



Presentation at SP C meeting at BASt,
Bergisch-Gladbach, Germany

26-27 April 2006

By Ulf Sandberg, VTI

WP C4:

Legislation-related issues

Tasks

Task C4.1: Integration of collected knowledge into a sustainable policy

Task C4.2: Time trends in tyre/road noise emission

- **Subtask C4.2.1: Survey of noise emission from tyres in new condition but from different time periods**
- **Subtask C4.2.2: Study of the influence of tyre age and state of wear on noise emission**

Task C4.3: Measurement methods

- **Subtask C4.3.1: Possibilities to replace some coast-by measurements with laboratory drum or CPX measurements**
- **Subtask C4.3.2: Consideration of whether the present measurement methods may be improved**

Task C4.1: Integration of collected knowledge into a sustainable policy

- Will consider the output of the 2001/43/EC study by FEHRL but will not be limited to it
- Consider tyres not presently covered by 2001/43/EC
- May include measurements in cases where a lack of data is identified
- Noise and RR labeling?
- Will make use of parts of Swedish-Polish project
- Recommendations based on the other 4 subtasks
- Deliverably due at project completion
- Work will be made mainly in 2007

Subtask C4.2.1: Survey of noise emission from tyres in new condition but from different time periods

- Will use the output of the 2001/43/EC study by FEHRL
- Regulation history and its expected and documented effects
- Tyre dimensional history and its expected and documented effects
- Rubber hardness history and its expected and documented effects
- Changes in M+S tyre design and its noise effects (e.g. siping)
- Consider positive (?) interaction between noise and rolling resistance
- Will include measurements on older tyres (from before 1990) and on brand new ones
- Inventory of old types of tyres for testing (VTI, BAST, TUG, Conti)
- Compilation of measured data, mainly on ISO surfaces
- Will be made mainly in Aug-Dec 2006

Subtask C4.2.2: Study of the influence of tyre age and state of wear on noise emission

- Will consider work being made in ISO/TC43/SC1/WG33 on tyre ageing effect on noise and ageing effect on rubber hardness in PIARC Reference Tyre Group
- Cooperation with the Conti "Wear Competence Center"
- Wear by driving car considered but abandoned due to cost
- Wear made on the Conti Wear Machine
- 3 Conti summer tyres and one winter tyre, plus two non-Conti tyres, to be worn down by 2, 4 and 6 mm
- Coast-by, CPX and drum noise and RR drum measurements when new and after each wear period
- Will be made May-October 2006. Deliverable due 31 July 2006 must be shifted to 31 January 2007

Subtask C4.3.1: Possibilities to replace some coast-by measurements with laboratory drum or CPX measurements

- Milestone report produced in April 2006

Subtask C4.3.2: Consideration of whether the present measurement methods may be improved

- Improved specs for ISO 10844 surface (evaluate and refer to ISO...WG42 work)
- RRT made by M+P for WG42 shall be considered
- Representativity and relevance of the ISO 10844 surface (already started activity)
- Need for additional ISO surface (rough texture)
- Calibration of ISO surfaces using reference tyre?
- Vehicle test speeds (also 50 km/h?)
- Lifecycle considerations (new vs worn tyres)
- If worn tyres need testing, consider the laboratory drum method
- dB discount and truncation
- How to achieve that vehicle improvements reducing tyre noise will mean a reward to the producer?
- Consider doing some measurements on laboratory drum (COP)
- Will be made mainly in Sep 2006 – Jan 2007

Milestones

- **C.MS8:** Conclusion regarding the use of laboratory drum and CPX measurements

Originally 31 January 2006, will be 30 May 2006

- **C.MS9:** Conclusion regarding the noise emission of worn relative to new tyres

When? Originally: Month 18 (31 July 2006)

(This deadline shall be moved 6 months)

Deliverables

- **C.D6:** Report on worn tyre policy

When? Month 18 (31 July 2006)

(This deadline should be moved to 31 January 2007)

- **C.D7:** Report on vehicle/tyre/road noise emission limits

When? Month 36 (31 January 2008)

MILESTONE REPORT

Presentation at SP C meeting at BAST,
Bergisch-Gladbach, Germany

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By Ulf Sandberg, VTI

**Possibilities to Replace Outdoor Coast-by Tyre/Road Noise
Measurements with Laboratory Drum Measurements**

Milestone according to contract

- **C.MS8:** Conclusion regarding the use of laboratory CPX measurements (or possibly even field CPX measurements): Are such methods enough representative and accurate in order to be useful, e.g. in COP testing or testing of tyres in worn versus new condition? (Month12)

Measuring methods considered

- The ***Coast-By (CB)*** method
- The ***Close-Proximity (CPX)*** method
- The ***Trailer Coast-By (TCB)*** method (a hybrid of the two first methods)
- The laboratory ***Drum (DR)*** method

Largest drum (6.3 m) – "real" road surface



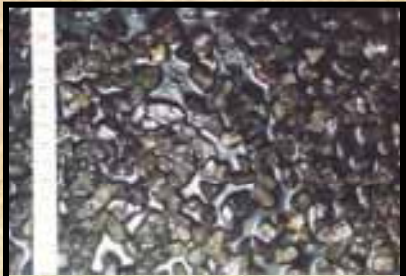
Smallest drum (1.5 m) – replica road surface



Laboratory (indoor, drum) measuring method



SurfDress



SW



ISO



DAC 16





Replica road
surfaces

Relations between **Close Proximity** and **Coast-By** method





- Accounts well for road surface influence
- Good designs not very sensitive to background noise
- Requires only one test tire
- Fairly representative
- Measurements rather easy and inexpensive
- Not useful in wet road conditions
- Equipment rather expensive



