

Course: Metalworking
Unit #/ Unit Name: Unit #2 Developmental Work/Planning for Production

Year of Implementation: 2019-2020

Curriculum Team Members:

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Stage One - Desired Results

Link(s) to New Jersey Student Learning Standards for this course:

<https://www.state.nj.us/education/cccs/2014/tech/82.pdf>

<https://www.state.nj.us/education/aps/cccs/career/>

<https://www.state.nj.us/education/cccs/2014/career/CareerReadyPractices.pdf>

Unit Standards:

8.2 Technology Education, Engineering, and Design: All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world, as they relate to the individual, global society, and the environment.

C. The design process is a systematic approach to solving problems

8.2.12.C.1 - Explain how open source technologies follow the design process.

8.2.12.C.3 - Analyze a product or system for factors such as safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, and human factors engineering (ergonomics).

8.2.12.C.5 - Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled

8.2.12.C.7 - Use a design process to devise a technological product or system that addresses a global problem, provide research, identify trade-offs and constraints, and document the process through drawings that include data and materials.

Transfer Goal(s): Students will be able to independently use their learning to...

Students will be able to independently use their learning to create and read technical drawings, layout raw materials, and utilize a Computer Aided Drafting program to create a plan to produce a product.

Enduring Understandings

Students will understand that. . .

EU 1

design is a process that is used to systematically solve a problem.

EU 2

technical drawings and sketches should be used to communicate plans to create a product.

EU 3

materials have properties that can alter the manufacturing techniques used to create a product.

Essential Questions

EU 1

- Why is using a systematic approach or a design process essential to create a product?

EU 2

- What type of sketch will best communicate the production of a part?

EU 3

- How can a material's property influence the design of a product?

Knowledge

Students will know. . .

EU 1

- the various steps in the design loop.
- how to work through a problem solving process.

EU 2

- how to interpret working drawings.
- learn how to read measurement on a ruler, dial caliper, and other measuring devices.
- identify tools to create a layout on metal to prepare for processing.

Skills

Students will be able to. . .

EU 1

- apply the steps of the design loop to create a product.

EU 2

- interpret and recreate drawings according to product specifications.
- utilize measuring and layout tools to develop a processing plan on a metallic part.
- use a CAD program to prepare a design for processing or machining.

- Create basic lines and shapes in a CAD software program.

EU 3

- physical, chemical, and mechanical properties of metallic materials.
- the factors that affect a metallic material and its manufacturability.

EU 3

- determine the best procedure to process a part based on the properties of a material.

Stage Two - Assessment

Other Evidence:

- Portfolio completion for assignment using the design loop. (EU1)
- Material properties identification quiz/test (EU3)
- Students demonstrate appropriate hands-on methods to layout and design parts (EU2)
- Teacher approved checkpoints on design/layout with formative feedback (EU2)
- Comparative observations from a template or CAD model (EU2)

Stage Three - Instruction

Learning Plan: Suggested Learning Activities to Include Differentiated Instruction and Interdisciplinary Connections: Each learning activity listed must be accompanied by a learning goal of A= Acquiring basic knowledge and skills, M= Making meaning and/or a T= Transfer.

- Teacher led discussions on how problem solving follows a universal approach. (A) (EU1)
- Teacher led discussions on the different type of material properties. (A) (EU3)
- Teacher led discussions and demonstrations on measurement, layout techniques and tools. (A) (EU2)
- Create and design a product using a design process(M) (EU1)
- Create an enlarged version of a ruler segment using a paper model. (M) (EU2)
- Practice new skill-sets on measuring, layout processes, and create basic designs on CAD. (M)(EU2)
- Create a model mock-up of a product using the correct measuring and layout process prior to manufacture. (M,T)(EU2)

- Apply techniques of developmental work using layout procedures within specifications for a plan to process a part.
(M,T)(EU2)