Unit 5: Individual Required Projects provided by Manufacturing Technology Instructors.

Content Area: **Industrial Technology**
Course(s): **Manufacturing Technology I**
Time Period: **2 marking periods**
Length: **24 Weeks**
Status: **Published**

Unit Overview

Students will be required to select two projects or more for each marking period 2nd, 3rd and 4th marking period.

Transfer

Students will be able to independently use their learning to...

Students will select projects that the instructor has provided that encompass some or all of the skills previously taught in earlier lessons by the instructors. Students will be required to select these projects and turn the completed projects in at the end of each marking period.

For more information, read the following article by Grant Wiggins.

http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=60

Meaning

SWBAT apply the techniques they have learned in Sheet Metal, Casting and Forging, Soldering, Brazing and Welding, Fastening and Machining techniques to complete projects that may be assigned or selected by the students. (Examples) Sheet Metal Tool Box, Machinist Hammer, Sheet Metal Candle Holders, Initial Casting Project, Matchbox Holder and Assorted Projects that are posted on the bulletin boards.

Understandings

Students will understand that...

How the skills they have learned can be applied to manufacture projects that they can sell or use at home or work.

The students should realize how they can find a career with the skills they have acquired or repair items at home or on transportation vehicles.

Essential Questions

Students will keep considering...

What is technology?

How does various types of technology contribute to advaces in industry?

What are the types of careers available in Manufacturing?

How can the skills that have been learned lead to a career?

How can I apply the skills to benefit financially?

What is the importance of accurate measurement and layout when creating a finished project?

Is craftsmanship important when completing a project?

What will happen if my fastening is not sturdy and aesthetically pleasing on my project?

Application of Knowledge and Skill

Students will work in different areas to apply the knowledge they have acquired in Sheet Metal Work, Foundry and Forging, Soldering, Brazing and Welding and Machining to create a finished project.

Students will know...

Students will know that safety rules must be followed when beginning work in the Manufacturing Lab.

Students will wear Safety Glasses or Safety Goggles at all times when working in the shop.

Students will be able to operate safety apparatus like the eyewash, chemical shower, fire blanket, fire extinguisher and first aid kit location.

Students will be able to locate and operate lab power safety shutoff buttons in the Man. tech Lab.

Students will dress appropriately when working in the lab.

dentify basic measuring tools and gages and explain how they are used.

Measure to 1/16th and .05 mm with a steel rule.

Read drawings dimensioned in fractional and decimal inches and metric dimensions.

Identify and understand the different types of information indicated on a typical drwing.

Describe how detail, assembly, and subassembly drawing differ.

Explain the purpose of sa layout and how it is used tp prepare metal for machining.

Identify common layout tools and use them safely.

Make simple layouts.

List and observe common safety precautions used in layout work.

Identify basic hand tools used in metalworking.

Select right tool for the job

Explain how to maintain tools properly.

Safely Operate and identify parts of basic sheet metal machines.

Safely Operate Spotwelders.

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SWBAT ram up a foundry project and cut the gating system to allow metal to flow into the pattern.

SWBAT wear the proper safety equipment for handling molten metal.

SWBAT safely charge the crucible with aluminum and light the crucible furnace.

SWBAT safely pour molten metal into gating system.

SWBAT machine and polish metal casting.

SWBAT heat steel up to proper temperature and use metal tongs and proper blacksmithing tools to shape metal.

How to safely tin soldering iron and use flux to soft solder?

How to safely set up oxyacetylene welder to braze, weld and cut using torch and cutting torch.

How to select arc welding electrodes, arc welding current selection and weld assessment and weld projects.

Students will be skilled at...

Students will be skilled at...

Being able to apply Critical Thinking Skills to select what type of processes they will need to complete their selected projects.

Recalling information on past processes to set up equipment and machinery.

Following proper safety procedures when operating hand tools and powered machinery or equipment.

Academic Vocabulary

annealing, beating down, chasing, pickling, piercing, planish, raising repousse, snarling iron, soldering, bar folder, beading, box and pan brake, cornice brake, crimping, parallel line development, radial line development, seam, squaring shears, stretchout, bench metal, bending jig, honest finish, metal former, ornamental ironwork, peening, rod parter, scroll, surface texture, wrought iron.

Learning Goal 1

SWBAT manufacture Individual Project selected by Instructor or Student if permitted.

- SWBAT manufacture Individual Project selected by Instructor or Student if permitted.

