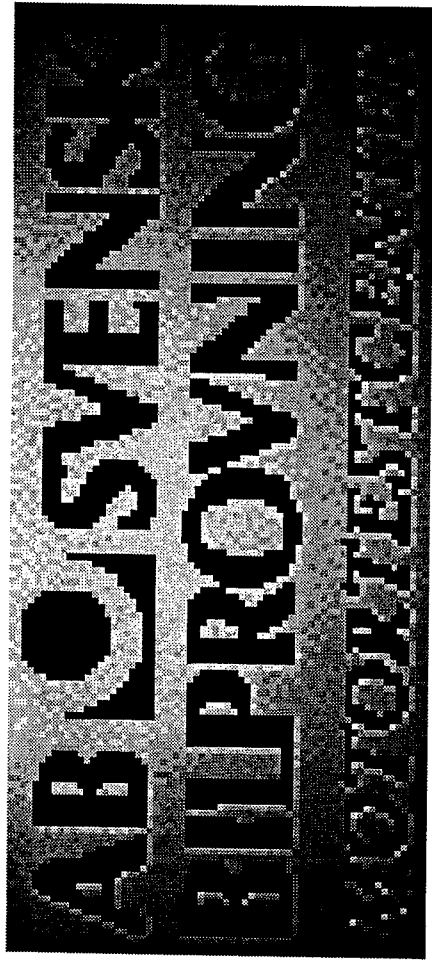


Peter Ahlvik
AB Svensk -Bilprovning
Motortestcenter

Particle Size Distribution Activities at MTC



**Particle size distribution
activities at MTC**

ETH Workshop Zürich 7/8 -97

Peter Ahlvik, Motortestcenter



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

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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

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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

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Facts about Motortestcenter



- ◆ Area (land): 12 000 m²
- ◆ Buildings: 4 000 m² (1:st floor: 3 000 m²)
- ◆ 4 Test cells for light duty vehicles and/or small engines
- ◆ 1 heavy duty chassis dynamometer
- ◆ 1 heavy duty engine test cell

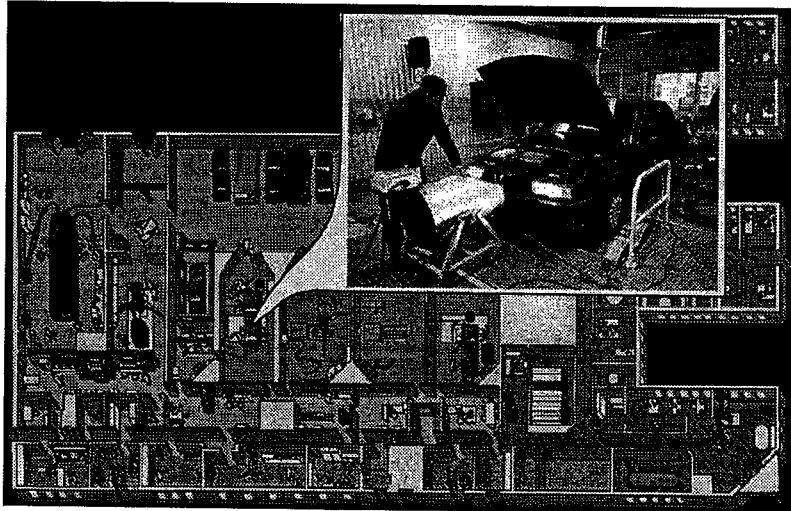
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Light duty vehicle testing - Cold start



