AUTHOR & PHOTOGRAPHER: **COLIN STRAUS**

evoJet B220neo

Worlds first! RCJI tests the most powerful engine produced by evoJet

Turbine Package Contents:

- evoJet B220neoTurbine
- Jetronic-EX ECU (Engine Control Unit)
- Jetronic GSU (Ground Support Unit)
- Switch Harness
- Fuel Pump
- Leads
- Instruction Manual
- Fuel Tubing
- Fuel Filter

It has been some time since we last had the opportunity to test a turbine from the German manufacturer evoJet, so we were very pleased to get the chance to test the most powerful turbine in the range, the evoJet B220neo. Supplied in a sturdy cardboard box, and packed neatly into a preformed foam insert, the B220neo is supplied together with a comprehensive package of ancillary items, including the expected ECU, in this case a Jetronic-EX unit, matching GSU, fuel pump, filter, associated leads and fuel tubing etc, but unusually, also a switch harness to fit in between the ECU and its battery, this being very useful when a flying session has finished as there is no need to unplug the ECU battery to avoid this being damaged by over-discharge. As with most turbines these days, no battery is supplied, the recommended types being either a 3 cell Li-Po of around 3,000mAh capacity or a 4 cell Li-Fe of 2,000mAh capacity, although the instructions do mention that 12v Ni-Cd or Ni-MH batteries or 2 cell Li-Po batteries can also be used.

For testing we using a 3 cell 3200mAh Li-Po, with which the turbine operated perfectly.

Notably, the B2200neo is available in versions with 18Kg, 20Kg and 22Kg maximum thrust levels, with the price varying dependant on the version selected. If at a later date the owner decides more power is required, they can buy from evoJet the software required to update the ECU and allow the engine to reach the higher thrust level, avoiding the need to buy a new engine. Of course running the engine at the lower thrust levels should mean that the engine life will be extended, due to the lower stresses at the restricted rpm's. Unusually the suggested maintenance interval is 25 hours (the same as many other turbines) or 120,000,000 revolutions, this data being amongst that stored by the ECU.

In this case those of us that fly at full power all the time would expect to have their turbine serviced more often than those that generally fly at much lower throttle settings, which means using the overall revolutions of the engine as a maintenance interval makes a great deal of sense, after all an engine run at full power all the time would be expected to need servicing earlier and more often.

It should also be noted that the ECU and its software were developed and are produced by evoJet, meaning that they are perfectly matched to the turbines evoJet produce, giving improved performance and ultimate reliability.

The supplied English language instruction manual is extremely comprehensive and easy to follow, and includes a nice and clear layout drawing which illustrates the various fuel and electrical connections very well, making a new owner's first installation simple. The various ECU menu's 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 B220neo is

The evoJet B220neo complete with its ancillary items, note that an English language manual was also supplied but is not shown in this photo.

The turbine itself is superbly finished and has a very clean and uncluttered appearance.

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 of design and manufacture is striking, the front cover being finished in an attractive orange colour.

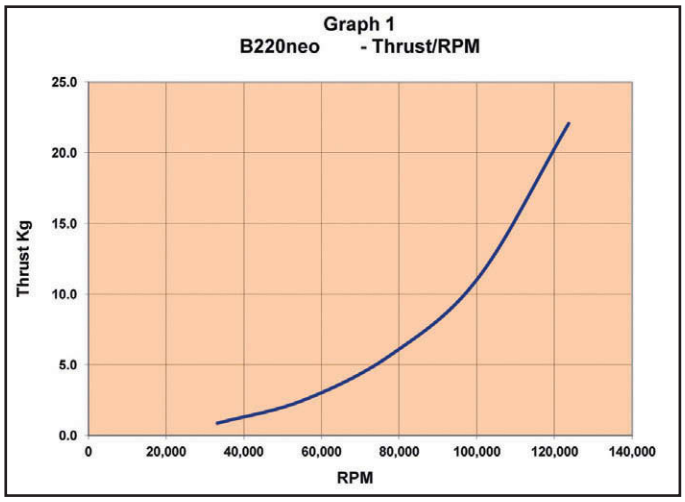
Connections to the engine number only three, a single fuel feed line from the pump via the supplied filter, a main power input and a data lead, these last two connecting to the Jetronic-EX ECU. With both the start and main fuel solenoids being under the front cover of the turbine the fuel system becomes greatly simplified, making installation in a model quick and easy.

