EMP 2019
Electronics Manufacturing & Production Handbook

What you need to know about the Hermes standard

How to care for soldering tips

BGA optical joint inspection criteria and test methods

Selection Guides for equipment, consumables, tools & accessories

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It's certainly never a good strategy in business to work dumb, but the word 'smart' is applied to so many technologies nowadays and has become so nebulous that it can take on different meanings in different contexts, and depending on who you're talking to.

In the world of electronics manufacturing, the market for smart consumer devices is a juggernaut, with perhaps its most famous exponent, Apple, having last year become the first company ever to attain a market value of $1 trillion. Hardly anyone you meet doesn't have a relatively new smartphone – I should know because when mine packed up recently I was reduced to using an old Nokia I dug out of the cupboard. I can't imagine doing or saying anything that would make me as much of a social leper as people seeing me pull that thing out of my pocket. But you know what, it made and received calls and text messages, and the battery life was almost eternal.

Throw the Internet of Things (IoT) into the mix as one of the key enablers of smart technologies, and the potential market swells to include industrial applications. In fact, according to recent research by IndustryARC, the major IoT evolutions and investments currently are not in the consumer segment but in the Industrial IoT (IIoT) segment, which it predicts will reach $123.89 billion by 2021. And the sector that it says will generate the most revenue? Manufacturing (and 'advanced' manufacturing). These predictions are also echoed by findings from other research firms.

The main drivers for this growth will be increasing investments in smart technologies to improve operational efficiencies, and the ability of IIoT to reduce manufacturing costs. But smart manufacturing is about more than just giving operators the convenience of controlling equipment using a smartphone or tablet, it's about using smart technologies in smart ways.

These concepts are generally characterised under the umbrella of Industry 4.0 – the much touted 'next big thing' that will propel humankind's capabilities into a fourth industrial revolution. Here we start moving away from soldering irons and production cells, and start talking about concepts such as advanced manufacturing processes and rapid prototyping, collaborative virtual factory platforms, advanced human-machine interaction (HMI) and augmented reality (AR) devices, machine learning, cyber-physical systems and machine-to-machine communication.

What this will mean for electronics manufacturers is access to more data to gain insights, as well as, ultimately, closed-loop control of a full manufacturing process. One of the industry efforts, which you can read more about in this handbook, is the Hermes Standard Initiative. This initiative concentrates specifically on the machine-to-machine communication aspect of an SMT assembly line, and aims to create a single global standard to do away with obsolete technologies and vendor-specific, proprietary solutions. The next few years will tell how readily electronics manufacturing facilities actually adopt Hermes, but its backing from more than fifty leading equipment vendors will surely help to drive its uptake.

There is also increasing pressure on companies across industrial sectors, including electronics manufacturers, to be smarter about the environment. This starts with the design of the products they're making, by developing new methods to produce devices that consume less energy, to instituting 'green' manufacturing processes that have less negative environmental impact and a smaller carbon footprint.

Companies are increasingly realising the need to go beyond public sector initiatives and funding, to protect the environment not only around where they operate, but on a global scale. One of the most stark recent examples of why this is becoming necessary comes in the form of the power utility Pacific Gas and Electric, which is blamed for causing the deadly California 'Camp Fire' last year when a power line came in contact with nearby trees. The wildfire ultimately caused 86 deaths and destroyed 14,000 homes, resulting in claims of at least $7 billion against the company and leading it to declare bankruptcy. While it may seem a stretch to blame it all on global warming, it is beyond doubt that the fire wouldn't have been able to spread so fast and so aggressively were it not for the extremely dry conditions experienced in the area at the time.

But enough of trying to solve all the world's problems. In this, the fourth edition of our EMP Handbook, we bring you views from some local contract electronics manufacturers, profiles of a few companies operating within this space, technical articles and practical 'how to' guides, and a selection of equipment, accessories, tools and consumables available from various suppliers. So without further ado, we at Dataweek hope you are able to make good use of this handbook, and wish you all the best for a productive 2019.
What you need to know about the Hermes standard

Hermes is the name of a recently created standard conceived to serve as a backbone for board-flow data management in smart electronics manufacturing facilities, by providing a vendor independent method of machine-to-machine communication for SMT (surface mount technology) assembly.

Taking advantage of modern TCP/IP communication and XML data format technologies, Hermes is effectively a replacement of the more than 20-year-old SMEMA (Surface Mount Equipment Manufacturers Association) standard (which carries the official designation IPC-SMEMA-9851), which is considered obsolete.

The Hermes standard was instigated by an independent group of equipment vendors and was officially launched at Productronica 2017 as an open standard under the auspices of the Hermes Standard Initiative. It has subsequently been recognised by IPC as the successor to SMEMA, and been assigned the official designation IPC-HERMES-9852. While it remains organisationally independent from the IPC body, close cooperation assure full compatibility, and both parties work together to guarantee a seamless fit, in particular with regards to the related IPC-CFX standard.

One standard to rule them all?
As with so many standardisation initiatives, there is no one standard to rule them all. Shortly after the Hermes standard was published, a group of mainly Japanese vendors, organised in a sub-committee of the Japanese Robot Association (JARA) decided not to join but to go for a similar yet separate approach that it calls JARAS 1014. While there has been some bickering between the two bodies, IPC's support for Hermes positions it as the clear favourite to realise its goal of becoming the de facto global standard.

The Hermes Standard Initiative has been true to its claim of being truly open, and has a wealth of freely available information on its website, including the entire decision making process and all results, including the specification itself. It has also published an in-depth comparison between Hermes, JARAS 1014 and Fuji's Easy Link solution.

All vendors of SMT equipment are free to join the Hermes Standard Initiative and to participate free of charge, and it counts roughly more than 50 companies amongst its membership, including most of the biggest names in the business from all across the globe.

Value proposition to manufacturers
Based on TCP/IP and XML, the Hermes standard uses modern communication technology and standardised data formats for machine-to-machine (M2M) communication. Its purpose is to transmit barcode information and board or job related data such as dimensions, board identifiers and product type identifiers together with the board along the machines of different vendors in an SMT line.

This means that a maximum of only one barcode scanner is required in the line. Besides this, the product itself becomes the driver of changes along the SMT line, so that manual adjustment of conveyor belt widths, for example, becomes unnecessary. Likewise, the information provided with a board can be used to automatically change the program according to the product type.

There are a number of clear benefits this offers to manufacturers of electronic assemblies. First of all, if all the machines on a production line are talking the same language, regardless of who made them, closed-loop handover is far more easily achievable.

Since it is protocol based rather than signal based, it is easier to adjust and expand for integrating further information. It also uses standard components in the form of Ethernet cables, plugs and interfaces that are inexpensive and readily available. If supported by the equipment, cables can even be done away with in favour of standard Wi-Fi.

New equipment can be used alongside existing SMEMA-only devices if required, but the full benefit will only unfold in lines where the majority of machines are compliant with IPC-HERMES-9852. According to the Hermes Standard Initiative, operational lines successfully making use of the standard have been running since June 2018, although no further details are provided.

For more information visit www.the-hermes-standard.info.
In 1992 Leon Vos, a driven, young entrepreneur with a passion for electronics, established Advanced Electronic Production and Integration. What started off small, with him working days and nights from a small establishment, grew over the years as he recognised an opportunity for a gap to be filled within the industry for a complete, integrated electronics solution experience.

Now called Automated Electromechanical Production, the company is able to offer its customers a complete electronics manufacturing solution, from a concept or idea to a finished product. Its range of services includes product integration, printed circuit board assembly, cable harnesses, production and testing, potting, rework and repair.

Also on offer is metal work that consists of enclosures, design and drawing, fibre laser cutting, CNC metal punching, CNC plasma cutting, routing of non-ferrous metals, welding and laser engraving. Also included is plastic work that entails electronics enclosures, design and drawing, routing, welding and laser engraving; as well as the supply, design and drawing of vinyl stickers and doming.

Making use of the latest current technology and software, Automated Electromechanical Production’s expert teams can ensure that every customer’s requirements are fulfilled, and it prides itself on the fact that there is absolutely no project or concept too big or too small for it to execute with perfection and professionalism.

The pursuit of quality has been at the core of the company’s drive to support and unlock opportunities to better serve its clientele. This sets it apart, by providing a complete basket of an in-house electronic manufacturing solution.

Procurement is of utmost importance, therefore Automated Electromechanical Production sources only the best components and materials, nationally and internationally, at the best price.

These core principles mean that the company is able to serve a large target market due to its flexible, diverse and unique services provided, from the man in the street with a small idea to well established brands with volumes. There is no idea or concept that Automated Electromechanical Production will not take on.

For more information contact Automated Electromechanical Production,
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www.electronicproduction.co.za
Having initially procured its first pick-and-place line to assemble its own printed circuit boards, the company found that its increased production efficiency provided excess capacity, which it began offering to small local companies to assist them with development boards and small production boards. This proved to so successful that in 2004, Diel Manufacturing was born to focus purely on contract manufacturing.

With a clear understanding that development boards and small production runs are just as important as larger production jobs, Diel Manufacturing's target market is generally small- to medium-sized companies looking to build anything from one to five thousand board runs. So where other contract manufacturers prioritise larger production runs to maximise their profits, Diel prioritises the smaller boards to aid engineers in their research.

Diel Manufacturing offers a high-quality, full turnkey production service – from procurement right through to final packaging. This is backed by the flexibility of having no minimum order quantity (MOQ), quick turnaround times, and assured quality to ISO 9001 and IPC 610-D standards. With electronic components getting ever smaller and packages like BFGs and QFNs becoming the norm, boards can no longer be assembled by hand. Diel Manufacturing thus aids companies by assembling their complex boards to high levels of quality, helping engineers to get their products to market quicker.

Although 70% of its customer base is within the Western Cape, the company has a number of national and international clients too. While Diel Manufacturing is dedicated to maintaining its core business focus for the foreseeable future, it also has the goal of continuing to increase this customer base.

For more information contact Diel Manufacturing, +27 21 715 1120, manufacturing@diel.co.za, www.dielmanufacturing.co.za
Electronic Touch Systems (ETS) has supplied membrane keypad solutions and ancillary products to the South African electronics industry for more than a quarter of a century. The company was founded by Tony Ellis in February 1990 to fill the niche market of South African-manufactured membrane switches and instrument panels printed on polycarbonates.

Ellis passed away in 2007 but his wife Carol still helms the company together with Denzil Hagemann and Patrick Thomas. ETS is well regarded for the high quality of its membrane switches and overlays, and indeed its core product is the membrane switch in all its contemporary formats like tactile feel, various options of backlighting, and most recently digital printing of the graphic component of the products. Quality is something to which ETS certainly does not simply pay lip service. Each and every button on each and every keypad the company manufactures is manually tested before being dispatched. It is thanks to this attention to detail, as well as its highly trained and experienced staff members, that the company has received numerous SASPA and CBI awards for quality and zero defects.

The company strives to be at the forefront of Global Development in the manufacturing of membrane switches by regularly sending representatives to international membrane switch and printed circuitry symposiums and exhibitions.

ETS is constantly improving on its standards of excellence and service. It prides itself on being South African manufacturers of a niche product in a difficult economic environment and strives to uphold its integrity as such by ensuring its products are equal to—if not better—than what may be obtained off-shore.

Although it faces stiff price competition from Eastern competitors and has experienced cases where companies who have come to it for prototypes have then taken their high-volume production requirements to the East, ETS has also seen customers come back to it, once they experience quality problems with Asian products. The company steadfastly believes that its strong focus on quality, as well as its eager and immediate service capabilities will continue to hold it in good stead.

Going forward, ETS will continue to focus on delivering to the South African market to the best of its ability, in addition to exporting its products to Europe and the America, by driving manufacturing excellence and service to its highest standards, while remaining competitive as far as pricing is concerned.

For more information contact Electronic Touch Systems, +27 11 782 3346, touch@global.co.za, www.electouch.co.za

The company strives to be at the forefront of global development in the manufacturing of membrane switches and is constantly improving on its standards of excellence and service.
Contract electronics manufacturing in SA

The world of electronics manufacturing spans the entire globe and accounts for trillions of dollars worth of products being made annually, but it is also a small world in the sense that many of the companies manufacturing electronics are faced with similar challenges, use similar technologies, and have similar ambitions for the future.

We asked representatives from two leading South African contract electronics manufacturers to share some of their insights into this complex landscape. They are Grant Emandien, operations manager at Leratadima Tellumat Manufacturing, and Petrus Pelser, managing director at Etion Create (formerly known as Parsec).

What are some of the manufacturing capabilities your facility employs?

Grant Emandien: The increase in the percentage of surface mount technology (SMT) components present on printed circuit boards (PCBs) is continual, and increasingly printed circuit board assemblies (PCBAs) are now populated only with surface mount devices. Thus, the selection of related equipment for populating PCBs is imperative to remain competitive in the provision of quality and reliable products.

Not only is the choice of component placement machines critical, but the reduction in component size also places increasing focus on solder print equipment and inspection equipment (solder paste and automated optical inspection and X-ray equipment).

While equipment choice is critical, process management and monitoring are essential to ensure rework costs are minimal and throughput is maintained at expected levels. Choosing the correct test equipment and associated test techniques is fundamental in delivering (a) functional products, (b) a price competitive product and (c) minimising the costs of product returns and repairs.

Petrus Pelser: Etion Create specialises in the design, manufacturing, integration and support of advanced technologies. We design, develop and manufacture a wide range of advanced electronic and digital technologies for internal and external customers.

Our core business focus is on electronic solutions and covers product development, manufacturing and systems integration services. We also do weapons and electronics integration and manufacture a range of products, from printed circuit board level (SRUs) to complete solutions (LRUs).

Our electronics manufacturing capability is close to our internal design authority, which gives us closed-loop feedback and feedforward regarding design for manufacturability (DFM) issues. This helps us with our production engineering services and interfacing to external design authorities.

We do full turnkey manufacturing of electronic assemblies (procurement through to shipping of tested units), and we conform to IPC class 2 and class 3 standards to serve our industrial and defence clients. Our QMS processes give us repeatable quality deliverables and our lean practices drive continuous improvement of those processes.
We are also ISO 9001:2015 certified, but what sets us apart is our ability to create customised subsystems and products for clients across a range of sectors, including mining and industrial, defence and aerospace, IoT and sensors, and cybersecurity. We also have a range of commercial off-the-shelf (COTS) products.

**Is it a problem finding the right people with the right skills you need for your manufacturing plant?**

*Grant Emandien:* Yes. Due to South Africa having a small contract manufacturing sector, as well as the changing economy, staff inevitably require training to meet requisite quality and reliability expectations.

All staff are trained in-house for assembly needs, in addition to those staff with technical diplomas and those doing technical learnerships who do more complex testing and other higher-skilled jobs. It could typically take six months for trained staff to meet the minimum level of proficiency.

Even though technical staff may be obtained with a diploma, additional skills are still required to meet specific demands.

*Petrus Pelser:* Our people are the driving force of our growth, so we are focused on developing and nurturing new skills critical to our growth. Yes, we do struggle to find good technically skilled operators that can program and run complex automated machines. The colleges and tertiary training facilities do not deliver people skilled in these aspects.

That is why we are committed to building a diverse workforce that reflects the diversity of our customers, partners and society. We have successfully built a diverse workforce which delivers innovation on a daily basis, with fresh ideas and a broad cultural mix.

45% of our total workforce as a group requires technical skills. We do a lot of in-service training, and also make good use of the interns who come to work for us to get their practical experience on an annual basis — this provides us with the additional benefit of employing good candidates after evaluating them during on-the-job training.

Our heritage in engineering and technology ranges over 31 years, and our people are a good mix of old and new. The future will demand an adaptable and versatile workforce, so finding people that can easily be skilled, reskilled and upskilled is key.