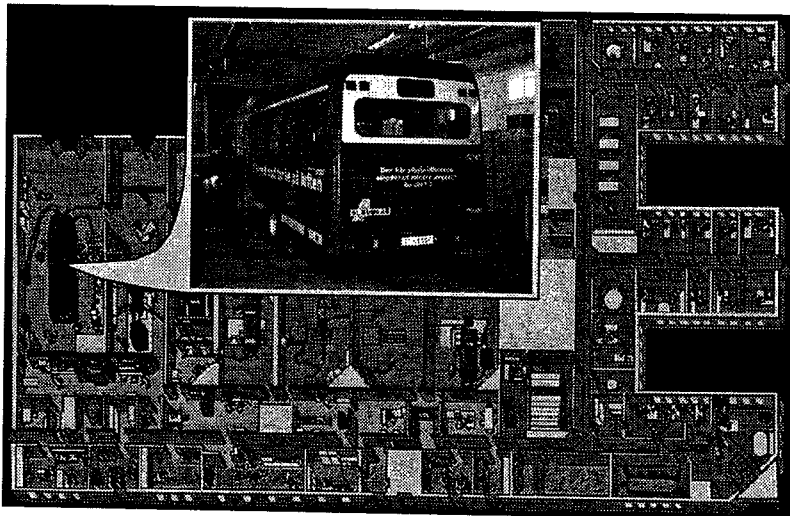
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Heavy duty vehicle testing - Hybrid bus



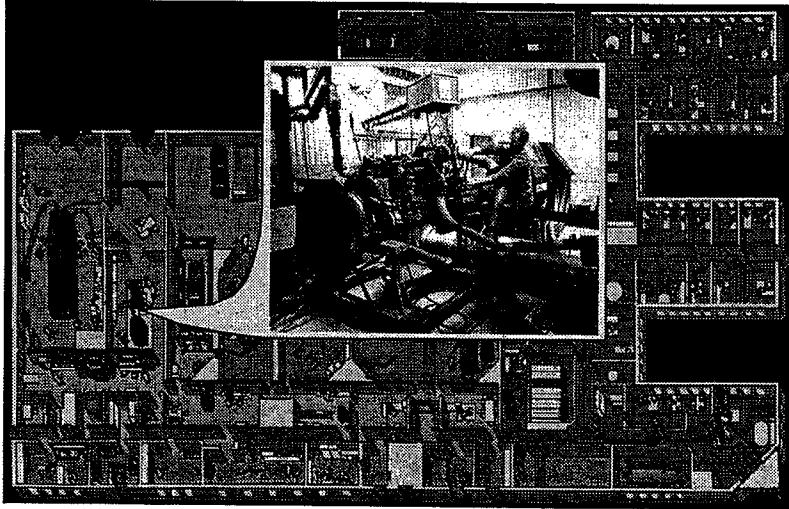
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Heavy duty engine testing - Volvo 7 liter engine



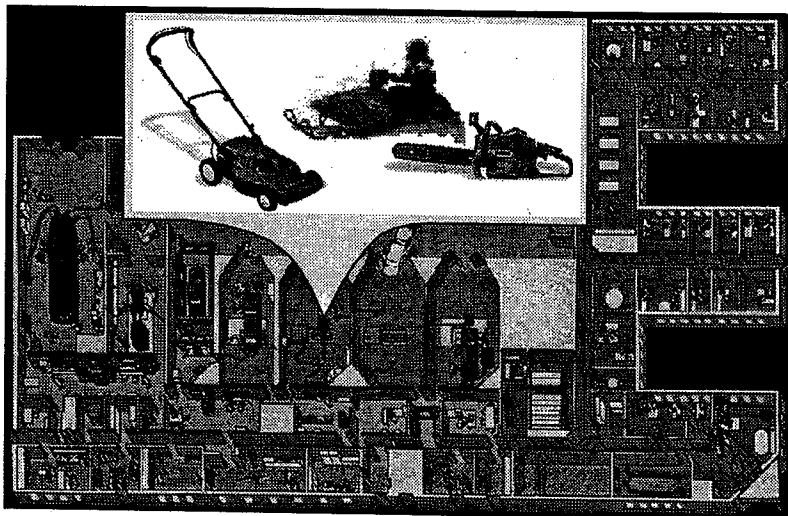
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Small engine testing - Various engines

