

Mobile Crane Operator Guide to Course Content

2021



Online: www.saskapprenticeship.ca

Recognition:

To promote transparency and consistency, this document has been adapted from the 2013 Mobile Crane Operator National Occupational Analysis (Employment and Social Development Canada).

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

STRUCTURE OF THE GUIDE TO COURSE CONTENT

To facilitate understanding of the occupation, this guide to course content 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.

Elements of harmonization of apprenticeship training: includes adoption of Red Seal trade name, number of levels of apprenticeship, total training hours (on-the-job and in-school) and consistent sequencing of technical training content. Implementation for harmonization will take place progressively. Level one to be implemented in 2016/2017, level two in 2017/2018 and level three in 2018/2019

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.

Training Profile Chart: a chart which outlines the model for Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training.

Technical Training Course Content for the Mobile Crane Operator trade: a chart which outlines the model for SATCC technical training sequencing. For the harmonized level of training, a cross reference to the Harmonized apprenticeship technical training sequencing, at the learning outcome level, is provided.

Appendix A: Post Harmonization Training Profile Chart: a chart which outlines the finalized model for SATCC technical training sequencing with a cross reference to the Harmonized apprenticeship technical training sequencing, at the topic level.

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: To graduate from each level of the apprenticeship program, an apprentice must successfully complete the required technical training and compile enough on-the-job experience to total at least 1800 hours each year. Total trade time required is 5400 hours and at least 3 years in the trade. There are three levels of technical training delivered by the Western Trade Training Institute in various locations around the province:

Level One: 8 weeks

Level Two: 8 weeks

Level Three: 2 weeks

Examination required for proficiency certificates: boom truck operator “A”; boom truck operator “B”.

The information contained in this guide to course content details the technical training delivered for each level of apprenticeship. An apprentice spends approximately 15% of their apprenticeship term in a technical training institute learning the technical and theoretical aspects of the trade. The hours and percentages of technical and practical training may vary according to class needs and progress.

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

Entrance Requirements for Apprenticeship Training

Your grade twelve transcripts (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 journeyman 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>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.esdc.gc.ca/eng/jobs/les/profiles/index.shtml

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.

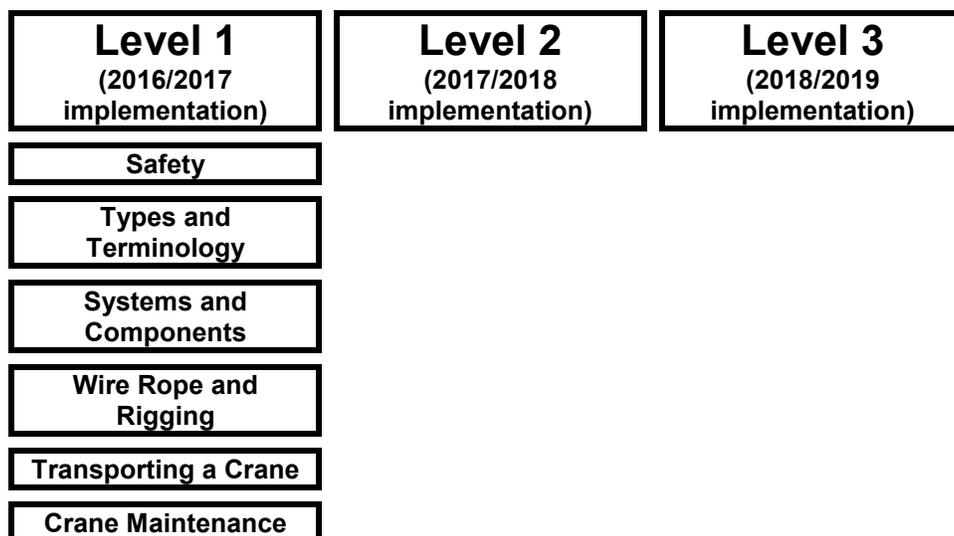
3. Total Training Hours during Apprenticeship Training

