evoJet B180vx

The evoJet B180vx laid out with all the ancillary parts included in the complete package

It was with great interest that the new evoJet B180vx was received for testing, as it is claimed to be one of the most powerful turbines in its size category, as well as being one of the lightest, allied to which is the simplified installation due to single valve operation.

Supplied in a sturdy cardboard box, and packed neatly into a preformed foam insert, the B180vx is supplied together with a comprehensive package of ancillary items, including the expected ECU, fuel pump, GSU and solenoid valve etc. but also supplied is a filtered fuel tank clunk pick-up and a 4-cell LiFe battery pack.

TURBINE PACKAGE CONTENTS:

- **evoJet B180vx Turbine**
- **ECU (Electronic Control Unit)**
- **GSU (Ground Support Unit)**
- **Solenoid Fuel Valve**
- **4-Cell 13.2 V 2000 mAh LiFe Battery**
- **Fuel Pump**
- **Leads**
- **Instruction Manual**
- **Fuel Tubing**
- **Fuel Filter**
- **Filtered Clunk Pickup**

In the Box

The included English language instruction manual supplied is extremely comprehensive and easy to follow, and includes a clear layout drawing which illustrates the various fuel and electrical connections very well, making a new owner's first installation simple. The various ECU menus are again shown in a very straightforward way in the manual, making programming a painless operation, and the important safety information on installing, operating and flying a gas turbine engine is well described.

Featuring internal kerosene start, the external appearance of the B180vx is exceptionally clean, aided by the temperature sensor also being fitted internally, allowing a completely smooth and unbroken outer finish to the main casing, conventional clamp type mounts being used to secure the engine to the model, or in this case the test rig. All visible parts of the engine have been beautifully machined, and the impression of quality design and manufacture is striking.

Connections to the engine number only three, a single fuel feed line from the solitary external solenoid valve, a main power input and a data lead, these last two connecting to the Jetronic ECU. The use of a single external solenoid valve simplifies the installation in a model, and is explained by the provision of the second valve hidden behind the intake cover of the engine, this operating during the starting procedure.

