAINING

CONTENT FOR THE MOBILE CRANE OPERATOR

TRADE

This chart outlines on-the-job examples for apprentices to achieve relevant work experience to prepare for the topics of technical training. Topics of technical training are provided with the associated learning outcomes.

Level One	8 weeks	240 hours
Safety/Tools and Equipment		
<ul style="list-style-type: none">• types of personal protective equipment (PPE) and clothing and describe their applications, limitations and procedures to maintain• hazards and describe workplace safety and health regulations• techniques for effective verbal and non-verbal communication• applicable hand signals used during craning operations• trade related documents and describe their applications• hand, power and measuring tools and describe their applications, procedures for use• retaining devices and describe their applications and procedures to install and remove		
Mentors can assist the apprentice to prepare for this section of technical training by:		
<ul style="list-style-type: none">• <i>ensuring the apprentice follows safe work practices and has knowledge of CSA standards, OH&S regulations and company safety policies</i>• <i>demonstrating the use of safety equipment such as PPE, first aid kits, fire extinguishers and spill kits</i>• <i>allowing apprentice to attend company safety meetings</i>• <i>demonstrating crane safety and possible hazards</i>• <i>demonstrating, then supervising the apprentice using hand signalling procedures during actual lifts of materials and equipment</i>• <i>explaining safety procedures as it relates to high voltage electrical equipment</i>• <i>explaining limits of approach when working near high voltage equipment</i>• <i>ensuring the apprentice knows the safety procedures associated with electrical contact</i>• <i>reviewing and explaining technical information from manufacturer's manuals</i>• <i>explaining the personal responsibility for crane operators to maintain log books</i>• <i>demonstrating the use of the crane log book</i>• <i>allowing the apprentice to use written communication, such as log book time sheets and accident reports</i>• <i>ensuring the apprentice has knowledge of various hand and power tools</i>• <i>ensuring the apprentice is exposed to various types of crane hardware/fasteners and their usages</i>		

Rigging

- codes, standards and regulations pertaining to wire ropes, rigging hardware and slings
- wire ropes, rigging hardware and slings and describe their applications, limitations and procedures for use and storage
- procedures used to select, install and connect wire ropes, rigging hardware and slings
- procedures used to troubleshoot issues with wire rope, slings and rigging components
- procedures used to dispose of damaged rigging components
- information pertaining to rigging and hoisting found on drawings and specifications
- procedures used to calculate sling angles and their effect on sling capacities
- procedures used to determine the appropriate sling size for a given load
- considerations and calculations used to determine WLLs

Mentors can assist the apprentice to prepare for this section of technical training by:

- *demonstrating inspection procedures and identify damage to wire rope*
- *allowing the apprentice to choose the appropriate hardware for various lifts*
- *identifying various block classifications and their applications*
- *discussing the effects of sling angles*
- *exposing the apprentice to lifts requiring different sling configurations*
- *allowing the apprentice to choose the rigging configuration for a basic lift such as sling type, size, use of hardware and quantity*
- *discussing the effects of different types of sling configurations such as vertical, choker, basket hitch and two leg bridle*

Load Weight Calculations

- knowledge of the weight of basic shaped loads
- knowledge of center of gravity

Mentors can assist the apprentice to prepare for this section of technical training by:

- *allowing the apprentice to calculate load weights for basic shaped loads*
- *allowing the apprentice to determine and calculate center of gravity*

Load Charts

- basic load charts, their characteristics and applications
- crane capacity, crane component capacity and working radius for basic lifting operations

Mentors can assist the apprentice to prepare for this section of technical training by:

- *ensuring apprentice is aware of factors reducing capacities such as wind, weather and ground conditions*
- *allowing the apprentice to use basic load charts*

Mobile Crane Operations

- lifting theory and forces
- units of measure and symbols regarding lifting plans and load charts
- basic crane operations, applications and procedures
- procedures used to perform pre/post-operational inspections
- crane computers and integrated computerized components, their applications and procedures for use
- procedures used to plan and organize job tasks
mobile cranes, their characteristics and applications

Mentors can assist the apprentice to prepare for this section of technical training by:

