

# **ROHS – Materials and Process Discussion**

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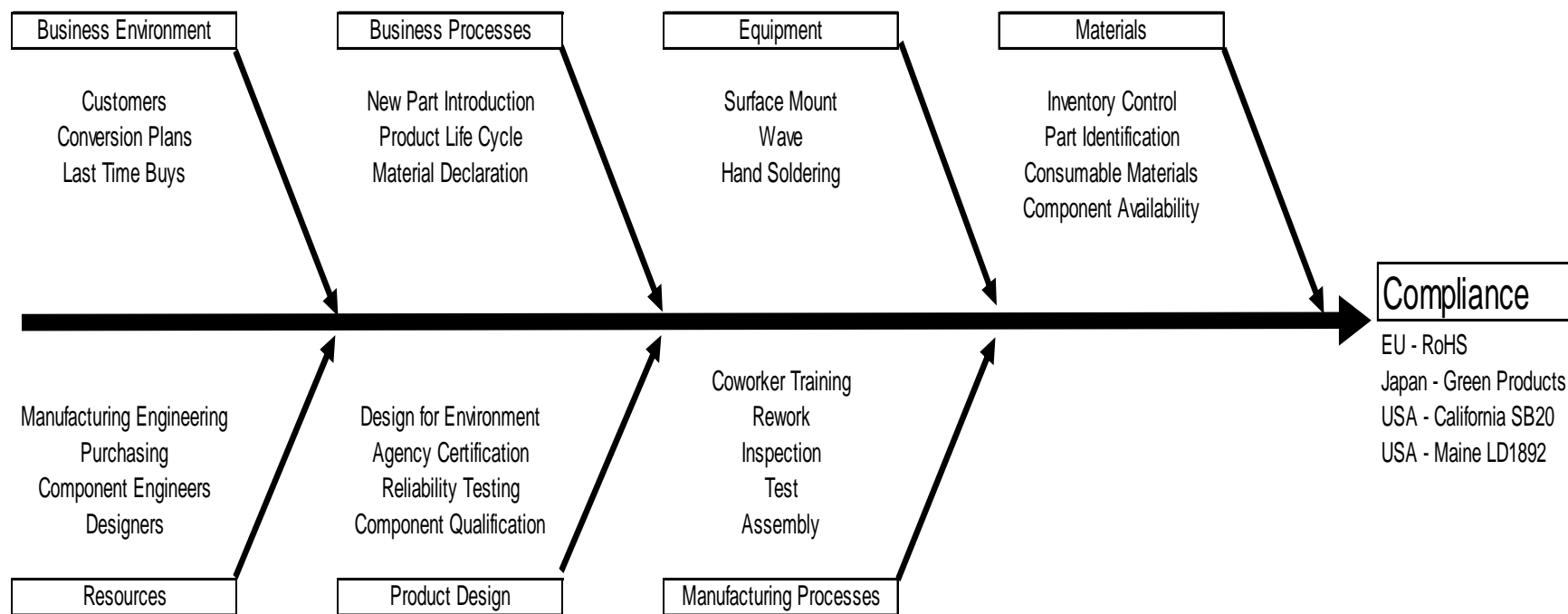
# Key Dates for Directives

- RoHS (Restriction of Hazardous Materials)  
Hazardous Substances Banned July 1, 2006
- IPC (Association Connecting Electronics Industries)  
IPC Web Link <http://leadfree.ipc.org>

# Materials Restricted by RoHS

- Lead
- Mercury
- Hexavalent Chromium (CrVI)
- Polybrominated Biphenyls (PBBs)
- Polybrominated Diphenyl Ethers (PBSEs)
- Cadmium

