

CAPE Support Request

{Team Name}
{Competition Year}

Submitted By:

{Names of members working
on this document}

Team Composites Lead:

{Name/e-mail}

Outline: *(Text in red is intended as guidance, remove or overwrite it as appropriate.)*

- I. Team Information
 - a. Competition Information
 - *Names, dates and locations of this year's competitions*
 - b. Composites Lead Member
 - *Name, contact information, experience, etc.*
 - c. Experience & Training
 - *Names of members intending to participate & brief description of their experience with composites*
 - *Approximate number of members who need training*
- II. Historical Information
 - a. Past Work at Cape
 - *Has the team worked at CAPE before? When?*
 - b. Processing Details
 - *Types/materials of molds*
 - *Processes used for part manufacture*
- III. List of Projects
 - a. Existing/Modified projects
 - *List Names of projects here, details in body*
 - b. New Projects
 - *List Names of projects here, details in body*
 - c. Experimental Processes
 - *Detail any new processes with which the team is interested in experimenting*
- IV. Miscellaneous
 - a. Special Requirements
 - b. Comments

I. Team Information

Competition Information

List the competitions in which you intend to participate this year, including competition name, sponsoring organization, dates and location.

Composites Lead Member

The Composites Lead will be the liaison between your team and the CAPE staff. This person will be responsible for arranging equipment usage and meetings, and will have authority over the team's "credit" with CAPE. Include the member's name, e-mail, phone number, and a summary of his or her experience with composites and CAPE.

Experience and Training

List the team members who have experience working with composites at CAPE or elsewhere and are willing to lead and assist other members. Also list members who are willing to attend a training session and then lead and assist other members.

II. Historical Information

Past Work at CAPE

If the team has worked at CAPE in the past, list some of the projects which illustrate the level of proficiency that the current team has reached. Try to characterize the team's current skill level relating to composites design and manufacturing.

Processing Details

Describe the scope of work with which the team has experience. What kinds of molds have current team members designed and built, and from what materials? What composite processes have team members used (VARTM, wet layup, etc.?)

III. List of Projects

Existing/Modified Projects

List the projects/parts which the team has built in previous years, and will build again using existing molds. If the existing molds will be modified, note the extent. Note the process and material you intend to use for manufacturing. Provide a rough estimate of the size of the part and amount of material used to make the part in the past. Each part will require a manufacture plan which will include greater detail. For example:

Project: *Mid-sized Widget*

Mold Requirements: *Existing mold will be modified to smooth sharp edges by sanding and re-sealing*

Process: *VARTM with oven cure*

Material: *Previous year's build required 25 square feet of 9oz fiberglass and two pounds of epoxy. Modified design will require approximately the same.*

New Projects

Provide details similar to the above section for projects for which the team will not re-use an existing mold. For example:

Project: Oversized Widget

Mold Requirements: New mold will be machined from laminated MDF, sanded, sealed and checked to ensure +/- 0.010" tolerance.

Process: VARTM with oven cure, or pre-preg with autoclave cure.

Material: Part area is approximately five square feet, and will require approximately 40 square feet of material. Carbon-fiber is preferred for weight savings.

Innovative Processes

*If you are interested in experimenting with molding or processing techniques which have not been previously demonstrated at CAPE, and will expand CAPE's abilities, you may be offered additional support. Describe those processes here, and CAPE staff will discuss with you the possibilities of pursuing them. **Projects which pursue innovative processes or use of materials may be given priority over those which do not.** For example:*

Project: Widget Bracket

Mold Requirements: A new mold will be built using the rapid-prototyper. This mold will include integrated vacuum and resin channels for more efficient infusion processing, and a thin wall cavity for improved heat transfer during oven curing. Additionally, a newly available mold-coating product, ToolKote, will be tested for use as a low-cycle mold surface.

Process: VARTM processing and oven cure.

Material: To be initially tested and validated with fiberglass and epoxy. Upon validation of the complete process, final parts will be made from Kevlar and epoxy.

Innovations: The integration of processing aids, in this case flow channels and heat transfer aids, into a rapid-prototyped mold has not previously been attempted at CAPE, and is not a common practice in industry. Additionally, the use of ToolKote tool surface material has not been demonstrated on plastic molds. This material was featured in the January 2009 issue of the SAMPE (Society for the Advancement of Material and Process Engineering) Journal and has been widely adopted for use on foam molds, but searching journals and other literature has shown no documented use on plastic molds. We will be investigating its suitability and compatibility.

Validation: In order to demonstrate the viability of these innovations, several tests will be performed on simple prototypes.

1. A small, simple (i.e., a rectangular bar) mold with integrated flow channels will be built in the rapid-prototyper. A part will be built to demonstrate that the mold can be adequately clamped and sealed.
2. ToolKote tool surface material will be bonded to a simple sheet of material from the rapid prototyper. A flat composite test plaque will be infused on the tool surface and oven cured to simulate the processing of a final part. The ToolKote and the plaque will be inspected to confirm durability and performance.

IV. Miscellaneous

Special Requirements

If there are members of your team who intend to work on composites at CAPE and have special health, safety or accessibility requirements, please note them so that we may plan in advance to accommodate their needs.

Comments

Feel free to comment here on any topics related to this process or to the work you intend to carry out at CAPE. If there are concerns or factors which you feel are important and are not addressed above, please describe them.