PowerModel Jet Oil

Questions and answers

Q1. I have heard about PowerModel Jet Oil and wonder if it is suitable for my model turbine?

A1. Yes it is suitable for all types of model turbines that run on kerosene/oil mix at the turbine makers fuel : oil ratio. It offers the unique combination of cleaner emissions and high temperature protection and is much safer to handle.

Q2. Have any turbine makers tested and approved the oil ?

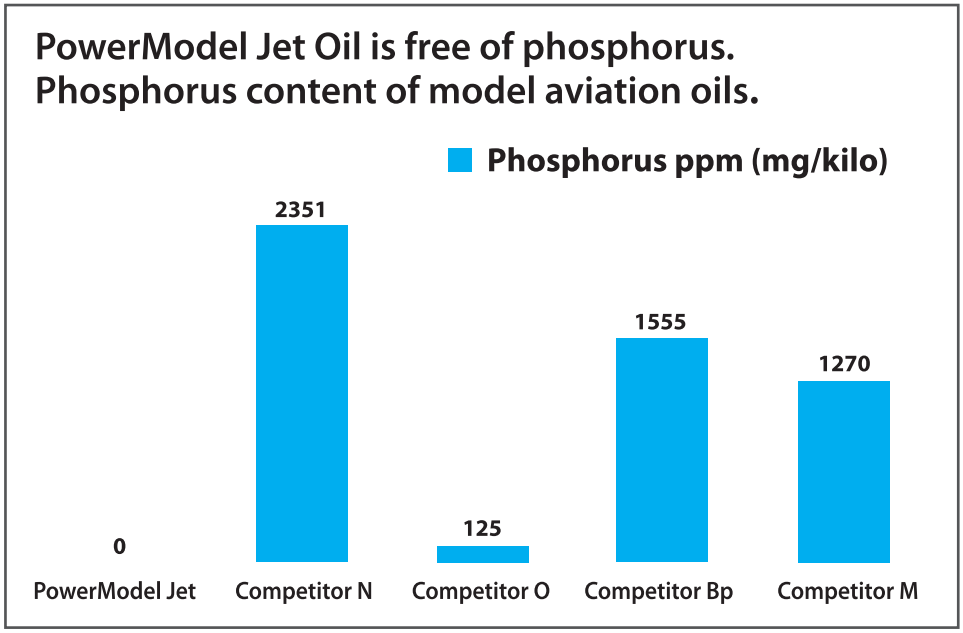
A2. We already have 7 engine makers that have approved it with many more turbine makers still testing. We have letters of approval from all 7 makers. But watch our website for news of more approvals.

Q3. I am currently using a full size turbine oil which seems to work satisfactorily so why should I change to PowerModel Jet Oil?

A3. Full size gas turbine lubricants have good thermal stability but they are hydraulic oils which are likely to contain organophosphates. Hydraulic oils are not designed to be burnt so these additives generate harmful gaseous emissions.

PowerModel Jet Oil is designed to a molecular level with pure clean, purposely designed synthetic components reinforced with a powerful antioxidant system. It is free of organophosphorus materials (Fig 1.) and because it is fully synthetic there are no aromatics that could be present in lower priced mineral based turbine oils. This unique combination delivers a lubricant that burns cleanly with outstanding high temperature stability to give improved air quality with less harmful gases.

Fig 1.

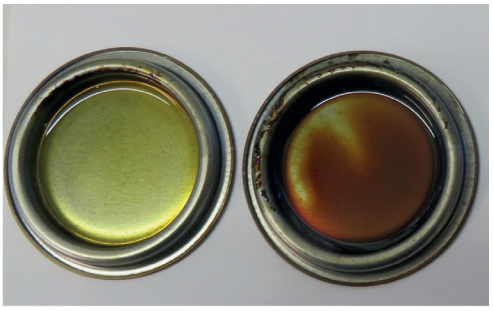


Q4. I am currently using synthetic 2 stroke oil; why should I change to PowerModel Jet Oil?

A4. Whilst 2 stroke oils are meant to be burnt they are not designed for the extreme high temperatures found in model turbines. Bearings could become sticky or carbonise during the heat soak that occurs during shut down *(Fig 2.)*. PowerModel Jet Oil is stable right up to 300 C.
2 stroke and many other types of oil, when burnt, can also form ash that will stick to metal parts and interfere with the gas flow through the turbine.

