



Opinion on Maintenance

"How Good is Your Fuel?"

by Bill Andreychuk

Turbine-powered helicopters require clean and uncontaminated fuel to meet the equipment manufacturer's specifications.

From an operator's perspective, ensuring that this basic requirement is met would seem simple enough. But, of course, the reality is not always so.

Recently, my wrench-turning peers and I were involved in a maintenance inspection and service of a privately owned helicopter. The aircraft was a new model and by most standards quite advanced. While performing the scheduled maintenance, we discovered the fuel on board was red in color.

My initial suspicion proved correct: the aircraft had been fueled with marked fuel. What's more, it had been operated using this marked fuel for an undetermined period of time. Accordingly, we carried out some basic research and soon discovered the aircraft owner's fuel supplier had all of his bulk fuel stocks refined to the "higher" aviation standard and had introduced the coloring agent to mark the fuel for that specific purpose. We were assured the fuel quality was the same as the aircraft's required specifications.

True enough, perhaps, but the problem wasn't the fuel quality—it was the effect of the dye packages used to color the fuel. (A follow up with the OEM's service bulletins confirmed this.)

This particular scenario was not as exceptional as you might think. Helicopter operators depend on a number of factors that can affect the quality of fuel they use. These include transportation, storage, handling, and, especially, the ground fueling of aircraft. For their part, operators rely on a variety of their own systems and measures to prevent contamination when the fuel supply is within their immediate control. However, they have to depend on an awful lot of trust prior to delivery.

Of course, many suppliers are diligent about ensuring quality fuel, but not all follow the simple, necessary steps. And considering that aviation accounts for only a minute fraction of the overall fuel market, you can't assume everyone involved from order to delivery is familiar with the peculiar demands and safety systems associated with aviation grade fuel. Obviously, the human factor is huge in the fueling process.

As such, what process or procedure do you follow when

a contaminated fuel sample is discovered? Do you know exactly what to do when making this type of discovery? What about the source of supply? Do we know where the last fuel load came from? Is there a system of record keeping to record the fuel ordered and the fuel delivered? Is the issue isolated to our aircraft and/or ground handling equipment? Are there procedures in place to protect the other aircraft and personnel in the fleet?

So many questions, so many variables.

A number of years ago, I was involved in some construction work involving heavy-lift helicopters. Such jobs depend on the helicopter going out as light as possible. This meant the fuel load was always calculated based on the lift cycles scheduled throughout the day. Basic story: operating light on fuel with multiple refueling based on load calculations.

We had been using the same company-owned fuel truck for some time and had not found any problem with its equipment. However, during one shift we started having fuel boost pump problems and found the aircraft filters and fuel tanks contaminated with what appeared to be fine metal particles. We checked the fuel truck filters and found no contamination. We were stumped. I was left with pulling the aircraft fuel pumps and related sumps and found the pumps and motors coated in iron filings, almost as fine as dust.

We checked the truck again. In turn, we found the fuel pump and filter plumbed in reverse with the fuel flowing through the center of the filter. Our initial inspection had not revealed that the filter was completely packed with contamination from the truck fuel pump. As the truck's pump failed, it generated the iron particles that eventually got passed directly into our aircraft.

In the absence of records, we were left trying to determine who had put the truck together, how long had it been this way, and who else had used fuel from this particular truck.

Thereafter, we ensured knowledgeable staff inspected the fuel delivery system, and we began maintaining a fuel delivery log so as to contact other parties in the event of future findings. Had these basic, non-complex systems been in place, this major and costly difficulty could have been mitigated. Hard lessons learned.

