

Sheldahl Bankruptcy Plan Approved

A bankruptcy judge has put his stamp of approval on a plan to sell it's operating assets to a group of investors, according to a story by in the Minneapolis Star-Tribune.

The plan allows Sheldahl to continue to operate it's Northfield, Minnesota plant. The Longmont, Colorado facility will be sold and the equipment moved to Northfield. This follows the plant closure and equipment auction at Sheldahl's IFT plant in Endicott, NY earlier this year.

These moves will save 400 jobs at the Northfield plant. Unfortunately for the Sheldahl shareholders, there is nothing left for them.

You can read the full Star-Tribune story at <http://www.startribune.com/stories/535/3191102.html>



Throughout *The Flex Circuit News* there are links to the web pages of those companies or individuals mentioned in the articles, as well as links to advertisers web pages. Look for the pointing finger.



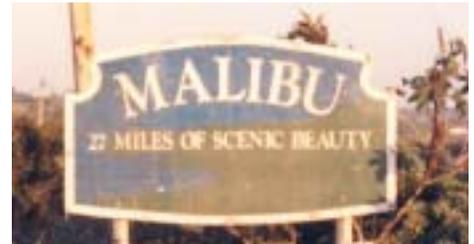
Flex Manufacturers of Southern California

Cruising the Pacific Coast Highway

Flex circuit manufacturers in the USA are concentrated in three regions - New Hampshire, Minnesota and California.

Tom Woznicki

While I am very familiar with the flex manufacturers here in Silicon Valley I haven't ever visited any of the companies down in Southern California. So last Spring I ventured out of the CAD cave and traveled South to meet the flex makers down in SoCal and do something else I've always wanted to do - drive the Pacific Coast Highway from Silicon Valley to Los Angeles.



Like people in New York City who've never visited the Statue of Liberty, I've lived in California for over 20 years and have never driven down Highway 1. I've daydreamed about tak-

Flip Chip Proto Shop Opens

Finally, a place to get flip chip prototype assemblies! Flexible Manufacturing, Inc. (FMI) in Irvine, CA is open for business. Started by a bunch of engineers who used to work for Saturn/Smartflex, FMI has flip chip assembly equipment, wire bonding equipment and SMT equipment in-house. They are set up to quickly process small to medium volumes of high-end flex circuit assemblies.

This is such good news — in the past only the large contract manufacturers had flip chip equipment, and to get their attention your project had to have high volume potential before they would build your prototypes. Since FMI is set up for protos and small runs, OEMs can try out flip chip assemblies and see how the performance gains and smaller footprints will benefit their product. If flip chip is not the answer, FMI has wire bonders to do chip on flex protos.

Their web page isn't up yet, but call and ask for Frank and tell him I said hello!

Flexible Manufacturing, Inc.

1881 Kaiser avenue
Irvine, Ca 92614
Phone: 714 713-2893
Fax: 714-493-1455

ing the top off my old 1990 Jeep Wrangler and winding my way down the coast, but just never got around to it. Now I had a reason.

My wife Julie wisely talked me out of taking the Jeep, so I went and rented a car for the trip - a brand new Ford Taurus with about 80 miles on it. I packed the car that night and set the alarm for 4:30 AM.

As I pointed the Taurus towards Monterey and Highway 1 it was pitch dark and raining and I thought "I'm going to drive right off a cliff." Fortunately the sun came up and the rain stopped just as I passed Carmel, and I beheld the California coast in all it's splendor. It truly is as beautiful as it appears in all the car commercials.

About midway down the coast



the road came out of the redwood forest and the road became flat and very close to the ocean. I looked to my right and whoa! — the beach was full of elephant seals! There were hundreds of them all over the beach. The

large bulls with their trunk-like noses were laying around with their harem of cows, while a short distance away the smaller bulls were all alone, looking pitifully at the larger bulls as if to say "can't I have just one?" I stayed for about



Excellence in the Design, Manufacture & Assembly of Flexible Circuits!



Electrical Testing and Engineering Analysis

Quick-Turn Prototypes or Production Quantities

Automated Assembly

**Photoimageable Coverlay - Eliminates Expensive
Hard Tooling and Lead Time**

Design and Turnkey Services Available

GC Aero Flexible Circuitry

3165 Fujita Street Torrance, CA 90505

310-539-7600 Fax 326-7903 Modem 539-6784

www.gcaero.com



twenty minutes hoping to get a picture of the bulls fighting, but they just laid there like burlap sacks with whiskers.

After a brief stop at Moro Bay for breakfast, the road continued through vast coastal plains filled with vegetables and strawberries and small coastal towns. After a stop near Santa Barbara to visit a customer, I continued South into the Los Angeles Area and ran smack into rush hour traffic. I finally reached my first hotel near the LA airport about eight o'clock. The sightseeing was over — it was time to go to work.

