Addressing the Issues Facing Industry Today

SMART Group 26th Birthday Conference & Exhibition

6-7th October 2010 at Oxfordshire Golf Club, Thame, Oxfordshire

Following our successful two day conference last year that celebrated 25 years of the **SMART Group's** existence, **SMART Group** proudly announces our **26th Anniversary Birthday** with an equally exciting two day event conference. The aim and thrust of this year's conference is to address many of the issues facing our industry today. Despite some of the pessimism the European electronics industry still has much to offer our global customers.

This year's conference will look at the supply chain, inform about the latest research projects and explore whether manufacturing standards make things better. Other topics will cover production control, the importance of chemistry, what's happening with RoHS and REACH, why do we clean, what are tin whiskers and are products really failing in the field. Further presentation topics and speakers will be announced shortly with an updated list of exhibitors. ***Book today to avoid disappointment and receive your 10% discount!!***

Day one invited speakers include:-

- Interview with Robert Gregory – Rolls Royce/Chairman of the IAG for PERM - Manhattan Project for Lead-Free Process Problem Mitigation
- Impact on Handling PCBs & Correlation of Cleanliness & SIR Results - Doug Pauls – Rockwell Collins, USA
- Voiding in BGA & the Potential Impact on Reliability - Dave Hillman – Rockwell Collins, USA
- What is Happening in Science Research to Help Engineers with Lead-Free - Dr Chris Hunt - NPL
- RoHS and REACH - Are they Killing the Industry in Europe? - Nigel Burtt – Enjaybee Associates

Day two invited speakers include:-

- New Cleaning and Cleanliness Specifications for PCBs & Assemblies - Doug Pauls & Dave Hillman – Rockwell Collins, USA
- Mitigation of Whisker Growths Associated with High Reliability Electronics and Spacecraft Hardware - Barrie Dunn - ESA
- Why do we Clean when we have a No-Clean Process? - Dr Ralph Hoeckle - Dr OK Wack Chemie, Germany
- Silver v Sulphur Corrosion Can Conformal Coatings Help? - Phil Kinner/Marie Kaing – HumiSeal, USA
- Head in Pillow or Head on Pillow - That is the Question? - Karl Seelig, Vice President of Technology for AIM, USA
- Designing Products Protection to Meet Harsh Working Environments - Marion Quarrington, Cooper Industries
- Component Re-finishing/Re-tinning Good Practice and Reliable? - Joe Tumilty – Retronix

Conference Exhibitors/EU Project partners confirmed include:

Conference Booking Form Delegates

Two day conference pass £150 for SMART members; £300 non-members + VAT
One day conference pass £85 for SMART members; £175 non-members + VAT

Price includes, arrival tea, coffee; mid morning tea coffee & biscuits; lunch; afternoon tea and coffee. Seminar proceedings will be available from the SMART Group website.

Return Booking Form with payment to:

SMART Group, 85 Easton Street,
High Wycombe, Bucks HP11 1LT

Telephone: +44 (0) 1494 465217
Facsimile: +44 (0) 1494 473975

I would like to book ....place(s) at the conference for the following (Please tick):

- ❑ Two Day SMART Group 26th Birthday Conference pass, Oxfordshire Golf Club
- ❑ One day only 6th October or ❑ 7th October
- ❑ SMART Group Member ❑ Non Member

Payment is due at time of course booking and may be made by Visa/Mastercard/AMEX by completing the mandate below or by cheque made payable to SMART Group. A pro forma invoice can be provided by fax if required, on receipt of a company purchase order. A VAT receipt will be provided on receipt of payment, together with booking confirmation, hotel locations and map/directions to conference location.

