

INTRODUCTION TO COMPOSITES -- MFET555

Fall 1998 -- Exam 2

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Name: _____

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

A European manufacturer of prepregs (Ten Cate, from Holland) specializes in selling thermoplastic prepregs. They sell these prepregs as layered materials with all of the appropriate layers already stacked together in a unit. The materials are lightly bonded (consolidated) as sold. The part manufacturer takes the prepregs and molds them. Suggest how this molding might be done and what the advantages this method might offer over other, more traditional methods for making similar parts.

1. Briefly answer the following:

a) What key 3 cost elements should be considered during process selection?

b) You have a 90% learning curve and an initial cost (T_1) of \$1000. What do the following units cost?

T_2 _____

T_4 _____

T_8 _____

T_{16} _____

2. Illustrate and name the elements in a typical vacuum bag layup sequence and give a short (one sentence) purpose for each of the materials.

3. In the design of a filament wound tank, you have previously determined the loads that must be carried by the helical wraps and by the hoop wraps. In the burst test of the tank, you find that the bursting point is exactly at the transition from the cylindrical portion to the domes. You desire to move the burst location onto the cylindrical portion and when you consult a design guide it says to arbitrarily lower the tensile strength value of the fibers when they are used in the helical direction. Discuss why the book would say this and what are the manufacturing consequences of making this modification?4. Discuss the modifications that might be necessary in a tape laying machine to change it from a thermoset machine to a machine that can laydown thermoplastic tape.5. Identify briefly the following terms:

a) gel coat

b) b-stage

c) geodesic path

d) monolithic graphite6. Identify 3 advantages of composite tooling over metal tooling.7. Discuss why thermoplastic prepregs are so difficult to manufacture.8. Briefly identify the following as they pertain to RTM:

a) Name 5 resin systems currently used in RTM.

b) What pressures are usually encountered in injecting resin in an RTM process?

c) Resin usually enters an RTM mold at what location -- Top, bottom, or parting line?

d) Identify the following:

Biaxial braid --

Triaxial braid --

3-D weave --