Early next morning I made my way to GC Aero, one of the oldest flex makers in Southern California. The owner, Jim Cowherd, is one of the nicest guys I've met in the industry. His dad Gene had started the company back in the

1970's assembling pc boards, but moved to making flex circuits in the 1980's. They are still a small company specializing in protos and medium volume production. They are one of the few companies that I know that have surface mount assembly equipment in-house. In addition, they have formed partnerships with high volume flex manufacturers in the Far East to produce flex circuits once a project is at a volume that is beyond their capabilities. The customer is made aware that the circuits will now come from an overseas source and GC Aero remains involved with the program, receiv-



Pier at Moro Bay — view during breakfast

GC Aero
 3165 Fujita Street
 Torrance, CA 90505
 Phone: 310-539-7600
 Fax: 310-326-7903
 www.gcaero.com



ing and inspecting the circuits when they come in. Also, since GC Aero still has the tooling in place they can provide additional capacity if the customer needs more circuits right away.

Altaflex *Your Quality Flex Circuit Partner*

Quick-turn Prototypes & Medium Production

- Mass Production Quality Flex Circuits
- Single and Double-sided Designs
- Fine Line Trace and Space Capability
 0.0015" on 12um Cu
 0.002"/0.003" on 0.5 oz Cu
- Minimal Adhesive Squeeze-out
- Tight and Consistent Trace to Edge
 Registration With Burr-free Edges
- Controlled Impedance Circuits

Customers include:

- DataPlay*
- Flextronics*
- Hewlett Packard*
- IBM*
- Maxtor*
- Mektec Corporation*
- Nitto Denko*
- Samsung*
- Saturn Electronics*
- Schlumberger*
- Seagate*
- Verifone*

Altaflex, Inc
 336 Martin Avenue
 Santa Clara, CA 95050
 Ph: (408) 727-6614
 Fax: (408) 988-8009
 www.altaflex.com



Back on the freeway, I made my way to Santa Ana to visit Pioneer Circuits. They build almost exclusively for military, aerospace and other high-rel applications, including the flex circuits for the Mars rover that roamed the red planet a few years ago. I was looking forward to this visit because they were currently building a rigid-flex board that I had designed for a satellite application. The application engineer, Dan Hansler,

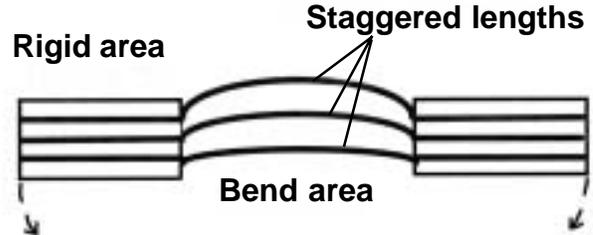
gave me a nice tour and introduced me to all the folks I'd been talking to over the past few weeks. It is an impressive facility, including a six foot autoclave for large, complex laminations. Dan told me their specialty is bookbinder rigid-flex circuits — multilayer circuits with each successive flex layer shorter than the previous one. This enables a sixteen layer circuit to bend and fit inside a satellite, jet fighter, etc.

Pioneer Circuits
 3000 S Shannon Street
 Santa Ana, CA 92704
 Phone: 714-641-3132
 Fax: 714-641-3120
 www.pioneercircuits.com

There are pictures of the Mars Rover flex circuits and other space projects up on the Pioneer

web page at <http://www.pioneercircuits.com/pci-old/dale/rovindex.htm>.

Back on the freeway, I drove North to Anaheim to have lunch with Bud Tapscott, VP of marketing and



Bookbinder Rigid Flex
 Illustration courtesy of Joe Fjelstadt

Rick Hall, regional sales manager, of M-Flex. I was surprised at how big M-Flex is. I had the impression that they were a medium-sized flex maker, but I learned they have a 150,000 square foot factory in China. I was also surprised to learn how much flex assembly business they do. While they don't do any flip chip or wire bonding, they have large SMT and through-hole assembly facilities both in Anaheim and in China. Last

M-Flex USA
 1301 N. Dynamics Street
 Anaheim, CA 92806
 Phone: 714-996-1248
 Fax: 714-996-3834
 www.mflex.com

The Flex Circuit News is a bimonthly newsletter published by Tom Woznicki and Flex Circuit Design Company in San Jose, California. It is dedicated to providing information about all aspects of and promoting the use of flexible printed circuits in interconnection and electronic packaging.

The Flex Circuit News is a free publication that is delivered to subscribers by e-mail.

Flex Circuit Design Company is a consulting company that specializes in designing flexible printed circuits for OEMs and flex circuit manufacturers.

© Copyright 2002, Flex Circuit Design Company
 All rights reserved.

Got a question?

