

<b>Advanced Machine Tool Technology</b>			<b>Grades 9-12</b>
<b>Standards</b>		<b>Benchmarks</b>	<b>Activities/Examples</b>
1. Students will develop an understanding of the characteristics and scope of technology.	L	Inventions and innovations are the results of specific, goal-directed research.	Student's design a pneumatic air engine with a variety of metals and plastics. The air motor is evaluated upon completion.
2. Students will develop an understanding of the core concepts of technology.	AA	Requirements involve the identification of the criteria and constraints of a product or system and the determination of how they affect the final design and development.	Students are required to make 3 darts in class. The dart barrels can be made with any material the students choose, but must be a certain weight. Students must evaluate the product material for strength, weight and functionality.
3. Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.	J	Technological progress promotes the advancement of science and mathematics.	Read Drawings that are dimensioned in fractional inches, decimals inches and in metric units. Explain.
4. Students will develop an understanding of the cultural, social, economic, and political effects of technology.	K	The transfer of a technology from one society to another can cause cultural, social, economic, and political changes affecting both societies to varying degrees.	Identify the various types of gages found in the machine shop. Use dial indicator. We discuss the use of Imperial measurement and the metric system in a Global system.
5. Students will develop an understanding of the effects of technology on the environment.	L	Decisions regarding the implementation of technologies involve the weighing of trade-offs between predicted positive and negative effects on the environment.	Students understand the use of natural resources to create things within our planet.
6. Students will develop an understanding of the role of society in the development and use of technology.	I	The decision whether to develop a technology is influenced by societal opinions and demands, in addition to corporate cultures.	Students are exposed to the use of automated equipment, which has been known to replace the skilled worker in a factory.
7. Students will develop an understanding of the influence of technology on history.	G	Most technological development has been evolutionary, the result of a series of refinements to a basic invention.	Chapter 1 reading and questions about history and evolution of machine tools starting with the File to modern day automation.
8. Students will develop an understanding of the attributes of design.	H	The design process includes defining a problem, brainstorming, researching and generating ideas, identifying criteria and specifying constraints, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing and evaluating the design using specifications, refining the design, creating or making it, and communicating processes and results.	Student's design a pneumatic air engine with a variety of metals and plastics. The air motor is evaluated upon completion.

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9. Students will develop an understanding of engineering design.	K	A prototype is a working model used to test a design concept by making actual observations and necessary adjustments.	Students often create prototypes before they make a working object.
10. Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.	I	Research and development is a specific problem-solving approach that is used intensively in business and industry to prepare devices and systems for the marketplace.	Students make useful products and sell them. Rattle reel project. This project was developed and tested in a fish house for a year. The students then changed the product, mass produced, and sold it as a fundraiser.
11. Students will develop the abilities to apply the design process.	N	Identify criteria and constraints and determine how these will affect the design process.	Students know their constraints and need to take into consideration while designing their Vise and any other projects they design in class.
	Q	Develop and produce a product system using a design process.	Students make useful products and sell them. Rattle reel project. This project was developed and tested in a fish house for a year. The students then changed the product, mass produced, and sold it as a fundraiser.
12. Students will develop the abilities to use and maintain technological products and systems.	L	Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.	Identify the various parts to the lathe. Sharpen lathe-cutting tools. Describe screw threads on the lathe. Students are tested on their knowledge and safety practices on each piece of equipment.
	N	Troubleshoot, analyze, and maintain systems to ensure safe and proper function and precision.	Identify the various parts to the lathe. Sharpen lathe-cutting tools. Describe screw threads on the lathe. Students are tested on their knowledge and safety practices on each piece of equipment.
	O	Operate systems so that they function in the way they were designed.	Identify the various parts to the lathe. Sharpen lathe-cutting tools. Describe screw threads on the lathe. Students are tested on their knowledge and safety practices on each piece of equipment.
	P	Use computers and calculators to access, retrieve, organize, process, maintain, interpret, and evaluate data and information in order to communicate.	Explain the use of CNC machining equipment to produce various parts of a product.

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17. Students will develop an understanding of and be able to select and use information and communication technologies.	P	There are many ways to communicate information, such as graphic and electronic means.	Students are taught to use Blueprints to communicate the language of Drafting from designer to machinist and Explain the information found on a typical drawing.
19. Students will develop an understanding of and be able to select and use manufacturing technologies.	L	Servicing keeps products in good operating condition.	Students are required to help Lubricate and service the machine tools.