Unit 11 Computer Controlled Woodworking Machines.

Content Area: **Industrial Technology**
Course(s): **Construction Technology II**
Time Period: **4th Marking Period**
Length: **Weeks**
Status: **Published**

Unit Overview

Students will be able to identify and describe how Computer Controlled Woodworking Machines operate.

Students will be able to operate the machines that are avaiable in the Labs.

Transfer

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

Program Computer Controlled Woodworking Machines knowing how G and M codes control the machines ability to move. This will allow students that pursue a Career in the Manufacturing of Wood parts the ability to describe how the machines work.

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

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

Meaning

Students will be able to describe how Computer Controlled Machines perform a task.

Understandings

Students will understand that...

Computer Controlled Machines must be programmed to perform a task.

That Computer Controlled Machines operate with the Cartesian Coordinate System. Polar, Absolute, and Relative Coordinates.

How a Computer Controlled Machines can make more accurate parts then a human.

What are the negatives and the positives of incorporating Computer Controlled Machines into a business.

Essential Questions

Students will keep considering...

Will a Computer Controlled Machines assist with making a part for my project?

Will a Computer Controlled Machines increase or decrease the aesthetics of a project or product?

Why should I be able to descibe how a Computer Controlled Machines operates?

Application of Knowledge and Skill

Students will apply the basic methods of G and M coding.

Students will run one of the CNC Controlled Machines. Ie: Laser Cutter, 3D Printer.

Students will know...

Students will know...

How Computer Controlled Machines work off of the Caretesian Coordinate System.

How Computer Controlled Machines work with G and M Codes to control movement.

What is an additive or subtractive Computer Controlled Machines application.

How to operate a Computer Controlled Machines safely and in the correct manner.

Students will be skilled at...

Students will be skilled at...

Programming and Operation of a Computer Controlled Machines.

Academic Vocabulary

Cartesian Coordinte System, Polar Cartesian Coordinte System, Absolute Cartesian Coordinte System, Relative Cartesian Coordinte System, G and M Computer Programming, gLaser Cutting, 3D Printing, Computer Aided Design CAD, Computer Numerical Controlled Machining, PLA material, ABS material, Cutting Speeds and Feeds.

Learning Goal 1

Basic Computer Programming of Computer Controlled Machines.

9.3.12.AC.1	Use vocabulary, symbols and formulas common to architecture and construction.
9.3.12.AC.3	Comply with regulations and applicable codes to establish and manage a legal and safe workplace.
9.3.12.AC.4	Evaluate the nature and scope of the Architecture & Construction Career Cluster and the role of architecture and construction in society and the economy.
9.3.12.AC.5	Describe the roles, responsibilities, and relationships found in the architecture and construction trades and professions, including labor/management relationships.
9.3.12.AC.6	Read, interpret and use technical drawings, documents and specifications to plan a project.
9.3.12.AC.7	Describe career opportunities and means to achieve those opportunities in each of the Architecture & Construction Career Pathways.
9.3.12.AC-CST.3	Implement testing and inspection procedures to ensure successful completion of a construction project.
9.3.12.AC-CST.5	Apply practices and procedures required to maintain jobsite safety.
9.3.12.AC-CST.9	Safely use and maintain appropriate tools, machinery, equipment and resources to

	accomplish construction project goals.
9.3.12.AC-DES.2	Use effective communication skills and strategies (listening, speaking, reading, writing and graphic communications) to work with clients and colleagues.
9.3.12.AC-DES.6	Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
9.3.12.AC-DES.7	Employ appropriate representational media to communicate concepts and project design.

Target 1

SWBAT identify and describe the Cartesian Coordinate Systems and how it is applied to CAD and CNC machines.

Target 2

SWBAT program CNC machine.

Learning Goal 2

Operation of a Computer Controlled Machines.