*Petrus Pelser.*

- eLearning platforms will play a crucial part in the continuous learning journey, and this is a platform that we are now adapting as a company.

**What excites you most about where electronics manufacturing technology is at the moment, and where it’s heading?**

*Grant Emandien:* As a contract manufacturer it is always exciting to continually build new and innovative, leading-edge products for customers. Currently, the improvement in process technologies and available tools to improve and monitor productivity and efficiencies is a key driver to becoming a cost-effective manufacturer. The reduction in cost of these tools over recent years has been an important factor in reducing cost and improving productivity.

*Petrus Pelser:* Firstly, the drive of Industry 4.0 is an exciting opportunity, with automation of higher-volume assemblies and improvement in efficiency at the core. Emerging technologies are improving the modelling and monitoring of manufacturing facilities, which allows for easier information-based decision making and improvement opportunity identification.

Industry 4.0 is driving socioeconomic change on a scale and at a pace never seen before. Technological advancements such as the Internet of Things (IoT) and robotic process automation are fundamentally changing the way in which we live and work, especially the way in which operations are handled.

Within this context, leaders in government, business, industry and the state-owned companies (SOCs) are all concerned about the impact that the rapid move to digitalisation will have on their organisations. This is particularly true of some major SOCs, which have large legacy systems. The most pressing question for them is whether they will need to completely replace their ICT infrastructures or whether it is possible to digitalise existing systems. The ability to build digital capacity into legacy systems is crucial, as the financial and operational implications of having to replace entire systems are enormous.

As a provider of integrated digital technology solutions in major sectors such as rail, mining, defence and telecommunications, Etion is acutely aware of the need for innovative thinking on issues of this nature. It is for this reason that we actively engage with our customers in order to develop and implement the best possible digital solutions to suit their evolving needs.

As a group, we are adapting to a changing world, we’re combining all our expertise into one and this change really
excites me. South Africa could become an important hub for supplying electronics products into Africa, or at least SADC countries. We have the opportunity to bring localisation of electronics manufacturing in Africa, instead of all countries being reliant on manufacturing in the East.

What are your biggest frustrations or challenges in being able to make your products efficiently and cost-effectively?

Grant Emandien: Material, and specifically electronic components availability, is a challenge due to the current market conditions. In general, though, it is the poor delivery performance of component suppliers in not meeting stated/committed delivery dates – this is exacerbated by the poor communication of some suppliers. For the industry to remain competitive, costly delays in the full supply chain must be kept at a minimum.

Petrus Pelser: There are a few. Firstly, the shortage of components: being a growing world technology player, our manufacturing industry does not have the buying power to get electronic parts at the same cost or in the timescales required by our customers. Technological development inevitably brings with it unexpected consequences, and the advent of the fourth industrial revolution is no exception. Fuelled by rapidly increasing demand for technologies such as smartphones, new-generation vehicles and advanced defence hardware, as well as by an explosion in the use of the IoT in industry, it is causing a global shortage of critical electronic components that are affecting most sectors that are dependent on such components.

All electronic devices, from smartphones to satellites, require parts called multi-layer ceramic capacitors (MLCC). These are essential to the functioning of the device’s electrical circuitry and are used in thousands of applications. Since 2017, a surge in demand for MLCCs and a parallel shortage of the raw materials needed to manufacture them has impacted heavily on supply, which is now more constrained than ever.

While the global output of MLCCs is well over a trillion pieces a year – with China accounting for the lion’s share of this – demand since 2013 has skyrocketed so much that manufacturers just can’t keep up and a worldwide shortage has developed. The demand-driven shortage is further being exacerbated by capacity problems across many electronic component manufacturing segments. This has come about partly because as MLCC technologies are increasingly adopted, prices have fallen, with the result being a perfect storm that is seriously affecting capacitor supply, a phenomenon that is likely to continue for some time.

Secondly, our labour laws can sometimes be too restrictive given the globally competitive environment in which we have to operate.

Thirdly, it is difficult to compete on price. When exporting electronic assemblies, we have to get the parts from overseas and ship finished products back overseas, placing a further burden on cost competitiveness. Supporting local distributors and sourcing through trusted channels can add a premium on the cost of material.

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Realising the expectations of AOI

Information from MEK Marantz Electronics.

With the resurgence of the electronics interconnect manufacturing industry, there is renewed emphasis on automated optical inspection (AOI).

Long-time users are in the market for new and improved technology, while other companies are ready to implement AOI on a wider scale.

AOI suppliers, of whom there are more than 30, are clamouring for attention and a way to differentiate themselves in a crowded market. Price competition has thinned profit margins for both users and vendors, and yet AOI has still not achieved its original performance goals.

Today, inline systems are available for as little as 70 000 Euros in Europe – where volumes are low and support requirements are high. Prices dip as low as $50 000 in China – the mother of all price markets. Many vendors have recently begun to offer bench-top models in addition to inline offerings in the hopes of capturing more market share.

On the user side, companies have begun re-evaluating their AOI strategies. Millions of dollars have been spent in some cases; yet in most factories, an operator is standing at every machine to verify defects. The issue of false alarms has become one of the keys to unlocking the potential of AOI. One primary goal has been that AOI is used most effectively as a feedback tool for yield improvement.

The reality is that many users are simply ‘inspecting defects out’ of the product, and the data from an AOI system is so corrupted by false alarms and questionable defect categorisation that the information generated may be functionally useless for statistical process control (SPC).

A recent evaluation at a large European-based automotive electronics manufacturing services (EMS) company illustrates this. This company has more than 20 conveyorised AOI systems installed, but instead of operating them in line, has opted to create staffed work cells to perform inspection.

It was found that, because of high defect call rates, direct operator involvement was necessary after every inspection cycle; thus, the inline AOI process had become a bottleneck and reduced overall line productivity. The labour savings and improved yields that were expected had not occurred. While end-of-line defects had been reduced, there was no significant reduction in rework – indicating that the pre- and post-reflow inspection data generated was not leading to process optimisation.

This same EMS firm then decided that, because it was not using the conveyorised systems as they were intended, it would also evaluate bench-top systems. It is important to note that this is a plant producing more than 10 000 assemblies a day and is well-versed in six sigma manufacturing practices. We may see this trend spread.

Solder inspection revisited

Another trend has been a reassessment of solder inspection in line. Reviewing the AOI evaluation specifications of five years ago, the...
solder inspection criteria included excess and insufficient solder, bridging, microvoids, ‘excess’ voiding, shorts, opens, cracks, etc.

All of these parameters are critical, but programming for full solder inspection can, in some cases, take a week. Even then, false alarm rates are often high. In some cases, AOI systems have captured three to four defects on a panel with hundreds of false alarms. In verification, operator acuity is impaired when verifying panels with high numbers of false calls – as real defects inevitably escape.

In a high-mix/low-volume (HMLV) environment, time is of the essence; when parts must ship quickly, programming time is a paramount issue. Additional and angled cameras also impact programming time, inspection time and false alarm rates. Today, many users are attempting to find a balance between defect captures and low false alarms while keeping the line running. When dealing with the inherently unstable and non-repeatable images of solder fillets, the user must strike a fine balance. The operating guideline is ‘Keep it simple.’

Time to first board
With the predominance of HMLV manufacturing in North America and Europe, the semantics of programming and debugging time has become another issue. Interpretations abound, but the crux is that when evaluating AOI systems, you must look at the time it takes between the moment the programmer begins and the time the operator pushes the button on the first inspection cycle.

In some cases, programming is quoted in minutes, while debugging is not discussed. In others, the programming process can be daunting, but debug is simple. In the end, the user must assess the overall time it takes to run the first panel effectively. (See Figure 1)

Proper use of AOI is still an issue, even in large manufacturing installations with years of experience. When visiting a large EMS manufacturer recently, it was found that the operators set the AOI parameters wider to reduce the number of alarms, rather than adjusting the production process to reflect the data developed from AOI. This defeats the original purpose of AOI.

Proper and regular training is critical for successful implementation, and cannot be overemphasised. An AOI system that may cost several hundreds of thousands of dollars is only as good as the training of the operator running it. Between turnover and human nature, the system is only as good as its weakest link. Well-trained operators produce better results.

At many companies, price is the driving factor. With AOI, this can be a fatal mistake. A false sense of security can be engendered and real defects escape, with significant consequences. Up to 25% of all AOI systems sold to date are languishing unused. Unmet expectations abound, and we are seeing second-generation implementation of the technology at many companies.

The long-term goal must be process improvement. It takes good equipment, well-trained operators, and accurate data to realise the expectations of AOI.

Where Marantz comes in
AOI systems offered by Marantz have been expressly designed to address many of the issues identified above. The very existence of the Marantz AOI product range came from dissatisfaction with commercially available equipment back in the mid-1990s when Marantz engineers failed to find a system that would meet their needs in manufacturing the company’s acclaimed audio products. So they designed their own.

A few turns of the evolutionary cycle later, and the company has a product range that includes powerful benchtop systems – acknowledging that effective AOI usage demands an operator. But key across the board to the Marantz solutions is 24-bit colour imaging.

Most vendors deploy only 8-bit greyscale. 24-bit colour demands a powerful graphics processing engine but goes a long way to minimising false alarms by improving image clarity and helping to separate components and solder images from the background board or substrate (see Figure 1.) It also enables the Marantz equipment to identify colour as part of the inspection process – for example with colour coded components.

Innovative angled illumination, along with coloured lighting, further adds to the detecting capabilities, particularly with solder fillets. Even though reflowed solder pads are silver-grey, it’s surprising how the selective and calculated use of coloured illumination and 24-bit processing reveals significantly more than a grey-scale engine.

So how do Marantz AOI systems cope with the burden of 24-bit image processing? They all use powerful Apple Mac computers – just like almost every other professional in the graphics industry. And no, operators don’t get iTunes loaded as standard!

For more information contact Zetech,
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The need to reduce climate change is prevalent, with global recognition of its impact resulting in many targets being put in place to ensure that dramatic changes in our energy usage occur.

The EU has devised the 2020 package with reductions based on 1990 levels. The package includes a 20% cut in greenhouse gas emissions, 20% of energy from renewable sources and a 20% improvement in efficiency by 2020. Some countries also have their own targets; for example, the UK is looking to achieve an 80% reduction in greenhouse gas emissions by 2050.

As a consequence, the dominance of energy derived from fossil fuels is no longer considered appropriate in some quarters. In a technological age where energy is so important to our everyday lives, it is imperative that we focus on increasing our energy efficiency across all industries and with that thought in mind, we shall discuss power electronics.

Power electronics provide the efficient conversion of electrical energy, typically involving a change to the voltage or current level and/or frequency. The power levels involved can range from very low to very high, mW to GW (for example), therefore the applications are wide-ranging.

There are some obvious examples where the level of energy efficiency is a critical factor for success, and these include the automotive electric vehicle and LED industries. Wireless phone charging, connection of renewable energy sources, power distribution and sensor technology are a few more key areas.

So how do we improve our energy efficiency across the spectrum of these areas? The design of these electronics is clearly the most important factor, but in order for these electronics to work and achieve maximum efficiency under a variety of conditions, the use of thermal management materials and protective products may be the vital step towards achieving these targets to fully maximise the efficiency and reliability of power electronics.

There are two key areas where such substances can be used: at component level and device level. At component level, we are typically referring to thermal management. Components, such as a resistor, will generate more heat when more power is applied, however, if this heat is not properly dissipated, the operating temperature of the component will increase to such a point that it may eventually fail.

A thermal interface material (TIM) can be used to improve the conduction of heat through to a heatsink. During this process, heat is radiated to the surrounding environment by means of convection. The use of TIMs improves the efficiency of heat transfer and by helping to reduce the operating temperature of particular components, or the PCB as a whole, the efficiency of the device is also improved, consequently reducing energy usage.

TIMs can also provide a good compromise of increased performance without the negative impacts of increased board weight or size. This provides PCB designers with additional thermal management options for thermal backplanes or heavy board traces, for example.

The type of thermal management product can also have an impact on the efficiency of heat transfer. With these products, particularly in the case of TIMs, the thickness at which the product is applied affects the thermal resistance at the interface.

TIMs are designed to be applied in thin, even films. With any thermally conductive material, it is very important to ensure that the interface between the device and heatsink is completely filled and all air is displaced. Ensuring all air is excluded from the interface leads to a lower thermal resistance and lower device operating temperature.

The thermally conductive heat transfer compound will have a lower thermal conductivity than the heatsink material. Therefore, keeping the thickness of the film at the interface as low as possible will decrease the thermal resistance and in turn lower the operating temperature.

TIMs can range from thermal pastes/greases, bonding products such as RTVs and chemical cure compounds to solid gap pads. Phase change materials are a newer example of TIM technology, designed to combine the very low thermal resistance achieved using a thermal paste, with the stability of a cured or solid material, such as an RTV or gap pad. During use, the properties change state from a solid to a liquid and back again, depending on the temperature of the application.

Each phase change material will have its own activation temperature, at which the change of state occurs. Once this temperature is reached the ability of the phase change material to become softer, allows the product to fully conform to the contours of the substrate, filling in the

Supporting the future through reliability and protection of power electronics

By Jade Bridges, global technical support manager, Electrolube.

A thermal interface material (TIM) can be used to improve the conduction of heat through to a heatsink. During this process, heat is radiated to the surrounding environment by means of convection. The use of TIMs improves the efficiency of heat transfer and by helping to reduce the operating temperature of particular components, or the PCB as a whole, the efficiency of the device is also improved, consequently reducing energy usage.

TIMs can also provide a good compromise of increased performance without the negative impacts of increased board weight or size. This provides PCB designers with additional thermal management options for thermal backplanes or heavy board traces, for example.

The type of thermal management product can also have an impact on the efficiency of heat transfer. With these products, particularly in the case of TIMs, the thickness at which the product is applied affects the thermal resistance at the interface.

TIMs are designed to be applied in thin, even films. With any thermally conductive material, it is very important to ensure that the interface between the device and heatsink is completely filled and all air is displaced. Ensuring all air is excluded from the interface leads to a lower thermal resistance and lower device operating temperature.

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interface at a minimal bond line thickness. This in turn results in very low thermal resistance and maximises the efficiency of heat transfer.

Some examples of where Electrolube products have been used for power electronics applications include TIMs for IGBTs in power distribution products, gap filling and TIM applications to transfer heat from components to the outer metal casing in a variety of automotive devices, such as battery chargers, and the use of TIMs for heat dissipation within drivers for LED billboards.

All of these applications provide their own challenges. IGBTs have a large surface area and are subject to thermal cycling, generating a pump-out/shear effect through changes and variances of CTEs. Pump-out can represent a significant challenge but can be mitigated via a product specifically designed to resist pump-out of the thermal interface layer from the bond line, hence ensuring minimal degradation of effective heat dissipation. Gap filling applications in the automotive sector are subject to many different environments, as well as the effects of vibration.

None of these applications faces continuous and stable environmental conditions, which leads us to the next part of this discussion; the protection of power electronics to increase reliability.

A finished unit or PCB will operate under standard ambient conditions, however, there are always external factors such as condensation, corrosive gases, salt mist, airborne contamination and thermal changes, which will impact the working life of the device.

Products such as conformal coatings and encapsulation resins are used to protect PCBs from these external influences, in turn increasing both reliability and lifetime. Power electronics push performance expectations further in terms of efficiency and every detail is important, including the protection of electrical contacts and connectors using contact lubricants to ensure stable electrical transfer.

A couple of examples where Electrolube products are used within power electronics to improve device lifetime and reliability, include conformal coatings for power control units within digital substations and resins for encapsulating solar inverters.

