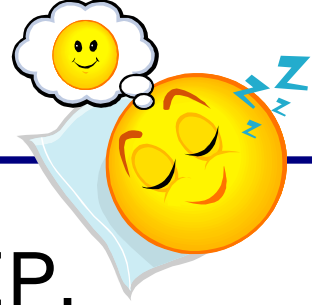


Cadmium Replacement

- Francis DiGiovanni CEF-2
 - MacDermid Inc.
- Technical Service Director
- fdigiovanni@macdermid.com



Trouble Sleeping?



- Worried about the 800 lb gorilla (EPA, DEP, POTW) over Cadmium?
- Worried about the 800 lb gorilla (Customer: Military) wanting Cadmium?
- Worried about the 800 lb gorilla (Insurance: H&S) concerning Cadmium exposure?





Cadmium

- **Pros**

- Proven process
- Corrosion resistant finish
- Easy to use
- Military Spec'd
- Conductive Finish
- Torque and tension characteristics
- Easy substrate prep

- **Cons**

- Controlled and limited by legislation
- Banned in many countries
- Toxic metal
- Insurance concerns on physical exposure
- Waste treatment concerns
- Not used in the following industries: automotive, medical, electronics, housing, agriculture





Innovations

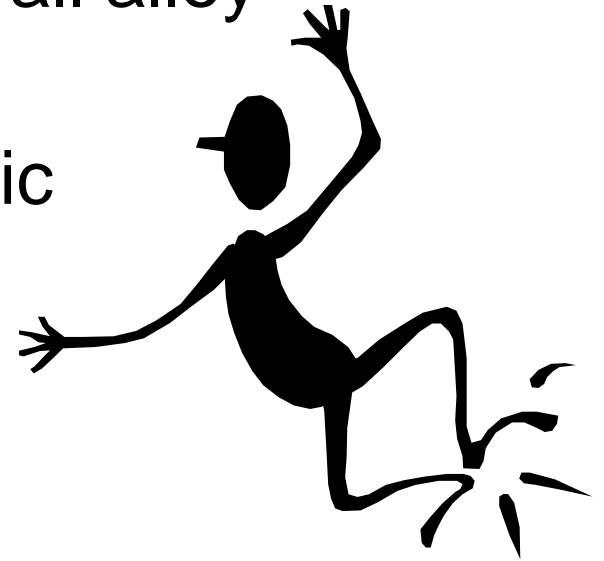


YES WE



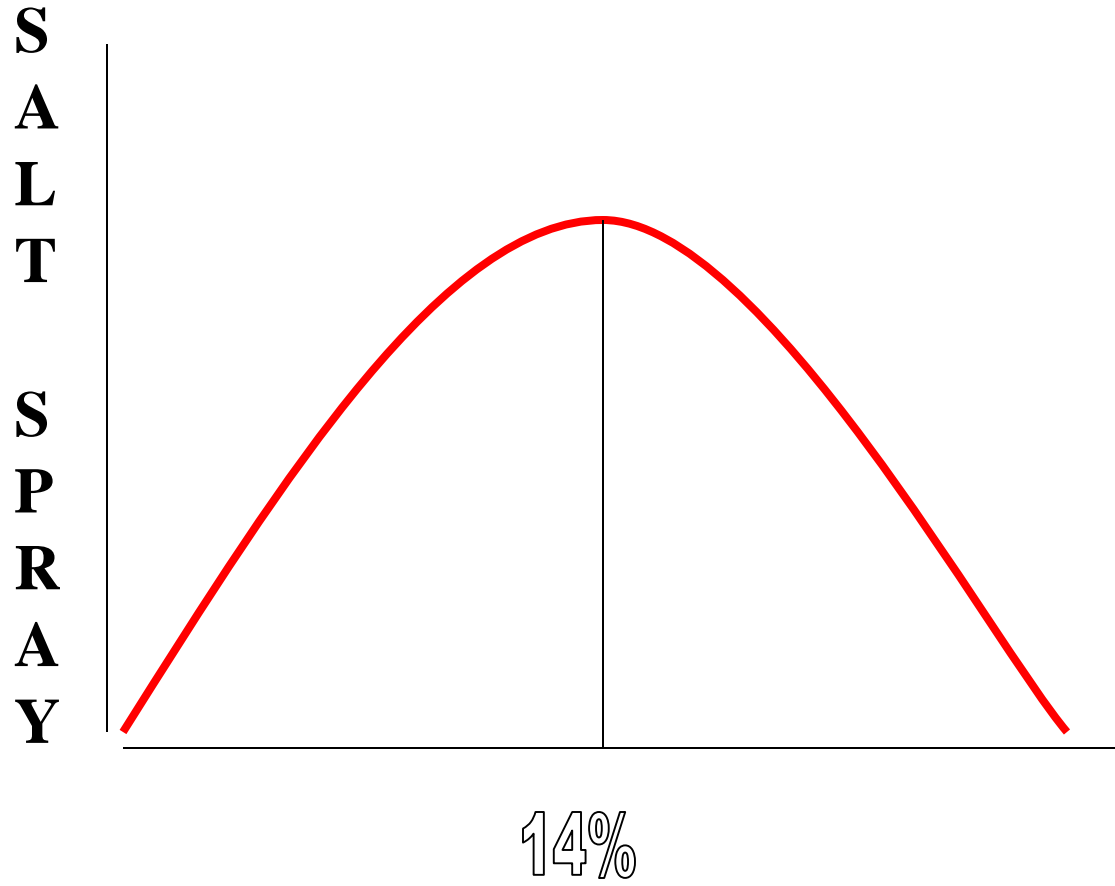
