4: Milling Machine Training Video Worksheets

Video #1: Machine Shop 4 – Milling Machine 1 (50:33)
http://techtv.mit.edu/genres/24-how-to/videos/127-machine-shop-4

- Mill Parts
  o Which direction does the knee move? ____________________________
  o Which direction does the saddle move? ____________________________
  o Which direction does the bed move? ____________________________
  o What two purposes is the brake used for? ____________________________
  o List the steps to remove a tool:
    • ____________________________
    • ____________________________
    • ____________________________
    • ____________________________
    • ____________________________
  o What do you do if you cannot change from high to low gear? __________

- Quill Feed
  o Note: Power feed no available in lab

- Axis Handfeed
  o Note: Digital readout available on mills for X, Y, Z locating

- Gib Locks
  o What is this device used for? ____________________________

- Power Feed
  o Note: Power feeds not available on mills in lab.

- Digital Readouts
Do we need to worry about backlash with a digital readout? _______________

Note: Head and vise are routinely squared by TA. This does not need to be performed by students.

Accessories and workholding techniques:
- What is the “most common tool”? ___________________________
- To make precise holes, use what tool? _______________________
- To square up stock material, use which tool? ___________________
- What is an end mill held in place with? _______________________
- After you drill a hole, what tool is used to refine a drilled hole? __________
- What tool is used to find the edge of a part? ____________________
- To drill large holes, what tool is used? _______________________

Honor Pledge: I watched this video fully focused and without distraction. No answers were dishonestly obtained. Signed: __________________________Date: __________

Video #2: Machine Shop 5 – Milling Machine 2 (1:03:33)
http://techtv.mit.edu/genres/24-how-to/videos/84-machine-shop-5

- Clamping Stock material
  - How is the hex collet block different than the square one? ________________
  - What is the V-block used for? ________________________________
  - For large parts that don’t fit in the vise, how should they be secured? ______
  - In this operation, how are parallels used? _______________________
  - Should the hold down clamp be exactly horizontal when clamping? ______
  - To cut material at an angle, without readjusting the vise, what tool should be used? ________________________________
What are a few methods to securely clamp awkward positions? 

For clamping up thin material, what should be used?

- Squaring high aspect ratio parts
  - Name some problems of vibrations resulting from cantilevered parts?
    - 
    - 
  - How can one increase the stiffness of the part?

Note: Right Angle Attachment not available for use in lab

- To make high aspect ratio slots, what tool should be used?

- Should coolant be used in this operation? How much?

- Rotary Table
  - How do you reference the center of the rotary table to the center of the quill?
  - What tool can be used to quickly indicate commonly spaced holes?

Honor Pledge: I watched this video fully focused and without distraction. No answers were dishonestly obtained. Signed: ___________________________ Date: __________

Video #3: Machine Shop 6 – Milling Machine 3 (42:36)

http://techtv.mit.edu/genres/24-how-to/videos/143-machine-shop-6

- Squaring Stock
  - What does squaring the stock mean?
  - Why is a concave surface desired?
  - What is a good depth to cut for initial squaring?
For a finishing pass, what is a good depth?

- Squaring a Plate
  - List steps to mill the edge of a part:
    -
    -
    -
    -
    -
    -
    -
    -
    -
    -
  - When milling the edge of a horizontal part, what is a good pass depth for accurate dimensions?
  - Why can one not go deeper per pass?
  - When roughing out stock, or removing large amounts of material, what is a good pass depth?

- Edge-finder
  - To locate the part relative to the spindle of the machine, what tool is used?
  - Does the machine need to be spinning for this tool to be used?
  - Note: The electronic edge finders should not be spun
  - When you have located the edge of the part, is the center of the spindle located over the edge of the part?

- Drilling Holes
  - What tool is used to start drilling a hole?
- What is special about this tool? ____________________________
  ____________________________

- How deep should this first hole be drilled? ____________________________
  ____________________________

- When should cutting fluid be used? ____________________________
  ____________________________

- What precaution should be taken when drilling all the way through a part? __
  ____________________________

Honor Pledge: I watched this video fully focused and without distraction. No answers were dishonestly obtained. Signed: ____________________________ Date: ____________

Video # 4: Machine Shop 7 – Milling Machine 4 (23:07)
http://techtv.mit.edu/genres/24-how-to/videos/183-machine-shop-7

- Reaming Holes
  - How close can one expect a hole diameter to be to the state drill size? _______
    ____________________________
  - If one requires a more accurate hole than this, what tool should be used? ___
    ____________________________
  - How precise can this tool be? ____________________________

- Boring Holes
  - Should this tool be used to take out a lot of material at once? _____________
  - Can this tool be used to take out a lot of material at once? _____________
  - Can absolute hole sizes be bored, or relative? ____________________________
    ____________________________

- Milling a Slot
  - What is the most common tool used for milling? ____________________________
  - What is the depth of cut that can be taken? ____________________________
    ____________________________
- How does one produce a very flat surface, with a good surface finish?

- Milling a Shoulder
  o What is climb milling?
  o What is conventional milling?
  o Which is more dangerous?
  o Which is better for finish cuts?
  o Which is better for rough cuts?

- Cleaning the machine
  o Should compressed air be used to clean a machine?
  o What is the risk?
  o When should the cutting tool be removed?
  o When should the machine be cleaned?

**Honor Pledge:** I watched this video fully focused and without distraction. No answers were dishonestly obtained. Signed: ________________________________________ Date: ____________