



Research, Development & Engineering Command/ Army Materiel Systems Analysis Activity (AMSAA)



U.S. Army Materiel Systems Analysis Activity (AMSAA) Support to Condition Based Maintenance (CBM) for Ground Vehicles



Vehicle Instrumentation – Automated Data Collection: Condition Based Maintenance (CBM) for Ground Vehicles

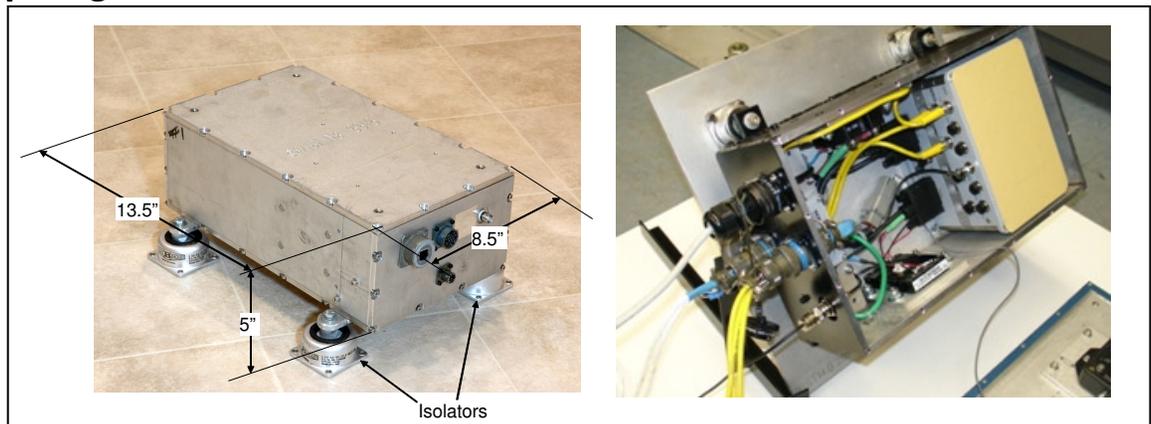


✓ Current instrumentation package:

- Collect & store data feeds from onboard sensors/systems (e.g., vehicle databus)
- Accelerometers on sprung & unsprung mass
- GPS
- Thermal button recorders

✓ Passed developmental test

- Thermal
- Electromagnetic interference
- Durability
- Data feeds



✓ Passed operational test with 11th ACR at Ft. Irwin during recent unit field exercise (15-29 Jul 06)

- 11 ACR provided vehicles & bay space for instrumentation installation
- Access to vehicles to download data
- No negative impacts - no interference with training exercise
- Achieved operational test goals
 - Increased OPTEMPO & mission environment
 - Desert conditions (sand & high temperatures)
 - Validation of data collection & onboard processing during operational use

Significant accomplishments to-date ... Examples of NTC data & analysis transformed into information/knowledge



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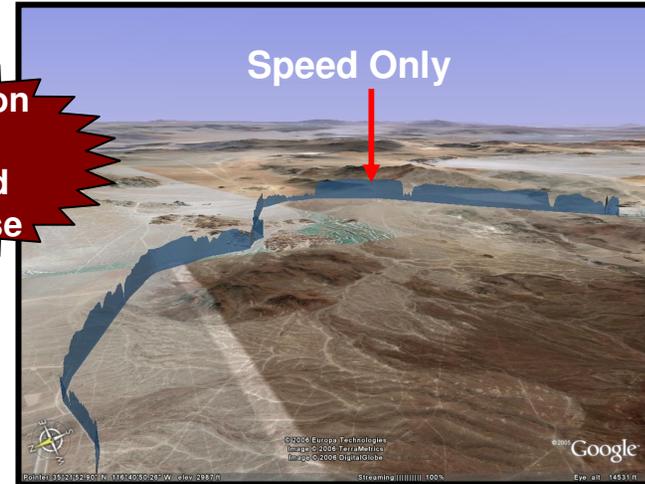


HMMWV Ambulance



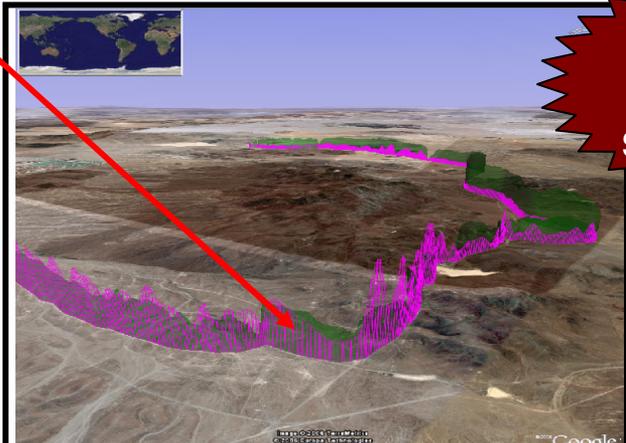
Visual representation of various data elements collected during NTC exercise

HEMTT Wrecker



Speed vs. Vertical Accelerations

HEMTT Tanker



Can provide quick feedback to customers – Soldiers, LCMCs, ...