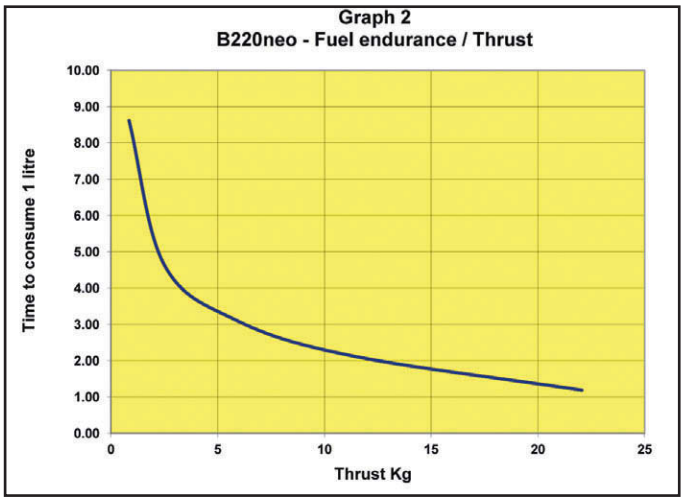
With the engine bolted to the test rig and fuel and electrical connections completed I used the GSU to run the fuel pump and open the solenoid valve to fill the fuel line up to the engine, taking care not to allow the fuel to actually enter the engine. As soon as this was done I was ready to start the 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 33,000rpm. The start was notably clean and free from any sign of flames at all stages. Time taken from the commencement of the start procedure to the

Very crisp machining on the compressor is evident in this photo.

Tailcone and turbine wheel are equally nicely produced, note the unusual hole in the centre of the exhaust cone.

FOD OFF	RPM	EGT	ambient temp	ambient press sea	RPM	Fuel start	Fuel finish	Elapsed time	fuel flow
idle	33	539	12.0	1021.0	33,000	2525	2432	60.00	1.55
25% stick	55	460	12.0	1021.0	55,000	2318	2146	60.00	2.86
50% stick	78	417	12.0	1021.0	78,000	2052	1796	60.00	4.26
75% stick	100	414	12.0	1021.0	100,000	1590	1215	60.00	6.24
100% stick	123	585	12.0	1021.0	123,000	2398	1720	60.00	11.27





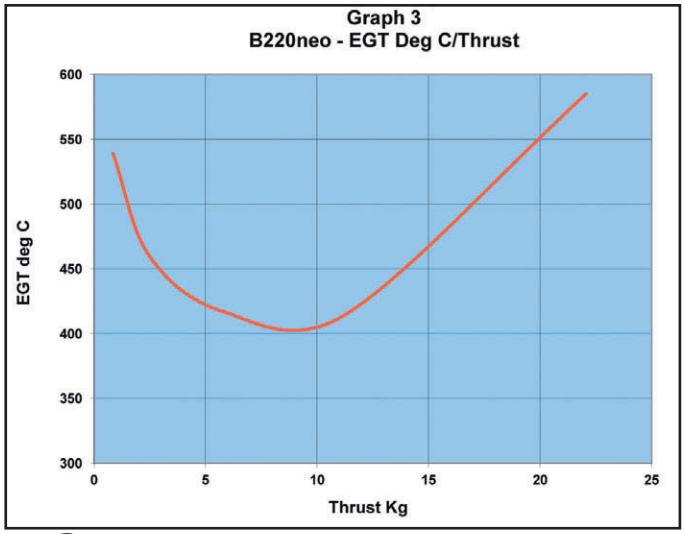
engine being at idle and under the operator's control was just over 70 seconds, this being repeated during further starts from cold whilst starts where the engine was still warm were a little faster at around 60 seconds.

