ALM-Meca A180

First ever test of a turbine from a new manufacturer!

Turbine Package Contents:

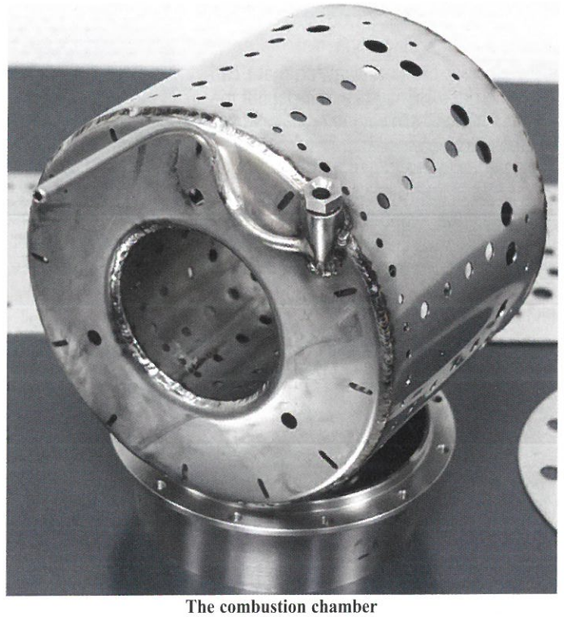
- ALM-Meca A180 Turbine
- ECU/Pump/Valves Unit
- GSU (Ground Support Unit)
- Leads
- FOD Guard
- Instruction Manual

The A180 package has a minimal parts count as many components are installed within the combined Pump/ECU/Valve block.

It is not often that a brand new turbine is launched by a company that is also new to the model industry, but this is the case with the turbine I am testing this issue. Produced by the French company ALM-Meca, which is a precision engineering company that focuses on the aviation industry, the company is led by a jet modeller, and during the pandemic lockdown it was decided that there was time for the company to develop their own turbines, of course they already had the expertise and high-precision machinery that is required to produce high quality model turbines, giving them a huge advantage in this competitive field.

The first two engines in what is planned to become an extensive range are a 210 Newton turbine and the subject of this test, the A180, which as its name suggests is nominally of 180 Newtons (18.35Kg/40.47Lb) thrust.

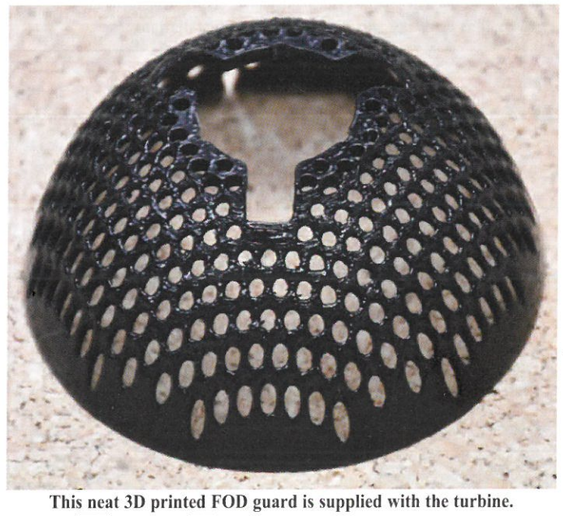
The engine arrived packaged in a substantially sized and heavy duty printed cardboard box, the turbine itself and the ancillary components being supported in strong pre-cut cardboard inserts, and this was quickly opened to take a first look at the engine. The A180 is of conventional appearance, and boasts a fully machined alloy main case, which has a recess



The combustion chamber

View of the turbine itself, note the substantial machined alloy mounts and the well protected main electronics cable from the engine.