Booking conditions:
Full refund if cancellation notification received more than 10 working days before the event, subject to £30 administration fee per delegate. Refund of 50% if cancellation notification received 6-10 working days before the event date. No refund if cancelled within 5 working days. However, an alternative delegate may be nominated. We reserve the right to cancel the event or change content at any time, a full refund of the fee or the opportunity to attend the seminar if re-scheduled

Company PO Number for Proforma Invoices: ______________________________

Name: ______________________________ Job Title: ______________________________

Company: ______________________________

Address: ______________________________

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Postcode: ______________ Tel: ______________ Fax: ______________

Email: ______________________________

Second Delegate: ______________________________ Job Title: ______________________________

Email: ______________________________

Third Delegate: ______________________________ Title: ______________________________

Email: ______________________________

To pay by Visa/Mastercard/AMEX please also complete the following and fax booking form to **(+44) 01494 473975**
Please ensure all sections are completed fully in order to comply with credit card companies' requirements to validate transactions

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Name (as printed on card): ______________________________ Signature: ______________

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Book your place with payment before 31st August and save 10%

SMART Group 26th Birthday Conference & Table Top Exhibition

6 & 7th October, Oxfordshire Golf Club, Thame, Oxfordshire

SMART Group Table Top Exhibition Space

SMART Group is one of the largest trade associations in the industry, actively involved with the electronic design, assembly, test and inspection issues encountered by members and non-members. We often have the opportunity for small table top exhibition and literature displays at our events. Equally we often work with material and equipment suppliers to offer non commercial hands-on events.

Companies interested in participating should contact ***Tony Gordon***. If you want to book a place you should fax back this form as space is very limited. There may be some restrictions on space at venues. Sponsoring events, special features or delegate packs may also be available at some events speak to Tony regarding other event sponsorship opportunities.

Table Top/Literature Display Guidelines for Participation

- One Exhibition Space per company with one conference place only
- Exhibition Space is limited: strictly first come basis
- Table top space is no larger than 1m x 2m. A table cloth is recommended
  No signs or display material will be provided. (Space can vary at each event, please confirm with the SMART Group office prior to each event)
- Single phase power is sometimes available at venues, three phase/air is not provided
- Exhibits must be set-up before the start of any event, normally before 8.30am
- No floor-standing equipment, popup displays must not be larger than table top space
- Company logos may be used on selected event material

Thank you for supporting the SMART Group at this and future events

FAX BACK THIS FORM TO 01494 473975

Book one table top exhibition space on 6 & 7th October, Oxfordshire Golf Club Thame, Oxford
(Cost is £400 **SMART Group members**/£650 Non members + VAT)

Name: ______________________ Company: ______________________

Address: ____

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Telephone: ______________________Fax: ______________________

Email: ______________ @ ______________________

Card type: Visa/Mastercard/AMEX Card no: ______________________

Card Security code (3 digits printed on card signature strip): ________ Card expiry date: ________

Cardholder's name: ______________________Signature: ______________________

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The SMART Group, 85 Easton Street, High Wycombe, Bucks HP11 1LT
Telephone: 01494 465217 Facsimile: 01494 473975
info@smartgroup.org www.smartgroup.org

Day One 6th October 9.15am Coffee & Table Top Exhibition on Arrival

SMART 25TH ANNIVERSARY 1984 · 2009 GROUP

Welcome – Keith Bryant SMART Group Chairman Conference

Keynote Presentation "Has the supplier chain broken down"? - Robert Gregory - Rolls Royce

During this presentation Graham Naisbitt, Vice-Chairman of SMART Group, will interview Bob Gregory asking whether the supplier chain has broken down and to what extent do the problems associated with lead-free processes impact high reliability and safety-critical electronics. Mr Gregory is Chairman of the IAG for Pb-Free Electronics Risk Management (PERM) - the Manhatten Project for lead-free process problem mitigation PERM Consortium is chartered by the Aerospace Industries Association (AIA) and includes support from DoD, DoE, Army, Air Force, Navy, FAA, NASA, and industry

Reliability issues with lead-free - What is happening in science research? - Dr Chris Hunt - NPL

There is a contradiction in today's electronic assembly technology, while a significant fraction of electronics is built using lead-free materials and achieving consumer satisfaction, there remains an important fraction of industry that has yet to embrace lead-free technologies. For this remaining sector the transition is fraught with possible calamities and an understanding of the new materials, their interactions and environmental factors are needed. The material challenges are continuing to be added to by the advances in technology that demand increasing complexity and resistance to operating in ever-harsher conditions.

This paper will consider a range of issues that may influence lead-free assemblies that arise from material phenomena and process issues: fatigue, whiskering, substrate stability and the use of mitigation. Characterisation of materials continues to improve and with this, an understanding to build in resilience is achievable. The measurement tools and methods for this will be discussed.