HEMTT Cargo

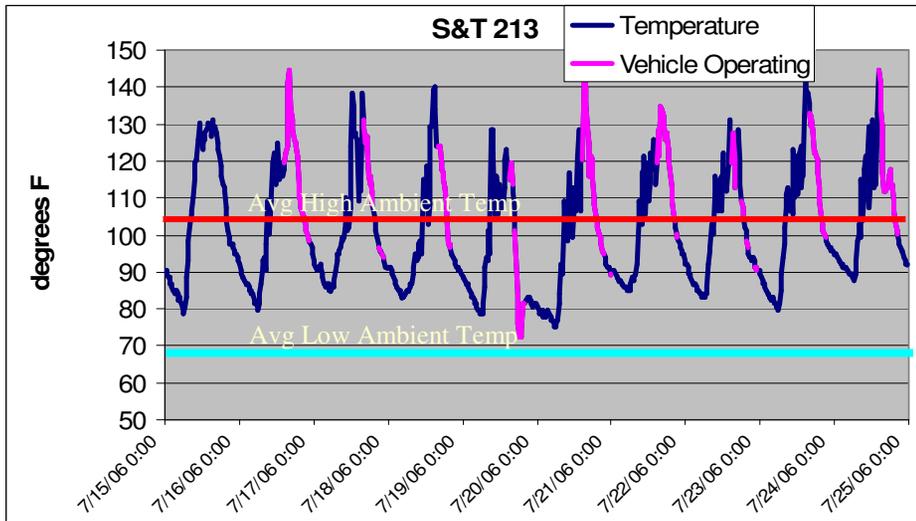


- ✓ Visualization provides ability to quickly assess terrain conditions & operator characteristics
- ✓ Any collected parameter can be plotted (e.g., coolant temp, horsepower, hard brakes, ...)

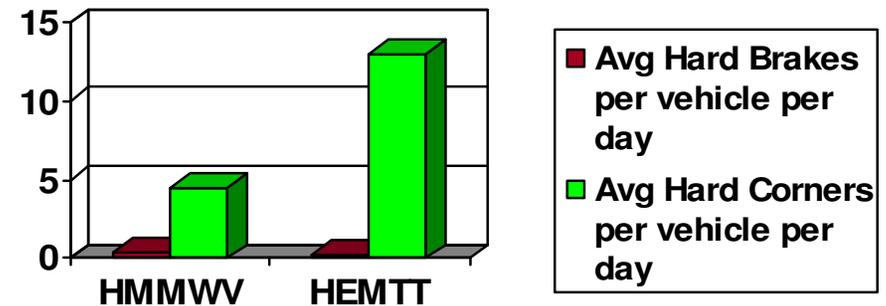
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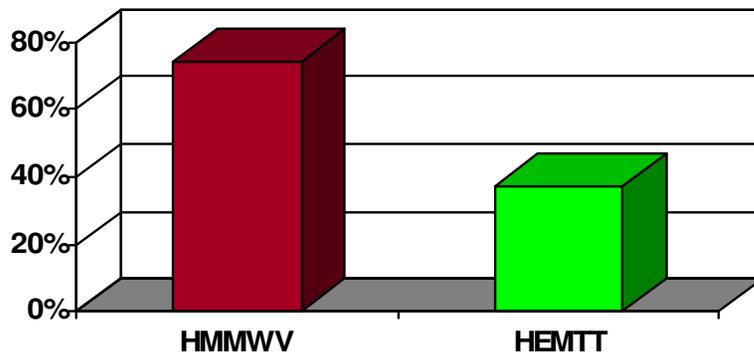
Interior Temperature



