Manitowoc Lattice Training
Course Catalog
Manitowoc WI, United States

06/2016
Contacts and Trainers

Keith Opperman  
Manager of Technical Training III  
Keith.opperman@manitowoc.com

Ken O’Leary  
Lead Training Instructor  
Kenneth.O’leary@manitowoc.com

Kurt Jaeckel  
Training Instructor III  
Kurt.Jaeckel@manitowoc.com

Jorge Pinto  
Training Instructor III  
Jorge.Campanico@manitowoc.com

Teh Theam Song  
Training Instructor III  
TheamSong.Teh@manitowoc.com
Training Center Objectives

Our Capabilities:

Our factory-certified instructors offer operating systems, components, maintenance and repair training on all of our products: Grove, GMK, Manitowoc, National Crane, and Potain.

Manitowoc Crane Care is an innovative leader in advanced crane industry training. Our onsite and online training curriculum is designed with your profits and your safety in mind. With professional and experienced instructors, our training helps you build the knowledge you need to be as productive as possible.

Our Facility for Lattice training in USA:

The training facility in Manitowoc WI offers multiple state of the art classrooms. 2 large hands-on simulators labs to include simulators of multiple generations of Manitowoc EPIC, Canbus and Crane Control Systems.

Available lab workstations:

• 4 generations of Lattice Crane simulators, from conventional cranes to CCS generation;
• 4 hydraulic benches with pumps and motors that can simulate the function of the machines.
• Completely functional Operator simulator that enables to lift and move like it was inside of the crane.
• Small Crawler simulator for the small Crawler range.
• Also available in Baltar (Portugal) Dubai and Singapore:
  • Epic Simulator
  • Canbus Version 1 and version 2 Simulator;
  • Crane in the box Simulator
  • CCS Simulator
Training Arrangements

Our Address:

Manitowoc Company, Inc.
2400 South 44th Street
Manitowoc, WI 54221
920-684-4410 voice
920-652-9778 fax

Where are courses held?
Manitowoc Crane Care has two (2) different Training centers in Manitowoc. Our class confirmation letter will provide the address to the appropriate Training center.

What airport should I fly into to attend courses at the Manitowoc facility?

Green Bay Austin Straubel Airport - If you are flying into this airport, directions are as follows. As you leave the airport, make a right turn onto Airport Drive. Follow this to the 41/172 interchange where you will get on 172 going east. Watch for the signs for I-43 south. Continue on I-43 south for about 40 miles to Exit 149 at Manitowoc. After exiting I-43, turn left (east) onto Hwy. 151. The Holiday Inn will be just a short distance ahead and to your right.

Milwaukee’s Mitchell Field Airport - If you are flying into this airport, directions are as follows. As you leave the airport, make a right turn onto I-94 north. As you near the downtown Milwaukee interchange, follow the signs for I-43 north. Continue on I-43 north for about 80 miles to Exit 149 at Manitowoc. After exiting I-43, turn right (east) onto Hwy. 151. The Holiday Inn will be just a short distance ahead and to your right.

What about transportation to and from airport?
A rental car will be required for transportation from the airport. If you need to check on local transportation, the following cab service is available out of Green Bay:

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<tr>
<td>Bay City Cab</td>
<td>920-432-3456</td>
</tr>
<tr>
<td>Title Town Taxi</td>
<td>920-432-5151</td>
</tr>
<tr>
<td>Checker Cab</td>
<td>920-435-6004</td>
</tr>
<tr>
<td>Astro Taxi</td>
<td>920-499-9119</td>
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<tr>
<td>Yellow Cab</td>
<td>920-435-6285</td>
</tr>
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<td>Universal Taxi</td>
<td>920-435-6969</td>
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<tr>
<td>Ace Yellow Cab</td>
<td>920-435-6985</td>
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Training Arrangements

Where would I stay if I am traveling to Wisconsin for a course?
You may stay at the hotel of your choice; however, for your convenience we have listed several local hotels. We recommend you plan to arrive in the area the day before the class starts. For reservations, click on one of the hotels listed below or call the number provided. Be sure to mention you are with The Manitowoc Company for special rates.

**Holiday Inn**
Address: 4601 Calumet Avenue, Manitowoc, Wisconsin 54220
Phone: (920) 682-6000
The hotel provides a shuttle service to and from class each day departing from the hotel at 7:20 AM, returning to the hotel at 4:30 PM.

**Best Western**
Address: 101 Maritime Drive, Manitowoc, Wisconsin, 54220-6804
Phone: (920-682-7000)

Are lodging, transportation and meals paid for?
No. Attendees are responsible for lodging, transportation, and meals. We provide all training materials and lunch each day.

When do classes start/end?
Training starts on MONDAY at 7:30 AM and ends at 4:00 PM daily; EXCEPT for the last day of training which ends FRIDAY around 11:30 AM or when you are advised by the instructor.

What to Wear:
Students should wear comfortable work clothes; jeans are recommended daily and during the hands-on portion of the class. NO shorts or open-toed shoes/sandals are permitted. Please be advised that if a student shows up to training inappropriately dressed they will be sent back to change their clothes.

