

Current Affairs

News and views from Ergo Consulting Ltd

Issue 17 – Winter 2014

Audits and Investigations

The electrical infrastructure of a plant is often viewed as an expensive overhead. However unless it is well-designed and regularly audited, it may be unsafe, unreliable, and prone to unforeseen electrical incidents.



Piecemeal upgrades

Many electrical infrastructures are augmented without an overall plan. New transformers are added here and there, or an additional 400V supply installed by the local utility. Over time a 5MW to 10MW load could be running on an infrastructure designed for 2MW or less.

Older plants

Design practices have changed over time and many older plants no longer conform to current best practice. These plants often have:

- Poor environmental condition
- Equipment that is inadequately maintained or operating beyond its fault rating
- Dangerous levels of arc flash
- Poor protection discrimination with no redundancy - a small fault can have a widespread effect
- Low visibility/monitoring of the electrical network
- Low levels of remote control - manual switching takes time and is relatively risky
- Documentation which fails to provide simple drawings of the electrical network.

Safety

Safety standards have increased dramatically in recent years. What was acceptable in the past, such as technicians being routinely exposed to high voltages, is no longer the norm. It is now common practice to have fixed pattern switchgear for remote isolation of circuits, compartmentalised switchgear to limit

operator exposure, and arc flash protection including face shields and arc flash rated clothing.

Safety needs to be reviewed regularly. Unsafe practices creep in over time in the absence of proactive audits. Of concern are cluttered switchrooms with no clear egress, exposed conductors, and equipment which is not identified on layouts/single line diagrams or is not clearly labelled.

Operational continuity

A poor electrical infrastructure can result in significant down time, but financial losses can be minimised with prudent planning. Plant managers should be able to answer the following questions with confidence: How will a problem with the electrical infrastructure be identified? If circuits need to be switched to restore operation, is there enough information/control to do so? Are there up-to-date drawings, manuals and spare parts to ensure quick and safe repairs?

Providing solutions

Ergo undertakes independent network audits and investigates electrical incidents. Our reports include suggested short and long-term solutions to boost employee safety and operational continuity, and to assist with strategic planning. For more information contact Power Systems Head of Department – Carla Smith.

Chris Turney
Director - Power Systems

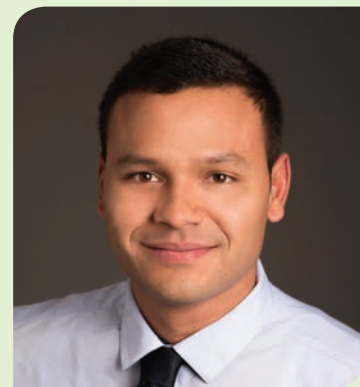
Ergo News

- Raj Chand and his wife Samantha welcomed their first child, a son named Xavier, in April.



Chris and Nigel tramp the Milford track.

- Chris and Nigel went on their annual Easter tramp, this year tramping the Milford track with their families.



New @ Ergo

Redaw Matthews joined the CAD team in April as a junior designer. He has completed a Certificate of Applied Technology and a Bachelor of Applied Technology at Unitec. This background in electro-technology means he is familiar with electrical schematics, symbols and circuitry.



The winning team 'Putt for Dough', L-R Richie Murray, Kevin Jacob, Adam Searancke, Russell Pascoe.

Golf control

Control Systems held its inaugural Waikato Region Golf Day at the Horsham Downs golf course, Hamilton, in early April. Joining Ergo were staff from various Waikato councils (Hamilton, Waikato and Hauraki), EnviroWaste, AWT and Northern Electrical. Only one stroke separated the top two teams over the nine holes. An excellent afternoon's golfing was rounded off with a barbecue and prize giving in the clubrooms.



Dima Ibrahim presents Steven Ridgway the award for the longest drive.



Scott Wilson (Ergo) tees off, while his team members consider their options.

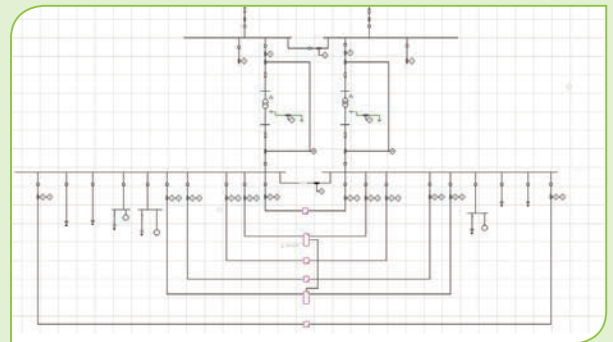
Network Modelling

Complex electrical networks are best understood with computer modelling. By simulating load flows and fault levels, good decisions can be made regarding upgrades and the use of existing assets.

Ratings critical for safe operation

Current rating and fault rating are two important criteria for any electrical asset. A network model determines appropriate ratings for transformers, switchgear, and cables.

- **Current rating** - can the assets cope with the required load? Protection design also looks at the network's ability to switch quickly between power pathways.
- **Fault rating** - can the assets withstand fault conditions? Protection design ensures power disconnects as quickly as possible and specifies a fault rating for all equipment on the network. A current rating might be 600A, but the fault rating could be in the order of 26,000A for one second. It is critical that equipment operates within its fault rating.



Getting the model right

Network modelling is governed by the 'garbage in, garbage out' principle. Correct inputs are vital for meaningful results – inputs such as current and voltage ratings, fault levels, protection relays and settings, transformer ratios and taps, single line drawings, and load/switching configurations. A correct model will predict load flows that are observable in real life.

Ergo has a methodology and default tables for sites that do not have good documentation or metering. In all cases the source documents (assumed or actual) are cited and discussed with the client. The model's output is linked to well-documented and independently verifiable input data.

Producing useful results

Network modelling generates a huge amount of data. Engineers need experience with DigSilent and ETAP software to interpret the results and summarize them in a manner that the client can understand. Maria Kobe, Steve Timmins and David Fraser of the Power Systems team have the expertise to undertake this.