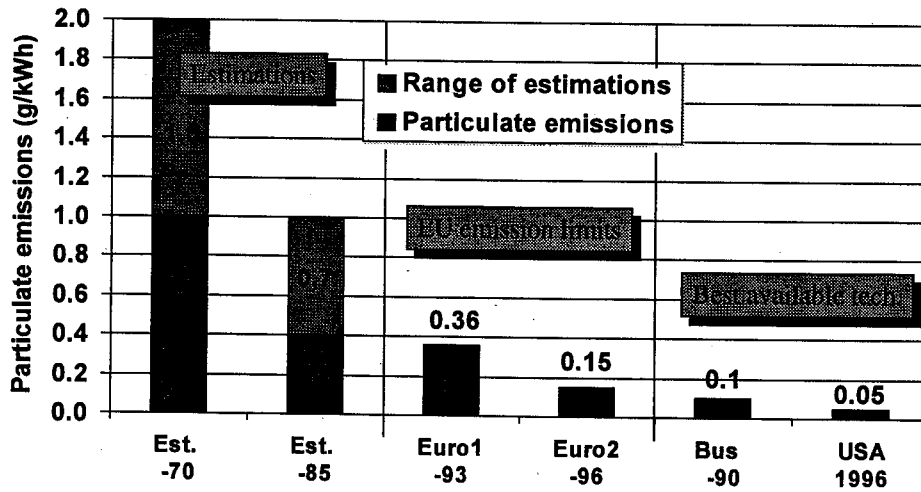


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Particulate emissions in ECE R49 since 1970



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MTC's Aims



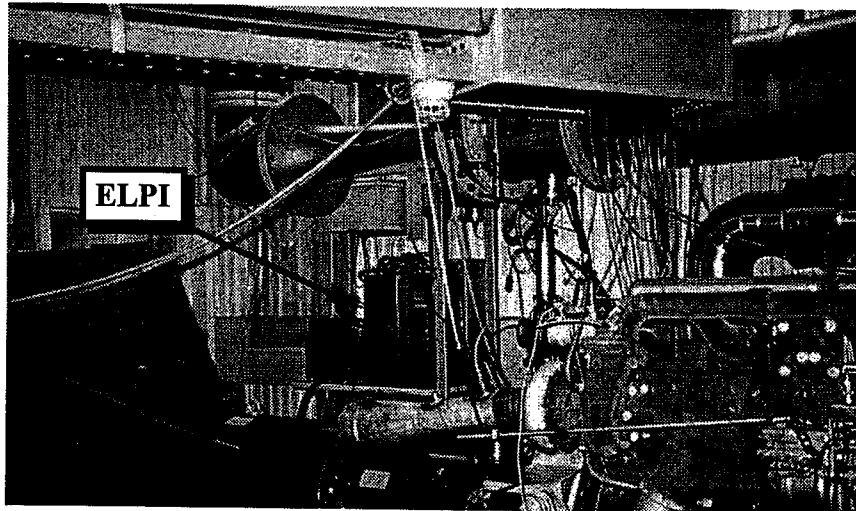
- ◆ Development of a method to measure total number and number distribution of particles in real-time (transient driving cycles)
- ◆ Integration of the instrumentation to be used in the testing environment of an engine laboratory
- ◆ Co-operation with instrument suppliers, other labs, universities, etc..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

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ELPI instrument in the heavy duty engine test cell



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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

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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