What to Bring:
Laptop computer (if required for your course)
Steel-Toed Boots with metatarsal guards
Safety Glasses
Volt Meter (if required for your course)

Not permitted on premises:
Pets (cats, dogs, etc.) - except for accessibility issues
Weapons of any kind
Illegal substances of any kind
Alcoholic beverages
Training Arrangements

Cell Phones:
We ask students to turn off cell phones during class and check messages during breaks and lunch time.

No Smoking:
Smoking is not permitted in our buildings. The use of smokeless tobacco in the classrooms/lab areas is not permitted. There are designated smoking areas outside of the buildings and containers for cigarette butts.

What if I need to cancel my attendance in a class?
Please refer to the cancellation policy below. You may email your cancellation to Toni.Pagliaro@manitowoc.com

CANCELATION POLICY:
SEAT CANCELLATION FEE: Course cancellation requests received after a student has been confirmed in a course will result in a $125.00 cancellation fee. This is a flat fee and will NOT be waived under any conditions or circumstances.

NO SHOW FEE: Students that fail to show up to a course with no notification or cancellation to Manitowoc will incur a $500.00 class preparation fee.

Are there maps available?
Yes - Area map of Manitowoc with hotel

Additional Questions: Please contact Toni Pagliaro - Toni.Pagliaro@manitowoc.com
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Content:

This course requires no service knowledge of Grove, GMK, National or Manitowoc crane systems and will be used as a prerequisite for all introductory level courses. The course is designed to provide a basic understanding of hydraulic, electrical and pneumatic principles and how they are applied on the different Manitowoc product lines. This course will also provide a basic understanding of the different Crane Care online systems used for parts, service and maintenance. The course will consist of classroom time utilizing programs covering the basics of hydraulic, electrical and pneumatics along with their components and how these components operate and interact with each other. Schematics are used to help the students gain a basic understanding of schematic layouts and component symbols used on the different product lines.

Hydraulic and Electrical test benches are incorporated into the course to help give the student a better understanding of the hydraulic and electrical theories learned in the classroom portion of the training. Manitowoc Crane Care online systems for parts, service and maintenance will be covered to help the students understand basic navigation and content of the different systems.

Course Benefits:

At the end of the course, technicians will be able to:

• Have the basic understanding of hydraulic, electrical and pneumatic principals.
• Have a basic understanding of how hydraulic, electrical and pneumatic principles relate to the different Manitowoc product line systems.
• Have a basic understanding of schematic design and layout for the different Manitowoc product line.
• Have a basic understanding of hydraulic, electrical, and pneumatic symbols used on Manitowoc schematics.

Prerequisites
None

Capacity
8 students – USA
4 students – Portugal
4 students - Singapore
Content:
This 4 day course includes the analysis of information contained in the several crane manuals, for the Crane Control System that is now implemented in the cranes built by Manitowoc. During the course, the Crane Assembly Procedure will be explained, as well the fundamentals of the CCS; how the different components are distributed throughout the crane; the steps to configure the RCI/RCL system, and set it up. Class size is limited to eight (8) students. This class will feature the Manitowoc Lattice Crane models MLC-300 & MLC-650. (Physical Crane will not be used. Training simulators will substitute for actual crane.) The following subjects will be covered during daily classroom lecture time:

• A safe assembly procedure, of the crane components, as shown in the Operator’s Manual, from off loading from trailers, to boom rigging and assembly to RCI/ RCL configuration based on load charts specs.
• Layout and functional properties of all cab controls.
• Specific Lab Units covered will be IOL, IOS, CCM and SCM modules and breaking down the swing circuit
• Quizzes and tasks will be assigned to give technicians additional opportunities to gain and retain the daily information covered in these sessions. The course will be approximately 60% classroom and 40% practical.

Course Benefits:
At the end of the course, technicians will be able to:
• Establish and perform an safe assembly of crane components, as shown in the Operator’s Manual.
• Identify the new operators Cab Controls.
• Proper configuration of RCI/RCL based on load chart specifications, and navigation through the CCS menus.
• Know the components, and layout of the Canbus structure of the CCS.
• How to make an onboard calibrations of hydraulic system.
Hands-on lab exercises will include:
• Identifying and connecting the modules for each crane network.
• Build the MLC-650 swing circuit electronically and hydraulically. There will be a limited amount of hands on during this class.

Prerequisites
Crane System Theory Lattice

Capacity
8 students – USA
4 students – Portugal
4 students - Singapore
CCS Lattice Level 1

Content:

This 4.5 day course will cover the theory of operation for the travel, drum 4, crane wireless systems and rate capacity indicator. The MLC300 and MLC650 will be covered during this class. The MLC650 crane will be used for the hands-on and classroom. The class size will be limited to eight (8) students. All classroom presentations will be reinforced with practical hands-on operation of the car body and upper works systems. The course will be approximately 40% classroom and 60% practical.