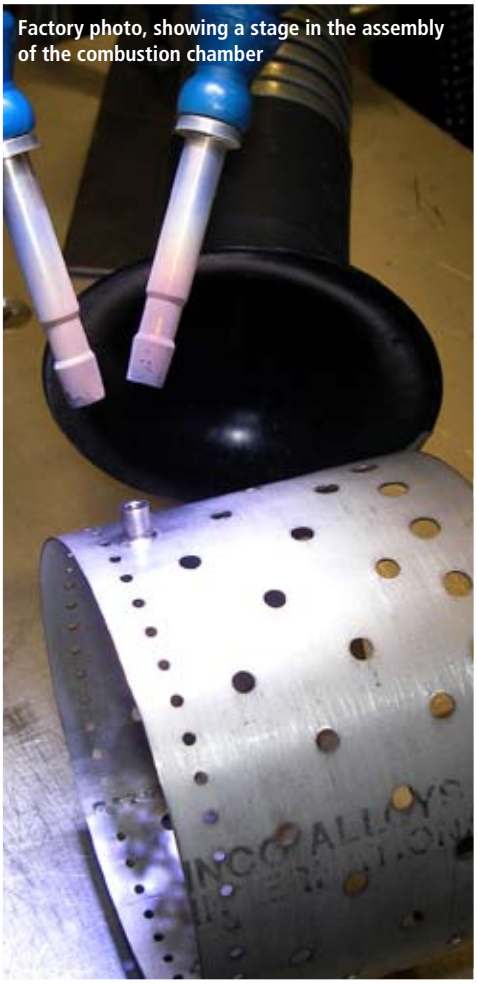
On Test

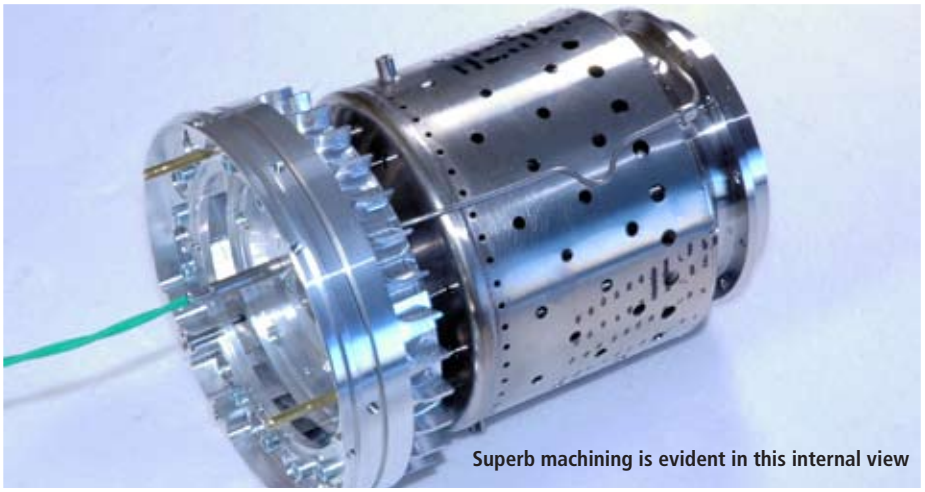
With the engine bolted to the test rig and fuel and electrical connections completed I used the GSU to run the fuel pump and open the solenoid valve to fill the fuel line up to the engine, taking care not to allow the fuel to actually enter the engine. As soon as this was done I was ready to start the engine, this proving to be very simple, the ignition was very smooth and ramping steady, after which the engine carried out a calibration procedure before settling to a very steady idle at 34,000 rpm.

Time taken from the commencement of the start procedure to the engine being at idle and under the operator's control was just over 60 seconds, this being repeated during further starts from cold whilst starts where the engine was still warm were a little faster at around 50 seconds.

The engine was then run up to full power, which topped out at 121,000 rpm and around 170 Newtons thrust, both figures being slightly lower than detailed in the manual and on the evoJet website. A quick check with the factory was made and it was explained that the engine is supplied to customers with very conservative settings, although even with these the engine's performance is very competitive.

If even greater performance is needed then the owner can very easily increase the maximum rpm to the full 124,000 rpm, whereupon as the test results show, a figure of


Factory photo, showing a stage in the assembly of the combustion chamber


Superb machining is evident in this internal view

The superb surface finish shows up well in this photo, along with the attractive orange anodising used on the intake cowl

Not a view a user will normally see, this factory-supplied photo shows what is hidden under the intake cowl

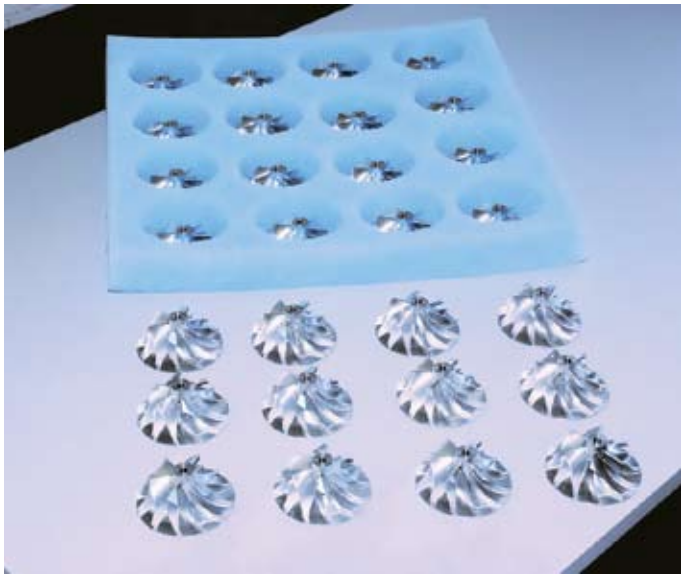
just over 180 Newtons was recorded, corrected to ISA conditions.