- *discussing the components of leverage and their applications*
- *having the apprentice look through manufacturer's manuals*
- *allowing the apprentice to interpret technical information gathered from multiple sources*
- *demonstrate the quadrants of operation and the effects of lifting over the different quadrants*
- *demonstrating operating procedures such as swing, hoist up/down and using multiple functions at the same time*
- *ensuring the apprentice has basic crane operations such as programming range limiting devices and use of LMI*
- *explaining job site layouts and hazards to consider*
- *allowing the apprentice to attend a site meeting*
- *exposing the apprentice to crane operations of various cranes such as lattice, hydraulic and boom trucks*
- *supervising the apprentice during the completion of a walk around inspection prior to operation*

Rigging

- non-routine rigging and lifts, their applications, limitations and procedures
- non-routine rigging and lift techniques
- reeving operations
- methods and equipment used for reeving operations
- multi-crane lifts and their applications
- procedures used for multi-crane lifts

Mentors can assist the apprentice to prepare for this section of technical training by:

- *identifying the various types of hoist blocks such as ball, block, and snatch block*
- *ensuring the apprentice can select the rigging configuration for various lifts*
- *demonstrating the use of equalizer beams and spreader bars*
- *discussing lubrication needs for wire rope slings*
- *allowing the apprentice to install various parts of line*
- *allowing the apprentice to seize and braze wire rope*
- *supervising the apprentice during the preparation and setup of a multi-crane lift*

Load Weight Calculations

- procedure to determine weight of irregular shaped loads
- procedure to determine center of gravity

Mentors can assist the apprentice to prepare for this section of technical training by:

- *ensuring the apprentice can complete basic load weight calculations*
- *supervising the apprentice when needing to calculate load weights requiring multi step calculations*

Load Charts

- load charts, their characteristics and applications
- crane capacity, crane component capacity and working radius for lift operations

Mentors can assist the apprentice to prepare for this section of technical training by:

- *ensuring the apprentice can gather information from multiple locations within a load chart*
- *discussing the factors reducing rated capacities such as wind, weather, ground conditions and personnel experience*

Pre-operational Checks, Inspections and Maintenance

- engines and drive systems, components, their purpose and operation
- procedures used to inspect, maintain and troubleshoot engines and drive systems
- mechanical systems, components, their purpose and operation
- procedures used to inspect, maintain and troubleshoot mechanical systems and their components
- hydraulic systems, components, their purpose and operation
- procedures used to inspect, maintain and troubleshoot hydraulic systems and their components
- procedures used to perform continual checks

Mentors can assist the apprentice to prepare for this section of technical training by:

- *having the apprentice view the crane manufacturer's requirements for inspections/maintenance*
- *exposing the apprentice to maintenance procedures and checklists for rigging, pre-lift planning, crane setup and crane maintenance*
- *supervising the apprentice conducting crane preventative maintenance tasks*

- *demonstrating daily interval checks such as ground conditions, outriggers remain set and crane condition*
-

Mobile Crane Set-up

- positioning, blocking and leveling operations and their applications
- lattice boom cranes and their associated components
- procedures used for the assembly and disassembly of lattice boom cranes and their components
- telescopic boom cranes and their associated components
- procedures used for the assembly and disassembly of telescopic boom cranes and their components
- procedures used to prepare cranes for transport
- procedures used to transport cranes, their components and accessories
- steps required for pre-lift planning
- procedures used to determine crane positioning and setup
- procedures used to prepare worksite for crane operations

Mentors can assist the apprentice to prepare for this section of technical training by:

- *supervising the apprentice while positioning the crane, making sure the apprentice takes into account radii, voltage/obstacle clearances, crane dimensions and load dimension/weight*
 - *allowing the apprentice to help in the assembly/disassembly of various cranes and attachments such as the house(upperworks), outriggers boxes, the boom and jib*
 - *discussing permit requirements for transport of cranes on various methods of carriers*
 - *discussing the various methods of transporting a crane*
 - *having the apprentice visit the job site to determine if it is favourable for crane mobility and setup*
 - *allowing the apprentice to attend pre-lift planning meetings and completing a lift plan form*
 - *describing the importance of site meetings*
 - *discussing potential site hazards such as overhead and underground obstructions and ground conditions*
-