CAEP.9.2.12.C.1	Review career goals and determine steps necessary for attainment.
CAEP.9.2.12.C.2	Modify Personalized Student Learning Plans to support declared career goals.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.
CAEP.9.2.12.C.6	Investigate entrepreneurship opportunities as options for career planning and identify the knowledge, skills, abilities, and resources required for owning and managing a business.
MANU.9-12.9.4.12.M.(1).2	Research new manufacturing processes to manage production of new and/or improved products.
MANU.9-12.9.4.12.M.(3).5	Develop hands-on knowledge of equipment operation to identify maintenance needs and maximize performance.
MANU.9-12.9.4.12.M.(6).6	Evaluate and summarize training in health, safety, and/or environmental issues needed to provide safe, healthy, and productive manufacturing work environments.
MANU.9-12.9.4.12.M.(6).10	Examine and summarize health, safety, and/or environmental quality assurance programs in order to ensure healthy and safe manufacturing work environments.
MANU.9-12.9.4.12.M.1	Demonstrate language arts knowledge and skills required to pursue the full range of postsecondary education and career opportunities.
MANU.9-12.9.4.12.M.2	Demonstrate mathematics knowledge and skills required to pursue the full range of postsecondary education and career opportunities.
MANU.9-12.9.4.12.M.3	Demonstrate science knowledge and skills required to pursue the full range of postsecondary education and career opportunities.
MANU.9-12.9.4.12.M.4	Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice.
MANU.9-12.9.4.12.M.7	Evaluate and use information resources to accomplish specific occupational tasks.
MANU.9-12.9.4.12.M.15	Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
MANU.9-12.9.4.12.M.16	Employ critical thinking and interpersonal skills to resolve.
MANU.9-12.9.4.12.M.21	Operate Internet applications to perform tasks.
MANU.9-12.9.4.12.M.28	Use computer-based equipment (containing embedded computers or processors) to control devices.
MANU.9-12.9.4.12.M.33	Demonstrate knowledge of personal and jobsite safety rules and regulations to maintain safe and healthful working conditions and environments.
MANU.9-12.9.4.12.M.35	Identify emergency procedures that are necessary to provide aid in workplace accidents.
MANU.9-12.9.4.12.M.39	Maintain safe and healthful working conditions and environments to ensure employee safety.

MANU.9-12.9.4.12.M.47	Establish and maintain effective relationships in order to accomplish objectives and tasks.
MANU.9-12.9.4.12.M.49	Employ mentoring skills to assist others.
MANU.9-12.9.4.12.M.52	Identify and demonstrate positive work behaviors and personal qualities needed to succeed in the classroom and/or to be employable.
MANU.9-12.9.4.12.M.53	Develop a Personalized Student Learning Plan to meet career goals and objectives.
MANU.9-12.9.4.12.M.54	Demonstrate skills related to seeking and applying for employment in a desired job.

Target 1

SWBAT layout using measuring tools, cut out, bend, weld, and shape the project.

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Target 2

SWBAT assemble project using various methods such as soldering, welding, brazing or fasteners. SWBAT prep project for finishing by sanding, buffing, grinding, degreasing and painting.

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Learning Goal 2

SWBAT manufacture Individual Project selected by Instructor related to machining working with Metal Lathe or Vertical Milling Machine or both.

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CAEP.9.2.12.C.1	Review career goals and determine steps necessary for attainment.
CAEP.9.2.12.C.2	Modify Personalized Student Learning Plans to support declared career goals.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.
CAEP.9.2.12.C.4	Analyze how economic conditions and societal changes influence employment trends and future education.
MANU.9-12.9.4.12.M.(2).8	Maintain equipment, tools, and workstations to provide safe work environments and meet company regulations.
MANU.9-12.9.4.12.M.(3).7	Create a preventive maintenance schedule to maintain manufacturing equipment, tools, and workstations.
MANU.9-12.9.4.12.M.(3).9	Identify and diagnose equipment problems in order to effectively repair manufacturing equipment.
MANU.9-12.9.4.12.M.(6).2	Analyze investigations of health, safety, and/or environmental incidents and hazards in order to maintain healthy and safe manufacturing work environments.

MANU.9-12.9.4.12.M.(6).9	Examine and summarize continuous improvement protocols, techniques, and practices in order to enhance the health and safety of manufacturing work environments.
MANU.9-12.9.4.12.M.(6).10	Examine and summarize health, safety, and/or environmental quality assurance programs in order to ensure healthy and safe manufacturing work environments.
MANU.9-12.9.4.12.M.1	Demonstrate language arts knowledge and skills required to pursue the full range of postsecondary education and career opportunities.
MANU.9-12.9.4.12.M.2	Demonstrate mathematics knowledge and skills required to pursue the full range of postsecondary education and career opportunities.
MANU.9-12.9.4.12.M.3	Demonstrate science knowledge and skills required to pursue the full range of postsecondary education and career opportunities.
MANU.9-12.9.4.12.M.4	Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice.
MANU.9-12.9.4.12.M.7	Evaluate and use information resources to accomplish specific occupational tasks.
MANU.9-12.9.4.12.M.11	Apply active listening skills to obtain and clarify information.
MANU.9-12.9.4.12.M.15	Employ critical thinking skills (e.g., analyze, synthesize, and evaluate) independently and in teams to solve problems and make decisions.
MANU.9-12.9.4.12.M.16	Employ critical thinking and interpersonal skills to resolve.
MANU.9-12.9.4.12.M.21	Operate Internet applications to perform tasks.
MANU.9-12.9.4.12.M.33	Demonstrate knowledge of personal and jobsite safety rules and regulations to maintain safe and healthful working conditions and environments.
MANU.9-12.9.4.12.M.35	Identify emergency procedures that are necessary to provide aid in workplace accidents.
MANU.9-12.9.4.12.M.42	Demonstrate understanding of how to control workplace hazards in manufacturing business environments in order to maintain safe working conditions.
MANU.9-12.9.4.12.M.44	Employ leadership skills to accomplish goals and objectives.

