MMAN1130 – Design and Manufacture

Assignment

Due Date: Week 10 Friday – 06/08/2021, 11:55pm

Weighting 35%

INSTRUCTIONS

Assignment

1. Answer the questions from Part A, B and C in a word document. **Note, formatting and professional layout is worth 5 marks!**
2. Save as a PDF file and rename the file "zID_Assignment". E.g. z5734996_Assignment
3. Upload to "Assignment Turnitin Submission" on Moodle.

Early Submission Bonus

If you are able to submit your assignment early, I will apply an early submission bonus. This bonus will be applied to your raw mark. Submitting by the following date will earn:

- Monday Week 10 – 02/08/2021 before 11:55pm = 10%
- Tuesday Week 10 – 03/08/2021 before 11:55pm = 7.5%
- Wednesday Week 10 – 04/08/2021 before 11:55pm = 5%
- Thursday Week 10 – 05/08/2021 before 11:55pm = 2.5%

E.g. If you get a raw mark of 50 and submit before 11:55 on Monday, 50+10%=55

If you get a raw mark of 30 and submit before 11:55 on Wednesday, 30+5%=31.5

CAD Files

1. Create the 3D CAD models and assemble as required in Solidworks.
2. Save the files in a zip file using Pack and Go. See the "How to Create a Pack and Go" pdf in Teams for instructions on how to do this.
3. Rename the part file(s) as "zID_PackAndGo". E.g. z5734996_PackAndGo
4. Upload to "Assignment - CAD File Submission".
5. **DO NOT UPLOAD THE ASSEMBLY DRAWING/CHART TO THE FILE SUBMISSION. THOSE GO IN YOUR REPORT BODY!**

Part A – Machining Theory Questions (20 marks)

1. What is near-dry and dry machining? What are the benefits of near-dry and dry machining? (5 marks)

2. Outline the instructions you would provide a machinist in order for them to produce a M16 x 2 screw hole in a 25mm thick plate of steel. You can assume that the steel is already clamped appropriately in the drill press machine and the machinist has access to all tools required. (5 marks)

3. One of your friends has created a drawing for a conveyor shaft (see Conveyor Shaft Drawing in Teams folder). This will form part of an assembly to autofill bean bags. However, they aren't too sure if they have completed everything required for manufacture. He has asked you for your advice, and you, being the legend you are, are happy to assist.

