A Better Approach to Backup Power Generation

Back-up Systems and Redundancy

Many boats and specialty vehicles will carry a second or backup generator in case of emergency.

Typically, the installation will include a primary generator designed to carry the full load, with a smaller emergency unit which hopefully never gets used apart from an occasional warm up to test. Alternatively, it could even be fully redundant primary generators, both capable of carrying the full load. Both configurations introduce potential hidden costs and maintenance issues that are rarely considered as this is "how it has always been done".

In the case of the smaller emergency backup in isolation (see example Fig 1 blue), costs are incurred in 2 ways;

1. The larger unit is generally configured for peak loads, so it is big, heavy, thirsty. Fuel costs are high because of the operating fuel consumption of a "big clunker", fixed speed engine.
2. Fuel costs of the transport vehicle increase from carrying the extra weight and fuel for the large generator. Estimates are that fuel consumption increases by 7% for every 10% weight increase.
3. It is rare that either unit regularly gets used to full capacity. The likelihood of significant damage over time due to underutilization is high. This adds expensive repair costs and shortens the useful life of the generator (see Article Carbon Build-up and Cylinder glazing).
4. The initial cost of the larger generator is higher than it needs to be.

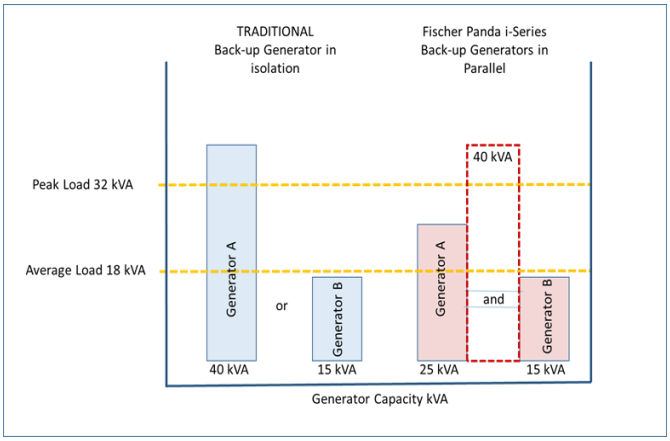

Fig 1 – Back-up Generator Options

The smaller back-up unit suffers the same problem of carbon build-up and glazing, only worse. At best, power output diminishes over time and ultimately an expensive rebuild will be required well before the generator reaches what you would hope to be the end of its usable life.

Fischer Panda's i-Series, with the paralleling option enabled, opens up a very different approach to back-up/redundancy. Instead of a primary unit sized for peak loads, the combined power output of the two generators, operating seamlessly with load balancing and variable speed, enables smaller output units to be installed (Fig 1 red). Both generators are run in parallel during peak times, sharing the load. The net effect is to optimise the maintenance cycles for both units, reduce fuel consumption, weight and size, and virtually eliminate carbon build up issues.

Where fully redundant systems are installed (Fig 2); each capable of delivering peak load power, the problems are the same, only the magnitude of the initial outlay overspend, and the costs of downstream rebuilds are higher.

The example in Fig 2 shows a larger installation with peak load requirements of 200 kVA in a fully redundant set up. The traditional approach (in blue) would likely install identical 250kVA generators, both capable of handling the peak loads.

With average loads at less than 40% of maximum, both generators will ultimately suffer damage from carbon build up.

With **Fischer Panda**, there is an option to install smaller output units, both of which are capable of handling average loads. It is your choice to run one or the other, or both generators in parallel to deliver even higher peak load capacity than was possible under the traditional approach. With variable speed technology, carbon build up problems are eliminated, redundancy is still supported, and a solution like this can remove '000s of kg from the vessel or vehicle.

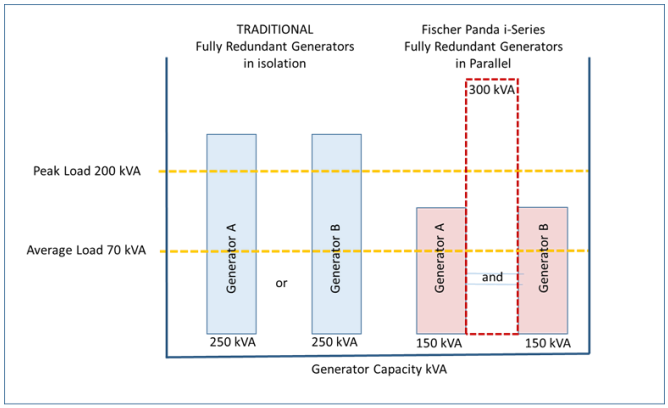

Fig 2 – Redundant Generator Options

Fischer Panda i-Series generators use invertor technology to condition the variable frequency power generated at different RPM to produce perfect sinewave power all the time every time. In doing so, the variation to the speed of the engine allows a much broader torque/rpm/load balance resulting in optimal power loading across the range. This same invertor technology manages the paralleling capability. Synchronization, load balancing, diagnostics are all handled within the invertor units. Wiring is a simple connection between Invertor units – no additional frames or wiring required.

Conclusion - Not only do Fischer Panda i-Series generators offer the highest kW per kg of any water cooled diesel generators on the market, they open up a completely new set of possibilities to address your redundancy/backup requirements.

You will get better performance, longer life, less maintenance by downsizing your primary generator(s) for less than peak load and using the load balancing capabilities when demand is high. All Panda i-series generators can be enabled for paralleling so you can choose the options that best suit you. Mix and match, paralleling is possible with any other inverter model with no extra parallel box required and without the on board skill required to operate many manual parallel systems.

Multiple parallel switching with Fischer Panda i-Generators

Whilst weight saving and overall cost saving are significant positives in the mobile vehicle and marine markets the redundancy capability available with 3 or more generators seamlessly operating in parallel is also of interest to applications requiring emergency backup of a high calibre. By examples hospitals and industry in areas where grid power is unreliable.

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Fischer Panda SEA Pte. Ltd.
102F Pasir Panjang Road
#06-09 Citilink Warehouse Complex
Singapore 118530
Tel (65) 63771017 Mob (65) 9838 6460
www.fischerpanda.com.sg
sales@fischerpanda.com.sg