Inquiry Question: *How can I make the tools in the engineering shop a place for creative inspiration instead of intimidation?*

Topic: *I will create projects for each "intimidating" tool in the shop, such as the CNC, Mill, Lathe, and Water Jet. I will display these projects so incoming students can get creative inspiration from what they can make with the tools. In addition, there will be a poster that briefly describes each tool and its limits.*

Bibliography

Source #1:

Jennings, Micky R., D.M. Donner, and Tim A. Bacon. "Chapter 9 Part 1: Manual Vertical Milling Machines." Pressbooks, n.d. https://openwa.pressbooks.pub/machining1/chapter/9pt1/.

Annotation:

This source provides information about a manual vertical milling machine which is very important since we do not have a CNC mill. This source is an overview of different parts of the mill and how to properly take care of it when working on my project. It is important to always keep lubricating the machine which it goes over. With each part, there is a corresponding image which helps me visualize what I am supposed to do more than other sources I have found. I will be using this source to become more familiar with the mechanics of the mill than the operation portion.

Source #2:

South Bend Lathe Co. "Owner's Manual for South Bend Lathe Co. Milling Machine Models SB1024, SB1025, SB1026," 2015. https://cdn0.grizzly.com/manuals/sb1026_m.pdf.

Annotation:

This source is the manual to the exact model Milling machine we have in the engineering shop. With this book, I will be able to understand how to operate the machine and how it was made.

This manual will also help me understand the different types of materials I can use on the machine and what I need to accommodate them. For example, it states that if you are trying to cut something such as aluminum it is best to move the belt on another part of the motor to get a bigger RPM. This source will prove to be very useful for learning how to operate the mill.

Source #3:

"What Are Manual Mills and How Do They Work? - CNC Masters." *CNC Masters - Just Another WordPress Site*, 28 Nov. 2022, www.cncmasters.com/manual-mills-when-to-use-one-when-to-not/.

Annotation:

This source gives a broad overview of a manual mill vs a CNC mill. Through these comparisons, it is easy to see what I may be able to make on the manual mill we have. This overview of the mill would also prove useful for my poster that I am creating where I try to briefly describe each tool. Although this source has a lot of great content it won't help me with the actual building process of my project which is why I have the other sources to account for that. I will be using this source as my guide when I create my posters.

Source #4:

Government of Canada, Canadian Centre for Occupational Health and Safety. "Metalworking Machines - Lathes," November 28, 2024. https://www.ccohs.ca/oshanswers/safety_haz/metalworking/lathes.html.

Annotation:

This is an important source I found because the lathe is the most dangerous tool in the shop. This is because the part being cut is rotating at hundreds of rotations per minute. Due to this, it is extremely important that all safety procedures are followed thoroughly and efficiently. I chose this source because it goes over all the safety procedures to a lathe. A few examples of things it goes over is: What you should know before using a lathe, safety principles, and things to avoid. With its in-depth descriptions I will be able to complete my projects as safely as possible for myself and those around me.

Source #5:

"Chapter 10 Part 1: Manual Lathes." Pressbooks, n.d.

https://openwa.pressbooks.pub/machining1/chapter/__unknown__-8/#:~:text=The%20spinning%20handles%20on%20a,while%20using%20the%20manual%20lathe.

Annotation:

This source is made by the same person as source #1 but for a lathe instead. Within this source you learn how to operate a lathe safely and also what to look out for. Since a lathe, similar to a mill, has multiple moving parts it is important to keep it lubricated and this website tells you how to do that (It is different from the mill). With its visual images it is easier to learn about what each part of the lathe does and how to operate it. It also goes over how to properly clean a lathe after you are finished with it which is an important part to keeping our machines in mint condition.

Source #6:

South Bend Lathe Co. "13" HEAVY 13 GEARHEAD LATHE OWNER'S MANUAL," 2012.

https://cdn0.grizzly.com/manuals/sb1049_m.pdf.

Annotation:

This is a manual from the company that manufactured the lathe we have in our engineering shop. This source will help me understand how to actually operate the machine in a safe and efficient manner. The manual gose over all the parts of the machine and their functions so you know if you are using the correct parts. It also lets you know how a lathe actually works so you have a better understanding of the machine. This will help me when it comes to making my poster that will include what a lathe is and what it can do. This source will mainly help me understand how to operate the machine.

Source #7:

Wikipedia contributors. "Water Jet Cutter." Wikipedia, January 12, 2025.

https://en.wikipedia.org/wiki/Water_jet_cutter#:~:text=A%20water%20jet%20cutter%2C%20also,water%20and%20an%20abrasive%20substance.

Annotation:

This source gives an overview of what a water jet is along with its history. Although this source is not useful when it comes to operations it is helpful in understanding how water jets work as a whole. This is because it goes into detail about its high pressure, different abrasive water jets, how to control it, and its benefits. All of these subjects will allow me to deepen my understanding of how a water jet works and why you would use it instead of a CNC. This source will contribute highly to my poster where I will give an overview, descriptive function, and materials you can use.

Source #8:

Dr. Mohamed Hashish. *The Modern Waterjet*. *The Ultimate Guide to Waterjet*, 2021.

https://www.flowwaterjet.com/getmedia/4a99c88c-f9db-4aef-b1f2-78db52c9fc03/the-ultimate-guide-to-waterjet.pdf.

Annotation:

A part of this source I really wanted to use is the materials portion. In this section it talks about the different materials a water jet can cut depending on it being a pure vs abrasive water jet. This will help me better understand the material I should use when making my project and will contribute to the information I put on my poster. It also goes over the advantages of a water jet as well as its versatility. All of these components of this source will greatly help me when it comes to my poster and planning out my projects for the water jet even if it doesn't help me with understanding how to operate it.

Source #9:

"Operation Guide, ProtoMAX," n.d.

https://knowledgebase.omax.com/protomax/content/401434/401434-operation-guide.htm.

Annotation:

This is a manual for the exact model of water jet we have in our engineering shop. Through this manual I will be able to understand how to operate the water jet in a safe manner. The source is especially helpful because it has images that go along with its detailed instructions which will help me better visualize the process. This source also goes deeper into safety that the others

didn't get into. This will help me ensure that the machine, myself, and others around me will be safe while operating. It will also help me understand the water jet on a deeper level than all of the overviews I was reading before.

Source #10:

CAMaster, Inc. "User Manual." Manual, July 23, 2023. https://www.camaster.com/wp-content/uploads/2019/05/CAMaster%20SmartCore%20User%20Manual%20V1.0.pdf.

Annotation:

When it comes to the CNC machine it is difficult to find sources for our model so the most reliable source was the manual. This manual goes over every part of the machine along with the important safety measures you need to follow when operating this large machine. In addition, it goes into detail about the materials that you can use such as plywood, acrylic, and foam. This will help me with the planning process of my capstone project where I will need to figure out what project can be made with which material to get the best result.

Additional Sources as Inspiration for Machining Projects

- Ardent. "9 Milling Machine Projects to Expand Your Toolset and Skillset - American Rotary." American Rotary, March 12, 2024. https://www.americanrotary.com/blog/milling-machine-projects/.
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- "10 Cool Metal Lathe Projects to Hone Your Skills - American Rotary." American Rotary, March 12, 2024. https://www.americanrotary.com/blog/metal-lathe-projects/.
    -
- Pinterest. "Water Jet Ideas," n.d. https://www.pinterest.com/landruncoffee/water-jet-ideas/.