Metals Manufacturing Processes 2

Course Description:

The curriculum for this course is developed from the Wisconsin Standards for Technology and Engineering. This elective course is a 2 Trimester Course in which students will develop intermediate level skills and technical knowledge in the areas of machining, metal casting, sheet metal, CNC machining, GMAW welding and fabrication. While learning skills and technical knowledge in these areas, students will fabricate multiple small projects. Students will be asked to work in small groups and individually to complete learning exercises. The class will also participate in a mass production simulation producing a finished product. The information in this course overview outlines what students should understand and be able to do by the end of the trimester.

Mastery Standards:

Knowledge of equipment and safety procedures are essential to responsible use of equipment and tools in the metals manufacturing industry . (AC1.c, AC1.d, AC1.e, AC1.f, MNF1.a)

Understanding and knowledge of tools and materials is required for analyzing sound choices in methods and materials in the metals manufacturing industry. (BB1.b)

Quality design, engineering, and construction require accurate knowledge and application of measuring systems. (AC1.a, AC1.b)

Experience applying design theory allows for stronger analysis of plans and designs before investment of resources in final production. (ENG1.a, ENG2.a, ENG2.b, ENG3.a, ENG3.b-ENG4.a)

Executing and receiving evaluations and feedback on projects is vital to learning and improving skills. (ENG4.c, ENG5.a)

Specific tasks require experience and knowledge to correctly identify, select, and safely use appropriate tools, machines, products, systems, and techniques. (MNF1.a, MNF1.b, MNF1.c, MNF1.d, MNF1.e, MNF1.f, MNF1.g, MNF1.h)

Unit	Description of Unit and Learning Targets
Unit Title: 1 Essential Questions: ● How does understanding technical metalworking information and manufacturing skills help you build skills that can lead to a career in the metalworking industry?	Students will... Learning Targets: ● I can demonstrate the safety procedures and practices in various work environment settings pertaining to the Metals Manufacturing Industry. ● I can demonstrate and use the hand and power tools of the trade properly and safely. ● I know how raw materials are turned into secondary materials. ● I know the difference between an alloy and element. ● I know how secondary materials are categorized and sold. ● I know that there are many careers associated with the metals manufacturing industry. ● I know the identity and use of 90% of the basic hand tools used.. ● I know how to measure using a steel rule, dial caliper and micrometer. ● I can identify, Interpret and apply manufacturing blueprints and specifications to produce a part. ● I can convert scaled blueprint drawing measurements to full dimensions for a given manufacturing project.

	● I can calculate a bill of materials for various products produced in the lab.
Unit Title: 2 <u>Essential Questions:</u> ● How do you use various metalworking technologies, machines and processes to produce finished manufactured parts and assembled products to a high degree of accuracy?	Students will... <u>Learning Targets:</u> ● I know how to safely operate the drill press to produce holes in various parts and products. ● I know the safe operation of the Vertical Mill and can square up stock, locate and drill holes and cut keyways. ● I can safely use the pedestal grinder, belt sander, chop saw and portable hand grinder to grind, smooth, polish and cut metal materials. ● I can safely operate the Bandsaw to cut off different types of metal stock. ● I know the parts and functions of the metal lathe and can use the lathe to face, center drill, turn and knurl parts. ● I can calculate speeds and feed settings for a lathe and adjust these speeds on the lathe. ● I can demonstrate and use the common forming tools and equipment safely and properly to bend metal parts. ● I know the basic industrial terminology used in sand casting aluminum products and can prepare a mold, cast the part, break out the casting and prepare it for finishing. ● I can prepare metal materials for finishing applications. ● I can use the GMAW welding process for various introductory level welding processes such as surfacing, basic joints and for joining together parts into a finished product. ● I can identify basic mechanical fasteners and apply the correct fastener to the parts being assembled. ● I can correctly select the correct tap drill and tap to produce internal threads. ● I can correctly cut external threads using a die. ● I know the basic G&M codes and can apply them to basic CNC machine code. ● I can write G&M code to machine my initials into a piece using straight line interpolation. ● I can write G&M code to machine straight keyway cuts with coolant. ● I can write G&M code to peck drill holes into parts.