Next Month's Focus
Assembly and Production

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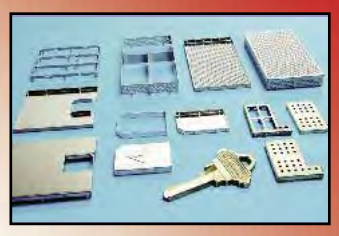
VOLUME 33 - NUMBER 1 THE GLOBAL HI-TECH ELECTRONICS PUBLICATION February, 2018

Product Preview:
ATX/MD&M West



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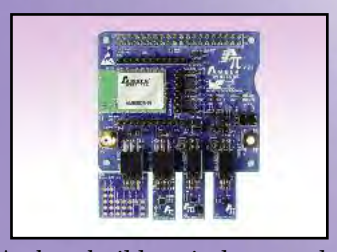
Test and Measurement



Amber builds wireless modules on the Raspberry Pi; MVP celebrates 25 years of inspection and metrology; GL Optic measures LED luminance to the latest CIE standard. This issue's Special Features begin on…

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Cogiscan and MIRTEC in Industry 4.0 Partnership

Bromont, Quebec, Canada — Holding fast to the company's goal of providing seamless connectivity, track, trace and control (TTC) systems provider Cogiscan has partnered with MIRTEC to develop an Industry 4.0 solution for MIRTEC's suite of optical inspection machines and software. Cogiscan's Co-NECT production software is a standalone connectivity solution for communication between different machines, software and enterprise systems.

MIRTEC develops and manufactures automated optical inspection technology for the SMT and LED industries. For the past 18 years, the company has offered inspection machines and a portfolio of related software applications.

Executives from Cogiscan and MIRTEC sign a partnership agreement to develop a collaborative Industry 4.0 solution.

Investing heavily in research and development, MIRTEC has also created a complete technology roadmap for Industry 4.0 that involves close collaboration with other leading machine and software vendors, in order to enable the smart factory.

Chanwha Pak, CEO of MIRTEC, commented, "Connectivity with other machines and software applications is the key to enabling Industry 4.0. Seamless connectivity requires more than just a communication protocol. It requires a complete and robust connectivity platform supported by a team of integration experts to make it work. Cogiscan and its Co-NECT

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Specialized Coating Services to Open Facility

Fremont, CA — Specialized Coating Services is expected to open a second facility in Billerica, Massachusetts, in mid-February of 2018. The 13,000 ft² (1,208m²) facility is designed to meet the demand for professional conformal coating and potting services on the U.S. East Coast. Co-founders Rick Ramirez and Kim Atkins spent the last few years researching various locations for the facility before settling on Billerica.

Specialized Coating Services has been providing contract conformal coating, potting and encapsulation, and ruggedization of PCBs since 1996. The company meets demand in a variety of industries, including medical, military, aerospace, commercial, and retail.

The new facility is currently being equipped with the latest robotic and conventional spray systems, plasma treatment, cleaning, and ionic test equipment, as well as potting and encapsulation meter mix systems. "We've been providing conformal coating services to our Midwest and East Coast accounts for over fifteen years. By opening a facility closer to these customers, it will enable us to provide quicker turns and reduce freight costs. In addition, the need for our services in these areas continues to grow." says Ramirez.

Certifications currently held in California and planned for the new

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SEMI: New Highs in Fab Spending

Milpitas, CA — The year-end update to the SEMI World Fab Forecast report reveals 2017 spending on fab equipment investments will have reached an all-time high of $57 billion. High chip demand, strong pricing for memory and fierce competition are driving the high level of fab investments, with many companies investing at previously unseen levels for new fab construction and fab equipment.

The SEMI World Fab Forecast data shows fab equipment spending in 2017 increased 41 percent year-over-year. In 2018, spending is expected to increase 11 percent to $63 billion. While many companies, including Intel, Micron, Toshiba, Western Digital, and GLOBALFOUNDRIES increased fab investments for 2017 and 2018, the strong increase reflects spending by just two companies and primarily one region.

SEMI data shows a surge of investments in Korea, due primarily to Samsung, which is expected to increase its fab equipment spending by 128 percent in 2017, from $8 billion to $18 billion. SK Hynix also increased fab equipment spending, by about 70 percent, to $5.5 billion, the largest spending level in its history. While the majority of Samsung and SK Hynix spending remains in Korea, some will take place in China and the United States. Both Samsung and SK Hynix are expected to maintain high

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Stripping Costs From Photoresist Processing

By Ed Sullivan

Silicon and compound semiconductor wafers undergo many critical procedures during the microfabrication process, including the recurring stripping of photoresist. This is the light-sensitive material (liquid or film) that is deposited during various steps of wafer production. Reexamining the wet process of stripping of thick photoresist, which occurs at the back-end of wafer processing, can significantly reduce the amount of chemicals required, as well as related disposal costs.

Photoresist materials are designed to mask, or "resist," UV light to accomplish back-end-of-line tasks, such as the etching and electroplating of circuits and copper pillars used as bonding pads for wafer packaging.

In recent years, wafer foundries, as well as semiconductor and compound semiconductor manufacturers, have begun to incorporate copper pillars into their fabrication processes. The advantages of copper over solder have become increasingly clear, enabling higher pin counts and interconnect densities. Copper also offers higher reliability and improved electrical and thermal performance.

