

Lead-Free and Beyond: Addressing the Remaining Challenges and Preparing for Tomorrow's

December 9, 2010

- **Lead-Free: It's only the beginning**

Michael Kirschner, President, Design Chain Associates, LLC

- **Lead-Free Electronics: What is left to implement?**

Heather McCormick, Senior Process Consultant,
Performance Innovation, Celestica

- **Lead-Free Electronics: The Tin Whisker Challenge**

Polina Snugovsky, Ph.D., D.Sc., Chief Metallurgical
Consultant, Performance Innovation, Celestica

OPS ALA CARTE®

COMPANY

OVERVIEW



Confidence in Reliability



- **Ops Solutions** – Ops provides end-to-end solutions that target the corporate product reliability objectives
- **Ops Individual "A La Carte" Consulting** – Ops identifies and solves the missing key ingredients needed for a fully integrated reliable product
- **Ops Training** – Ops' highly specialized leaders and experts in the industry train others in both standard and customized training seminars
- **Ops Testing** – Ops' state-of-the-art

**HALT & HASS
LABS™**
a division of Ops A La Carte LLC

RoHS Services

We help with *Risk Mgmt.* of Entire Process

- Help you identify reliability risks
- Work with your design and manufacturing teams to mitigate these risks
- Set new *Metrics* and Develop Implementation *Plans*
- Develop new Qualification Plans, Manufacturing Screens
- Work with your Suppliers & Contract Manufacturers
- Use HALT results to estimate actual field reliability
- Adding more RoHS compliant products to reliability database. We offer free AFR estimation for data contributors.

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RoHS: 10,000 m View

Lead (Pb) elimination has been a ~10 year effort and is continuing.

Short list of challenges, some met, some remain issues:

- Solder alloy composition proliferation, $\text{Sn}_x\text{Ag}_y\text{Cu}_z$ and SnAgCuX
- Metallurgical and mechanical properties vs. Sn-Pb
- Component availability: Pb-free, and Sn-Pb compatible for exempt and out-of-scope products
- Higher process temperatures: components and circuit boards
- Narrower process windows: product yield and quality
- Product reliability, SnAgCu better in some applications, worse for others... **Heather McCormick**
- Surprises: Sn whiskers... **Polina Snugovsky**
- Greener products and environmental impact concerns will be of increasing importance. Current & future challenges to eliminate other constituents: halogens, phthalates... **Michael Kirschner**

Registration Poll Results

What is your primary electronics industry sector?	
OEM	33%
Other service	23%
Design	17%
Component, PCB suppliers	11%
EMS, ODM	11%
-	6%
Total responses	231

What is your status on RoHS and Reliability?	Overall	OEM	Other service	Design	Component, PCB supplier	EMS, ODM
We believe we have addressed most/all reliability concerns	34%	29%	23%	44%	60%	48%
We are working on reliability risks as we work on compliance	26%	45%	9%	31%	32%	8%
We are compliant but don't know if we addressed reliability	16%	11%	23%	15%	4%	36%
-	15%	5%	25%	3%	4%	8%
Out of scope but worried about component availability	8%	7%	21%	8%	0%	0%
We have not addressed reliability	1%	4%	0%	0%	0%	0%
Total responses	231	76	53	39	25	25

Webinar Housekeeping

- Time permitting, will have 5 min. Q&A after each presentation. Aim to finish presentations in 1.5 hours. We can have extended discussion after the final presentation.
- For those in Europe & Asia, webinar will be recorded
- Link to recording and PDF of slides will be sent to all registered attendees.
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