CALLBACK ASRS

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Refueling Retrospectives

Fuel exhaustion and fuel mismanagement are common causes of engine failures and forced landings. A General Aviation (GA) pilot describes how he and his instructor had to make a forced landing, even after they obtained what they thought was the necessary fuel for their final leg home.

■ *My helicopter CFII and I preflighted the helicopter before…a training flight of about 1.5 hours. We "dip-sticked" the tanks and determined that we had approximately 28 gallons aboard. We expected to burn about 12.5 gallons per flight hour. I monitored our fuel state during the flight. The fuel gauge indicated we had about [5-7 gallons] of fuel for our return flight. The fuel gauge indicated a drop to almost zero while we were enroute. We made a precautionary landing at a private airfield just a few miles from our destination. We persuaded an airfield resident to turn on their fuel pump…There was no decimal on the gauge, no obvious 1/10-gallon indicator numerals. My CFII pumped fuel into…one tank until the fuel pump indictor read "6" and into the second tank until the indicator read "12."*

While preflighting the helicopter again, we noticed that the fuel gauge still indicated zero. Because the gauge had historically intermittently indicated zero instead of the actual fuel state and because we thought we had just on-loaded 12 gallons of fuel, we disbelieved the fuel gauge, took off, and flew on to our destination. I was hover-taxiing back to the ramp when the engine sputtered and quit, requiring an unplanned emergency landing from a three-foot hover.

*The fuel tanks were found to be completely dry, after a flight of only a few miles. Postflight checking of the tanks, fuel boost pumps, and lines revealed no leaks. I believe that we on-loaded only **1.2** gallons of fuel—not **12** gallons as we had thought. We should have taken the time to "dip-stick" the fuel tanks to be completely certain about the amount of fuel on-loaded.*

The reporter paid the airfield resident $20, making that a very expensive gallon of fuel. Still, as the reporter concludes, *That was one of the best buys I've ever made, since it allowed us to fly back to our airport before the engine quit on the ramp—rather than in the air, requiring a real autorotation to the ground.*

Another GA pilot also made a precautionary landing when the fuel gauge did not jibe with the planned fuel burn.

■ *I gave the FBO instructions to fill both fuel tanks to 1/2 inch below the filler neck. I returned four days later, preflighted the aircraft, and looked in both fuel tanks—the level seemed lower than I had requested but not so low that I was suspicious. I departed…and noticed the fuel consumption was more than normal. The right tank ran dry soon after I changed over to it. I advised Center I was going to divert…but I became concerned that I might run out of fuel, so I chose a good looking pasture and made a precautionary landing. I called a [nearby FBO] for fuel. A farmer mowed a strip for me, and I took off and flew the 5 miles to [my diversion airport]. I have a billing account at the departure airport, so no fuel receipt was given to me, and my visual inspection did not clue me in to the fact that I had not been fueled. I should have used a measuring stick in the tanks.*

Visual inspection of tanks, dipstick measurements, fueling receipts (when available), and fuel gauge readings should all concur. If any one is out of synch with the others, the situation warrants a manual fuel check to verify actual fuel status.

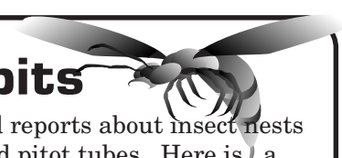
Multiple Misses

Next, an air cargo crew missed multiple preflight cues that their fuel state was not as it should be. In portions of the report not cited here, the Captain lists schedule pressure, crew fatigue, and lack of currency as causes of this incident:

■ *During takeoff, the airplane began to yaw and dip to the left. The takeoff was rejected. While taxiing back, we discovered that the main fuel tank was virtually empty, thus starving the #1 engine of fuel. Apparently the engine flamed out during takeoff, then relit during the rejected takeoff. Further investigation found a fuel valve open which had allowed the main tank to pump itself empty into another tank. Both the Captain and Second Officer missed seeing the low fuel tank quantity, the fuel transfer light, the low fuel tank warning light, and the fuel fill valve switch in the wrong position.*

As the reporter of another fuel mismanagement incident summed up: *Any fuel situation is potentially dangerous, no matter how benign it may appear. As I learned many years ago, fuel in the fuel truck is of little use to a pilot in the air.*

Nesting Habits



In the past, we have shared reports about insect nests found in fuel tank vents and pitot tubes. Here is a report of a new location for those pesky and persistent little wasps known as mud daubers, or dirt daubers. The First Officer of a B-727 cargo flight tells the tale:

■ *Preflight, start, and taxi were normal. Setting power for takeoff, the Captain announced that the #1 and #3 throttles felt misaligned with #2. The decision was made to continue takeoff. Takeoff roll was longer than normal for this weight. Airborne, the Captain and Flight Engineer analyzed the engines and determined that the EPR's [Engine Pressure Ratios] were extremely high on the #1 and #3 engines for the corresponding [engine instrument] readings. The decision was made to return to the airport. Maintenance found the PT2 [Pressure/Temperature terminal 2] probes on engines #1 and #3 to be fouled with dirt dauber nests.*

