Fuel Containers Ignite

This item was published in Flight Safety Australia, November 1998.

Most people who fly ultralight or GA aircraft have been exposed to the hazards of transferring fuel.

Before I left home to go flying recently, I decided to transfer standard unleaded fuel from one plastic fuel container (approved type) to another of the same type.

The day was a warm 25°C, with humidity at 65 percent. I was in the shade – not exactly what you would call ideal static generating conditions. Suddenly – *whoomph!* – instantaneous combustion. Result: two burning containers plus myself from the knees down.

Fortunately I carry two BCF fire extinguishers in my aircraft trailer, the door of which happened to be open at the time.

So the 'inflammable man', mumbling "stay calm" and "kill the source" ran for the trailer and grabbed one of the extinguishers (mounted at the rear of the trailer, just inside the door) and with three squirts put out the containers and my burning legs.

–Name withheld by request.

Analysis

The Importance of Voltage

We all know that the little device screwed into the engine cylinder head has the all important function of igniting the fuel-air mixture in the cylinder – it provides a gap where high voltage from a coil or magneto is induced to spark across.

Unfortunately, nature can provide the same high voltage source; if there is the right kind of gap present during refuelling, then you risk ignition of the fuel.

In the same way that a comb brushed through dry hair produces static electricity, so does fuel sloshing around in a container. If the container is made from non-conductive material, for example, plastic or fibreglass, the static electricity can build up to a high charge.

Current Flow

The problem arises when the fuel in a container of high electrical charge comes close to something of a different charge – that is, there is a 'potential difference'. Electrical current will flow if it gets a chance.

If a solid electrical conductor is provided, such as an earthing strap, then the current will flow safely from one body to another.

However, if there is no conductor, and there is a big enough difference in the electrical potential, then a spark can bridge the gap.

And if there is enough fuel-air mixture around, you risk ignition.

It is not hard to reduce the risk of fuel igniting.

You should consider:

- Sparks are a problem only when a fuel-air mixture is present.
- Metal and other conductive containers will reduce electrostatic build-up. If you must use a plastic container, make sure that it is one of the conductive types.
- Before you move fuel from one container to another, you should connect or touch the conductive bits together first, in an area that is not surrounded by fuel fumes – that is, connect the earthing straps before taking the caps off.
- If possible, have everything at the same electrical potential as the ground – that is, earthed to a ground spike.
- Minimise sloshing or splashing when moving fuel.
- Just in case all these precautions fail, have an effective fire extinguisher handy.

– Aussie Pratt, Airworthiness Inspector, CASA ■

New Video – Fuel Management

The CAA has a new safety video available on fuel management. The video is in two parts; the first looks at flight planning and in-flight fuel management, and the second covers basics such as refuelling, de-fuelling, and what to do if something goes wrong. The video is designed to complement the *Fuel Management* GAP, also produced by CAA.

Refer to the March/April 2002 issue of *Vector* for details on how to borrow or purchase this or other titles in the CAA safety video series. Alternatively, see the video list on our web site (www.caa.govt.nz) by clicking on **Safety Information /Videos**.