In the same manner, the idle speed could be reduced to 31,000 rpm, although this did result in a noticeably slower acceleration, and the reduction in residual idle thrust was not significant, so I would be tempted to leave the idle at the pre-set 34,000 rpm level. With this idle speed the acceleration of the engine to the full power setting of 124,000 rpm was measured at around 4 seconds, with the deceleration figure being almost exactly the same.

Running characteristics were excellent, and the rpm stability extremely good, less than 100 rpm variation being noted at the various rpm points recorded during testing, basically once the rpm required was reached the engine held this very precisely until the throttle stick was moved.

Part of the testing process of all the turbines I run is to run the engine for periods of 60 seconds at points throughout the rpm range and measure the amount of fuel consumed – in the case of the evoJet this continued as normal until the full power setting of 124,000 rpm was reached, when I was surprised to find the engine throttling itself back slightly after around 30 seconds, to a level of 121,000 rpm.

Again this resulted in a question to the factory, the answer being that this a feature of the software, in that if the throttle stick is held at the full power position without any change for more than 30 seconds the engine drops



A batch of beautifully milled compressors ready to be assembled into engines

TEST RESULTS	
Idle rpm	34,000
Idle Thrust	7.0 Newtons (0.71 kg/1.56 lb)
Idle Temperature	600 degrees Centigrade
Maximum rpm	124,000
Maximum Thrust	180.6 Newtons (18.42 kg/40.5 lb)
Maximum Thrust Temperature	750 degrees Centigrade
Fuel Consumption at Max Thrust	769 ml/min
Fuel Used	Kerosene
Lubricant	Aeroshell 500 turbine oil
Fuel/Oil Ratio	5% (20:1)
WEIGHTS	
Turbine (inc Mount)	1705 grams (3.75 lb)
Ancillaries (inc Battery)	510 grams (1.12 lb)
SIZES	
Length	288 mm (11.34″)
Diameter	112 mm (4.41″)

back into a high power cruise setting. If the throttle is moved at any time before 30 seconds is reached this cruise setting is not implemented, and I very much doubt that many model pilots would notice it, as this powerful engine is unlikely to be flown for long periods at full power, it is really only noticeable on a test rig.

