

MILWAUKEE ELECTRONICS NEWS



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IN THIS ISSUE

ISO 13485	2
Lean Event	3
Engineering in Action	4

About Milwaukee Electronics

Milwaukee Electronics designs and manufactures custom circuit board assemblies for the medical, transportation, military, HVAC and a variety of other industries. The Company operates over 135,000 square feet of manufacturing in Portland, Oregon; Milwaukee, Wisconsin; and Tecate, Mexico. In addition to EMS and product design and engineering services, it offers quick-turn prototyping through its Screaming Circuits business unit.



Milwaukee Electronics provides manufacturing expertise in projects with multiple partners.

Coordinating a Multiple Partner Project

The goal of any outsourcing effort is normally to help the client company deliver a product to market that is faster, better and less expensive than they could build in-house. Sometimes the best way to achieve that involves multiple parties. In those cases, Milwaukee Electronics is often the bridge, working closely with both a design partner and the end customer. This is the case with

the Portland facility and one of its industrial customers.

The product is server/client units used to communicate fuel purchase and secure chip credit card data from the dispenser to a store. The design firm specializes in these products and developed a custom product

(Continued on page 2)

Letter from Mike

Every company searches for ways to be distinctive. How can they set themselves apart from others in their market? How can they inspire their workforce? For our company that difference is identified in two words: PERFECT PRODUCT.



And there's a story behind that bold statement.

Back in the early 1990s, Milwaukee Electronics was preparing for our first ISO audit to become certified. We learned that the auditors would request our Quality Policy from us, and that as they audited our facility they were likely to ask anyone in our workforce what our Quality Policy was. This audit item caused much debate in our company. We needed a strong quality policy to represent

(Continued on page 4)

Portland Facility Passes Stage One ISO 13485 Audit

Milwaukee Electronics' Portland facility has passed its stage one ISO 13485:2003 audit and the team is getting ready for the final certification audit in the first week of

September, which will involve two auditors and a 3-4 day process.

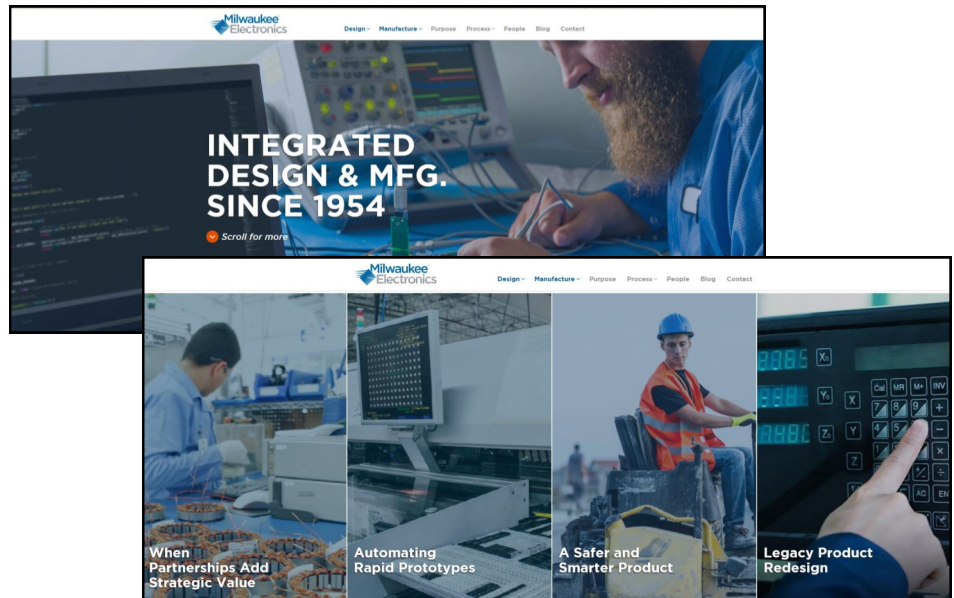
"I am very proud of our team and the effort they put forward to accomplish this

goal. Completion of the final audit in September will open the door to new opportunities in the medical market," said Rick McClain, COO.

