color permeating the entire thickness, which cannot be removed. New transparencies are designed to bounce a small bird in flight, so if you gently push on a new window it should flex slightly. An old window, especially one that has spent its life in the sun, could easily crack by doing the same thing. It is always the best course of action, and less expensive in the long run for many reasons, to store an aircraft indoors.

The second naturally occurring killer is water. Acrylic is hygroscopic, meaning it absorbs water. Transparency thickness fluctuates slightly all day long as it absorbs from 2 to 10% of its weight in water, depending on the humidity. In flight, the aircraft will naturally build up a negative static charge, causing the water to act as a discharge wick. Static electricity literally explodes from the window, leaving a permanent pit behind. The best preventive maintenance is a half-hour per week spent waxing transparencies with paste wax to prevent them from absorbing the water.

Finally, there is abrasion. Your friendly flight line attendant is your worst enemy. While wiping your transparencies with a rag previously used to mop up metal shavings would be bad enough, even more commonly it is the liquids that may be absorbed in the rag. Solvents, paint strippers, acetone, and especially hydraulic fluid literally destroy acrylic transparencies. One FBO, mindful of this problem, issued a directive that personnel would not use rags of any type to clean windshields; rather, they would use new paper towels of the type found in the restroom. Unfortunately, the towels were rough enough to cause damage by themselves. They also set up a terrific static charge that strongly attracted dust and other airborne particulate matter, probably causing more damage than the towel's roughness. It is always best to take the time to clean windows yourself. For the same reasons, it is good preventive maintenance to keep the cockpit as clean as possible. A clean cockpit cuts down on airborne dust, which, after adhering to the inside of the window, will eventually scar it.

Acrylic Transparency Replacement

A glass transparency must be replaced immediately if it is cracked, but that is not necessarily so with acrylic. One of the advantages of an acrylic transparency is that if a crack in the transparency of a nonpressurized aircraft is caught early enough, it is possible to stop-drill it to prevent further damage. Cracks are often the result of relief of internal stresses caused by the manufacturing process or installation. While stop-drilling a crack is certainly cost-effective, pilots should be aware that this procedure does weaken the structure somewhat and the transparency becomes less likely to be able to hold together in the event of a bird strike. Also, the potential for in-flight structural failure may also be somewhat greater. A crack in the outer ply of a laminated acrylic transparency weakens the entire structure somewhat, but a strong inner ply is still capable of withstanding normal stresses. On the other hand, a crack in the inner ply significantly weakens the structure; such a transparency should be replaced.

Delamination

One of the more serious problems associated with transparencies, be it glass or acrylic, happens when the inner layer separates from the other layers. Called *delamination*, it is