Impact on Handling PCBs & Correlation of Cleanliness & SIR Results - Doug Pauls – Rockwell Collins

This presentation covers a research effort to examine the effects of hand sanitizers and hand lotions on high reliability electronics. In a Rockwell Collins study, four sanitizers and three common hand lotions were examined for their potential effects on SIR, dielectric withstanding voltage, adverse effects on adhesion, conformal coat adhesion, and solderability.

Voiding in BGA & the Potential Impact on Reliability - Dave Hillman – Rockwell Collins

Voids in area array components - Ball Grid Arrays (BGAs), Chip Scale Packages (CSPs), Flip Chips (FCs) - is an intensively controversial discussion topic in terms of solder joint integrity. Does a void decrease the solder joint integrity because it reduces the necessary crack failure length? Does a void increase the solder joint integrity because it blunts the crack tip thus impeding crack growth? What kind of void do I have? What type of X-ray technique(s) do I use to assess the voids? Can I use underfill and/or corner bond materials to change the interaction of voids and area array component solder joints? Basic void types, their root causes and other topics of concern will be addressed from an IPC Class 3 High Performance avionics products

Nordson DAGE · DKL METALS LTD · FRASER TECHNOLOGIES LTD · GEN3 SYSTEMS · GOPEL electronics · Heraeus · O'DELL REWORK · BGA · SHIP INSPECTOR · TestPEP

Day One 6th October Continued

RoHS and REACH - are they killing the industry in Europe? - Nigel Burtt - Enjaybee Associates

The candidate list of Substances of Very High Concern (SVHC) continues to grow under the EU's regulation concerning the Registration, Evaluation, Authorisation & restriction of Chemicals (REACH.) At the time of writing the number of substances stands at 38, with 8 of those added in June 2010. Campaigning NGOs such as ChemSEC have a target Substitute It Now (SIN) list of over 350 substances that they consider should be SVHC listed. Meanwhile, electronics manufacturers have an apparently never-ending burden to demand data on usage from their supply chain each time the SVHC list is updated all over again.

The RoHS Directive (and its companion WEEE Directive) are undergoing revision which adds more uncertainty and concern. Thus far no further substances have been added to the restricted list of six, but the negotiations are ongoing. The Directive looks certain to add CE marking conditions in the near future and as the draft version stands it will now encompass all electrical or electronic equipment unless specifically excluded from scope or by a valid exemption within the text of the legislation – known as "open scope." These changes will add yet more burdens for industry. Outside Europe other nations are following suit with similar laws... so these regulations already have an increasing global impact.

Question Time - Chairman - Graham Naisbitt

Panel of experts include: Robert Gregory - Dr Chris Hunt - Dave Hillman - Doug Pauls - Robert Gregory - Nigel Burtt

SMART Group 26th Birthday Celebrations

Day Two 7th October 9.15am Coffee & Table Top Exhibition on Arrival

9.15 Coffee & Table Top Exhibition on Arrival

Welcome - Peter Swanson SMART Group Honorary Life Vice President Conference Day Two 7th October

Keynote Presentation - New Cleaning and Cleanliness Specifications for PCBs & Assemblies - Doug Pauls & Dave Hillman – Rockwell Collins

With the release of J-STD-001E and IPC-A-610E, there are questions related to cleaning and cleanliness, as always. In this presentation, Doug and Dave cover the cleanliness aspects of standards, as well as IPC-5704, the new IPC standard on bare board cleanliness. IPC-9202, the process qualification standard, will be covered, as well as IPC-9203, the companion Users Guide to the 9202 document.

Day Two 7th October Continued

Why do we clean when we have a no-clean process? - Ralph Hoeckle – ZESTRON/Dr OK Wack Chemie

No-clean is a process. Like every technical process it has limits. Precondition for not cleaning is a sufficient cleanliness hitting minimum the J-STD 001E and often other requirements, too. That means that the soldering conditions are able not only to form the joints, but also to encapsulate endangering residues or evaporate them.

