

with the partial pressure of oxygen and with a mixture of oxygen and nitrogen. The important point to make is that over the range of oxygen pressures in which we operate, the variation and propagation is only a factor of two or three, while by going to totally new material, such as teflon, the propagation rate at the 5 pounds per square inch pressure of pure oxygen—which we have used in our spacecraft cabins—is zero, as is that of fiberglass. Our approach then is one of selecting materials insofar as is possible which do not propagate flame in any atmosphere.

Classes of materials

We can divide the materials in the spacecraft cabin into a number of different classes, but I would like to discuss four with you today; fabrics, fasteners, films and foams (fig. 23, MC67-5965).

FABRIC DEVELOPMENT

	ADVANTAGES	PROBLEMS OR DISADVANTAGES
• BETA FIBER	MELTING TEMP 1540°F DOES NOT BURN	FABRICATION TECHNIQUES ABRASION RESISTANCE
• TEFLON MATERIAL	MELTING TEMP 550°F SELF EXTINGUISHING	FABRICATION TECHNIQUES TOXICITY

NASA HQTRS.
MC67-5965

FIGURE 23

In fabrics, we are considering, among other materials, the use of Beta cloth, which is a new glass fiber cloth, to replace our current fabric material which melts in the range of 400-700° F and will support combustion. The new fiber has a melting temperature of about 1500° F and does not burn. One of the problems with the new fiber is that making garments out of it requires the development of new fabrication techniques. At this point it appears promising. We believe that enough of it can be produced to meet our requirements and that the fabrication problems can be solved.

I might mention also that one of the problems with previous glass fibers has been the dermatological effects when the fabric is worn next to the skin. Preliminary tests of prototype clothing made with the new fiber appear promising in this respect also. A number of people have worn underclothing of this material for some months without any adverse reaction.

A second problem with Beta cloth is that of abrasion resistance. Many of the applications, such as in the outer covering for a spacesuit, require a high order of resistance to abrasion and so far it has not been possible to develop a tight enough weave to provide adequate abrasion resistance in this cloth. A second fabric that is being evaluated and in which there have been some recent developments is that of teflon. Teflon has the advantage of being self-extinguishing in a 5 pounds per square inch oxygen atmosphere. Because of its hardness and smoothness new techniques for fabrication have to be developed before we can apply it. Also, in the thin cross-sections required for nets and similar materials, we need to evaluate the possible toxicity when exposed to flame.