

**CUTTER**

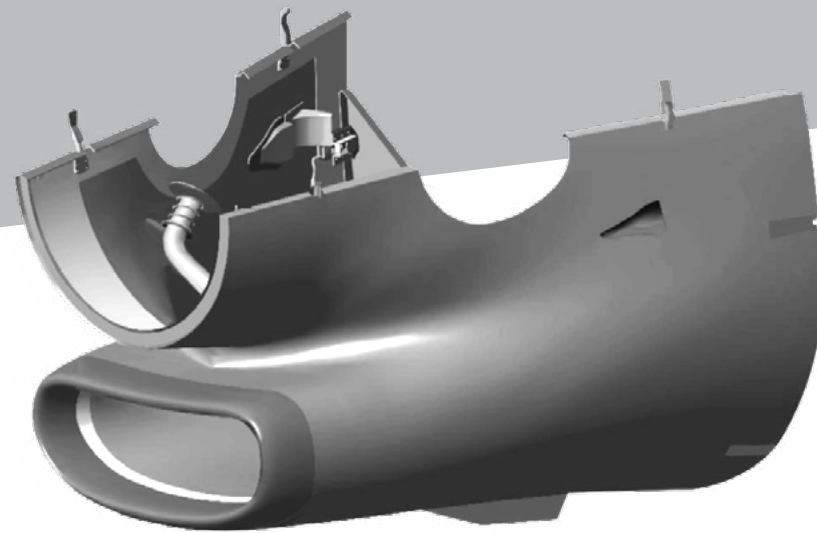
LEADING THE BUSINESS OF AVIATION

**SPEED  
COWL**

**HIGH-EFFICIENCY COWLING SYSTEM  
FOR ALL PILATUS PC-12**

**Improved Take Off Performance  
Quicker Climb: 250-400 ft/min  
Faster Cruise: 10+ kts  
Reduced Fuel Flow  
Increased Range**

# SPEED COWL



After analyzing the PC-12's stock cowling, some areas of improvement were identified – specifically the ram air inlet and internal ducting. This analysis led to the design and manufacture of **Speed Cowl™**. The cutting-edge design combines a cowl inlet which maximizes the recovery of high-velocity ram air and internal ducting that is aerodynamic minimizing air separation and flow losses of the high-velocity air to the engine's plenum. This results in higher available torque at the same ITT settings, which significantly improves the performance of the Pratt & Whitney PT6A-67 turbine engine.

**Speed Cowl™** has been flight tested in multiple flight configurations – climb, cruise at various altitudes, descent, with the inertial separator door open and closed – all at varied torque and ITT settings. During flight tests, under standard conditions, the cruise true airspeed was shown to increase approximately 10 knots in the flight levels. Also, time to climb above FL180 was noticeably reduced due to the available torque increase. Performance improvements will depend on altitude, outside air temperature, and ITT settings.

## LET'S TALK PERFORMANCE

Ram air recovery percentage is the ratio of the measured static pressure around the engine's plenum compared to the dynamic pressure of the aircraft's velocity through the air. Higher ram air recovery percentage results in optimum engine performance.

## INTERNAL AERODYNAMIC DESIGN

## THE FACTS

"We performed two independent tests: one with standard cowl and one with the new **Speed Cowl™**. Take off power authority is impressive! The performance increase during climb was immediately noticeable with between 250-400 ft per minute. Improvements of TAS by 10 knots at cruise altitude at normal and max performance cruise settings."

– Jon L. flying N124R

Internal Aerodynamic Design is a key factor in achieving optimal engine performance. The aerodynamic efficiency of the cowl inlet and ducting are measured by how well dynamic air pressure, created by the aircraft's velocity through the air, is captured at the cowl inlet and converted into static pressure around the engine's plenum. This static pressure is generally expressed as a percentage of what is known as ram air recovery. For instance, 100% ram air recovery would indicate that 100% of the dynamic air pressure is captured by the cowl inlet and 100% of that is converted to static pressure at the engine's plenum. The higher the ram recovery percentage, the better the engine will perform.

At a given interstage turbine temperature (ITT), there is a finite amount of energy that can be produced by a turboprop engine. This energy is shared by the two power absorbing sections of the engine – the compressor section, which compresses air for combustion, and the power section, which turns the propeller. By increasing the ram air recovery to the engine's plenum, less energy is used by the compressor section leaving more energy to drive the propeller.