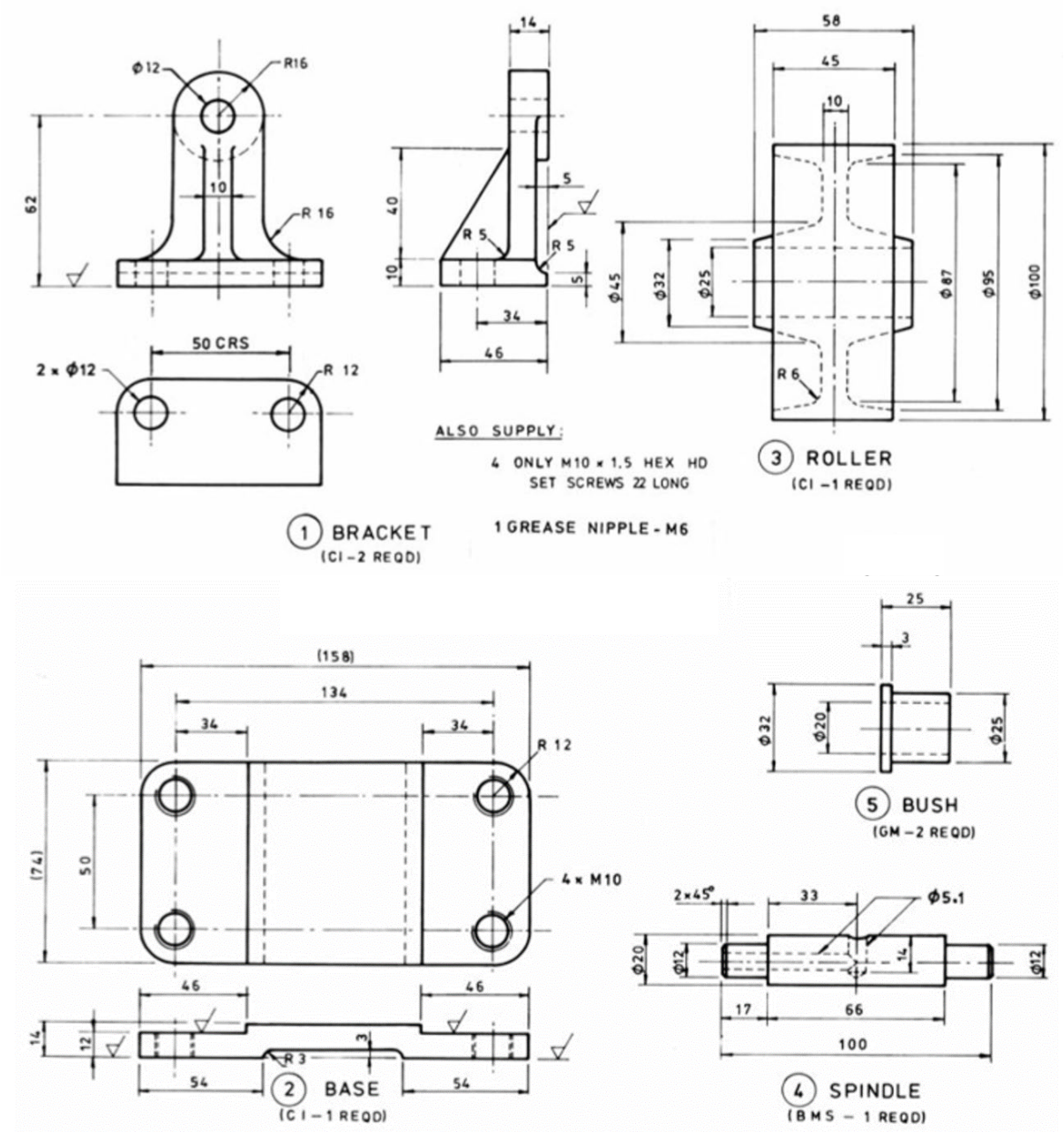
    a. You have noticed there is no tolerance for the diameter of the shaft where the bearings will sit. Provide an appropriate fit designation and justify your selection. (2 marks)
    b. By modifying the providing drawing file, add the bilateral limits to the bearing seat diameter. Include an image of the updated drawing in your report. (2 marks)
    c. Explain why a clearance or transition fit would not be ideal for the proposed operation. (1 mark)

4. Outline the necessary turning operations required to create the part in Figure 1. You can assume that an appropriate piece of stock has been secured into the lathe. HINT: A numbered list is much better than a long paragraph. (5 marks)

Figure 1 – Fancy candlestick

Part B – CAD Assembly and Process Planning Documents (40 marks)

Using the provided component drawings of a roller bracket, you must:



1. Create part files for each component in Solidworks (.sldprt).
2. Assemble the system in Solidworks (.sldasm) (20 marks)
3. Create an assembly chart and an assembly drawing (with bill of materials). (20 marks)

IMPORTANT: The assembly chart and assembly drawing are to be submitted in your report pdf NOT in the Pack and Go. IF IT IS NOT IN THE REPORT, IT WILL NOT BE MARKED.

You must submit a Pack and Go of your assembled system to the "Assignment - CAD File Submission" box in Moodle. See the "How to Create a Pack and Go" pdf in Teams for instructions on how to do this.

Part C – HV Manufacture Study of CNC Machining Assessment Component (40 marks)

With your newly acquired knowledge in high-volume (HV) design, you are now taking your wonderful primary and complementary parts from the CNC Machining Assessment to the masses. Your task is to create a HV process plan to manufacture 50,000 sets of the primary and complementary parts. Note: 1 set consists of a primary AND complementary part.

1. Compare **three** different HV manufacturing methods (one method must be CNC milling) summarising the pros and cons of each. (15 marks)

2. Perform a cost analysis on each method you investigated to select the most cost-effective method. A sample cost analysis table can be found in the Week 9 tutorial slides. Numbers should be based on real values with a source where possible. However, if this is not possible, an estimate with justification is acceptable. (15 marks)

3. For your selected cost-effective method, create a routing chart and work method sheet for each component. (10 marks)

Formatting and Professional Layout (5 marks)

You do not need to have a formal report layout. E.g. Introduction, methods, etc.

Rather, focus on a logical, neat presentation of the information. Consider how best to present information and make it easy for the reader to absorb all your hard work.