Course Benefits:

At the end of the course(s) , technicians will be able to:

• Have an understanding of the operating system as used on the Model MLC300 and MLC650 cranes;
• Enhance their troubleshooting skills;
• Use the crane service tool with customer level access;
• Understand the electrical schematic from the battery to the boom top;
• Check Canbus communication by information covered in this class;
• Build MLC650 travel complete electrical and hydraulic system;
• Set the travel threshold and pressure compensation over-ride adjustment in the lab;
• Build the MLC650 Drum 4 complete electrical and hydraulic system in the lab;
• Set the drum 4 threshold and pressure compensation over-ride adjustment in the lab;
• Perform pressure calibrations on CCS Canbus cranes;
• Perform controls calibrations on CCS Canbus cranes;
• Perform charge pressure tests on CCS Canbus cranes;
• Perform pump pressure test on CCS Canbus cranes;
• Set up the Manitowoc rated capacity indicator;
• Be prepared for advancing to the Level 2 class:
• Set up a complete boom system and troubleshoot it

Prerequisites
CCS AOM & Overview

Capacity
8 students – USA
4 students – Singapore
4 students – Portugal
Content:

This 4.5 day course will cover the theory of operation for the travel, drum 4, crane wireless systems and rate capacity indicator. The MLC300 and MLC650 will be covered during this class. The MLC650 crane will be used for the hands-on and classroom. The class size will be limited to eight (8) students. All classroom presentations will be reinforced with practical hands-on operation of the car body and upper works systems. The course will be approximately 40% classroom and 60% practical.

Course Benefits:
At the end of the course(s), technicians will be able to:
- Have an understanding of the control system as used on the Model MLC300 and MLC650 cranes;
- Enhance their troubleshooting skills;
- Use the dealer level crane service tool with programming level will be taught to dealer technicians;
- Understand the electrical schematic from the battery to the boom top;
- Check Canbus communication by information covered in this class;
- Build MLC300 Luffing drum complete electrical and hydraulic system;
- Set the motor threshold and pressure compensation over-ride adjustment in the lab;
- Build the MLC3000 VPC max complete electrical and hydraulic system in the lab;
- Perform VPC Max calibration on the MLC300 crane;
- Perform VPC tray calibration on the MLC300 crane;
- Set up the Manitowoc rated capacity indicator to the VPC Max and VPC Luffing configuration.

Prerequisites
CCS Lattice Level 1

Capacity
8 students
Intro to CANBUS

Content:
This 4.5 day course will showcase the operational systems of the version 2 CANBUS system. The service technicians will be guided through the electrical and hydraulic systems. This will be done by studying the crane schematics. Extensive in-depth sessions of the machine’s Rated Capacity Indicator (RCI) system will allow technicians to build the necessary system knowledge and confidence to troubleshoot system problems. The class size will be limited to eight (8) students. Quizzes and tasks will be assigned to give technicians another opportunity to gain and retain the daily information covered in these sessions. Specific Lab Units covered will be 90 Series pump, Master Node, Universal Node, Boom Node and breaking down the swing, and RCI circuits. Specific classroom units include understanding pressure vs. voltage, electrical and hydraulic systems for fixed and variable displacement pumps and motors. The course will be approximately 60% classroom and 40% practical.

Course Benefits:
At the end of the course, technicians will be able to:
• Use hydraulic and electrical schematics for troubleshooting.
• Use pressure gauges and flow meters for troubleshooting.
• Have an understanding of the operating system as used on the Lattice cranes Version 2 CANBUS software as used on the Model MLC 165.
• Tell the difference in a version 1 and version 2 CANBUS machine.
• Understand the Manitowoc Hydraulic system used on the CANBUS machines.
• Set the hydraulic system pressure; check and test transducers, multi-function valves, and hydraulic pump controls.
• Understand the electrical schematic from the battery to the boom top.
• Check the master, side console, and universal nodes with ohm meters.
• Test harnesses, bin nodes, and CANBUS shorting plugs.
• Perform pressure calibrations on version 2 CANBUS cranes.
• Perform controls calibrations on version 2 cranes.
• Set up the Manitowoc Rated Capacity Indicator on version 2 cranes.
• Be prepared for advancing to the Level 1 class.

Prerequisites
Crane System Theory - Lattice

Capacity
8 students – USA
6 students – Singapore
4 students – Dubai and Portugal
Content:
This 4.5 day course will cover the theory of operation for the travel, drum 4, crane wireless systems and rate capacity indicator. It will consist of the version 1-style Canbus machines. The 555, 1015 and 18000 will be covered during this class. The 18000 crane will be used for the hands-on and classroom. The class size will be limited to eight (8) students. All classroom presentations will be reinforced with practical hands-on operation of the car body and upper works systems. The course will be approximately 40% classroom and 60% practical.

Course Benefits:
At the end of the course, technicians will be able to:
• Have an understanding of the operating system as used on the Model 555, 1015 and 18000 cranes. (Version 1 Lattice Cranes)
• Enhance their troubleshooting skills.
• Understand the 18000 cranes with and without a supercharge pump system.
• Identify the cab differences on version 1 cranes.
• Understand the electrical schematic from the battery to the boom top.
• Check Canbus communication by information covered in this class.
• Build 18000 travel complete electrical and hydraulic system.
• Set the travel threshold and pressure compensation over-ride adjustment in the lab.
• Build the 18000 Drum 4 complete electrical and hydraulic system in the lab.
• Set the drum 4 threshold and pressure compensation over-ride adjustment in the lab.
• Understand the 555 and 1015 freefall operation.
• Perform pressure calibrations on version 1 Canbus cranes.
• Perform controls calibrations on version 1 cranes.
• Set up the Manitowoc rated capacity indicator.
• Be prepared for advancing to the Level 2 class.
• Set up a complete boom system and wired and wireless load links.

