edition 29 | December 2015

# DriveLink

Serial communication from POWER ELECTRONICS Experts in Motor Control

## summary:



# Welcome

## to the latest edition of DriveLink.

2015 seems to have gone by in a blur.

It has been an extremely busy year for the Power Electronics team. Continued growth has dictated the need for additional staff as well as a new building for the Christchurch head office. The new members of our team and the building are profiled in this edition of Drive Link.

The uptake of the Sinexcel Static VAr Generator and Active Harmonic Filter range continue upwards at an exponential rate approaching 20MVAr now sold. The Static VAr generator is proving to be a true replacement for traditional capacitor based PF systems.

We wish you all the best for the festive season. The Power Electronics offices will be open normal business hours throughout the entire Christmas / New Year period so if you need our help please feel free to touch base.

# New Christchurch Head Office

To cope with growing demand Power Electronics Christchurch office has relocated to a brand new purpose built premise at 14B Opawa Rd, Christchurch. The new location provides 540M2 of warehousing, dedicated service workshops, as well as new office areas.

Whilst a major logistical exercise the shift was made easy by the fact that the new premise is right next door to our original building.

"Our original building was damaged during the 22nd of February 2011 earthquake. This gave us a good opportunity to think about our future requirements and what type of building would suit us best. The result is just fantastic!" says Managing Director, David O'Donoghue "The increased size will allow us to hold more stock and is large enough to cope with our plans for future expansion of both our VSD and Power Quality business. We would welcome any customers who want to stop by and visit!"


*Power Electronics new purpose built head office and warehouse*

*Extensive warehouse and service facilities*

# Sinexcel SVG Sales Take Off

With approaching 20 MVAr of Sinexcel SVG Inverter Based Power Factor Equipment sold in less than twelve months, this revolutionary technology is striking a chord with many New Zealand customers.

Automatic Power Factor systems are often un-loved and clunk away in the corner of a switch room only receiving attention when "smoke gets out", or when the electricity retailer begins charging penalties due to it not operating correctly. Whilst PFC equipment is usually installed purely to meet minimum network Power Factor limits and to avoid penalty charges, a correctly sized Power Factor Correction system can reduce maximum demand charges and improve site electrical efficiency.

Traditional Automatic Power Factor systems comprise banks of capacitors that are switched in steps to maintain a PF of 0.95 Cos Phi or better. This technology has existed for half a century or more. It can be maintenance intensive, with contactors requiring regular attention and capacitors typically needing to be replaced every three to five years.

With a design service life of >100,000 hours the SVG units overcome many of the traditional maintenance issues associated with capacitor based systems. One of the outstanding benefits is the rate of response of the SVG, as it continuously monitors and supplies reactive VArs to maintain an absolute set point. Provided the SVG system is correctly sized, Cos Phi of 0.99 can be maintained – even on sites where there are highly dynamic load variations e.g. saw mills and quarries. Under and over compensation is a thing of the past.

