

Hail & Storm Damage to Composite GA Aircraft

National Transportation Safety Board
General Aviation Safety Forum

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- This incident is a contemporary experience concerning the inspection and reparability of composite airframes:



Major crack in DA-40 wing

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- Oct. 17th, 2011, a hailstorm ravaged Middle Tennessee State University's (MTSU) 20 Diamond aircraft, 5 Piper and 4 Cessna training aircraft:
 - Loss of life/physical injuries avoided by warning flying aircraft to land immediately,
 - Training fleet endured combination(s) of windshield/canopy cracks and punctures, light lenses shattered and composite fairings damaged,
 - Metal skinned aircraft (Piper and Cessna) suffered substantial damage(s) requiring extensive repair(s).

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- **Diamond Aircraft;**

- Hail damage to aircraft elevators, ailerons and fixed structural members,
- Two planes' outer wing surface were penetrated,
- Diamond Aircraft representatives arrived soon after the storm,
- Damage to the area of the spars where the outer skin could not flex and absorb the golf-ball-sized hail,
- Indentations between the outer skin panel and core material, voids (delimitations) can allow introduction of water into the subterranean core material and structure.

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- **The key points are:**
 - While there was much superficial cosmetic damage from hailstone impact, all but 4 aircraft could be returned to service without repair, with cosmetic damage to be addressed when convenient,
 - Three aircraft required repairs to damaged wing skins and empennage, with full cosmetic refinishing deferred to coincide with scheduled maintenance,
 - Flight controls are sensitive to weight and balance, consequently, several were replaced since repair of damage was not feasible.

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- **Recommendations:**

1. Continuing regulatory oversight (aging aircraft) should emphasize importance of paint and seals for protection against exposure to damaging ultraviolet light and intrusion of moisture and fluids,
2. OEMs specify repair techniques in Structural Repair Manuals (SRMs) prepared for each aircraft. In some instances the SRM data states "Contact the manufacturer for further instructions." This can be problematic.

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- **Recommendations:**

3. AMT training programs (14 CFR147) need to be updated to reflect the skill requirements necessary to inspect, maintain and repair modern composite aircraft and structures.