

# Unit 1: Hand/Machine Drawing Processes

Content Area: **Industrial Technology**  
Course(s): **Auto CAD I**  
Time Period: **1 marking period**  
Length: **10 Weeks**  
Status: **Published**

## Unit Overview

---

In this unit, Students will be learning the Mechanics and Processes of Proper Engineering Machine/Hand Drawing. Students will be exploring all the techniques and formatting associated with these processes, which are utilized by Engineers and Drafters in the Field. This unit is to be used as a segway into computer based design, serving as the foundational skills for such designs to be built upon throughout the class.

## Transfer

---

Students will be able to independently use their learning to

- Complete real world tasks typically asked of architects and engineers
- Work as a drafter for any design firm without any college experience
- Utilize design principles normally used by engineerings and architects
- Apply critical thinking skills for any task, especially ones focused on utilizing design aspects

---

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

[http://www.authenticeducation.org/ae\\_bigideas/article.lasso?artid=60](http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=60)

## Meaning

---

## Understandings

---

Students will understand

- Conventions and principles of machine drawing and design
- Different drawing view points, and their significance
- Sketching principles and shortcuts to efficiently produce machine drawings
- Properly utilization of scale in the context of machine drawing
- Labeling of machine drawings

## **Essential Questions**

---

Students will keep considering

- Is there a simpler process for producing machine drawings?
- Am I properly labeling and making the drawing in a way that is legible to my reader or client?
- Am I following all the correct conventions for machine drawings?
- Does the drawing I made properly illustrate what was suppose to be shown?

## **Application of Knowledge and Skill**

---

### **Students will know**

---

Students will know

- What are the orthographic and isometric view points/perspectives
- How to utilize different types of engineering drawing paper for machine drawings
- Positions of different pieces of machine drawings
- What each type of line means within a machine drawings

## **Students will be skilled at**

---

Students will be skilled at

- Utilizing different tools in order to create more accurate drawings, such as rulers and protractors
- Selecting which engineering paper to use for any drafting task
- Efficiently generating machine drawings of both simple and complex objects/parts
- Having clean line work in their machine drawings, with no indication of smudging or mistakes

## **Academic Vocabulary**

---

Orthographic Projection

Isometric Projection

Line Conventions

Drawing Principles

Engineering Paper

Protractor

## **Learning Goal 1 - Basic Line Conventions / Drawing Principles**

---

Utilize line convention principles in order to draw proper machine drawings

TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.1.12.E.CS2	Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
TECH.8.1.12.E.CS3	Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.
TECH.8.1.12.F.CS4	Use multiple processes and diverse perspectives to explore alternative solutions.

## **Target 1 - Line Convention Principles Introduction**

---

SWBAT Follow principles of design for machine hand drawings and line conventions

TECH.8.1.12.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.1.12.E.CS3	Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.

## **Target 2 - Line Conventions Understanding Assessment**

---

SWBAT Apply principles of design conventions to presented preselected scenarios in order to assess knowledge of the topic

TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.E.CS2	Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.

## **Learning Goal 2 - Orthographic Projections**

---

SWBAT Utilize Orthographic Projection Style to show detailed views of real world objects presented on a 2D space

TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.1.12.E.CS2	Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
TECH.8.1.12.E.CS3	Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.
TECH.8.1.12.F.CS4	Use multiple processes and diverse perspectives to explore alternative solutions.

## **Target 1 - Orthographic Projection Introduction**

---

SWBAT Create drawings based on the principles of Orthographic Projections

TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.E.CS3	Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.

## **Target 2 - Orthographic Project Understanding Assessment**

---

SWBAT Demonstrate knowledge of orthographic projections on an individual level, by complete assigned drawing challenges for assessment

TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.F.CS4	Use multiple processes and diverse perspectives to explore alternative solutions.

### **Learning Goal 3 - Isometric Projections**

---

SWBAT Utilize Isometric Projection Style to create drawings of 3D objects in a 2D space

TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.1.12.E.CS2	Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
TECH.8.1.12.E.CS3	Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.
TECH.8.1.12.F.CS4	Use multiple processes and diverse perspectives to explore alternative solutions.

### **Target 1 - Isometric Projection Introduction**

---

SWBAT Create drawings based on the principles of Isometric Projections

TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.1.12.F.CS4	Use multiple processes and diverse perspectives to explore alternative solutions.

### **Summative Assessment**

---

- Performance Task
- Test/Quiz
- Benchmark Exam Drawing
- Challenge Drawing of Marking Period

### **Target 2 - Isometric Projection Understanding Assessment**

---

SWBAT Demonstrate knowledge of isometric projections on an individual level, by completing assigned drawing challenges for assessment

TECH.8.1.12.A.CS1	Understand and use technology systems.
TECH.8.1.12.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.1.12.E.CS3	Evaluate and select information sources and digital tools based on the appropriateness for

specific tasks.

TECH.8.1.12.F.CS2

Plan and manage activities to develop a solution or complete a project.

## **21st Century Life and Careers**

---

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
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.3	Identify transferable career skills and design alternate career plans.
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.9	Analyze the correlation between personal and financial behavior and employability.

## **Formative Assessment and Performance Opportunities**

---

- Academic Games
- Classroom Discussions
- Classwork
- Closures
- Do Nows / Warm Ups
- Group Work
- Homework
- Student / Teacher Discussions
- Think-Pair-Share
- After School and Lunch Opportunities
- Project Correction Opportunities
- Challenge Drawings

## **Accommodations/Modifications**

---

- Alternative Assignment to Orthographic and Isometric Projection Project for Students who struggle with drawing and measuring in order to still grasp positioning and orientation for future computer work
- Resizing of all drawings and paperwork for the Orthographic and Isometric project for students with vision difficulties
- If Vision issues with computer screens, can adjust size of text font and icons to fit the needs of the students
- If ESL, Language adjustments can be implemented into AutoCAD
- If ESL, Alternative Notes can be provided

- Preferential Seating will be provided for the sake of demonstrations, note taking, and general physical and behavioral accommodations
- 504 Accommodations
- Additional Challenging / Enrichment Tasks
- Grouping
- IEPs
- Drawing of the Month
- Scaffolding Questions
- General Use of Technology Accommodations (Adjusted to meet needs of student in accordance to 504/IEP)

## Unit Resources

---

- AutoDesk Design Handbook
- General AutoCAD Practice Websites - <https://www.investintech.com/resources/blog/archives/5947-free-online-autocad-tutorials-courses.html>
- Khan Academy
- Youtube Tutorials - [https://www.youtube.com/channel/UC0bEfqT1FZudcnyegNvtu1A?view\\_as=subscriber](https://www.youtube.com/channel/UC0bEfqT1FZudcnyegNvtu1A?view_as=subscriber)

## Interdisciplinary Connections

---

LA.RH.9-10.3	Analyze in detail a series of events described in a text; draw connections between the events, to determine whether earlier events caused later ones or simply preceded them.
LA.RH.9-10.7	Integrate quantitative or technical analysis (e.g., charts, research data) with qualitative analysis in print or digital text, to analyze information presented via different mediums.
LA.WHST.9-10.6	Use technology, including the Internet, to produce, share, and update writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.
9-12.HS-ETS1-1.1	Asking Questions and Defining Problems
9-12.HS-ETS1-4.5	Using Mathematics and Computational Thinking
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.