

ATLT-2130: OVERHEAD CRANE ELECTRICAL

Cuyahoga Community College

Viewing: ATLT-2130 : Overhead Crane Electrical

Board of Trustees:

2015-12-03

Academic Term:

Spring 2019

Subject Code

ATLT - AIT-Lifting Technologies

Course Number:

2130

Title:

Overhead Crane Electrical

Catalog Description:

Cover electrical maintenance procedures for all types of Cranes. Demonstrate the ability to troubleshoot electrical problems and determine effective methods of installing or repairing electrical components in any type of electric overhead crane, hoist, or workstation.

Credit Hour(s):

2

Lecture Hour(s):

2

Requisites

Prerequisite and Corequisite

Departmental approval: admission to Lifting Technologies apprenticeship program.

Outcomes

Course Outcome(s):

Discuss the purpose of DC Crane Drive systems, the respective components and the power and control circuits.

Objective(s):

1. Discuss the purpose of DC Crane Drive Systems.
2. Identify and define the terms related to overhead electric cranes.
3. Differentiate between DC and AC drive systems.
4. List the basic components of DC Controls used for efficient crane operation.
5. Differentiate between power and control components.
6. Explain how control components energize power components.
7. Explain how electrical diagrams are used to troubleshoot AC and DC drive systems.
8. List and explain the symbols and abbreviations used on electrical schematics.

Course Outcome(s):

Explain the advantage of AC Crane Drive systems, the respective components and the power and control circuits.

Objective(s):

1. Construct basic schematic diagram to enhance or develop interpretation of schematics.
2. Review the National Electrical Code article 610 as it applies to overhead cranes.
3. Interpret electrical schematics to analyze AC and DC circuits.

Course Outcome(s):

Analyze electrical diagrams to include symbols and abbreviations and explain the safety standards with respect to the National Electrical Code and the National Fire Protection Association

Objective(s):

1. Explain how electrical diagrams are used to troubleshoot AC and DC drive systems.
 2. List and explain the symbols and abbreviations used on electrical schematics.
 3. Interpret electrical schematics to analyze AC and DC circuits.
 4. Construct basic schematic diagram to enhance or develop interpretation of schematics.
 5. Review the National Electrical Code article 610 as it applies to overhead cranes.
 6. Explain ARC Flash safety clause of the NFPA-70E as it pertains to overhead cranes.
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Course Outcome(s):

Demonstrate the ability to troubleshoot electrical drive systems and perform preventative maintenance and inspections in overhead cranes using schematics and test equipment

Objective(s):

1. Diagnose the electrical malfunction as described by the customer or end user.
 2. Select and properly use the test equipment required for troubleshooting electric overhead cranes.
 3. Perform the troubleshooting procedures required for resolving the malfunction.
 4. Document the malfunction and describe the repair process including replacement parts.
 5. Describe preventative maintenance procedures for electrical components of overhead cranes.
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Methods of Evaluation:

1. Participation
2. Assignments
3. Quizzes & Exams
4. Practical Application Projects

Course Content Outline:

1. Drive Systems
 - a. Purpose
 - i. Crane operation
 - ii. Safety
 - iii. Efficiency
 - iv. Production
 - b. Terminology
 - i. Drive system
 - ii. DC power
 - iii. AC power
 - iv. Hoisting control
 - v. Travel control
 - vi. Variable Frequency drives
 - vii. Wound rotor drives
 - viii. Static stepless drives
 - ix. Energized equipment
 - c. DC vs AC
 - i. Advantages
 - ii. Disadvantages
 - iii. Efficiency
 - iv. Serviceability
 - v. Logistics
 - d. DC Components
 - i. Contactors
 - ii. Relays
 - iii. Power limit switches
 - iv. Motors
 - v. Dynamic braking contactor
 - e. Power components

- i. Contactors
 - ii. Shunt brakes
 - iii. Series brakes
- f. Control Components
 - i. Timing relays
 - ii. Dash pot timers
 - iii. Safety devices
- g. Energizing components
 - i. Contactor control
 - ii. Master switches
 - iii. Safety devices
- 2. Electrical schematics
 - a. Purpose
 - i. Troubleshooting
 - ii. Installations
 - iii. Repairs
 - b. Symbols
 - i. Relays
 - ii. Contactors
 - iii. Resistors
 - iv. Electronics
 - v. Radio
 - vi. Protective devices
 - c. Abbreviations
 - d. Analyze
 - i. DC Schematics
 - ii. AC Schematics
 - e. Construct
 - i. Basic AC schematic
 - ii. Basic DC schematic
- 3. Electrical standards
 - a. Review National Electrical Code Article 610
 - i. Apply to over head cranes
 - b. Review NFPA-70E
 - i. Apply to over head cranes
- 4. Troubleshooting
 - a. Customer/operator discussion
 - b. Select tools/equipment
 - i. Voltage tester
 - ii. Multi-meter
 - iii. Megger
 - iv. Ammeter
 - c. Resolve
 - i. Identify issue
 - ii. Resolve issue
 - d. Documentation
 - i. Details
 - ii. Customer discussion
 - iii. Customer acceptance
 - iv. Signature
 - e. Inspections
 - i. Operation
 - ii. Electrical items
 - iii. Checklist Details
- 4. Documentation

Resources

Herman, Stephen. *Industrial Motor Control*. 7th ed. Clifton Prk, New York : Delmar Cengage Learning, 2014.

Millermaster, Ralph A. (ed). *Harwood's Control of Electric Motors*. 4th. New York: Wiley Interscience, 1970.

Resources Other

1. National Electrical Code, Article 610, Copyright 2014. <http://www.codebookcity.com/codearticles/nec/necarticle610.htm>
2. NFPA-70E, Copyright 2015. <http://www.nfpa.org/>
3. Electrical Construction & Maintenance, <http://ecmweb.com/>
4. R&M Materials Handling Inc. (<http://ecmweb.com/>) <http://www.rmhoist.com/>

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