

New breed of smart energy information solutions

Wellington company Energy Intellect has pioneered the development of a new breed of smart energy information solutions that provide a fresh perspective on energy measurement, remote communications and Automatic Meter Reading (AMR).

The company has developed a range of smart meters designed to top international standards for high quality revenue and sub-metering applications, and is the Australasian market leader in the development and deployment of Internet hosted realtime energy information solutions.

Energy Intellect is in a growth phase and moving into next generation manufacturing processes to make it easier to scale up production for larger international markets.

The company commissioned Nightside Test Design to create a more rigorous in-house production test system for assembled boards prior to being installed into the product range. Energy Intellect uses contract manufacturing to produce its range of metering products, and wanted to raise the bar in terms of quality control for every meter coming off the production line.

The objective was to provide rigorous, automated testing for each assembled circuit board before it was installed into the finished product, saving time and cost further down the production line.

Energy Intellect also required a turn key solution that was scalable, used primarily off-the-shelf components and could be easily duplicated in other manufacturing facilities for future offshore production.

The solution Nightside put together for Energy Intellect is a high volume, high quality, in-circuit and functional production test system. It comprises three main parts:

1. The NightGate production test fixture - the board to be tested is placed into the drawer, which is then closed,

automatically starting the test. There is a pin bed inside the test fixture and compressed air is used for power.

2. A National Instruments PXI system including an in-built controller (e.g. a full PC on a card) for reliability and robustness. Features of the PXI system plug in cards including a digital multimeter, high density switch matrix, firewire, counters and digital I/O.
3. The customisations and power supplies box, which is custom built by Nightside for each test system and contains as many of the unique interfaces for the product under test as practical. The outputs from the customisation box are connected through to the fixture as required.

The aim of this test system is to fully automate the process of testing the product – the operator scans an identifying barcode, places the product into the tray, closes the drawer and has no other interaction with the system until it has finished testing and produces a pass or fail result.

The test system first completes a range of in-circuit tests of the parts loaded onto the PCB – checking that resistors and other components are the correct values. Then it installs the product's embedded software and checks specific critical functionality of the product. Finally it completes a check of the LCD using a camera to look for faults by generating a series of patterns (see attached picture).

The system has been installed and running now at Energy Intellect's contract manufacturing facility in Lower Hutt for several months and has effectively streamlined the test and diagnosis process.

A manual test

process that was creating a production bottleneck by taking up to 20 minutes per circuit board is now taking only four minutes per board, speeding up the production process overall to 15 boards per hour, reducing the failure rate and offering a higher level of confidence in the product.

All the results gathered by the test equipment are stored in a database so they are accessible and can be analysed when necessary. Traceability is a key issue – it is very useful to be able to track back from a field failure to find the date it was tested and determine the product's performance at that point.

Having this technology at their fingertips has also resulted in a substantial redesign of the design and build process for Energy Intellect, making it much quicker to find any defects because they are localised to the circuit board component.

Energy Intellect's chief design engineer, Mark Wilson, says, "Nightside provided the turn-key test system development we needed in a time frame that we could not have achieved with in-house resources. From inception, through development, to delivery and beyond, Nightside have proven themselves to be a professional and strongly customer focused team."

