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NASA TECH BRIEF

Ames Research Center

Cushion Module for Stowing Electronic Equipment

The problem:

To fabricate a polymeric cushion module which meets spacecraft requirements for stowage of delicate instruments.

The solution:

Adjust processing techniques to produce an essentially void-free material and provide for clean removal of finished material from the mold.

How it's done:

The polymeric composition consists of 100 parts of silicone sealant, 1 part catalyst, 15 parts of microspheres, and 35 parts of sodium carbonate powder (by weight). The sealant is poured into a mixing container and then the microspheres and carbonate are added and thoroughly blended. The container is placed in a vacuum chamber, and air is removed with the aid of an externally-operated mixer. Then the catalyst is added and the mixture made homogeneous under vacuum. To prevent air from being trapped during transfer and to permit maximum working time, a piston is used to push the mixture out of the mixing container directly into a refillable mold-injection cartridge. Maximum working time after addition of catalyst is 2 hours at about 20°C, but only one hour at 32°C.

Mold parts are cleaned then washed with 5-percent detergent solution and dried with lint-free material so as to leave a parting surface on the mold for easy removal of polymer casts; the treatment also removes the adherent silicone residues which interfere with removal of casts.

The mold is slowly filled with a mold-injection device which interfaces a piston between the surface of the silicone mixture and a mechanical pressure device; air pressure must not be applied directly to the mixture or piston as this forces air into the mixture. Moreover, the mold should be vented wherever possible to prevent trapping of air. The filled mold is allowed to stand 24 hours at room temperature; then the polymer is cured in an oven for 24 hours, cooled to room temperature, and removed from the mold. Ordinarily, small pieces are readily removed, but larger pieces may tend to adhere; in this event, insert a thin spatula between mold and casting, fill the crevice with isopropanol, and direct low-pressure air into the crevice to free the casting.

The microsphere filler imparts strength to the polymer and sodium carbonate imparts flame-resistance. The void-free polymer composition provides vibration-resistance.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
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Moffett Field, California 94035
Reference: TSP 74-10073

Patent status:

NASA has decided not to apply for a patent.

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Category 04