The turbine shaft



This neat 3D printed FOD guard is supplied with the turbine.

for the very nice, engraved engine mount assembly, which has a main clamp section around the engine, and then separate and very substantial mounts. Interestingly, the company offers other optional mounts to allow easy installation in various types of models, for example to allow installation of the turbine from the rear where required, or in a glider. The front cover and starter motor bullet appear to be 3D printed and have a black finish, with the cap over the starter motor being red. Externally there is the thermocouple, which runs under a raised section of the mounting clamp, a heavy duty and well protected electrical cable, and separate fuel and kerostart lines. The compressor appears to be a (nicely produced) casting, whilst the turbine wheel also looked to be of the highest quality, both this and the NGV (Nozzle Guide Vanes) being supplied to ALM-Meca by JetMax of Switzerland. Supplied with the engine is a neat FOD guard, which again appears to be 3D printed, and finished in black. Also supplied is a support unit which contains the fuel pump

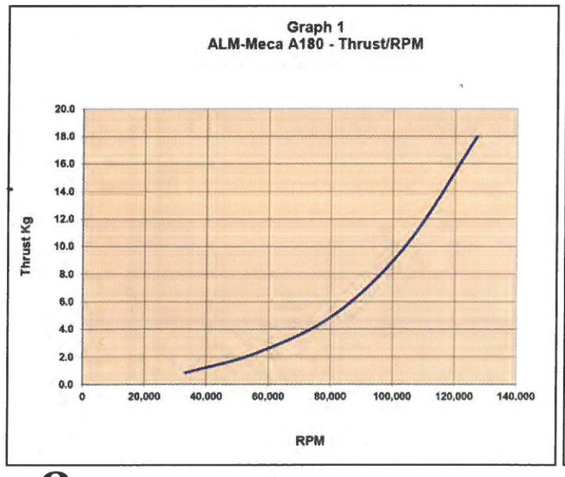
Throttle	RPM	EGT Degrees C	Fuel Consumption ml/min	1 Litre run time in mins	Thrust Lbs	Thrust Kg	Thrust N	TSFC
idle	33,000	632	105.7	9.46	1.8	0.8	8.0	0.1707
25% stick	56,000	638	176.7	5.66	5.1	2.3	22.5	0.1020
50% stick	81,000	620	267.5	3.74	11.3	5.1	50.3	0.0690
75% stick	104,000	668	401.8	2.49	22.6	10.2	100.5	0.0519
100% stick	126,000	824	659.4	1.52	39.7	18.0	176.5	0.0485

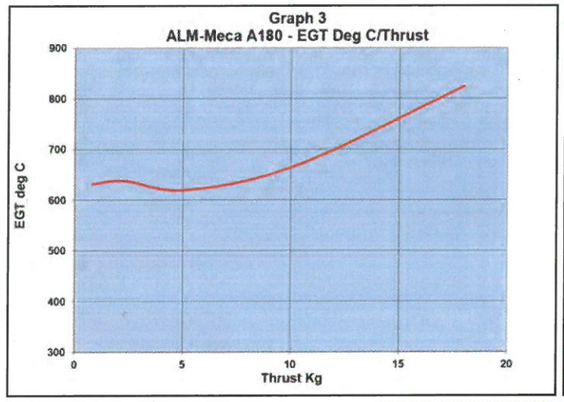
(from HP Tech in Austria), V10 ECU (from Xicoy in Spain) and fuel/kerostart valves. Combining these various components in a single unit does allow for simple and very quick installation where room allows, but it is rather bulky, so smaller models and in particular scale jets might struggle to find suitable space. The company is aware of this, so will be offering units in different shapes and sizes, to ensure that there will be something suitable for every model. Other items included are an Xicoy GSU, Multiplex to Deans adapter lead and a short English language manual – this does not cover programming or using the Xicoy ECU/GSU, but of course the manual detailing all of this is available via the Xicoy website. As is now standard no battery is supplied, the instructions recommend a 2 cell Li-Po battery so for all the testing a 2S 3200mAh battery was used. No fuel filter is supplied, but it is recommended that a filtered clunk is used in the fuel tank to ensure a clean supply of fuel to the engine.

