

# Pb-Free Solder Technology in Aerospace and Defense:

## *Surface Finishes – Somewhere Over the Rainbow ...*

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# So Many Choices !

- ◆ When making technical decisions, having more choices is a far better than having few-or-none !!!!

- Hot-air solder leveled (HASL) ... SnPb or Pb-free
- Organic solderability preservatives (OSP)
- Tin (Sn) ... immersion or electroplated.
- Immersion Ag ... on Cu
- Electroless nickel, immersion gold (ENIG)
- Electroless nickel, immersion silver (ENIS) ... *new*
- Electroless nickel, electroless palladium, immersion gold (ENEPIG)
- Electroplated Sn-Bi

*“Old standby’s:”*

- Electroless nickel, electroless gold
- Electroplated nickel, electroplated gold



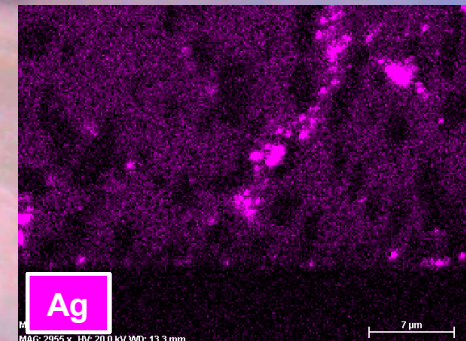
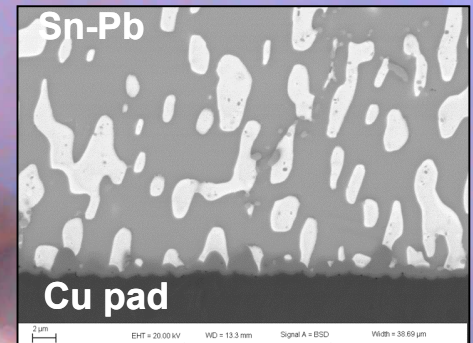
# Gaps to Fill

- ◆ The requirements that apply to selecting a surface finish differ between commercial and A&D industries.
- ◆ There remain gaps for the A&D industry:  
*... some gaps are technical in nature ...,  
and some originate from the supply chain.*

- ◆ Examples:

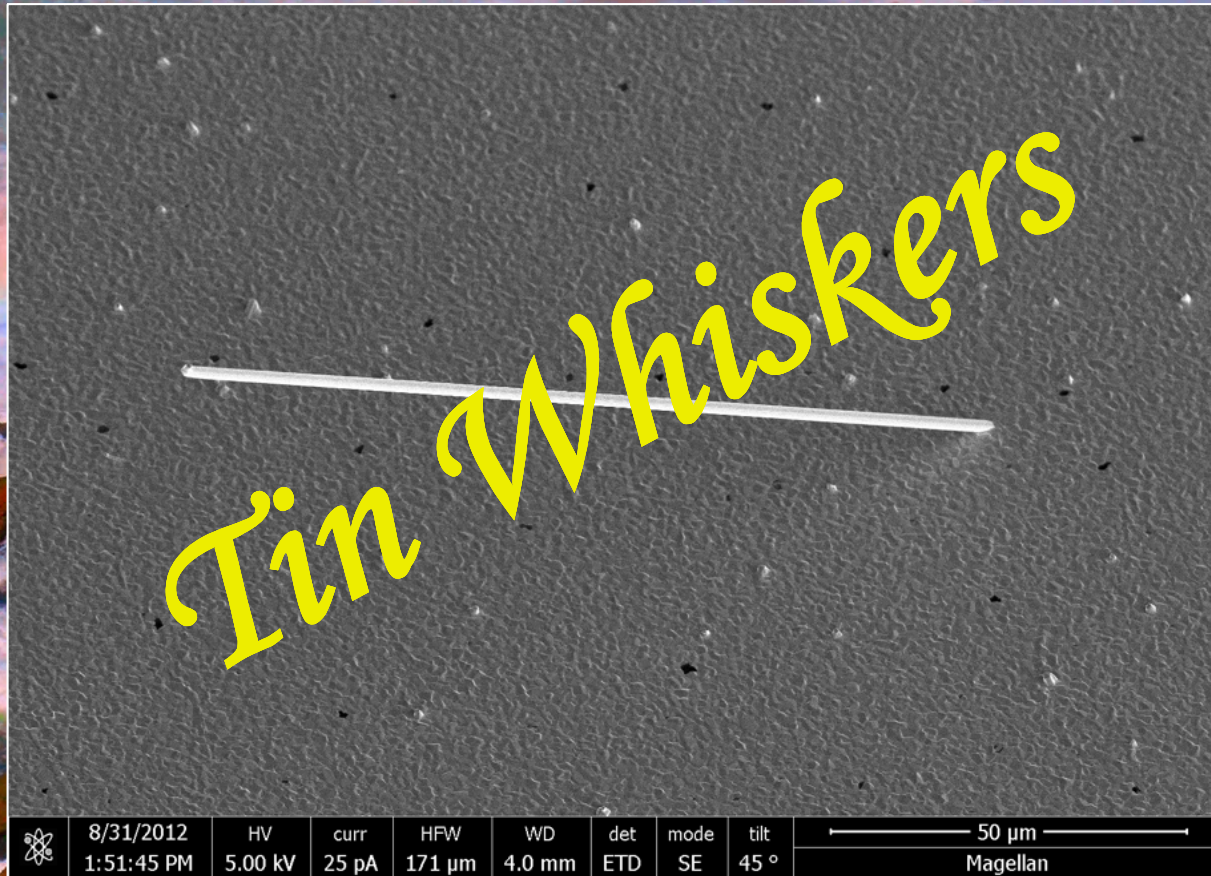
**Technical:** What is the impact of new surface finishes on the long-term reliability of solder interconnections?

**Supply chain:** How does the “slow-paced” A&D industry adapt to the rapid pace of the supply chain ... and adopt new technologies into legacy, current, and future products?





# “Numero Uno” for the A&D Industry



The present approach is to understand the fundamental mechanism so as to develop a *first-principles mitigation*.



# The Out-Years

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- ◆ The A&D industry must exercise *flexibility*:

Follow the  
Commercial  
Industry

Explore  
New Coating  
Materials

Develop  
Alternative  
Paradigms

Weigh the technical attributes and drawbacks  
against programmatic cost and schedule.



# The Pot of Gold ...

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