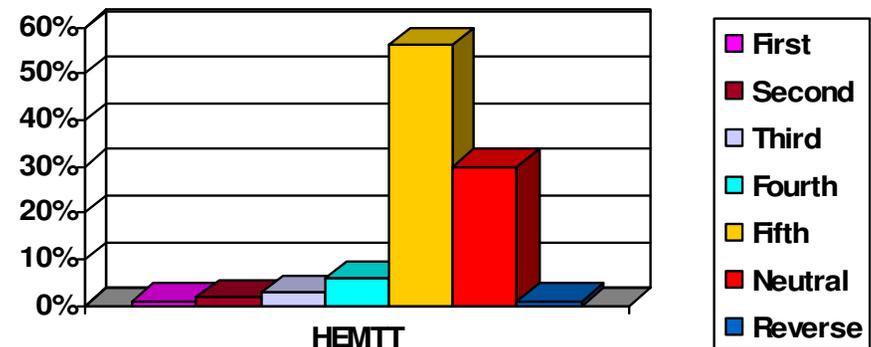
Braking and Cornering



Percent Time at Idle



% Time in Gear (Gear Selected)

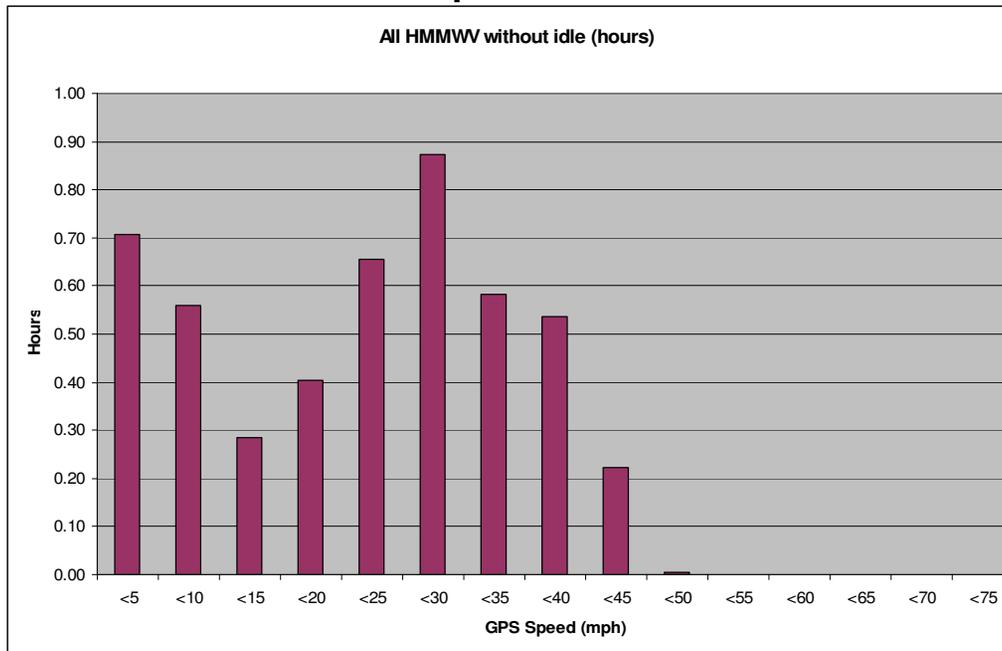


Using NTC exercise, many data elements analyzed & transitioned to useful information/knowledge - quickly

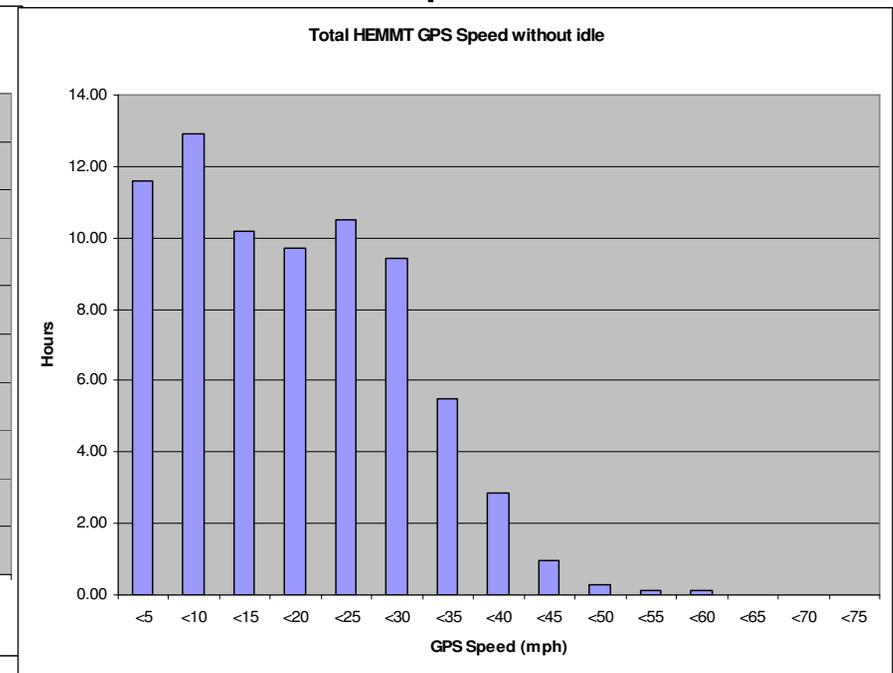
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HMMWV Speed Profile