Fig 2.

Thermal stability
PowerModel Jet Oil compared with 2 stroke oil



PowerModel Jet Oil 2 stroke oil

Test condition
20 mins at 200 C

Q5. What fuel oil mix should I use when blending PowerModel Jet Oil?

A5. Always follow the turbine makers fuel oil ratio recommendation as published on their website and in their owners' manuals.

Here is a useful mix ratio chart *(Fig 3.)* for US and European quarts and gallons.
Note 1 US quart is 0.946 litres so for North American users :

1. **5.25 US gals mix with 1 litre of PowerModel Jet Oil gives a 20:1 mix**
2. **5 US gals with 1 litre of oil gives 19:1 mix *i.e.* slight over oiling**

Fig 3.

Mix ratio up to 50:1 or according to manufacturer

Ratio of fuel to oil	ml of oil per litres of fuel			ml of oil per US gal/qt	
	1 litre	5 litres	20 litres	1 qt	1 gal
14:1	71	357	1428	68	270
15:1	67	333	1333	63	252
20:1	50	250	1000	48	189
25:1	40	200	800	38	151
32:1	31	156	625	30	118
40:1	25	125	500	24	95
50:1	20	100	400	19	76

Conversions: 1 US gal = 3.785 litres (3,785 ml) 1 US quart = 946.3 ml
1 US fl oz = 29.6 ml 1 litre = 1000ml

Q6. Yes I want to change over to PowerModel Jet Oil but will it mix with other oils ?

A6. Yes it is fully compatible with all following turbine oils (see list below) and we would expect it to be compatible with almost every turbine oil in the market (*Fig 4. /5.).*

A Aeroshell 500
B TurboNycoil
C Opti-Jet Turbine oil
D BP 2197
E Mobil Jet 2
F Jet Cat turbine oil
G evoJet turbine oil
H KingTec turbine oil
I Mineral 2 stroke oil
J Mobil DTE light

Fig 4.

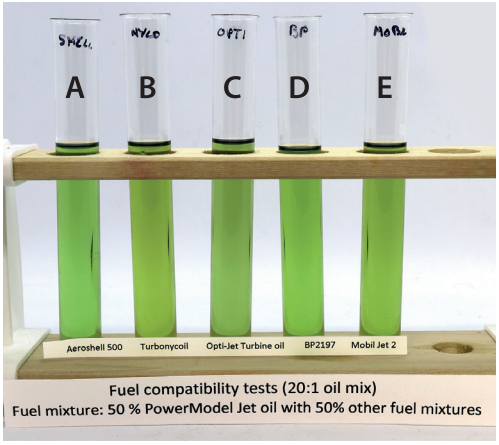
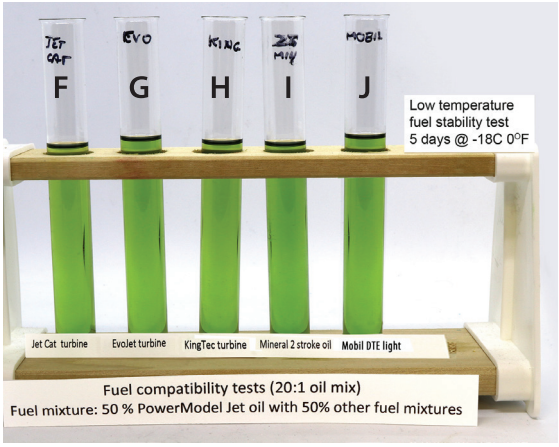


Fig 5.



Q7. My turbine currently uses diesel fuel; is PowerModel Jet Oil designed for this?

A7. Yes PowerModel Jet Oil is perfectly suited for use with pump diesel fuel oil mixtures. We also tested its long term stability in diesel fuel and set up the dye colour for it.

Q8. How should I store my oil mix between runs?

A8. PowerModel Jet Oil / kerosene (kerosine) fuel should be stored in dry, opaque containers in a cool dry place.

Q9. Both kerosene and diesel are recommended by my turbine maker. What is the difference between these two fuels and is PowerModel Jet Oil suitable for these fuels?

A comparison of the fuels is shown in (Fig 6.)on page 4.

