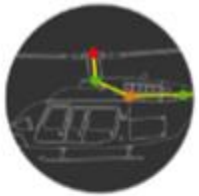*MEMS for Condition Monitoring*

PHM, 2018

Low Cost/Light Weight HUMS Using MEMS

- Extensive Use of MEMS to Reduce Cost/Weight of the System
    - Embedded MEMS Accels Allows for Custom Sensor Packaging
    - MEMS IMU allows for AHRS/Vehicles State to be measured – opening up market to "analog" or older platforms with no digital interfaces.

Better Fit
Foresight installs at up to 1/10 the weight and as low as 1/3 the cost of existing HUMS systems, meeting both tight budgets and tough weight/space constraints.

Proven Results
Foresight earned top marks in an unprecedented blind gearbox test at one of the largest helicopter manufacturers in the world.

Clean Data
The simple graphical interface provides at-a-glance top-line data for the entire fleet, and can even send text message alerts. The data can be segmented later for more detailed analysis
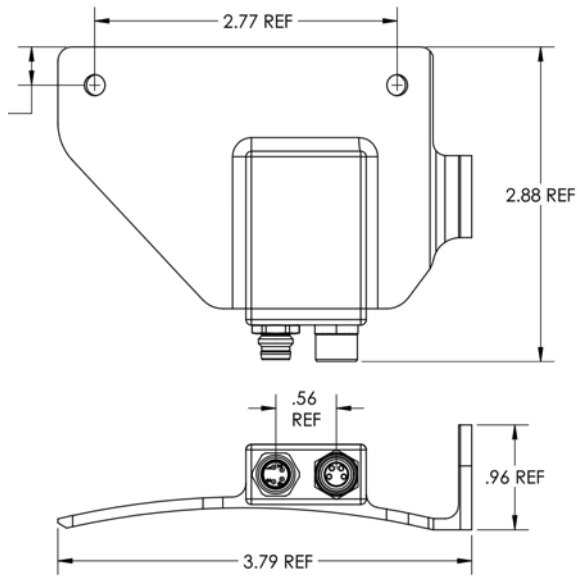
GPMS

MEMS IMU

- ## OBUC: Onboard Control Unit
  - Regime
  - Aircraft State/Exceedance

- ## High Speed Sensors:
  - Local Process
  - Configurable from 366 to 93750 sps
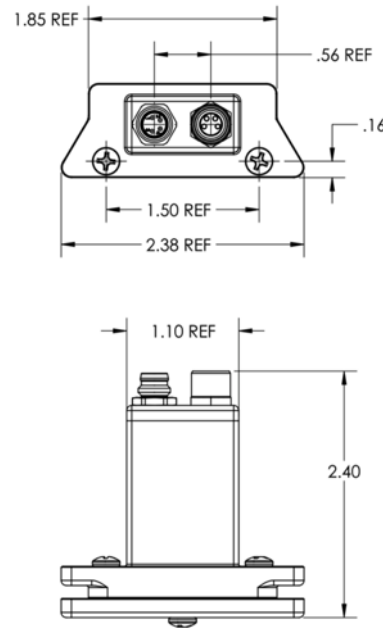 - 32 MB RAM
  - Shaft, Gear and Shaft Analysis
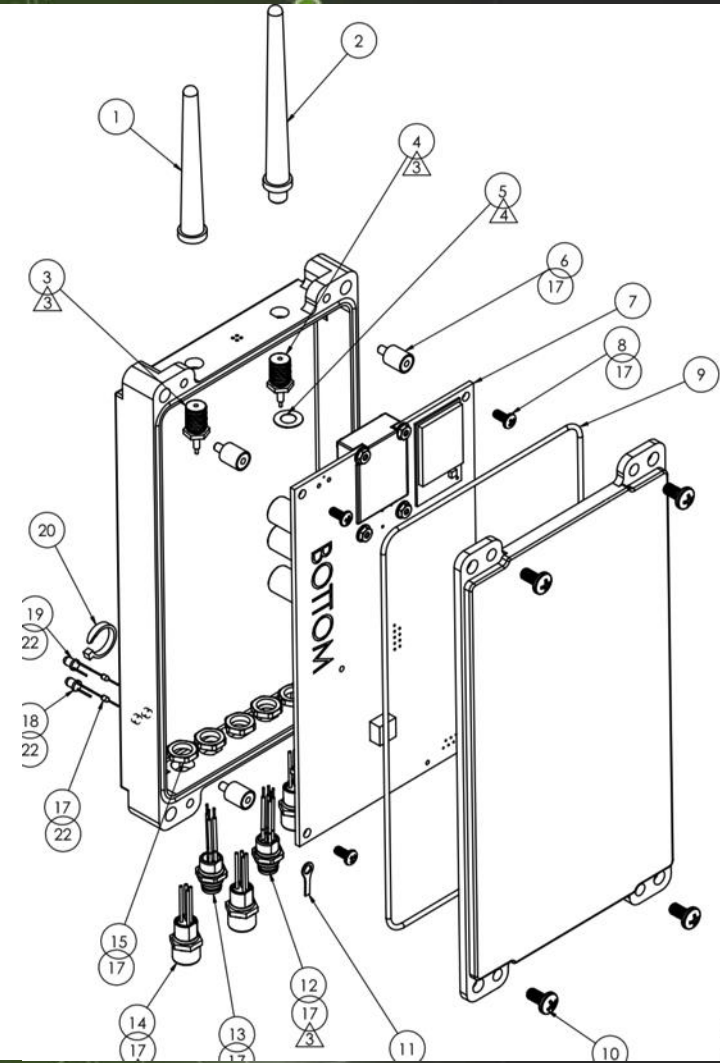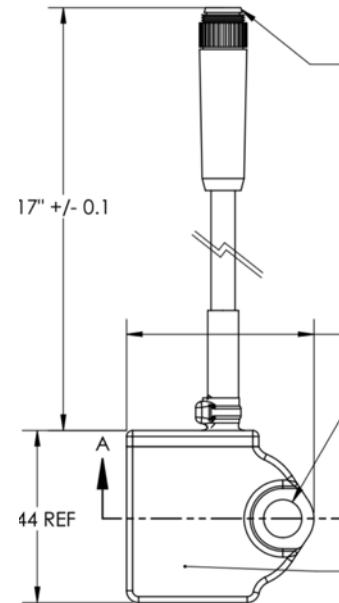
MEMS Accelerometer in Smart Sensor

