INTRODUCTION TO COMPOSITES -- MFET555

Fall 1998 -- Exam 2

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

1.   Filament winding has the capability of using three types of feedstock: (1) tow which is impregnated as it is applied (wet winding), (2) tow which has been previously impregnated (prepreg tow), and (3) tape which has been previously impregnated (tape winding). Indicate the advantages and disadvantages in using each of these materials.

2.   Identify in two or three sentences the following terms:
a)   geodesic path

b)   fiber placement

c)   gel coat

d)   RIM

3.   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?

        d)   Which of the processes we have discussed fit into each category (advanced and engineering)?

4.   Describe how RTM might be adopted to the use of thermoplastic resins.

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. Discuss these methods as they would be used in making this part and justify the choice of one of them. 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.