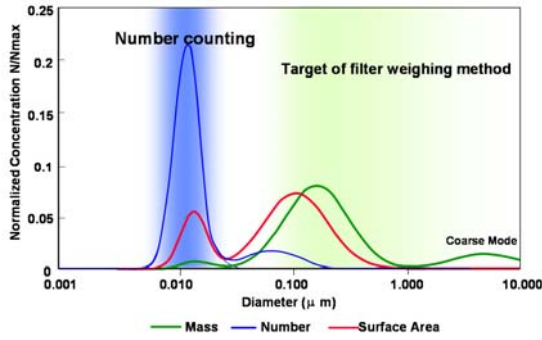


# Particle Number emission from recent HD engines with PMP method

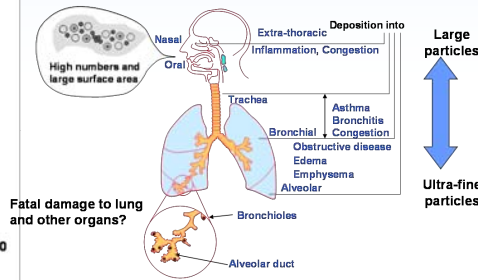
National Traffic Safety and Environment Laboratory

Hiroyuki YAMADA (h-yamada@ntsel.go.jp)

## Target diameter of both methods



Human body significantly reacts to diesel nano-particles. Small particles are too dangerous to nervous system.



Source: Ishihara

## PMP (Particle Measurement Program)

Established in 2001 under GRPE

### Objective

Developing a new technique of measuring PM in type approval test.

Proposed number counting method

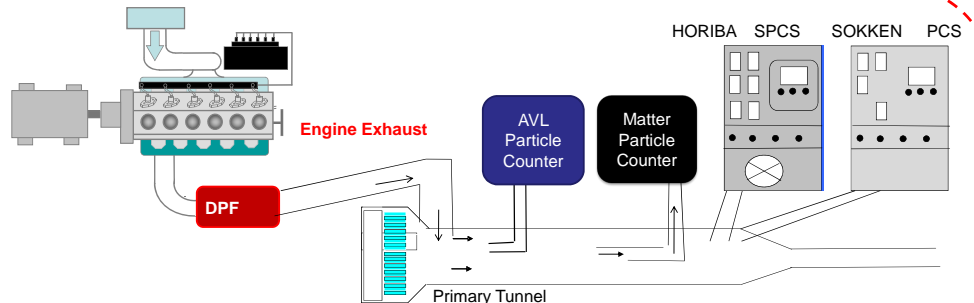
### Now

Light duty: EU decided to introduce this method.

Heavy duty: Under testing (Round Robin test, Validation Exercise)

## Experimental

Engine Model	J08E-TP
Constructor	Hino
Configuration	Inline 6 cyl. w/ I.C, T. C
Bore x Stroke	112 x 130
Inj. System	Common Rail (Max 1600 bar)
Emission Reduction Devices	DPF w/ CAT, Cooled EGR
Displacement	7.684 L
Compression Ratio	18
Max Power	117 kW / 2700 rpm
Max Torque	716 N-m / 1600 rpm
Emission level	2005 Japan NOx and PM 10 % reduction

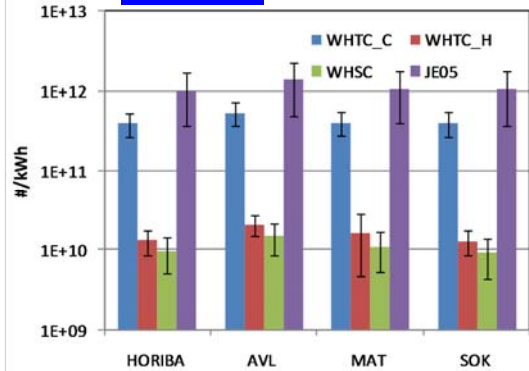


Tested mode : WHTC cold, WHTC hot, WHSC and JE05

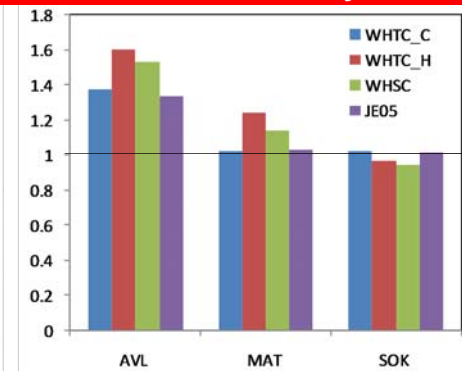
Simultaneous observations using HORIBA, AVL, Matter and SOKKEN number counting system were performed with DPF equipped diesel engine.

