

# ATLT-1802: MOBILE CRANES I: TYPES AND COMPONENTS

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## Cuyahoga Community College

**Viewing: ATLT-1802 : Mobile Cranes I: Types and Components**

**Academic Term:**

Spring 2019

**Subject Code**

ATLT - AIT-Lifting Technologies

**Course Number:**

1802

**Title:**

Mobile Cranes I: Types and Components

**Catalog Description:**

Course covers the different types of mobile cranes, electric and hydraulic, common components of each and their respective applications. Included is a discussion and explanation of the lateral and vertical operation of tower cranes.

**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 the different types of mobile cranes and explain the purpose of each.

**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. Identify and define the different terms related to mobile cranes.
2. Differentiate between mobile and industrial cranes.
3. Identify and describe the different types of mobile cranes.
4. Discuss the purpose of mobile cranes relative to each crane.
5. Differentiate between hydraulic and electric cranes.

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**Course Outcome(s):**

II Describe the common components of different mobile crane types, those parts specific to individual mobile cranes and explain the function of each.

**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 the components of mobile cranes that are common to each crane type.
2. Explain how the boom, block, and drum work systematically.
3. Explain the role of the counter weight in the crane function.
4. Explain how increasing the number of sheave systems increases the force multiplier with respect to lifting loads.

5. Describe the different types of boom designs and explain the advantage of each.
6. Explain how different drums used on tower cranes work together to move loads laterally and vertically.
7. Explain the function of the trolley of a tower crane with regards to moving loads horizontally.
8. Describe the function of outriggers used on all terrain cranes and explain the constraints required to maintain Department of Transportation compliance.

#### Methods of Evaluation:

##### Evaluation of Student Achievement or Proficiency:

Participation and contribution to discussions (Individual)	20%	
Assignments	20%	
Quizzes & Exams		30%
Practical Application Projects	30%	
	100%	

#### Participation & Contribution to discussions (Individual) 20%

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 20% 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 20%

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 30%

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

#### Practical Application Projects 30%

This portion of the course will help you develop a comprehensive understanding of the materials. Periodically throughout the course, you may be required to perform and display your understanding of the materials in a practical shop setting.

#### Note:

Class assignments, quizzes, exams and projects dates may be altered, rescheduled, changes, 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. Mobile Cranes: Types and Purposes

- a. **Terminology**
  - i. **Crane**
  - ii. **Rope**
  - iii. **Block**
  - iv. **Mobile**
  - v. **Boom**
  - vi. **Jib**
  - vii. **Tower**
  - viii. **Cab**
  - ix. **Counter weight**
  - x. **Reeving**
  - xi. **Drum**
  - xii. **Cab body**
  - xiii. **Sheave**
  - xiv. **Pendant line**
  - xv. **Spooling**
- b. **Mobile vs Industrial**
  - i. **Differences**
    1. **Lifting**
    2. **Load distribution**
    3. **Capacity**
    4. **Rope**
    5. **Components**
  - ii. **Similarities**
    1. **Lifting**
    2. **Production**
    3. **Environment**
    - 4.
- c. **Crane Types**
  - i. **Crawler**
  - ii. **Rough Terrain**
  - iii. **All Terrain**
  - iv. **Telescopic Truck**
- d. **Purpose**
  - i. **Crawler**
    1. **Heavy lifts/uneven ground**
    2. **Construction**
  - ii. **Rough Terrain**
    1. **Construction (small)**
    2. **Maintenance**
  - iii. **All Terrain**
    1. **Municipal**
    2. **Immediate availability**
  - iv. **Tower**
    1. **Long term construction**
    2. **High-rise construction**
    3. **Significant coverage area**
  - v. **Telescopic Truck**
    1. **Deliveries**
    2. **Small construction**
- e. **Hydraulic versus Electric**
  - i. **Similarities**
    1. **Boom**
    2. **Counter weight**
    3. **Cab operation**
    4. **Rope**
  - ii. **Differences**

1. Energy saver
  2. Location
  3. Operation
  4. Block design
2. Crane components
    - a. Common components
      - i. Boom
        1. Lattice
        2. Jib
        3. Telescoping
1. Block
  - a. Load connector
  - b. Sheave
  - c. Headache ball
2. Wire rope
  - a. General purpose
  - b. High performance
  - c. Design requirement
    - i. 3::1 versus 5::1
    - ii. Lay length
    - iii. Metal cross section
    - iv. Tensile strength
    - v. Rotation resistant
    - vi. Anti-crushing
  - d. Counter weight
    - i. Function
    - ii. Types
3. Systemic operation
  - a. Design
    - i. Specific wire rope
    - ii. Reeving
    - iii. Cross
    - iv. Dead end horizontal
  - b. Role
    - i. Resistance to load
    - ii. Load stabilization
4. Counterweight
  - a. Stabilization
  - b. Safety
5. Sheave system
  - a. Type
    - i. Boom hoist
    - ii. Luffing jib
    - iii. Load line
    - iv. Trolley
  - b. Force multiplier
    - i. Mechanical advantage
    - ii. Pull length vs. lifting load
1. Boom design
  - a. Type
    - i. Lattice
    - ii. Telescoping
  - b. Advantages
    - i. Lattice
      1. Longer length
      2. Reduced load
      3. Higher lifting
    - ii. Telescoping
      1. Maneuverability
      2. Immediate deployment

2. **Drum**
  - a. **Types**
    - i. **Load**
    - ii. **Main line**
    - iii. **Whip line**
    - iv. **Boom**
    - v. **Trolley**
    - vi. **Luffing**
  - b. **Load movement**
    - i. **Vertical**
    - ii. **In/out**
3. **Trolley function**
  - a. **Anchor point**
  - b. **Load support**
  - c. **Directional movement**
  - d. **Block guide**
4. **Out-riggers**
  - a. **Function**
    - i. **Tip protection**
    - ii. **Stabilization**
    - iii. **Load centering**
  - b. **Constraints**
    - i. **Height**
    - ii. **Width**
    - iii. **Weight**
  - c. **Department of transportation**
    - i. **Truck load capacity**
    - ii. **Axel load**
    - iii. **Permit**

**Resources Other**

<http://www.mazzellacompanies.com/mazzellalifting> (<http://www.mazzellacompanies.com/mazzellalifting/>)

<http://www.thecrosbygroup.com/>

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