Case Study

Acquiring In-House Design Skills and Best Practice leads to Profitable New Product

Environmental Measurements Ltd (EML), based in Sunderland, designs and manufactures weather monitoring instrumentation, which it currently supplies to more than 30 countries worldwide.

The EML portable, modular weather station data logger

The original Winlog data logger weather station

One of EML's products is a portable Modular Weather Station, a multi-channel analytical recording system for the Environmental and Weather Industries. It records rainfall, wind speed and direction, radiation, temperature and humidity.

Need for the New Product Development

The original EML Weather Station relied on EML's data logging product "Winlog" to measure and record data. Winlog had a number of limitations which were severely affecting its sales. It had insufficient sensor channels to satisfy customers' requirements, and lacked other desirable features offered by its competitors. It also contained obsolete components and was expensive to manufacture.

Although EML had strong skills in sensor technology and analogue electronics, it lacked in house capability in support microcontroller circuit design and programming, having subcontracted out the Winlog Support Microcontroller development. EML recognised that it would require training and assistance to replace the Winlog product.

Support from EDSC

The Electronics Design Support Centre at Northumbria University acted as advisors to EML during the design and development of the replacement product.

EML were able to use the resources of the Support Centre to evaluate development tools, and to make the best selection without financial risk. The Support Centre delivered a comprehensive package of management training, development assistance and technology transfer to ensure that EML could continue to operate independently in the future.

The New Generation Product

It was vital to choose the correct technology for the new generation product, named "DataTrek", to give it the broadest range of capabilities together with low manufacturing costs and a long product lifetime. A new microcontroller was chosen which integrated many of the required functions into a single chip, increasing the product's flexibility while reducing the component count.
Additional features and benefits were incorporated into DataTrek to increase its functionality and competitiveness:

- Additional analogue and digital input channels
- Increased memory capacity
- Digital outputs for alarms and to control external equipment
- High-speed serial communications
- Optional modem for remote configuration and data reading
- Optional solar panel battery charging for longer unattended operation

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- Reduced size, allowing larger batteries to be used
- Lower power consumption
- Windows-based configuration and data reading utility software

The new DataTrek data logger comprised only two circuit boards compared to the three of the Winlog logger. By thoughtful design to ensure ease of manufacture and test, a 22% reduction in build cost was achieved.

Best Practice Design

The use of Best Practice methodologies during the design process reduced the cost and timescale of the development, and will continue to bring benefits throughout the life of the product:

- The initial technical and commercial feasibility studies gave confidence that a profitable market exists for the product
- The thorough specification and top-down design process ensures that the product is fit for its purpose
- Built-in product self-test and auto-calibration reduces build costs
- The circuit boards were designed for ease of manufacture and test
- The modular design provided scalability and ease of adaptation
- The code is re-usable for future enhancements and new products

Technology Transfer

The design assistance delivered by the Support Centre was supplemented by a comprehensive technology transfer programme to allow EML complete independence in their future electronic designs.

Training courses and hands-on assistance were given in:

- Best Practice Design
- Project Planning
- Design of Support Microelectronics hardware
- Coding in 'C' for embedded systems
- PCB CAD
- Serial communications

EML now has the confidence, knowledge and skills to develop new products based on the DataTrek technology.

Benefits to Environmental Measurements Ltd

Acquiring the capability to design its own data logging equipment gives EML a significant advantage over their competition, who mostly rely upon third-party hardware. EML expect to increase its weather station market share significantly, and to move into new environmental monitoring markets.

The production cost of the logger has been reduced by 22% due to lower component, build and test costs, and manufacturing time has been reduced by 50%. Unit sales are expected to increase 4-fold, and the development costs should be recovered within two years.
Most importantly, EML has gained additional knowledge and expertise to compete successfully in a world-wide market for their products.

The new DataTrek logger, complete with modem extension board

Further Information on the web:

http://mcttc.unn.ac.uk/
http://www.emltd.net/