

Rotor Ice Protection Systems (RIPS) —

FLY WITH CONFIDENCE IN THE MOST SEVERE ENVIRONMENTS

Providing advanced ice protection for
today's high-performance helicopters



Collins Aerospace

ROTOR ICE PROTECTION SYSTEMS (RIPS)

Ice detection and protection of rotor blades, engine air intakes and windshields

- Over 100 years experience and expertise drives toward value added solutions in design/development, qualification and certification
- Rigorous aerodynamic, ice accretion analysis, and other state-of-the-art technologies are used to provide advanced ice protection products and systems
- Leading manufacturing practices deliver high quality, reliable hardware that can withstand the most severe environments

DURATHERM® ELECTROTHERMAL ICE PROTECTION

Collins meets today's toughest aerospace environments with a full range of pneumatic and electrothermal ice protection systems. From rotor blades, engine inlets, gear box fairings and leading edges on fixed wing aircraft, we are able to develop ice protection for virtually any aircraft structure. Our patented electrothermal DuraTherm® technology provides a redundant multiple path circuit permitting continuous heater operation, preventing failure or non-operable zones. Even after damage, heater functionality is preserved. Built-in redundancy provides greater fault/FOD/fatigue tolerance and higher reliability.

ICE PROTECTION POWER, DISTRIBUTION AND MONITORING

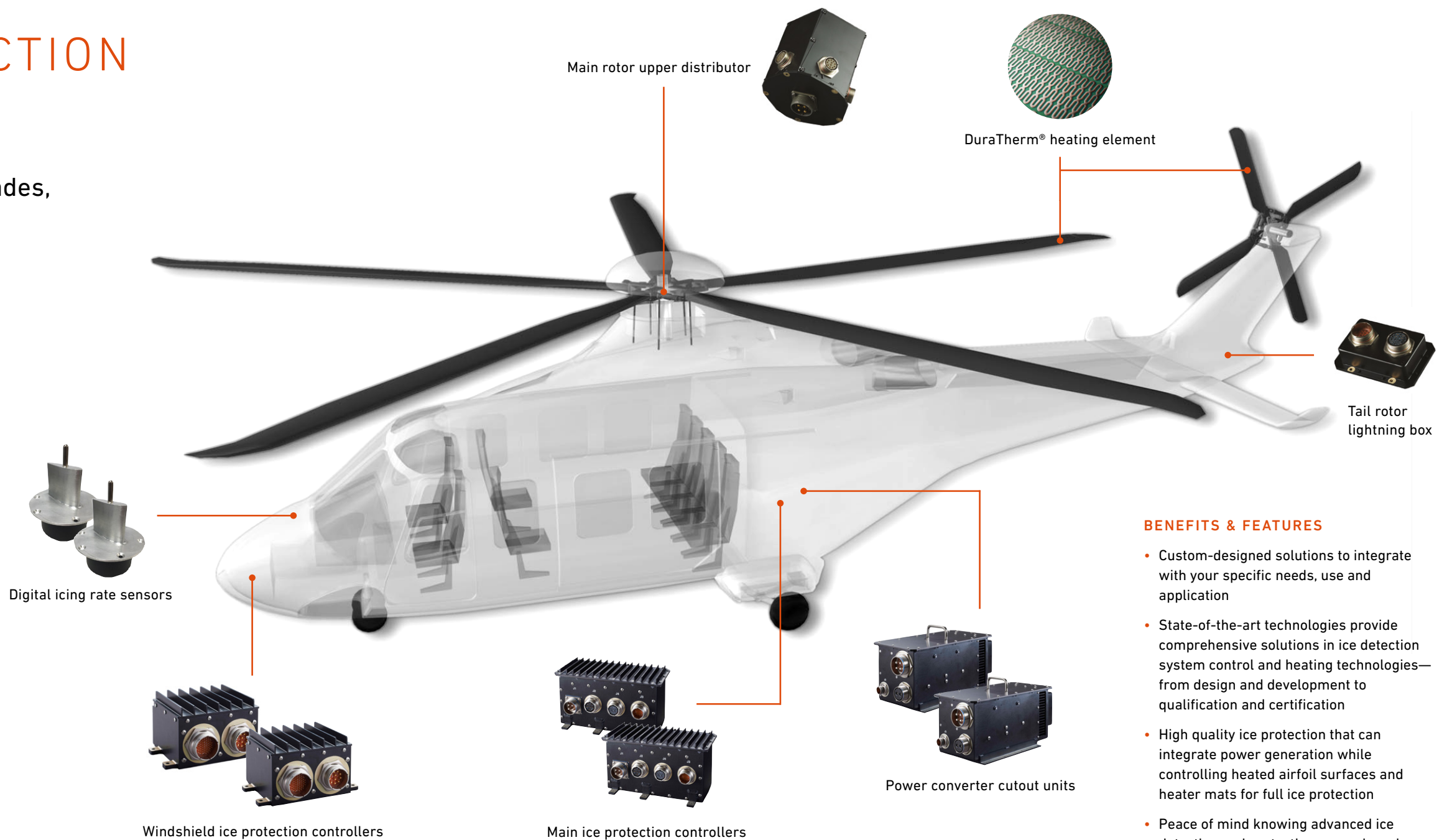
Collins provides the necessary solutions with the latest technology in current monitoring equipment and ice protection system control and power switching. This ensures proper and reliable operation in critical weather conditions, providing power to aircraft heating elements and gradually applying heat effectively, thus extending the overall life of heaters and aircraft structures.

- System solutions that distribute, control and monitor power for every de-ice and anti-ice critical surface including rotor blades, engine intakes and windscreens
- AC or DC heater power control, single or multi-heater element operation and digital or analog control designs
- Duty-cycle modulation control, integral cycle switching, zero voltage turn-on and zero current turn-off to reduce generated EMI
- Warm-up period minimizing thermal stresses
- Automatic system level power adjustment—based on icing severity
- Solid-state power control and LRU fault indication and notification
- Secondary safety cutouts on all input power systems

ICE DETECTION

Collins Aerospace continues to be at the forefront of ice detection technology. Our magnetostrictive ice detection technology provides flexible, robust designs to detect ice in a wide range of icing environments. The technology is capable of detecting ice accretion as little as 0.001" while being insensitive to various types of contamination. The high collection efficiency of our sensing element provides excellent sensitivity relative to aircraft surfaces. Optimized set-points for ice detection and icing severity provide a balance of early detection and minimized ice protection operation. Icing severity and liquid water content measurements from the ice detector can be provided to the ice protection controller to modulate and optimize the control of the ice protection system.

Efficient system design leverages Collins' ice detection experience to ensure that electrothermal ice protection and control occur only when ice is present. Heater mat technology uses high fatigue strength heaters to provide robust ice removal. Low power electrothermal ice protection provides tapered watt density and uniform heater resistance. Improved manufacturing metrics ensure higher quality and lower integration costs with increased throughput.



BENEFITS & FEATURES

- Custom-designed solutions to integrate with your specific needs, use and application
- State-of-the-art technologies provide comprehensive solutions in ice detection system control and heating technologies—from design and development to qualification and certification
- High quality ice protection that can integrate power generation while controlling heated airfoil surfaces and heater mats for full ice protection
- Peace of mind knowing advanced ice detection and protection are on board

To learn more, go to
→ collinsaerospace.com/deicing

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