Test Project

Module 4 Reverse engineering from a physical model

Mechanical Engineering CAD

Submitted by:

Bruno Filipe Alves Correia – Independent, Independent Test Project Designer

Antonia Marlene Moreira – CENFIM, Independent Test Project

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Introduction

The project contains the following documents / files:

- Printed task and information
- Physical part for modeling
- Given Files

Description of project and tasks

This project requires you to use a 3D scanner and measuring tools to scan and measure the provided component, reverse engineer the damaged impeller, pump body, and pump cover according to the given requirements, and complete the assembly. Create detailed drawings and a rendered image in accordance with the specifications below.

Apart from instructions, you are free to choose Inventor or Fusion to complete the task.

The total time allocated to perform this activity is 4 hours; however, the workpiece will be removed after 2 hours.

Instructions to the Competitor

1. Use the following information to support the measurement process, create the 3D models and save the file as Pump body.ipt:

   (a) Measuring accuracy: ± 0.3 mm.
   (b) Accuracy for holes position: ± 0.4 mm.
   (c) Accuracy for angle: ± 0,5°.
   (d) Radii and chamfer 0.4 mm or less are not required.
   (e) Text, trademarks, logo and numbers should not be modeled.
   (f) Some dimensions of the Pump Body are provided in the Appendix.

2. Use the file generated from the 3D scan of the Pump body to complete the modelling of the Pump cover. You should create an outline similar to that of the Pump body and create the five (5) holes to connect the two (2) parts. The holes should be sized to fit the bolt that will connect the two (2) parts.

3. Due to the assembly process, the Impeller was broken into several pieces during disassembly. Based on the scan data of the fractured fragments, reverse engineer and reconstruct the impeller part, and save it in IPT format.

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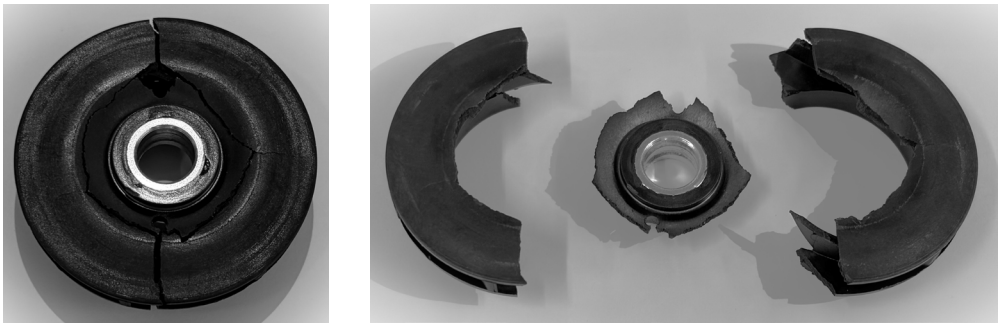


Fig. 1 - Impeller

4. On a sheet (size A1), use the scale of your own choice, create a fully dimensioned detail drawing of Pump Body as follows:
   (a) Add proper view(s) to fully display the structure of the workpiece.
   (b) Place all dimensions as required for the manufacturing. All dimensions should be rounded to two (2) decimal places (0,00), without trailing zero, while all dimension tolerances should be rounded to three (3) decimal places (0.000).
   (c) Add roughness surface symbols and tolerances of form and position.
   (d) Indicate the volume in mm³, and precise to single digits.
5. On a sheet (size A3), use the scale of your own choice, create a detailed drawing of parts Pump cover and Impeller as follows:
   (a) Add proper view(s) to fully display the structure of the workpieces.
   (b) Only annotate the dimensional tolerances and geometric tolerances of the main mating features.
   (c) All dimension tolerances should be rounded to three (3) decimal places (0.000).
   (d) Add roughness surface symbols and tolerances of form and position.
   (e) Indicate the volume in mm³, and precise to single digits.
   (f) Place both parts on the same sheet.
6. Using Autodesk Inventor or Fusion, create a rendered image of Body pump as follows:
   (a) Image Size (resolution): 1024 x 748
   (b) Save the file in .PNG format
   (c) Demonstrate differentiated metallic textures, positions, reflections and lighting style

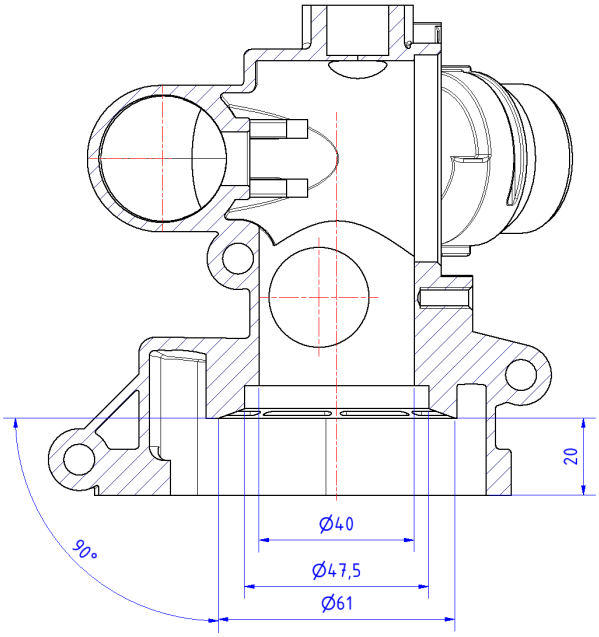
The use of a 3D scanner is permitted from the start of the competition time. The measuring instruments stated in the Infrastructure List and Technical Description are permitted. Please make sure to review all supplied information for additional details and dimensions.

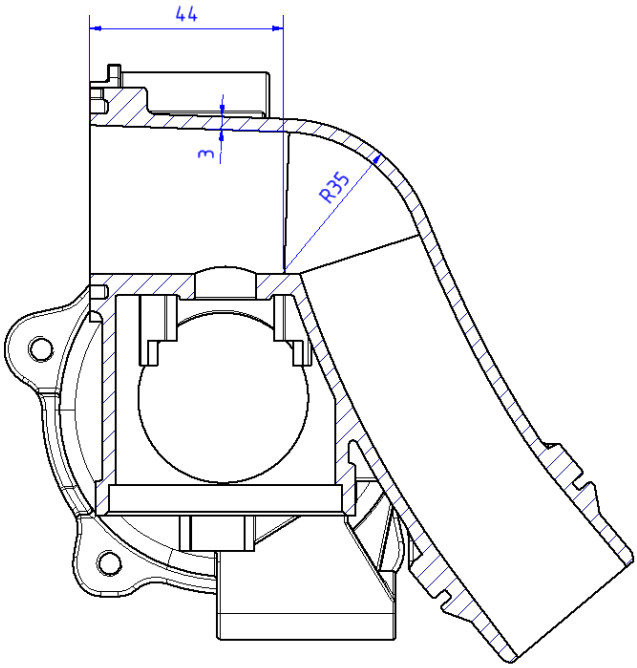
Marking Scheme

CRITERION	SUBCRITERION	MARKS		
		Judgement	Measurement	Summary
D1	Presence of part features	-	6.5	6.5
D2	Accuracy of dimensions	-	11.7	11.7
D3	Tolerances and surface texture	-	3	3
D4	Presentation	1.2	1.1	2.3
D5	3D scanning	1	0.5	1.5
		2.2	22.8	**25,00**

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Appendix





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