Milwaukee Electronics Website Redesigned

Milwaukee Electronics' website (www.milwaukeeelectronics.com) has a new look to provide visitors with more detail on its services and capabilities. The expanded site also helps increase its visibility in web searches for engineering, prototype and contract manufacturing services.

"We bring a broad mix of solutions to the marketplace and we've redesigned the site so that visitors can see both a description of our capabilities and examples of ways the solutions we provide have helped our customers. This is important because we often solve problems customers didn't think could be solved through a contract manufacturer," said Jered Stoehr, Milwaukee Electronics' VP of Sales & Marketing.



Multi-Partner Project

(Continued from page 1)

for the end customer. Milwaukee Electronics is doing a full electromechanical box build with multiple printed circuit board assemblies (PCBAs) connected together. The original product had nine PCBAs, but a recent cost reduction design spin has reduced that to three PCBAs. The server unit is a rack-mounted network box and the dispenser unit is a sub-assembly mounted in the fuel pump.

Volume production began at Milwaukee Electronics about five years ago. Volumes have increased from an average of 100 servers per month to 500 servers per month.

While the design firm has primary responsibility for driving cost reduction efforts, the team at Milwaukee Electronics has supported those efforts in several ways. The Purchasing team has negotiated cost reductions from suppliers. The

Manufacturing Engineering team has made recommendations on design changes to minimize assembly labor. For example, on the client unit the team recommended reducing the number of mounting brackets and that reduced labor. They also made recommendations on changes to the PCBA. Additionally, the team recommended changes to the way the metal supplier was packaging the chassis for shipment to reduce unpack time. The original design had specified far more protective packaging than was needed.

The design firm developed the functional test and over time, with feedback from Milwaukee Electronics' team, has streamlined the test as it became apparent that the product design was generating very little fallout.

Milwaukee Electronics' manufacturing team is now focused on improving throughput so that the higher volumes can

be accommodated with no increase in floor space. The team has applied its Lean manufacturing training to re-layout the entire production flow. A supermarket has been installed in the manufacturing area to streamline material transactions. Point-of-use stocking and pull systems are being enhanced in the final assembly work cell. Additionally, the SMT equipment the facility has recently purchased enables offline feeder setup, which reduces setup time.

"Our goal is to continuously find ways to capitalize on the equipment and training investments the Portland facility has been making over the last year, enhancing the value we are offering customers. The increased production in this project provides an excellent opportunity to demonstrate the benefits our expanded capabilities," said Michelle McGillivray, Program Manager.

Portland Facility Hosts Continuous Improvement Event

Milwaukee Electronics' Portland, OR facility recently hosted a hands-on problem solving event that took a multi-company approach to continuous improvement. The workshop was facilitated by Mike Hoseus the Executive Director for the Center for Quality People & Organizations (CQPO). CQPO is an organization developed in 1999 as a vision of Toyota Motor Manufacturing to share Lean Quality philosophy and human resource practices with education, business, and community organizations. Mike is a Toyota Certified Trainer in Global Problem Solving and Waste Reduction, Standardized Work and Kaizen Events. He is the co-author of Toyota Culture with Jeff Liker (author of The Toyota Way, The Toyota Way Fieldbook, and Toyota Talent).

The event included participants from seven other non-competing manufacturing companies: Benchmade Knife Company, Columbia Machine, ESCO Corporation, Keith Manufacturing, Leupold & Stevens, Myers Container and Woodfold. Milwaukee Electronics identified six areas they would like to improve and six teams were created from the participants. The approach put "fresh minds" on each problem and added the perspective of people familiar with manufacturing practices in non-related industries.

"We really got more out of this than we thought we would. HEPC was very pleased with our ability to answer questions and provide data. I was particularly impressed during the workshop at what the team members from other companies who had no familiarity with our processes were able to discover," said Ashley Rochholz, Screaming Circuits Manufacturing Manager.

