

# Ruggedizing ATCA Blades to Meet Military Requirements

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# Why is a “chassis guy” talking about blades?

# Developing the Military Ecosystem



Picture your  
board here

## The Mindset Problem

- ~~Commercial~~ **Military**
- Off
- The
- Shelf
- = **M**QTS

## Defining the Military Environment

- Electromagnetic Environment:  
MIL-STD-461, TEMPEST, HEMP
- Power Environment:  
MIL-STD-704, MIL-STD-1399
- Physical Environment:  
MIL-STD-901, MIL-STD-167, **MIL-STD-810**

# Temperature Environment

- Categories
  - Non-Operating, Operating, Shock, Cyclic (solar)
- Design considerations
  - Component selection
  - Component screening
  - $C_{TE}$  matching

# Vibration, Acceleration, Noise, and Mechanical Shock Environment

- Every category is significantly different
  - Ground/fixed, Ground/mobile, (Sub-)Surface ship, Aircraft (fighter vs. cargo)
- Design considerations
  - Connectors (fretting, mating/alignment)
  - PCB, heatsinks, and EMI shields (stiffness)
  - AMC frames (distortion)

# Rain, Humidity, and Salt Fog Environment

- Categories
  - Non-condensing, Condensing, “Puddling”, Crystalization
- Design considerations
  - Coatings
    - PCB (absorption, conduction)
    - Metals (carbon vs. stainless steel)
  - Seals

# Fungus Environment

- Avoid testing, use analysis
  - Long time, costly, often inconclusive results
- Design considerations
  - Component selection (nutritive, hydrophilic)
  - Coatings, seals, etc.

## Miscellaneous Environments

- Low Pressure (atmosphere)
- Sand & Dust
- Immersion
- Contaminants
- Explosive & Acidic Atmosphere
- Icing
- Environment interaction

## Key Concepts

- Component selection
- Conformal coat
- Paint, plate, or film
- Maximize gold use for connectors
- Eliminate flex
- Simulate, test, and verify

# Third Generation Design Debut



## For more information...



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