# Road to Compliance



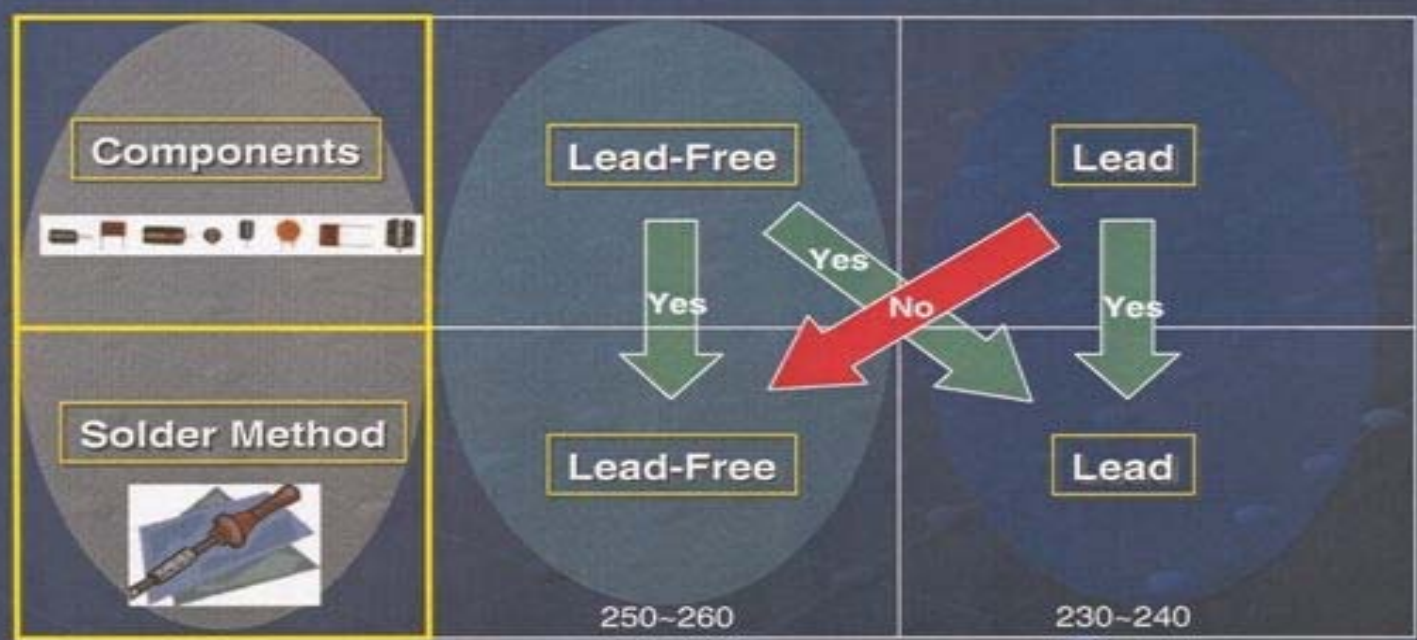
# Bill of Materials

## Component Considerations

- Components typically spec's to 250c to 260c max
- Hotter Process Temperatures
  - SMT Reflow Peak Temperature
    - » 63/37 Tin-Lead : 230c (446f)
    - » SAC 305 : 250c (464f)
  - Wave
    - » 63/37 Tin-Lead : 248c (480f)
    - » SAC 305 : 260c (500f)
- Moisture Sensitivity Ratings Change
- Lead composition – lead free, solderable material
- PCB Selection (Surface Finish, Tg, Td, T)

# Bill of Materials

## Lead Free Process Compatibility:



Note:  
Bismuth: used to lower reflow soldering temperature. Lead (Pb) and Bismuth (Bi) **must not** be used together –  
• Lead-Free Components are OK with Lead-Free solder with Bi present  
• Lead based components **cannot** be used with Lead-Free Soldering containing Bi.

# Bill of Materials

## Current Product

- BOM conversion and provide RoHS compliant manufacturers part numbers on a project basis.
- Update Approved Parts Source Listing
- Implementation based upon Customer approval with engineering change notice (ECN)

# Material Tracking for Declaration

- Establish Unique Part Numbers for Components  
(May increase number of SKU's)
- Code Components for ease of identification and sort
- Recommend Customers change both component part numbers and assembly part numbers in order to identify the change to RoHS compliant product

# Material Tracking

## Component Codes

First Character	Second Character		Third Character		
<b>Environmental Code</b>	<b>Temperature Rating Code</b>		<b>Moisture Sensitive Code</b>		
<b>X - Not Checked</b>	<b>Degrees ° C</b>		<b>@ Stated Reflow Temperature</b>		
<b>N = Not ROHS Compliant</b>	<b># = Non SMD Part</b>		<b>Per J - STD-020 Rev. C</b>		
	120	A			
<b>R = ROHS</b>	130	B			
<b>E = ROHS Exempt</b>	140	C	REL CODE	JEDEC CODE	TIME
<b>Z = Pending Answers</b>	150	D			
	160	E	1	1	Unlimited
	170	F	2	2	1 year
	180	G	3	2a	168 hours
	190	H	3	3	168 hours
	200	J	4	4	72 hours
	210	K	5	5	24 hours
	220	L	5	5a	24 hours
	225	M	6	6	Time on label
	230	N	Z	Pending	
	235	P	L	N/A	Shelf live (1)
	240	Q			
	245	R			
	250	S			
	255	T			
	260	U			
	Pending	Z			

Notes:

1. Shelf life material is designated by the appropriate environmental code followed by #L
2. REL moisture sensitivity code 3 combines codes 2a and 3, using the shortest exposure time
3. REL moisture sensitivity code 5 combines codes 5 and 5a, using the shortest exposure time
4. RoHS exempt. Solderable areas must be lead free

# Circuit Boards

## Laminate

- Tg – Glass Transition Temperature (170c min)
- Td – Decomposition Temperature
- Thermal Expansion Coefficient (Z axis expansion)

## Finish

- OSP (Bare Copper)
- Immersion Gold
- Immersion Silver
- Immersion Tin

# The Build Process - Surface Mount

## Equipment Review

- Oven evaluation - Processing window is tighter due to maximum component temperature versus reflow temp
- Peak Temp-Pb 230c (446f), SAC305 250c (464f)



# The Build Process -Wave Soldering

- Pot Temperatures 248c (480f), SAC305 260c (500f)  
SAC 305 (96.5% Sn/3% Ag/0.5%Cu)Melts 217 C (423 F)
- Spray Fluxer - No clean, Water Soluble
- Nitrogen Blanket to reduce dross
- Wire feeder



# The Build Process-Hand Soldering

- Hotter soldering tips, new soldering tips
- New cored wire, new flux system
- Processing methods to prevent cross contamination
- Flux Systems- No clean, water soluble
- Coworker Training

# Additional Support Equipment

- PACE Hot Gas Soldering Machines
- Solder Pot Machines
- Niton Material Analyzer



# Process Development & Verification

- Process Development Circuit Board
- Develop Soldering Processes
  - SMT, Wave, Hand Soldering, Repair
- Cross Section Analysis
  - Intermetallic Joint Evaluation
- Mechanical Testing
  - Pull Testing
  - Life Cycle Testing
- New Flux Systems
  - SIR Coupon Evaluation
- Manufacturing Instructions
  - Clear Identification of Solder Type



# Inspection and Training

- New IPC Inspection Standards
  - IPC 610 D – Acceptability of Electronic Assemblies
  - SOP's for RoHS compliant product
- Training
  - All employees will be educated in RoHS Requirements
  - Trainers completed IPC 610 D training - May 2005
  - Coworkers completed IPC 610 D training - July 2005
- IPC Certification for RoHS Lead Free Electronics Assembly Process Capability Program - Fall 2006

# RoHS Status



Systems are in place and Riverside is manufacturing RoHS compliant assemblies!

