Future Truck Technologies

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Information & Control Evolution

- **1976 – rudimentary mechanical *engine* controls**
  - **RPM limiters actuated for top gear only.**
- **1987 – 1st generation of electronic *engine* controls**
  - **RPM & Speed controls, fuel injection management and timing**

- **1991 – 2nd generation of electronic *vehicle* controls**
  - **Added "smart" engine protections & more vehicle controls.**
  - **1st commercial AMT's available.**

- **2002 – 1st generation of "new" turbo-machinery devices.**
  - **Variable geometry actuation and turbine wheel speed controller.**

Information & Control Evolution

- **2007 – Vertically engineered engine & AMT package.**
  - **100% of the available communications between engine / trans**

- **2009 – Broadening of the *engine* managements & controls**
  - **Smart engine cooling fan systems; Smart Cruise Control algorithms**
- **2010 – 3rd generation of electronic *vehicle* controls**
  - **Smart(er) Powertrain management systems, electronically controlling manual transmission shift points based on load.**

- **2011 – Power Management.**
  - **Interaction between driver full throttle demand and acceptable rates of acceleration, skip shifting, terrain variables with integrated systems. Load Based Variable Power systems.**

Applying Beneficial Information

- **Understand the basic requirement.**
- **The ability to tailor or customize vehicle performance under varying duty cycles to meet customer operational and efficiency requirements.**
- **How can this be done? – correct application of the data collected and review of lessons learned.**

Reaping Advantages

- **Load based Variable Power Programming**
  - **Typical ≤80K# Interstate op's ~1.0% FE gain.**
- **Smart Speed controls. ~1.0% FE gain**

  - **Incr. Gov. droop at both high & low engine speeds. CC does not apply 100% power**
  - **Smart engine cooling fans ~1.0% FE gain**

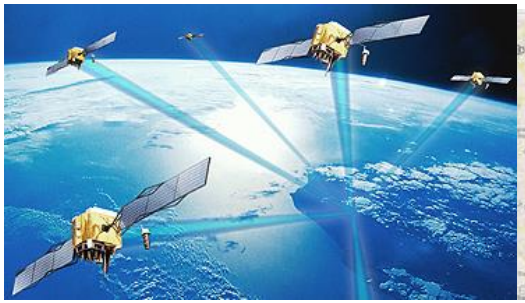
  - **Only as needed & then at a modulated speed.**
  - **No extended over run with A/C demand.**

Today's Technologies

- **Ultra-low speed engine operating range w/ Cruise RPM's ~1100RPM. . ~1.5% FE gain**
- **Clutched air compressors w/ smart technology & Electronic Air Dryers. . ~.75% FE gain**
- **Puff top Speed Limiters – set amount of time / miles per segment that vehicle can exceed RSL to pass.**

Advancing Forward

- Waste Heat Recovery – heat to electrical energy
- 2 stroke engines?
- GPS based vehicle management via Telematics
  - Geo- Fencing.
  - Real time vehicle speed controls for local area.
  - HP output for a specified area of operation only.



Thank you & Good Morning

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