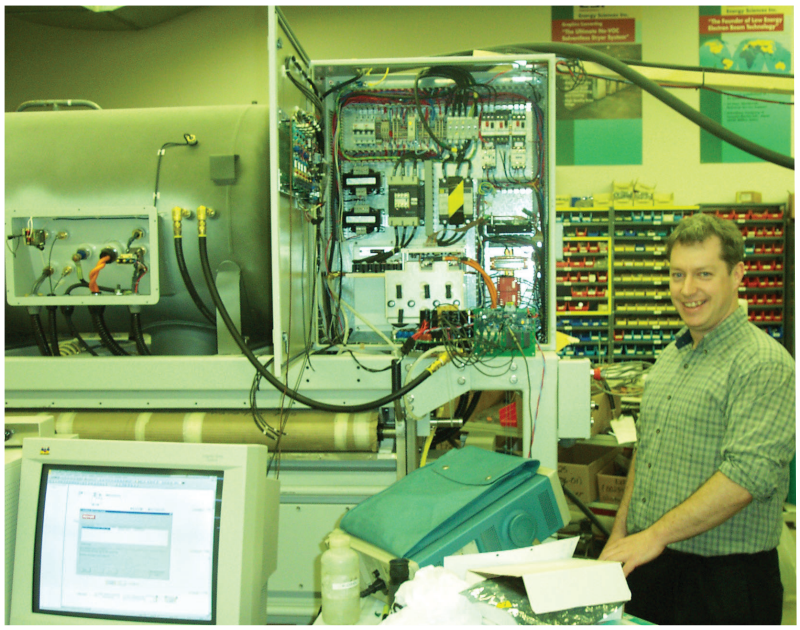
CUSTOMER STORY

Energy Sciences

Electron Beam Curing System Designed with Embed

ALTAIR Embed



Greg standing next to electron beam curing system.

"[Embed] is a stable and robust product. I found it very powerful, yet easy to learn and use. The DSP code generator is excellent. It generates fast, tight, and reliable code."

Greg Gottschalk
Electrical Engineer
Energy Sciences

Energy Sciences - a subsidiary of Iwasaki Electric Corporation - designs and builds state-of-the-art energy curing systems for the packaging industry.

Energy Sciences originally purchased Embed (formerly called VisSim Embedded) to design the controller for a high-speed labeling machine for such items as ice cream and orange juice containers. Paper stock, which is fed through the machine at 1,000 feet per minute, is imprinted with polymerizing plastic inks. The labeling machine cross links and cures the wet ink with a high voltage electron beam (100,000 to 300,000 volts).

Initial Design

Mr. Gottschalk's first assignment was to make improvements to the switching technology used to control the voltage to the beam. Using Embed, he created a digital control system to replace the old analog-based technology. The control system used closed-loop control to monitor beam strength. The architecture comprised two LF2407 DSPs: one at high voltage and the other at ground potential. They communicated over an optically-isolated CAN bus. Gottschalk automatically programmed the on-chip CAN bus, serial peripheral interface (SPI), analog input, watchdog, PWM, and numerous digital I/Os, all within the Embed graphical environment.

Energy Sciences Inc.

INDUSTRY

Power Systems

CHALLENGE

Improve the controller switching technology for high-speed labeling machine

SOLUTION

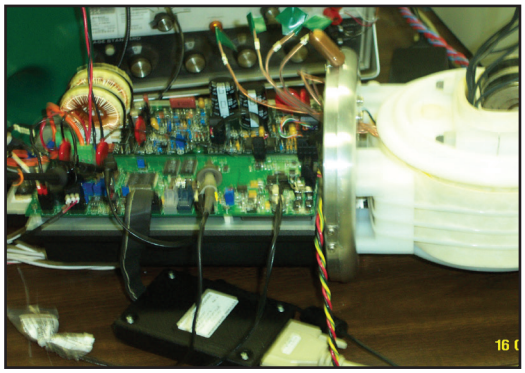
Use Embed to create a digital control system that replaces the analog-based technology

BENEFITS

- Point-and-click programming of on-chip peripherals speeds up the design process
- Automatic code generation reduces the risk of introducing errors to the design
- Easy to find and correct design flaws before committing to the hardware

Collapsing Development Time

Energy Sciences purchased Embed with the idea that Gottschalk would use it exclusively as a graphical programming environment to program Texas Instruments C2000 family of DSPs. Because Gottschalk was responsible for the entire circuit board design, he did not have time for hand-coding and debugging 16-bit fixed-point programs; and because he was not a C coder by training, he neither wanted to work with an additional C coder consultant nor worry about bugs in the code. With Embed, Gottschalk could rapidly generate accurate and reliable C code to access on-chip peripherals.



High voltage board.

Low voltage board.

Designing with Embed allowed Gottschalk to collapse his firmware development time from months down to about a week. According to Gottschalk, "It is almost impossible to overstate the importance of [Embed] to my development timetable."

Modeling the Power Supply

Gottschalk also used Embed for pure simulation to model the entire power supply system. Later in the design phase, Gottschalk discovered an unstable power supply that jeopardized his work. Using the general simulation capability of Embed, Gottschalk was able to immediately find and correct the design flaw. For this problem, Gottschalk actually preferred using Embed to PSpice because of its high-level modeling capability.

By using Embed to model parts of the machine, Gottschalk could quickly determine proper sizing of inductors and capacitors before working on any actual hardware prototype. This proved to be much less expensive than working with hardware prototypes.