SUBJECT: Avoiding Runway Excursions as a Result of Frozen Brakes

DATE: January 5, 2016

This FIF sets standard practices to minimize runway excursions due to frozen brakes on the Cirrus SR20.

In January 2010, a WMU Cirrus went off the runway while landing and ended up in the snow left of the runway. Both pilots were fine, and the aircraft received minor damage to the right tie-down ring.

This occurred on the initial landing at Hastings airport, on a snow-covered runway. The landing went well, with a soft touchdown. Shortly after touchdown, the aircraft started to drift/veer to the left. The pilot gently applied right rudder but was reluctant to aggressively apply right rudder as the runway was snow covered and he was concerned about further loss of directional control. Ultimately, the aircraft went off the left side of the runway.

The aircraft likely landed with the left brake frozen. When the weight of the aircraft transferred from the wings to the landing gear, the drag from the sliding left tire started to yaw the aircraft to the left. The pilot’s correction with right rudder was not enough to counteract the drag forces of the frozen brake.

Frozen brakes are a reality with winter flying. Even a light dusting of snow can melt on the brake disc, allowing the resultant water to freeze the brake once cooled. Sometimes this freezing occurs on initial taxi, sometimes during flight. When a brake freezes while airborne, the forces encountered during landing usually are sufficient to jar the frozen brake free. Oftentimes, the pilot is not even aware that the aircraft had a frozen brake.
Regardless of whether you suspect a frozen brake or not, the following can help minimize frozen brakes and shall be incorporated into flight crew practices:

During all wintertime operations:

- **Minimize braking while taxiing.** Use power judiciously and taxi with minimal braking necessary to control the aircraft. Do not drag the brakes to compensate for excess power. Cool brake discs have less chance of melting snow and causing a frozen brake.

- **Avoid towing or taxiing an aircraft through loose or deep snow.** Regardless of temperature, minimizing moisture on the brakes will reduce the possibilities of frozen brakes.

- **Position your aircraft for the run-up so as to not blow loose snow back over the brakes.**

- **Check runway conditions prior to landing.** While this can sometimes be done with a thorough weather briefing, it might necessitate a phone call to the FBO or airport manager or a radio call to UNICOM. When practical, use airports that have uncontaminated runways and, if necessary to land on a contaminated runway, land on an area that is clear of snow and ice.

- **If in doubt of runway condition at an out station, do not land.** Divert to a more-suitable airfield.

When operating in conditions at or below -5°C (23°F) with surfaces contaminated with snow, slush or ice, or when blowing snow conditions exist:

- **Avoid soft touchdowns on the first landing.** Wintertime is not the time to impress your passengers, flight instructor or even designated examiner with the landing you just “greased on.” **A firm landing shall be attempted** in order to break the adhesion between the brake disc and pad.

- **Treat any landing after a taxi episode as an initial landing.** After a full-stop and taxi back, or a touch-and-go or stop-and-go where moderate or stronger braking occurs, the next landing shall be considered a “first-landing” and shall be a **firm landing.**

- **Do not attempt a soft field landing technique or try to “grease it on” unless you have previously conducted a “firm landing”, mitigating the risk of a frozen brake.**
• **Choose a runway that will give you the best outcome should you encounter a frozen brake.** When choosing a runway consider wind direction, \( mu \) values and braking action reports, degree of runway contamination, runway width, and the size and location of snow banks. **Do not take this responsibility lightly.** If there is high likelihood of frozen brakes, the pilot is responsible for evaluating the conditions and mitigating the risks to the greatest extent possible. The clearer the runway, the wider the runway and the lower the snow banks provide the best conditions to handle a frozen brake. Generally speaking, towered airports have longer and wider runways and have resources better adept at removing snow, thereby providing better braking action and throwing the snow far from the runway, thus minimizing the snow banks.

If a frozen brake is encountered during any operation:

• **Attempt to keep the aircraft on the runway.** This may include utilizing up to full opposite rudder and locking up both brakes to maintain directional control. Asymmetric braking is typically the largest contributing factor in these runway excursions. Balancing the drag by intentionally locking up BOTH brakes may be necessary to stay on the runway.

• **Report any frozen brakes in CASRS.** This includes any encounter of a frozen brake, even during preflight or taxi out. The reason for these reports is so the college can collect data and better determine the likelihood of when frozen brakes will occur. Predictability of a hazard is key in mitigating the associated risks. When filing a CASRS report, be sure to include all relevant data, including OAT; a description of the snow, slush, or ice conditions; and a brief description of recent aircraft operations. The CASRS program is accessible at [www.wmich.edu/aviation](http://www.wmich.edu/aviation). Please see your flight instructor or the SOF with any questions on submitting a CASRS report.