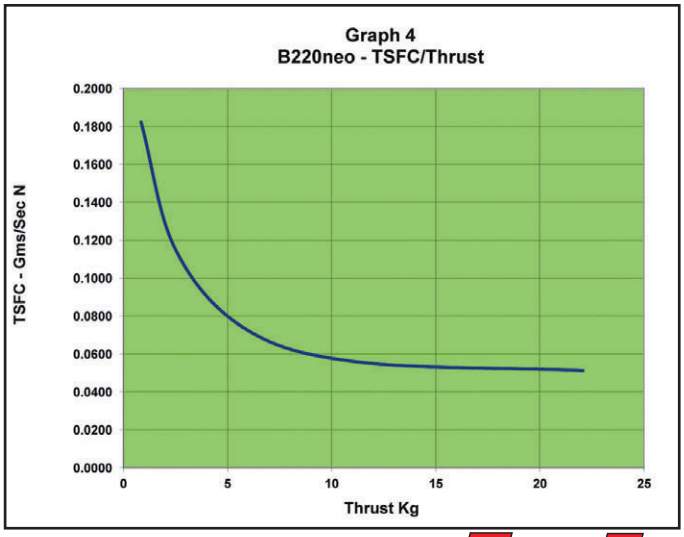
The engine was then run up to full power, which as supplied from the factory topped out at 120,000rpm and around 200 Newtons thrust. Interestingly, the engine is supplied to customers with very conservative settings, both for maximum rpm and for acceleration, although even with these the engines performance is very competitive. If even greater performance is needed then the owner can very easily increase the maximum rpm to the full 123,000rpm, whereupon as the test results make clear, a figure of just over 216 Newtons (22.1Kg) was recorded, corrected to ISA conditions, this being fractionally above the thrust level of 22Kg claimed by the manufacturer. With the idle speed at its default setting of 33,000rpm the acceleration of the engine to the full power setting of 123,000rpm was measured at around 4 seconds, with the deceleration figure being slightly faster, at around 3.5 seconds, both of these figures being extremely good for any turbine, let alone one with this level of thrust.

Running characteristics were excellent, and the rpm stability extremely good, less than 100rpm variation being noted at the various rpm points recorded during testing, basically once the

Purpose designed Jetronic-EX ECU (Engine Control Unit) is supplied with the turbine.

This 300v10 fuel pump is supplied with the B220neo.





fuel flow	Thrust	Inlet air temp	Delta	Theta	time for 1 litre in mins	Shaft speed	Thrust lbs	Thrust kg	Thrust N	TSFC
115.97	8.50	285.2	1.008	0.990	8.62	33,173	1.9	0.9	8.3	0.1824
214.49	24.80	285.2	1.008	0.990	4.66	55,289	5.5	2.5	24.4	0.1156
319.24	57.90	285.2	1.008	0.990	3.13	78,409	12.8	5.8	56.9	0.0737
467.63	111.90	285.2	1.008	0.990	2.14	100,525	24.7	11.2	109.9	0.0559
845.48	220.40	285.2	1.008	0.990	1.18	123,645	48.6	22.1	216.4	0.0513

Unusually for a turbine, but very useful, a switch complete with charge socket is supplied with the engine.