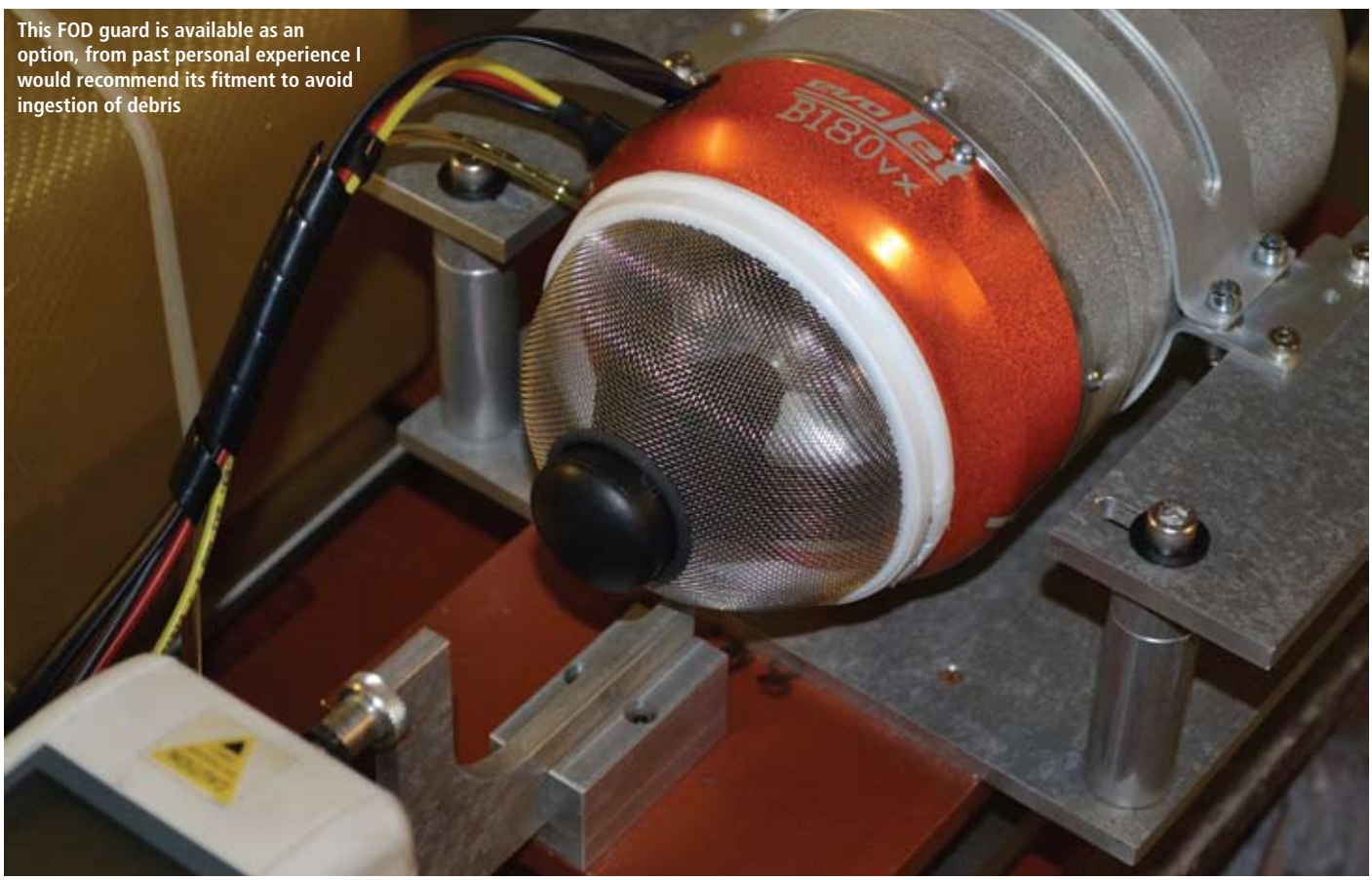
In fact this feature could actually be quite useful, as full power is available for take-off and other limited time periods such as vertical climbs etc., but then a slightly lower thrust level, and of course lower fuel consumption, would occur if the throttle stick is left at the full power position for an extended period, rather like full size aircraft 'military power' option.

Conclusion

Tested fuel consumption proved slightly higher than claimed, however to enable a compact engine such as the B180vx to provide the exceptionally high power it does results in some loss of efficiency right at the top end of the power curve.

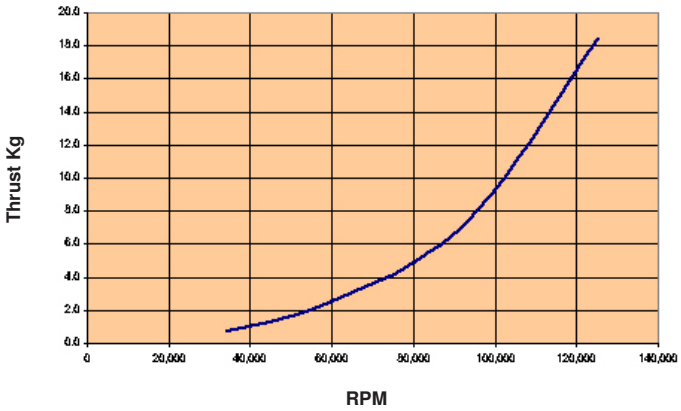
A number of test runs were made during the testing process and the engine behaved impeccably throughout, with no failed starts or problems of any kind, the only issue I had was that additional weight had to be added to the stand for the test rig, as this powerful engine was capable of moving the entire, extremely heavy, stand!

