SUBJECT: Frozen Brakes in the Cirrus Fleet

DATE: March 10, 2014

The Cirrus fleet has proven itself to be susceptible to frozen brakes. Frozen brakes occur when snow or slush melts on warm brake discs allowing a thin layer of water to subsequently freeze between the brake disc and the brake pad. At the least, a frozen brake can be quite an annoyance when it occurs on the ground. At worst, a frozen brake can lead to control issues if it freezes when airborne and is first noticed when landing. As pilots, we need to understand how we can minimize the likelihood of frozen brakes and what actions can be taken to reduce the impact should a frozen brake be encountered.

Simply put, a pilot can reduce the likelihood of frozen brakes. This can best be achieved by adhering to the following practices:

- **Avoid warming the brake discs.** The prospect of frozen brakes will be reduced if you can keep the brake disc from melting the slush or snow. Power management during taxi and judicious use of brakes is imperative. Minimizing brake application is a must! Unless turning or coming to a stop, pilots need to avoid the use of brakes. The dragging of brakes during taxi will lead to warm brake discs and significantly increase the likelihood of frozen brakes. Regardless of temperature, power should be at idle prior to brake application; the exception being if a tight turn needs differential braking when power is applied. Finally, when coming to a stop, reducing your speed through power management can significantly reduce the need for braking.

- **Minimize snow and slush contamination during ground operations.** This can be accomplished by the following:
  - Avoid taxiing through any accumulated slush or snow. While a direct taxi path is most expeditious, adjusting your taxi route to avoid accumulations of slush and snow is essential.
  - If possible, avoid taxiing in areas where there is a layer of blowing snow near the ground. Often times these conditions can be widespread and cannot be avoided, but if conditions allow, then avoidance should be followed.
  - When conducting run-up power checks, make sure the aircraft is in an area of dry pavement. This will minimize the propeller blast from inducing a localized blowing snow condition.
Regrettably, a frozen brake may not be fully avoidable when taxiing on contaminated surfaces during below freezing temperatures. If a frozen brake is encountered during landing and the adhesion between the brake disc and brake pad does not break loose, the aircraft will experience significant yaw toward the side of the frozen brake. Pilots must be prepared to take action to mitigate the risks of such encounters, and being prepared for this starts during preflight planning. When favorable conditions exist for frozen brakes, pilots should choose their airports and landing surfaces carefully. Avoiding a runway excursion and minimizing damage should a runway excursion occur are important preflight considerations. Pilots should only use airports that have well cleared landing surfaces and minimal accumulation of snow embankments along the runway. This likely will restrict pilots to using towered airports or non-towered airports whose favorable conditions have been verified. Diligent preflight planning is a must.

The landing technique is a pilot’s final line of defense combating frozen brakes. First, the pilot should avoid nice smooth soft-field like touchdowns. A firm touchdown on dry pavement is the best type of landing to break the adhesion between the brake disc and the brake pad. Soft touchdowns should be avoided on the first landing back to the airport. If, at touchdown, a pilot encounters a frozen brake, the pilot will need to apply whatever technique is necessary to remain on the runway. This will likely include the need to intentionally lock up both brakes through aggressive brake application to both brakes along with full rudder application in the direction opposite the yawing. A couple blown tires is a small price to pay compared to the potential damage encountered during a runway excursion.