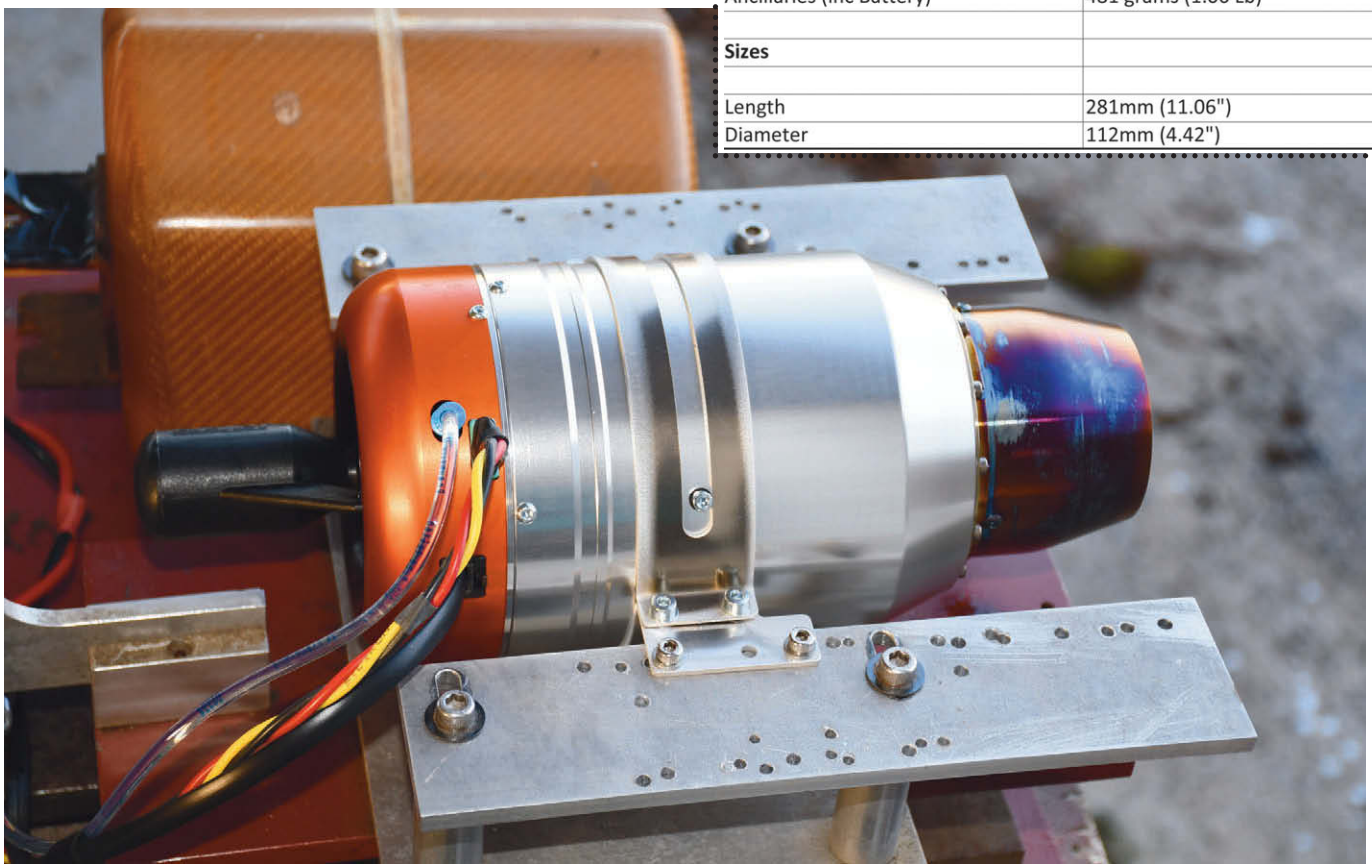
rpm required was reached the engine held this very precisely until the throttle stick was moved. Part of the testing process of all the turbines I run is to run the engine for periods of 60 seconds at points throughout the rpm range and measure the amount of fuel consumed – this means that any instability would be noticed immediately. Vibration was almost completely absent throughout the rpm range, and in general the engine ran very smoothly indeed.

Tested fuel consumption proved slightly higher than claimed, with a full power consumption of 678 grams per minute, compared to the claimed figure of 640 grams per minute. 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 B220neo just illustrates 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 powerplants such as this engine from evoJet being available.

WEBSITE
www.evojet.de

Test Results	
Idle RPM	33,000
Idle Thrust	8.3 Newtons (0.9Kg/ 1.9Lb)
Idle Temperature	539 degrees Centigrade
Maximum RPM	123,000
Maximum Thrust	216.4 Newtons (22.1Kg/48.6 Lb)
Maximum Thrust Temperature	585 degrees Centigrade
Fuel Consumption at Max Thrust	845ml/min
Fuel Used	Kerosene
Lubricant	Mobil II Jet Oil
Fuel/Oil Ratio	5% (20:1)
Weights	
Turbine (inc Mount)	1669 grams (3.67 Lb)
Ancillaries (inc Battery)	481 grams (1.06 Lb)
Sizes	
Length	281mm (11.06")
Diameter	112mm (4.42")



Ready for its first run, the B220neo sits on the test rig.