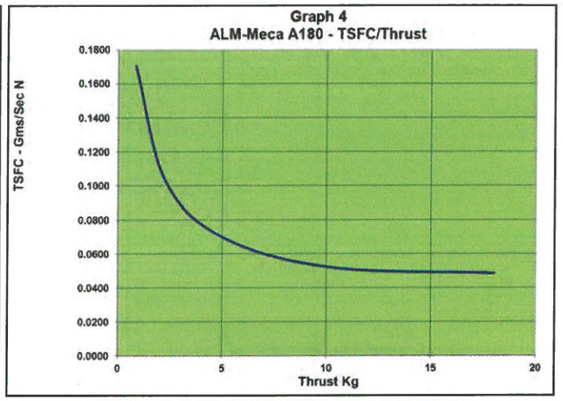
Note that although the current engines are supplied with Xicoy ECU/GSU, from around August/September 2022 this will be replaced with ALM-Meca's own ECU/GSU and electronics, currently in the final stages of development.

Mounting the turbine to the test rig took little time, with the nicely produced and very rigid aluminium engine mounts making this simple. The fuel supply input to the combined pump/ECU unit is just a length of fairly rigid plastic tubing,

The combined Pump/ECU/Valve unit is quite large, but ALM-Meca will offer alternative designs of this to suit different models/installations.







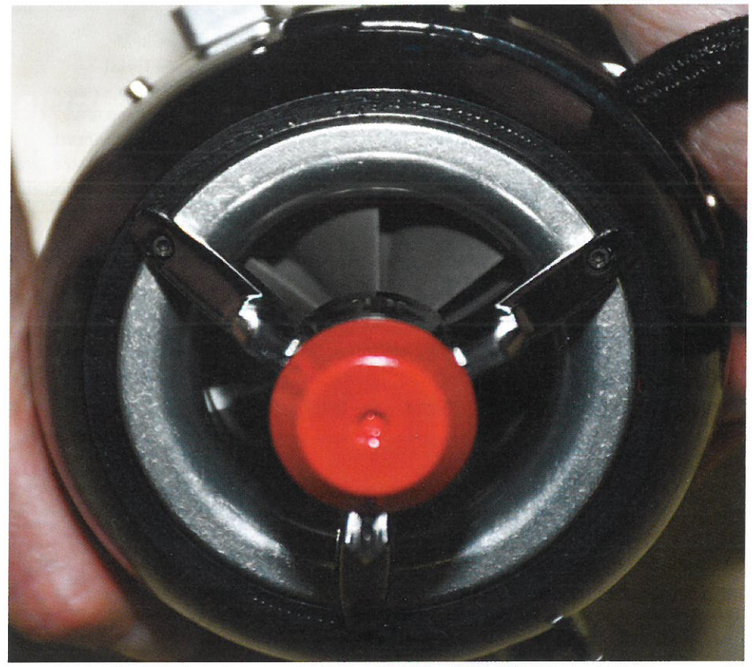
which accepts standard 4mm clear tubing, this simply being pushed into place. Although this worked perfectly during all the testing I carried out, I would like to see a slightly more secure system offered (possibly as an option).

With everything prepared it was as usual a very simple matter to programme the Xicoy ECU and prime the fuel lines into the engine so that it was ready to run. The first start was extremely straightforward and fuss free, with the engine igniting as expected and then accelerating through the rest of the start process, until it passed control to the radio system being used for the test, however I did find that this took around 80 seconds in total – later starts with the engine warm brought his down slightly, to just over 70 seconds.

