Particle Size Distribution Activities at MTC
Particle size distribution activities at MTC
ETH Workshop Zürich 7/8 -97
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Motortestcenter

- Located in Jordbro, Haninge, 20 km south of Stockholm
- Separate department ("business area") of the Swedish Motor Vehicle Inspection Co. To become a wholly owned subsidiary company
- About 30 employees
- Turnover about 45 M SEK/year

3 major areas 1(2)

- Certification
  - Certification according to EU directives
  - National certification
  - In-use compliance testing
- Research and development work for the Sw. EPA
  - Research and development in the field of emission control
  - Deterioration of emission control systems
3 major areas 2(2)

- Consulting
  - Fuel and additives
  - Alternative fuels
  - International projects
  - Research and development for the auto industry
  - Working parties and investigations
  - Seminars and conferences
  - Expert functions

Facts about Motortestcenter

- Area (land): 12 000 m²
- Buildings: 4 000 m² (1st floor: 3 000 m²)
- 4 Test cells for light duty vehicles and/or small engines
- 1 heavy duty chassis dynamometer
- 1 heavy duty enginge test cell
Light duty vehicle testing
- Cold start

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Heavy duty vehicle testing
- Hybrid bus

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Heavy duty engine testing
- Volvo 7 liter engine

Small engine testing
- Various engines
Particulate emissions in ECE R49 since 1970

MTC’s Aims

- Development of a method to measure total number and number distribution of particles in real-time (transient driving cycles)
- Integration of the instrumentation to be used in the testing environment of an engine laboratory
- Co-operation with instrument suppliers, other labs, universities, etc. to further develop the technology
ELPI instrument in the heavy duty engine test cell

Parameters affecting particle measurements

- Vehicle or engine tested
- Fuel used
  - Diesel, gasoline, alternatives
- Driving cycle dynamics
  - Steady state, transient
- Sampling system configuration and conditions
  - Geometry, mixing, air stream velocity, temperature, dilution ratio,...
- Instrumentation
Particle size distribution - projects at MTC 1(2)

• A project was initiated in 1997 with funding from the Swedish EPA with the following aims:
  - Development of the methodology
  - Light duty vehicles: diesel and gasoline cars at different ambient temperatures (+22°C and -7°C)
  - Heavy duty vehicle: diesel with and w/o cat & filter
• Both light and heavy duty vehicles will be tested according to different driving cycles. The instrument can also be used in engine test cells

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Particle size distribution - projects at MTC 2(2)

• Future projects will include reformulated and alternative fuels (light duty and heavy duty)
  - Diesel fuel qualities: C1, C2 and C3
  - RME
  - Blended fuels
  - Ethanol (methanol)
  - CNG, biogas
  - DME

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Total number of particles
VW Golf TD in NEDC

Number distribution for the
VW Golf TD in NEDC
Total number of particles in the OICA Cycle

Distribution of particles in 2 modes of the OICA cycle
Particulate emissions in FTP phase 1 - Honda Civic

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