It is worth noting that back-end processes require the use of solvents while front-end-of-line processes typically employ acids, including sulfuric acid and peroxide. These would attack surfaces, such as copper pillars, and damage them. Also, back-end processes use much thicker photoresist materials, and because the solvents used for back-end stripping are less aggressive, chunks of undissolved resist residue often accumulate in the bath. These chunks can block bath circulation and filtration, shortening bath life and increasing solvent chemistry consumption substantially.

Evaluating Wet Processing Challenges

After deciding to adopt copper pillars for in-house wafer production, one wafer manufacturer ran into some obstacles. Two situations caused the manufacturer to rethink the process by which it stripped the "thick" resist from its wafers during the copper pillar attachment process. Both issues

JST Manufacturing's semiconductor processing applications lab.

stemmed from the chemical bath tool that was integral to the stripping process.

"Our customer, an amplifier manufacturer, was dealing with a 50 to 100 micron thick resist film on its wafers, about 15 times thicker than resist used on front-end processes," explains Ryan Zrno, chief technical officer of JST Manufacturing, a specialist in wet processing equipment for the MEMS, nano, photovoltaic, wafer, and related industries. "The traditional solvent chemistry was leaving large amounts of chunky resist residue in the bath, which was interfering with both circulation and filtration. This was causing increased bath changes, resulting in production delays and excessive use of expensive chemical solvents."

Zrno adds that the customer also wanted to find an alternative to the solvent that had been used in the past, one based on TMAH (tetramethylammonium hydroxide). Although not used in toxic amounts, this solvent had a strong odor and was not the most effective chemical for resist stripping of wafers with copper pillars.

To evaluate the problems and propose a solution, Zrno invited the customer to visit JST's applications lab and run some tests with the engineering staff. The company also coordinated a series of tests with appropriate solvents made to order from Diamalloy, the customer's chemical supplier.

Tailoring a Solution

"We ran a set of three different kinds of tests, each in our standard down-flow bath tool," Zrno says. "Each time we would learn something valuable about possible solutions. It was a three-way development team composed of the customer's staff, the chemical company and our engineers."

After a few weeks of testing, the proposed solution was a new wet processing tool that did not leave large deposits of solubilized resist in the bath. Instead, a new chemistry was recommended along with a series of screens that were incorporat-

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Stripping Costs From Photoresist Processing

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ed into quick-dump exchanges.

This meant that the bath solvent chemistry was circulated in such a way that it flowed over the screens, removing any large clusters of resist before they could become totally solubilized and deplete the effectiveness of the bath solvent. Removal of resist clusters also meant that they were no longer a threat to bath filtration or circulation.

The next step was to build a test module, which included a bath with a single series of screens, a reservoir, basic control system, and a pump.

"Once completed, the customer came back out and we did testing again," Zrno says. "After successful testing of the module, JST designed and built a fully-automated production tool with a 6-gallon bath and 20-gallon reservoir. We also added other proprietary components that enabled the tool to meet the customer's needs."

The customer ordered two of the new production tools in order to run parallel processes and meet throughput requirements.

A Combination of Savings

As anticipated, this new, automated resist-stripping tool reduced chemical usage, and the series of screens prevented the recirculating bath chemistry from plugging up the filters.

Chemical usage dropped by two-thirds at the customer's resist stripping stations, mainly due to the increased bath life. Also significant was the reduction of downtime for changing baths, which normally took 30 to 60 minutes. That time was reduced by two-thirds as well, as was the associated downtime to drain and recharge bath solutions.

The new resist stripping station includes a menu of built-in settings, which were tested and installed at the JST factory lab. This menu makes it unnecessary for users to go to another facility to establish new settings, a process that could increase production downtime by up to several days.

According to Zrno, it makes a lot of sense to periodically review production systems, such as wet processing equipment, particularly when production procedures change. In many cases, making minor modifications to existing equipment, whether standard or custom, can help companies save significantly.

Contact: JST Manufacturing, Inc., 219 E 50th Street, Boise, ID 83714 ☎ 208-377-1120
fax: 208-377-3645
E-mail: info@jstmfg.com
Web: www.jstmfg.com ❒

Cradle to Grave Solder Solutions

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back into their pockets," Buck says. "It's truly a 'cradle-to-grave' solution for electronics manufacturers. As partners, we can offer these products and services as seamlessly as if we were one company. This relationship makes both companies stronger and more competitive in the marketplace."

"Amerway is a small, family-owned business with the technology and capabilities of much larger corporations," Buck concludes. "We offer a free solder pot analysis, high-purity material, shorter industry lead times, a certificate of analysis, and certificate of conformance with every order upon request. Buying from Amerway means buying directly from the manufacturer."

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☎ 814-944-0200
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Versa Electronics Achieves New ISO Certification

Minneapolis, MN — In accordance with ISO 9001:2015, and based on the recently completed assessment by its registrar, Orion Registrar, Inc., Versa Electronics is on the leading edge of a group of companies that decided to complete transition to the new ISO 9001:2015 standard in 2017.

Versa Electronics has a long history of producing medical devices and subassemblies. Versa's services to the medical device OEM market include PCB assembly, wire harness/cable assemblies and electronic subassemblies. Versa is demonstrating its commitment to the medical device community by achieving ISO 13485:2003.

The company's quality management system and the addition of the new ISO certification broadens its potential market to over 602 establishments in Minnesota alone, enhancing the company's FDA registration.

Versa is a privately-owned electronics contract manufacturer that builds products for OEMs in the medical, utility and power, communications, security, and other markets.

Contact: Versa Electronics, 3943 Quebec Avenue North, Minneapolis, MN 55427 ☎ 763-557-6737
fax: 763-557-8073
E-mail: korr@versae.com
Web: www.versae.com