KPBSD Computer Aided Drafting/Compter Aided Manufacturing I – Curriculum 2017

Industry Standards

Skills USA Automated Manufacturing Technology Standards

1. Perform mathematical and measurement calculations used in automated manufacturing situations. MFG 1.1, 1.2, 1.4
2. Design, sketch, and plan machine work to U.S. National CAD Standards. MFG 2.1, 2.2, 2.5, 2.6
3. Create a toolpath (CAM file) and the CNC code to related duty tasks of the National Institute for Metalworking Skills (NIMS) Duties and Standards for Machining Skills, Level I. MFG 3.1, 3.2, 3.3, 3.4, 3.5
4. Perform CNC machining functions given a scenario to the related duty tasks of the National Institute for Metalworking Skills (NIMS) Duties and Standards for Machining Skills, Level I. MFG 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11
5. Perform and inspect part(s) using a Total Quality Management process. MFG 5.1, 5.2, 5.3
6. Demonstrate safety practices in a working situation to the related duty tasks of the National Institute for Metalworking Skills (NIMS) Duties and Standards for Machining Skills-Level I. MFG 6.1, 6.2, 6.3

ALASKA STANDARDS ALIGNMENT:
[CAD/CAM I](#)

Transfer Goals

Students will be able to independently use their learning to…

- Design media using computer software and output to a CNC machine.
- Utilize critical thinking to make sense of problems and persevere in solving them.
- Identify careers that use CAD/CAM applications.

Meaning

ENDURING UNDERSTANDINGS

Students will understand…

- How to utilize basic drafting and design tools to measure and draw within a standard tolerance.
- And draw items to an appropriate scale.
- How to determine the length and shape of an object.
- How to use lines that meet drafting standards.
- How to make parts from scaled drawings with a machine.
- How to digitize a given object into a part file (reverse engineering).
- That CNC machines are used to create specialized parts.
- The spatial relation between views (Cartesian coordinates system/Pan Views) and objects.
- The process of toolpath sequencing.
- What an orthographic view of an object looks like.
- How to utilize appropriate speed and feed rates while operating a CNC machine.

ESSENTIAL QUESTIONS

Students will keep considering…

- How can I use drafting and design tools to create a product?
- How can I edit projects to ensure quality?
- How can I safely operate CNC machines?
- Why they use CNC machines?
- What dimension and scaling techniques were used to make this product?
- What defines a quality product?
- What career opportunities are available using CNC machines?

	- There are various file extensions associated with machine parts. - How to evaluate various types of file formats and select the most appropriate format for each CNC machine to use for machining the part. - That quality control is a planned process that ensures a product, service, or system meets established criteria. - And recognize the design process includes many stages, factors, and inherently designs have a set of constraints and criteria. - How to analyze and evaluate solutions based on the needs of customers, society, or environment. - That clamping and positioning techniques are for holding down parts to be processed. - And explore various careers related to graphic design and machining.	
	Acquisition	
	Students will know… - Appropriate safety rules in any given setting. - There are multiple tools within the given software to perform given tasks. - Dimensions are used to create precision and accuracy. - Coordinate grids and how to identify an X and Y axis. - Evaluate and digitally reverse engineer an object.	Students will be skilled at… - Following appropriate safety requirements. - Creating 2D objects using modification, editing, drawing, and annotation tools and techniques. - Predicting the outcome of a 2D object. - Using dimension tools to ensure part accuracy. - Using measurement tools along X and Y axis.

| | • Know CNC machines have appropriate feed rates in order to function properly.
• Know CNC machines require specific file formats.
• Identify career opportunities available in construction, engineering, and manufacturing fields related to CAD/CAM. | • Evaluating an object and reproducing it digitally in 2D (reverse engineering).
• Explaining and applying the appropriate feed rates for the CNC machine being utilized.
• Choosing appropriate file formats for CNC machines.
• Positioning and securing media on machining surface.
• Locating materials and resources to research current information on careers. |

Evidence

Evaluative Criteria	Assessment Evidence
Design and Quality Rubrics CTE Content Rubrics SkillsUSA standards	• Draw a basic shape to a predetermined dimension. • Create a 2D scale drawing. • Create a 2D drawing of a tangible object. • Student will be able to create orthographic views of a 3D object. • Use a CNC machine to create a predefined part that the student has designed. • Use of AKCIS to identify careers in the manufacturing fields related to CAD/CAM.

Resources

skillsusa.org,

NCCER, 2009 Core Curriculum

NCCER Basic Safety module 09

NCCER Introduction to Power Tools 09

SkillsUSA Technical

Drafting 2011 Equipment: PlasmaCAM cutting machine

Drafting Software: AutoCAD (from AutoDesk)

Drafting Program 2010

Additional Drafting Software: Chief Architect 2010