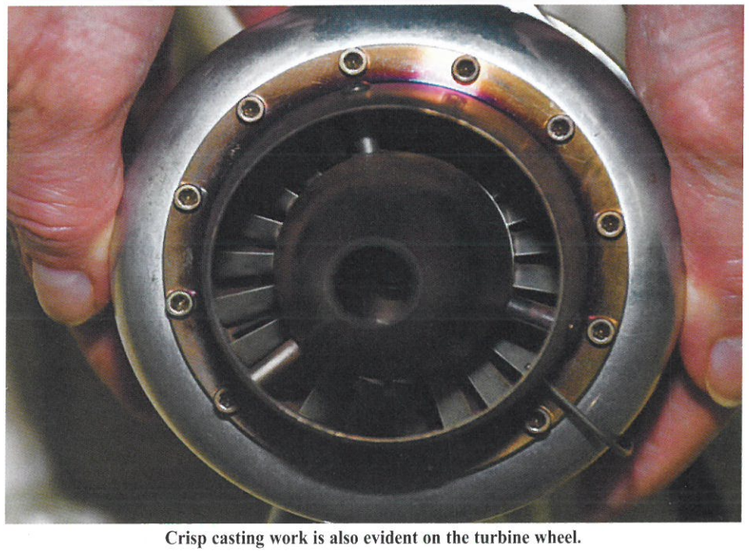
A few small licks of flame were generated during the start process, but this is quite normal with many turbines, and did not cause any concern.

With the start procedure completed and the engine stably running at idle the testing could commence, the engine being run at the various required points throughout its rpm range so that the thrust levels, fuel consumption and exhaust gas temperatures could be monitored and noted down for the test.

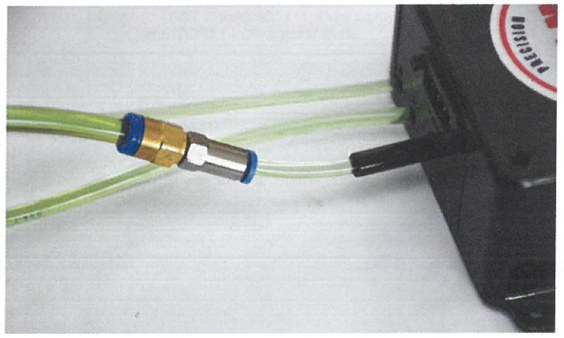
Unusually the A180 had been supplied with the ECU set to Linear, and I did find that this resulted in an inconsistent idle rpm – changing to the standard Expo setting cured this, after which the rpm was steady wherever it was set across the range. Running characteristics proved to be excellent, with the engine being very smooth right the way through from idle to full throttle, and once all of the figures had been collated it was possible to check the acceleration and deceleration times, which proved to be pretty rapid for a powerful turbine such



Nicely cast compressor wheel is partly hidden behind the starter bullet.



Crisp casting work is also evident on the turbine wheel.



Unusual fuel line input to the combined Pump/ECU/Valve unit – the fuel tube is simple pushed into the black input tube. Note the fuel and kerostart lines to the turbine in the background.

as this at around 4.2 seconds from idle to full rpm and fractionally slower at 4.5 seconds from full rpm back down to idle.
The full power thrust at the maximum rpm figure of 126,000 was measured at a corrected figure of 176.5 Newtons (18.0Kg/39.7Lb), so just slightly below the 180 Newtons specified, whilst the fuel consumption at full power was 600ml per minute – interestingly the figure specified by the manufacturer is 370ml per minute, but at 100,000rpm, so making a direct comparison impossible, although this does look about right, when put against the 402ml/min figure recorded at the ¾ throttle position of 104,000rpm. Idle thrust was nice and low, at only 8.0 Newtons (0.8Kg/1.8Lb), making landing approaches much easier than they would be with a turbine having a higher thrust level at idle.
There were no problems found throughout the testing, and the engine looked like new when we finished. I have thoroughly enjoyed testing the A180, it is great to see another manufacturer entering the competitive field of model turbines, giving us jet modellers even greater choice.
The quality of materials used and of assembly is excellent, and the engine runs very smoothly and without fuss. ALM-Meca are already working on further turbines beyond the A180 and A210, with engines offering between 30 and 50Kg and 100Kg thrust under development!