	HORIBA MEXA1000	AVL Particle counter	MATTER	SOKKEN PCS
Primary Dilution	Ejector	Chopper	Rotary Disc	Ejector
Distance between sampling point and primary diluter	4m	0.2m	0.2m	4m
Perf (target dilution factor)	185.98 (150)	277 (250)	189.66 (150)	118.6 (100)
PNC	CPC (TSI)	CPC (TSI)	CPC (TSI)	CPC (TSI)

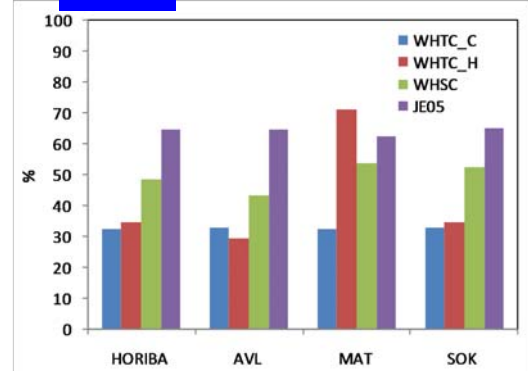
## Results



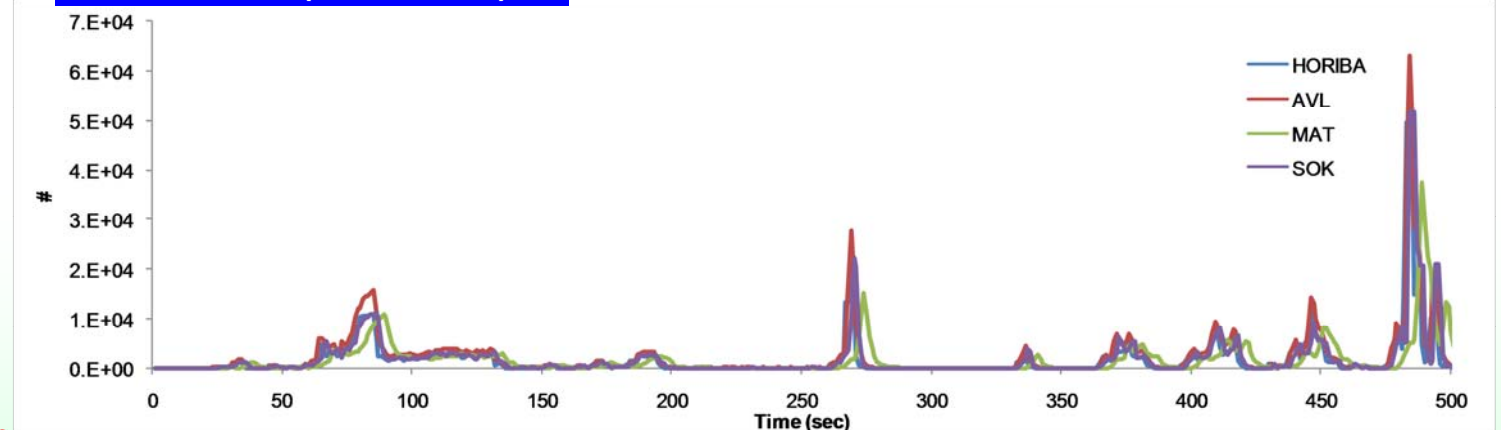
## Results normalized by Horiba



## COV



## Real time data (WHTC Cold)



## Conclusion

- Trends of number emission in various mode were almost the same under 4 measurement systems
- AVL system exhibited 1.5 times higher emission. This may be arisen by the high DF value.
- No difference was observed in real time emission by the difference of a primary dilutor location.