



Southmoreland School District Advanced Manufacturing Curriculum Overview

Advanced Manufacturing Overview:

Students will form a classroom-based company that will develop a product from design, production and marketing. Students will assume leadership positions within the company and research and develop prototypes to decide on a final product. Next, students will develop a production analysis and process materials through traditional machine operations as well as CNC and graphic operations. Finally, students will market their product through advertising and complete a cost analysis reflecting costs, profits and losses.

Prerequisite: Introduction to Automation

Module Titles:

Module 1: Machine Safety

Module 2: Research & Design Prototype

Module 3: Project Selection & Refined Prototype

Module 4: Manufacturing Assignments

Module 5: Flow Process Charts

Module 5: Tooling Fixtures & Operation Sheets

Module 6: Inspection Gauges & Inspection Sheet

Module 7: Production

Module 8: Cost Analysis

Module 9: Marketing

Module Overviews:

Module 1: Machine Safety

Students will learn about various tools and machines within the material processing environment. Teacher lead demonstrations will be provided and all students must pass a written (and sometimes practical) examination of the machine to use within the course. *Student safety packets are good for the entire school year and must be completed each year.

Module 2: Research & Design Prototype

Students will begin by proposing a number of different project ideas that will be mass produced within the class. Once a list of ideas are generated, discussion and debate will occur over several periods to remove ideas and settle on 4-6 project ideas. Ideas must incorporate 2 distinct materials, be produced within our production facility, incorporate CNC and Graphic applications, and possess some sort of package to keep the components contained if needed.



Southmoreland School District

Advanced Manufacturing Curriculum Overview

Module 3: Project Selection & Refined Prototype

Students will form small groups and complete an extensive research and design project that will lead to a formal class presentation. Students will create a mockup/prototype of the project and complete market research about the product seeking design changes or improvements. Students will refine the design and prepare a formal presentation outline their designs, research, and process bottlenecks that would occur during production.

Module 4: Manufacturing Assignments

Once a final project is selected, students will break down each part step - by - step following the squaring and production procedures. These become specific stages and will be given operation numbers and assign inspection numbers as needed. This will serve as a guide for production and assign students to specific task stages that will set up the production of the project.

Module 5: Flow Process Charts

Utilizing the manufacturing assignments, students will develop a sample Flow Process Chart that is commonly found in industry. Flow process charts will expand to incorporate each time the materials are processed, transported, inspected, delayed in production and placed in storage. Students will list each step and code with the specific industry symbol.

Module 5: Tooling Fixtures & Operation Sheets

Students will be tasked with developing a tooling fixture that will assist in the production of a stage of the project. The tooling fixture will allow students to complete that stage more efficiently and reduce the amount of time needed to register and set up a machine or measure and layout marking for cuts. The fixture should focus on safety as well. Students will develop an industry based operation technical sheet that will accompany the fixture and explain how that fixture works.

Module 6: Inspection Gauges & Inspection Sheet

As parts are developed, inspection gauges will be required to perform quality control stages of production. In industry it is imperative that parts are produced within prescribed tolerances and will be critical to identify defective parts. If parts are becoming oversized or undersized, it will alert the operator that the machine is out of alignment. Students will develop an inspection technical sheet that will explain how the inspection gauge works and provide a situation for rework operation when the parts are too large or pitch when too small or possess any visual defects.



Southmoreland School District Advanced Manufacturing Curriculum Overview

Module 7: Production

Students will safely operate machinery and produce a required quantity of finished products for each student to take home. This will include the processing of materials, finishing and assembling of the product. This will enact the use of each students' tooling fixture, inspection gauge and when needed an assembly fixture to ensure accurate assembly of the project.

Module 8: Cost Analysis

In manufacturing, the general rule of thumb is make a profit. In the event students would market the product, they will need to complete a cost analysis of necessary fees and upfront costs for materials, finishes and energy which would be considered when developing a market sale price. In industry, when material, energy, and labor costs increase, those are typically reflected in the sale price when we see those items in stores. How well did students manage their materials? How much waste did they generate? How much theoretical profit would they generate?

Module 9: Marketing

In manufacturing, marketing of the product occurs in a variety of ways. Students will develop a theoretical package that would group the product and all necessary components together that we would find on the store shelf and develop possible advertising methods through print, graphical, and media outlets. How would the students grasp potential buyers?