The teams were introduced to an eight step program solving process:

- **Step 1:** Clarify the problem
- **Step 2:** Break down the problem
- **Step 3:** Target setting
- **Step 4:** Root cause analysis



Event participants toured the production floor to observe processes.

- **Step 5:** Develop countermeasures and implementation plan
- **Step 6:** Seeing countermeasures through
- **Step 7:** Monitoring the process and results
- **Step 8:** Standardized successful practices and share.

During the two-day workshop, each multi-company team utilized the tools and training provided to work through their assigned improvement area. At the end of the event, Milwaukee Electronics' team leaders became responsible for implementing the solutions and reporting results.

Some of improvement areas worked on included:

- **Inventory transaction errors between raw material and work-in-progress (WIP) and job to finished goods (FG).** This problem solving effort was a good example of a team finding out that an assumed root cause was not the actual root cause. After research into the data, the team found that the transaction error issue was better handled as part of the EMS SMT team's problem solving focus. They provided the data they reviewed early in the process to the SMT team and then focused on improving cycle counting. That effort identified that a scale in the stockroom

could be impacted by temperature and vibration. Previously, it had been assumed that unit was not susceptible to environmental changes and it was not on the calibration list. It was leveled on a stable shelf mount and added to the calibration list. A reel counter was determined to be inaccurate and new unit is on order.

- **Late internal EMS deliveries to subsequent processes from SMT.** The team found there were two root causes for inefficient throughput: the planning schedule and insufficient parts. The planning schedule was outside of their control, so they focused on the part shortages. Machine-driven attrition was the main driver. The solution focused on reviewing scrap factors on projects where the situation had occurred more than once to determine if they were incorrectly calculating scrap factors. They also reviewed the data provided by the inventory transaction team and found that material used in rework operations wasn't being counted. The results after the first month of corrective action were that the SMT area has eliminated the backlog of late jobs. Most of the jobs during the month were classified as late in on-time delivery (OTD) metrics tracking because of the backlog. Now that it has been eliminated, that metric should improve. The team's original plan was to

(Continued on page 5)

Engineering in Action

Supporting Product Upgrade Redesign Efforts

A manufacturer of community audio alert equipment used in the early warning system industry wanted to upgrade a siren signal control to allow an operator to dispatch a single command signal using a high-level graphics program to simultaneously trigger the multiple sirens that were highlighted on the screen.

The customer wanted to a common design that could support two different product applications: a basic siren alert control housed in a sealed metal box and mounted at the base of a telephone type pole with the actual siren mounted at the top of the pole, and siren alert controls mounted into their base stations located inside municipality offices which interface direct to the radio systems used for emergency vehicles.

Milwaukee Electronics' Design Engineering Group started the process with a feasibility concept phase to discuss multiple design ideas and options.

The existing unit utilized an off-the-shelf microcontroller module. Since these modules are often upgraded by the manufacturer over time and may not be backwards compatible, the Design Engineering Group suggested a custom high-level ARM7 based microcontroller solution with a seven-year published availability to avoid future risk. The customer also wanted to maintain responsibility for the high-

er-level application program (Java) due to the customization requirements for these signal control applications. Milwaukee Electronics was able to support this requirement and took responsibility for the Linux operating system as well as the low level device driver firmware.



A typical high audio siren installation.

The Design Engineering Group provided a full hardware design, software design, mechanical design, prototype unit tooling and build, and product verification testing.

The system concept required a two-board set hardware design to accommodate both a simple siren signal control mounted in a panel as well as the feature rich siren signal control mounted as a table top system.

The customer pre-sold upgraded control panels with an expedited delivery schedule.

To accommodate this new time-to-market requirement, the Design Engineering Group suggested development of a single board control with reduced functionality. The team worked with the customer to quickly develop a second set of product specifications and proceeded with this alternate design. To further reduce engineering costs and future engineering firmware development time, the team added additional circuitry to the single board design that was not required by this initial order but allowed the engineers to proceed with development of the more complex functionality prior to the development of the future two-board design.

Following verification testing and customer approval, this design was released to manufacturing for build.

