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## IN THIS ISSUE:

- Tramonto News
- Industry News
- Design Tips

- 
- [Design Tips](#)
  - [Request A Quote](#)
- 

"I appreciate all your help on this, it definitely shows the difference in companies when choosing a source for something."

**Mr. Dewayne Bowles**  
**BE Aerospace.**

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[Click for next page](#)

## [Tramonto News](#)

### **Tramonto Circuits joins IPC & SMTA and other odds & ends**

Tramonto Circuits has officially joined two important industry associations this year. We've joined the IPC as all circuit board manufacturers, assemblers or designers should. The IPC is a member driven organization with its reach and tutelage felt around the world. With offices in the U.S.A., China, Sweden, Russia and India, they have continued their efforts to be the standardization focal point of the entire electronics industry worldwide. Their focus on design, fabrication and assembly serves as the place to go for advice, education, knowledge and research in our industry.

See [Odds & Ends](#) on page 2.

## [Industry News](#)

### **IPC releases PCB Industry results for July 2011**

*IPC - Association Connecting Electronics Industries announced the July findings from its monthly North American Printed Circuit Board (PCB) Statistical Program.*

#### **PCB Industry Growth Rates and Book-to-Bill Ratios Announced**

Rigid PCB shipments were down 10.2% and bookings were down 17% in July 2011 from July 2010. Year to date, rigid PCB shipments increased 2.3% and bookings declined 10%.

See [IPC Results](#) on page 2.

## [Design Tips](#)

### **Robust Design for ZIF (Zero Insertion Force) connectors**

#### **Robust ZIF Connector design for flexible circuits**

ZIF connectors are a very popular choice for flexible circuit attachment. The choice allows a seamless method that utilizes the nature of the flexible circuit very well. Most connectors are designed for either 1.0 mm or 0.5 mm pitch, however smaller more dense patterns are also available.

A zif connector is similar to a card edge connector for PCBs. The connector itself accepts a 0.3 mm (0.0118") thick circuit (most common) and the cable is held in place by friction or in some more extreme cases, by a snap down strain relief.

See [Robust ZIF](#) on page 3.





**Mary Vierling Customer Service & Office Mgmt**

**“July is typically a slower month than June for the PCB industry.” Negative year-on-year growth rates in North American PCB sales and orders for July reflect slowing growth compared to the height of the recovery one year ago,”**

**IPC President Denny McGuirk.**

## ***Tramonto Odds & Ends***

We've also joined the Surface Mount Technology Association (SMTA). The SMTA is an international network of professionals who build skills, share practical experience and develop solutions in electronic assembly technologies, including micro-systems, emerging technologies, and related business operations.

Tramonto Circuits is proud to be a member of both organizations and we look forward to the mutual support we can all provide to each other and to our entire industry.

In other news, Tramonto Circuits has continued to expand and improve our assembly department in Lake Elmo, MN. We've added several people this year and improved our capabilities in SMT and lead-free assemblies. The continued improvement bodes well for our company as well as for our customers. We're able to assist with many different applications locally which allows us to respond faster to our customer's needs. Our commitment is to improve continuously. Our strides this year have confirmed our company's goals.

## ***IPC Results***

Compared to the previous month, rigid PCB shipments decreased 24.8% and rigid bookings decreased 19%. The book-to-bill ratio for the North American rigid PCB industry in July 2011 remained near parity at 0.99.

Flexible circuit shipments in July 2011 were down 28.3% and bookings declined 4.5% compared to July 2010. Year to date, flexible circuit shipments increased 3.2% and bookings also increased 8%. Compared to the previous month, flexible circuit shipments decreased 17.8% and flex bookings fell 34.9%. The North American flexible circuit book-to-bill ratio in July 2011 jumped to 1.20.

For rigid PCBs and flexible circuits combined, industry shipments in July 2011 decreased 12.1% from July 2010, as orders booked decreased 16% from July 2010. Year to date, combined industry shipments were up 2.4% and bookings were down 8.5%. Compared to the previous month, combined industry shipments for July 2011 decreased 24.2% and bookings decreased 20.8%. The combined (rigid and flex) industry book-to-bill ratio in July 2011 climbed to just above parity at 1.01.

“July is typically a slower month than June for the PCB industry,” said IPC President and CEO Denny McGuirk. “Negative year-on-year growth rates in North American PCB sales and orders for July reflect slowing growth compared to the height of the recovery one year ago,” he added. “The good news is the book-to-bill ratio remains just above parity, largely due to the continued strength of flexible circuit orders.”

The book-to-bill ratios are calculated by dividing the value of orders booked over the past three months by the value of sales billed during the same period from companies in IPC's survey sample. A ratio of more than 1.00 suggests that current demand is ahead of supply, which is a positive indicator for sales growth over the next two to three months.

Book-to-bill ratios and growth rates for rigid PCBs and flexible circuits combined are heavily affected by the rigid PCB segment. Rigid PCBs represent an estimated 89% of the current PCB industry in North America, according to IPC's World PCB Production Report.

See [More IPC Results](#) on next page.

## More IPC Results

### The Role of Domestic Production

IPC's monthly survey of the North American PCB industry tracks bookings and shipments from U.S. and Canadian facilities, which provide indicators of regional demand. These numbers do not measure U.S. and Canadian PCB production. To track regional production trends, IPC asks survey participants for the percent of their reported shipments that were produced domestically (i.e., in the U.S. or Canada). In July 2011, 82% of total PCB shipments reported were domestically produced. Domestic production accounted for 82% of rigid PCB and 82% of flexible circuit shipments in July by IPC's survey participants. These numbers are significantly affected by the mix of companies in IPC's survey sample, which change slightly in January, but are kept constant through the remainder of the year.

