



Geneva Timing Mechanism

Overview: Students will develop a Geneva Timing Mechanism using CNC and manual mills. They will start with materials that have been pre-cut by a saw or lathe. Students will learn about basic functions of CNC and manual mills. They will be asked to use mills to change their materials into a functional Geneva Timing Mechanism using the Process Document that provides them with step by step instructions.

Goal: Students will learn about basic manual and CNC operation, tooling used and the function of Geneva Timing Mechanisms.

Unit duration: 5 – 7 weeks.

By the end of this unit, students will be able to:

- Identify tooling and basic manual and CNC mill parts.
- Interpret and apply instructional steps.
- Produce materials to function as a Geneva Timing Mechanism.
- Select what processes need to be done prior to others.
- Understand order of operations/process.
- Apply the use of PPE (Personal Protective Equipment), practicing proper safety.

Materials

- Prepped Aluminum Flat Bar (Base)
- Prepped Aluminum Round Stock (Wheel & Slotted Wheel)
- Edge Finder
- Dial Indicator
- 1/4" X 1 1/4" Dowell Pins
- 3/16" X 1" Dowell Pins
- 3/4" Cap Screws
- 1/2" Cap Screws
- 1/4" Countersink
- B Drill
- 1/4" Reamer
- V-Blocks
- J Drill
- #16 Drill
- .1865 Reamer
- 1/2" End Mill
- Files
- Deburr Tool
- 3/16" X 3/8" 4 Flute End Mill
- Hammer
- Indicated Vise
- Vise Stops
- Parallels
- Fixture for Wheel
- Files
- Deburr Tool
- Fixture for Slotted Wheel
- Tap Handle
- Hand Tap
- Hammer
- CNC Mill
- Manual Mill

Resources

- Process Document
- Overview PowerPoint
- JCC's Manufacturing Technology Institute – 716-484-1101 (if needed for equipment/location)

Timeline:

2 months prior: Order any tooling or materials. If JCC is needed, get in touch.

1 month prior: Prep aluminum.

2 weeks prior: Program CNC Mills for students.

1 week prior: Print out applicable materials, prepare power point.

Activity Overview

Week	Activity	Activity outline	Guiding questions
1	Introduction to Geneva Timing Mechanism	Describe (using PowerPoint): <ul style="list-style-type: none"> • What are Geneva Timing Mechanisms? • Where are they used? • What equipment will be needed to make this one and basic overview. • How the machines operate. • How this equipment is used in manufacturers and what it creates. • What careers are related to this manufacturing function. • Talk about how the aluminum was prepped (lathe function). 	What do you know about Geneva Timing Mechanisms? What do you think they do? What do you know about a CNC machine?
2	Preparing Manual Mills	<ul style="list-style-type: none"> • Explain what dial indicators and edge finders are. • Explain why these need to be used. • What is the goal? • Show students how to use them. • Have students prep manual mills. 	Why is it necessary to use a dial indicator and edge finder? How should we set up the X,Y axis for our parts?
3	Operating Manual Mills	<ul style="list-style-type: none"> • Explain the tooling that will be used on the manual mills. • Show how the manual mills operate. • Explain the importance of clean surfaces. • Show the basic process. • Have students mill their base, wheel and slotted wheel. 	Why would we need to reem out a drilled hole? Why do we need to be sure the surfaces of the vise are clean?
4	Operating the CNC Mills	<ul style="list-style-type: none"> • Explain the CNC mill, how it is programmed, what they are used for, etc. • Show the fixture that was created for this project, explain how and why. • Show how to CNC the wheel and slotted wheel. • Have students operate CNC mills. • If there's time, students can put dowell pins in their base and wheel. 	What do you know about CNC mills?
5	Wrap up	<ul style="list-style-type: none"> • If not done yet, put in dowell pins and deburr any parts that need it. • Clean shop areas. • Reflect on the project. 	What are some ways we could improve the process? What skills did we need or use in order to make this happen?



Judging Criteria

Category	Criteria	Scale	Score
Design	Meets the design criteria (List criteria)	4-5 – Excellent 2-3 – Satisfactory 1 – Unsatisfactory 0 - Missing	
Methodology	Demonstrates intended design (List criteria)	4-5 – Excellent 2-3 – Satisfactory 1 – Unsatisfactory 0 - Missing	
Construction	Craftsmanship Adherence to design (List criteria)	4-5 – Excellent 2-3 – Satisfactory 1 – Unsatisfactory 0 - Missing	
Creativity	Shows creativity and innovation (List criteria)	4-5 – Excellent 2-3 – Satisfactory 1 – Unsatisfactory 0 - Missing	
Presentation	Clear and professional Thoughtful responses to questions Poster – clarity and aesthetics (List criteria)	4-5 – Excellent 2-3 – Satisfactory 1 – Unsatisfactory 0 – Missing	
		Total	