GENERAC®
POWER SYSTEMS, INC.

Gemini® Twin Genset

WHITE PAPER

INTRODUCTION

Marketing studies have indicated that there are more than 25,000 customers for gensets of 1000 kW or more. With that kind of business at stake in this high dollar segment, Generac plans to be a significant player and to capture its share of this market with top quality, high value products.

To compete effectively in the higher kilowatt range, we will serve the market by providing innovative, lower cost alternatives with superior features and built-in advantages. Our first offering to this segment was the Modular Power System, and we are now adding another solution with our Gemini® twin genset.

THE POWER OF THIS CONCEPT

By combining two generators side by side and running them in parallel, we can produce varying — and greater — amounts of power. With our initial offering at 750 kW, not only will we be able to produce power at levels equal to competitive single engine units of 750 kW, but we'll also offer greater flexibility at a very attractive price point. Our Gemini product has also been designed with a variety of features that will make it a superior alternative to large, single engine gensets of similar size. To expand this into a significant product line, we'll follow the 750 kW standby product with additional offerings at other kW ratings, and add capabilities for base loading and peak shaving.

WHAT IS GEMINI?

The Initial Offering: 750 kW
The Gemini® twin genset houses two powerful generators inside a single package, offering superior power density. The first version is rated at 750 kW, powered by a pair of 12.0 liter Mitsubishi 6 cylinder inline diesel engines, each one powering a 375 kW alternator through a Generac gear drive.

Parallel operation of the two generators is made possible by Generac's own PowerManager® control system and our proven transfer switch. Our twenty years of experience in designing and building top quality transfer switches is reflected in this fully integrated design.

Having two smaller engine driven generators inside the same enclosure has all sorts of advantages over larger, more costly single engine units. Not only is the acquisition expense reduced, but the dual generators also provide additional flexibility and built-in redundancy.

Starting with that premise, Generac engineers began by designing Gemini from the ground up. The result is a fully integrated product that combines the best features of our smaller gensets into one powerful package. Even the package itself is new — a durable, weather protected enclosure that is sound attenuated, with a patent pending airflow system for effective combustion and cooling.

Easy Serviceability
Serviceability was another important design element of the Gemini product, and the placement of key components received special consideration. With the two engines and their alternators facing opposite directions inside the enclosure, the important service and maintenance points are located on the outside, where they're easily accessible through one of the unit's nine access doors.

WHY GEMINI?

A Higher Value Alternative
The Gemini product is a higher value, lower cost alternative to large, single engine gensets. It is a viable option that will produce the power of similarly rated individual units, with much greater flexibility.

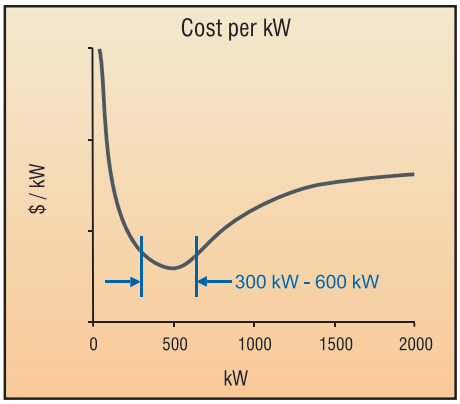
The economic advantage is simple. Gemini uses two smaller, less costly engines to do the job of one larger, more expensive one.

Generac further improves the power and cost equation through the use of its proven gear drive technology. This industry exclusive system has three distinct benefits:

- It allows engines to run comfortably at a higher speed (around 2300 rpm), within their optimal operating range and peak power band
- The higher operating speed allows the engines to more quickly and easily respond to block loads than competing genset engines that operate at 1800 rpm, where recovery is slower
- Engines with gear drives can produce more kilowatts per horsepower, increasing their electrical power output

The Key: Dollar Cost Per Kilowatt
One look at the dollar cost per kilowatt at different power outputs will show why the dual engine concept works so well. The smaller engines are mass produced industrial or truck engines, which cost less due to economies of scale. The larger engines — which are necessary above 600 kW — are much more specialized, and built in far fewer numbers, making them more costly to manufacture.

By combining two engines from the lowest cost per kilowatt category and integrating them with its own switch technology, Gemini provides the same power output as larger, single engine units, at much less cost.



Increased Reliability
Not only is the acquisition cost of the Gemini product about 25% lower, but with two engines on call, redundancy is built-in and reliability is increased. Each generator backs up the other, and provides partial coverage during maintenance.

With its load shedding capability, the Gemini genset can operate in a reduced capacity. If the electrical load is divisible, one generator can handle half of it while the other is offline. This is an inherent advantage over the "all or nothing" aspect of a single engine unit.

Compact Footprint
Gemini's profile and footprint are amazingly compact, compared to other sound attenuated gensets of similar output. Since size is often a consideration, the Gemini twin genset provides a powerful solution where space is at a premium, and power density is a key requirement.

Expandability
The Gemini system is designed with expandability in mind, allowing multiple Gemini's to be combined for even great power output.

Quicker Availability
Product availability is enhanced with Gemini also, since it uses engines that are more commonly available, with shorter lead times than large, single engine units.
Generac's vertical integration means that the unit's key components are Generac designed and built, including the gear drive, alternator, digital control panel, automatic transfer switch, sound attenuated enclosure, and sub base fuel tank. Generac is the single source supplier of the entire package.

Ease Of Service
Gemini's smaller engines are easier to service than larger units that require more specialized - and more costly - technicians, spare parts, and repair shop services.

FEATURES & BENEFITS

Integrated Control System
Generac's own F panel digital control panel and user interface integrates all generator and paralleling functions into a single control. The control elements include a speed governor, voltage regulator, and automatic synchronizer. To control these elements while paralleled, the F panel implements isochronous load sharing and reactive cross current between the two generators.

The F panel also protects the system and provides information at a glance. Its protective functions are annunciated by an audible alarm covering numerous types of conditions:

- All NFPA 110 Level 1 alarms and pre-alarms
- Sensor failures
- Communications fault
- Transfer switch fault

Besides alarm information, the F panel displays other critical system data during operation of the genset:

- Volts
- Amps
- Power Factor
- Kilowatts
- Frequency
- Engine speed
- Run hour
- Oil pressure and temperature
- Coolant temperature and level
- Fuel level

The master controller for Gemini is the PowerManager® module, which coordinates key functions and supports multiple modes of operation. The initial product offerings are designed to operate with an open transition configuration. Product offerings in the near future will include a closed transition contact mechanism, allowing PowerManager® to support base loading and peak shaving operation. Gemini features built-in communications capabilities, making remote operation easy via GenLink® software or third party interface equipment utilizing the modbus protocol. Using a PC, it is possible to see the entire system, or focus on the operation of an individual generator. In addition to viewing the operation of an individual generator, it's possible for the servicing dealer to set and adjust its operating parameters.

WARRANTY COVERAGE

Two Year / 2000 Hour Coverage
The Gemini product is covered by Generac's standard 2 year / 2000 hour limited warranty.

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