Both of these applications have their own challenges. The solar inverter also requires heat dissipation through the encapsulation resin, maintaining the operating temperature of components within the desired ranges. The coating for power control units needs to offer protection against moisture and corrosive gases, but also requires quick and easy application on complicated PCB designs where connectors could not be masked. A thorough understanding of the environmental conditions is therefore imperative to the successful choice of protection compound.

To summarise, power electronics is clearly a rapidly expanding and vitally important market. If we are to achieve our goals for a more energy efficient future, we must focus our attention to the small details, some of which may seem insignificant at first, but ultimately, will allow power electronics to function in the vast array of applications in which they may be utilised.

It is the crucial understanding of application conditions which will allow the use of thermal management and environmental protection products to increase the efficiency and reliability of power electronic devices. Finally, with collaborative working throughout the design process, we can further improve on the remarkable and extensive advancements that have already been made in this industry.

For more information contact Vepac Electronics, +27 11 454 8053, sales@vepac.co.za.
How to care for soldering tips

Information from Weller.

The tip of any soldering iron is the most critical component in the performance of the tool. If it cannot perform its function of effective heat transfer to the connection point, the soldering iron itself will be unreliable. Poor tip maintenance is one of the leading causes of soldering problems.

Soldering tips wear out over time and eventually need replacing, but taking steps to care for your tips can extend their life, save you money and improve the results of your soldering work. Follow these tips to reap the benefits of proper soldering iron tip care.

Using high-quality solder

One of the best preventive measures you can take to protect your solder tips is to use high-quality solder. If you use low-quality solder that contains impurities, those contaminants may build up on the tip, get it in the way of heat transfer and make your soldering work more difficult.

Purchasing solder from reputable brands is one way to increase certainty that the product will be of high quality. You can also test the quality of solder by heating it and observing how easily it melts. Good-quality solder should melt readily at the expected temperature, while low-quality solder may not melt completely. Most 60/40 (tin/lead) solder, for example, should melt easily at around 238°C.

If you use solder that contains lead, the appearance will also give you an idea of its quality. Melted lead solder will appear shiny, while a low-quality product will look more matte. High-quality melted lead-free solder also has a matte appearance.

Different types of solder will act differently, so it’s essential to check the manufacturer’s description to ensure it performs as expected.

It’s also vital to choose the right type of solder for your project. The composition you want depends on the material you plan to solder and whether you’re using flux, as well as health and safety concerns. The US Safe Water Drinking Act, for instance, requires you to use lead-free solder on all lines that will carry drinking water. The size of the project will determine the solder diameter that’s right for you.

You should also take care to only use as much solder as you need. Excess solder can end up in the socket or base, and cause short circuits and jammed switches.

Maintaining optimal temperature

Keeping the temperature of your tips as consistent and as close to optimal as possible will help extend their life.

When using many soldering irons, the temperature of the tip will naturally decrease when in use. To compensate for this, many solderers turn up the heat more than is needed. Using excessive temperatures, however, reduces the life of your tips and can lead to sub-optimal results.

Soldering station irons that have a temperature sensor can help regulate temperature for you without damaging your tips. These sensors can sense when the temperature has dipped or risen out of the intended range and automatically adjust it. Some soldering irons have more accurate temperature regulation than others. Recovery time, which is the time it takes the tip to return to the desired temperature, also differs between soldering iron models.

The temperature you set the iron to also impacts tip life. Avoid using temperatures that are higher than you need them to be to help protect your tips. This principle also applies when you aren’t actively using your iron. Make sure to reduce the temperature to an ‘idle’ setting or turn off the unit when not using it for extended periods. Some irons will automatically decrease their temperature when not in use.

Weller soldering irons offer excellent temperature stability. The WEP70 iron of the Weller WE 1010, for example, has a temperature stability of plus or minus 6°C. It also has a standby mode and auto setback feature that reduces the temperature of the iron when it’s idle.

Cleaning your tips

To care for your equipment, you need to know how to clean soldering iron tips. Keeping your tips clean is crucial to ensuring that they perform properly, and it can also extend their life. You should clean them before, during and after use. You can tell your tip is clean when it appears bright and shiny.

Before soldering, use alcohol and a clean cloth to remove contaminants such as grease, corrosion and oxidation from the surface to be soldered. To clean your tips, use either brass or stainless steel wool. Brass wool is softer and less abrasive, while the harder stainless steel wool has a longer life.

Metal wool effectively removes dirt and other contaminants and avoids issues associated with using a damp sponge to clean soldering tips. Using a wet sponge will reduce the heat of the tip. Frequent wiping with a damp sponge causes repeated changes in temperature, causing the tip to expand and contract repeatedly. This cycle causes metal fatigue and eventually the failure of the tip.

Cleaning wool will not reduce the temperature of the tip. To remove small amounts of contaminants from your tips using metal wool, gently dab them into the wool. For more stubborn residue, hold the iron more firmly and apply more pressure when rubbing it against the wool. Vary the strokes, so you remove contaminants from all sides and edges of the tip.

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After cleaning, immediately wet the tip with fresh solder to prevent oxidation. For heavier-duty cleaning, you can occasionally use a Weller WPB1 cold-tip polishing bar. Only use this device when the tip is cold, as using it with a hot tip can damage the tip.

If a tip does become oxidised, flush it several times with a rosin-activated, flux-cored solder. That should remove the oxides unless you have allowed the oxidation to build up excessively. After cleaning, cover the tip surface with a thin coating of solder.

**Using flux**

When many metals come into contact with the oxygen in the air, they form an oxide layer. This layer of oxidation prevents solder from adequately wetting the joint and negatively impacts the quality of the solder joint.

Flux is a substance that removes this oxidation layer. The flux dissolves the metal oxide layer, which evaporates once the flux reaches its boiling point. Flux may come in paste form, or it may be in the core of a soldering wire, which allows it to work as you are soldering the part with no extra effort.

Avoid dipping your tips into flux to clean them, as the substance is corrosive. Some fluxes, called water-soluble fluxes, can damage tips at higher temperatures. Many solderers only use these fluxes when doing projects that require wave soldering, immediately followed by a full cleaning to remove excess flux residue on the circuit board. Using wire solder and water-soluble flux for touch-up and rework operations will still hasten tip failure.

Another type of flux, no-clean flux, is only for soldering parts that require little to no cleaning. This very mild cleaning action normally isn’t thorough enough to remove oxidation from soldering iron tips. A badly oxidised tip will be easy to spot because of ‘burnout,’ which is the appearance of black or brown coating.

**Tinning your tips**

You should tin your tips before and after each soldering session, as well as in between soldering every two to three joints. You want to keep your tip tinned at all times, from the first time you use it until you discard it. When you tin a tip, you cover it with a thin layer of solder.

**Tinning stops your tips from oxidising by creating a protective layer between the air and the iron. Preventing oxidation through tinning extends the life of your tips.**

**OXIDIZED TIP**

**TINNED TIP**

If you tin a tip, you cover it with a thin layer of solder. Your tip tinned at all times, from the first time you use it until you discard it. When you tin a tip, you cover it with a thin layer of solder.

**Tinning your tips**

If you are just starting your session, begin soldering as soon as you finish tinning the tip. Throughout a project, clean and then tin your tip after every few joints. If you’re tinning a tip after completing a project, wipe the tip again briefly after tinning and then turn the iron off and put it away.

**Reactivating your tips**

If a tip becomes oxidised, it will appear dark, and you may not be able to tin it. To fix this problem, you can use a tip activator to reactivate or re-wet it. To reactivate the tip, dip it into the paste-like activator substance and move it around until it starts to become shiny again. The fine abrasives and additives within the activator will break down and remove the oxide layer. Once the tip looks mostly clean, remove it from the activator and clean it using brass or steel wool. Then, re-tin it immediately. Flushing the tip with solder by re-tinning it will remove any remaining contaminants. Then, clean it and re-tin it again. You should then be able to use the tip without trouble.

**Storing tips**

The way you store your soldering iron tips can also affect how well they perform and how long they last. Following some simple procedures when storing your tips can help protect them.

When storing a tip for a shorter period, such as between soldering joints in one soldering session, store it in the iron in a secure iron holder. Ensure it does not stay at the operating temperature, as this will decrease the life of the tip. You can store many Weller irons at an idle setting, which keeps them at a lower temperature but still ready to be used.

If storing your tips for an extended period, you should clean and tin them before putting them away, which will help prevent them from oxidation. After letting them cool, you may also want to store them in a sealed container, such as a bag or case, to further protect them from oxidation, humidity and contamination.

When storing a tip in the iron, loosen the nut or screw that holds it in place before putting the iron away. This practice will prevent the tip from becoming stuck, an issue known as seizing.

**Changing soldering iron tips**

Weller seeks to make it easy to remove, change and reinsert its soldering iron tips, and it doesn’t take long to learn how to do this. With the WE 1010 soldering iron station, for example, you can manually change out tips without any additional tools.

When inserting tips, always make sure you have positioned them correctly in the barrel. You can keep the screw or nut that secures the tip slightly loose to prevent it from seizing. Many Weller models have a stainless steel liner in the sensor hole in the base of the tip to prevent the tip from seizing to the sensor.

**Recycling your tips**

When you use high-quality products and take proper care of them, they can last an extraordinarily long time. Eventually, though, tips wear out. Weller makes it easy to dispose of your tips in an environmentally friendly and economical way, and even offers a voucher you can put toward your next purchase of Weller tips if you mail your used tips to the company for recycling.

For more information contact Allan McKinnon & Associates, +27 11 704 3020, info@testerion.co.za.
BGA optical joint inspection criteria and test methods

By Bob Willis.

Visual examination of ball grid array (BGA) solder joints is best achieved using an endoscope system, which are available from a number of suppliers worldwide. These systems have been specifically designed to allow solder joints to be examined between the base of the device and the printed circuit board (PCB).

Often there are limited stand-off heights and overhang restrictions due to the body of the package. The close proximity of components to the body of the device to be examined may also limit the opportunity for inspection, particularly when scanning along the sides of devices. With care, design engineers can always leave areas free of parts, particularly on the corners of adjacent sides of a device.

Although not covered in this article, X-ray criteria are available, and this is the popular alternative to optical inspection. X-ray was of course the first choice for BGA inspection when area array devices were first introduced, and is commonly used in industry. The author has conducted many hands-on training courses on inspection criteria for both optical and X-ray inspection, and produced the first training videos and interactive CD-ROM on area array inspection.

It is possible to examine the outer row of ball terminations with traditional inspection equipment, depending on stand-off height and the overhang on the side of the BGA. However, this is not feasible to use on inner ball terminations or where the overhang obscures the terminations when tilting the board assembly.

Both X-ray and these specialist inspection systems have limitations on the process issues and defects they can detect. If the budget is available, the ideal situation is to have both methods of controlling and defining the manufacturing process, or to have samples from production examined by an external source.

Ideally some visual standards should be provided for operator reference during final inspection or during process monitoring. This is true for both X-ray and optical inspection, as assessing joints can be daunting for staff members new to these techniques. Criteria should include conventional BGA, chip scale package (CSP), package on package (POP) and flip chip terminations with tin/lead or lead-free eutectic and high-temperature ball terminations. Solder joints to high temperature terminations do look different! – see Figure 2.

Examples of the soldering quality on high-temperature balls often featured on ceramic ball grid arrays (CBGA) should be included due to the difference in surface appearance. With balls that become liquid with the paste, there is little evidence of any demarcation between the two solder surfaces. With high-temperature balls like 90%lead/10%tin there will be a demarcation line between the solder alloy and the ball. This is because the ball does not reflow but the paste does. There can be differences in the height the solder rises up the ball due to the paste volume and the wettability of the terminations. The line formed at this point has often been referred to as the ‘waist line’ and mistakenly referred to in some specifications as defective.

In cases where lead-free termination BGAs are used with tin/lead paste, the ball may not completely reflow at 210°C - 225°C. These temperatures are quite normal for a surface mount assembly with tin/lead. Tin/silver/copper (Sn/Ag/Cu) or SAC balls will have a reflow temperature of approximately 217°C. As new alloys are used on area array packages to improve shock and drop performance the problems can become more complex.

If measurements are to be taken during inspection then the following can be used as a guide. It is good practice to take some measurements on typical BGA devices during early production runs or the first new product introduction (NPI) build against specific devices and their locations. If problems do arise in future production these measurements can be very useful for reference and for comparing reworked devices.

Remember that the measurements here are only a reference, as the final dimensions will depend on the original ball size on the device, the paste thickness and pad surface on the board. In the case of reworked devices, it matters whether paste was used for replacement, or flux-only reflow.

Size of ball terminations

Ball diameter should be equal to or larger than the original ball diameter on the BGA prior to reflow, due to the addition of paste. In the case of high-temperature lead/tin ball terminations which do not reflow, there should be no change in ball size. The ball size does define the stand-off height of the package.

Figure 1. One of the biggest challenges to inspection and process improvement has been head-in-pillow defects. This type of defect is intermittent so finding it in the first place is a challenge.

Figure 2. Example of high-temperature ceramic package satisfactorily soldered to the pad surface.
Stand-off height of BGA package

Measure the difference in height between the board and the base of the BGA laminate on a minimum of two of the four corners. Compare the variation in height of the BGA by scanning along the length of the BGA on two sides. The height will be equal to or less than the original ball height. The stand-off height will reduce due to the size of the device and its weight.

Variations in height between the centre and the edges of the BGA may indicate warpage of the fibre glass device or PCB. It can also indicate voiding in the ball terminations. This is more commonly noted if all termination measurements are taken. Warpage can occur up or down in the centre area of the part, although uncommon warpage can even be seen on ceramic packages.

Check for solder shorts

Scan along two adjacent sides of a BGA using light from the opposite side of the devices. There should be no restrictions to viewing each of the termination outlines. If light is restricted, short circuits may be visible under the device. Viewing two sides makes sure that shorts can be seen, whereas shorts can be missed when viewing one side only. Also look for chip components under packages due to poor placement control.

Check for complete reflow of solder paste and ball terminations on tin/lead or lead-free joints. In the case of high-temperature balls on ceramic parts, the ball will not become liquid. During soldering the paste will reflow and allow wetting to take place between the high-temperature ball and the pad surface. There will be a distinct line between the ball and the solder at the interface. This is due to the different metal surfaces being joined.

Summary

BGA failures do occur for a variety of reasons; they may be component, printed board, process or design related. On some occasions, both X-ray and optical inspection cannot easily provide the answer and that is when other techniques must be used. Microsections, dye penetrant and acoustic scans may assist in pinpointing the root cause.

The essential aspect in all analysis is the experience of the engineer who is tasked with finding the root cause of the failures. There is no substitute for practical experience.

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Choosing the right type of ioniser

Information from Charles Water.

An ioniser creates great numbers of positively and negatively charged ions.

Fans help the ions flow over the work area. Ionisation can neutralise static charges on an insulator in a matter of seconds, thereby reducing their potential to cause ESD damage.

Types of ionisers

Electrical ionisers generate air ions by a process known as corona discharge. A high voltage is applied to one or more sharp points and quantities of air ions are created. Fans or blowers may be incorporated in the ioniser to assist the movement of the ions and enhance performance.

AC ionisers

AC ionisers use a transformer to multiply the AC power line voltage, which means that the power cycles from positive to negative 60 times per second. The AC ioniser therefore produces both positive and negative ions from the same points or emitters. The drawback with this approach is that many ions recombine because the cycle frequency is too fast. For this reason, most AC ionisers rely on fans or blowers to be effective.

Pulsed DC ionisers

Pulsed DC ionisers utilise separate power supplies to generate positive and negative voltages, and usually each power supply has its own dedicated emitters. The power supply alternates between positive and negative, but usually at a lower frequency than AC units.

