ATIW-2500: RIGGING AND HOISTING

Cuyahoga Community College

Viewing: ATIW-2500 : Rigging and Hoisting

Board of Trustees:
June 2020

Academic Term:
Fall 2020

Subject Code
ATIW - Appld Indus Tech - Ironworking

Course Number:
2500

Title:
Rigging and Hoisting

Catalog Description:
Procedures of rigging and hoisting including identification, handling, and storage of equipment: chains, hardware, reeving, slings with practice of knot tying and splicing. Topics include characteristics and uses of cranes, procedures for inspection, safe operation, testing and maintenance of cranes, including machine assembly and set-up procedures. Safety procedures and hand signaling, according to OSHA regulations.

Credit Hour(s):
3

Lecture Hour(s):
3

Requisites

Prerequisite and Corequisite
ATIW-2360 Ornamental Applications or concurrent enrollment, or departmental approval.

Outcomes

Course Outcome(s):
A. Demonstrate rigging and hoisting procedures related to the ironworking trade.

Objective(s):
1. Utilize steel chokers to make a lift.
2. Utilize nylon straps to make a lift.
3. Apply the proper method for lifting a load using the various types of choker configurations.
4. Apply the proper sling angle when making a lift.

Course Outcome(s):
B. Identify, handle, and store rigging and hoisting equipment.

Objective(s):
1. Analyze the different types and characteristics of fiber ropes.
2. Calculate the safe working load of fiber rope.
3. Analyze safety factors related to fiber rope.
4. Apply proper care for and use of fiber rope.
5. Tie basic and complex knots and splice ropes.

Course Outcome(s):
C. Exhibit proper hand signals in directing machines.

Objective(s):

1. Apply proper use of Hand and arm signals for signaling a crane during lifting operations.
2. Apply proper use of hand and arm signals while maneuvering a crawler crane.
3. Apply proper use of hand and arm signals while working with an overhead crane.

Course Outcome(s):

D. Explain procedures for the inspection, safe operation, testing and maintenance of cranes.

Objective(s):

1. Apply the proper procedures for inspection of rigging and crane cables.
2. Analyze the area where the crane is to be set up: soil, water, and the safe distance from power lines and holes.
3. Ensure that all inspections are current for the crane before using it.
4. Analyze the cranes boom parts: jib, pulleys, lattice members, gantry etc.. for any signs of wear or damage before use.

Course Outcome(s):

E. Describe machine assembly and set up procedures for cranes.

Objective(s):

1. Evaluate the different parts to mobile cranes, boom trucks, carrier and crawler mounted lattice boom cranes, carrier and crawler mounted telescoping boom cranes, rough terrain cranes, mobile tower cranes, and overhead cranes.
2. Apply the proper procedure for reeving the block.
3. Apply the proper procedure for attaching the jib section.
4. Apply the proper procedure for setting up a crane with outrigger pads.

Course Outcome(s):

F. List and describe safety procedures pertaining to rigging and hoisting, according to OSHA regulations.

Objective(s):

1. Apply the proper use of minimal clearance distances when near power lines.
2. Research wire rope inspection criteria.
3. Adapt a monthly inspection plan.
4. Select wire rope according to the selection and installation criteria.

Methods of Evaluation:

1. Quizzes
2. Exams
3. Classroom participation
4. Demonstration of project assignments

Course Content Outline:

1. Construction ropes
   a. Natural fiber ropes
   b. Synthetic fiber ropes
   c. Wire ropes
2. Knots
3. Splices
   a. Tools
   b. Types
4. Chains
   a. Hoisting devices
   b. Grades
   c. Characteristics
   d. Use and maintenance
   e. Inspection