Running an engine such as the B180vx just shows how far model turbines have come over the last few years, being ever easier to install and operate, more and more powerful, yet with faster and faster acceleration – no wonder model jet turbine models are such a growth area of the model hobby with power plants such as this engine from evoJet being available.

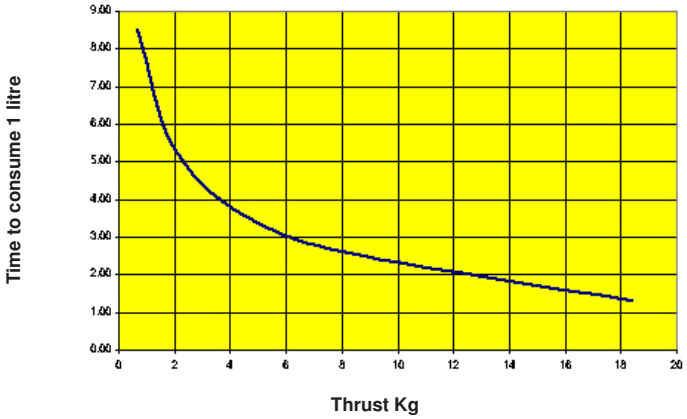


This FOD guard is available as an option, from past personal experience I would recommend its fitment to avoid ingestion of debris

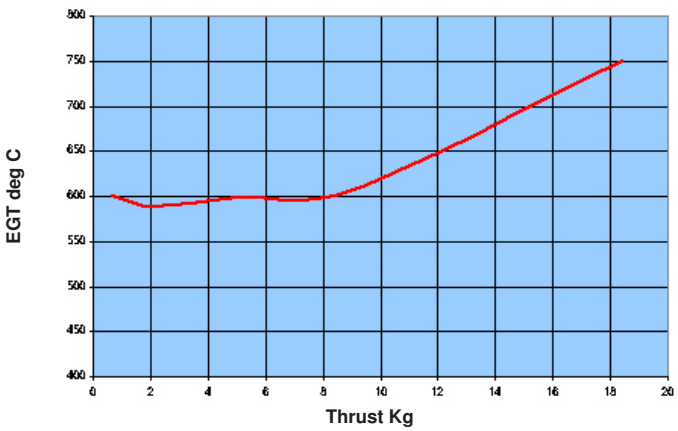
evoJet B180VX Graph 1
Thrust/RPM



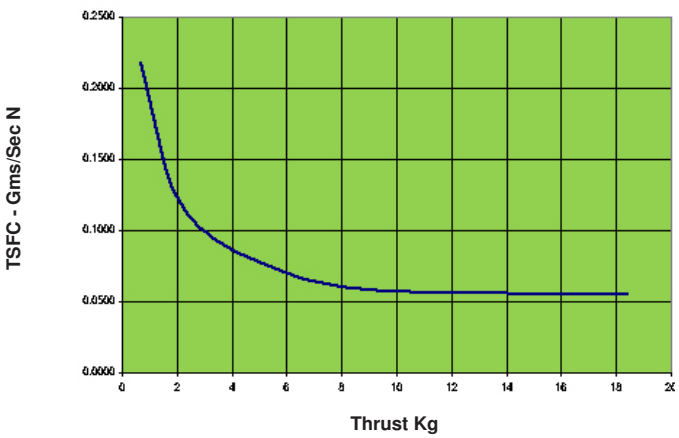
evoJet B180VX Graph 2
Fuel Endurance / Thrust

