Villinger GmbH

Gewerbepark 6, A-6142 Mieders, Austria, Europe;
Tel: +43-5225-64455 Fax: +43-5225-6445566 mail: fly@villinger.com

Development of Advanced Aircraft Ice Protection on Propellers

Ice Protection for Aircraft applications featuring: runback ice avoidance improved aerodynamics by smooth surface and defined airfoil, high durability, lightweight, flexible installation

Partner: MT-Propeller / Straubing DE

Development Nr: 20100426PA

Development of aerodynamic improvements on Aircraft Propellers with integrated de Icing application including - test flights

Test Set up:

Comparison of Propellers with Conventional De-Icer boots (Goodrich) to the same type of propeller with integrated de-ice system (Villinger) for improved aerodynamics. Professional comparison test flights together with MT- Propeller according their professional testing standards. Test flights performed on the same day with a high performance single engine piston airplane at similar atmospheric conditions, power settings, weight and altitude to measure performance differences of the two propellers.

Test preperation

Propeller A: : MT - MTV-12-D Propeller with conventional De-Ice boots (Goodrich)

Propeller B: : MT - MTV-12-D Propeller with internal De Ice system (Villinger)

Airplane:
Mooney M20K-231 N231MV with propeller de-ice system installed
Engine: TCM TSIO 360-LB turbo charged - Max cont. power: 210 HP

Comparison test-flights: 04-30-2010

Temp: 14,7 C QNH : 1014 Testing altitude: 6000ft Tank: full

Pilot: Villinger / Eberl

Propeller A: MTV-12-D with conventional de-icer boots (Goodrich)

Propeller B: MTV-12-D with integrated de-ice system (Villinger)

Test Program:

full power
MAP: 37" RPM: 2700

Propeller A: 154 KIAS
Propeller B: 161 KIAS

max. cruise power
MAP: 37" RPM 2500

Propeller A: 147 KIAS
Propeller B: 153 KIAS

economy cruise power
MAP: 30" RPM: 2500

Propeller A: 138 KIAS
Propeller B: 147 KIAS

Fuel flow @ 147 KIAS (accumulated):

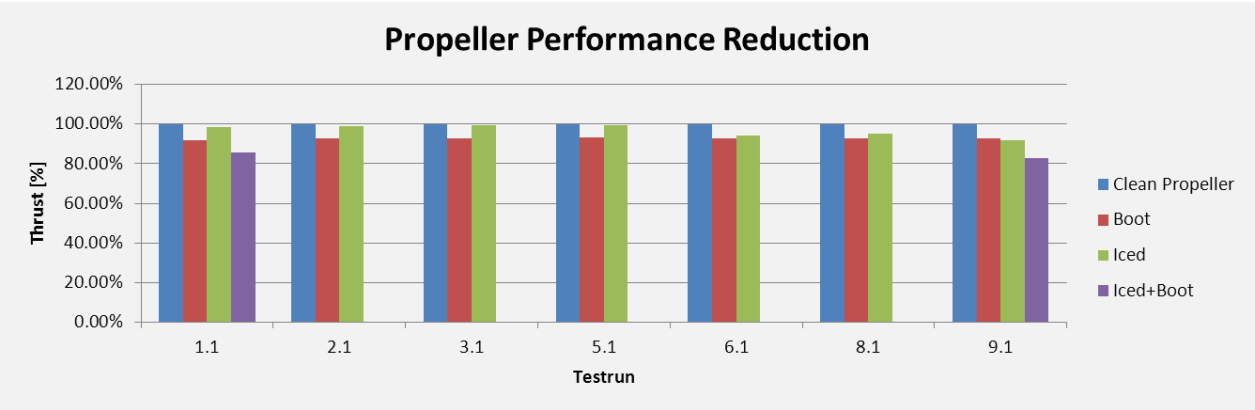
Propeller A: 195 HP fuel flow: 18 g/h
Propeller B: 175 HP fuel flow: 15 g/h
(Villinger Propeller consumes 15 % less fuel @ same speed)

Test flights were conducted in calm conditions at 6000ft altitude - on the same day within 3 hours time . The tests showed a measurable and significant performance advantage of the propeller with Villinger integrated Ice Protection System (Propeller B). At full power Propeller B was 7 knots faster (indicated - air speed) compared to the propeller with conventional De Ice system (Propeller A). This equals 5% more speed with the same power. Flying at the same speed Propeller B requires approx. 10% less power which results in approx. 15% less fuel consumption on the (piston) engine of the test aircraft.

Summary of test flights – conventional vs integrated IPS:

The test flights show that the propeller with the integrated de-ice system which has a completely smooth surface and defined airfoil has significant and easily measurable performance improvement over the same propeller but with the conventional de ice boots.

Airlines operating turbo prop aircraft may achieve significant cost savings due to the reduced fuel consumption. Furthermore the Villinger IPS technology features a much higher damage tolerance resulting in less down time for repair of troublesome conventional de-icer boots.



CFD Simulation - performance Propeller with de-ice boots versus integrated de-ice system