HEMMT Speed Profile



Next Steps with NTC Data

- ✓ Continue analysis of NTC instrumented vehicle data and maintenance data collected through SDC
 - Link deadlining faults to measured performance exceedences
 - Finalize comprehensive list of metrics
 - Determine “health” of instrumented NTC fleet
- ✓ Provide detailed update to 11th ACR & CG NTC



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Path Forward

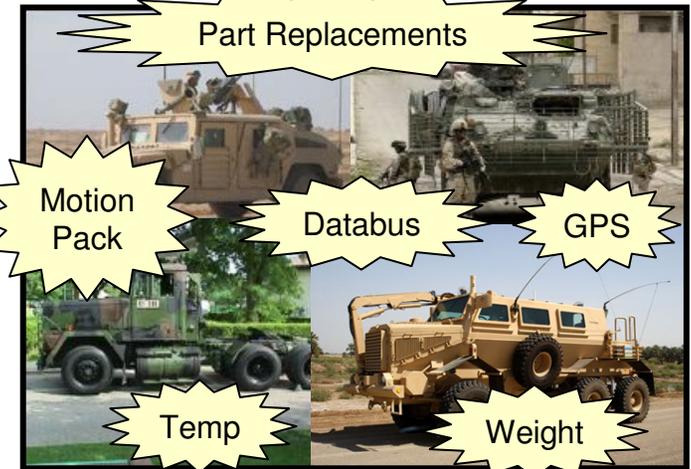
- ✓ AMSAA will deploy 20-30 boxes to OIF ~Nov 06
 - Developmental & operational tests completed
 - Utilize AMSAA deployed analyst at AFSB-Iraq
 - Utilize AMSAA SDC infrastructure at multiple OIF locations
 - Select diverse vehicles & mission profiles
 - Coordinate with operational units
 - Feedback to all customers (Soldiers, LCMC, RDEC, ATEC, CRC, ...)

- ✓ Vehicle scales also being deployed to determine operational loads

- ✓ AMSAA will utilize SDC program to capture maintenance events of instrumented vehicles

- ✓ AMSAA continues to coordinate all of its efforts with TACOM LCMC, TARDEC, OC&S, CASCOM, CRC, Transportation School, ATEC, LIA, ...
 - Data and analysis requirements determination
 - Collaboration with other initiatives
 - Collaboration/integration with Common Logistics Operating Environment (CLOE)

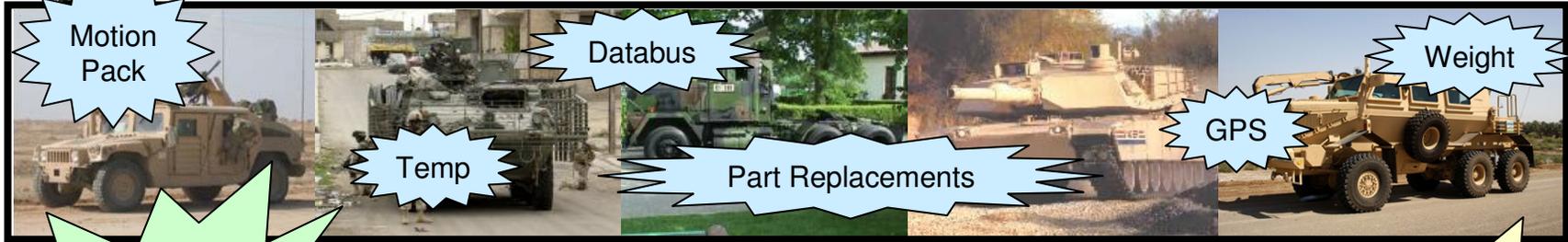
- ✓ Begin prognostic algorithm development



Today - Able to provide significant breadth of data and analysis for fleet management



Summary



Can and ARE doing this!

Ultimate goals

Still working on this!

Compile and Report Usage Data To

- Fleet Managers
- Engineers (product improvement)
- Logistics

USAGE

Provides Immediate Value

Develop prognostic tools/algorithms

Feed data to prognostics algorithms

Report impending failures and unsafe or damaging usage to:

- Vehicle Driver
- Maintainers
- Commanders
- LCMCs

PROGNOSTICS

Value In the long-term