In this way, ion recombination is reduced and performance is increased. Airflow may then be reduced for operator comfort without sacrificing much performance. With pulsed DC, it is important to cycle at least two or three times per second to prevent harmful voltage swings on the object being protected.

Steady-state DC ionisers

Steady-state DC ionisers also employ separate power supplies and emitters, but instead of alternating positive and negative, both supplies are on all the time, as the name implies. As would be expected, there is some degree of recombination, however, the ion density is still greater because of continuous operation of both supplies. The offset or balance voltage at the output will normally be more consistent than pulse units.

There are also nuclear types of ionisers which are non-electric. They are more frequently used in flammable or explosive environments for applications other than electronics.

Ioniser configurations

Room ionisation

This type of configuration will typically have multiple emitters just below ceiling height, and will rely on some amount of air movement for moving the ions down to bench level. It used to be considered as the most effective way to protect large areas against ESD hazards. However, these days localised workstation ionisation is recommended.

Product sensitivity has become much greater and long decay times of room ionisation cannot be tolerated. With room ionisation, often only a fraction of the ionised area may be ESD sensitive.

Localised ionisers bring protection to the areas where it’s needed and performance is often 10 times faster than the ceiling height system.

Localised ionisation moves with the workstation (or to a new workstation), making it much more flexible with changing production line layouts.

Workstation ionisers

Workstation ionisers come in many shapes and sizes. Probably the best known type is the benchtop ioniser, which is about the size of an iPad mini and about 10 cm deep. They’ve been around for many years and are to this day still in high demand.

Over the years, smaller and lighter units were developed. As workstation space is incredibly valuable, many users prefer the smaller units. Some benchtop ionisers can even be suspended above the bench using a flexible mounting arm. Whatever style is chosen, care should be taken to assure that items normally on the bench would not obstruct the flow of ionised air.

A real benefit of benchtop ionisers is the fact that they can easily be moved between workstations. So if you only have a small EPA (ESD protected area) with a few users and shared workload, you can save money by moving one ioniser between different benches.

Overhead ionisers

Overhead ionisation was established to solve the problem of items on a bench blocking the flow of ionised air. Overhead ionisers have a
unique hanging capability and are suspended about 45 cm to 60 cm above the bench — either by hanging from chains or by using mounting brackets attached to a shelf or bench.

Using this method of ionisation makes it very unlikely for items to block the flow of ionised air to the item being protected. In addition, the downward airflow is more consistent over the entire bench. To ensure that adequate air is delivered, an overhead ioniser with two to four fans should be used. Overhead ionisers are ideal for areas where bench space is limited.

**Forced air ionisers**

Most companies address electrostatic attraction, visual imperfections and contamination issues by dislodging charged dust and debris with compressed air ionisers. They use compressed air or nitrogen to neutralise static charges in localised areas — they are a quick ‘point-and-shoot’ option. They are either handheld or may be mounted in a fixed location.

The main advantage of this type is that the user has the benefit of a strong air blast (20 to 100 psi) to help dislodge contamination, while the ionisation in the air stream eliminates the static attraction of the particles at the same time. Handheld air nozzle types will usually have a trigger or pushbutton to activate the air and ion flow, while the stationary-mounted type is frequently remote controlled with a foot pedal, photo sensor or some other switch closure.

**Making choices**

What type of ioniser you choose depends on a lot of different factors. There is no right or wrong – just different options. A few things you should consider before making any decisions are:

**Type of operation**

Depending on the work your operators are doing, one type/configuration of ioniser may have more benefits than another. For example, if your workspace is limited, an overhead ioniser might be the answer. On the other hand, if there is an issue with debris and dust in your operation, then a compressed air ioniser would be better suited.

**Features required**

Does your ioniser need to be made of stainless steel? Does it need to use zero-volt technology? Do activities need to be monitored and recorded with some sort of software? Make a list of what is an absolute must and where you can compromise.

**Available budget**

Even though this one is the last one in this list, it by no means is the least important factor. Quite to the contrary, it’s generally one of the main considerations when investing in an ioniser. However, it kind of goes hand in hand with the previous two points. So you may have to make compromises on the features, for example, depending on what monies are available.

**Conclusion**

Ionisation is one of the best methods of removing charges from insulators, and as a result plays an important role in controlling ESD. Remember though: an ioniser is a secondary form of defence and does not eliminate the need for standard ESD control devices such as wrist straps, heel grounders and work surface mats. It is only one element in an effective ESD programme.

Also, ionisers require periodic cleaning of emitter pins and the offset voltage must be kept in balance. Otherwise, instead of neutralising charges, if it is producing primarily positive or negative ions, the ioniser will place an electrostatic charge on items that are not grounded.

For more information contact MyKay Tronics,
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How electronics manufacturers can benefit from ESD flooring and grounding

Information from Altico Static Control Solutions.

An electrostatic discharge (ESD) is the sudden micro-lightning bolt of electricity that flows from one charged, conductive surface to another conductive surface.

A typical example is when a person walks across a carpet and experiences a sudden shock when touching a metal doorknob. The intermittent contact between the person’s shoes and the floor results in an exchange of electrons, which generates static charge on the conductive surface of the body. Once this static charge comes into contact with another conductive object, it discharges this static energy to restore the imbalance.

The hidden dangers of ESD
ESD might seem like a harmless occurrence, but in the electronics manufacturing industry, ESD can cause irreparable damage to electronic components. This micro-lightning bolt can burn holes through insulating layers and metal of microcircuits, causing it to malfunction.

Humans cannot detect ESD below 3000 V, but a discharge of as little as 60 V can destroy electrical components. Often the damage incurred is microscopic and goes completely undetected, only to cause a malfunction later (known as latent failure). This makes industries such as electronics manufacturing especially vulnerable to ESD.

According to a recent article published by Desco Industries, entitled ‘Increase your Return on Investment with a Successful ESD Control Programme’, ESD results in 10% of annual revenue loss, which translates into billions; not to mention the exorbitant costs of diagnostic, repair and maintenance of damaged components. In the same vein, companies have seen massive revenue savings, as much as 50%, after implementing a successful ESD control programme.

How ESD flooring prevents ESD damage
ESD flooring contains antistatic chemicals that enable static to dissipate through the floor to a ground point, and in so doing prevents discharges from occurring. For this reason, your first line of defence should be to invest in a robust ESD floor.

Before choosing a floor best suited to your needs, it’s important to 1) identify all ESD-sensitive objects in your facility, 2) install antistatic flooring in dedicated ESD protected areas, and 3) ground all personnel that handles ESD-sensitive objects.

Types of ESD flooring
When deciding on ESD flooring, you can choose between vinyl, epoxy or paint. Let’s take a closer look at your ESD flooring options:

- **Vinyl**: an affordable, antistatic tile or sheet installed as a permanent ESD floor. Vinyl lasts long (10 years+) and there’s no need for regular maintenance. It comes in a variety of decorative styles. Vinyl is pliable and very popular in medical facilities for hygiene purposes. It is not chemical-resistant and therefore not recommended for acidic environments. Vinyl needs to be earthed by laying a conductive carbon or copper-based adhesive to glue down the sheeting.

- **Epoxy**: a durable cement and carbon liquid mixture that is applied in coats onto existing hard-surface floors, such as concrete. Epoxy is impervious to acids and chemicals and it can be applied in layers to adjust the level of resistance as required. As this is a liquid coating, it requires repeat applications, depending on foot traffic. It is expensive compared to vinyl.

- **Paint**: an effective antistatic coating for existing floors. Paint is a more affordable short-term solution and it is highly effective in preventing static build-up. However, it does require repeat applications.

Another important consideration when choosing an ESD floor is its resistance to earth, which indicates how strongly the material will resist the flow of electricity through it (measured in ohms). Remember, the floor needs to be able to conduct static electricity to a ground point, which means it cannot be completely resistant. For electronics manufacturing, the following material types are recommended:

- **Static Dissipative (SD)**: a hard-wearing, homogenous contact sheet or tile floor that is chemically treated to discharge static electricity. The resistance level of the floor does not need to be as low as that of conductive floors. SD must be used in a controlled environment with a relative humidity of more than 40%. Typical areas of use include electronics manufacturing, operating theatres, computer areas, instrument control rooms, repair centres and production.
facilities. This floor offers a resistance to earth of $5 \times 10^6 – 1 \times 10^9 \, \Omega$.

Electrostatic Conductive (EC): contains carbon in order to discharge electricity quickly and efficiently. It is typically used for electronics assembly/repair areas, in highly-sensitive medical equipment and highly sensitive computer equipment. This floor offers a resistance to earth of $5 \times 10^4 – 1 \times 10^6 \, \Omega$.

Once you’ve determined the resistance to earth required in your facility, you can select a floor cover best suited to your needs. It is important to match all ESD equipment to the electrical resistance required by your facility; for example, if your floor is SD, ensure the ESD consumables you purchase adhere to the same resistivity range.

The importance of proper grounding
ESD flooring cannot function without grounding equipment. Every person that works in the ESD protected area is a potential conductor of static electricity and needs to be grounded. Grounding devices provide a continuous path to ground and drain static build-up from the body through the floor to earth before it discharges.

The following consumables are all excellent grounding methods: wristbands and grounding cords, shoe grounders (with the option of heel grounders or removable, conductive insoles and outsoles) and grounding cords.

A chain is only as strong as its weakest link, so ensure to follow these best practices to complement your ESD flooring investment:
- Test all flooring and grounding equipment on a regular basis.
- Train everyone who comes into contact with ESD-sensitive objects.
- Mark ESD protected areas and objects clearly.
- Use only antistatic cleaning detergents in the ESD-protected area.

Partner with a credible provider
Altico Static Control Solutions, a division of Actum Electronics, focuses exclusively on ESD control in the working environment. Altico has partnered with the world’s leading suppliers of static control solutions and has been in operation for more than 20 years.

The company’s product offering includes complete ESD audit and recommendation services, ESD training, ESD consumables, cleaning materials, as well as the complete supply and installation of ESD flooring. It specialises in static control within the telecommunications, electronics manufacturing, medical facilities and industrial mining industries.

For more information contact Altico Static Control Solutions, +27 11 608 3001, sales@actum.co.za
Eight things to consider when planning a flex or rigid-flex board

By John Steinar Johnsen, senior technical advisor, Elmatica.

Every day you can read about the Internet of Things (IoT), API, Industry 4.0 and automation in the news. The future is not something seen in movies (like we did back in the eighties when Back to the Future seemed like Utopia) – we know better. The future is now, and all the new products and possibilities it brings will certainly change how we design printed circuit boards (PCB).

Within this context, it is no surprise that there is a trend towards increasing demand in flex and rigid-flex PCBs. The demand for flex and rigid-flex circuits naturally increases when new and advanced technology requires it. The competitive situation also forces companies to bring these new products to market at an ever-increasing rate.

Many products connected to the IoT and flexible displays demand smaller, lighter and more cost-effective products. In these cases the flexible circuit is a viable option. Flexible PCB material is utilised to meet challenging form-factor requirements, eliminate connectors and improve performance.

One positive aspect with flex and rigid-flex circuits is the reduction in assembly time. For rigid-flex, reduced use or elimination of connectors will also increase reliability. Customers often request a reduction in costs, time spent in assembly, fewer cables and sockets. These requirements are in many cases solved with flex and rigid-flex boards.

By John Steinar Johnsen, senior technical advisor, Elmatica.

A huge variety
The adoption of flexible circuits is growing because it offers a huge variety for seamless interconnections, lighter weight, improved reliability and compressed constructions. With the many manufacturing options and material choices available to prospective flex circuit users, the possibilities and processing choices are numerous.

So why do we talk so much about rigid-flex now? Consider the trends in the news: IoT is not just a buzzword tech-bloggers toss around, it’s a completely new industry where rigid-flex boards fit like French cheese and wine. With the rising possibilities IoT brings, it can come in handy to have some advice on what to consider when planning rigid-flex printed circuits.

Continued on page 26
Continued from page 25

The following are eight things to consider when planning a flex or rigid-flex board:

1. **Weight reduction.** The use of flexible circuits can reduce the weight of an electronic package significantly, due to the fact that they do not have reinforcements that are characteristically higher in density than unfilled polymers.

2. **Decreased assembly time.** Seamless integration of several rigid boards into one rigid-flex, which can be assembled and soldered as one PCB, will save time. Connectors and cables are gone, and reliability is another benefit borne out of this.

3. **Purchasing cost.** The purchasing cost might be higher when purchasing a rigid-flex PCB, where several pieces are connected together with flex, than purchasing each board separately. However, you do not need to buy any connectors or cables between them. And with the increased system reliability you get by not using connectors and cables, the benefit might outrun the cost.

4. **Dynamic flexing or just a bend-and-stay solution.** The very thin polyimide with a very thin copper foil is ideal for dynamic flexing applications. For a bend-and-stay application a thicker or multi-layered flex can be used.

5. **Heat dissipation.** Heat dissipation is normally better on the flat copper tracks you find on a flexible circuit, compared to the round wire surrounded with insulation material. This makes the flexible circuit a preferred choice in areas where resistance to heat is crucial. Stack-up for improved signal integrity is also available when using reference/shielding layers. Flexible circuits are more resistant to heat than printed circuits, such as FR4.

6. **Bending radius.** This depends on the number of layers to be bent, the thickness of the copper and the total thickness, and whether it is dynamic or just a few bends. Specific figures are available for this, shown in Table 1.

7. **Materials.** Most common materials are polyimide (PI), but there are also other materials available such as PET (polyester), PEN (polyethylene naphthalate), LCP (liquid crystal polymer) and others. Polyimide is the one used for products where reliability is a top priority.

   Polyimide has the advantages of excellent flexibility at all temperatures, good electrical properties, good chemical resistance (except hot alkaline solutions), good tear resistance and high tensile strength, but suffers from high moisture absorption of up to 3%, is expensive compared to PEN, and its high-temperature performance is worse if used with an adhesive system.

   Comparatively, PET polyester is low-cost and offers good flexibility and tear resistance, low moisture absorption, good electrical properties and good chemical resistance. Since it is a thermoplastic, it can also be formed. However, it is not suitable for soldering and is unsuitable for extreme cold as it becomes brittle.

8. **Design possibilities.** Finally, and quite simply, designers benefit from an increase in design possibilities when using flexible circuits.

For more information visit https://elmatica.com/contact/

### Table 1. Recommended maximum bending radius for different circuit types.

<table>
<thead>
<tr>
<th>Flex circuit type</th>
<th>Minimum bend radius</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-sided flex</td>
<td>3–6 times circuit thickness</td>
</tr>
<tr>
<td>Double-sided flex</td>
<td>7–10 times circuit thickness</td>
</tr>
<tr>
<td>Multilayer flex</td>
<td>10–15 times circuit thickness (or more)</td>
</tr>
<tr>
<td>Dynamic flex applications (only single-sided recommended)</td>
<td>20–40 times circuit thickness</td>
</tr>
</tbody>
</table>

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**Figure:**

*Membraneswitch Co. Ltd*

**Contact:**

Tel: +27 11 887 1227  
info@membraneswitch.co.za
3D printer for diverse applications

RS Components recently launched its new easy-to-use 3D printer, the RS Pro iTX. The additive-manufacturing machine targets a wide range of users in manufacturing and many other commercial and business applications, as well as being ideal for educational purposes and at home for anyone who wants to design and build things quickly and at low cost.

A key element of the machine is its upgradability: the high-quality machined parts and circuit boards are designed to be easy to replace and/or upgrade in a matter of minutes. All RS Pro 3D printers are open-source designed, which means they can easily be customised by advanced users and enthusiasts alike.