"We performed two flights, one with standard cowl and one with the **Speed Cowl™**. My impressions are as follows:

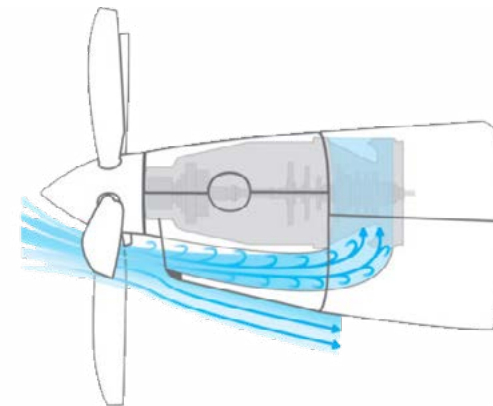
**Climb:** Noticeably improved. In fact, I'd say around 40% in most mid altitudes. We shaved several minutes off the climb to 300 with the **Speed Cowl™** still pulling over 700 fpm at 29,500 compared to less than 500 on the stock cowl. We made 300 in just over 20 minutes with the **Speed Cowl™** and about 24 minutes with the stock cowl. Interestingly, at 260 the **Speed Cowl™** was still climbing at 1,000-1,100 fpm vs. 700 on the stock cowl. Time to climb to 260 was less than 15 minutes with the **Speed Cowl™** and just over 17 minutes with stock. Also, the critical ITT transition altitude is increased several thousand feet from around 15,000 to about 210.

**Cruise:** There is definitely an increase in cruise speed but the gain varies by altitude and variance in air temperature. My generalization would be about a 7-14 knot TAS gain in most scenarios. We used 780 degrees as a baseline for both cowls to gain a comparison at 300, 240 and 15,000. I did go off program at 240 for a max speed run, because, well, I had to know. Temps were ISA +10 and we were about 8,500 lbs. TAS nudged right up to 290 which while exciting, was less than the tables called for. In all fairness, my fuselage has more parasitic drag than most with an HF antenna and some extra other antennas sticking out. Looks like my plane probably won't make NGX speeds but others might!

**Icing performance:** We did not encounter icing conditions; however, on my plane, opening the inertial separator with the stock cowl results in a 2.6 psi torque reduction. Opening the sep with the **Speed Cowl™** results in a 1.6 psi reduction. I can only infer that climb and cruise performance will be improved by 1 psi of torque in icing conditions.

One interesting phenomenon I noticed is a change in harmonics due to the increased airflow. We did a relatively rapid descent from 300 to 240 on both flights and I noticed an increase in harmonics with the **Speed Cowl™**. It is not annoying, just different. Likely related to an increase in airflow I assume. All in all, I'm very pleased with the performance gains."

– Brian C. flying N326V

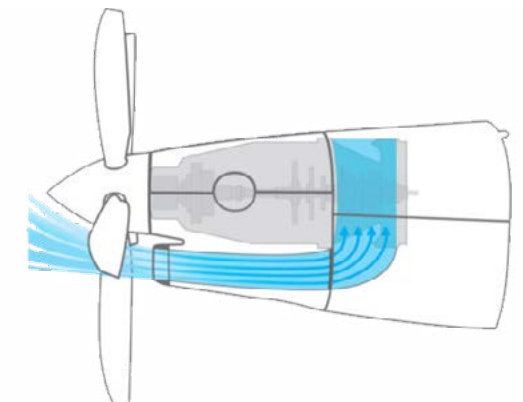


## BEFORE: Standard Factory Pilatus Cowling

Pressure from high-velocity ram air is reduced by turbulence caused by the shank of the propeller near the spinner. Also, the spinner directs much of the airflow to the lower lip of the inlet causing additional turbulence within the ducting. The result is a significant reduction in ram air recovery to the engine plenum.

## AFTER: Speed Cowl™ For Pilatus

Pressure from the high-velocity ram air is fully recovered at the cowl inlet and flows efficiently through the ducting to the engine plenum. This significantly increases ram air recovery to the engine plenum.







## SCHEDULE YOUR SPEED COWL INSTALLATION TODAY!



**Cutter Aviation Denver, CO**  
12180 E. Control  
Tower Rd.  
Englewood, CO 80112  
(303) 799-9999



**Cutter Aviation Addison, TX**  
4500 Claire  
Chennault Drive  
Addison, TX 75001  
(469) 518-5779



**Cutter Aviation Phoenix, AZ**  
2802 E. Old  
Tower Road  
Phoenix, AZ 85034  
(602) 267-4090



**Cutter Aviation San Antonio, TX**  
10440 John Cape  
Road, Suite 101  
San Antonio, TX 78216  
(210) 340-8804

## TRUST YOUR AIRCRAFT UPGRADES TO THE PILATUS EXPERTS



TO LEARN MORE ABOUT OUR SERVICES,  
GO TO [CUTTERAVIATION.COM/SPEED-COWL](http://CUTTERAVIATION.COM/SPEED-COWL) OR CALL 602.267.4090