Prerequisites
Intro to CANBUS

Capacity
8 students – USA
6 students – Singapore
4 students – Dubai and Portugal
**CANBUS 2**

**Content:**
This 4.5 day course will cover the theory of operation of the Travel, Drum 4, and Rate Capacity Indicator. It will consist of the version 2 style Canbus machines. The European 15000, 14000, and 16000 will be covered during this class. The 14000 and 16000 crane will be used for the hands-on program and classroom lecture. The class size will be limited to eight (8) students. All classroom presentations will be reinforced with practical hands-on operation of the car body and upper works systems. The course will be approximately 40% classroom and 60% practical.

**Course Benefits:**
*At the end of the course, technicians will be able to:*
- Have an understanding of the operating system as used on the Version 2 CANBUS Lattice cranes software as used on the Model 15000, 16000 and 14000.
- Set the hydraulic pressure for the travel and drum 4 system.
- Understand the electrical schematic from the battery to the boom top 14000 and 16000.
- Check CANBUS communication by information covered in this class.
- Build 16000 travel complete electrical and hydraulic system.
- Set the travel threshold and pressure compensation over-ride adjustment in the lab.
- Build the 16000 Drum 4 complete electrical and hydraulic system in the lab.
- Set the drum 4 threshold and pressure compensation over-ride adjustment in the lab.
- Build the 14000 Drum 1 complete electrical and hydraulic system in the lab.
- Set the 14000 drum 1 threshold and electronic compensation over-ride adjustment in the lab.
- Use the complete 14000 cab test bench for troubleshooting experience.
- Understand the 14000 freefall operation.
- Be prepared for advancing to the Level 3 class.

**Prerequisites**
CANBUS 1

**Capacity**
8 students – USA
6 students – Singapore
4 students – Dubai and Portugal
Content:
This 4.5 day course will cover the theory of operation for the 16000 and 18000 luffing drums along with wheeled maxer operations for both models. The class will consist of the MAXER, Luffing Jib, and CANBUS computer downloads for the 18000 and 16000 crane models. The class size will be limited to eight (8) students. All classroom presentations will be reinforced with practical hands-on operation of the carbody and upper works systems. The course will be approximately 40% classroom and 60% practical.

Course Benefits:
At the end of the course, technicians will be able to:
• Have an understanding of the Luffing jibs used on the 18000 crane model.
• Have an understanding of the Wheeled Maxer used on the 18000 crane model.
• Have an understanding of the Luffing jib used on the 16000 crane model.
• Have an understanding of the Wheeled Maxer used on the 16000 crane model.
• Build on their troubleshooting skills on Canbus system cranes and their attachments.
• Install Canbus computer programs and crane load charts into the crane computers.
• Build and troubleshoot the 18000 drum 5 fixed mast hoist system.
• Build and troubleshoot the 18000 drum 6 luffing drum hoist system.
• Build and troubleshoot the 16000 drum 3 luffing drum hoist system.
• Build and troubleshoot the telescopic wheeled Maxer used on the 16000 crane model.
• Set up both versions 1 and 2 Rated Capacity Indicators for Maxer and Luffing Jib configuration.
• Be prepared for advancement to the Level 4 New Technology class.

Prerequisites
CANBUS 2

Capacity
8 students – USA
CANBUS 4: New Technology

Content:
This 4.5 day class was designed for students that have been through the CANBUS 3 program or completed the CANBUS Certification class. Each person who fits the criteria must attend this class at least every 3 years to keep their rating. Failure to do this means the CANBUS Certification class must be retaken and passed to be recertified. The course is designed to keep attendees informed on the current and upcoming crane and CANBUS systems. New crane systems can be covered for models not yet released. This class is an ongoing and changing program in order for the attendees to stay on top of the CANBUS Crawler changes. There will be extensive hands-on for this program. The systems can vary based on new technology. The class size will be limited to eight (8) students. All classroom presentations will be reinforced with practical hands-on operation of the carbody and upper works systems. The course will be approximately 60% classroom and 40% practical.

Course Benefits:
At the end of the course, technicians will be able to:
• Be brought up to date on the latest crane systems Version 1 and 2 cranes.
• Be taught the latest Rated Capacity Control systems Version 1 and 2 cranes.
• Have a chance to bring up topics for discussion based on information changes from the last time at school.
• Be taught the newest hydraulic motor controls based on information changes from the last time at school.
• Be taught the newest hydraulic pump controls based on information changes from the last time at school.
• Receive and be trained on the MCC Controls software for installing new programs on Canbus nodes.
• Be tested by a hands-on shop exercise.
• Be taught changes to Crane STAR.
• Be taught changes to Common Controls.

Prerequisites
CANBUS 3

Capacity
8 students – USA
Content:
This 4.5 day course will be used to test the students on each of the CANBUS systems they might encounter working on our product line. The Instructor will pick different crane systems of the CANBUS cranes and have the student build them based on the knowledge they have gained from the previous classes. When the instructor approves the students’ knowledge of the circuit, simulated crane faults will be given so the student can repair. Points will be awarded based on completion of the faults. If the student repairs 30 total faults and completes all 10 random crane circuits, a grade of 100% will be earned. To pass the class and earn the Crane Care Certification rating a 90% is required. The Student must continue to attend the CANBUS Level 4 New Technologies class and then the CANBUS Level 5 Testing Class to maintain their rating. The class size will be limited to four (4) students. All classroom presentations will be reinforced with practical hands-on operation of the car body and upper works systems. The course will be approximately 5% classroom and 95% practical.

