

EnginePolygraph®



EngineAngel®

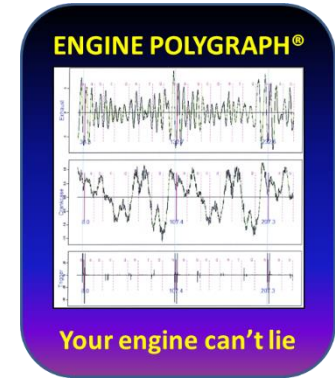
Predictive Fleet Technologies, Inc.

2017-11-28

Engine Analysis and Proscriptive Fleet Management
by leveraging AI & Big Data

Two major components

1. Engine Polygraph® to sample exhaust and crankcase pressure changes to assess an engine's 'health' and provide data to Engine Angel for predictive models.
2. Engine Angel® collects and integrates data from sensors and observations from assets and people (drivers and technicians) to provide performance reporting, work-flow aids (alerts and proposed maintenance schedules), and specific analysis supporting planning practices.

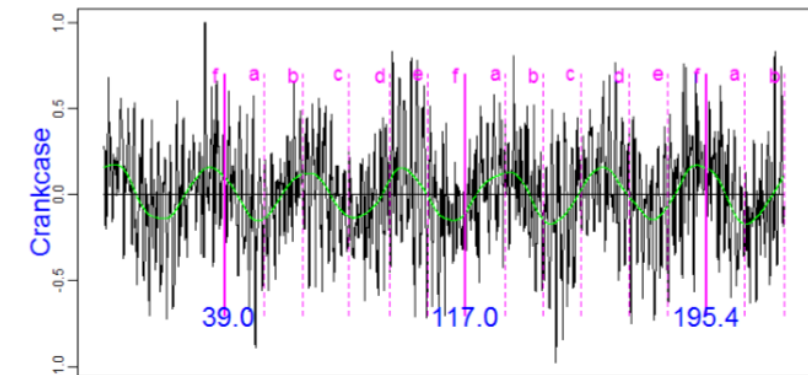
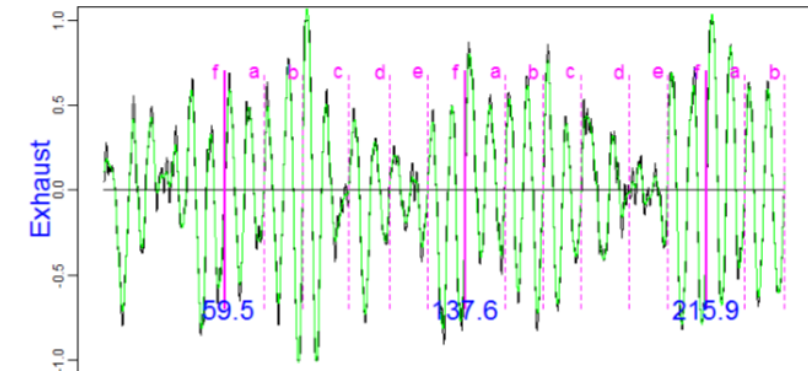


EnginePolygraph[®]

Using piezoelectric sensors, score engine 'health' assessment (1 is very good, 9 is very poor)

- Score 'Upper' engine: valves, head gasket, injectors, etc.
 - Something broken?
 - Volumetric Efficiency - needs cleaning?
 - Dirty (carbon buildup?)
- Score 'Lower' engine: rings, pistons, etc.
 - Something broken?
 - Corroded/pitted cams, bearings?
 - Poor lubrication – contamination, inadequate oil selected?

