Manufacturing

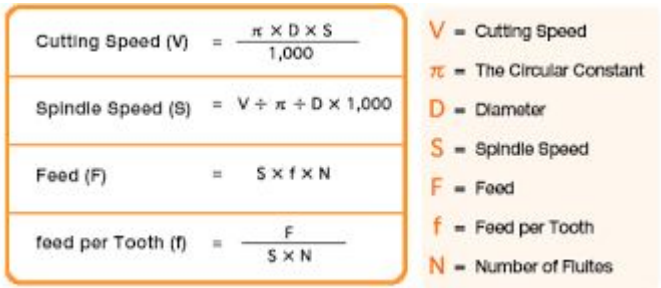
TMJ3C / TMJ4C

Calculating Cutting Speed Project

Project Outline

This project will teach students how to calculate proper cutting speeds for the lathe and milling machine based on the material to be machined and the type of cutter supplied.

The practical portion of this project will have students prepare a blank of rough stock aluminum, practice their layout skills to prepare their blank for machining, and then machine the various diameters of their project by using the lathe and the correct calculated cutting speeds.



Learning Goals

By the end of this project the students will:

- Learn about various types of metals and their properties
- Understand how different materials and cutting tools affect cutting speed
- Be able to calculate the cutting speed for a variety of materials
- Measure and layout out their project
- Understand the importance of proper cutting speed selection when machining

Student Activities

Activity 1 – Research Assignment: Types of Metals (60 minutes)

Activity 2 – Calculating Cutting Speeds (60 minutes)

Activity 3 – Cutting Speeds Quiz (45 minutes)

Activity 4 – Project: Cutting Speed Practice (180 minutes)

Activity 1

Research Assignment: Types of Metals

The goal of this activity is for students to learn about the different properties and uses for various metals. Students will complete this task by researching 6 different metals and use their findings to complete the accompanying worksheet.

Student worksheet

Additional Materials: Metal samples to pass around to students

Activity 2

Calculating Cutting Speeds

The goal of this activity is for students to understand how to calculate proper cutting speeds for the lathe and milling machine. Students will watch a video to learn about different factors that affect cutting speed and why it is important to select the correct cutting speed for the job required. They will complete a worksheet while they watch the video.

Video

Student worksheet

Additional Materials: Cutting tools, various size material samples

Activity 3

Cutting Speeds Quiz

The goal of this activity is to assess the students understanding of cutting speed calculations. The students will complete a quiz where they must calculate the cutting speeds of various materials and diameters.

Student quiz

Activity 4

Project: Cutting Speed Practice

The goal of this activity is to allow the students to use their knowledge of cutting speeds to manufacture a machined piece of aluminum on an engine lathe with various sized diameters. The students will use the drawing provided to layout and prepare the rough stock aluminum for machining. The students are then tasked with calculating the cutting speeds of 4 different diameters.

The students will use the lathe to turn the 4 different diameters on their material using the proper cutting speeds, then they will hand in their project for evaluation using a rubric

Detail Drawing

Rubric

Additional Materials: Aluminum stock, high-speed steel tool bits, height gauge, surface plate, band saw, lathe

Lesson Plan

For complete lesson plans, instructional materials, and additional handouts click this link.