Course Benefits:
At the end of the course, technicians will be able to:
• Gain experience troubleshooting hydraulic systems.
• Gain experience troubleshooting version 1 and version 2 crane CANBUS systems.
• Install software on many different types of CANBUS computers.
• Use flow meters in aid of troubleshooting.
• Use pressure gauges in determining hydraulic problems for various pump and motor configurations.
• Earn the Manitowoc CANBUS Certification Card.
Intro to EPIC

Content:
This 4.5 day course will showcase the operational systems of the 999 crane. The class size will be limited to eight (8) students. All classroom presentations will be reinforced with practical hands-on electrical systems. The course will be approximately 60% classroom and 40% practical. The service technicians will be guided through the electrical and hydraulic systems by studying the systems' schematics, manuals; and by participating in actual hands-on sessions. The Load Indicator Systems will be covered to allow technicians to build the system knowledge and confidence to troubleshoot system problems. Specific Lab Units cover the 90 Series pump and 90 Series motor, Central Processing Unit (CPU) and breaking down the swing circuit. Additional units include understanding pressure vs. voltage, electrical and hydraulic systems for fixed and variable displacement pumps and motors. The swing and calibration of the EPIC system will be used for the hands-on final testing. Quizzes and tasks will be assigned on material covered.

Course Benefits:
At the end of the course, technicians will be able to:
• Understand the operating system as used on the Lattice crane Model 999.
• Use hydraulic and electrical schematics for troubleshooting.
• Use pressure gauges and flow meters for troubleshooting.
• Use the Manitowoc Service Manual.
• Understand the operating system as used on the 999 Lattice cranes.
• Be guided through the Manitowoc Hydraulic system used on the EPIC 999 crane.
• Set the hydraulic system pressure.
• Check and test transducers, multi-function valves, and hydraulic pump controls.
• Understand the electrical schematic from the battery to the boom top.
• Check EPIC computer diagnostics.
• Perform pressure calibrations, and controls calibrations.
• Understand the basic operation, troubleshooting, and maintenance on the 999 crane.

Prerequisites
Crane System Theory - Lattice

Capacity
8 students – USA
6 students – Singapore
4 students – Dubai and Portugal
Content:
This 4.5 day course will showcase the operational systems of 777 and 888 cranes. The service technicians will be guided through the 777 electrical and hydraulic systems by studying the systems’ schematics, manuals; and by participating in actual hands-on sessions for travel, boom hoist and hoist. We will review faults, limits, troubleshooting and the 777 boom hoist leakage test. The class size will be limited to eight (8) students. All classroom presentations will be reinforced with practical hands-on electrical systems. The course will be approximately 60% classroom and 40% practical. Covering the Rated Capacity Indicator (RCI) will allow technicians to build the system knowledge and confidence to troubleshoot system problems. Quizzes and tasks will be assigned to give technicians another opportunity to gain and retain the daily information covered in these sessions. Specific Lab Units covered will be 90 Series pump and 51 Series motor, Central Processing Unit (CPU) and breaking down the travel, boom hoist and hoist circuits plus changing data in the RCI. Specific classroom units include understanding the electrical and hydraulic systems for 777 pumps and motors.

Course Benefits:
At the end of the course, technicians will be able to:
• Understand the operating system as used on the Lattice Crane Model 777/888.
• Use hydraulic and electrical schematics for troubleshooting.
• Use pressure gauges and flow meters for troubleshooting.
• Navigate the Manitowoc Service Manual.
• Understand the Manitowoc Hydraulic system used on the Epic 777 crane.
• Set the hydraulic system pressure.
• Check and test transducers, multi-function valves and hydraulic pump controls.
• Understand the electrical schematic from the battery to the boom top.
• Check EPIC computer diagnostics.
• Perform pressure calibrations and controls calibrations.
• Set up the Manitowoc LMI on the 777/888 cranes.

Prerequisites
Intro to EPIC

Capacity
8 students – USA
6 students – Singapore
4 students – Dubai and Portugal
Content:
This 4.5 day course will showcase the operational systems of 2250, M250 and the Maxer 2000. The class size will be limited to eight (8) students. All classroom presentations will be reinforced with practical hands-on electrical systems. The course will be approximately 60% classroom and 40% practical. The service technicians will be guided through the 2250 and Maxer 2000 electrical and hydraulic systems, by studying the systems’ schematics and manuals, participate in actual hands-on sessions for boom hoist and hoist and Maxer 2000, and review faults, limits, troubleshooting and the 2250. The Rated Capacity Indicator and CraneStar will be reviewed, which will allow technicians to build the system knowledge and confidence in setting and troubleshoot system problems. In addition, the Central Processing Unit (CPU) and breaking down the boom hoist and hoist circuits plus building the dual CPU’s for the Maxer 2000. Specific classroom units include understanding the electrical and hydraulic systems for 2250, Maxer 2000 pumps and motors. Quizzes and tasks will be assigned on material covered.

