New Course Form

MET 150 Industrial Mechanics II 6

Originator: Kenny Keith **Status:** Approved **Date Created:** 02/01/2013

Department: MET: Mechatronics **Submitted:** 02/05/2013 **Completed:** 02/27/2013

To ACETS:

Course Prefix: MET

Course Number: 150

Course Title: Industrial Mechanics II

Cross-listing: No

Cross-listing information:

Semester for Implementation: Fall

Year of Implementation: 2013

Course Type: Required Transfer Vocational

Credit Hours: 6

Transfer Course: BAS-articulation discussions are underway

Course Catalog Description: This course builds and expands upon Industrial Mechanics I by covering the principles and applications of additional mechanical drive and fluid power components, expanding upon troubleshooting and looking at predictive and preventative maintenance techniques.

Rationale: This level II course when combined with the associated level I course provides the advanced mechanical principles, skills and competencies that would be required of a maintenance mechanic in a complex high production manufacturing environment in discrete or hybrid industries such as electronics, automotive, food, pharmaceuticals, consumer products, packaging, metals, mining,energy, or materials. When combined with Industrial Electrical Systems, the student should be capable of troubleshooting and maintaining non-PLC based electro-pneumatic, electro-hydraulic, and moderately complex electro-mechanical equipment

Total Lecture Contact Hours per Week: 4

Total Lab Contact Hours per Week: 6

Total Contact Hours: 150

Load Factor: 8.2

Requisites:	Yes
Prerequisites:	MET 120 Industrial Mechanics I
Co-requisites:	
Mode of Instructional Delivery:	(1) Traditional classroom instruction (3) Hybrid: internet with live lab (5) Laboratory
If "other" mode of instruction, specify:	
Library Resources:	N/A
Assessment of Student Learning - Methods:	(1) Written Examinations (5) Demonstration of Skills
IF "other" assessment, specify:	
Recommend Course Enrollment:	
Credit by Examination:	No
Literacy/ Critical Inquiry Component:	N/A
Ethnic/ Gender Awareness:	N/A
Sustainability:	No
Sustainability (explanation):	
COURSE TOPICS:	Topics include mechanical power transmission devices such as gear drives and ball screws; laser alignment techniques; pneumatic logic, pressure and vacuum systems; vibration analysis; and central lubrication. All course material is supplemented with practical hands-on exposure to the items described.
COURSE OUTCOMES:	1. Apply basic safety rules for working with mechanical and pneumatic equipment, industrial lubricants, and conveyor systems. 2. Describe the function, construction and operation of synchronous timing and high torque drive belt systems 3. Select components for, install, align, tension and troubleshoot synchronous belt systems 4. Describe proper maintenance procedures for synchronous belt systems 5. Measure the components of spur, bevel, helical, worm, and right angle gears 6. Calculate speed and torque of gear systems 7. Disassemble, install, adjust backlash and align shafts in systems using various

gear train types
8. Describe how gear systems are specified
9. Apply lubrication and maintenance techniques for gear drive systems
10. Describe the function and operation of plain, ball, roller, and antifriction bearings
11. Explain how to specify, select, apply and lubricate these bearings
12. Demonstrate the ability to remove, install, align, adjust, inspect, maintain and troubleshoot bearings using appropriate tools and methods
13. Describe the function, construction and operation of linear ball bushings and ball screws
14. Explain how to specify, select, and apply linear components
15. Demonstrate the ability to install, adjust, inspect, maintain and troubleshoot linear ball bushings and ball screws
16. Describe the function, construction and operation of gaskets, sealants, and seals
17. Demonstrate the ability to elect, install, remove, inspect and troubleshoot gaskets and seals for various applications
18. Describe the function, construction and operation of mechanical and electrical clutches, brakes, and clutch/brake combinations
19. Perform calculations to specify clutches and brakes
20. Demonstrate the ability to install and adjust clutches and brakes
21. Demonstrate the ability to inspect, troubleshoot and maintain clutches and brakes
22. Describe the purpose and function of lubricant types and additives
23. Describe the methods of applying lubricants
24. Demonstrate the proper use of manual lubricating equipment
25. Describe the properties of a lubricant, measure the properties of a lubricant, and select the proper lubricant for an application.
26. Describe the purpose, function, components and operation of central lubrication systems
27. Describe the operation, installation and maintenance of a series/progressive lubrication system
28. Demonstrate the operation, installation and maintenance of a series/progressive lubrication system
29. Describe the operation of a central lubrication controller
30. Configure a central lubrication controller
31. Demonstrate the ability to troubleshoot and repair a series/progressive system and controller
32. Describe the operation and function of various types of shaft couplings using conventional methods
33. Demonstrate the ability to install and precision align a variety of types of shaft couplings using conventional methods
34. Describe the operation and function of laser shaft alignment
35. Determine alignment tolerances, use a laser system to align, and store, recall and print alignment data on a power transmission system
36. Describe the operation and function of conveyor systems
37. Calculate conveyor lengths and speeds
38 Demonstrate the ability to install, adjust and maintain flat belt conveyors
39. Define preventive maintenance, predictive maintenance and total predictive

maintenance
40. Explain how vibration analysis may be used to implement various maintenance techniques
41. Apply preventive maintenance, predictive maintenance and total predictive maintenance
42. Explain how vibration analysis may be used to implement various maintenance techniques.
43. Describe the physics of vibration
44. Demonstrate the ability to apply vibration sensors and interpret results of vibration measurements
45. Describe causes of vibration in different types of components
46. Demonstrate the ability to correct, isolate or dampen vibration
47. Describe the function, application and operation of pneumatic directional control valves
48. Design, install and operate circuits using manual, cam and pilot operated directional control valves
49. Describe troubleshooting techniques for directional control and flow control valves
50 Apply troubleshooting techniques for directional control and flow control valves
51. Describe the function, application and operation of pneumatic power cylinders, pneumatic motors and air bearings
52 Calculate torque, speed and air consumption for various loads, cylinders and motors
53. Measure torque, speed and air consumption for various loads, cylinders and motors
54. Demonstrate the ability to install and operate cylinders and motors
55 Describe troubleshooting techniques for pneumatic cylinders, motors and rotary actuators
56. Apply troubleshooting techniques for pneumatic cylinders, motors and rotary actuators
57. Describe the function, application and operation of pneumatic logic
58. Demonstrate the ability to design and simulate pneumatic logic circuits
59. Demonstrate the ability to design, build and operate pneumatic circuits
60. Describe the function, application and operation of single and two stage air compressors and air compressor controls
61Apply the ideal gas law to air compressor operation and sizing
62. Demonstrate the ability to operate and test air compressors
63. Use instruments to measure operating conditions.
64. Describe troubleshooting techniques for conditioning equipment of an air system
65. Apply troubleshooting techniques for conditioning equipment of an air system
66. Describe the function, application and operation of vacuum systems including vacuum producing equipment; measuring units and equipment; vacuum switches; and vacuum cups and lifters.
67. Use Bernoulli?s Law to explain a venturi
68. Use Bernoulli?s Law to calculate vacuum lifting forces
69. Demonstrate the ability to connect and operate a vacuum system for

handling material
70. Describe troubleshooting techniques for vacuum equipment and systems
71. Apply troubleshooting techniques for vacuum equipment and systems
72. Describe component and system level troubleshooting techniques, use a troubleshooting flowchart and troubleshoot electro-pneumatic systems using PLC indicator lights
73. Apply component and system level troubleshooting techniques, use a troubleshooting flowchart and troubleshoot electro-pneumatic systems using PLC indicator lights

Proposer: Kenny Keith