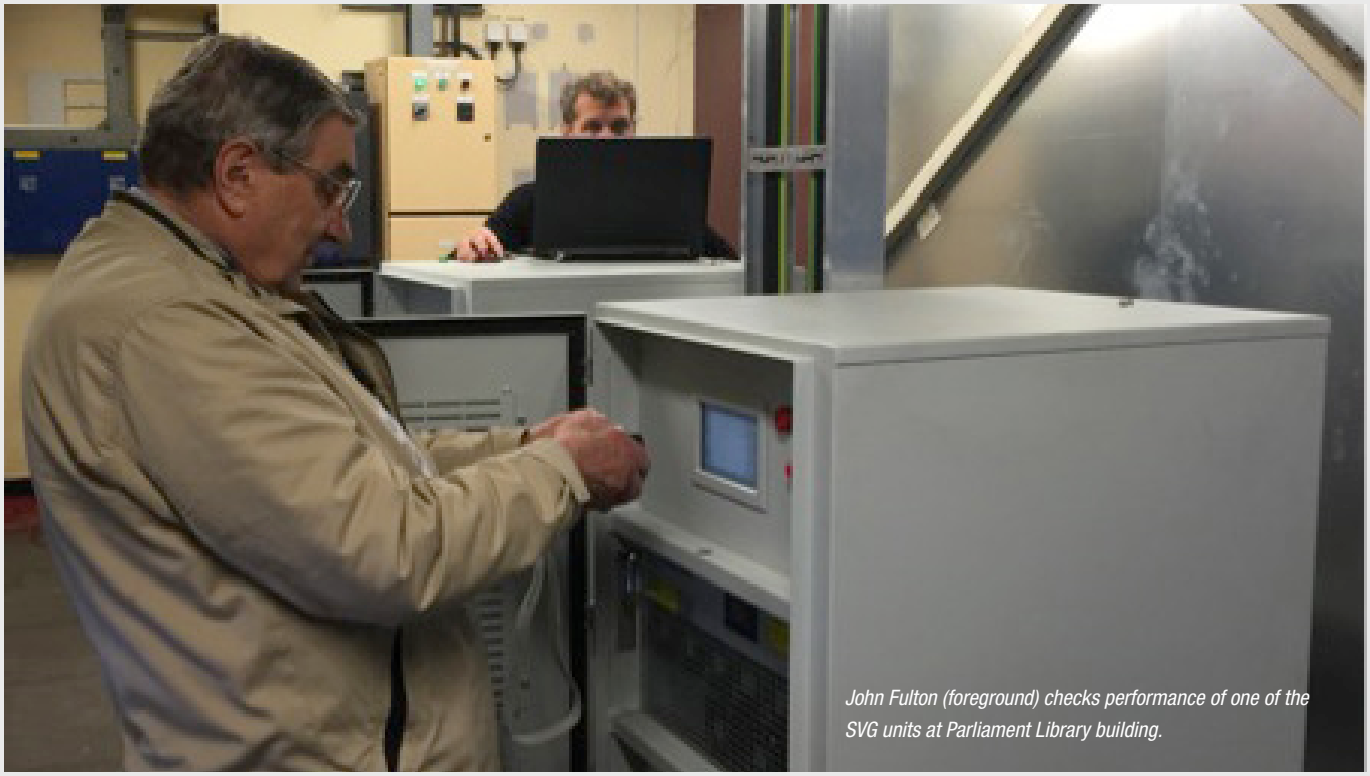
Health and safety is now the highest priority on most sites.

To that end, Power Electronics has been involved in several installations where SVG has been selected to replace conventional capacitor systems that have caused electrical fires. One such installation is the Parliament Library building in the Parliament precinct, Wellington. Engineering Consultants Stephenson and Turner were engaged to select and specify a replacement system. Keith Johnstone, the engineer responsible for the project with the assistance of John Fulton reviewed the technologies available. Keith and John identified that inverter based Static Var Generator technology was most suitable for the application. The project was tendered and Power Electronics were awarded the contract to supply two 130kVAr SVG systems to building services contractor, Cowley Services. Keith is very happy with the performance of the SVG equipment and says; "This technology has a sound future in electrical system design".

Whilst Power Factor systems may have originally been specified to meet electricity network limits the load profiles of sites change over time. The PENZ team frequently see PFC equipment that is inadequately sized, or no longer functioning correctly. In addition to this, many New Zealand electricity retailers have a strong focus on Power Factor and are hiking penalty charges.

Although your electricity supplier may not be imposing Power Factor penalties, they all reserve the right to do so.

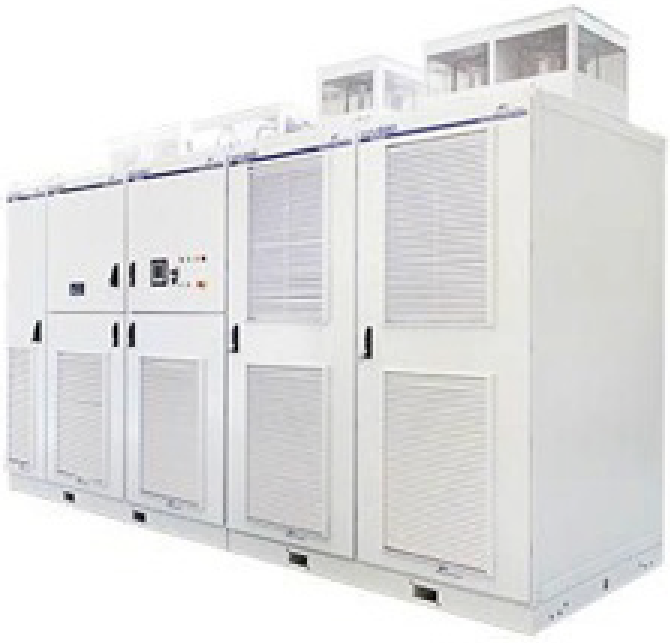
Power Electronics NZ offers a Power Quality Audit Service. Our Engineers have extensive experience in understanding the various electricity retailer billing formulas and even if penalties aren't presently being charged, maximum demand and fixed charge tariff reductions can result in a fast pay payback by improving site Power Factor.