More and more often such critical residues are left on the assemblies especially enforced under the rim condition of lead free soldering. These residues may result in malfunctions caused through electrochemical migration, leakage currents and corrosion. Silver which replaced lead is much more susceptible to corrosion and is able to form dendrites by electrochemical migration at about 10 % lower humidity levels than lead will do. Furthermore lead free solders contain more activators. So there are more acids and so more hygroscopic potential for leakage current and corrosion on the board surfaces. A new corrosion mechanism which has returned to the surface with lead free is whisker growth. This corrosion type needs especially activators and particularly chloride containing ones. This type of residue is hard to encapsulate or to evaporate completely. As corrosion studies show even small amounts of chlorides are able to initiate these corrosion whiskers. To meet this required cleanliness for field reliability, a cleaning process opens up a broad process window for soldering, bonding and coating. Modern professional cleaning processes are easy to handle and to trace. If they are planned and integrated properly with other manufacturing steps like coating they also can be neutral in terms of cost of ownership.

Mitigation of Whisker Growths associated with High Reliability Electronics and Spacecraft Hardware - Barrie Dunn - ESA

The presentation will provide an overview of the problems encountered by European space projects due to whisker growths. Some non-tin "whiskers" will be described, but the main emphasis will be devoted to tin-whisker growths occurring on spacecraft components either prior to RoHS or after the RoHS proposals in 1995. ESA has participated in some studies related to tin whisker growths and from these investigations the mitigation strategy is mainly by the imposition of contractual standards, skills training, verification of assembly processes, Alert systems and the reprocessing of component terminations.

Silver v Sulphur Can Conformal Coatings help - Phil Kinner/ Marie Kaing - HumiSeal

Corrosion on printed board assemblies due to sulphur rich environments has been a problem in the industry for some time. One world lead in PC manufacture changed many of his printed board designs away from the use of silver finish to solder levelled boards with a lead free finish. But what are the issues and how can conformal coating provide a possible to this and other corrosion issues. Considerable research has been undertaken on the failure modes on different board finishes and this presentation will look how coating can provide protection

Designing Products Protection to Meet Harsh Working Environments Marion Quarrington, Cooper Industries

Modern electronic assemblies have to meet ever more challenging environments and this can be very demanding. Verifying the product will meet "real life" is also a constant challenge even with the international standards available. Today printed board assemblies have to standard up to mechanical shock, vibration and temperature cycling often all at the same time. Some products are also simultaneously being exposed to gaseous and humid environments. Design and production engineering have to work concurrently to find the best product protection specification without impacting price, weight or functionality. Marion Quarrington, during her presentation will outline some of the options and the practical experience gained during product development.

Day Two 7th October Continued

Head in pillow or head on pillow - that is the question? Karl Seelig, Vice President of Technology for AIM

Open solder joints on area array devices can be very difficult to detect and can be intermittent making them random faults during production, test or possibly field failures. Head in Pillow (HIP) or Head on Pillow (HOP) can to some be as annoying as one form of music. Basically the problem relates to incomplete wetting of the solder ball alloy and the paste during reflow and can be exaggerated by component ball alloy, oxidisation of the liquid surfaces and distortion of the component. Recent work to improve the reliability of the solder joints to mechanical shock by changing the solder ball alloy has resulted in varying wettability on the surface of the spheres making life very difficult for the assembly engineer. During Karl's presentation he will also briefly discuss "Lake Voids" in LGA/QFN solder joints and the continuing reliability studies produced by the IPC Solder Products Value Council SPVC.

Component Re-finishing/Re-tinning Good Practice and Reliable? - Joe Tumilty - Retronix

With the world even more concerned over cost structures, scrap reduction, and stock utilization, there is a growing need to use components that have either a chequered past in terms of traceability and storage, or someone else's old excess inventory that can be purchased at a BARGAIN ! More and more of these components will induce defects into your production processes or even your supply chain – all relating to their solderability condition. Whether the devices are Pb Free or SnPb, they can be checked for their solderability as well being processed to improve their solderability. This presentation will endeavour to show Who, What, Where, Why and When parts can have their solder contacts improved and also show an insight into how it can be completed without impacting reliability

Question Time Chairperson - Sue Knight

Panel of experts include: Dave Hillman - Doug Pauls - Dr Ralph Hoeckle - Barrie Dunn - Phil Kinner/ Marie Kaing - Joe Tumilty - Marion Quarrington

4.30pm The Conference Ends

Conference Exhibitors/EU Project partners confirmed include