During the final test phase of the single board control, the customer requested the addition of a database feature to the core platform. The Linux library set that was selected for this particular target build contained a MySQL Data Base feature. During testing, the database was found to be inadequate due to feature limitations. The team researched and located a Postgres SQL type data base which met customer requirements.

As a result, of this collaborative effort,

(Continued on page 5)

Letter from Mike

(Continued from page 1)

our true business philosophy, but yet one simple enough for our workforce to both be inspired by AND remember. We eventually came up a Quality Policy of: PERFECT PRODUCT! WHAT THE CUSTOMER WANTS, WHEN THEY WANT IT, WITH NO RETURNS.

It turned out that statement was easy for our workforce to remember and it strong-

ly stated our commitment to the highest quality standards. Interestingly it did create a problem we didn't expect. Our workforce all gave us feedback that we can't do that day after day, month after month, and never have an error. After much internal gnashing of teeth, we finally convinced our workforce that this is the ultimate goal to strive for and that imperfection could be accepted, if it occurred,

as long as we corrected the cause in a way that prevented it from happening again. We did receive our ISO certification, and everyone who was asked was able to provide our Quality Policy to the auditors. That was more than 20 years ago, and as the saying goes...."that's our story, and we're sticking to it!"

P. Michael Stoehr
President & CEO

Engineering in Action

(Continued from page 4)

the customer was successful in launching the single board design to the market within their customer's delivery schedule. The

ability for the Milwaukee Electronics engineers to debug and test the more complex firmware features in parallel to the single board development and produc-

tion readiness cycle helped to reduce the development costs and time to market for the final two-board system.

Lean Event

(Continued from page 3)

use the daily machine reports to identify scrap rates higher than issued in Epicor and reduce the number of WIP shortages on the line. Purchasing Manager Loan Thai offered an easier solution, suggesting that with IT's help, the reports could be used to automatically adjust higher scrap parts out of Epicor so that inventory counts would be correct. The project is currently at this stage and is being led by the Purchasing Manager. The original OTD metric was averaging 38 percent and is now up to 50 percent.

- *Eliminating downtime on Screaming Circuits' SMT lines.* The team looked at data logs from the line and found that most of the downtime was related to the setup process for Mydata equipment, more specifically a process known as bill of material (BOM) site, which checks the programming for accuracy. The team is exploring if operators could perform BOM site for the next job while waiting for the printed circuit board assemblies (PCBAs) to finish the assembly process or do the activity offline on another placement machine. The team also questioned whether or not the process was actually necessary and has been performing design of experiments (DOEs) to find out what works best on second shift.

- *KISS selective solder machine down-*



The event combined training with hands-on problem solving.

time. The KISS unit was already scheduled for refurbishment, so the team did not look at mechanical issue-driven downtime. Instead they focused on bottlenecks in PCBAs waiting for QC inspection. They decided to add a visual color-coded status indicator as a signal to QC inspectors. Red indicated that they were line down and needed immediate support, yellow indicated that a QC inspector was needed in the next 10-15 minutes and green indicated that QC inspection was keeping pace with demand. They also moved the QC station closer to the machine so that the operation and QC inspector could communicate without leaving their work areas. The visual indicator was also in view of Screaming Circuits' Supervisor. Finally, a scheduling board was added to help the operator better understand job priority.

Tara Locke, a Stockroom Clerk summed up what the class meant to participants

well: "This class has influenced us to better our processes to make the company more efficient. There is still work in progress. By consistently evaluating our processes we will continue to have improvements. More proficient processes make a business that builds confidence in our customers and employees."

HPEC is a program that grew out of the Association for Manufacturing Excellence (AME). They facilitated the event that Milwaukee Electronics hosted.

"EMS companies must constantly improve. The benefit of this type of collaborative effort was that in addition to learning a strong problem solving method, our personnel also applied that method to solving small issues that impacted quality, efficiency and cost. This 'hands on' training methodology helps instill a focus on applying these skills anywhere unexpected outcomes arise," added Ashley.

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