

ATLT-1803: SPECIAL TOPICS: OVERHEAD CRANE CLASSIFICATION

Cuyahoga Community College

Viewing: ATLT-1803 : Special Topics: Overhead Crane Classification

Academic Term:

Spring 2019

Subject Code

ATLT - AIT-Lifting Technologies

Course Number:

1803

Title:

Special Topics: Overhead Crane Classification

Catalog Description:

Course covers various industrial crane classifications with respect to national and international design standards and describes component specifications with respect to lifting applications. In addition, design criterion related to inspection procedures and cost factors is covered.

Credit Hour(s):

1

Lecture Hour(s):

1

Requisites

Prerequisite and Corequisite

Departmental approval: admission to Lifting Technologies apprenticeship program.

Outcomes

Course Outcome(s):

I Discuss various crane classifications with respect to crane use in conjunction with United States and European design standards and describe the component specifications for different lifting applications.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. List and define the terms related to various crane components.
2. Differentiate between Federation European Materials (FEM) and Crane Manufacturers Association of America (CMAA).
3. Describe the different manufacturing industries served by industrial overhead cranes.
4. List the related industry standards to crane general specifications, classifications, and structural design criterion
5. Explain how changes in production and process result in a changes to crane classifications.
6. Describe the operation of the crane hoist and explain the proper and improper application of its use.

Course Outcome(s):

II Discuss the design criterion with respect to duty cycle for different crane classifications with the related inspection procedures and explain the cost factors as related to crane design.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. Explain how design criterion affects crane component selection.
2. Differentiate between heavy and light duty crane usage.
3. List and explain hoist design standards as prescribed by FEM and CMAA for proper component determinations.
4. Differentiate between light and heavy crane duty cycles.
5. Explain how cost factors affect various crane components with respect to duty cycles.

Methods of Evaluation:

Overview of Instructional Procedures and Activities:

This course will incorporate a combination of lecture (classroom) and practical lab (shop) activities. From time to time the instructor may provide additional reading materials and reference materials related to the course. The blended format is designed to be "interactive." We all live and work in the lifting and rigging industry. As a result, each of us has experiences and knowledge that provides insight which may add value to the class, active participation is highly recommended. Your job is to be fully prepared to discuss the material that is relevant for that class session and be willing to contribute to the classroom discussions.

Evaluation of Student Achievement or Proficiency:

Participation and contribution to discussions (Individual)	30%	
Assignments		30%
Quizzes & Exams		40%
		100%

Participation & Contribution to discussions (Individual) 30%

Your own contribution to the discussion based on your unique experience and knowledge is a critical part of the success of the course for everyone. Note 30% depends on your performance in this facet of the course. This is often enough to make a difference in final grades. The instructor will expect informed, insightful comments from individuals both in the classroom as well as the practical lab (shop) activities. The grade for participation is not based on quantity but instead on the quality of the contributions.

Assignments 30%

Assignments may be individual or done in teams and provides the opportunity for you to inject some of your own learning and experience more directly into the mix.

Quizzes and Exams 40%

These individual assignments may be a combination of written, oral or practical in nature.

Note:

Class assignments, quizzes, exams and projects dates may be altered, rescheduled, changed, deleted or added by the instructor.

Grade Computation:

Your grade in this course is based on a combination of individual and group related classroom and lab work.

Grades are reported as follows:

- A: Indicates consistently excellent work
- B: Indicates work of the quality normally expected from Lifting Technologies Apprentice student
- C: Indicates the minimum acceptable level of work from a Lifting Technologies Apprentice student
- D: Indicates below minimum acceptable level of work (requires review and evaluation with Mazzella Companies)*
- F: Indicates below minimum acceptable level of work (requires review and evaluation with Mazzella Companies)*
- I: Indicates incomplete (either due to attendance (withdrawal) or lack of work being submitted)

Grades A, B, and C maybe modified by a plus or minus as appropriate. See below scale.

A+: 99-100%		C+: 78-79%
A: 93-98%		C: 73-77%
A-: 90-92%		C-: 70-72%
B+: 88-89%		69% and below*
B: 83-87%		
B-: 80-82%		

*Any grade achieved below a 70% or "C-" is unacceptable and requires that the Lifting Technologies Apprentice student to re-register and re-take the course. Any Apprentice not achieving a grade of 70% or "C-" will be required to meet with Mazzella Companies' Apprenticeship Program Coordinator to review and evaluate continuation in the Lifting Technologies Apprenticeship Program prior to re-registering and retaking.

Late Assignments and Make-up work:

Mazzella Companies expects that Apprentice's exhibit good planning and time management skills throughout the course semester. Late assignments (assignments not turned at the scheduled, or agreed upon, deadline) will result in a minimum of a 10% reduction.

