

Permanent Magnet Generator (PMG) without Electronics:

5 KVA TO 60 KVA

RFL Tri-Gen Technology used in Military applications

Description Of the Tri-Gen Generator:

The RFL Tri-Gen Generators are Permanent Magnet 2 and 4 pole generators designed to run from petrol and diesel engines in the range from 1500 RPM to 3600 RPM. As they have PM rotors they have very high efficiency typically in the range of 93% for small units to as high as 98% for larger generators. They are very robust and reliable units, they have no electronics and do not require any AVR or external electronic devices such as, Inverters or Power Conditioners to supply 3 phase ac at 50 and 60 Hz. They have very good waveforms under all load conditions typically around 3% THD. The voltage regulation under load is under 4%, from no load to full load, and is achieved by the patented Tri-Gen rotor magnetic circuit, (no Electronics, AVR , Shunt Transformers, Brushes or Exciter).

Advantages:

They are 1/3 the weight and size of conventional brushless 3 phase generators. Giving compact and easy to transport Gen-Sets.

They have very high efficiency 95%+. As a result of this high efficiency smaller engines can be used to drive them, reducing fuel consumption and further reducing the gen-set weight and size.

They are designed to fit to the standard flange mountings of existing engines, but with a 50% reduction in length. This gives a wide choice of engines. The generator can be easily removed from a worn engine and fitted in the field, to a new engine of a different make.

They come in sealed (IP65) or open casing(IP32), depending on the application.

They use high temperature Magnets for Military Spec Application. These generators will run at full load in up to 60 Deg C in high humidity environments.

They have no electronics and are not affected by radiation, requiring no shielding against radiation.

They are extremely simple, having only a stator and a PM rotor. The only component requiring maintaining is the generator bearing. This is contained in a removable cassette for easy field replacement.

The voltage and voltage regulation, is set at time of manufacture and is maintained for the life of the generator. No field adjustment is required.

They do not require any external electronics such as Inverters or Power Conditioners. This reduces the total weight of the package. It also improves the reliability (The more components the higher probability of a failure). It also improves the redundancy factor, as each unit is fully self-contained, no need for separate generators and Power Units. This cuts down on the number of spares required.

The extreme simplicity of the RFL generator means that no high tech skills are required to maintain it.

The unique rotor magnetic circuit makes parallel operation of generators easy. The rotor magnetic circuit will adjust each generator to share the load evenly over all the parallel sets, without any external controls. In most cases, if the generators are within 1% of the synchronous speed they can be switched directly on to the line with minimal surge current. This makes parallel operation easy for low skilled operators.

When the RFL - generator is required to supply DC power, this is supplied from a separate low voltage winding in the generator stator. This gives very good isolation of the DC from the 3 phase supply, with no need for extra power transformers or electronics. The low voltage is obtained from a separate low voltage 3 Phase winding in conjunction with a 3 Phase rectifier stack. The generator's internal voltage regulation, will keep the DC output voltage within limits under load.

In applications requiring even higher fuel savings the RFL can be run at lower speed to save energy, providing the units being supplied can cope with lower voltage and frequency during low energy requirements. For example: Fans, Air Conditioners and Pumps running over night. As the RFL unit has a PM rotor there is a direct relationship between voltage and frequency, in the same way as a VF drive. The RFL can mimic a VF drive for running .

AC motors at variable speed, by controlling the RPM of the engine. This can give significant reductions in fuel in some applications.

The simplicity of the RFL will reduce the overall cost and the need for spare parts. This means that more units can be purchased for the same budget allocation.

Other Points to Consider

The RFL generator can be paralleled easily due to its unique magnetic circuit enabling lock on without surge issues.

The 8.2 Kw and 12.6 Kw are below the smallest size in the Stamford presentation. The only way to get 40 KVA is if the Power factor is around .3 Pf and a current of around 60Amps. This is typical of the sort of currents for motor start up, or switch on of transformers.

For Stamford to get this even the small generator would need the large Power Conditioning system. This is a seriously large inverter at a very high cost. That is why they are only using 1 PCS for 4 generators. This is a high cost problem if one is required to be used on its own as it requires another PCS. If the PCS fails all units connected also fail

With our 200mm design we can get the 60 amps for a short time at a Pf of 0.3 at motor start up without overloading the Engine.

With the Stamford unit the inverter (PCS), it needs to be rated at 40Kw (60Amps) not 10Kw just to handle the motor start currents.

Also if you look at the combined efficiency of their generator(95%) and the PCs(95%) you get an overall efficiency of around 90% This is 5% to 6% lower than our generator.

An RFL option would give the Indian Defence a much cheaper and robust option, along with significant energy and weight savings as well as the ability for an Indian company to be a supplier.

The Stanford Generator option would require considerable extra training of personnel at a high cost as well as a restrict engine range. They would have to commit to purchasing the Generators Engines and Power Conditioning Systems from Stanford, along with spares

(For Further Details: <http://www.radialfluxlabs.com/en/contact-us.html>)