

ATLT-1050: RIGGING GEOMETRIC

Cuyahoga Community College

Viewing: ATLT-1050 : Rigging Geometric

Board of Trustees:

2015-12-03

Academic Term:

Spring 2019

Subject Code

ATLT - AIT-Lifting Technologies

Course Number:

1050

Title:

Rigging Geometric

Catalog Description:

Provides an emphasis on the techniques used for understanding stresses common in lifting and rigging. Review of trade and industry math and applications commonly found in lift plans calculations. Includes the interpretation of drawings, technical drawings of lifting applications.

Credit Hour(s):

2

Lecture Hour(s):

2

Requisites

Prerequisite and Corequisite

Departmental approval: admissions to Lifting Technologies apprenticeship program.

Outcomes

Course Outcome(s):

Review basic math concepts used in rigging geometrics to include addition, subtraction, multiplication and division of whole numbers, fractions, decimals and percentages.

Objective(s):

1. Apply basic math concepts to determine quantities, weights, and materials of rigging components.
2. Addition and subtraction of feet, and fractional units of an inch.
3. Convert fractions to decimals required for proper component determination.
4. Apply math concepts for decimal and fractional applications.
5. Calculate percentage of ultimate loads for determine working load limits.

Course Outcome(s):

Apply basic math concepts to rigging geometrics.

Objective(s):

1. Compute perimeter, area and volume required for rigging applications
2. Establish basic concepts of center of gravity for safe load of lifts.
3. List the various geometric configurations used in the rigging industry.
4. Apply the Pythagorean Theorem to comprehend the rigging triangle.
5. Calculate the length and angle factors for rigging applications.
6. Apply contact pressure and fleet angles for rigging components.

Course Outcome(s):

Establish processes required for angle determination and load rating for rigging applications.

Objective(s):

1. List rigging applications requiring angular determinations.
 2. Review angular measures for adding and subtracting degrees.
 3. Compute circumferences for reels, sheaves, and drums for wire rope applications.
 4. Review trigonometric concepts for load rating multiplier for determining forces on rigging components.
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Course Outcome(s):

Demonstrate the ability to interpret lift plans using rigging geometric concepts to identify proper rigging gear required for lifting applications.

Objective(s):

1. Interpret lift plans to determine rigging specifications.
 2. Identify the rigging geometric concepts required for sizing rigging components.
 3. Apply relative math concepts to calculate angles, center of gravity, headroom, D/d ratios and load angle factors.
 4. Select the right tool and component for the rigging lift plan.
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Methods of Evaluation:

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

Course Content Outline:

1. Basic Math Concepts
 - a. Addition, Subtraction, Multiplication, Division
 - i. Order quantity
 - ii. Weights
 - iii. Lengths
 - iv. Components
 - b. Fractions
 - i. Design Factors
 - ii. Lengths
 - iii. Headroom
 - iv. Diameters
 - v. Loads
 - c. Decimals
 - i. Conversions
 - ii. Efficiencies
 - iii. Rated load
 - iv. Percentages
 - d. Fractions and decimals
 - i. Applications
 1. Measurements
 2. Wire rope
 3. Chain
 4. Structural components
 5. Allowances
 6. Tolerances
 - e. Percentages
 - i. Ultimate loads
 - ii. Manufacturer breaking strength
 - iii. Catalog breaking strength
 - iv. Working Load Limits
2. Rigging Geometrics
 - a. Configurations
 - i. Triangles
 - ii. Circles

- iii. Cylinders
 - iv. Cubes
 - v. Irregular
- b. Pythagorean Theorem
 - i. Angles
 - ii. Hypotenuse
 - iii. Legs
 - iv. Rigging triangle
 - 1. Load angle factor
 - 2. Lengths
- c. Rigging Applications
 - i. Load rating
 - ii. Reduction in efficiency
 - iii. Sling length
- d. Rigging components
 - i. D/d ratio
 - ii. Fleet angle
 - iii. Contact pressure
- e. Perimeter, area, and volume
 - i. Perimeter
 - 1. Lifting constraints
 - 2. Headroom versus lifting requirements
 - ii. Area
 - 1. Staging parameter
 - 2. Load size
 - iii. Volume
 - 1. Center of gravity
 - 2. Lifting load
- f. Center of gravity
 - i. Safe Lifting load
 - ii. Load configuration
 - iii. Rigging component attachment
- 3. Angles and load ratings
 - a. Applications
 - i. Working Load Limit
 - ii. Size of rigging gear
 - iii. Type of rigging gear
 - iv. Sling determination
 - b. Angular measure
 - i. Calculation
 - ii. Angles
 - iii. Minutes
 - iv. Circumferences
 - v. Area
 - c. Circumferences
 - i. Rope Capacities
 - ii. Reels
 - iii. Sheaves
 - iv. Drums
 - d. Trigonometric Concepts
 - i. Applications
- a. Load angle
- b. Lifting angle
- c. Load rating reduction
- 1. Forces
 - a. Applications
 - i. Lift Plans
 - 1. Interpretation
 - 2. Rigging specifications

3. Customer requirements
4. Component selection
- ii. Geometric Concepts
 1. Configurations
 2. Pythagorean Theorem
 3. Trigonometric Concepts
 4. Angular measure
- iii. Math Applications
 1. Angles
 - a. Load angle
 - b. Fleet angle
 2. Center of gravity
 - a. Calculation
 - b. Lifting Load
 3. Headroom
 - a. Building constraints
 - b. Rigging constraints
 - c. Minimum requirement
 4. D/d ratio
 - a. Lift point
 - b. Rigging component
 5. Load angle factors
 - a. Trigonometric concepts
 - b. Pythagorean application
 - c. Angular concerns
 - d. Load configurations
 - e. Capacities
 - f. Limits
- iv. Tool and component selection

Resources

Mike Riggs. *The Complete Rigger's Reference Handbook A practical reference tool for the rigger and crane operator*. Knoxville, TN: RigSafe Solutions, 2009.

Wire Rope Technical Board. *Wire Rope User's Manual*. 4th ed. Alexandria, VA: Wire Rope Technical Board, 2005.

Wire Rope Technical Board. *Wire Rope Sling User's Manual*. 3rd ed. Alexandria, VA: Wire Rope Technical Board, 2007.

Resources Other

1. <http://www.mazzellalifting.com/>
2. http://energy.gov/sites/prod/files/2014/01/f6/HoistingRigging_Fundamentals.pdf
3. <http://www.iti.com/riggingengineering>
4. <https://www.business.govt.nz/worksafe/information-guidance/all-guidance-items/acop-load-lifting-rigging/rigging-load-lifting-acop.pdf>

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