Send e-mail to
Twoznicki@AOL.com or call
408-629-8343

Subscribe to
The Flex Circuit News
 on the web

www.flexdude.com

The material choice of flex circuit manufacturers is

Gould® flex

ultrathin adhesiveless laminates

Ideal Applications

- Single and double sided high-density flexible circuits requiring copper thickness less than 18 micron.
- Rigid-flex circuits to eliminate adhesives with high CTE.
- Circuits requiring controlled characteristic impedance.
- Semiconductor packaging: BGA, µBGA, TAB, and chip scale packaging.
- Thin light-weight portable products.

For more information, contact:
 Gould Electronics Inc.
 34929 Curtis Blvd.
 Eastlake, OH 44095-4001
 440-953-5198 phone
 440-953-5152 fax
 www.gouldelectronics.com

GOULD Electronics Gould Electronic Materials Specialty Products

Near the end of my visit Tim asked me if I'd visited KCA on my trip, and I admitted that I'd never heard of them. A quick call to Mike Busby, the VP of Technology and Marketing, and I was on my way North again to the town of Placentia.

I had heard of Mike Busby before, he's been in the flex business a long, long time, but KCA didn't sound familiar at all. It turned out that KCA (parent company of Korea Circuits) had purchased Pentadyne, a manufacturer of military and aerospace flex circuits, back in 1999. KCA was able to maintain the military qualifications for both flex and rigid boards, and they are now branching out into medium volume commercial applications. The facility is bright and hospital clean and full of fascinating flex circuits and pc boards.

KCA Electronics, Inc.
711 Fee Ana Street
Placentia, CA 92870
Phone: 714-223-3400
Fax: 714-223-3499
www.kca-placentia.com



After a pleasant lunch with Mike and general manager Rick Henninger I jumped back on the freeway and headed South towards San Diego and LE Flex. LE Flex was started back in 1981 by Jack Lexin and for years was the "vendor of last resorts," specializing in building the unusual, technically challenging flex circuits that no one else would attempt. These days they've moved away from the oddball applications but they still build good circuits. Jack's wife Connie now runs the company along with Bill Cross, another industry veteran, while Jack is enjoying semi-retirement. By the time I arrived most of the staff had gone home, but Connie gave me a quick tour of the facility. They are a small facility in two buildings, set up to handle protos to medium volume production.

LE Flex
6195 Corte del Cedro, Suite 110
Carlsbad, CA 92009
Phone: 760-431-1112
Fax: 760-431-0551
www.leflex.com



After saying goodbye to Connie I steered the Taurus, now dusty and filled with fast-food wrappers, South on Interstate 5 towards San Diego, hoping to see MicroJoin in Poway before 5:00. MicroJoin

manufactures hot bar assembly equipment and they had been very helpful to my customers who have had problems or questions with hot bar soldering. I arrived at about 4:55 and did meet Henrik Hansen, the Western Regional Sales Manager, and other members of the support staff. Note: Earlier this month MicroJoin was acquired by Unitek Miyachi International. Hot bar soldering equipment is now part of the Unitek Eapro a division Unitek Miyachi. Their web page is

www.unitekeaprosystems.com



Mission accomplished, I pulled into San Diego Airport for the flight home. I wished I had a few more days because there were many other flex manufacturers that I didn't have time to see. I guess I'll just have to make the trip again next Spring! Big thanks to everyone who made this trip a whole lot of fun!

Back issues of The Flex Circuit News are available on our web page -
www.flexdude.com



UNI-FLEX CIRCUITS

Your One-stop Shop for Quick-turn Flex Circuits
Quality Products, & Exceptional Service

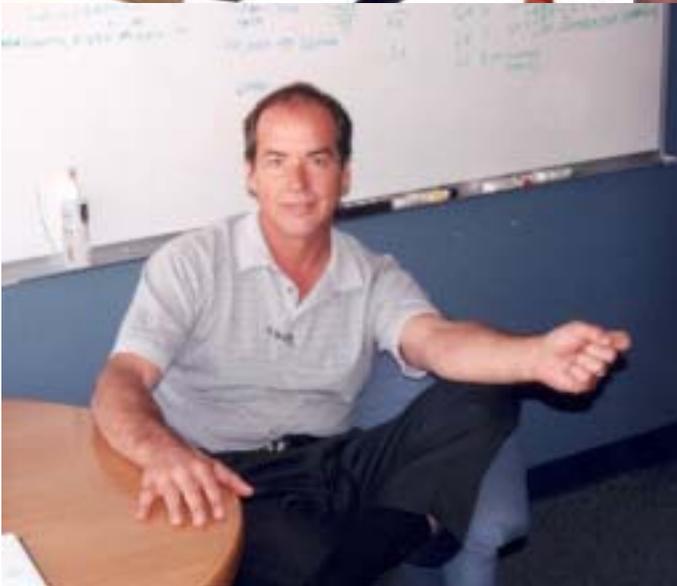


- ◆ Single, Double & Multilayer Flex Circuits
 - ◆ Cost Effective
- ◆ Prototype to Medium Quantities
- ◆ Engineering and Design Support
- ◆ 24-hour Fabrication Available

Uni-flex Circuits
1782 Angela Street • San Jose, CA 95125
Ph: (408) 998-5500 • Fax: (408) 998-5505
Email: uniflexcir@aol.com
www.hometown.aol.com/uniflexcir



Pix from Southern California



More Pix from Southern California



More Cool Stuff...