*John Fulton (foreground) checks performance of one of the SVG units at Parliament Library building.*

# Power Electronics NZ Ltd, secures its first HV VSD order

The equipment is due for shipping this month from the Power Electronics Valencia Factory and will be destined for Golden Bay Cement in Northland. The Power Electronics XMV660 series VSD will be used in conjunction with a 235kW 3,300V Exhaust Fan.



The XMV660 Medium voltage variable speed drive goes one step further in achieving high performance by using proven low voltage technology within a rugged, modular, multi-level configuration. The multi-step quasi-sinusoidal output voltage produced by the cascaded H-bridge power cells results in sinusoidal motor current and is low in dV/dt. The multi-pulse phase shift transformer at the input minimises harmonic current drawn from the grid ensuring compliance to international THD standards. It is designed under the strictest safety regulations and complies with the most demanding industrial requirements. The XMV660 is available in a wide voltage and power range. It offers the best power quality, maximum motor care, uncompromising safety and reliability across the full range.

Further information to follow

# New Appointment

# Brian East Operations Manager

Power Electronics are pleased to announce the appointment of Brian East in the role of Operations Manager. Brian will be based at head office in Christchurch where he will be responsible for systems, inventory, and the day to day operation of the business.

Brian has come from the Otis Elevator company where he has been for the past 28 years. Brian has undertaken various roles within the Otis organisation but most recently as a project manager for projects within New Zealand and the Pacific Islands. Brian brings a strong background in systems, planning, and organisation. Brian began his working career as a fitter so he is also very practical and not frightened to “roll up his sleeves”.

Brian resides in Kaiapoi, within the greater Christchurch area, with his wife and two dogs. He is a self-confessed golf addict!

**We hope you have a very Merry Christmas.**

The Power Electronics Team

# Drive Tips

Is there one type of VSD harmonic mitigation that is the best?

*In short the answer is NO. Harmonics from a VSD can be addressed by system design, multi-pulse VSDs, Passive or Notch Filters, Active Harmonic Filters, or Active Front End VSDs. The solution for every application should be considered on a "case by case" basis.*

*Each harmonic mitigation method has pros and cons. Consideration needs to be given to economics, physical size, actual VSD(s) installation, existing electrical network performance, and desired mitigation levels.*

*It is really important to talk to a supplier that can offer all the harmonic mitigation topologies so that you get the best solution for the job rather than being pushed down the path of a supplier that can only offer one or two solutions. Power Electronics can assist with all the topologies.*

Is it correct that installing an output choke on the output of a VSD lowers dV/dt?

*Many of the latest generation variable speed drives have very high rates of output dV/dt. If this is not addressed correctly the resulting peak voltage applied to the connected motor can be up to two times the level of the DC Bus Voltage. This can result in first turn failure of the motor windings.*

*A common solution for this has been for suppliers to recommend the installation of an output choke between the VSD and motor. This does result in lowering of the peak voltage applied to the motor but most suppliers will not be able to categorically confirm for you what the dV/dt rate or peak voltage level will be. Thus the solution may not be satisfactory to comply with the motor manufacturers stated maximum levels.*

*Insist that your VSD supplier is prepared to state in writing the dV/dt and peak voltage levels when the choke is installed. Or alternatively select a low dV/dt VSD, like the Power Electronics SD700, which contains an integral dV/dt and peak voltage solution.*

Why is an inverter based power factor system like the Sinexcel SVG safer than traditional capacitor based power factor systems?

*Capacitor based power systems have been around for in excess of 50 years and fundamentally have not changed in their design. Over this period of time the loads connected to the electrical supply have changed significantly. The volume of non-linear type loads like Variable Speed Drives, DC Power Supplies, UPS, and LED lighting have increase exponentially. As result the power supply is often now rich with harmonics. Harmonics, temperature, and frequent on/off operation are the biggest killer of capacitors and unfortunately a common capacitor failure mode is fire.*

*The Sinexcel SVG uses an inverter to "exchange" VAr with the electrical supply resulting in an improved PF. There are no AC capacitors connected to the power supply so the SVG is completely immune to harmonics. The SVG inverter is infinitely variable so there is no requirement to stage banks of capacitors in and out as power factor changes. High temperature events do not deteriorate the SVG. If high temperature occurs the SVG will simply shut off.*

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