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PRINCIPLES OF TECHNOLOGY II

Industrial Technology **11-12**

Curriculum Standard One: **The student will demonstrate his/her ability to solve problems and apply technical solutions in mechanical, fluid, and electrical systems as they relate to force transformers.**

Performance Objective	Critical Attributes	Benchmarks/Assessment
1. The student will solve problems in mechanical systems utilizing both linear and angular force transducers.	A. Can the student select appropriate equations and input data to solve linear and angular force transference problems?	• The student will calculate ideal mechanical advantage in both linear and angular mechanical force transducers. • The student will calculate actual mechanical advantage from experimental data. • Given a problem in fluids, the student will calculate the transformance of energy using pressure intensifiers.
2. The student will assemble, run, and analyze linear and angular force transducers.	A. Can the student follow a schematic and set up a mechanical force transducer?	• Given a schematic and written instructions, the student will correctly set up, troubleshoot, and run a mechanical force transducer. • The student will use appropriate equations to analyze experimental results.
3. The student will learn the design, calculations, and appropriate use of a step up and step down electrical transformer.	A. Can the student predict the result of an electrical transformer on a circuit?	• The student will determine the correct size of transformer to produce a specific voltage or current. • The student will identify five uses in industry of step up or step down electrical transformers.

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Performance Objective	Critical Attributes	Benchmarks/Assessment
4. The student will learn the function and appropriate use of both pressure intensifiers and fluid transformers.	A. Can the student identify the effects of pressure intensifiers and fluid transformers in a fluid system on energy flow?	• Given a fluid system, the student will identify the appropriate place to add a pressure intensifier or fluid transformer and predict its effect on energy flow. • The student will identify the differences between pressure intensifiers and fluid transformers.

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Curriculum Standard Two: **The student will demonstrate his/her ability to solve problems, perform in labs, and apply technical solutions in systems as they relate to momentum.**

Performance Objective	Critical Attributes	Benchmarks/Assessment
1. The student will learn about linear and angular momentum and about impulse.	A. Can the student explain the concept of linear momentum and analyze experimental data?	• The student will correctly calculate momentum in a linear system. • The student will correctly calculate momentum in an angular system. • The student will correctly calculate impulse and explain its effect on momentum.
	B. Can the student explain the concept of impulse and calculate its value from experimental data?	
2. The student will correctly identify appropriate English and SI units for linear and angular momentum.	A. Can the student use dimensional analysis to derive correct units?	• Given an electrical circuit and some known values, the student wil use Ohm's Law to predict other values.
3. The student will collect data about momentum and impulse from labs and analyze results.	A. Can the student perform in lab and collect accurate and appropriate data?	• The student will correctly analyze results from lab concerning momentum and impulse.

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Curriculum Standard Three: **The student will demonstrate his/her ability to solve problems and apply technical solutions in systems where energy is transferred by waves and vibrations.**

Performance Objective	Critical Attributes	Benchmarks/Assessment
1. The student will describe wave motion in general.	A. Can the student find the natural frequency and period of oscillation of vibrating systems by direct measurement?	• The student will determine the frequency and period of a vibrating system by direct measurement.
2. The student will describe characteristics that are used to define a specific wave.	A. Can the student define and identify characteristics, such as wavelength, frequency, period, and amplitude?	• The student will accurately plot a sine wave from data, considering amplitude and period.
	B. Can the student use basic trigonometry functions to define a specific wave?	• The student will use appropriate trigonometry functions to plot a sine wave.
3. The student will distinguish between longitudinal and transverse waves.	A. Can the student describe characteristics of longitudinal and transverse waves?	• The student will explain the effects of both longitudinal and transverse motion on a medium.
4. The student will become proficient in using an oscilloscope to analyze waves.	A. Can the student appropriately use an oscilloscope in a lab setting to measure vibrations?	• The student will use an oscilloscope and correctly determine wavelength, frequency, period, amplitude, and phase difference. • The student will assemble, connect, set, and read an oscilloscope correctly to measure vibrations in a lab setting.

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Performance Objective	Critical Attributes	Benchmarks/Assessment
	B. Can the student determine constructive and destructive interference?	• The student will find the resultant waveform for two waves in the same medium as a result of wave interference.

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Curriculum Standard Four: **The student will demonstrate his/her ability to solve problems and apply technical solutions to systems as they relate to energy converters.**

Performance Objective	Critical Attributes	Benchmarks/Assessment
1. The student will identify and analyze converters that change energy from one source to another.	A. Can the student select appropriate mechanical energy converters, such as a pump, and explain how mechanical energy is converted to fluid energy? B. Can the student select appropriate mechanical energy converters, such as a fan, and explain how mechanical energy is converted to fluid energy? C. Can the student select appropriate mechanical energy converters, such as an alternator, and explain how mechanical energy is converted to electrical energy? D. Can the student select appropriate mechanical energy converters, such as a pump, and explain how mechanical energy is converted to thermal energy?	• The student will determine efficiency of the mechanical energy converters. • The student will explain appropriate industrial uses for mechanical energy converters. • The student will solve energy conversion problems for mechanical energy converters.

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Performance Objective	Critical Attributes	Benchmarks/Assessment
2. The student will identify and analyze energy converters in a lab setting.	A. Can the student identify energy converters and collect and analyze data?	• The student will determine the focal length of a parabolic mirror to analyze the concentration of sound energy.