Investigation of the Effects of Corrosion on Aircraft Transmission Lines

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Presentation Outline

Background
Research objectives
Experimental plan and setup
Results and Conclusion
Acknowledgement
Signal reflection from discontinuity.

AFDX and ARINC 429 testing systems not detecting malfunctions on time will lead to catastrophic failures.

Z0 = 50 + 0j Ohms, ZL = Open
D = 4.00 wavelengths

A sinusoidal wave propagates down the line...
Research objectives

To develop methods and means for diagnosis and prognosis of Aircraft Transmission Lines

❖ Determine the system behavior under environmental factors:
  ❖ Corrosion (In progress)
  ❖ Heat
  ❖ Vibration
  ❖ Electromagnetic waves

❖ Develop statistical theory

❖ Proceed with development of methods
Experimental plan and setup

Accelerated Corrosion Chamber Q-Fog CCT-600

G85 Prohesion Test conducted that simulates Aircraft environment

Wires are taken each 168 hours and measured, then placed back into the chamber

3 types of damages were induced
### Obtained results

<table>
<thead>
<tr>
<th>Before exposure in corrosive environment</th>
<th>After 168hrs of exposure in corrosive environment</th>
<th>After 840hrs of exposure in corrosive environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completely exposed inner conductor</td>
<td>Exposed outer conductor</td>
<td>Exposed inner conductor</td>
</tr>
</tbody>
</table>

- **Before exposure in corrosive environment**: Cables appear intact with no signs of corrosion.
- **After 168hrs of exposure in corrosive environment**: Slight corrosion is visible on the outer conductor, but the inner conductor remains protected.
- **After 840hrs of exposure in corrosive environment**: Significant corrosion is observed on both the outer and inner conductors, indicating severe degradation.
Obtained results
Completely Exposed Inner Conductor
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Completely Exposed Inner Conductor
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Exposed Outer Conductor
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Exposed Inner Conductor
Acknowledgement

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QUESTIONS