In particular, the iTX’s RS Pro VariBLOCK head unit offers future-proofing, as it is easily interchangeable and upgradable to other extruder head systems, allowing the machine to use various other materials as they become available.

For more information contact RS Components, +27 11 691 9300, sales.za@rs-components.com.

Screen printer with fully automatic changeover

The US-2000XF was developed with ESE’s strong R&D capabilities and is an upgrade from the US-2000FA which was developed through cooperation between Samsung Electronics and ESE in 2012. The US-2000XF is a uniquely functional printer which facilitates automatic stencil change, paperless stencil cleaner, auto solder paste dispenser, solder grabber squeegee (or a closed squeegee tool), traceable ESE standard format of printer parameter data (MES), SPI closed loop and software managed by barcodes.

The intelligent machine fulfils the requirements of a smart production line, based on two-way communication between the manager and the production line, and achieves very high productivity, maximises managing efficiency and assists in the implementation of Industry 4.0 and smart factory concepts.

For more information contact Quamba Technologies, +27 83 417 4294, igmar@quamba.co.za.

SMT screen printer

GKG’s G-Star system is capable of handling M-size boards and achieves precision printing down to 01005 component size. Through full contact with the stencil, its improved cleaning system ensures that any remaining paste in the mesh will be eliminated before printing. The 2D paste inspection function is able to detect insufficient paste, bridging and other defects. G-Star is also equipped with top and motorised side clamp, thereby ensuring optimised printing quality.

The machine supports a stencil frame size of between 470 mm x 370 mm and 737 mm x 737 mm (L x W), and printed circuit boards measuring 50 mm x 50 mm up to 400 mm and 340 mm (L x W) with thicknesses of 0.4 mm to 6 mm. An optional automatic thickness adjustment system is available, which reduces the maximum printed circuit board width to 310 mm.

For more information contact Techmet, +27 11 824 1427, info@techmet.co.za.

Printer for professional 3D printing

The Ultimaker S5 3D printer targets the professional end of the market across a number of applications, and meets engineering requirements from the creation of prototypes to full end-use, industrial-grade components and parts. Headline features of the Ultimaker S5 include continuous operation, large build volume, advanced connectivity, dual extrusion, an open filament system and the ability to print with a wide range of materials, including third-party filaments.

The Ultimaker S5 brings together the Ultimaker 360-degree holistic approach with the integration of hardware, software and materials. This results in an easy-to-use and highly reliable manufacturing solution with full settings alignment to meet the needs of engineers, designers or specialists working in many different fields, from architecture to medical, as well as use in universities and other academic institutions.

Features include the printer’s build volume of 330 x 240 x 300mm, which makes it suitable for printing larger objects, and the machine’s active multi-point bed-levelling system.

For more information contact RS Components, +27 11 691 9300, sales.za@rs-components.com.
SMT screen printer with automatic dispense unit

The SP710 SMT screen printer from Speedprint is equipped with an optional automatic dispense unit (ADu), which can be fitted with any combination of paste and glue module. The machine utilises advanced drive control technology with 1 micron resolution linear encoders on all axes, together with a suite of intuitive software that enables total control of the printing process.

The printer is fully equipped, as standard, with many features such as automatic rail width adjust, auto stencil loading and eject, and an under-stencil cleaner.

The vision system utilises a unique twin roving camera 'look down, look down' method of automatic vision alignment. This gives users the capability of checking for solder paste presence on the stencil before printing.

Selective auto-paste inspection comes as standard and is fully programmable. The top camera is used to check that adequate solder paste is present on the stencil, and will alert the operator or instruct the automatic paste dispenser to deposit paste, if fitted as an option.

For more information contact Truth Electronic Manufacturing, +27 31 822 8555, terence@truthelectronics.co.za.

High-speed surface mounter

Yamaha Motor IM Europe’s Z:TA-R YSM40R surface mounter boasts a placement speed of 200 000 components per hour, and was said upon its launch to be the fastest in the industry on a 1 metre wide footprint.

While providing the functionality of a rotary head, the newly developed RS (Revolutionary Speed) head is also capable of simultaneous pickup. Placement accuracy and mounting reliability are improved due to the adoption of a new high-rigidity base frame, new lightweight X beam, and a high-speed side view camera that checks the status of components in real time immediately after pickup, and before and after mounting. All of these improvements enable the Z:TA-R YSM40R to be compatible with extremely small components down to 0201 (0,25 x 0,125 mm).

Machine stoppages are minimised thanks to a system that performs nozzle self-diagnosis and self-restoration without interrupting production.

For more information contact Truth Electronic Manufacturing, +27 31 822 8555, terence@truthelectronics.co.za.

Flexible placement platform

Fuji’s AIMEX III component placement system is designed for component flexibility, printed circuit board flexibility and production flexibility. It can support large panels up to 774 (L) x 710 (W) mm in size, and simultaneous production of two different products is possible using a dual-conveyor configuration machine. The AIMEX III also enables various production methods and supports a wide range of panel sizes.

The machine offers dynamic exchange during production to the best tool for the job. Borderless production is made possible using the DynaHead to dynamically exchange between 12-nozzle, 4-nozzle and single-nozzle tools. Changeover time can be reduced by performing MFU batch changeover and by the machine having up to 130 slots for feeders, which makes it possible to load all of the required parts. Automatic data creation and on-machine editing using a large touchscreen panel work to support ramping up new production and quick response to sudden changes to programs.

For more information contact Testerion, +27 11 704 3020, info@testerion.co.za.

Hybrid component mounter

Hanwha’s SM485P is a multi-functional hybrid mounter that can place SMD components and insert THT components. Components are placed with four precision heads, after simultaneous recognition using the S-Fix camera.

The pin position of an insertion component is accurately measured using a 2D laser. The backlighting system makes it possible to recognise components that cannot be recognised with general lighting. The placed component height inspection system prevents placement errors by measuring the component height after placing. An optional lead scanner can be fitted to inspect the component for bent leads.

The SM485P can place components from 0201 chips up to 55 mm square components and can also handle long connectors up to 150 mm (L) x 25 mm (W), with a maximum component height of 32 mm (option for 42 mm height). Standard PCB size is 460 mm (L) x 400 mm (W) with an option for 610 mm (L) x 460 mm (W).

For more information contact Quamba Technologies, +27 83 417 4294, igmar@quamba.co.za.
Pick-and-place machine for high-mix applications

Yamaha Motor’s YSM20W, a member of the Z:LEX series, provides flexibility and efficiency in various forms of production without the need for replacing the head thanks to the ‘1 head solution’ concept. This model is a wide-body version of the Z:LEX YSM20 universal modular, and is capable of handling extra-large PCBs for automotive, industrial, medical, power devices, and LED lighting etc. with its significantly increased adaptability to PCB sizes and weight.

Ideal for high-mix applications, the YSM20’s versatility comes thanks to the HM high-speed multi-purpose head using 10 nozzles in-line, supporting from ultra-tiny chips of 03015 (mm) to large components of 45 x 100 mm and height of 15 mm. The FM flexible multi-purpose head with 5 nozzles in-line supports force control and handles a broad spectrum of components from ultra-tiny chips of 03015 (mm) to ultra-large components of 55 x 100 mm and tall components with heights up to 28 mm.

For more information contact Truth Electronic Manufacturing, +27 31 822 8555, terence@truthelectronics.co.za.

Vapour phase soldering system

The main target areas of application for Asscon’s VP310 vapour phase soldering system are labs, and prototype and small-series manufacturing operations. Due to the compact dimensions and the fact that no stationary supply systems are needed for operation, it makes for trouble-free application at many different sites – a 240 V power supply is all that is needed.

The system is highly flexible in terms of both the adjustment of soldering parameters of the board assembly, and control of the process. Each individual step can be initiated manually when needed, such as board loading, modification of temperature gradient, activation of vapour generation and the start of the soldering procedure.

The machine’s electronic control system, with its precise sensors for the heating element and the temperatures of the liquid and the vapour, ensures fully secure operation. Visual process control is made possible by an inspection window.

For more information contact MyKay Tronics, +27 11 869 0049, mykay@iafrica.com.

Entry-level selective soldering system

SEHO Systems introduced the new StartSelective, a ‘plug-and-produce’ selective soldering system for those just entering into automated soldering. With a footprint of only 2.5 m², it provides quality and reproducibility of soldering results for assemblies up to 508 x 508 mm.

All process-relevant components such as the micro drop jet fluxer, preheat system and maintenance-free electromagnetic soldering unit have successfully been in use for years in other soldering systems from SEHO. While all process steps are fully automated and monitored, loading and unloading of assemblies is done manually.

As with the high-volume selective soldering systems from SEHO, the StartSelective is equipped with a complete package for automated process control. The spray jet control in the fluxing area, automatic wave height control and solder level monitoring with automated solder wire supply are only some of the monitoring functions.

For more information contact Quamba Technologies, +27 83 417 4294, igmar@quamba.co.za.

Reflow oven for high-volume production

Designed around the requirements of large EMS/high-volume automotive customers, BTU International’s Pyramax Vacuum reflow oven is configured with ten zones of closed-loop convection heating and a maximum production width of 45.72 cm.

Nitrogen atmosphere capable, the oven offers a maximum process temperature of 350°C. It features integrated controls with BTU’s proprietary Wincon Windows-based control system and full integration with factory MES/Industry 4.0 including vacuum parameters. Additional features include automatic sequencing, programmable control of vacuum level and hold time, and pass-through mode for non-vacuum operation.

According to BTU, it is easy for existing Pyramax customers to transfer their process to the new oven.

For more information contact MyKay Tronics, +27 11 869 0049, mykay@iafrica.com.
3D solder paste inspection system

Koh Young's KY8030-2 is a full 3D solder paste inspection machine that makes use of 3D shadow-free Moiré technology and dual projection to solve the problem of shadowing. It also applies multi-frequency technology to perform real-time measurement and compensation of board warp, with respect to the ideal plane.

Real-time, online, high-quality PCB images with measurement data are provided through the user-friendly Renewal GUI, which features an optimised display for the user with smart menu groupings. Closed-loop, real-time communication of printing process monitoring data is performed between the KY8030-2 and screen printers, as well as with pick-and-place machines. The system supports pick-and-place process optimisation by controlling panels containing defects.

For more information contact Zetech, +27 11 609 1244, orllain@icon.co.za.

Inline 3D AOI system

The ISO-Spector M1A from Mek (Marantz Electronics) features advanced hardware specifications and a convenient, fast automatic programming method for achieving production-ready inspection results with very short cycle times.

The machine has a field of view of 69 x 69 mm and a 25 megapixel camera with advanced lens optics. Multiple Moiré fringe projections enable high-precision, shadow-free measurement of heights up to 25 mm as well as four fully programmable side view high-resolution cameras able to actively inspect J-leads and other devices invisible to top-side imagers.

The programming of the ISO-Spector M1A is easy and programmer-independent.

The artificial intelligence (AI) reduces the human element involved in the programming, meaning that the inspection results are the same whether programmed by a beginner or by an expert. The AI learns the production process values of assembled and reflowed PCBs and then recognises defects based on hundreds of preset parameters.

For more information contact Zetech, +27 11 609 1244, orllain@icon.co.za.

MRS-enabled AOI machine

The SQ3000-DD 3D automated optical inspection (AOI) system from CyberOptics features ultra-high-resolution, multiple-reflection suppression (MRS) sensors.

The dual lane, dual sensor system maximises flexibility to cater to varying PCB widths. This design provides the ability to inspect high-volume assemblies, the convenience of inspecting different assemblies and board sizes simultaneously on different lanes, or even switching from dual lane to single lane mode to inspect very large boards.

The new MRS sensor option provides an even finer resolution than the standard, delivering superior inspection performance ideally suited for 0201 metric and microelectronics applications where an even greater degree of accuracy and inspection reliability is critical. The unique architecture of both MRS sensor options simultaneously captures and transmits multiple images in parallel, while highly sophisticated 3D fusing algorithms merge the images together, delivering microscopic image quality at production speed.

For more information contact Truth Electronic Manufacturing, +27 31 822 8555, terence@trueelectronics.co.za.

3D automatic optical solder joint inspector

The S3088 ultra gold 3D AOI system by Viscom is used successfully for the inspection of components, assemblies and soldered joints around the globe, and has established itself as a premium system with optimal inspection depth and high speed.

The system’s performance is enabled by its innovative camera technology: the high-speed Viscom XMplus camera module produces easy-to-classify height and position values. The access to exact measuring results helps users to create inspection programs. The quality of the data is crucial for accurate, reliable measurement.

The S3088 ultra gold measures multiple height profiles at the solder meniscus with a high resolution of 10 µm. Its laterally angled cameras ensure a panoramic view of components and their solder joints from all eight directions. Realistically accurate inspection images, combined with highly reliable verification software, ensure minimal pseudo-errors.

For more information contact Techmet, +27 11 824 1427, info@techmet.co.za.
Yamaha Motor’s YSi-SP is a high-speed 3D solder paste inspection machine that enables high-speed, high-accuracy inspections based on the company’s ‘1-head solution’ concept for using a single type of head to handle various inspections.

The YSi-SP is Yamaha Motor’s first solder paste inspection (SPI) machine, and employs a proprietary algorithm combining 2D- and 3D-based measurements, and image resolution switch-over utilising super-high resolution technology.

Tapping into the company’s expertise as a comprehensive manufacturer of a full lineup of surface mounting machinery, the YSi-SP can swiftly coordinate with other Yamaha machines, such as performing automatic setup changes, automatically adjusting solder misalignment, and automatically converting adhesive inspection data from the dispenser.

While offering Statistical Process Control (SPC) to perform a wide range of statistical processing, the YSi-SP can also be equipped with various optional features, including bonding inspection and foreign matter inspection.

For more information contact Truth Electronic Manufacturing, +27 31 822 8555, terence@truthelectronics.co.za.

The SQ3000 is an innovative 3D automated optical inspection (AOI) system from Cyber Optics that earned three awards during 2015, the year of its introduction, including a Global Technology Award presented at productronica.

The system maximises return on investment and line utilisation with multi-view 3D sensors that capture and transmit data simultaneously and in parallel, accelerating 3D inspection speed versus competing technology. The proprietary Multi-Reflection Suppression (MRS) technology combined with the highly sophisticated 3D fusing algorithms offers microscopic image quality at production speeds. An easy-to-use, intuitive interface with touch control facilitates minimal training and operator interaction.

The SQ3000 supports board sizes up to 510 x 510 mm, achieves sub-10 micron resolution and inspection speed of 40 cm²/sec.

For more information contact Truth Electronic Manufacturing, +27 31 822 8555, terence@truthelectronics.co.za.

The Zenith 3D automated optical inspection (AOI) machine from Koh Young delivers advanced SMT process control based on full 3D measurement and inspection by visualising, identifying and eliminating the root cause of defects.

The system measures the true profilometric shape of components, solder joints, patterns and even foreign materials on assembled printed circuit boards (PCB), overcoming the shortcomings and vulnerabilities of 2D AOI. Using Koh Young’s patented multi-frequency height measurement technology, the heights of various components can be accurately measured.

Programming is fast and intuitive through inspection condition settings, enabling the removal of uncertainties in production control through inspection result quantification. Condition settings and modifications can easily be made, with condition recommendation by component and component management using JOB manager software.

For more information contact Zetech, +27 11 609 1244, orliain@icon.co.za.

This mechanical bed-of-nails test fixture, according to its maker Test Fixture Technologies, is the most widely used solution for printed circuit board (PCB) testing in South Africa. It is built with a sturdy aluminium enclosure whose 350 x 300 mm footprint makes it especially suitable for benchtop use.

