

INTRODUCTION TO COMPOSITES -- MFG555

Summer 2002 – Exam 2

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Name: _____

All problems have the same value, although some problems may have several parts.

1. Advanced composites are generally those used for very high performance, such as aerospace and high end sporting goods. Engineering composites are generally those used for lower performance such as fiberglass reinforced plastics, automotive SMC and BMC, and injection moldable reinforced thermoplastics. Discuss the differences between the manufacturing methods for advanced composites (as a group) and for engineering composites (as a group) in light of the following questions:

- a) What are the minimum criteria that must be met by each type of process?
- b) What are the advantages and disadvantages of each type of general manufacturing method (advanced vs engineering)?
- c) What do you see as the direction of new manufacturing methods and why?

2. Describe the problems that might be encountered in making a thick-walled vessel such as a submarine. How would you overcome these problems? What manufacturing method would you use?

3. Give three reasons why vacuum bagging is almost always required for prepreg manufacturing but is rarely used for wet layup.

4. Discuss the advantages and disadvantages of tooling made of composites versus tooling made of metal. When would the metal tooling be most appropriate?

5. You have been asked to prepare a manufacturing plan for making carbon fiber/epoxy golf club shafts. A preliminary plan identified the following as possible manufacturing methods: filament winding, pultrusion, RTM and roll wrapping. Indicate two advantages and disadvantages in the use of each of the methods **for this application**. You have been told to expect production volumes of 10,000 shafts per year. Comment on the costs, quality, and performance expected from each of the methods.