ASRS Recently Issued Alerts On...
DC generator shaft failure in an SF34
Missing lug nut on Fokker 100 main wheels
Malfunctioning pilot-controlled lighting at a Georgia airport
Glider activity near the final approach of a Tennessee airport
MD11 cockpit smoke and fumes caused by a burned brake coil

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March 1999 Report Intake	
Air Carrier/Air Taxi Pilots	2100
General Aviation Pilots	660
Controllers	48
Cabin/Mechanics/Military/Other	160
TOTAL	**2968**

"Hazmat" in the Hold

Improper carriage of hazardous materials (hazmat) can pose a serious threat to air safety. A private pilot, traveling as a passenger on a commercial flight, reports on an incident involving a common item that some people might not recognize as a hazardous material.

■ *This event was the ignition of a box of wooden kitchen matches contained in my duffel bag. Also contained in my bag was a box of fire starter [sawdust and paraffin, shaped like a candle] which did not ignite. The matchbox fire went out on its own, and was discovered by smell by someone loading the baggage. I was informed that both of these products are illegal to pack in baggage.*

I was traveling with a group for a fishing trip, and packed a duffel bag containing community food and camping gear. I made arrangements to have fuel and stove oil waiting at our destination, as it is common knowledge that these are hazardous materials and cannot be transported safely on a commercial airline. I have spoken with at least 20 people, including many pilots and several flight instructors, and not one was aware that matches were a prohibited material.

The reporter notes that the posted hazmat warning at the airline check-in counter referred to "flammable liquids and solids," but matches were not included in the list of examples. He adds that, later, *At the ticket counter…they took out from behind the counter a flier stating that matches are prohibited. However, it was not posted where the public could read it, and I would not have thought to ask for the flier if this event had not occurred.*

In another incident, a knowledgeable First Officer recognized the danger of carrying two hazardous materials together:

■ *The ramp agent came to the cockpit and handed the Captain a Hazmat form for one container of oil. The Captain rejected the Hazmat form because it listed only one container and we were asked to carry two. The agent returned with new copies of the paperwork.*

The agent then handed the Captain a new Hazmat form for a canister of oxygen [which] would go in Bin 4 alongside the oil. I asked the agent if it was a good idea to put oxygen and oil containers together, since oil and oxygen can combine if we hit turbulence. The agent didn't know. Both the agent and the Captain were satisfied with the oxygen and oil packed together in the same bin. I told the Captain that I was not comfortable with this combination, and did not want to fly with it unless they were separated into different bins.

After discussing several notable aircraft accidents attributed to improper handling of hazardous materials, the crew agreed to have the items loaded into separate cargo areas. The First Officer was wise to insist on the safe course of action.

Great CRM–and Piloting

Some of the most interesting incidents we hear about at ASRS come to us as brief reports from modest crew members. For example, the following report from an L-1011 Captain did not reveal the gravity of the emergency:

■ *The [overwater] flight was uneventful until just west of our destination, when an electrical fire occurred behind one of the circuit breaker panels in the cockpit. The Second Officer [SO] had to discharge a fire extinguisher through a narrow seam crack in the panel. The bright white electrical arcing left the SO visually challenged. An emergency was declared, and we made an uneventful, but challenging, approach and landing.*

Reports from the First and Second Officers and a callback conversation between the Captain and an ASRS analyst told a much more harrowing story. From the First Officer [FO]:

■ *The Captain's autopilot dropped off with several warning flags on his flight instruments. He transferred control of the aircraft to me. During descent, various warning lights illuminated, which were reset several times. We ended up with one pitch trim working.*

The Captain was surrounded by inop flags on his instrument panel, so was unsure of which instruments were still operating. Random electrical warnings erroneously indicated that the aircraft was simultaneously on the ground and in the air.

The FO continues: *The Captain and I had donned oxygen masks as soon as we detected smoke. The Captain had a partial com failure with his oxygen mask, then with his headset/boom mike. Cabin pressurization was climbing.*

Cabin pressurization control was switched to standby mode. The SO found a second fire extinguisher and discharged it into the continuing red glow in the circuit breaker panel.

And finally: *During the approach, we encountered… failure of both direct lift control auto spoilers. At touchdown, spoilers were manually extended. I selected reverse thrust, but no thrust reversers worked. On taxi in, all three engines were in flight idle. At the gate…the aircraft was still pressurized—Flight Attendants could not open the door. The SO tried to shut down all packs and engine bleeds, but could not. The Captain attempted to shut down the engines with fuel and ignition switches, but engines kept running. Engine fire [fuel shutoff] handles were pulled, and engines shut down. The door was opened from the outside, and the passengers exited.*

The final diagnosis from maintenance personnel: an improperly installed wiring clamp had worn through the insulation and shorted out. Kudos to the flight crew for great crew coordination and superb handling of this aircraft emergency.