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## How We Achieve Low Scrap

Circuit Express built the highest technology PCBs in company history in 2008 and so far in 2009 this trend has continued. Blind/buried vias, .003" core laminates, and .006" mechanically-drilled vias are just three of the advanced technologies we build on a daily basis. With advanced technologies comes increased risk and for most PCB manufacturers it also brings increased scrap.

But Circuit Express is different. We're averaging less than 2% scrap and 98% on-time delivery for the last 18 months. How do we do that?

Well it takes a lot more than just a dedicated business plan that focuses on only small quantity orders. In our world we classify orders as either "Apples" or "Oranges." "Apples" are easy but twice per day our management team holds "Orange" meetings to review all jobs that meet critical technology requirements that require special human interaction to achieve success. We review customer purchase orders, the PCB quotation, fabrication prints and ReadMe files, job travelers, and the working films for each and every job identified as an "Orange."

During these meetings our managers discuss the technology and critical process steps required and very often we decide on changes that we feel will improve yields. Success depends on this type of action!

So "how we do it" is by involving our personnel in the critically important review process that we feel is required in order to do your job right the first time in order to hit your dock date!



- 24, 48, and 72 Hour Turns

- 5 Day Standard Delivery for  
2 to 10 Layer Prototypes

- 3 mil Trace/Space, Blind/Buried Vias,  
Advanced Controlled Impedance

- RoHS Materials, Rogers, Polyimide,  
Duroid & More!

# The CIRCUIT EXPRESSION

The Circuit Express Company Newsletter

Tempe, Arizona, USA

Volume XXIV, 3rd Quarter 2009

## From the President

*These are certainly difficult and tumultuous times!! The widely reported recession has reached and impacted all of us. Even as little as a year ago, who would have thought that the US government would be offering cash for clunkers, backing auto warranties, and determining the amounts of executive bonuses? In the same duration, homeowners have watched the values of their homes be dramatically reduced, and unfortunately we have all become far too versed in the words: short sale, foreclosure, and bailout.*

*At Circuit Express, Inc. we are committed to working on those things within our control, and are intensely focused on what the call "The Big Four": Pricing, Delivery, Quality, and Service. We entered 2009 with goals of: being profitable, developing new customer accounts, purchasing some key equipment, becoming ISO 9001 and AS9100 certified, delivering on time (above 96%), low scrap/restarts (less than 2.5%), and advancing our technical capabilities. We our proud to state that we are accomplishing all of the above!!!*

*We hope you enjoy this newsletter, and we extend our appreciation to our many loyal customers, and to our many new relationships.*

*-Travis Bice, President*



**"Time Critical PCB Solutions"**

## CEI Builds to Print

One of the most commonly heard questions heard during new customer appointments is "What makes you so different than the other quick-turn PCB shops?" We have more than just one answer to that question, but most often we respond by saying that Circuit Express builds each and every order to the requirements listed on the customer fabrication drawing; we build to print.

But in order to do that we have to know what you want! To combat missing information, our Customer Service team works with each account to create customer specific "Tickler" files that contain helpful information regarding customer needs and requirements that are often left off of fab prints. During the quote process we make notes on our quotes that call out our quote assumptions. All assumptions must be authorized before we can start building your job!

After we release your order, each and every job goes through the same front end process steps regardless of turn time or required manufacturing specification. You will often hear from our Planning department to help resolve any last minute questions regarding missing information. The Planning department plans each job by reading all customer supplied documentation including fab drawings and all included ReadMe files, purchase orders and additional customer instructions from email messages that accompany the order, and builds a "Traveler" that accompanies the job through all manufacturing processes. All deviations to fabrication notes or customer instructions require customer approval and we record these items in a "Technical" discrepancy form.

Once your order clears our Product Engineering departments (Planning and CAM) the job begins manufacturing. Our manufacturing and quality personnel use not only the manufacturing specification required for the job, but also your purchase order, fabrication print, "Tickler" file, and "Technical." By following this system we guarantee that CEI will build your order to print!

## Employees of the Quarter

Congratulations to Jim Michelin and Samantha "Sam" Mounlachack for being selected by their peers as Employees of the Quarter for our Tempe and Deer Valley facilities.

In Tempe, Jim is our Environmental, Health and Safety Manager. Just a few of his responsibilities include maintaining Environmental and Regulatory compliance, waste water treatment, chemical receiving and maintenance.

Up in Deer Valley, Sam does all of LPI soldermask imaging and in the afternoon does Inner Layer and Outer Layer imaging, and she is also a backup in Artwork.

Both employees are well known for their dedication, work ethic, and excellent attendance. Congratulations to Jim and Sam for this honor.

Each will receive a \$250.00 bonus!

## Useless Knowledge

- A rat can last longer without water than a camel.
- A duck's quack doesn't echo. No one knows why.
- A 2 X 4 is really 1-1/2" by 3-1/2".
- Celery has negative calories. It takes more calories to eat a piece of celery than the celery has in it to begin with.
- Chewing gum while peeling onions will keep you from crying.

