

MEEG 301-18f

Machine Design – Kinematics

Homework #6

Part 1: Engineering Economics

One hardcopy due at the beginning of lecture on 15 November. For problems that utilize the NPV template, print and attach a copy of your work in Excel.

1. The following scenario is being considered by a local Prototyping Shop for purchasing a laser cutter. The following are the terms of the purchase and operation of the equipment:

- Initial purchase price of the laser cutter: \$175,000
- Annual revenue to be generated: \$150,000
- Annual operating cost (labor cost, overhead costs, and electric cost): \$70,000
- Average annual maintenance: \$5,000
- Useful life of the cutter: 8 years
- Salvage value: \$5,000

If the desired MARR on an investment by this company is 20%, is this a good investment? Include a cash flow diagram and show your work using the interest tables. To receive full credit, check your computed answer with the NPV template introduced in lecture. (15 pts)

Also, model the cash flows using the NPV template, and estimate the actual ROR using Excel. (20 pts)

2. Analyze the problem introduced in class on 30 October 2018 regarding the two options for the Pleating Machine being considered by Gore. Determine the NPV for each option at an effective annual interest rate of 12%. For your analysis, use an updated value of \$3.50 per meter of the pleated fabric being manufactured. Also, compute the actual ROR for each machine using the NPV Excel template. Which option would you recommend Gore pursue? (40 pts)
3. A company is considering the purchase of an injection molding machine for use over a 6 year period. Maintenance and machining costs to repair and rework the mold at the end of the first year are projected to be \$25,000, and will increase each subsequent year by \$5,000. Using the interest tables and an effective annual interest rate of 12%, determine the following: (15 pts)
 - 1) a cash flow diagram for the maintenance costs over this 6 year period.
 - 2) the equivalent annual payments of the maintenance costs over the 6 year period using a combination of the given annual payments and gradients payment.

Part 2: Three-Axis Machining Simulation of the "Plate Project" Using MasterCAM

Upload your electronic file on Canvas by midnight on Tuesday, 27 November.

Complete the simulation assignment posted on Canvas in the Machine Shop Project Folder entitled *Hw6_Pt2 MasterCAM Plate Simulation.pptx*. (30pts)