A Vision for Flexible Hybrid Electronics (FHE)

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What is Boeing?

1925: Boeing Air Transport enables cargo transport in the emerging Air industry

2017: Boeing is World’s Largest Aerospace Company
Boeing’s Interest in FHE

Lighter Weight
- 1% weight reductions can equate to billions in operating cost savings to carriers.

Less Complexity, Improved Maintenance, Higher Reliability

Added Capability

Printed electronics is an enabler
OEM Timeline for Implementation of SHM

Near Term
- Replace inspection tasks with SHM to reduce maintenance burden
- Enable flexible maintenance intervals via operational monitoring using existing aircraft & ground capabilities
- Assess conditional events

Mid Term
- Integrated airplane-level solutions and conditional maintenance based on SHM information
- Enable SHM based optimized design and weight savings
- Certification of maintenance credit

Long Term
- Optimize design rules for integrated F&DT and maintenance philosophy based on SHM monitored structures
- Longer economical airframe utilization

Benefits:
- Reduced Life Cycle Cost
- Improved Mission Reliability
- Improved Availability
- Improved Operational Plans
- Efficient Supply Chain
- Enhanced Design
Build Something Better

Antenna Technologies

Enhances

Flexible Antenna

Antenna on Wing Tip

Simpler to Make, Install Anywhere, Flexible and Conformal, Improve Performance

Asset Monitoring

Enabler

More data on Demand, IoT through Life Cycle

Multiple Operations, Lots of Infrastructure
Boeing Technology/Material Needs

Some of the Things Boeing is Seeking to Enhance with FHE:

- Knowledge of Corrosion Status in Materials
- High Conductivity Materials
- Fabrication of Large FHE Arrays/Systems
- Robust Interconnects
- Substrate Materials
- Component Integration
Boeing FHE Example

747-8 Damage Detection Sensor
Uses a form of FHE

FAA Certified; Currently flying on all 747-8’s