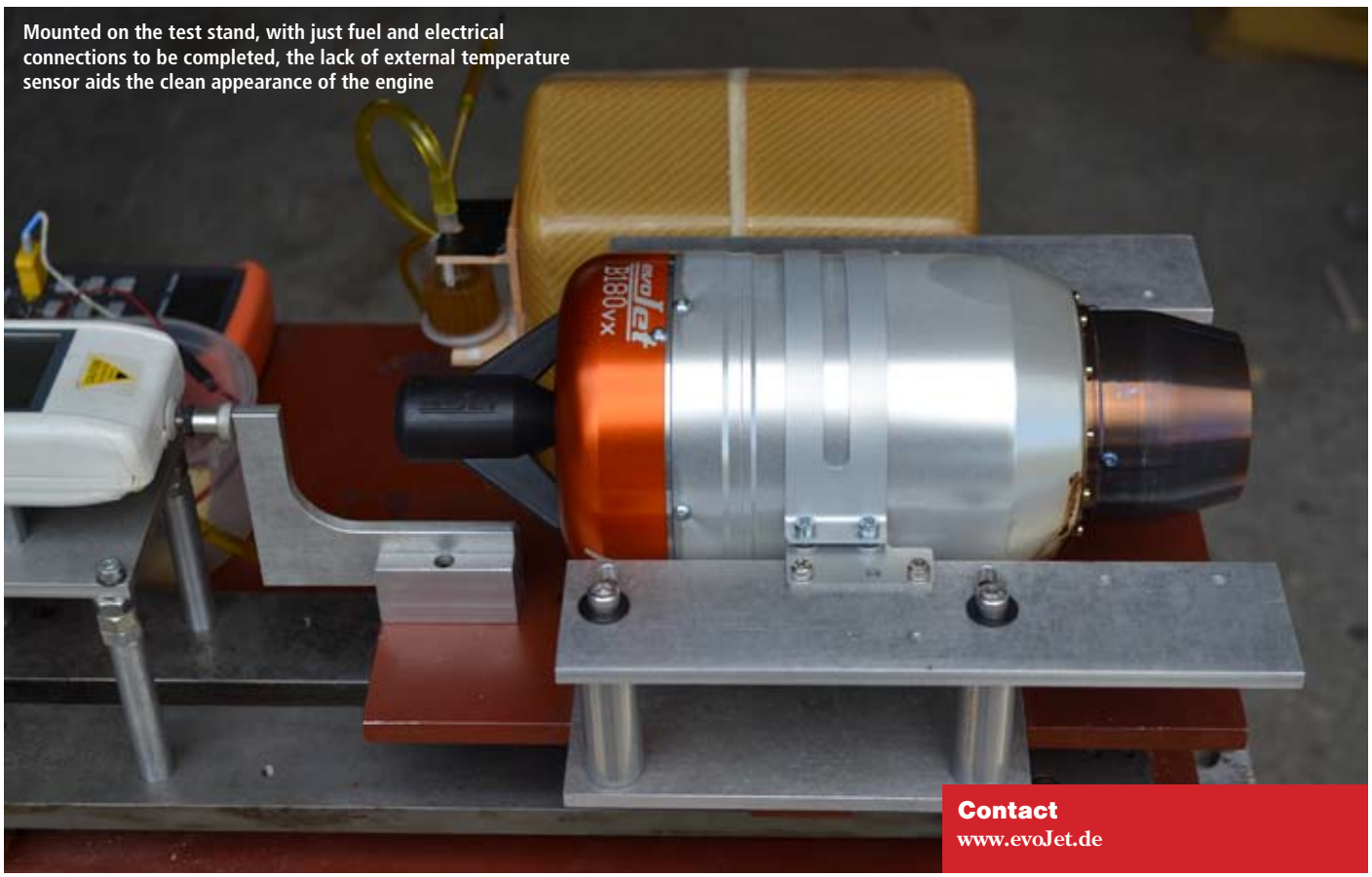


evoJet B180VX Graph 3
EGT Deg C/Thrust



evoJet B180VX Graph 4
TSFC/Thrust





Mounted on the test stand, with just fuel and electrical connections to be completed, the lack of external temperature sensor aids the clean appearance of the engine

Contact
www.evoJet.de