The fixture uses a sophisticated lifting mechanism to precisely raise a platen containing the spring-loaded test probes from below the unit under test (UUT). Unique tapered tooling pins precisely position the UUT and, together with linear guide pins and bushes, ensure highly accurate, repeatable and reliable contacting of test points down to 50 mil (1.27 mm) pitch and probe counts up to 300.

Experienced engineers carefully customise the design of each and every fixture specifically for the board that is being tested. Parts are CNC machined to perfectly support the board from both sides, thus ensuring that it does not experience any mechanical stresses during testing.

Interfacing of power and data is usually done through panel-mount connectors on the rear face of the enclosure.

For more information contact Test Fixture Technologies, +27 11 791 5879, info@testfixtures.co.za.
**Soldering station for heavy-duty production**

PACE Worldwide’s ADS200 is a high-power, low-cost production soldering station featuring the TD-200 Cool-Touch handpiece, with its sleek and ergonomic aluminium handle designed to stay cool and comfortable during continuous production soldering. Blue Series tip-heater cartridges integrate a high-accuracy sensor with a robust heater, delivering up to 120 Watts of power. Unlike curie point systems, any temperature can be selected (from 193°C to 454°C) without changing the cartridge. The quick-change cartridges can be quickly swapped while hot, and achieve set temperatures instantly, yet they are cheaper than most other cartridge style or curie point tips. PACE’s AccuDrive temperature control technology delivers enhanced thermal performance and highly accurate temperatures, without the need to change tip cartridges or calibrate. Its advanced electronics provide instantaneous load sensing and on-demand power to quickly reflow solder joints at the lowest, safest temperature required, regardless of the mass of the application.

For more information contact MyKay Tronics, +27 11 869 0049, mykay@iafrica.com.

**Automatic BGA rework station**

The ZM-R6823 BGA rework system is suitable for normal SMD (BGA, QFP, etc.) and micro-SMD component repair, supporting 08 small-pitch LED beads and ICs down to 0,5 mm x 0,5 mm in size. The station has three independent heating areas – the first and second one being hot-air, and the third one a quartz heater. It is equipped with an air distribution system from a pressurised tank, allowing the user to connect the station to a nitrogen cylinder, which gives better results by minimising contamination of the solder, as well as the effects of surface tension and voiding. A split vision system with high magnification, adjustable freely in the XY plane, allows precise positioning of mounted components on the board, using a prism system of integrated optics. This allows the bottom of the system and its position to be previewed, relative to the board.

For more information contact Techmet, +27 11 824 1427, info@techmet.co.za.

**Ultrasonic stencil cleaning system**

Aqueous Technologies’ StencilWasher LDO utilises precisely controlled sound waves to remove un-reflowed solder paste from stencils, screens and misprints.

At 40 kHz, the ultrasonic energy is gentle enough not to damage delicate parts yet is highly effective in the removal of dried pastes on fine-pitch stencils. StencilWasher LDO is capable of cleaning stencils or misprints up to 73,66 x 73,66 cm in size (full immersion).

The system is equipped with many standard features, including programmable digital wash cycle time, safe 31 Watts per litre power ratio, wash solution heating system with programmable digital temperature controller, wash solution filtration system with stainless steel housing, rinse water filtration system with stainless steel housing, and handheld rinse wand and airknife.

StencilWasher LDO is designed to remove all solder paste types and uncured adhesives in cycle times averaging less than five minutes.

For more information contact MyKay Tronics, +27 11 869 0049, mykay@iafrica.com.

**Solder recovery system**

The EVS 500LF solder recovery system has been designed to be the same size as a printer and is aimed at multiple markets, such as the customer with one lead wave and one lead-free wave, or those who use nitrogen and want to reduce their nitrogen usage. The machine is also relevant for the customer with selective solder pots who only removes small amounts of dross every hour, or with multiple waves where one EVS 500LF is connected to each wave to ensure that the maximum recovery is maintained throughout the life of the wave solder system. Users can quickly recover up to 80% of pure solder with a higher return on investment from the waste dross.

The EVS 500LF is available in lead and lead-free models.

For more information contact Truth Electronic Manufacturing, +27 31 822 8555, terence@truthelectronics.co.za.
Tabletop ultrasonic cleaner

The Sawa 5000GUS from Seika applies ultrasonic vibration directly to the stencil, providing powerful cleaning capability. The system boasts the ability to clean apertures as effectively as fully automatic stencil cleaners that can cost three times as much; stencils can be cleaned in just a few minutes.

The machine removes solder balls from stencil apertures after normal wipe cleaning. A powerful handheld ultrasonic cleaning head is manually applied over apertures with IPA, water or a non-VOC solvent. During application of the cleaning head, the stencil is laid on a foam pad soaked with solvent contained within a large tray (81.3 x 81.3 cm). The foam is utilised to capture solder balls dislodged by the cleaning head.

For more information contact Laser Stencil Technology, +27 11 793 1311, don@lstec.co.za.

Parallel or sequential cleaning of two stencils

The new kolb AQUBE systems are next-generation cleaning systems that are highly efficient, compact, easy to handle and maintain, pre-equipped for extended water management and ready for the smart factory.

The AQUBE MV8 sTWIN is a high-end, dual-chamber PowerSpray system for the thorough parallel or sequential cleaning of two stencils, which provides excellent cleaning results in a short cycle time. It cleans two stencils up to 900 x 800 mm, making it especially suitable for large-scale manufacturing. While common systems with double capacity have to wait until two stencils are ready for cleaning or until the running cleaning cycle has ended, this system can start cleaning one stencil immediately and a second one later (sequential) or in parallel.

The machine features two full-fledged process chambers for parallel or sequential cleaning, and a two-tank system with four separate circuits.

For more information contact Allan McKinnon & Associates, +27 11 704 3020, info@testerion.co.za.

Cleaning system for screens and stencils

The kolb PSE economy line is a quality series of cleaning systems which focuses on all essential criteria for a qualified cleaning process, and therefore represents attractive purchase prices.

The systems of the kolb PSE economy series offer extremely compact machines with PowerSpray technology for the cleaning of screens, stencils and misprints from SMD paste, SMD adhesive, flux, oil, dust, grease, etc. The systems are applicable for small and medium sized companies and smaller quantities, as well as for mass production plants where a cleaning system is placed at each printer.

The range comes in several configurations depending on what needs to be cleaned, and offering different sized process chambers and cycle times.

For more information contact Allan McKinnon & Associates, +27 11 704 3020, info@testerion.co.za.

Automatic SMT cleaning machine

The HyperSWASH from pbt Works is a fully automatic cleaning machine featuring a spray-in-air, closed-loop, zero-drain system. Available in multiple platform configurations, it is ideally suited for cleaning high volumes of electronics assemblies.

Applications for HyperSWASH include defluxing to remove all kinds of solder residues; cleaning micromechanical components; removing contamination from handling and board manufacturing; cleaning densely populated electronics assemblies with low-standoff components such as BGA, CSP, BTC, QFN and MELF; cleaning of power electronics; and cleaning before conformal coating and wire bonding.

Furthermore, the system is ideal for second-side misprints on complex assemblies and for electronics assemblies requiring extra short process time.

For more information contact Electronic Industry Supplies, +27 11 726 6758, hreispty@iafrica.com.
Ionising guns and blowers

Air ionisation eliminates all electrostatic charge sources from an ESD protected area (EPA) and prevents contaminants from being attracted to surfaces. In areas such as cleanrooms, air ionisation can neutralise static charges on insulative materials that cannot be grounded.

Ionisation guns are ideal for electronics assembly, medical device assembly, packaging, semiconductor and disk drive manufacturing applications. Ionisers provide high blow-off force for rapid static charge decay. A status light indicates the active presence of ionisation, helping the user to ensure their ionisation equipment matches the range of resistivity prescribed by the relevant industry and application.

For more information contact Altico Static Control Solutions, +27 11 608 3001, sales@actum.co.za.

3D camera module for standalone AOI system

Goepel Electronic’s standalone AOI system ‘Basic Line’ can now be equipped with a new 3D camera module, allowing for cost-effective 3D measurement and 2D inspection even for SMD manufacturers with small batch sizes.

The 3D·ViewZ camera module combines 3D measurement technology based on structured light with angled-view inspection from 360 possible angles, allowing maximum fault detection even in difficult-to-view component situations. The Basic Line 3D is an AOI system for manual and flexible loading of different circuit boards, making it particularly suitable for electronics manufacturers in the high-mix/low-volume sector.

Due to the flexible configuration variants (angled-view, rotary drive, PCB size) it can be specifically adapted to the respective requirements. A special added value of the system is the possibility of using it for 3D solder paste inspection.

The MagicClick software tool provides significant time savings in the creation of AOI test programs.

For more information contact MyKay Tronics, +27 11 869 0049, mykay@iafrica.com.

Precision conformal coating jet

The SC-400 PreciseCoat jet from Nordson Asymtek is an optimal applicator for applying coating materials to highly selective areas, increasing throughput and yield. This jet solution is designed for coating both small substrates and those with high component density, and is ideal for applications with tight tolerances between coated and uncoated areas.

The SC-400 can be used individually or along with a different applicator to achieve greater agility and coating selectivity. The PreciseCoat jet reaches locations not accessible by other applicators by using a needle design with jetting action and fast pulse-width modulated control.

Small volumes and better material control deliver line widths down to 1,2 mm wide. The need for masking is eliminated because the flow is closely controlled. Film thicknesses of 15 micrometres are achievable when using solvent-based materials.

The jet is available for use on the Select Coat conformal coating system.

For more information contact Techmet, +27 11 824 1427, info@techmet.co.za.

PCB tab cutting tool

Ebsomat’s N100 PCB Nibbler for tab routed printed circuit cards is ideal for low- to medium-volume production or as backup to expensive capital equipment. Tabs are cleanly cut by placing them under the blade and stepping on the foot pedal – all that is needed is 80 to 100 psi factory air.

This tool is available with a standard support die or sharp blade die. The material from the tab is stored inside a compartment of the tool and can be easily removed at the operator’s convenience, by simply lifting the clear front cover of the housing and discarding the scrap. No secondary deburring operation is needed.

Blades are available for a variety of tab sizes and routing thicknesses. Standard thicknesses are 1,5 mm, 2,375 mm and 3 mm. The standard blade will cut tabs of 4,8 mm, while for longer tabs the 8,22 mm blade can be used. A double edged blade is available for applications where it is necessary to cut in both directions.

For more information contact MyKay Tronics, +27 11 869 0049, mykay@iafrica.com.
Antistatic tester

The SmartLog Pro is a static testing unit that verifies the functionality of an operator’s wrist strap and footwear, logs the test results, and controls access to an ESD protected area. It can generate automated reports that can be emailed to track short-term and long-term corrective actions.

The five-inch colour touchscreen provides an intuitive user interface for easy test operation and a clear indication of test results. The operator average test time is 2 seconds. Internal Flash memory allows operators to continue using the tester even if a network failure occurs. All test transactions would download to the database once the network connection is restored.

Altico’s range of testing units includes static locators, static field meters, surface resistivity meters, concentric ring probe, calibration monitors, chair checkers, and ioniser analysers. Altico offers manual testing units that are cheaper than Smartlog Pro, depending on budget and the level of ESD protection required.

For more information contact Altico Static Control Solutions, +27 11 608 3001, sales@actum.co.za.

Adhesive label sensor

The Label-Eye from Tri-Tronics is a special-purpose gap or slot sensor optimised to sense adhesive labels adhering to a roll of backing paper. The web of labels is directed from a roll across a peeler plate or around a sharp edge. As the web passes around the sharp edge of the peeler plate, the adhesive label peels from the backing material.

The function of the Label-Eye is to look through the backing paper to detect the gap between the labels and signal the labelling machine to stop the dispensing mechanism before the label is completely dislodged from the backing material. With the next ‘up’ label protruding off the end of the peeler plate, it is now perfectly positioned to be applied to the next product as it passes by on a conveyor.

Setup is accomplished by the single push of a button, and the device supports both opaque and translucent labels.

For more information contact Vepac Electronics, +27 11 454 8053, sales@vepac.co.za.

Dissipative floor finish

Statguard floor finish can form an important component of footwear-flooring systems in ESD protected areas. It is used to convert non-ESD floors to create a dissipative (less than 1 x 109 Ω) and low tribocharging (less than 100 V) surface, or to protect and enhance an existing ESD permanent flooring (vinyl, VCT, rubber, etc.)

The cross-linked polymer coating meets or exceeds ANSI/ESD S20.20 minimum requirements for use as a primary grounding method and for charge generation of the footwear-flooring systems. The coating resists abrasion and scuffing in order to maintain ESD performance and appearance.

Statguard floor finish is available in standard and low-VOC formulations, and is packaged in bag-in-boxes and lot coded for quality control.

For more information contact MyKay Tronics, +27 11 869 0049, mykay@iafrica.com

Adaptable packing bench

The Treston TPB packing bench is a well-thought-out, safe and easy all-in-one solution. It is a stepless, height-adjustable workbench (between 650 and 900 mm), and can be supplied with an above-workbench add-on to achieve 1080 to 1550 mm.

Designed with ergonomics in mind, the bench ensures that all the packaging materials are within easy reach. This results in increased efficiency, accuracy, safety and comfort, and facilitates the change of shift for packing staff. These features make it suitable for use in dispatch departments, web shops and logistics centres.

The TPB standard package includes 2 roll holders, an upper shelf, divider hoops, a perforated panel and an auxiliary shelf. It provides plenty of room to work, and space for packaging supplies and materials. The bench can adapt and grow according to needs, through the availability of more than 50 accessories, including a tape dispenser, a label dispenser and a tool holder box.

For more information contact Giuseppe Schito, IPD Electronics, +27 71 355 7208, giuseppe@ipdelectronics.com.
Ergonomic workbench

The ergonomic Concept workbench from Treston can be flexibly adapted to meet the needs of industrial working environments. Multiple sizes and combinations are available in this product family.

The height can be adjusted electrically (electric motor height adjustment) or manually (with a hand crank or an Allen key). The Concept workbench model has a wide range of accessories and add-ons to make it easy to customise, and is especially suitable for use in packing environments and by assembly and quality assurance functions in industry.

The workbench is highly stable, with a steel frame achieving a maximum load capacity of 500 kg. The frame, tabletop and accessories are available with ESD protection.

For more information contact Giuseppe Schito, IPD Electronics, +27 71 355 7208, giuseppe@ipdelectronics.com.

Dissipative bench mats

Altico dissipative bench mats are made from durable vinyl and consist of two layers: a 2 mm dissipative top layer, and a 2 mm conductive bottom layer for optimal ESD protection. These mats are solder, heat and chemical resistant, and feature an anti-friction material and embossed surface to prevent the mat from sliding. The mat can be linked to a grounding device to eliminate any static discharges on the work surface.

These mats are comfortable work surfaces and suitable for free laying. Bench mats need to adhere to the overall resistivity requirements and must be accompanied by grounding consumables, such as wrist straps and grounding cords, and an ESD floor or mat for ultimate ESD protection.

For more information contact Altico Static Control Solutions, +27 11 608 3001, sales@actum.co.za.

ESD grounding wristbands

Altico Static Control Solutions offers slimline ergo wristbands for the effective grounding of staff who handle ESD-sensitive components. The wrist straps are made from jewellery-grade, expandable stainless steel for high durability, with bands that are insulated with a triple-layer, oven-baked coating.

All models of metal bands come with patented ‘X-tenders’ – inter- connectable plastic links which enable the user to adjust or expand the strap to any wrist size by using one or more of the five pieces provided. This renders the metal band extremely comfortable and eliminates the need to stock up on different sizes.

The wristbands are grounded through a 3 mm stud with 360° swivel, and are adjustable from 130 mm to 170 mm using one or more of the five 10 mm nylon expansion links. They meet or exceed IEC 61340-5-1, MIL HDBK 263B, MIL STD 1686B and ANSI/ESD-S1.1-2006 standards.