Colin Straus

WEBSITE
www.alm-meca.com

Test Results

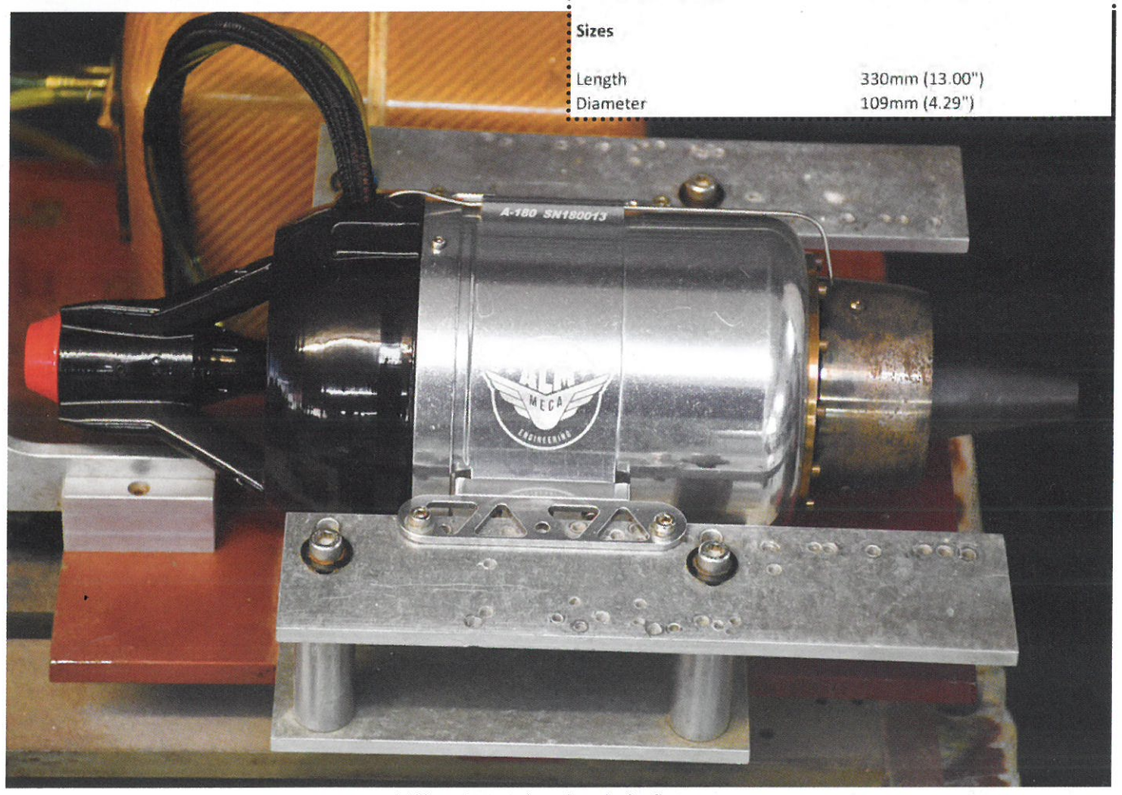
Idle RPM	33,000
Idle Thrust	8.0 Newtons (0.8Kg/ 1.8Lb)
Idle Temperature	632 degrees Centigrade
Maximum RPM	126,000
Maximum Thrust	176.5 Newtons (18.0Kg/39.7 Lb)
Maximum Thrust Temperature	824 degrees Centigrade
Fuel Consumption at Max Thrust	659ml/min
Fuel Used	Kerosene
Lubricant	Power Model Jet Oil
Fuel/Oil Ratio	5% (20:1)

Weights

Turbine (inc Mount)	1854 grams (4.08 Lb)
Ancillaries (inc Battery)	403g (0.90 Lb)

Sizes

Length	330mm (13.00")
Diameter	109mm (4.29")



A180 on the test rig and ready for first runs.