

# ATMW-2400: STEAM TURBINES

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## Cuyahoga Community College

### Viewing: ATMW-2400 : Steam Turbines

#### Board of Trustees:

2012-06-28

#### Academic Term:

Spring 2019

#### Subject Code

ATMW - Appld Ind Tech - Millwrighting

#### Course Number:

2400

#### Title:

Steam Turbines

#### Catalog Description:

Covers the various types of steam turbines currently in use. Students will learn how a turbine operates and will identify the various components of a turbine. Students will disassemble a steam turbine and determine the millwrights' responsibilities while working on a steam turbine.

#### Credit Hour(s):

2

#### Lecture Hour(s):

2

## Requisites

#### Prerequisite and Corequisite

Departmental approval: admission to any Applied Industrial Technology program.

## Outcomes

#### Course Outcome(s):

1. Apply knowledge of steam turbine operation, components, and determine the millwrights responsibilities while working on a steam turbine.

#### Objective(s):

1. 1. Identify all safety requirements pertaining to turbine work.
2. 2. Explain turbine operation and identify major components.
3. 3. Demonstrate the proper methods of removing and installing bolts, regarding tensioning.

#### Course Outcome(s):

2. Perform safe rigging procedures for the disassembly and reassembly of the turbine including crane safety.

#### Objective(s):

1. 1. Discuss gantry crane safety and operation.
2. 2. Demonstrate proper sling and hardware selection.

#### Course Outcome(s):

3. Perform and document results of turbine inspection according to industry standards.

#### Objective(s):

1. 1. Record accurate readings with precision tools to a tolerance of .001 of an inch.
2. 2. Discuss industry standards for completion of turbine inspection sheets.

**Methods of Evaluation:**

Quizzes, tests class participation and field exercises.

**Course Content Outline:**

1. Introduction to steam turbines
  - a. Steam Turbine Locations
    - i. Coal burning plants
    - ii. Nuclear plants
    - iii. Co-generation facilities
  - b. Main components
    - i. Shell
    - ii. Rotor
    - iii. Diaphragms
    - iv. Valves
    - v. Bearings
    - vi. Seals
    - vii. Bolting
  - c. Safety requirements
2. Bolting
  - a. Identification
    - i. Size
    - ii. Thread pitch
    - iii. Strength
  - b. Methods of loosening and tensioning
    - i. Impact wrenches
    - ii. Thermal expansion
    - iii. Hydraulic wrenches
    - iv. Torque wrenches
3. Rigging
  - a. Gantry crane safety and operation
  - b. Proper sling and hardware selection
    - i. Wire rope, synthetic, chain slings
    - ii. Shackles and eye bolts
    - iii. Rigging beams
    - iv. Chain falls and come-alongs
4. Inspections
  - a. Rotor position
    - i. Dial indicator check
  - b. Diaphragm clearances
    - i. Feeler gauges and micrometers
  - c. Bearings
    - i. Blue checks
    - ii. Dimensional readings / micrometers
  - d. Oil deflectors
    - i. Dimensional readings / micrometers
  - e. Valves
    - i. Steam chest disassembly
  - f. Seals and packing clearances
    - i. Feeler gauges

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**Resources**

Carpenters International Training Fund. *UBC Steam Turbine Qualification Program*,. current. Carpenters International Training Fund, Las Vegas Nevada, 2011.

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L. S. Starrett Company,. *Tools Rules for Precision Measuring*;. current. Abe Parkers books, Sarasota, Fla, 1998.

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James Gerhart. *Mastering Math for the Building Trades*,. current. McGraw Hill New York, New York, 2000.

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W.J. Kearton,. *Steam turbine theory and practice, a text-book for engineering students*,. Historical. Pittman and Sons, London, New York, 1922.

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#### **Resources Other**

[www.energy.siemens.com/hq/en/power-generation/](http://www.energy.siemens.com/hq/en/power-generation/) (<http://www.energy.siemens.com/hq/en/power-generation/steam-turbines/>)**steam-turbines**

[library.thinkquest.org/C006011/english/sites/dampfturbine.php3?v...](http://library.thinkquest.org/C006011/english/sites/dampfturbine.php3?v...)

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