For more information contact Altico Static Control Solutions, +27 11 608 3001, sales@actum.co.za.

Highly durable labels

Laser Stencil Technology’s Superlabels range includes a wide variety of high-temperature, coated Kapton/Polyimide materials for barcode and QR code ID tracking labels that resist the harsh PCB manufacturing processes with ESD-safe and flame-retardant options.

The high-durability labels’ coatings resist abrasion, do not soften or yellow, and withstand the harshest, highly active fluxes. The aggressive, pressure sensitive adhesives remain firmly affixed to PCBs and components through wave solder, reflow and high-pressure washes. The performance has been tested and approved by leading flux makers including Alpha Metals and Kestor, and cleaner makers including Kyzen and Zestron.

High-resolution, high-gloss labels are available from 5 x 5 mm to 80 x 80 mm, and are designed specifically for 600 dpi thermal transfer printing. The large ink contact area and adhesion produces more uniform 2D barcode cells with sharper edges. The coatings provide high whiteness values for increased contrasts and in less than ideal lighting conditions.

For more information contact Laser Stencil Technology, +27 11 793 1318, stencils@Lstec.co.za.
Storage boxes for ESD-sensitive components

Cortronic storage containers are ideal for safe transportation of ESD-sensitive components. A soft, dissipative foam lining provides safe padding and removes static. These containers are made from cardboard dipped in carbon and come flat-packed to enable assembly on-site.

Altico has a wide range of storage containers available through its partner suppliers, namely Cortronic, UTZ and Hans Kolb. These containers can accommodate a variety of different sized components for safe transportation.

For more information contact Altico Static Control Solutions, +27 11 608 3001, sales@actum.co.za.

ESD shielding bags

Altico shielding bags have been designed to protect intricate electronic components from electrostatic discharge (ESD) damage. Packaging comes in different colours, depending on the type of components being transported, and they are clearly marked with the ESD protection label to indicate that operators need to practice caution when handling these objects.

The ESD packaging comes in the following ranges:

- Antistatic, made from polyethylene low-charge material. Usually comes in a clear, pink-tinted colour and ideal for non-sensitive ESD items.
- Conductive packaging made from polyethylene and carbon. Ideal for ESD-sensitive objects and usually black-tinted.
- Shielding, for highly sensitive components that are especially vulnerable to ESD. Comes in vacuum-deposited aluminium with layers of polyester and polyethylene film. Appearance is metalised semi-transparent.

Altico offers ESD packaging in rolls that can be custom cut and sealed into different sizes as required. Desiccant bags are also available to remove moisture within packaging during long-term storage.

For more information contact Altico Static Control Solutions, +27 11 608 3001, sales@actum.co.za.

Reel-holder trolley

Treston’s RRT reel-holder trolley is a sturdy but lightweight trolley that is compatible with SMD component reel holders. The trolley, which comes with ESD protection, has four shelves for galvanised reel racks (the racks must be ordered separately) and can hold up to 360 SMD reels.

All of the trolley’s parts are made of powder-coated (RAL 7035) steel, with round, 25 mm diameter end frames. Its four sturdy shelves can handle a maximum load of 50 kg each, and the entire construction can handle up to 200 kg. It measures 1780 mm in height and comes with four swivel castors and ESD protection.

For more information contact Giuseppe Schito, IPD Electronics, +27 71 355 7208, giuseppe@ipdelectronics.com.

Stencil system with advanced tensioning

DEK’s VectorGuard stencil technology employs a unique, patented tension system offering significant advantages over traditional, mesh-mounted systems. VectorGuard is not air pressure dependent, meaning that tensioning is simple and automatic, independent of traditional pneumatic assistance processes.

Mounting the foil in the VectorGuard frame system takes only a matter of seconds – requiring little training or physical effort. Easy to set up and compatible with virtually any modern platform, VectorGuard eliminates the need for complex alignment procedures. Foil tensioning is both accurate and automatic, and the system is compatible with a wide range of VectorGuard foil technologies, from lead-free to adhesive printing.

As a lightweight and compact frameless stencil technology, VectorGuard offers manufacturers enhanced storage convenience. In fact, by storing foils in their designated protective cassettes, storage space can be reduced by up to 75% compared to conventional stencils. DEK also supplies a range of storage cabinets providing instant access to the required foil.

For more information contact Laser Stencil Technology, +27 11 793 1311, don@Lstec.co.za.
**Stencil stretching frame**

The ZelFlex patented stretching system using compressed air enables perfect tensioning all across the working area. The air source is disconnected after placing the stencil onto the frame. Easy, fast and repetitive changing of stencils is provided by innovative perforation.

One of the greatest advantages of ZelFlex pneumatic frames is constant tensioning, and therefore consistent and reliable print quality over time. Using different pressure levels, various thicknesses of stencil can be used. ZelFlex frames also ensure lower production costs as only one frame is required per line and can be used for multiple projects. No special docking station is required to change the stencil.

The frame can be placed into a printer and used for at least 24 hours without the need for air reconnection. Production quality can thus be improved by excluding the risk of long-term tension level decay which is presented by glued frames.

For more information contact Laser Stencil Technology, +27 11 793 1311, don@Lstec.co.za.

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**No-clean solder paste**

Electrical reliability is a must-have for electronic components and products to work properly, especially when issues like ionic contamination under low stand-off components can cause dendritic growth which can lead to intermittent operation or short circuiting, and ultimately field failures.

Indium8.9HF is an air-reflow, no-clean solder paste specially formulated to enhance electrical reliability and eliminate dendritic growth in high-power products, such as automotive electronics manufacturing.

Indium8.9HF delivers peace of mind, knowing that assemblies will maintain integrity with increased electrical reliability via enhanced surface insulation resistance (SIR) that inhibits current leakage and dendritic growth; and improved thermal reliability due to its low-voiding performance on bottom terminating components (BTCs), reducing the risk of application or product failure.

Indium8.9HF can accommodate the higher processing temperatures required by the SnAgCu, SnAg, and other alloy systems favoured by the electronics industry to replace conventional Pb-bearing solders.

For more information contact Techmet, +27 11 824 1427, info@techmet.co.za.

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**UV curable masking gel**

UV92 from HumiSeal is a one-part, thixotropic, UV curable masking gel for temporary protection of components during the coating process. It is user-friendly during application, curing and removal processes, and comes in various cartridge sizes and bulk packaging.

Application of HumiSeal UV92 is simple due to its high shear thinning property, which allows the gel to reduce viscosity during dispensing. Ease of dispensing and accuracy of placement by properly wetting the surface makes it ideal for protection of critical components. The material will return to its gel state when not sheared.

The UV92 masking gel cures with industry standard UV LED lighting at 365 nm or 405 nm, and has excellent solvent resistance once cured. In its cured state, it will have a cloudy white appearance for easy identification without the need of a black light, and is easily distinguishable from conformal coating. The UV92 can withstand short temperature excursions up to 150°C for various conformal coating cure methods.

For more information contact Zetech, +27 11 609 1244, orlina@icon.co.za.

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**Antistatic cleaning materials**

Static is an ever-present danger looming all around us. This means that even the detergents we use to clean ESD floors and equipment need to be antistatic.

For more than 40 years, ACL Staticide has delivered innovative products for specialised cleaning and static control. Staticide is an antistatic neutralising cleaner that diminishes static charge generation on floor surfaces.

Staticide has three applicants in the range: antistatic floor stripper, antistatic cleaner, and static dissipative floor cleaner. Antistatic bin bags, gloves and coats for cleaning rooms complement this solution.

For more information contact Altico Static Control Solutions, +27 11 608 3001, sales@actum.co.za.
Highly balanced solder paste

In today’s manufacturing environment, a totally balanced, high-performance solder paste with features like high wetting, ultra-low solder balling and low voiding, is required. At the same time, more emphasis is placed on achieving a stable printing process, so a stable viscosity is vital.

S3X58-G801, a general-application solder paste from KOKI with highly balanced SMT performance, is engineered with a highly heat-resistant flux that stays inactive at ambient temperature, thereby ensuring stable viscosity of the solder paste on the shelf and during continuous printing. This heat resistance effectively prevents heat-slump and eliminates the occurrence of solder balls. Furthermore, the solder paste achieves low voiding thanks to the fluidity of the flux, which reduces the generation of gas during the reduction reaction.

S3X58-G801 is a process-friendly, drop-in replacement solder paste that reduces the hassle of changing the material and ensures high-quality solder joints.

For more information contact Zetech, +27 11 609 1244, orlaiin@icon.co.za.

Peelable hot melt adhesive

Henkel’s Technomelt AS 8998 is a hot melt material that is used to mask keep-out zones prior to conformal and chemical vapour coating processes. A fast, highly precise, automated alternative to manual taping techniques, it facilitates a streamlined dispensing solution that dramatically reduces application time.

The material peels off cleanly, leaving no residue, and can be precisely applied to keep-out areas via automated dispensing systems, reducing process time and labour costs. According to Henkel, manufacturers incorporating the product in their operations have reported as much as a 40% cost reduction as compared to conventional approaches.

RoHS-compliant and halogen-free, Technomelt AS 8998 is slump-resistant for improved dispense control, exhibits no outgassing during the coating process, and is compatible with commonly used conformal coatings.

For more information contact MyKay Tronics, +27 11 869 0049, mykay@iafrica.com.

Thermal phase change material

Included in Electrolube’s thermal management product portfolio are TPM350 and TPM550 thermally conductive phase change materials.

TPM350 has a thermal conductivity of 3.5 W/m.K and becomes workable at approximately 50°C. At this ‘activation’ temperature it changes state to become a lower viscosity material, minimising contact thermal resistance and improving thermal conductivity. Once it cools, it reverts back to its original state. The material’s advanced formulation ensures minimal contact thermal resistance.

TPM550 has a higher thermal conductivity of 5.5 W/m.K and an activation temperature of 45°C. In common with the TPM350 product, TPM550 produces no mess due to its thixotropic characteristics which prevent flow outside of defined interfaces. Both TPM350 and TPM550 can be reworked and their low specific gravity means that more applications can be served per kilogram of the materials, reducing production costs.

The new phase change materials are silicone-free, have an operating temperature range of -40°C to +125°C and are RoHS-2 compliant.

For more information contact Vepac Electronics, +27 11 454 8053, sales@vepac.co.za.

No-clean solder paste

M8 no-clean solder paste from AIM is designed for the most demanding high-density electronic assemblies. An evolution of the highly successful NC258 platform and developed in combination with T4 and finer mesh leaded and lead-free alloy powders, M8 provides stable transfer efficiencies required for today’s challenging applications.

A novel activator system provides powerful, durable wetting action accommodating a wide range of profiling processes and techniques. M8 eliminates head-in-pillow defects on BGA and reduced voiding on QFN/BTC components while producing bright shiny solder joints. The paste leaves minimal, high-purity residue, engineered to be safely left in place. Developed with the input of coating and cleaning industry partners, residues can be directly coated or easily removed.

AIM solder pastes are produced from the highest quality, oxide-free powder manufactured to the Electropure specification. Solder pastes are manufactured in no-clean, water soluble and rosin based chemistries, and are available in all industry standard packaging.

For more information contact Truth Electronic Manufacturing, +27 31 822 8555, terence@truthelectronics.co.za.
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AAW Electronic Enterprises is an importer and distributor of ESD equipment, solder wire, bar and paste, soldering and rework equipment, precision and general tools, bench top and field test equipment to the electronics manufacturing and electrical industries.


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Core business offering in electronics manufacturing and production sector Altico Static Control Solutions, a division of Actum Electronics, is the only business in southern Africa focusing exclusively on ESD control. It is the exclusive representative of many of the world’s leading suppliers of ESD products, and offers complete ESD audits and a range of products for static control.

Brands: ACL Staticide, Cleantex, UTZ, Hans Kolb, IDI, Laja Pro, Polyflor, Simco-Ion, Levosil

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Allan McKinnon & Associates has been serving the electronics industry for over 40 years through the sale and rental of high-technology SMT production equipment and the distribution of European-made production consumables. Its mission is to remain a major supplier of production equipment, related consumables and technical information for the companies operating within the industry.

Brands: Heller Reflow, ITW/Cramolin, JUKI SMD Placement, Kester, Kolb PCB Cleaning Technology, Weller Tools

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Core business offering in electronics manufacturing and production sector Automated Electromechanical Production provides a fully integrated electronic solution, taking innovative projects and ideas to new heights. Its in-house offering covers plastic and metal enclosure design and manufacturing, complete PCB assembly and product integration, and finishing products off with custom stickers or laser engraving, according to customers’ needs.

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Barracuda Holdings is a privately owned and dedicated high-technology contract electronics manufacturer (CEM), offering a complete service from materials procurement to final product assembly and packaging. The company is ISO 9001:2015 certified, and boasts a passionate and highly experienced team spanning all disciplines.

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Battery Guys specialises in the design and manufacture of battery packs, and offers turnkey solutions to its customers in the electronics market. Through its experience in the industry, the company has formed strong working relationships with its overseas factories and local customers to ensure the highest-quality solution is offered.
Brands: Minamoto, Dyno, SAFT, Forbatt, Panasonic, Energizer

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CET is a manufacturer and importer of printed circuit boards – single sided, double sided and multilayer, and 100% netlist tested. It supplies defence and aerospace spec multilayers, flex and flex-rigid, aluminium and heatsink/thermal PCBs. Any PCB requirements can be met, including blind and buried vias, copper and resin filled vias, HDI and quick-turn prototypes.

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Contact name: Brandon Weavind
Diel Manufacturing offers full turnkey electronic contract manufacturing from prototypes right through to high-volume production. Services include part procurement and management, assembly, testing, mechanical integration through to packaging and shipping. The company has a comprehensive ISO 9001:2015 management system that ensures that top quality is maintained at all times.

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Edge Assembly is owner-managed and focused on providing its customers with not only price competitiveness and strict quality requirements, but the personal service that makes its customers feel like partners in the business. Edge Assembly’s flexibility enables it to meet its customers’ priorities, expectations and challenges more easily.

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Electronic Industry Supplies has been in existence since 12 July 1988 and in that time has moved from strength to strength. The main thrust of the business is the supplying of imported electronic and electrical components and related materials.

Electronic Touch Systems
Touch systems manufacturer
165 Beyers Naude Drive, Northcliff, Johannesburg, Gauteng
+27 11 782 3346
touch@global.co.za
www.electouch.co.za
Contact name: Patrick Thomas

Local design and manufacture of high-quality membrane switches, fibre-optic backlit membrane switches and overlays, tactile key embossing, electroluminescent backlit membrane switches, panels and labels.

Elmatica AS
PCB supplier/manufacturer
Grensen 12, N-0159, Oslo, Norway
+27 60 656 4484
sebastian.ndlovu@elmatica.com
www.elmatica.com

ExecuKit
Service provider/contract manufacturer
48 Richard Road, Stuart House Industria North, Randburg, Gauteng
+27 11 477 4760
renita.fleischer@execukit.co.za
www.execukit.co.za
Contact name: Renita Fleischer

ExecuKit offers a different and more cost-effective approach to electronic component procurement and kitting. ExecuKit’s goal is to provide its customers with a seamless chain of kit supply. Quality and on-time delivery are a given.