Upper Engine	5
Lower Engine	8
Volumetric Eff. Score	1
Valve Seating	1



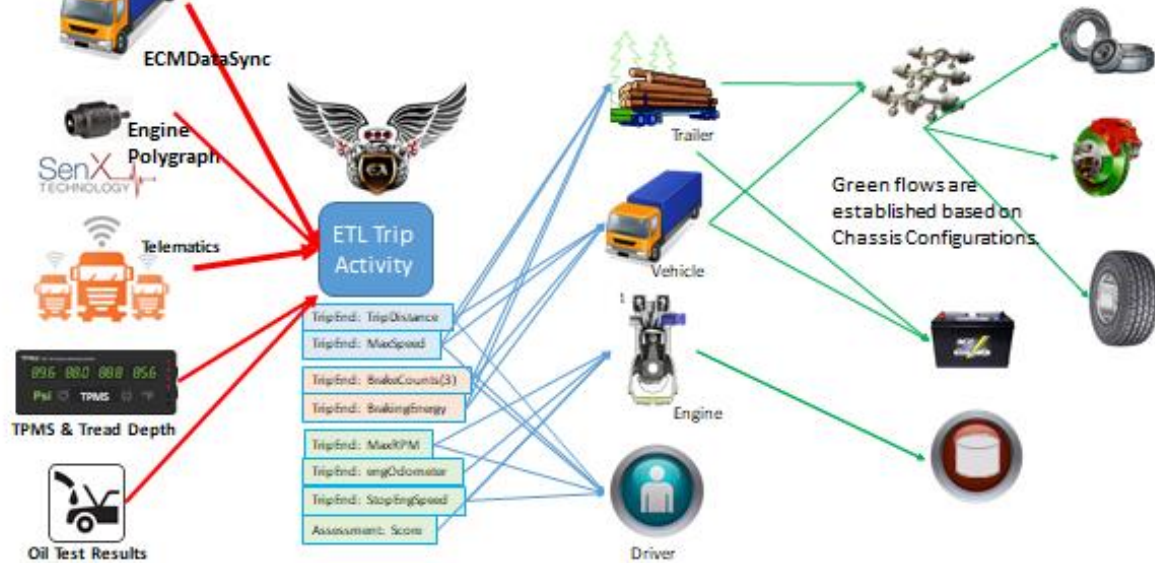
EnginePolygraph Value

- Increased confidence when evaluating a used equipment purchase
 - Lower risk of buying 'lemon'
 - If you are selling, evidence of good value (higher selling price)
- Aid to diagnosing a poorly running engine, especially if no OBD codes
 - Decreased diagnostic time, greater confidence in conclusion
 - Distinction of 'broken engine' vs. 'dirty engine'
- Verification that a repair was done correctly by comparing 'good to great' with 'before' and 'after'
 - Fewer customer complaints
 - Proof that effective work was done
 - Quick determination if more needs to be done
- Assessment of change at return of asset from 'assignment' (e.g., end of lease, end of large project, etc.)

EngineAngel®

- Integrates Fleet asset data to show performance over time and rank within asset vocation, geographic home-base, and season. Data sources: Engine Polygraph, ECM trip reports, Oil Test Results, etc.
- From the sensor data & human observations (driver and technician), calculate utilization rates and deterioration rates (wear, contaminant accumulation, corrosion/cavitation, fracture/rupture, and chemical reaction) to predict End-of-Life (EoF) dates for components.
- Generate proposed Work Orders for PM and repair work to prevent the EoL from occurring, esp. while 'in service'.
- Dynamically update deterioration predictors based on PM, repair work, and inspections of each asset.
- Analyze driver behavior for its affect on vehicle performance for driver bonus and re-training recommendations.
- With the 'Technology Groups' function, monitor trial technology improvements to the fleet assets to develop strategies for technology adoption and working with key partners for asset design improvements.