Samtec Enters Flex Biz

Very quietly Samtec Corporation, manufacturer of connectors has decided to enter the flex circuit manufacturing business. They have opened up a small manufacturing facility at their main corporate site at of New Albany, Indiana.

Personally, I like this idea. As a consultant I have often recommended Samtec connectors because if they didn't have parts in stock they would build some for you very quickly. Many flex assemblies only have connectors on them, and now Samtec can sell the whole flex assembly.

On their web page they list process capabilities of 5 mil lines and spaces and a maximum of three layers — plenty good enough for most simple flex assemblies. They also list standard products such as jumper circuits for high-speed signals.

You can get more information on Samtec's Sudden Circuits at 1-800-SAMTEC9 or on the web page at www.samtec.com. 

3M Completes Two-Metal Flex Factory

Eager to capitalize on Sheldahl's financial troubles, 3M's Microinterconnect Systems division announced that it is now in volume production of two-metal-layer, fine-line flex circuits.

Recently I went to lunch with our local 3M sales guy, Steve Meischke, and had a chance to eyeball some samples - they are impressive! 3M is able to produce traces on a 60 micron pitch (2.4 mils) with 50 micron (2 mils) laser-drilled vias.

For more info on 3M's two-metal capabilities you can view the press release at 3M web page [click here](#). 

There is also more info on web at www.3m.com. 

Miraco Announces Laser Processing Service and Quick Cable

Miraco Inc. of Manchester, New Hampshire, has announced two new products; laser processing and Quick Cable.

Their new laser can do pad exposure, cut flex outlines and can do rework such as squeezeout removal. According to Jay Michaud, Miraco's application engineer, their laser processing service is set up to provide fast turnaround for flex circuit manufacturers.

Their Quick Cable is an off-the-shelf flex cable. They use their new laser to cut the circuit to expose copper pads and cut the circuit to length.

You can call the smiling folks at Miraco at 603-665-9449 or get more info at www.miracoinc.com. 

Marching to Another Flex Circuit Design Company Adds Allegro Seat

(Warning - shameless plug ahead).

In an effort to prove that you **CAN** teach an old dog new tricks, I've added Cadence Allegro to our CAD arsenal here at Flex Circuit Design Company.

I did it for two reasons. First, I've seen an increase in complex rigid-flex designs. Second, I have a confession to make...I occasionally design rigid boards. Whew, there, I said it. It started innocently enough — flex customers who needed small rigid boards designed quickly. Then, two layers weren't enough — I went to four layer boards, then six layer boards, and before I knew it I needed the power of Allegro.

That said, 95% of my business is still flex circuits, so I won't be changing the name of the company.

On A Personal Note...

On Beyond Twenty

Twenty years of marriage, that is. Yep, for twenty years now Julie has put up with me. She has tolerated my love of Jeeps (I just bought another one), the remodeling projects (I'll start another one this fall), the ups and downs of running a business (where's the cash, Tom?), children with handicaps (we have three) and all the other stuff that two decades of matrimony will bring. I have been blessed far more than I deserve.

I met her at church just after I came West from Pennsylvania to San Jose, California. She was everything the Beach Boys said about California girls — tall, thin, pretty, long red hair, sweet and unpretentious — what else could I ask for? I snagged her quick! We married on Valentines Day. Julie picked that one — I have no excuse for forgetting our anniversary.

To celebrate, this summer we went on a short second honeymoon in California's wine country. We drove through San Francisco, over the Golden Gate Bridge, and North on Highway One to Sonoma County to spend the weekend wine tasting and relaxing while the younger kids were at camp. Mike, our 18 year old, had the run of the house for the weekend.

Though we're definitely beer-and-pretzels kinda folks, we quickly settled into the hot tub, wine-sipping atmosphere of Sonoma. We came home with more wine



Relaxin' with coffee in Sonoma.

than we will drink in a year, and we were pleasantly surprised that house hadn't burned down and that it was relatively clean.

We had such a good time Julie is already hinting about Hawaii for our twenty-

fifth! I guess that means she's going to stick around. Good thing — I don't know what I'd do without her.



Here we are taking the big plunge.



Twenty years later. Clockwise from the left: Me, Brian, Mary Beth, Julie, Tim and Mike.