### Bare Circuits versus Assembly

Flexible circuit sales typically include value-added services such as assembly, in addition to the bare flex circuits. In July, the flexible circuit manufacturers in IPC's survey sample indicated that bare circuits accounted for about 48% of their shipment value reported for the month. Assembly and other services make up a large and growing segment of flexible circuit producers' businesses. This figure is also sensitive to changes in the survey sample, which may occur at the beginning of each calendar year.

IPC is a global trade association based in Bannockburn, Illinois, dedicated to the competitive excellence and financial success of its 3,000 member companies which represent all facets of the electronics industry, including design, printed board manufacturing, electronics assembly and test. As a member-driven organization and leading source for industry standards, training, market research and public policy advocacy, IPC supports programs to meet the needs of an estimated \$1.85 trillion global electronics industry. IPC maintains additional offices in Taos, New Mexico; Arlington, Virginia; Stockholm, Sweden; Moscow, Russia; Bangalore, India; and Shanghai, Shenzhen and Beijing, China. For more information, visit [www.ipc.org](http://www.ipc.org).

## Robust ZIF

The difference of course is that a rigid PCB once plugged into a connector, is very stable. The flexible circuit on the other hand is by its nature, well, flexible. Let's discuss further below.

After the size of the connector has been chosen there are a few things to consider before simply adding the pattern to the end of a flex cable and plugging it in. Will the circuit route directly into the connector? Will it make a slow soft bend into the connector? Or will it make a hard sharp bend due to the lack of physical space? All of these scenarios have been used extensively over the years and most of the issues with each have been resolved. There are always going to be new applications that challenge our design's robustness, but if you follow the rules that follow in a generic manner, you'll be able to tackle any situation that arises.

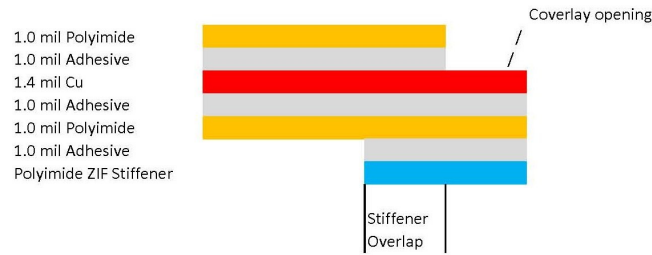
The first and most important message I would like to mention is this: Follow the manufacturer's specifications for width and tolerance closely! Don't compromise here. The width and its tolerance are the first thing that *will* cause grief in any ZIF design. Any compromise on the tolerance will either not allow the cable to plug in (too big) or worse yet allow it to slide around and cause frustrating intermittent shorts.

Once the pitch and width are designed properly the overall thickness is the next specification that must be met always. A rigid PCB edge connector is designed to accept a common thickness of .062" material. The most common thickness specification for ZIF connectors is 0.3 mm (0.0118"). This does not match a common thickness of flexible circuits. So we must typically add a polyimide or polyester "stiffener" under the connector pattern to create the proper thickness consistently. See image 1-1.

See [More Robust ZIF](#) on last page.

**"The good news is the book-to-bill ratio remains just above parity, largely due to the continued strength of flexible circuit orders."**

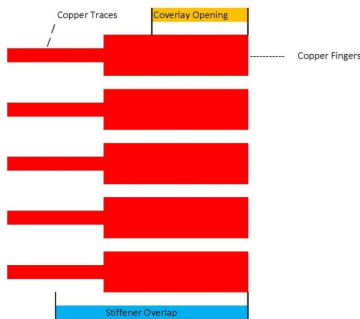
*IPC President & CEO  
Denny McGuirk*



**Image 1-1**

As you can see in image 1-1 the thickness of the Polyimide ZIF stiffener was left off purposely. This allows the thickness to be adjusted to the construction of the circuit, whether it's a single sided circuit as is depicted above or a double sided or multi-layered circuit. In the image above the thickness of the polyimide stiffener would need to be either 0.007" or 0.008" to meet the thickness requirement of 0.0118" +/-0.001". The thickness requirement of ZIF connectors forces us to do some calculation in order to meet the specification with the materials available. In this case we have two choices and the overall thickness can be adjusted with the polyimide thickness or the adhesive thickness.

Once the specifications, width and thickness have been met within the required tolerance range, the next and last thing we need to do is make that connection as robust as possible. Those of us who have designed flex circuits for any period of time know that the direction of the copper traces in relation to the bend areas of the circuit are an important detail. Also, we know that we can't simply line up edges on top of each other and expect robustness. In this case we'll have a coverlay opening to expose the copper fingers for the ZIF connector and a stiffener to afford us the proper thickness. If we line up the stiffener edge with the coverlay edge with the trace to pad junction, we will almost certainly see fractures of the trace at the pad junction. The most robust design calls for the pad to overlap the coverlay opening and the ZIF stiffener to overlap the pad/trace junction. This allows the circuit to be inserted without fear of broken traces from misalignment during insertion. It also protects the circuit in dynamic applications or those times when a sharp bend is necessary to insert the flex into the connector. See image 1-2.



**Image 1-2**

As you've noticed by now, none of these design tips are difficult to put into practice. Sure we have some math to do and must know the application well in order to maintain the integrity of the circuit in practice. But much time will be saved in development if you learn these three tips and utilize them in "every" ZIF connector designed into your products. Of course be sure to consult your flex manufacturer and design comfortably with ZIF connectors.



Flexible Circuits, Rigid Flex and Printed Circuit Boards

*The mission of Tramonto Circuits is "To consistently provide its customers with high quality electronic products and services that meet or exceed their expectations."*