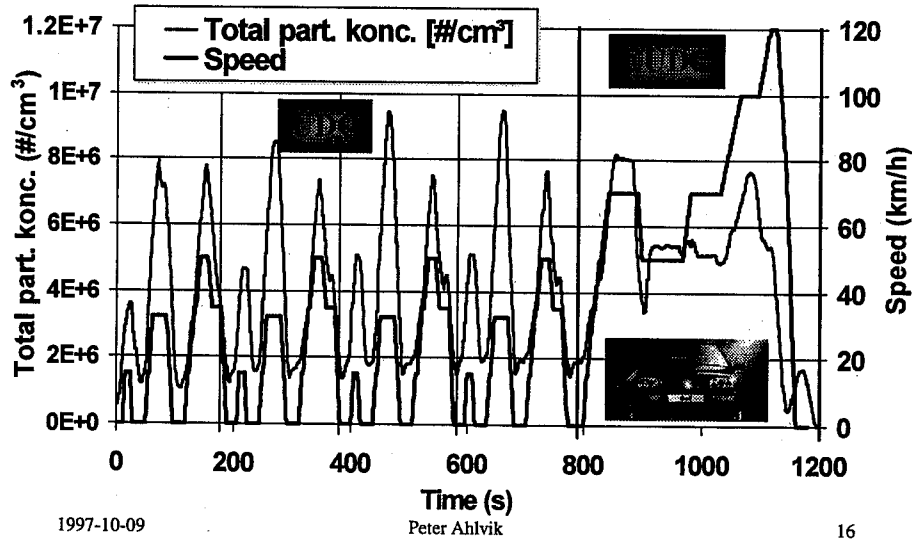
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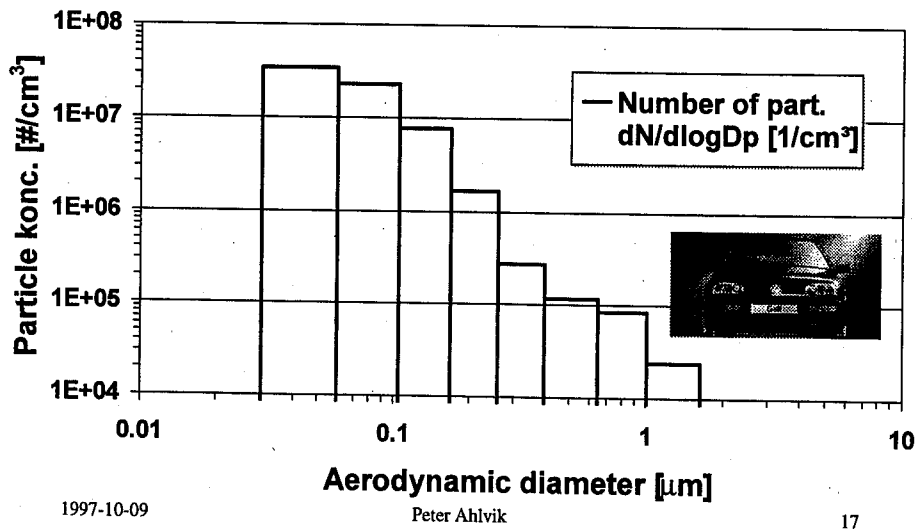
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Total number of particles VW Golf TD in NEDC