Advantages

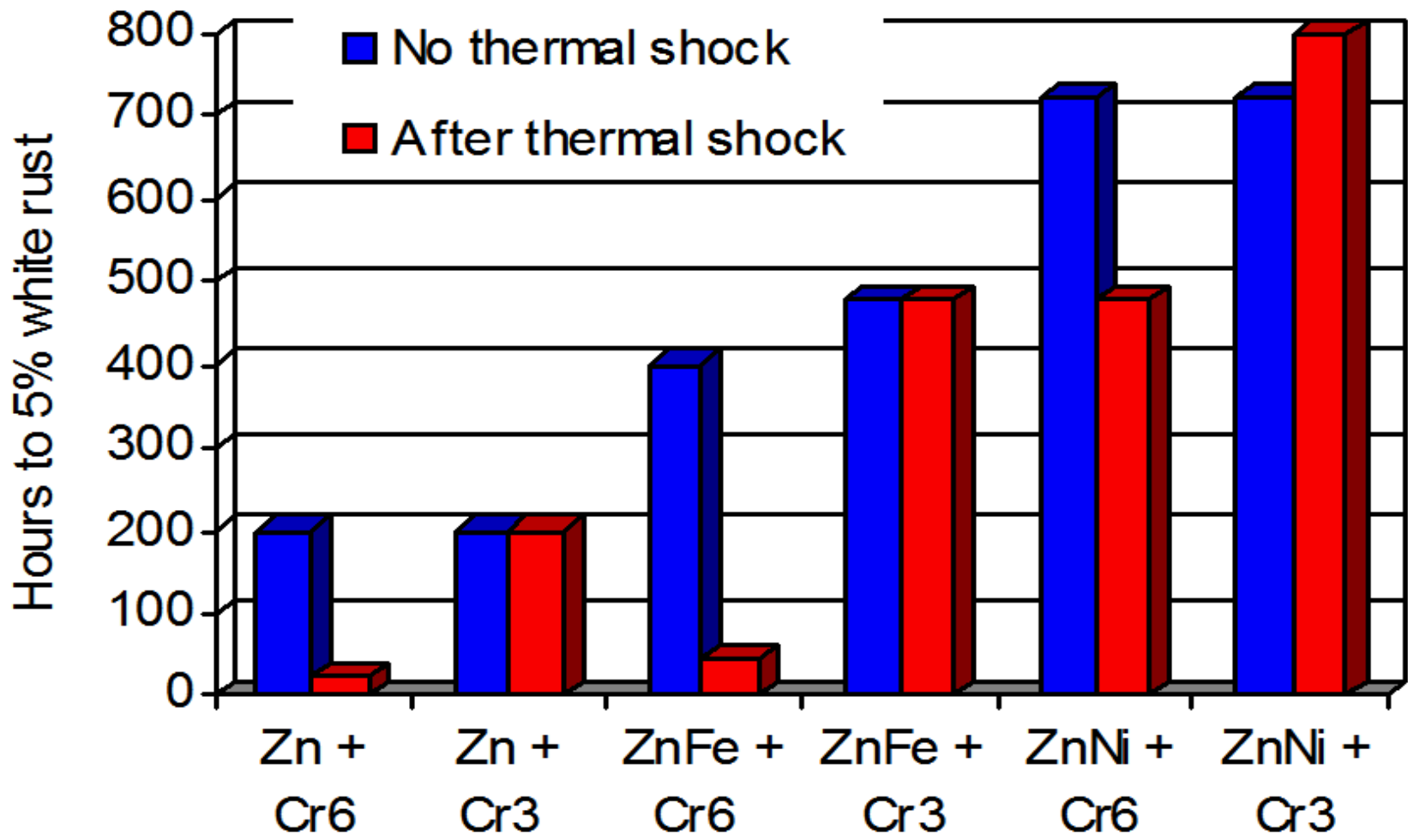
- Highest corrosion protection of all alloy finishes
- Best Alloy Performance in Cyclic Heat/Corrosion Tests
- Clear and black passivate coatings available
- Corrosion protection improves after bake





Corrosion Protection vs. Nickel Content





Greener Passivates

- New trivalent technology exists to match all the performance characteristics of hexavalent chrome with several important enhancements
- Topcoats provide additional corrosion protection, as well as scratch resistance and lubricity modifications



YES WE CAN





Electroless Nickel Option

- Production proven process 3000 hrs NSS to white corrosion on Aluminum
- Torque and Tension characteristics similar to Cadmium
- Options using multilayer EN types
- More expensive than other options but many benefits using EN
- More uniform deposit
- Dull finish for military use
- Black conductive EN option
- Nickel/Teflon option
- Tri-alloy EN