Mobile Crane Operations

- hydraulic telescopic boom cranes, their applications and operation
- procedures used to operate telescopic boom cranes and their attachments
- hydraulic drive lattice boom cranes, their applications and operation
- procedures used to operate hydraulic drive lattice boom cranes, hydraulic drive systems and their attachments
- friction drive lattice boom cranes, their applications and operation
- procedures used to operate friction drive lattice boom cranes, friction drive systems and their attachments
- knowledge of specialty crane operations, their characteristics, applications and procedures

Mentors can assist the apprentice to prepare for this section of technical training by:

- *allowing the apprentice to operate various types of cranes and boom trucks*
- *explaining the level of awareness required while operating a crane such as consistently monitoring gauges, watching load and the surrounding environment*
- *discussing specialty craning operations such as multi-crane lifts, personnel hoisting, pile driver, clamshell and draglines*

Safety/Tools and Equipment

- safety equipment, their applications, maintenance and procedures for use
- safe work practices and regulatory requirements pertaining to safety
- effective communication practices
- communication devices, their operation and the procedures used to communicate during hoisting operations
- procedures used to operate cranes near high voltage electrical equipment
- procedures used to complete documentation
- tools and equipment, their applications, maintenance and procedures for use
- fasteners and retaining devices, their applications and procedures for use

Mentors can assist the apprentice to prepare for this section of technical training by:

- *reviewing safety equipment and PPE requirements*
- *ensuring the apprentice can recognise site hazards*
- *allowing the apprentice to participate in shop safety meetings*
- *ensuring the apprentice has reviewed the CSA Z150, Saskatchewan OH&S manuals and company safety policy*
- *allowing the apprentice to direct rigging duties and demonstrate good knowledge of crane hand signals*
- *reviewing the importance of limits of approach*
- *demonstrating safety procedures associated with electrical contact*
- *discussing the process when requesting power to be de-energized when limits of approach cannot be used*
- *ensuring the apprentice records the information required in the crane log book*
- *allowing the apprentice to fill in log books*
- *ensuring the apprentice is able to use written communication such as incident reports and critical lift plan*
- *allowing the apprentice to use the different types of hand and power tools*

Rigging

- wire ropes, their applications, limitations and procedures for use
- procedures used to install, monitor, inspect, maintain, store and dispose of wire ropes and rigging hardware
- rigging hardware, their applications, limitations and procedures for use
- rigging and hoisting applications and techniques
- sling configurations, their characteristics and applications
- working load limits (WLL)
- non-routine rigging and lifts, their applications, limitations and procedures
- non-routine rigging and lift techniques
- methods and equipment used for reeving operations
- procedures used for multi-crane lifts

Mentors can assist the apprentice to prepare for this section of technical training by:

- *installing a wire rope on a hoist drum*
- *supervising the apprentice during inspection and maintenance procedures for rigging slings and hardware*
- *discussing proper storage methods of rigging hardware*
- *allowing the apprentice to select the rigging configuration for intermediate load configurations*
- *ensuring the apprentice can calculate angular loading for various sling configurations*
- *giving the apprentice exposure to lifts using various accessories such as equalizer beams and spreader bars*

- *allowing the apprentice to install the different parts of line*
 - *allowing the apprentice to prepare, setup and perform a multi-crane lift*
-

Load Charts

- load charts, their characteristics and applications
- crane component capacity and working radius for lift operations

Mentors can assist the apprentice to prepare for this section of technical training by:

- *ensuring the apprentice can interpret gross and net capacities based on manufacturer's load charts*
 - *ensuring the apprentice can interpret information from the cranes manufacturer's load charts*
 - *allowing the apprentice to complete a load calculation requiring information from multiple locations within a load chart*
-

Load Weight Calculations

- weight of basic shaped loads
- center of gravity
- procedures to determine weight of irregular shaped loads
- procedures to determine center of gravity

