Metals Manufacturing Process 1

Course Description:

The curriculum for this course is developed from the Wisconsin Standards for Technology and Engineering. This introductory elective course is a 1 Trimester Course in which students will develop basic skills and technical knowledge in the areas of machining, metal casting, sheet metal, CNC machining and welding. While learning skills and technical knowledge in these areas, students will fabricate several small projects. Students will be asked to work in small groups and individually to complete learning exercises. 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 basic technical metalworking information and manufacturing skills help you build a foundation of knowledge and skills that can lead to an interest in 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 know how raw materials are turned into secondary materials. ● I know the difference between an alloy and element. ● I know that there are many careers associated with the metals manufacturing industry and can identify with one that is associated with my own interests. ● I know the identity and use of 90% of the basic hand tools used in the metalworking lab. ● 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.
Unit Title: 2 Essential Questions:	Students will... Learning Targets:

● How do you use various metalworking technologies, machines and processes to produce finished manufactured parts and assembled products to a high degree of accuracy?	● I know the parts of the Vertical Mill and their function and can make cutter changes. . ● I can correctly mill and square up stock on the Vertical Mill. ● I can locate and drill holes using an edge finder. ● I can locate and cut a square keyway. ● I can identify different types of cutters and the appropriate use for each one. ● I know how to change bits and spindle speeds on the drill press so that I can safely and accurately drill holes in parts. ● I can safely use the pedestal grinder, belt sander, chop saw and portable hand grinder to safely 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 so that I can perform facing, center drilling, turning and knurling operations. ● I can calculate an offset taper and turn a taper on a lathe. ● I can demonstrate and use the common forming tools and equipment safely and properly to produce various parts. ● I know the basic industrial terminology used in sand casting aluminum products and can use those skills to prepare a mold, pour a casting, break out the casting and prepare it for finishing. ● I can demonstrate safe operation of a SMAW welding machine and perform straight beads and surfacing welds. ● I can identify the different types of welding joints and be able to safely demonstrate the ability to perform the welds using the GMAW process. (surfacing, butt, lap, tee). ● 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 and also cut external threads using a hand 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.