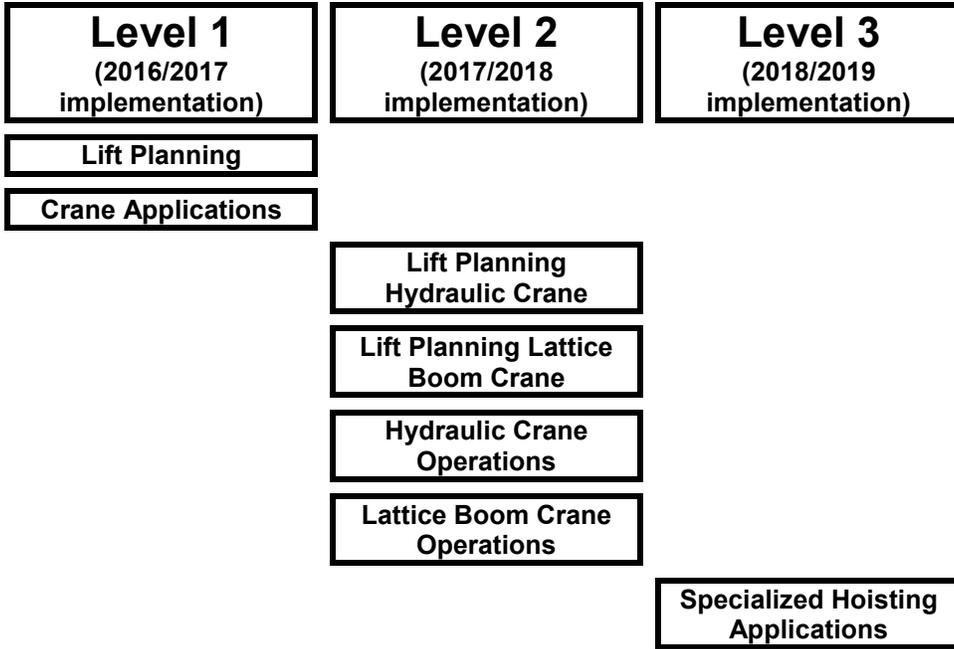
The total hours of training, including both on-the-job and in-school training for the Mobile Crane Operator trade is 5400.

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

Harmonization for the Welder trade has been fully implemented for each level of technical training. See the “Technical Training Course Content” section of this guide for more details.

White boxes are “Topics,” grey boxes are “In Context”. In context means learning that has already taken place and is being applied to the applicable task. Learning outcomes for in context topics are accomplished in other topics in that level.





MOBILE CRANE OPERATOR TASK MATRIX CHART

This chart outlines the major work activities, tasks and sub-tasks from the 2013 Mobile Crane Operator National Occupational Analysis. 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 Welder trade has been fully implemented for each level of technical training.

A – COMMON OCCUPATIONAL SKILLS

A-1 Performs safety-related functions	1.01 Maintains safe work environment 1,2,3	1.02 Uses personal protective equipment (PPE) and safety equipment 1,2,3
A-2 Organizes work	2.01 Communicates with others 1,2,3	2.02 Uses documentation 1,2,3

B – HOISTING CALCULATIONS

B-3 Determines load weights	3.01 Identifies the weight 1,2,3	3.02 Calculates weight 1,2,3
B-4 Calculates crane capacity	4.01 Determines radius and crane configuration 1,2,3	4.02 Interprets load charts 1,2,3
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 – CRANE INSPECTION AND MAINTENANCE

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		
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	
C-8 Performs minor crane maintenance	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 minor adjustments and replacements 1,2,3	

D – RIGGING

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
D-10 Follows rigging procedures	10.01 Selects required rigging 1,2,3	10.02 Rigs load 1,2,3	10.03 Monitors rigging 1,2,3	

E – LIFT PLANNING, SITE PREPARATION AND CRANE SETUP

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	
E-12 Sets up crane	12.01 Performs final site inspection 1,2,3	12.02 Positions crane 1,2,3	12.03 Completes setup 1,2,3

F – CRANE ASSEMBLY, DISASSEMBLY, AND TRANSPORT

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

F-16 Assembles and disassembles telescopic boom cranes	16.01 Installs outrigger boxes (telescopic boom) 1	16.02 Installs main boom (telescopic boom) 1	16.03 Installs hoist lines, hook blocks and overhaul ball (telescopic boom) 1,2,3	16.04 Installs counterweights (telescopic boom) 1	16.05 Installs swing-away jibs and inserts (telescopic boom) 1,2,3
	16.06 Removes swing-away jibs and inserts (telescopic boom) 1,2,3	16.07 Removes counterweights (telescopic boom) 1	16.08 Removes hoist lines, hook blocks and overhaul ball (telescopic boom) 1,2,3	16.09 Removes main boom (telescopic boom) 1	16.10 Removes outrigger boxes (telescopic boom) 1
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 – CRANE OPERATIONS

G-18 Performs common craning operations	18.01 Configures load moment indicator (LMI) 1,2	18.02 Mobilizes crane on jobsite 1,2
	G-19 Operates friction drive lattice boom cranes	19.01 Operates friction drive crawler-mounted lattice boom cranes 1
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
	G-21 Operates telescopic boom cranes	21.01 Operates crawler-mounted telescopic cranes 1,2,3

G-22 Performs specialty craning operations	22.01 Operates piledriver 2,3	22.02 Performs duty cycle operations 2,3	22.03 Operates cranes on barges 3	22.04 Performs multi-crane lifts 2	22.05 Uses personnel hoisting equipment 3
G-23 Secures cranes	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	
Load Weight Calculations	
Preoperational Checks, Inspections and Maintenance	
Mobile Crane Setup	
	80

TECHNICAL TRAINING COURSE CONTENT

This chart outlines the model for Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training sequencing.