9.3.12.AC.1	Use vocabulary, symbols and formulas common to architecture and construction.
9.3.12.AC.2	Use architecture and construction skills to create and manage a project.
9.3.12.AC.3	Comply with regulations and applicable codes to establish and manage a legal and safe workplace.
9.3.12.AC.4	Evaluate the nature and scope of the Architecture & Construction Career Cluster and the role of architecture and construction in society and the economy.
9.3.12.AC.5	Describe the roles, responsibilities, and relationships found in the architecture and construction trades and professions, including labor/management relationships.
9.3.12.AC.6	Read, interpret and use technical drawings, documents and specifications to plan a project.
9.3.12.AC.7	Describe career opportunities and means to achieve those opportunities in each of the Architecture & Construction Career Pathways.
9.3.12.AC-CST	Construction
9.3.12.AC-CST.5	Apply practices and procedures required to maintain jobsite safety.
9.3.12.AC-CST.7	Compare and contrast the building systems and components required for a construction project.
9.3.12.AC-CST.9	Safely use and maintain appropriate tools, machinery, equipment and resources to

	accomplish construction project goals.
9.3.12.AC-DES.1	Justify design solutions through the use of research documentation and analysis of data.
9.3.12.AC-DES.6	Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
9.3.12.AC-DES.8	Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.

Target 1

SWBAT select proper material and diferentiate a subtractive or additive Computer Controlled Machine application.

Target 2

SWBAT safely operate a Computer Controlled Machine.

Learning Goal 3

Select all applicable standards from the Standards tab.
Be sure to include the Anchor Standards for ELA, the Practice Standards for Math, the English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects, and the applicable Technology standards.

Target 1

Target 2

Target 3

Formative Assessment and Performance Opportunities

Students will be graded on hands on programming and operation of a Computer Controlled Machine by instructor observation. This will be done in the weekly work grade.

Summative Assessment

Students will be graded by tests on Computer Controlled Machines programming in Google Classroom.

Students will be graded by safety tests on Computer Controlled Machines operation in Google Classroom.

Accommodations/Modifications

Students with Accommodations/Modifications can be assisted by students that have already completed the task.

Students with Accommodations/Modifications can retake the topic tests or take the test with a Special Needs Teacher.

Unit Resources

Online Youtube videos related to Computer Controlled Machines.

Online tests posted in Google Classroom related to Computer Controlled Machines.

21st Century Life and Careers

Select all applicable standards from the applicable standards

CAEP.9.2.12.C	Career Preparation
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.
CAEP.9.2.12.C.5	Research career opportunities in the United States and abroad that require knowledge of world languages and diverse cultures.
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.
CAEP.9.2.12.C.7	Examine the professional, legal, and ethical responsibilities for both employers and employees in the global workplace.
CAEP.9.2.12.C.8	Assess the impact of litigation and court decisions on employment laws and practices.
CAEP.9.2.12.C.9	Analyze the correlation between personal and financial behavior and employability.

Interdisciplinary Connections

MA.K-12.5	Use appropriate tools strategically.
9-12.HS-ETS1-1.1	Asking Questions and Defining Problems
9-12.HS-ETS1-1.1.1	Analyze complex real-world problems by specifying criteria and constraints for successful solutions.
9-12.HS-ETS1-4.5.1	Use mathematical models and/or computer simulations to predict the effects of a design solution on systems and/or the interactions between systems.
9-12.HS-ETS1-2.6	Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles and theories.
9-12.HS-ETS1-4.ETS1.B.1	Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a given design will meet his or her needs.
9-12.HS-ETS1-3.ETS1.B.1	When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.
9-12.HS-ETS1-2.ETS1.C	Optimizing the Design Solution
TECH.8.1.12	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.A.CS2	Select and use applications effectively and productively.

TECH.8.1.12.B	Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
TECH.8.1.12.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
TECH.8.1.12.D.5	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.
TECH.8.1.12.D.CS1	Advocate and practice safe, legal, and responsible use of information and technology.
TECH.8.1.12.D.CS2	Demonstrate personal responsibility for lifelong learning.
TECH.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.
TECH.8.2.12	Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
TECH.8.2.12.A.2	Analyze a current technology and the resources used, to identify the trade-offs in terms of availability, cost, desirability and waste.
TECH.8.2.12.B.4	Investigate a technology used in a given period of history, e.g., stone age, industrial revolution or information age, and identify their impact and how they may have changed to meet human needs and wants.
TECH.8.2.12.B.CS1	The cultural, social, economic and political effects of technology.
TECH.8.2.12.B.CS2	The effects of technology on the environment.
TECH.8.2.12.B.CS3	The role of society in the development and use of technology.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.C.CS1	The attributes of design.
TECH.8.2.12.D.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
TECH.8.2.12.D.5	Explain how material processing impacts the quality of engineered and fabricated products.
TECH.8.2.12.D.CS1	Apply the design process.
TECH.8.2.12.E.3	Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).