- ## High Speed Sensors

Hanger Bearing Sensor

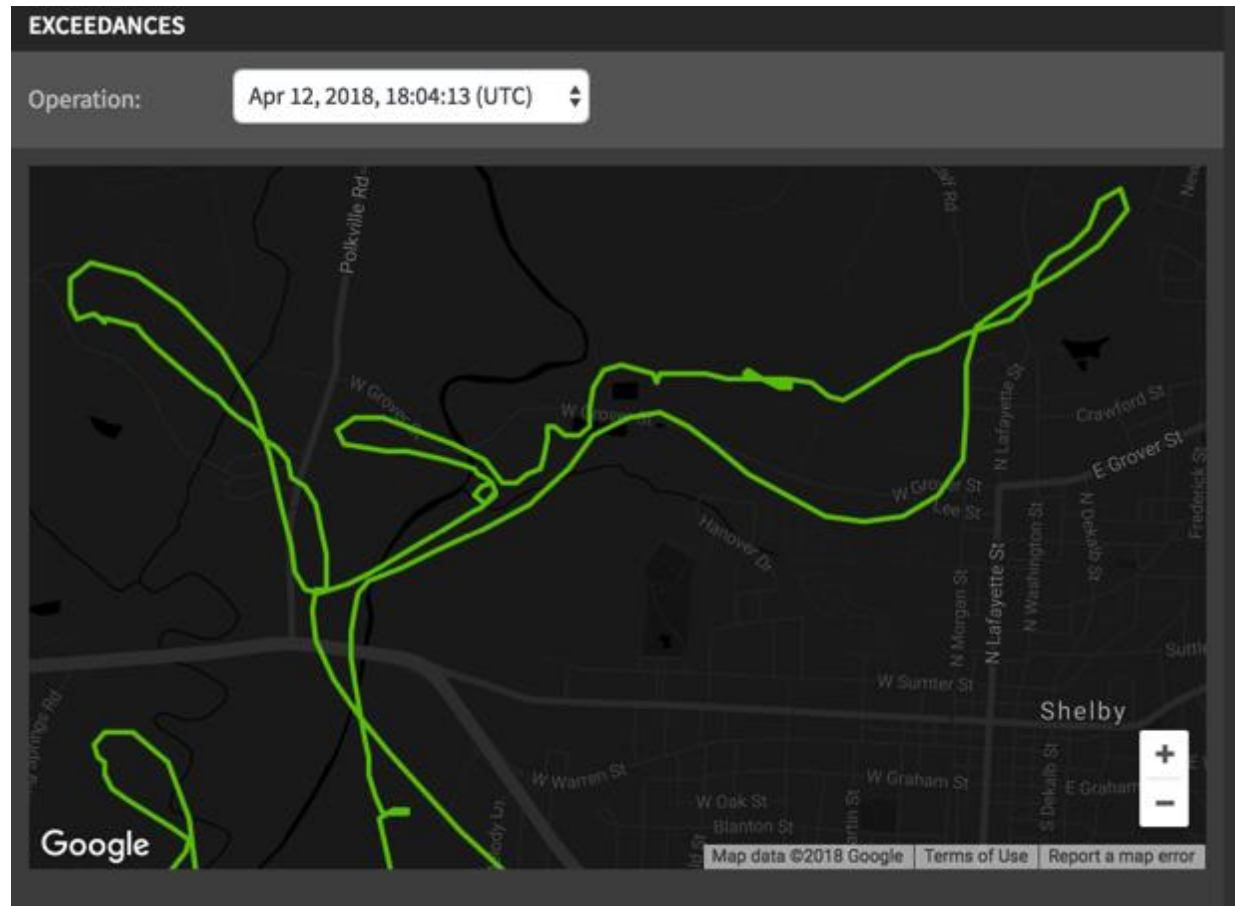**Oil Cooler Sensor**

Gearbox Sensor

IMU integrated into INU

- Allows Reconstruction of vehicle operation with no need to interface into existing avionics – reducing cost

Zoom/Pan

- Display Resolution is 6 seconds