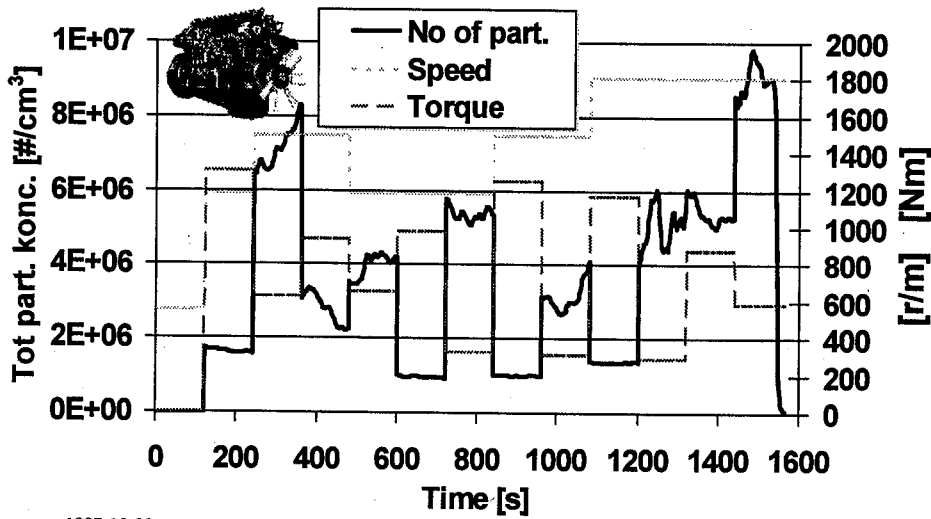


Number distribution for the VW Golf TD in NEDC





Total number of particles in the OICA Cycle



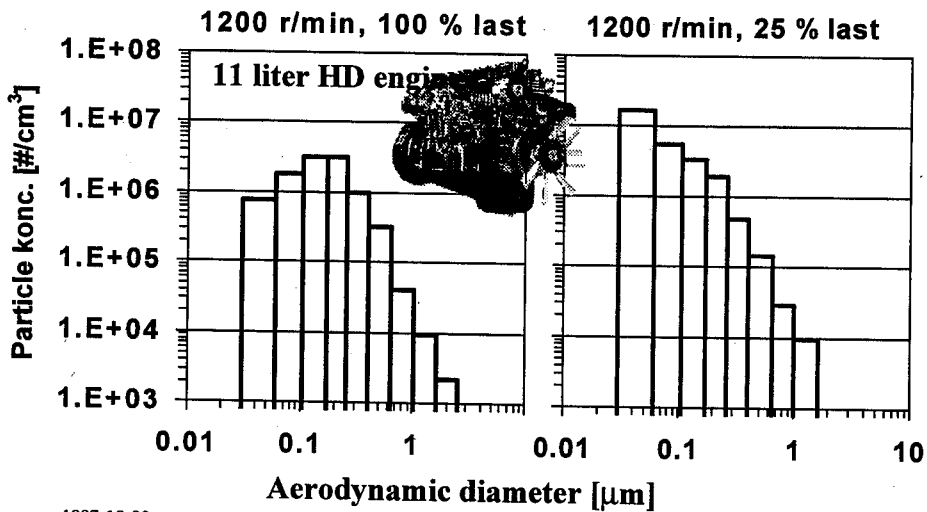
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Distribution of particles in 2 modes of the OICA cycle



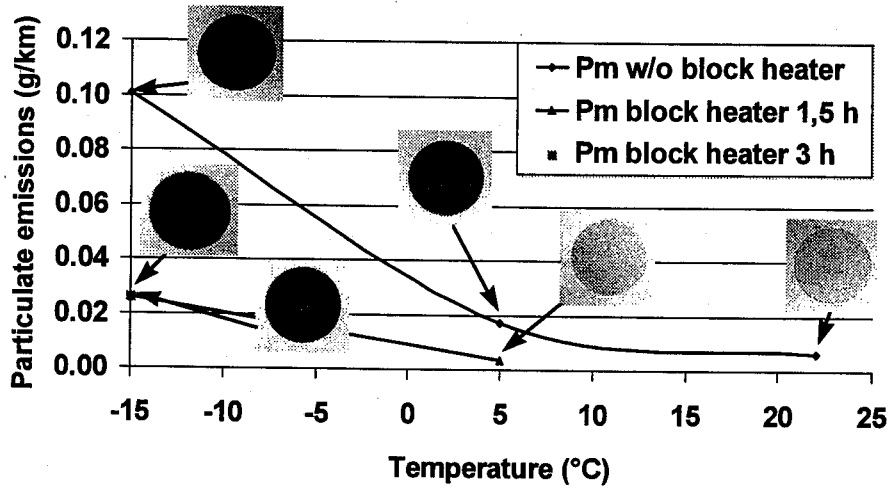
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Particulate emissions in FTP phase 1 - Honda Civic



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