TEAM UP ACADEMY
We Change Lives™

Lesson Plan

Course: CNC Machining Course **Instructor:**

Lesson Title: Introduction to Manual Mill Theory & Process **Date:**

Time Needed for Lesson: 2 hours

Objectives:

- - Understand the role of the manual mill in precision machining.
- - Identify major mill components and their functions.
- - Learn fundamental manual milling operations: facing, slotting, drilling, and pocketing.
- - Recognize the importance of precision flat and angular surfaces in manufacturing.
- - Observe a live demonstration of manual mill operations.

Materials Needed:

- - Manual Knee Mill (Bridgeport or similar)
- - Safety Glasses and Face Shields
- - Sample Block Workpieces
- - Cutting Tools (e.g., End Mills, Center Drills)
- - Whiteboard and Markers
- - Projector or TV for Video Presentation

Hook/Lesson Opener:

Begin with a discussion:

- - What parts in the world around us require precise flat or angled surfaces?
- - Why is the manual mill sometimes called "the backbone" of machine shops?

Encourage students to share examples and experiences.

Presentation:

Video Presentation:

* “ Ultimate Machinist Toolbox Essential Tools for Day 1” by CamInstructor

Link: [The https://www.youtube.com/watch?v=2DoPplcA69QUltimate Machinist Toolbox: Essential Tools for Day 1 on the Job]

* "Manual Milling Basics" by Suburban Tool

Link: https://www.youtube.com/watch?v=tADe1JfPmvI

Instructor Demonstration:

- - Walkthrough of manual mill components: spindle, quill, table, saddle, knee, column, X/Y/Z handwheels.
- - Explanation of basic milling operations: facing, slotting, drilling, and boring.
- - Safety protocols specific to milling (chip control, tool tightening, hand positioning).

Exercise:

Mill Components Identification:

Students will match mill components to their functions.

Component	Function Letter
Spindle	
Quill	
Table	
Saddle	
Knee	

Functions:

1. A. Vertical movement for drilling operations
2. B. Rotates the cutting tool
3. C. Moves the workpiece left and right
4. D. Supports the table and allows front/back movement
5. E. Supports saddle and provides vertical motion

Recap & Connector to Next Lesson:

- - Review key learnings through whiteboard quiz.
- - Discuss why flatness and perpendicularity matter.
- - Introduce next lesson: "Manual Mill Setup & Hands-On Milling Operations."

Assignment:

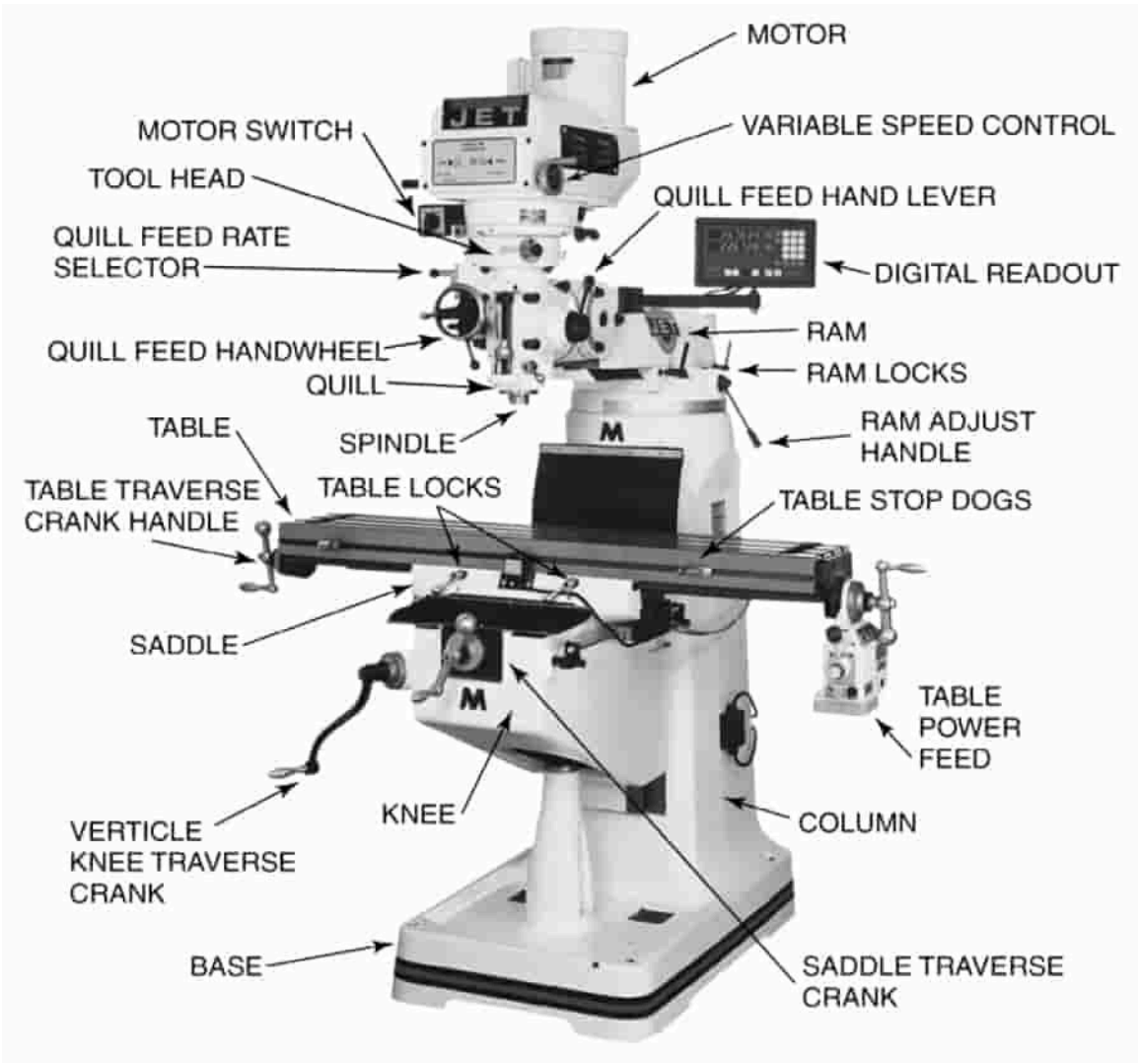
- Watch: "Basic Manual Milling Techniques"

Link: https://www.youtube.com/watch?v=ldV8vGdSfdc

- Write a 1-paragraph reflection: "Why mastering manual milling is still important in a CNC world."

Assessments:

- - Participation in discussions and component identification exercise.
- - Completion and quality of the video reflection assignment.

- 
MOTOR
MOTOR SWITCH
VARIABLE SPEED CONTROL
TOOL HEAD
QUILL FEED HAND LEVER
QUILL FEED RATE SELECTOR
DIGITAL READOUT
RAM
QUILL FEED HANDWHEEL
RAM LOCKS
QUILL
RAM ADJUST HANDLE
TABLE
SPINDLE
TABLE LOCKS
TABLE STOP DOGS
TABLE TRAVERSE CRANK HANDLE
SADDLE
TABLE POWER FEED
KNEE
COLUMN
VERTICLE KNEE TRAVERSE CRANK
BASE
SADDLE TRAVERSE CRANK