A9. Both kerosene and diesel are considered as heavy, more viscous fuels compared with gasoline for example. The more viscous diesel is slightly less refined than kerosene, has more odour and a higher energy content compared with kerosene. Good quality diesel fuel will also contain:

- biocide additives to help preserve the fuel
- lubricity additives to compensate for the removal of sulphur during the refining process (sulphur being a good natural lubricant but the cause of acidic emissions)

The chemical composition of diesel fuel is of course designed to ignite in compression engines unlike kerosene which is a simple burning / heating oil. Diesel is also taxed and more expensive. If the turbine maker is recommending diesel fuel then yes PowerModel Jet Oil can be used.

Q10. What is the difference between kerosene, premium kerosene and aviation kerosene ?

A10. Kerosene is a lighter distillate fuel compared with diesel and is for domestic and industrial heating. Premium Kerosene is a more refined narrow cut version and has a low aromatics content. It is cleaner burning and designed for applications where smell and emissions are more important e.g. space heaters, wick fed lamps, barbeque fuel. Both fuels have calorific values much lower than diesel. Premium kerosene will be cleaner to use in turbines, reflected by its high smoke point and lower char value (a measure of deposit tendency).

Aviation kerosene is also a more refined and developed version of a normal kerosene with quality controls on low temperature viscosity to ensure fuel flow (needed in full size aviation), and freezing point. Aviation kerosene will contain stabilising additives that keep the fuel safe e.g. anti-icing technology and biocides to prevent microbial attack. As it is highly controlled, aviation kerosene is far less susceptible to contamination with diesel or gas oil that might occur during transportation.

Fig 6. **Key properties of turbine fuels**

Fuel	Boiling range	Viscosity	Gross calorific value	Density +/- 150	Sulphur	Char value	Flash point (PMC)	Comments
Unit	Deg C	Cp@40C	MJ/Litre	g/l	ppm		Deg C	
Diesel	190-350	3.5-4.5	38	835	<15		>56	Diesel is the heaviest fuel but has very low sulphur. Lubricity additives are added
Kerosene premium	160-230	1-2	35	790		10	>43	A low aromatic kerosene that has superior combustion derived deposits
Kerosene normal	160-230	1-2	35	790	200	15	>38	Widely available but quality can vary
Jet A-1 Aviation fuel	160-230	1-2	35	790			>38	Tightest quality control. Has stabilising additives e.g. biocides important for fuel stability and also de-icing performance in flight

Notes :

1. This data is for indication purposes only as specifications vary across the world. Only aviation fuel is uniformly specified.
2. The test methods are not always the same for each of these products.
3. All these fuels contain a wide range of molecules of differing molecular weights structures and boiling points. They are initially separated by distillation in a refinery and inevitably there is some cross over between the classes at this point.
4. This table is strictly a guide only. Real values should be obtained from your supplier.

*Char value is a measure of visible deposit left after burning on a standard wick for a set time.

Q11. How do each of the fuels compare?

A11. Only use fuels specified by the turbine maker of course. Here is a useful comparison on how the various fuels compare for performance and cost *(Fig 7.)*.

Fuel	Cost	Cleanliness	Odour	Energy	Storage stability
Diesel	✓*	✓ ✓ ✓	✓	✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓
Kerosene	✓ ✓ ✓ ✓	✓ ✓ ✓	✓ ✓	✓ ✓ ✓ ✓	✓ ✓
Premium Kerosene	✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓
Aviation Kerosene	✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓ ✓	✓ ✓ ✓ ✓

Fig 7.

* Carries additional road tax duty in many countries

Q12. What other advantages does PowerModel Jet Oil have?

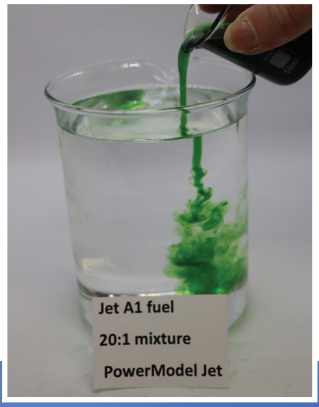
A12. PowerModel Jet Oil has a green colour for rapid recognition in fuel. It also

- has naturally anti-electrostatic technology
- is non-flammable
- uses biodegradable components
- is safe to handle and transport
- will not discolour or attack fuel lines and paint

Fuel mixtures made with PowerModel Jet Oil were also found to be stable down to minus 20 centigrade. Finally, it has an attractive odour!

So, if you are a Jet Modeller that cares for the environment why not ask your dealer for Deluxe Materials

PowerModel Jet Oil !



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