



Case study
Dynamic Controls/Nightside
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NIGHTSIDE ASSISTS DYNAMIC TO DEVELOP NEW DX2 POWER CHAIR CONTROLLER

Creating innovative new products for the health and mobility sector is an area that New Zealand manufacturer Dynamic Controls have made into an artform in recent years.

Of course one of the critical factors in the success of the controllers they develop for power chairs, is the ease of use for customers with disabilities and guaranteed performance under all conditions.

When it came to developing the new DX2 controllers, Dynamic called on Christchurch based test specialists Nightside Test Design to develop a means of testing a range of third party LCD displays under different light conditions, to ensure they lived up to their performance standards and then integrate the hardware and software to work with the Dynamic specification.

Nightside's team of test engineers delivered an embedded development including both hardware and software, which involved research, evaluation and integration of the LCD drivers to support the majority of LCD modules being considered. They developed software to enable Dynamic to plot simple graphics on the screen for evaluation as well as later interfacing with the windowing software used by Dynamic to generate the user interface.

Dynamic Controls started life in 1972 as a small company specialising in the design and manufacture of speed controls for industrial forklift trucks and personnel carriers.

1981 saw controllers for powered wheelchairs added to the product portfolio and seven years later Dynamic launched the "DM" - the world's first power chair controller based on the new microprocessor technology. Internationally acknowledged as the first in a new generation of controllers, the DM's success firmly established Dynamic as the world leader in the specialised niche market of controls for mobility products.

The spectacular growth that began with DM led to equally innovative new generations of power chair and mobility scooter controllers, as well as diversification into contract manufacturing of electronic assemblies in the medical and general electronics markets.

Dynamic now has distribution and service centres in New Zealand, Australia, the UK and USA, and the company's products are being used in power chairs around the globe.

Dynamic invests heavily in the latest design, manufacturing and product technology to surpass the highest international regulatory standards and give them an international edge.

Nightside Test Design is a Christchurch based specialist hardware and software testing company founded in 2001 by managing director Peter Brown.

A winner in the 2008 EDN awards in the 'Best application of test or data acquisition equipment' category, Nightside has developed a reputation for providing a high standard of service to corporate and government clients, inside and outside the embedded electronics sector. The company offers a range of test services, based around four main categories – production testing, embedded prototype and testing, software testing, and measurement and logging.

Nightside has had a long standing working relationship with Dynamic, including an eight month project developing test software scripts for the Shark power chair controller. The Shark range is operated by a simple joystick and driven by a power module, which is the brains of the unit.

This prototype and test project was for the newly released DX2 range of joystick operated power chair controllers, a much more sophisticated product designed for a high-end user with extremely limited mobility and/or input capability. This controller is more versatile and has a wider range of functionality built in.

Dynamic wanted to add an LCD display to a new joystick module for their DX2 range of power chair controllers. The display needed to be easily read both indoors and outdoors, under varying light conditions, similar in many ways to a cell-phone display.

The brief also required that the controller module would work with either black and white or colour LCD displays.

As with any prototyping process, Dynamic were looking for confirmation that the new controller concept would work before committing an in-house engineering development team to the full blown version of the project.

The brief to Nightside was to rapidly build an effective and flexible test platform for a range of different LCD display modules that claimed to be usable in all light conditions including sunlight and outdoors.

Dynamic had previously reviewed a number of LCDs and wanted to confirm the manufacturers' capability claims - and given that outdoor use was critical to the product's success, they needed to be confident that it would work.

A secondary aim was to provide Dynamic with a platform to develop their product using their current family of microprocessors.

Nightside completed an embedded development including both hardware and software which involved research, evaluation and integration of the LCD driver to support the majority of LCD modules being considered. They also developed custom software to allow display of graphics as well as interfacing to the windowing software used by Dynamic to generate the user interface.

An interface was provided to the third party provider of the LCD driver software and Nightside staff managed the project when significant modifications to the driver software were needed to optimise the speed that graphics appeared on the LCD display.

Nightside also designed electronics hardware and PCB layout for a high end Renesas microprocessor with external memory, communication buses, Input buttons, Output indicators and removable daughter boards for the LCD display modules.

At the final stage of the project, Nightside provided a handover to Dynamic's engineering department so they could pick up where Nightside got to and continue on with the project.

According to Nightside managing director Peter Brown, the DX2 project presented the sort of challenges relished by his test team.

"We are frequently called on to develop a test system from scratch in a situation where nothing quite like it currently exists – that's the nature of prototyping and product development. Developing a test rig or platform for a product that hasn't been created yet is always a challenge, but is an aspect of the work we do for a wide range of clients.

"The crucial thing in carrying out rapid prototyping for client companies is the ability to remove key risks for that company before they invest in setting up a production line."

Brown says that the processes followed in testing the hardware and software for an application like this follow fairly standard processes, but are speeded up significantly by the fact that the focus is purely on function at this early stage.

"We are being commissioned to determine whether the concepts will actually work, and if they do work to a degree, we can assist in optimising them so they work to the level the client requires," he comments.

"Of course once we deliver to the client specifications, they then need to spend a lot more time and resource developing the form of the product and adding all the other aspects that make the end result fully functional, user friendly and appealing to look at and handle."

"One of the critical factors in the creation of this display for Dynamic was that the graphic icons needed to show up quickly on the LCD screen. In the initial version they didn't show up fast enough, so we spent more time optimising the off-the-shelf driver software to ensure the screen was as responsive as Dynamic needed it to be.

"If that problem had been difficult or impossible to resolve, then the development project could potentially have stopped at that point," Brown says.

The hardware platform Nightside developed enabled the testing and design-in of the LCDs. This testing was completed by Dynamic staff by viewing the LCD screen in various lighting conditions and determining if it could be read.

Dynamic project manager Steve Hill commented that Nightside delivered on the specification in full and on time.

"They performed both the high and low level integration and completed all debugging necessary so that the team at Dynamic could immediately work with the LCD at an application level. There was some significant application level optimisation that we needed to do but that was always going to be the case.

"The outsourcing of this software task was very much a success. Nightside were flexible enough to work on this project at the right point in the project timescales, allowing us to develop other key deliverables at the same time.

"The project had a large proportion of new IP to be developed and having Nightside there to help out was a key component that enabled us to deliver the project," Hill said.

Dynamic's DX2 advanced joystick remote has been on the market since April 2008. Included among its features are the large colour LCD screen that adjusts the screen background automatically depending on ambient light conditions; a real time clock; icon based screen controls; large well spaced buttons; plus programmable keys that give direct access to chair functions including speed adjustment, raising leg rests before crossing a road, and turning on side lights and hazard lights.

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