

Break the Ice

By Kelly Aerospace

ThermaWing is the most advanced de-icing system on the market

ThermaWing is the choice for safety when dealing with ice hazard prevention. Technology usually limited to jets is now made available to the general aviation community and a proven solution to ice build-up. Through research with NASA assistance, Kelly Aerospace Thermal Systems has developed the ThermaWing system, a lightweight, easy-to-install, reliable de-icing system.

This new, flexible, electrically-conductive, graphite foil technology has none of the drawbacks or limited effectiveness of the boot or weeping wing. Instead of the chemical mess of liquid de-icers and the added weight/performance drag of boots, the ThermaWing covers a large surface area without significant weight penalties, yet instantly sheds ice.

The ThermaWing ice protection system development program began in 1999 supported by a NASA small business innovation research (SBIR) grant. The grant was utilized to adapt a graphite heating element, which has been used for decades in other

high-temperature heating applications, to a configuration useful for de-icing an aircraft.

The current FAA-certified heater element configuration was the result of extensive heater development, electronic control system design, and wind tunnel and flight testing. The launch customer for the system was Columbia Aircraft manufacturing (now Cessna) which utilizes a high performance, state-of-the-art composite airframe which offered unique design challenges. On the Columbia 300 and the Cessna 350 and 400, the ThermaWing system utilizes six heaters, three heater control modules, one main electronic controller and one 7,500-watt alternator to de-ice the aircraft.

Once armed, the ThermaWing system will activate at 41 degrees Fahrenheit, starting the de-ice cycle. The impingement area, or leading edge, is kept warm, continually melting impinging ice, or simply, "runs wet." The area just aft of this impingement area, or shedding zone, is kept below freezing, causing the run-back to freeze and collect as ice.

During a de-ice cycle, the voltage is increased and the heaters are pulsed to temperatures above freezing. Raising the temperature of this aft shedding zone breaks the bond between the ice and the heater surface, thereby allowing the ice to be aerodynamically shed from the protected surface.

Once power is removed from the heater, the shedding zones immediately freeze and continue to collect ice until the next de-ice cycle. The unique heater characteristic – virtually instantaneous cooling of the heater – precludes the creation of liquid water and minimal run-back onto unprotected areas of the wing.

This system may take as little as one second per surface and only 33 seconds to de-ice the entire aircraft using a 60-second cycle. Energy is controlled across the system so the leading edge and shed zones can be heated according to need, thus making ThermaWing the most advanced aircraft de-icing system available on the market today.



The ThermaWing De-ice System Minimizes Runback



FAA Icing test flight photo



Installing the ultra-thin lightweight graphite foil



Horizontal Stabilizer Heater Installation



C400 Installation

There are nearly 80 aircraft with the system installed and response has been positive. Kurt Blankenship of NASA comments that ThermaWing is "Some of the most promising technology to ever come our way." Aircraft owners love ThermaWing too. Steve Demy, a pilot and owner with ThermaWing installed, asserts, "Operationally, it is better than TKS (by a lot)! I think we have the best de-icing option that

a little plane can have. My hat's off to the dedicated people at Kelly for all the hard work they've done to bring their system to our airplanes."

The system can be installed on the Columbia 300 and the Cessna 350 and 400 model aircraft. There are several installation and maintenance centers across the globe. The installation centers are Kelly Energy Systems in Montgomery, Ala.;

Goodrich Aviation in Binghamton, N.Y.; Kelly Thermal Systems in Willoughby, Ohio; RDD Enterprises in Redmond, Ore.; and Socata Deutschland/Air Touring in Burbach, Germany.

New installations can be scheduled through Kelly Aerospace Thermal Systems. Contact Bob Remley at (440) 221-9004, (440) 951-4744 or bremley@kellyaerospace.com for schedule and details. ^{CO}

[Edrive]
INNOVATION
LYCOMING APPROVED & CHOSEN
THE BEST LYCOMING ENGINE STARTER... PERIOD!

- UNLIMITED 2YR WARRANTY**
- BEST DUTY CYCLE IN THE INDUSTRY**
(EXCEEDS OTHER STARTERS BY 40%, MORE STARTS!)
- NO BENDIX**
- KICK-BACK IMMUNE**
(NOT A SHREDED SHEAR PIN GUARANTEE WITH INCREASED OPERATING COSTS)

SELECTED & APPROVED BY LYCOMING FOR FACTORY INSTALLATION

KELLY AEROSPACE
WWW.KELLYAEROSPACE.COM
(877) FLY-KELLY