Course Content Outline:**Course Outline**

1. **Cranes: design and application**
 - a. **Terminology**
 - i. **Runway**
 - ii. **Electrification**
 - iii. **Bridge**
 - iv. **Hoist**
 - v. **End Truck**
 - vi. **Festoon**
 - vii. **Controls**
 - viii. **Trolley**
 - ix. **Girder**
 - x. **Load flipping**
 - b. **FEM vs CMAA**
 - i. **FEM**
 1. **European standards**
 2. **Less strict**
 3. **Widely accepted**
 - ii. **CMAA**
 1. **United States standard**
 2. **More complex**
 3. **Increased component longevity**
1. **Served industries**
 - a. **Repair shops**
 - i. **Motor**
 - ii. **Die repair**
 - iii. **Vehicle repair**
 - b. **Maintenance shops**
 - i. **Forklifts**
 - ii. **Crane on crane**
 - c. **Machine shop**
 - i. **Less than two tons**
 - ii. **Two tons to less than 10 ton lifts**
 - d. **Auto industry**
 - i. **Stamping presses**
 - ii. **Production**
 1. **Assembly**
 2. **Shipping and receiving**
 - e. **Manufacturing**
 - i. **Stone work**
 - ii. **Steel work**
 1. **Processing**
 2. **Production**
 3. **Warehousing**
 - iii. **Power generation**
 - iv. **Paper mills**
2. **Crane specifications and design standards**
 - a. **General specifications**
 - i. **Building design**
 - ii. **Design stresses**
 - iii. **Rated capacity**
 - iv. **Testing**
 - v. **Inspection, maintenance, and operator training**
 - vi. **Safety reference**
 - b. **Classifications**
 - i. **Class A: stand-by or service infrequently**
 - ii. **Class B: light service**
 - iii. **Class C: moderate service**

- iv. **Class D: heavy service**
- v. **Class E: severe service**
- vi. **Class F: continuous severe service**
- 1. **Production/process and crane classification**
 - a. **Higher capacity lifting**
 - b. **Over-taxing**
 - c. **Increased motor start/stops**
 - d. **Load handling process**
- 2. **Crane hoist: operation and application**
 - a. **Operation**
 - i. **Function**
 - 1. **Up/down**
 - 2. **Left/right**
 - ii. **Configuration type**
 - 1. **Top running**
 - 2. **Under running**
 - iii. **Proper use**
 - iv. **Improper use**
 - 1. **Design criterion and cost**
 - a. **Design criterion**
 - i. **Factors**
 - 1. **Lifts per hour**
 - 2. **Percent of capacity per lift**
 - 3. **Bearing life**
 - 4. **Motor starts and stops per hour**
 - 5. **Wire rope to drum ratio**
 - 6. **Wire rope to sheave**
 - 7. **Rope safety factors**
 - ii. **Duty cycles**
 - b. **Light versus heavy duty cycle**
 - i. **Light duty**
 - 1. **Infrequent use**
 - 2. **Lower percent of capacity**
 - 3. **Lower bearing life**
 - 4. **Moderate design**
 - 5. **Standard component engineering**
 - ii. **Heavy duty**
 - 1. **Robust design**
 - 2. **Longer bearing life**
 - 3. **Lower maintenance**
 - 4. **High production**
 - 5. **Higher percent of capacity**
 - 6. **Continuous use**
 - c. **Hoist design**
 - i. **FEM standards**
 - 1. **Less stringent**
 - a. **Bearing life**
 - b. **Maximum motor run time**
 - c. **Motor starts**
 - 2. **Widely accepted**
 - 3. **Greater product offering**
 - ii. **CMAA**
 - 1. **More strict**
 - a. **Longer bearing life**
 - b. **Higher maximum run time**
 - c. **Less universal**
 - d. **Crane cycles**

- i. **Heavy duty**
 - 1. **Ten plus lifts per hour**
 - 2. **Average load equal to 50% or more of capacity**
 - 3. **Shorter idle periods between lifts**
 - 4. **Faster speeds**
 - 5. **Load flipping**
- ii. **Light duty**
 - 1. **Ten or fewer lifts per hour**
 - 2. **Average load less than 50% capacity**
 - 3. **Longer idle periods**
 - 4. **Lower speeds**
- e. **Component cost factors and duty cycles**
 - i. **Faster speeds/larger motors**
 - ii. **Component engineering**
 - iii. **Steel sizing/stress**
 - iv. **Bearing life**
 - v. **Drives**
 - vi. **Gear boxes**
 - vii. **Maintenance features**
 - viii. **Rails**
 - ix. **Control packages**
 - 1. **Flux factors**
 - 2. **Festoon features limit switches**
 - 3. **Safety features**
 - 4. **Cab**

Resources

European Materials handling Federation (FEM). *o Rules For the Design of Hoisting Appliances*. 3rd. B-1030 Brussels, Belgium, Copyright 1998.

Crane Manufacturers Association of America. *CMAA 70 – Specifications for Top Running Bridge & Gantry Type Multiple Girder Electric Overhead Traveling Cranes*. current. Crane Manufacturers Association of America 8720 Red Oak Blvd., Suite 201 Charlotte, NC 28217, Copyright 2010.

Crane Manufacturers Association of America. *CMAA 74 – Specifications for Top Running & Under Running Single Girder Electric Traveling Cranes Utilizing Under Running Trolley Hoist*. Crane Manufacturers Association of America; Charlotte, NC 28217, Copyright 2010.

Resources Other

o <https://www.mazzellacompanies.com> (<https://www.mazzellacompanies.com/>)

<https://c-acranes.com/crane-classifications>

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