Course Benefits:
At the end of the course, technicians will be able to:
• Understand the operating system as used on the Lattice Crane Model 2250.
• Use hydraulic and electrical schematics for troubleshooting.
• Use pressure gauges and flow meters for troubleshooting.
• Understand the Manitowoc Hydraulic system used on the EPIC 2250 and Maxer 2000.
• Set the hydraulic system pressure.
• Check and test transducers, multi-function valves and hydraulic pump controls.
• Understand the electrical schematic from the battery to the boom top.
• Check EPIC computer diagnostics.
• Perform pressure calibrations and controls calibrations.
• Input data in the Manitowoc LMI on the 2250 cranes.
• Understand the operation, troubleshooting and maintenance on the 2250, M 250 and the Maxer 2000.

Prerequisites
EPIC 1

Capacity
8 students – USA
6 students – Singapore
4 students – Dubai and Portugal
Content:
This 4.5 day course will showcase the operational systems of 999, 21000 plus 111/222. The class size will be limited to eight (8) students. All classroom presentations will be reinforced with practical hands-on electrical systems. The course will be approximately 60% classroom and 40% practical. The service technicians will be guided through the 999 and 21000 electrical and hydraulic systems by studying the systems’ schematics, manuals; and by participating in actual hands-on sessions for the 999 hoist, with Free Fall, plus 21000 travel and hoist. Faults, limits and troubleshooting on the 999 and 21000 will also be reviewed along with up-load charts into the Rated Capacity Indicator and Cranestar on the 999. Specific Lab Units covered will be 90 Series pump and 51 Series motor, Central Processing Unit (CPU) and breaking down the hoist and 999 hoist circuits, plus build the dual CPU’s for the 21000 for travel and hoist. Additional classroom units include understanding the electrical and hydraulic systems for 999 and 21000 pumps and motors. Quizzes and tasks on information covered will be assigned.

Course Benefits:
At the end of the course, technicians will be able to:
• Understand the operating system as used on the Lattice crane Model 21000 and 999.
• Use hydraulic and electrical schematics for troubleshooting.
• Use pressure gauges and flow meters for troubleshooting.
• Understand the Manitowoc Hydraulic system used on the EPIC 21000 and 999.
• Set the hydraulic system pressure.
• Check and test transducers, multi-function valves and hydraulic pump controls.
• Understand the electrical schematic from the battery to the boom top.
• Check EPIC computer diagnostics.
• Perform pressure calibrations and controls calibrations.
• Up-load data in the Manitowoc LMI on the 999 cranes.
• Understand the operation, troubleshooting, and maintenance on the 999, 21000, 111/222.

Prerequisites
EPIC 2

Capacity
8 students – USA
6 students – Singapore
4 students – Dubai and Portugal
EPIC Certification

Content:
This 4.5 day course will be used to test the students on each of the EPIC systems they might encounter working on our product line. The class size will be limited to four (4) students. All classroom presentations will be reinforced with practical hands-on operation of the carbody and upper works systems. The course will be approximately 5% classroom and 95% practical.

The instructor will pick different crane systems of the EPIC cranes and have the student build them based on the knowledge they have gained from the previous classes.

When the instructor approves the students’ knowledge of the circuit, simulated crane faults will be given so the student can repair. Points will be awarded based on completion of the faults. A grade of 100% will be earned if the student repairs 30 total faults and completes all 10 random crane circuits.

Course Benefits:
At the end of the course, technicians will be able to:
• Troubleshooting hydraulic systems.
• Troubleshooting EPIC crane systems.
• Install software on many different types of EPIC computers.
• Use flow meters in aid of troubleshooting.
• Use pressure gauges in determining hydraulic problems for various pump and motor configurations.
• Earn the Manitowoc EPIC Certification Card.

Prerequisites
EPIC 3

Capacity
4 students – USA
**Content:**

This class was designed for students that have been through the complete program. All attendees have either received a level three or master qualification. All new attendees have either received a Crane Care qualified or certified level in the Epic program.

Each person who fits these criteria must attend this class at least every 3 years to keep their Certification. Failure to do this means the Epic Certification class must be retaken and passed to be reinstated.

This class is an open forum for learning anyone is available to cover a related topic or bring information to the table.

**Course Benefits:**

At the end of the course, technicians will improve their skill into:

- Crane Service Tool for Epic Cranes
- Master Node Programming
- Master Node RCI Downloading
- Epic CPUDownloading
- Epic CPU CONS
- Diagnostics
- Epic Tier 4 Final

**Prerequisites**

EPIC 3 or Certification

**Capacity**

4 students – USA
Content:
This 4.5 day course will showcase the operational systems of 10000. The class size will be limited to six (6) students. All classroom presentations will be reinforced with practical hands-on electrical systems. The course will be approximately 60% classroom and 40% practical.

