

ATLT-2140: OVERHEAD CRANE MECHANICAL

Cuyahoga Community College

Viewing: ATLT-2140 : Overhead Crane Mechanical

Board of Trustees:

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Academic Term:

Spring 2019

Subject Code

ATLT - AIT-Lifting Technologies

Course Number:

2140

Title:

Overhead Crane Mechanical

Catalog Description:

Introductory course in identifying and understanding the mechanical components of overhead cranes and hoists. Included will be an overview of proper component terminology, types, uses, and the subsequent selection of various mechanical components and devices that make up an Overhead Crane or hoist.

Credit Hour(s):

2

Lecture Hour(s):

2

Requisites

Prerequisite and Corequisite

Departmental approval: admission to Lifting Technologies apprenticeship program.

Outcomes

Course Outcome(s):

Visually identify and access all mechanical components in an overhead crane.

Objective(s):

1. List and define the terms relative to overhead cranes.
2. Explain the various Trolley mechanical drive systems.
3. Describe the different types of overhead cranes.
4. Describe the different mechanical devices and explain their relationship to other components with respect to lifting and transfer loads safely.
5. Discuss the mechanical safety related aspects required in overhead crane design.
6. List the major types of crane girders and recommend uses.
7. Identify respective connections used on girder types.
8. Explain the everyday functional operations of each major component group in an overhead crane.
9. Discuss the different types of drive systems used for bridge trolleys and hoist designs.

Course Outcome(s):

Discuss the operational aspects of components including descriptions, drive systems, and bridge trolley and hoist designs.

Objective(s):

1. Differentiate between the various Bridge mechanical drive systems.
2. Describe the various Hoist mechanical drive systems.
3. Identify and explain the various mechanical brake systems.
4. Describe the various mechanical wire rope, load block and sheave systems.
5. Compare the various types of crane girder connections.
6. Discuss the selection of mechanical components used in the design of an overhead crane.

Methods of Evaluation:

1. Participation
2. Assignments
3. Quizzes & Exams
4. Practical application projects

Course Content Outline:

1. Overhead cranes: types, components and drive systems
 - a. Terminology
 - i. Device
 - ii. Top running
 - iii. Under running
 - iv. Girder types
 - v. Profile girder
 - vi. Fabricated box girder
 - vii. Girder connection types
 - viii. Trolley types
 - ix. Top running trolley
 - x. Under running trolley
 - xi. Braking systems
 - xii. Gear box
 - xiii. End truck design
 - xiv. Crane wheel
 - xv. Wheel hardness
 - xvi. Wire rope drum
 - xvii. Standard lift
 - xviii. True vertical lift
 - xix. Load block
 - xx. Sheaves
 - xxi. Upper sheave nest
 - xxii. Integrated load cell
 - xxiii. Duty cycle
 - b. Overhead crane types
 - i. Top running
 1. Single girder
 2. Dual girder
 - ii. Underrunning
 1. Single girder
 2. Dual girder
 - iii. Custom Types - Uses
 1. Tri girder
 2. Quad
 3. Polar-Gantry-Nuclear
 4. Older designs including Riveted" "Fish Belly" Girder
 5. Lifting
 - iv. Girder End Trucks
 1. Top running
 2. Under running
 3. Patented track
 - v. Load block
 1. Configuration
 2. Sheaves
 3. Load Pins
 4. Berings
 5. Hook assembly
 - vi. Upper sheave nest

1. Configuration
2. Sheaves
3. Load pins
4. Bearings
5. Wire Rope - Dead end assy.
6. Integrated load cell
- vii. Hoist wire rope drum
 1. Drum designs
 2. Rope reeving on drum
 3. Single reeved
 4. Dual reeved
 5. Duty cycle
- viii. Crane wheels
 1. Trolley wheels
 2. Bridge wheels
 3. Axle types
- ix. Festoon system
 1. Control festoon systems
 2. Power festoon systems
- c. Safety design factors
 - i. Braking
 - ii. Lifting
 - iii. Load transfer
- d. Braking systems-Bridge, Hoist, and Trolley
 - i. Bridge and trolley brake types
 1. Worm gear drive
 2. DC shoe
 3. DC disc
 4. AC disc
 - ii. Hoist brake types
 1. AC/DC shoe
 2. AC/DC disc
 3. Regenerative braking
 4. Inverter controlled braking - VFD
- e. Girder Types
 - i. Profile
 - ii. Welded box
 - iii. Riveted fish belly
- f. Girder connections
 - i. Welded
 1. Shear type connections
 2. Stress type connections
 - ii. Bolted
 1. Shear type connections
 2. Stress type connections
- g. Major mechanical devices
 - i. Bridge mechanical drive systems
 - ii. Trolley mechanical drive systems
 - iii. Host mechanical drive systems
 - iv. Braking systems
 1. Traversing

Resources

Greiner, H.G. *Whiting Crane Handbook*. Harvey, IL: Whiting Corporation, 2011.

Resources Other

1. RM Materials Handling, Hoist Manuals, <http://www.rmhoist.com/technical-support/manuals> (<http://www.rmhoist.com/technical-support/manuals/>)

2. National Electrical Code, Article 610, 2014
3. Crane Handbook, Columbus McKinnon Corporation, 1999

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