- Full Resolution to 4Hz can be downloaded from CSV

EXCEEDANCES
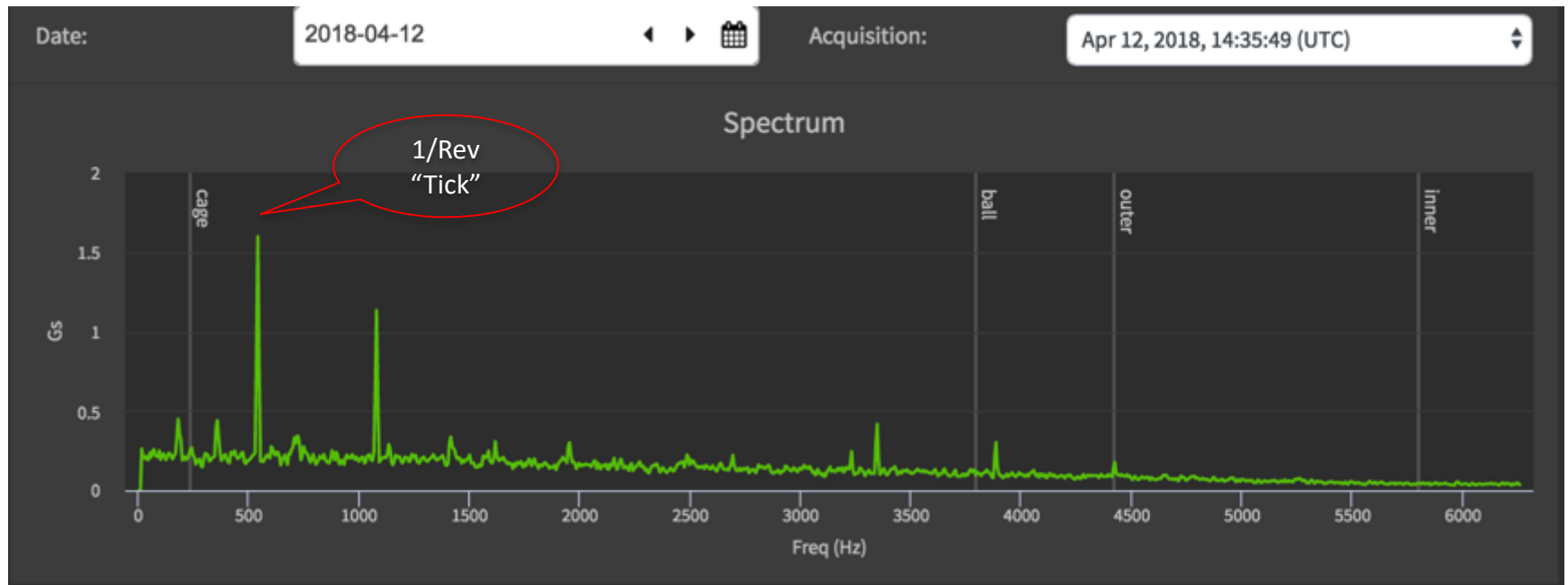
Operation: Apr 12, 2018, 18:04:13 (UTC)

GPMS

Example MEMS Accel on a turbine

Envelop Taken from 17 to 23 KHz
Turbine Shaft: 560 Hz, seen at 1/Rev "tick"
Display Replicates Analysis on the Sensors

Questions?