Designing and Testing an Event Data Recorder Using Environmentally Friendly Thermal Insulation Materials

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Background Information

- An Event Data Recorder (EDR) is responsible for recording the events before, during, and after an accident.
  - Used in automobiles, airplanes, & locomotives.
- Wanted to create a new environmentally friendly EDR design capable of withstanding temperatures up to 1000°C.
Material Criteria

- The initial goal of the project was to identify the best insulating materials to use.
  - Low thermal conductivity
  - Environmentally friendly with no hazardous or toxic substances

- Many EDR designs utilize phase change materials (PCM) that are often expensive and harmful to the environment.
Chosen Materials

- **Exterior:**
  - 304 Stainless Steel

- **Interior:**
  - Insulating Layer: WDS® LambdaFlex™ Super
    - Morgan Thermal Ceramics
  - Thermal Block: Muscovite HP5 Mica Paper
    - Asheville-Schoonmaker Mica Co.
Design I Interior
Design I During Operating Conditions
Design I During Non-Operating Conditions

Temperature Distribution over the various Surfaces (Design I)

- Shell Surface Temperature
- Insulation Outer Surface Temperature
- Insulation Inner Surface Temperature
- Thermal Black Inner Surface Temperature
- Chips Temperature

Temperature (Degree Celsius) vs. Time in Seconds
Design II Interior
Design II During Operating Conditions
Design II During Non-Operating Conditions

Temperature Distribution over the Various Surfaces (Design II)

- Shell Surface Temperature
- Insulation Outer Surface
- Insulation Inner Surface
- Thermal Block Inner Surface
- Chips Surface Temperature

Temperature (Degree Celsius) vs. Time (Seconds)
Next Steps

- Use purchased materials to fabricate and test physical model.
- Further verification testing would provide more accurate real-world results.
  - Necessary in determining viability of new EDR design.
Thank You!