5. Rigging hardware
    a. Drums
    b. Sheaves
    c. Hooks
    d. Rings, links and swivels
    e. Shackles
    f. Eye bolts
    g. Turnbuckles
    h. Spreader beams
    i. Equalizer beams
    j. Blocks
6. Reeving
    a. Effects of sheave friction
    b. Reeved systems
        i. block orientation
        ii. lacing blocks
        iii. symmetrical reeving
        iv. compound tackle system
        v. overhead cranes
7. Slings
    a. Hitches
    b. Wire rope
    c. Web
    d. Metal mesh
8. Safety factors
    a. Operating procedures
        i. centrifugal force
        ii. hydraulic machines
        iii. signaling
    b. Determinations
        i. lifting capacities
        ii. load weights
        iii. center of gravity
    c. Demolition work
    d. Working area charts
    e. Identification tags
    f. Material storage
    g. Inspections
    h. Helicopters
9. Miscellaneous rigging equipment
10. Skids and rollers
11. Access structures
    a. Ladders
    b. Scaffolds
    c. Platforms
    d. Boatswain¿s chair
12. Mobile cranes
    a. Characteristics
        i. load rating information
        ii. guards and protective structures
        iii. cabs and control stations
        iv. operating controls
        v. drum assemblies
        vi. brakes
        vii. ropes, rigging, reeving and accessories
        viii. sheaves
        ix. outriggers
        x. power controlled lowering

        xi. boom stops
        xii. safety features
    b. Equipment handbook and records
13. Tower cranes
    a. Machine selection
    b. Characteristics
        i. configurations
        ii. equipment requirements
        iii. identification
        iv. load rating information
        v. crane cabin
        vi. wind balance
        vii. operating parts
    c. Equipment handbook and records
    d. Inspection
    e. Testing
    f. Maintenance
    g. Storage of components
    h. Assembly
    i. Erection
        i. temporary base
        ii. free standing
        iii. turntable and mast
        iv. jibs
        v. checklist
    j. Installation
    k. Limit switch adjustment
    l. Bolting procedures
    m. Climbing procedures
    n. Dismantling procedures
    o. Transporting procedures
    p. Operating procedures
    q. General information
        i. terminology
        ii. special conditions
        iii. erection
        iv. telescoping
        v. G.M.R. erection
14. Kangaroo tower cranes
    a. Favco 750 tower crane
        i. foundation
        ii. starter legs
        iii. tower base
        iv. load-out
        v. erection
        vi. climbing operation
        vii. specifications
    b. Favco Standard 1000 tower gantry
        i. erection
        ii. load-out
15. Procedures for cranes
    a. Inspection
        i. new machines
        ii. frequent
        iii. monthly
        iv. annual
    b. Testing
    c. Maintenance

d. Storage
e. Machine assembly and set up
    i. undamentals
    ii. boom assembly
    iii. boom dismantle
    iv. safety precautions
f. Operating procedures
    i. management responsibilities
    ii. operators
    iii. pre-lifting safety
    iv. capacity factors
    v. load rigging
    vi. load handling
    vii. electrical hazards
    viii. multiple cranes
    ix. pick and carry operations
    x. signaling
    xi. unattended machine
    xii. machine transporting

16. OSHA regulations
    a. Rigging
    b. Hoisting

Resources

Leach, Robert Price. *Riggers Bible: Handbook of Heavy Rigging.* Rev. ed. Springfield, Missouri: Robert P. Leach, Jr. c. 1956, 1976.

MacDonald, Joseph, W. Rossnagel, and Lindley Higgins. *Handbook of Rigging: For Construction and Industrial Operations*. 5th ed. McGraw Hill, 2009.

International Association of Bridge, Structural and Ornamental Iron Workers. *Rigging Manual for Ironworkers III*. Washington, D.C.: AFL-CIO, 2018.

Resource Systems International. *Rigging for Commercial Construction.* Reston, Virginia: Reston Publications, c., 1983.

U.S. Department of Energy. Assistant Secretary of Environment, Safety and Health. *Hoisting and Rigging Handbook*. Washington, D.C.: U.S. Dept of Energy, Assist. Secretary of Environment, Safety & Health, 1999.

Resources Other

International Association of Bridge, Structural and Ornamental Iron Workers. http://www.ironworkers.org/. 2011.

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