



Case Study: National Grid Enderby Substation

When the Generating Set at NG Enderby came up for replacement, NG decided that for operational resilience reasons, this unit was to receive extra attention. Also a prototype for Type Registration and the new NG TS 3.12.3 Issue 7, the result was a set with quite a few new bells and whistles...

As a part of a general LVAC upgrade for the site, **WARDPOWER** performed sizing studies which determined the need for a new 463KVA Generating Set to replace the site's existing 187.5KVA set. The works were to be performed under the Construction (Design & Management) Regulations 1994 with **WARDPOWER** undertaking the role of Sub- Contractor.

This unit was the prototype for many new ideas that NG and **WARDPOWER** had been working together on for some time. To begin with, the Generating Set was placed on legs: Each NG Generating Set is required to have a 40 year design life. The unit was placed on legs to allow future inspection and maintenance of the bottom of the container which is also the bottom of the bund. What was initially a secondary consideration of putting the unit on legs – flooding – has since become a major one as more than one NG Generating Set has come to grief in the recent floods. The bund already benefits from a sacrificial steel layer, two levels of leak detection and a triple layering system but the design is such that it can be fully serviced and monitored for the asset's life.



*Standing Tall and Proud!
NG Type Registered Generating Sets are now
positioned on legs to prolong asset life and
avoid the rising Oceans...*

Putting the unit on legs also caused problems in respect of the FM 200 Active Automatic Fire Suppression System fitted: With the unit being on legs, the container was given galvanised ladders and stairways to meet the requirements for fire exits (no opening a door that goes straight down stairs).



*The Quality is in the Detail...
All NG Units are required to have a 40
year design life. We could use a £15
plastic emergency stop. Or we could use
one that will last 40 years.*

This unit is one of the first NG ones to have been fitted with the FM200 System which includes a Castell Door Interlock system to meet NG operating procedures.

As with all NG units, the Generating Set incorporates a 50% rated load bank which starts the set automatically for monthly self-testing. The load bank is also used as a ballast load to prevent light loading as this set is predominantly sized for motor starting and peak load requirements. To assist in this, it also includes a 146% rated alternator, selected to meet the site's locked rotor KVA requirements.

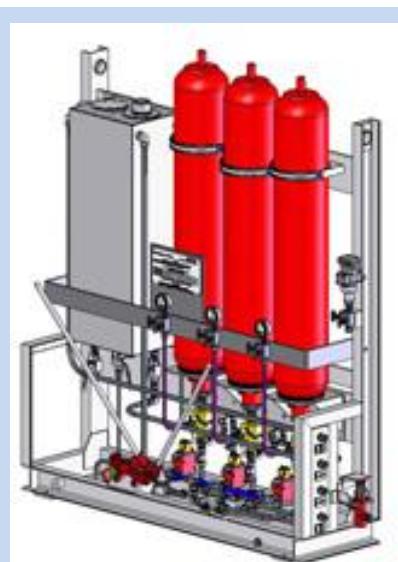
Control monitoring is also provided for every control combination that could lead to a fail to start for the Generating Set.

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This Generating Set was also equipped with a 3 shot Hydraulic Secondary Starting system. Capable of automatically starting the set a minimum of 3 times at 0°C, this equipment included:

- § A secondary SLA battery package to keep the Volvo EMS Engine Management System alive during start attempts from the Hydraulic Start Pack
- § 3 x 45L receivers with individual solenoids for multiple start attempt control
- § A flywheel driven re-charge pump
- § An emergency hand charge pump
- § An emergency manual start attempt control
- § Automatic controls to switch between the Primary NiCAD starting system and the Hydraulic Starting system depending on system conditions

The complete package was subject to third party design assessment and witness testing by Lloyds and fully tested by the supplier, Industrial Power Units, all in line with the Pressurised Equipment Directive.



*Hydraulic Starter Pack
The WP-V436PXD WARDPOWER
Generating Set is equipped with
a Multi-attempt Hydraulic Start
Package supplied by IPU*

Of course with clients like National Grid, nothing gets there if the Client isn't convinced before hand that the process for building the product is the right one: A full Design Intent Document and Commissioning File were supplied within 4 weeks of order detailing all that would be removed, built, delivered, installed, tested and commissioned down to the last wire. And as for Health & Safety, It's National Grid – what can we say! A full CDM Pack was submitted to the client 4 weeks prior to start of works detailing every single action, chemical and waste stream on site. Every individual on site was CSCS, NG Person, NG Competent Person and BESC qualified. Another typical job in the Wonderful World of **WARDPOWER**.

Project in Brief:

- Full scheme sizing
- 463KVA Prime Rated Generating Set in 85dB(A) at 1m Acoustic Container
- FM200 Active Automatic Fire Suppression System
- Multi-start attempt Hydraulic Secondary Start System with secondary battery control system
- Integrated 50% rated automatic load bank
- Removal of existing equipment including disposal of hazardous waste
- Commissioning including primary injections, 3 phase simulation tests, load tests and transient tests



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