## Employee Spotlight

This newsletter's employee spotlight is on Phich Nguyen. Phich works in the Tempe facility Electrical Test Department and has been with CEI for 7 years. He has been working in PCB electrical test for over 16 years and has developed tremendous expertise around both clam-shell and flying probe test methods.

Phich's daughter Marie is 9 years old and is an exceptional student at the top of her class! She excels in both math and reading and has perfect attendance in school. Phich moved to Phoenix from Vietnam over 25 years ago but he took Marie to Vietnam for the first time this year to visit family and friends.

Phich is a big fan of both the Phoenix Suns and the Arizona Cardinals and he really hopes that the Cards can make it back to the Superbowl this year. Of course, he hopes they win this time!

A special thank you goes out to Phich for his many years of outstanding service and dedication!!!

## Quotable Quotes

*"A lie can travel half way around the world while the truth is putting on its shoes." -Mark Twain*

*"If you don't know where you are going, you might wind up someplace else." -Yogi Berra*

*"Failure is not our only punishment for laziness; there is also the success of others." -Jules Renard*

*"Pain is temporary. Quitting lasts forever." -Lance Armstrong*

*"As I grow older, I pay less attention to what men say. I just watch what they do." -Andrew Carnegie*

## Employee Anniversaries

The following employees celebrated anniversaries with Circuit Express during the last several months. Their contributions to the success of our company are greatly appreciated!

Over 15 Years	Years	Years	Years
Randy Peck	17	Thai Doan	4
<b>Over 10 Years</b>		Dora Moraga	4
William Allen	12	By Bu	4
Dan Phaosihavong	10	Buffy Wilson	4
Jean Tizzano	10	Melanie Ashley	4
Ann Marie Henry	10	Carlos Delavega	4
Cuong Pham	10	Phan Phung	4
Karlo Castillon	10	<b>Over 1 Year</b>	
<b>Over 5 Years</b>		Herbert Loo	1
Phone Ngeuntha	8	Benny Pastrano	1
Paul Nguyen	7	Cindy Owens	1
Alisha Ann Hicks	7	David Hedegard	1
<b>Over 3 Years</b>		Gabriel Amaro	1
Larry Watson	4	Ivan Tomljenovic	1
Armando De La Trinidad, Sr.	4	Sean Luck	1
Lynn Hawkins	4	Daniel Palmer	1
Warren Stacy	4		

## Tech Talk: PCB Cost Drivers

Every company looks for ways to control costs, but in today's world many PCB designers don't have the luxury of choosing the most affordable technology characteristics. However, it's always a good idea to know early on in the design cycle how your requirements are going to impact your pricing and/or leadtime. We hope this edition of Tech Talk can help you better understand PCB Cost Drivers.

When quoting PCBs we first look at all PCB characteristics and then the customer quantity requirement to determine how to panelize the job. Layer count, panel size, and panel quantity determine the base lot charge which is then used to calculate additional cost adders for technology features. The prototype and quick-turn marketplace is not governed by maximized panel utilization as much as it is by effective panelization for registration, speed, and yield concerns. For example, running one 18x24" panel with 10,000 drill holes is much slower than running two 12x18" panels with 5,000 holes each! Jobs built to IPC6012 Class 3 or MIL-PRF-55110 certification need much more panel border space for the additional coupon requirements and if these same jobs have controlled impedance even more space is needed which ultimately reduces the number of boards that can be run on each panel.

The following is a partial list of some of the most commonly seen cost drivers and the associated percentage lot charge adders:

Common Cost Drivers			
<u>Materials</u>		<u>Drill Sizes</u>	
RoHS 180C	10%	.012	0%
Polyimide	50%	.010	5%
Duroids	35-200%	.008	10-15%
<u>Surface Finishes</u>		.006	35%
HASL	0%	<u>Blind/Buried Vias</u>	
Immersion Silver	2-4%	1X Blind	50-65%
Immersion Gold (ENIG)	5-7%	2X Blind	75-100%
<u>Trace/Space</u>		3X Blind	150-200%
.006	0%		
.005	10%	<u>Other</u>	
.004	25%	Plasma Etchback	15-20%
.003	75%	Via-In-Pad	25-35%
<u>Controlled Impedance</u>			
Characteristic	2-5%		
Differential	5-8%		

These costs not only represent the additional expense of the drill bits, surface finish chemistries, or materials, but also the added processing steps required to yield product that meets customer expectations. The old saying "You Get What You Pay For" could never be more true than at Circuit Express and our less than 2% scrap rate and greater than 98% on-time delivery is objective proof that we know how to build advanced technologies while at the same time offering our customers an exceptional value.

Circuit Express is happy to assist you with any questions you may have concerning how to reduce the cost of your designs. Please send your questions to [AskUs@circuitexpress.com](mailto:AskUs@circuitexpress.com).