Mentors can assist the apprentice to prepare for this section of technical training by:

- *ensuring the apprentice can calculate load weights using formulas such as cylinder, cube and pyramid*
 - *allowing the apprentice to calculate load weights requiring multi-step calculations such as tank with fluid, H-beams and pipes*
 - *discussing the effect of load weight estimating when adding rigging /accessories required for lift*
-

Pre-operational Checks, Inspections and Maintenance

- engines and drive systems, their purpose, components and operation
- procedures used to inspect, maintain and troubleshoot engines, drive systems and their components
- procedures used to inspect, maintain and troubleshoot mechanical systems and their components
- hydraulic systems and components, their purpose and operation
- procedures used to inspect, maintain and troubleshoot hydraulic systems and their components
- procedures used to perform continual checks

Mentors can assist the apprentice to prepare for this section of technical training by:

- *allowing the apprentice to complete a crane maintenance inspection*
- *allowing the apprentice to perform routine maintenance on the engine, power train, cooling hydraulic and fuel system*
- *demonstrating an undercarriage inspection and explaining the purpose and frequency*
- *reviewing crane inspection checklists and log books*
- *allowing the apprentice to complete a walk around inspection prior to operation*
- *supervising the apprentice during daily interval checks such as ground conditions, outrigger remain set and crane condition*

Mobile Crane Set-up

- positioning, blocking and leveling operations and their applications
- procedures used for the assembly and disassembly of lattice boom cranes and their components
- procedures used for the assembly and disassembly of telescopic boom cranes and their components
- procedures used to transport cranes, their components and accessories
- steps required for pre-lift planning
- procedures used to determine crane positioning and setup
- procedures used to prepare worksite for crane operations

Mentors can assist the apprentice to prepare for this section of technical training by:

- *allowing the apprentice to relocate of a crane on site, treating the relocation with the same attention and procedure as original site setup*
- *allowing the apprentice to calculate the assist crane required*
- *ensuring the apprentice can direct the assembly/disassembly of a crane and/or accessories*
- *ensuring the apprentice is aware of permit requirements when driving a crane on public/private roads*
- *allowing the apprentice to prepare for transport and drive the crane on public/private roads*
- *allowing the apprentice to communicate lift procedures to site personnel*
- *allowing the apprentice to lead a pre-lift planning meeting*
- *ensuring the apprentice completes pre-lift planning documentation*
- *having the apprentice conduct a site meeting*
- *ensuring the apprentice considers variables affecting a lift such as weather, ground condition and overhead obstacles*

Mobile Crane Operations

- lifting theory and forces
- units of measure and symbols relating to lifting plans and load charts
- procedures used to perform pre- and post-operational inspections
- procedures to perform crane operations
- crane computers, integrated computerized components, their applications and procedures for use
- procedures used to operate telescopic boom cranes and their attachments
- procedures used to operate hydraulic drive lattice boom cranes, hydraulic drive systems and their attachments
- procedures used to operate friction drive lattice boom cranes, friction drive systems and their attachments
- procedures used to perform specialty crane operations

Mentors can assist the apprentice to prepare for this section of technical training by:

- *allowing the apprentice to calculate working capacities for various crane configurations such as outrigger position, boom length and parts of line*
- *having the apprentice verify the LMI is set properly, gauges are displaying appropriate reading and anti-two block device is functioning properly*
- *identifying warning systems on cranes and importance of these systems*
- *allowing the apprentice to select which crane is used for a specific job taking into consideration location, load size and quantity*
- *ensuring the apprentice understands the legal responsibilities of the workers involved in crane operation*
- *giving the apprentice exposure to various styles of hoisting equipment*
- *allowing the apprentice to participate in specialty lifts such as blind lifts and tandem lifts*

Consider apprenticeship training as an investment in the future of your company and in the future of your workforce. Ultimately, skilled and certified workers increase your bottom line.

Get involved in the apprenticeship training system. Your commitment to training helps to maintain the integrity of the trade.

Do you have employees who have been working in the trade for a number of years but don't have trade certification? Contact your local apprenticeship office for details on how they might obtain the certification they need.

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