Target 1

SWBAT to safely set up and operate Vertical Milling Machine or Metal Lathe to produce Machinist Hammer or Machine Casting Project. SWBAT to layout and machine parts to proper tolerances.

- SWBAT to safely set up and operate Vertical Milling Machine or Metal Lathe to produce Machinist Hammer or Machine Casting Project. SWBAT to layout and machine parts to proper tolerances.

Target 2

SWBAT to safely thread machinist hammerhead with a 3/8-16 tap and thread hammer handle with a 3/8-16 die. SWBAT then sand and buff parts and assemble the project. They may apply finish to completed hammer. SWBAT to operate Vertical Mill to smooth casting project, sand and buff project to apply mirror finish.

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Learning Goal 3

SWBAT manufacture Individual Project selected by Instructor related to Computer numerical machining working with Laser Cutter, CNC Vertical Milling Machine, or 3D printer.

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CAEP.9.2.12.C.1	Review career goals and determine steps necessary for attainment.
CAEP.9.2.12.C.2	Modify Personalized Student Learning Plans to support declared career goals.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.
CAEP.9.2.12.C.4	Analyze how economic conditions and societal changes influence employment trends and future education.
MANU.9-12.9.4.12.M.(1).2	Research new manufacturing processes to manage production of new and/or improved products.
MANU.9-12.9.4.12.M.(1).4	Develop a continuous improvement plan to ensure production of high quality products that meet customer expectations.
MANU.9-12.9.4.12.M.(2).3	Recognize problems related to production processes, and design corrections to assure that products meet quality standards.
MANU.9-12.9.4.12.M.(2).6	Research the safe use of manufacturing process equipment in order to protect personal well-being in the work environment.
MANU.9-12.9.4.12.M.1	Demonstrate language arts knowledge and skills required to pursue the full range of postsecondary education and career opportunities.
MANU.9-12.9.4.12.M.2	Demonstrate mathematics knowledge and skills required to pursue the full range of postsecondary education and career opportunities.
MANU.9-12.9.4.12.M.3	Demonstrate science knowledge and skills required to pursue the full range of postsecondary education and career opportunities.
MANU.9-12.9.4.12.M.4	Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice.
MANU.9-12.9.4.12.M.8	Use correct grammar, punctuation, and terminology to write and edit documents.
MANU.9-12.9.4.12.M.16	Employ critical thinking and interpersonal skills to resolve.
MANU.9-12.9.4.12.M.19	Employ technological tools to expedite workflow.
MANU.9-12.9.4.12.M.28	Use computer-based equipment (containing embedded computers or processors) to control devices.

Target 1

SWBAT be introduced to the absolute coordinate system and its use in programming of CNC machines, Laser Cutter and 3D Printer. Relative and Polar Coordinates will be also introduced.

- SWBAT be introduced to the absolute coordinate system and its use in programming of CNC machines, Laser Cutter and 3D Printer. Relative and Polar Coordinates will be also introduced.

Target 2

SWBAT be introduced to basic G Codes and M Codes to write or troubleshoot simple programs. SWBAT explain how a programmable logic controller converts the code to machine code and controls the CNC

machines, Laser Cutter and 3D Printer.

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SWBAT explain how a programmable logic controller converts the code to machine code and controls the CNC machines, Laser Cutter and 3D Printer.

Target 3

SWBAT to safely operate one of the CNC machines, Laser Cutter or 3D Printer. They will produce a simple project or computer simulation of the machine running.

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Summative Assessment

Students will be required to pass a written safety tests on each piece of Vertical Mill, Metal Lathe, Grinder, Buffer, Disk and Belt Sander equipment that has been presented. This can be done using Google classroom or hand written tests.

21st Century Life and Careers

Select all applicable standards from the applicable standards

Formative Assessment and Performance Opportunities

Students will be assessed by performance on required project assignment. Students will also be assessed in the future on CNC, Laser or 3D projects they have selected for 2nd, 3rd and 4th marking period.

Accommodations/Modifications

SWBAT select more than one CNC coded machine project for more enrichment and knowledge.

Unit Resources

You tube Videos on Vertical Mill and Metal Lathe Safety, CNC Programming Techniques and Safety.

Modern Metalworking Instructor's Manual by John R. Walker

Modern Metalworking Textbook by John R. Walker

Modern Metalworking Workbook by John R. Walker

Safety Hand outs from NJ and PA. Safety Tests

Interdisciplinary Connections

LA.RST.11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
MA.K-12.1	Make sense of problems and persevere in solving them.