Event Creation & Data Flows



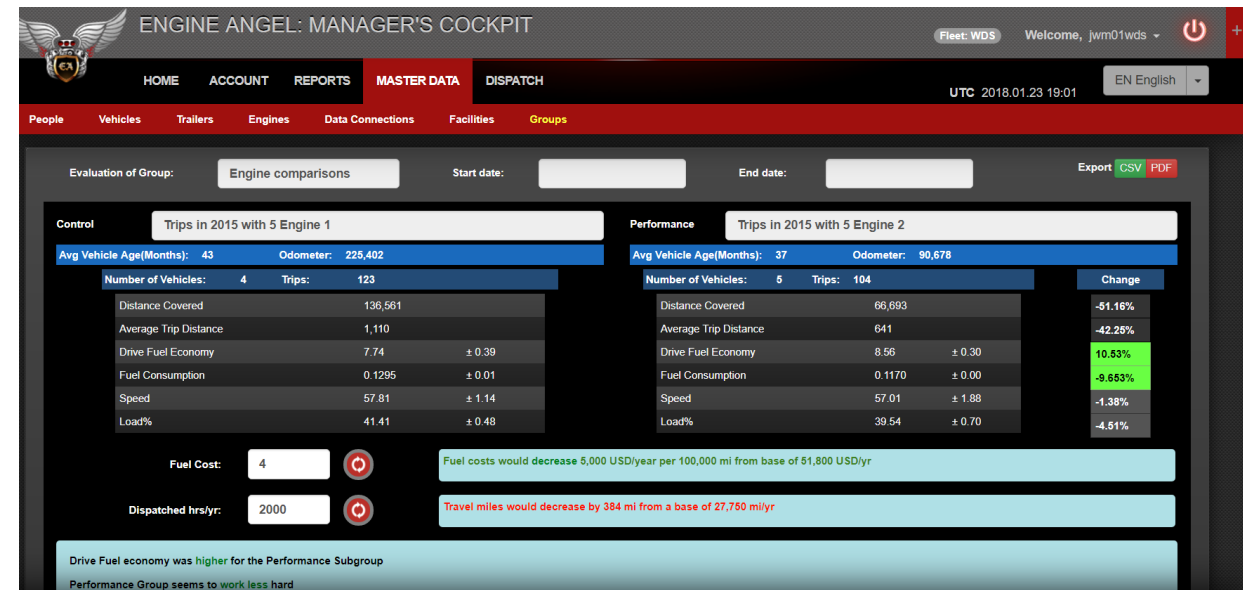
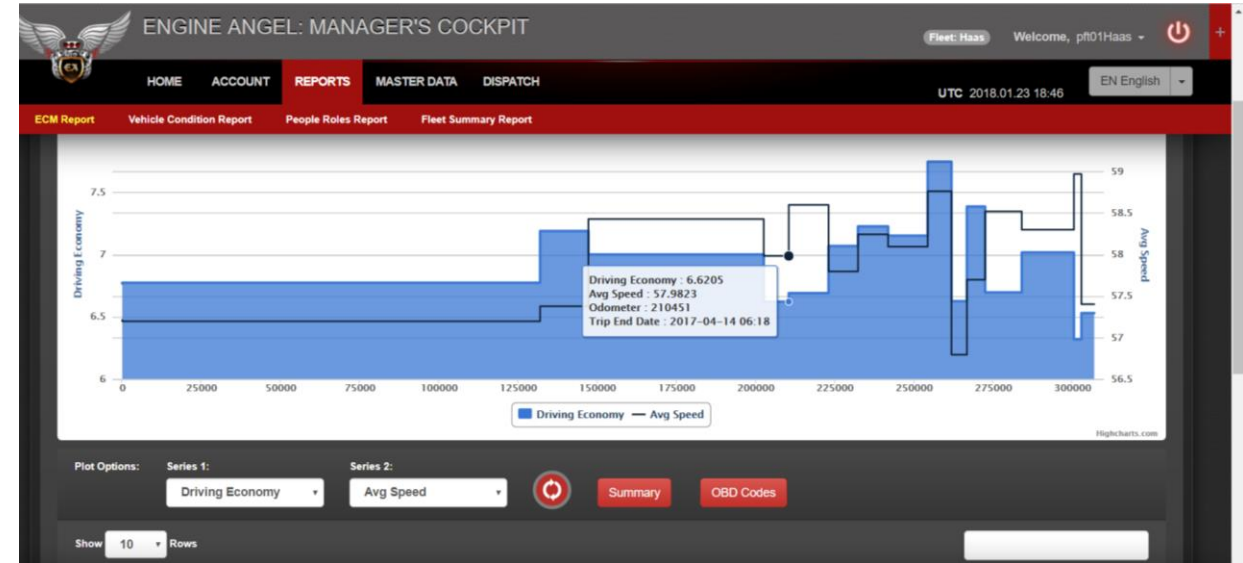
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Vehicle Number: B4O-859
 Vehicle Type: Argosy
 Chassis: L-S1-D2
 Num Axles: 3
 Num Batteries: 3

Viewing Tires on Axle Num: 2

Seq Num	Tire Brand	Tire Line	Rim Diameter	Width	Tread Orig (mm)	Warranty	Distance on Tires	Last Insp. Date	Observation
1	Goodyear	LHS Fuel Max	22.5	279	19.00	320000.00	1192330.00	2008-06-01	OK
2	Goodyear	LHS Fuel Max	22.5	279	19.00	320000.00	1192330.00	2008-06-01	OK
2	Goodyear	LHS Fuel Max	22.5	279	19.00	320000.00	1192330.00	2008-06-01	OK
3	Goodyear	LHS Fuel Max	22.5	279	19.00	320000.00	1192330.00	2008-06-01	OK

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EngineAngel Value

- Better planning of work at shop with 'proposed work order' visibility
- Fewer road-side calls/repairs; fewer OOS tags at inspections
- Better customer service (fewer late deliveries, less damaged goods)
- Longer asset life/ higher trade-in value
- Lower operation cost (better fuel economy, more asset availability)
- Improved Safety record (Driver behavior, better asset condition; Lower INS scores)
- Lower driver turnover (Coaching, training, bonus focused on individual performance; less frustration from OOS and break-downs)
- Improved value of aftermarket technology adds
- Improved specifications for new asset procurement based on your operations