The service technicians will be guided through the 10000 electrical and hydraulic systems by studying the systems’ schematics, manuals; and by participating in actual electrical hands-on sessions for 10000 swing, travel, boom hoist and hoist with Free Fall. We will review faults, limits, troubleshooting on the 10000. Technicians will enter crane configurations into the Load Moment Indicator plus review LMI set-up screens which will allow technicians to build the system knowledge and confidence in setting and troubleshoot system problems. Specific classroom and lab units will cover cab controls, gauge cluster, total controller, relay box, and electrical schematics. Technicians will build the Model 10000 electrical circuits. Quizzes and tasks will be assigned on material covered in these sessions. Technicians will need to have an 80% on quizzes and practical work to receive a passing score.

Course Benefits:
At the end of the course, technicians will be able to:
• Understand the operating system as used on the Model 10000 including cab controls, gauge cluster, total controller, relay box, and electrical schematics.
• Interpret ISO and ANSI Electrical, hydraulic symbols.
• Use hydraulic and electrical schematics for troubleshooting.
• Use the Manitowoc Service Manual.
• Understand the Manitowoc Hydraulic system used on the Model 10000.
• Understand the electrical schematic from the battery to the boom top.
• Check Model 10000 computer diagnostics.
• Understand the operation, troubleshooting and maintenance on the Model 10000

Prerequisites
Crane System Theory - Lattice

Capacity
4 students – USA
6 students – Singapore
Content:
This 4.5 day course that will showcase the operational systems of Model 8500-1. The class size will be limited to eight (8) students and will be mostly classroom presentation.

The technicians will be guided through the 8500-1 electrical and hydraulic systems by studying the systems’ schematics and manuals. We will review faults, limits, troubleshooting and the on the 8500-1. Technicians will learn about Load Moment Indicator plus review LMI setup screens, which will allow technicians to build the system knowledge and confidence in setting and troubleshoot system problems. Specific classroom units will cover these new 8500-1 items, including cab controls, energy saving AIS and G winch and engine systems, gauge cluster, main controllers (2), relay boxes (2), touch panel monitor, redesigning of most components, safety updates, additional load charts and electrical schematics. We will talk about the new 8500-1 crane download cables and software for the main controllers, touch panel monitor and LMI. Information will be supplied on the new Tier 4 Hino engine diagnostic codes, troubleshooting plus DPR and EGR systems. Quizzes and tasks will be assigned on the material covered in these sessions.

Course Benefits:
At the end of the course, technicians will be able to:
• Understand the operating system as used on the Model 8500- including cab controls, gauge cluster, total controller, relay box and electrical schematics.
• Interpret ISO and ANSI Electrical, hydraulic symbols.
• Use hydraulic and electrical schematics for troubleshooting.
• Use the Manitowoc Service Manual.
• Understand the Manitowoc Hydraulic system used on the Model 8500-1.
• Understand the electrical schematic from the battery to the boom top.
• Check Model 8500-1 computer diagnostics.
• Understand the operation, troubleshooting and maintenance on the Model 8500-1.

Prerequisites
Crane System Theory - Lattice

Capacity
6 students – USA
6 students – Singapore
6 students – Dubai and Portugal
Content:
This full five (5) day course will showcase the fabricated boom components of virtually all Manitowoc lattice boom crane models. Class sized is limited to five (5) students and will include approximately 20% classroom with 80% hands-on welding. The welding technicians will be guided through the inspection and repair processes used by Manitowoc Cranes by studying the rigging drawings and manuals and by participating in actual hands-on sessions. Extensive in-depth sessions at our factory weld school will help students develop the proper skills to perform in-field removal and replacement of boom lacings. They will be instructed in the proper methods for inspecting Manitowoc boom components. Quizzes and tasks are assigned to give technicians additional opportunities to gain and retain the daily information covered in these sessions. Specific Lab Units covered will be vertical, horizontal, and overhead welding techniques. In addition, those students who progress quickly will also be instructed in the methods used for our in-house production process. Students will also gain an understanding of Manitowoc boom drawings and the methods used for ordering replacement lacings.

At the end of the class, successful students will receive a certificate for the Boom Inspection process only. Upon receiving acceptable hands-on weld bend test samples done under Manitowoc’s supervision, the student will then receive the certificate for Lacing Replacement. (This qualifies the student to replace lacing on Manitowoc Lattice Crane boom only.) Any additional welding other than lacing must be approved by Manitowoc.

Course Benefits:
At the end of the course, technicians will be able to perform:
• Proper method of inspecting Manitowoc Boom.
• Proper method of inspecting Inserts.
• Proper method of inspecting Boom Top.
• Proper method of inspecting Straps and Pendants.
• Develop skills to replace damaged Boom Lacings.
• Use proper methods for ordering replacement Lacings.
• Use the Manitowoc and pertinent supplier manuals...

Prerequisites
Students must have successfully completed qualifications per Section 4 Part C of the AWS D1.1 Welding code - 2010 standard or equivalent code for Overhead (4G) and Vertical (3G) or all positions, S.M.A.W. Process. Documentation is required to show the material used along with the type and size of electrode and must also show that the student successfully passed such a test. THE DOCUMENTS MUST ALSO BE SIGNED OFF BY THE INDEPENDENT TESTER AND PROVIDED AT TIME OF REGISTRATION.

Capacity
5 students – USA
Advanced Field Welding

Content:
This full two week, ten (10) day course will showcase the fabricated components of virtually all Manitowoc lattice boom crane models. Class sized is limited to five (5) students and will include approximately 10% classroom with 90% hands-on welding.