Gihon Cables
Wire extrusion
128 Seilskip Road, Laser Park, Honeydew, Gauteng
+27 11 795 2222
ray@macrowatt.co.za
www.macrowatt.co.za

Hiconnex
Cable assembly
Tool, equipment and consumables supplier
20 Adriana Crescent, Gateway Industrial Park, Centurion, Gauteng
+27 11 661 6779
sales@hiconnex.co.za
www.hiconnex.co.za

Impro Technologies
Security/access control OEM
478 Gillitts Road, Surprise Farm, Pinetown, KwaZulu-Natal
+27 31 717 0700
info@impro.net
www.impro.net

Inhep Electronics Holdings
Security/access control OEM
91 Escom Road, New Germany,
Durban, KwaZulu-Natal
+27 31 705 1373
info@idsprotect.com
www.idsprotect.com

IPD Electronics
Tool, equipment and consumables supplier
118 Bavaria Road, Louwlardia,
Centurion, Gauteng
+27 71 355 7208
giuseppe@ipdelectronics.com
www.ipdelectronics.com/
Contact name: Giuseppe Schito

IPD Electronics represents America II, Amtek and Treston in South Africa.
The company has established itself as a reliable supplier of electronic components, as well as industrial furniture/workstations suitable for use in ESD protected areas (EPA). It provides solutions to specific production needs, cost saving, kitting and AS6081 military-grade testing.

Brands: America II, Amtek, Treston

JDK Harnessing
Cable assembly
258 Railway Avenue, Benoni, Gauteng
+27 84 704 1570
donald@jdkharnessing.co.za
www.jdkharnessing.co.za

Jemstech
Service provider/contract manufacturer
118 Bavaria Road, Louwlardia,
Centurion, Gauteng
+27 12 349 2492
gpjansen@jemstech.co.za
www.jemstech.co.za
Contact name: Gerrie Jansen

Jemstech’s business as a turnkey electronics manufacturing services (EMS) provider is to partner with original equipment manufacturers (OEM) to accurately manufacture their electronic products with reliability and punctuality. Jemstech’s purpose is clear – converting clients’ innovative product technology into engineered products, and connecting clients with the most capable supply base.

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Pretoria, Gauteng
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www.kses.net
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OEM
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+27 12 844 0930
info@kreon.co.za
www.kreon.co.za

Laser Stencil Technology
Stencil and precision metal parts manufacturer
2 Naaf Street, Strijdompark, Randburg, Gauteng
+27 11 793 1318
stencils@Lstec.co.za
www.Lstec.co.za
Contact name: Donovan Jeffery
Laser Stencil Technology is a manufacturer and supplier of solder paste stencils and precision metal parts to the local electronics manufacturing industry. Laser Stencil Technology recently added Superlabels (Polyimide high-temperature labels) to its product range.
Brands: DEK Pneumatic Frames, SAWA Ultrasonic Cleaners, Zelflex Pneumatic Frames, Superlabels (Polyimide labels)

Lauren Manufacturing
Tool, equipment and consumables supplier
1 Caroline Street, Eastgate Gardens, Commercial Park, Marlboro, Gauteng
+27 11 444 9009
sales@magnumproducts.co.za
www.magnumproducts.co.za

Leratadima Tellumat Manufacturing
Cable assembly
Service provider/contract manufacturer
64 - 74 White Road, Retreat, Cape Town, Western Cape
+27 21 710 2765
jvantoon@ltmanufacturing.com
www.ltmanufacturing.com

Macrowatt
Cable assembly
Stand 128, Seilskip Road, Laser Park, Honeydew, Gauteng
+27 11 795 2222
terry@macrowatt.co.za
www.macrowatt.co.za

Martin Electronics
Security/access control OEM
26 Kindon Road, Robertsham, Johannesburg, Gauteng
+27 11 433 4084
orders@martin-electronics.co.za
www.martin-electronics.co.za

Mateq Systems
Automated test solutions provider
7 Ermelo Street, Wierda Park X2, Gauteng
+27 12 665 1770
sales@mateq.co.za
www.mateq.co.za
Contact name: Hennie Bosch
Mateq Systems provides off-the-shelf and custom test solutions.
Brands: MultiMac, National Instruments PXI, LabView, TestStand

Membrane Switch Technologies
Membrane switch manufacturer
Block H, Georgian Place, 18 Southway Road, Kelvin, Sandton, Gauteng
+27 11 887 1227
info@membraneswitch.co.za
www.membraneswitch.co.za
Contact name: Colin Jennings
Manufacturer and supplier of membrane switches, polycarbonate facias, vinyl labels, flexible copper circuitry and laser cutting of plastics.

Microtronix Manufacturing
Service provider/contract manufacturer
67 CR Swart Drive, StrijdomPark, Randburg, Johannesburg, Gauteng
+27 11 792 5322
info@microtronix.co.za
www.microtronix.co.za
Contact name: Rebecca Elsey
Microtronix specialises in PC board assembly for the mining, military, automotive, security and various other commercial industries. It is able to provide turnkey manufacturing services including, but not limited to, SMD placements, conventional placement, testing and programming, full product assembly, conformal coating, PCB washing and component procurement.
Brands: Insele Solar Chargers, Kivah AudiBible

Montar Manufacturing
Service provider/contract manufacturer
7 Gert Kotze Street, Brackenfell, Cape Town, Western Cape
+27 21 981 5682
montar@montar.co.za
www.montar.co.za

Mykay Tronics
Tool, equipment and consumables supplier
27 Newquay Road, New Redruth, Alberton, Gauteng
+27 11 869 0049
mykay@iafrica.com
www.mykaytronics.com
Contact name: Dean Rodger
MyKay Tronics is the sole agency for a number of market leaders in SA for electronic production equipment and consumables. The company is the local distributor for pick-and-place machines, reflow ovens, selective wave soldering, rework stations, solder wire/paste, solder bar, flux, PCB washing machines, component counters, tools, cutters and more.


---

**Nordson EFD**

**Fluid dispensing solutions**

Unit 40 Northgate Business Park, Block A, Gold Street, Northgate Estate, Brooklyn, Western Cape  
+27 79 693 3572  
preston.bowman@nordson.com  
www.nordsonefd.com  
**Contact name:** Preston Bowman

Nordson EFD precision dispensing systems deliver consistent and reliable deposits that improve yields and reduce costs in the electronics assembly process. From benchtop dispensers to multiple axis robots and valve systems, the company provides the best solutions for the dispensing of solder paste, flux, UV adhesives, silicone, cyanoacrylates, epoxies and more.

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**North Bridge Technologies**

**Service provider/contract manufacturer**

84 Jean Avenue, Doringkloof, Centurion, Gauteng  
+27 12 667 4655  
wynand@northbridge.co.za  
www.northbridge.co.za

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**Omnigo**

**Service provider/contract manufacturer**

320 Kuit Street, Waltloo, Pretoria, Gauteng  
+27 12 803 8218  
sales@omnigo.co.za  
www.omnigo.co.za  
**Contact name:** Pieter de Nysschen

Core business offering in electronics manufacturing and production sector Omnigo prides itself on its quality and superior service, which is the reason it is the preferred electronics contract manufacturer for its clients. The company prefers to build long-term relationships and offers a wide range of flexible services to grow sustainable partnerships with all its clients.

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**Otto Wireless Solutions**

**Cable assembly**

58 Wakis Avenue, Strijdompark, Randburg, Gauteng  
+27 11 791 1033  
wireless@otto.co.za  
www.otto.co.za  
**Contact name:** Chris Viveiros

Besides its full support of RF and wireless products, Otto Wireless Solutions manufactures a variety of cost-effective and reliable RF cable assemblies, with customised lengths and connector types to choose from. It also lists a number of standard length cables which cover a wide market demand.

**Brands:** MC Technologies, Chang Hong, Beyondoor

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**P24 Interconnect**

**Cable assembly**

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+27 87 808 1652  
sales@projects24.net  
www.projects24.net

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**P. Beulich Sheet Metal Manufacturers**

**Enclosure manufacture**

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+27 83 270 3255  
garthbeulich@gmail.com  
www.pbeulich.co.za

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**Pam Landman (t/a IJ-CCAL)**

**Service provider/contract manufacturer**  
**CAD PCB layout designer**

Zandspruit Road, Farmall, Chartwell, Johannesburg, Gauteng  
+27 82 894 4145  
pam@ij-ccal.co.za  
www.ij-ccal.co.za

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**Phahama Systems Development**

**Service provider/contract manufacturer**

19 Pieter Street, Highveld Technopark, Centurion, Gauteng  
+27 12 665 4750  
hosiam@phahama.com  
www.phahama.com

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**Priben Distribution**

**Tool, equipment and consumables supplier**

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info@priben.co.za  
www.priben.co.za

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**Projects Concern Manufacturing**

**Service provider/contract manufacturer**

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sean@projectsconcern.co.za  
www.projectsconcern.co.za
Quamba Technologies
Tool, equipment and consumables supplier
32A Kloof Road, Bedfordview, Johannesburg, Gauteng
+27 83 417 4294
igmar@quamba.co.za
www.quamba.co.za
Contact name: Igmar Grewar
Quamba Technologies is a supplier of production equipment from leading global manufacturers, providing excellent local technical and after-sales support.
Brands: MBTech, Hanwha Precision Machinery, ESE, Seho, TTNs Inc., TWS Automation, Carton Optical Industries, Fonton, Gen 3, Mechatronic Systems, Surclean, Taiwan Drytech

Radel
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OEM
PO Box 4364, Cresta, 2118, Johannesburg, Gauteng
+27 72 061 7315
mabitje@radel.co.za
www.radel.co.za

Robert Bosch South Africa
OEM
Service provider/contract manufacturer
33 Riet Rautenbach Street, Brits Industrial, Brits, North West Province
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maritz.botha@za.bosch.com
www.bosch.co.za
Contact name: Maritz Botha
Bosch offers a world-class manufacturing facility based in Brits, specialising in electronic printed circuit board assembly for both automotive and non-automotive use where quality is key.
Brands: Bosch, SEG Automotive, Chassis Brakes International, other non-automotive brands

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RS Components is a global e-commerce distributor of electronic components and industrial products from prototyping to production, offering over 500 000 products across 2500 global brands, delivered within 4-6 working days. Its offering covers electronics bench test and measurement, soldering/desoldering, ESD control and cleanroom, tools and consumables, and 3D printing.
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OEM
Service provider/contract manufacturer
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info@sabertek.co.za
www.sabertek.co.za

Scanditron SA
Tool, equipment and consumables supplier
Unit 1, Motor City, 26 Main Reef Road, Langlaagte, Johannesburg, Gauteng
+27 11 473 2149
stencildata@priben.co.za
www.priben.co.za

SM Tech
Service provider/contract manufacturer
Unit 18 Miracle Retail Park, Corner Lenchen and Old Johannesburg Road, Centurion, Gauteng
+27 12 030 0316
engineering@smttech.co.za
www.smttech.co.za

StarTech Industrial
Cable assembly
Tool, equipment and consumables supplier
20 Adriana Crescent, Gateway Industrial Park, Centurion, Gauteng
+27 11 823 1520
sales@startech.co.za
www.startech.co.za

Tau di a Rora Technologies
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8 Myrna Street, Chrisville, Johannesburg, Gauteng
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tau@diaroratech.co.za

Techmet
Tool, equipment and consumables supplier
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Contact name: Grant Langley
Techmet Equipment is an integral part of the Techmet group of companies, dedicated to providing sales and service to the electronics manufacturing industry. The company is proud of its qualified and experienced engineering staff, providing professional technical support to the industry which includes installation, maintenance and process optimisation.

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+27 12 382 5039
vanderpoela@tut.ac.za
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sales@testandrework.co.za
www.testandrework.co.za

Testerion
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467 Felstead Avenue, North Riding, Randburg, Gauteng
+27 11 704 3020
info@testerion.co.za
www.testerion.co.za
Contact name: Vangeli Glyptis

Established in October 2000, Testerion specialises in the sale of high-technology SMT production equipment and the distribution of European and USA made production consumables. Its mission is to continue growing as a profitable company, with a focus on providing its customers with the very best service and highest quality equipment.

Brands: Fuji Pick-and-Place, Nutek, Plato, Speedline, Techspray, TRI

Test Fixture Technologies
Enclosure manufacture
Equipment/accessories/consumables
Custom automated test equipment
32 Liner Avenue, Laser Park, Johannesburg, Gauteng
+27 11 791 5879
info@testfixtures.co.za
www.testfixtures.co.za
Contact name: Adrian Storie

Test Fixture Technologies provides specialist design and manufacture of automated test equipment for board level and final product testing, calibration, programming and quality assurance. In addition, it offers custom, automated handling solutions, CNC machining, custom enclosures and prototype product manufacturing, and supply of test probes.

Brands: TFT, Everett Charles Technologies, ST Robotics

Theta Electronics
Tool, equipment and consumables supplier
Citirec House, Unit A 12 Stibitz Road, Westlake Business Park, 2 Tokai, Cape Town, Western Cape
+27 21 700 4910
info@theta-electronics.co.za
www.theta-electronics.co.za

TOA Electronics Southern Africa
Audio equipment OEM
High Street, Moddercresot Office Park, Modderfontein, Gauteng
+27 11 608 1477
marketing@toasa.co.za
www.toa.co.za

TraX Interconnect
PCB supplier/manufacturer
2 Estmil Road, Diep River, Cape Town, Western Cape
Branches: Johannesburg (sales office), Cape Town (factory and sales)
+27 21 712 5011
sales@tra.co.za
www.trax.co.za
Contact name: Anton Tait

Manufacturer of single sided, PTH and multilayer printed circuit boards for quick turn delivery, as well as offshore manufacture of volume requirements.

Brands: Neltec N4000-29, Neltec Mercurywave 9350, Rogers Corporation, Taconic

Truth Electronic Manufacturing
Tool, equipment and consumables supplier
49 Enforce Park, 43 Seacowlake Road, Springfield Park, Durban, KwaZulu-Natal
+27 31 822 8555
terence@truthelectronics.co.za
www.truthelectronics.co.za
Contact name: Terence Ruthnam

Truth Electronic Manufacturing prides itself on associating with leading global manufacturers in their respective fields. The company commits itself to working closely with its valued customers and suppliers to provide leading-edge products, systems and solutions. T.E.M. offers a wealth of experience from its past 19 years in the electronics industry.

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virginia@tvvelectronics.co.za  
www.tvv-electronics.co.za

Vepac Electronics  
Tool, equipment and consumables supplier  
1 - 7 Electron Street, Linbro Business Park, Marlboro, Frankenwald, Gauteng  
+27 11 454 8053  
sales@vepac.co.za  
www.vepac.co.za  
Contact name: Brian Howson  

Vepac Electronics is a local supplier of a variety of products for the assembly and manufacture of electronic products, including soldering/desoldering stations, chemicals for the cleaning and conformal coating of printed circuit boards, thermal pastes and wire strippers.

Brands: Hakko, Electrolube

Würth Elektronik eiSos  
Tool, equipment and consumables supplier  
PCB supplier/manufacturer  
Max-Eyth Straße 1, Waldenburg, Germany  
+27 71 259 9381  
Jason.Page@we-online.com  
www.we-online.com

X-Sight X-ray Services  
X-ray CT specialist  
Unit 2, 10 Derrick Drive, Somerset West Business Park, Cape Town, Western Cape  
+27 21 852 6642  
insight@x-sight.co.za  
www.x-sight.co.za

Zetech  
Tool, equipment and consumables supplier  
53 Plantation Road, Eastleigh, Edenvale, Gauteng  
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orliain@icon.co.za  
zetech@zetech.co.za  
www.zetech.co.za  
Contact name: Ina Orlianski  

Zetech offers not only equipment, materials and technical support to the South African electronics manufacturing industry, but also a laser cut stencil manufacturing service.


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- Reflow ovens; vapour phase ovens
- ESD consumables
- Component storage
- Low pressure injection moulding
- AOI; X-ray
- PCB washing machines
- Component counters
- In-circuit testers

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