

Corrosion Resistance in Earthmoving Machines

Caterpillar Inc.



Agenda

- Overview of Challenges
- Structure/Fabrication Design
- Coatings
 - Paint
 - Sprays and Soft Coatings
 - Tapes
- Basic Modifications
 - Breathers
 - Engine Air Intake
 - Enclosures
- Advanced Modifications
 - Guarding & Skid Plates
 - Abrasion-Resistant Material
 - Electrical
- Examples in Production



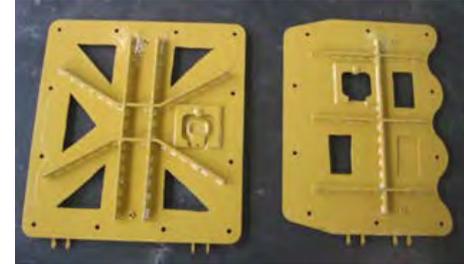
Challenges of Earthmoving Equipment in Dredging Environment

- Structures ability to handle extended use in wet/salt water conditions
- Coatings sufficient for wet/salt/abrasive conditions
- Intake/breather systems ability to deal with moisture & salt
- Enclosures and guarding that work with water and sand conditions
- Increased maintenance requirements
- Electrical systems with appropriate moisture and debris capabilities



Structure & Fabrication Design Considerations

- Avoid cavities, where moisture and material can gather
 - Designs to avoid such areas
 - Fully welded or sealed seams
 - Drain holes for areas of concern
 - Additional surface protection
- Vapor Corrosion Inhibitors (VCIs)
 - Sealed areas only
 - Require maintenance



> If you can't seal it up completely, ensure it can drain

Coatings

- Paints
 - Surface preparation
 - Primer Coats – Surface adherence
 - Top Coat – UV and abrasion resistance
 - Focus on Edges
- Sprays & Soft Coatings
 - Temporary solutions for storage
- Tapes & Wraps

> Follow manufacture's recommendations



Basic Modifications

- Breathers
 - Fuel - Consumption
 - Hydraulic Systems – Fluid level
- Air Intake
 - Raise
 - Precleaners – Exhaust Ejector
- Engine Enclosures
 - Design for water and debris
 - Lube points - Maintenance

> Keep debris out...



Advanced Modifications

- Guarding
 - Sensors & Wiring
- Belly Pans
- Abrasion-Resistant Materials (ARMs)
- Undercarriage
 - Rotating Bushing Track (RBT)
 - Full circle sprockets
- Electrical
 - Alternators
 - Wiring – Marine Grade (connectors, wicking)



> Experience is valuable, but be open to new ideas

Examples in Production

- D7E Dredging Arrangement Dozer
 - Surface and wiring protection
 - Drain holes
 - Undercarriage for abrasive application
- 966M
 - Originally designed for bulk salt applications
 - Wiring
 - Grease points
 - E coated cooling package
 - Paint and surface protection
 - Applicable to this industry (pipe placement)
 - Lessoned learned, can be applied elsewhere



> Valuable lessons learned

Conclusions

- Understanding the environment is required
- Understanding limitations of current as-built offerings
- “Do no harm”
- Leverage extensive knowledge and experience
- Maintenance (& storage) remains paramount





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