Harmonization for the Welder trade has been fully implemented for each level of technical training.

Level One	8 weeks	240 hours
Safety/Tools and Equipment		
<ul style="list-style-type: none">• safety• communications for hoisting• high voltage electrical fundamentals• trade related documents• tools and equipment• fasteners and retaining devices		
Rigging		
<ul style="list-style-type: none">• wire rope• rigging hardware• introduction to rigging and hoisting• sling configurations		
Load Weight Calculations		
<ul style="list-style-type: none">• load weight calculations I		
Load Charts		
<ul style="list-style-type: none">• load charts I		
Mobile Crane Operations		
<ul style="list-style-type: none">• lifting theory and forces• introduction to crane operations• introduction to computerized operational aids• job planning• introduction to mobile cranes		

Level Two	8 weeks	240 hours
Rigging		
<ul style="list-style-type: none">• advanced rigging and hoisting• reeving operations• multi-crane lifts		
Load Weight Calculations		
<ul style="list-style-type: none">• load weight calculations		

Load Charts

- load charts ii
-

Pre-operational Checks, Inspections and Maintenance

- engines and drive systems
 - mechanical systems
 - hydraulic systems
 - continual checks
-

Mobile Crane Set-up

- crane setup
 - assembly and disassembly (lattice boom crane)
 - assembly and disassembly (telescopic boom crane)
 - transportation
 - pre-lift planning
 - worksite preparation
-

Mobile Crane Operations

- hydraulic telescopic boom operation
 - hydraulic drive lattice boom operation
 - friction drive lattice boom operation
 - specialty crane operations
-

Level Three

2 weeks

80 hours

Safety/Tools and Equipment

- safety
 - communications for hoisting
 - high voltage electrical fundamentals
 - trade related documents
 - tools and equipment
-

Load Weight Calculations

- load weight calculations I
 - load weight calculations II
-

Load Charts

- load charts I
 - load charts II
-

Pre-operational Checks, Inspections and Maintenance

- engines and drive systems
 - mechanical systems
 - hydraulic systems
 - continual checks
-

Mobile Crane Setup

- crane setup
 - assembly and disassembly (lattice boom crane)
-

- assembly and disassembly (telescopic boom crane)
 - transportation
 - pre-lift planning
 - worksite preparation
-

Mobile Crane Operations

- lifting theory and forces
- introduction to crane operations
- introduction to computerized operational aids
- job planning
- introduction to mobile cranes
- hydraulic telescopic boom operation
- hydraulic drive lattice boom operation
- friction drive lattice boom operation
- specialty crane operations

APPENDIX A: POST HARMONIZATION TRAINING PROFILE CHART

This chart which outlines the finalized model for SATCC technical training sequencing with a cross reference to the Harmonized apprenticeship technical training sequencing, at the topic level.

Implementation for harmonization will take place progressively. Level one to be implemented in 2016/2017, level two in 2017/2018, and level three in 2018/2019.

SATCC Level One	Pan-Canadian Harmonized Level One
Safety/Tools and Equipment	Safety
Mobile Crane Operations	Types and Terminology
	Systems and Components
	Transporting a Crane
	Crane Maintenance
Rigging	Wire Rope and Rigging
Load Weight Calculations	Lift Planning
Load Charts I	
Mobile Crane Operations	
Load Weight Calculations	Crane Applications
Load Charts I	
Mobile Crane Operations	

SATCC Level Two	Pan-Canadian Harmonized Level Two
Rigging	Lift Planning – Hydraulic Crane (Basic and Advanced)
Load Weight Calculations II	Lift Planning – Lattice Boom Crane (Basic and Advanced)
Load Charts II	
Mobile Crane Setup	Hydraulic Crane Operations (Basic and Advanced)
Pre-operations Checks, Inspections and Maintenance	Lattice Boom Crane Operations (Basic and Advanced)
Rigging	
Load Weight Calculations II	
Load Charts II	
Mobile Crane Setup	
Mobile Crane Operations	

SATCC Level Three	Pan-Canadian Harmonized Level Three
Mobile Crane Operations	Specialty Hoisting Applications
Safety/Tools and Equipment	
Rigging	
Load Weight Calculations	
Load Charts	
Pre-operational Checks, Inspections and Maintenance	
Mobile Crane Setup	

Exceed Topics

Throughout this guide to course content there are topics which exceed the minimum scope of work as set out in the Mobile Crane Operator NOA. Industry in Saskatchewan has deemed certain topics to fall within the scope of work of the Mobile Crane Operator trade in Saskatchewan and therefore require technical training to cover these topics.