Students will be instructed in the various Manitowoc Weld Procedures then given the opportunity to perform those procedures in the various required positions. Students will also be completing a workmanship sample applying the various skills taught during the course of the two weeks.

At the end of the class, successful students will receive a certificate for Advanced Welding.

Course Benefits:
At the end of the course, technicians will be able to:
• Perform in-field repairs and/or modifications on Manitowoc Lattice Boom Cranes on a case by case basis when approved by the Manitowoc Welding Engineer.
• Assist Manitowoc Field Weld Technicians in making major modifications and repairs.
• Reduce need for Manitowoc Weld Technicians on certain repairs/modifications.

Prerequisites
Boom Inspection & Lacing Repair

Capacity
5 students – USA
Advanced Parts - Lattice

Content:
This 3 ½ day course provides an advanced look into the world of Lattice crane parts. Over the course of 3 days students will immerse themselves in the Lattice product lines including branded crawlers. Topics covered during the course include parts location and identification, programmed parts ordering, quotations, Manitowoc Direct. Student will also be provided with a flash drive loaded with information the Lattice Parts Professional will find invaluable. Class will be approximately 60% classroom and 40% hands on.

The course begins with team introduction, Manitowoc Direct and Crane Library, Ground Bearing Estimation and Rotec Bearing test. A factory tour will round out the day. Day 2 starts with Large and Small Crawler layout and parts pages. Then on to Part numbers Suffixes and Signal codes. A parts “Scavenger Hunt” will round out the day. Day 3 will focus on lacings, quotations, orders and returns. Also covered will be GPX2 and GTL overview. Hands on for day 3 will include parts ID and lacing selection.

Course Benefits:
At the end of the course, technicians will be able to:
• Navigate the Lattice parts system with ease
• Locate parts and part numbers.
• Order Programmed Parts with confidence
• Navigate Crane Library
• Locate Boom Lacing Part Numbers
• Be better equipped to communicate with field personnel

Prerequisites
Crane System Theory – Lattice, or Intro to Crane Care Parts, or one year of Lattice parts experience

Capacity
8 students – USA
6 students – Dubai and Portugal
Conventional

Content:
This 4.5 day course will showcase the operational systems of 3900, 4000, and 4100 models. Class size is limited to eight (8) students. The service technicians will be guided through the pneumatic and hydraulic systems by studying the systems’ schematics. There will be approximately 60% classroom and 40% hands-on exercises.

Extensive in-depth sessions on the various machinery trains along with torque converters (Vicon and non-Vicon) will allow technicians to build the necessary system knowledge and confidence to troubleshoot system problems.

Specific classroom units include torque converter adjustments, hydraulic and pneumatic symbols, hydraulic systems for fixed and variable displacement pertaining to the 4100 hydraulic boom hoist, pneumatic swing, travel, and boom circuits, and handle functions for boom, hoist, swing, and travel. Also covered, will be adjustments for torque converters, clutches and brakes.

Quizzes and tasks will be assigned on material covered in these sessions. Specific Lab Units covered will be 24 Series pump, 25 series motor, air system operation and breaking down swing, travel, boom hoist and main hoist circuits.

Building the 4100 Boom Hoist circuit with the pawl delay will serve as the final hands-on test. (in addition to a final written test). Successful students will receive a certificate of completion at the end of the class.

Course Benefits:
At the end of the course, technicians will be able to:
• Perform troubleshooting and repairs on various Conventional crane models (3900, 4000, 4100).
• Understand cab control functions.
• Perform necessary maintenance duties in order to increase crane uptime and reliability.

Prerequisites
Crane System Theory – Lattice, or Industrial Pneumatics

Capacity
8 students – USA
Lattice Terminology

Content:

This two-day course will present the terminologies used at Manitowoc relating to the current Epic and Canbus product lines as well as previous product technology as used in the Conventional products. Class size is limited to ten (10) students.

Attendees will be given the opportunity to visually locate various parts and components as they are located on an existing machine (varies by availability). Students will also be allowed to get a sense of operating the 2250 model crane by taking the operator seat in the Manitowoc Cranes Simulator. They will get to operate in the standard boom configuration as well as the with a luffing jib configuration.

Upon successful completion of this course the student will receive a certificate of completion.

Course Benefits:
At the end of the course, technicians will be able to:
• Understand various terms used at Manitowoc regarding crane functions and components.
• Physically locate major components and supporting items on Manitowoc Lattice Boom Cranes.
• Have improved communications between the student and other crane industry personnel.

Prerequisites
None

Capacity
10 students – USA
10 students – Singapore
10 students – Dubai and Portugal
Regional headquarters

**Americas**
Manitowoc, Wisconsin, USA
Tel: +1 920 684 6621
Fax: +1 920 683 6277

Shady Grove, Pennsylvania, USA
Tel: +1 717 597 8121
Fax: +1 717 597 4062

**Europe, Middle East, Africa**
Dardilly, France
Tel: +33 (0)4 72 18 20 20
Fax: +33 (0)4 72 18 20 00

**China**
Shanghai, China
Tel: +86 21 6457 0066
Fax: +86 21 6457 4955

**Greater Asia-Pacific**
Singapore
Tel: +65 6264 1188
Fax: +65 6862 4040

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