- Representative of actual noise emission
- Accounts very well for road surface influence
- May be used for testing wet road conditions
- Requires 4 or more test tires
- Sensitive to background noise
- Sensitive to meteorological conditions
- Test vehicle may influence results
- Many vehicles necessary to test all tire sizes
- Usually difficult and expensive to perform

Relations between **Close Proximity** and **Laboratory Drum** methods

- 
- Accounts well for road surface influence
 - Good designs not very sensitive to background noise
 - Requires only one tire
 - Fairly representative
 - Measurements rather easy and inexpensive
 - Not useful in wet road conditions
 - Equipment rather expensive

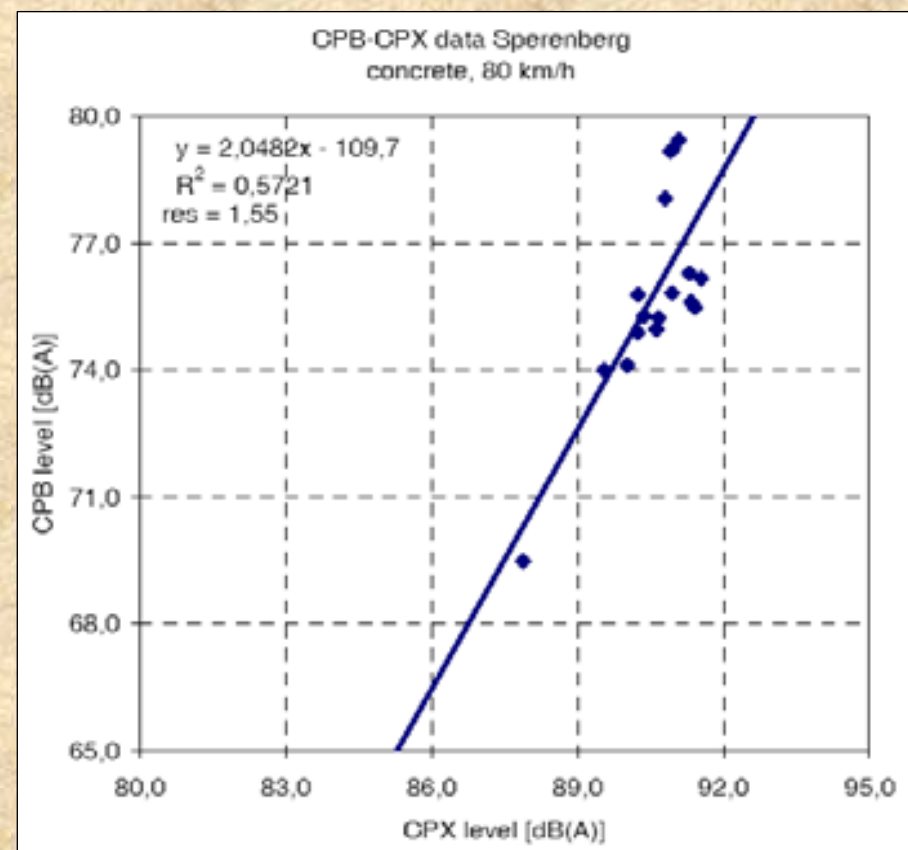
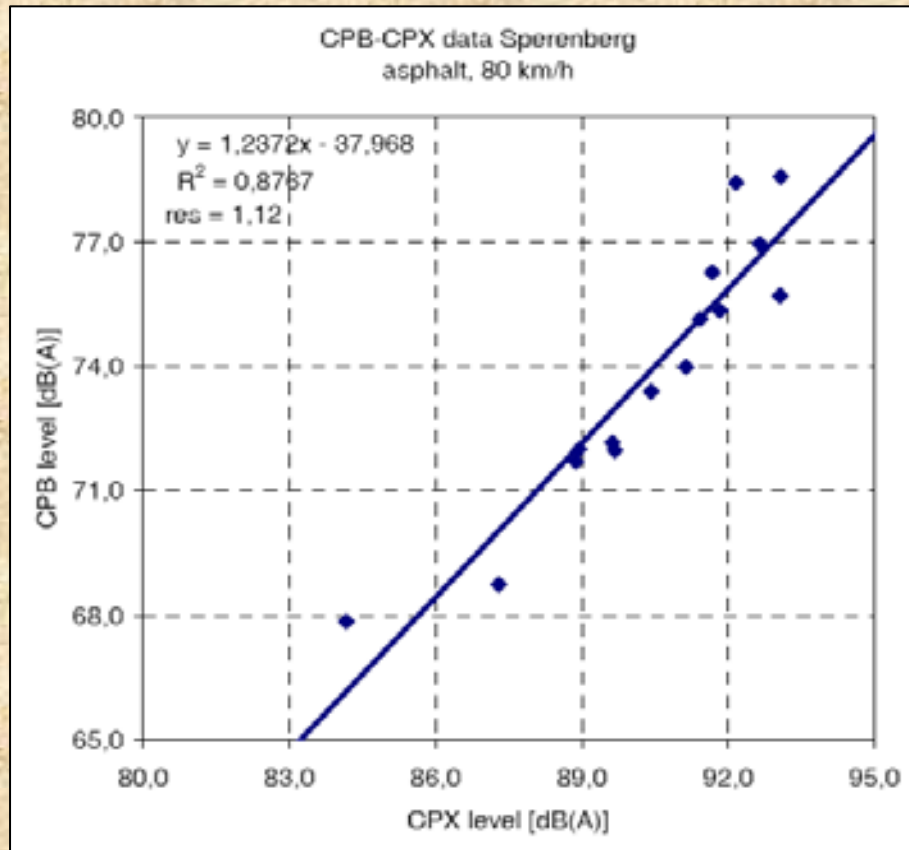
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- Very well suited for tire testing
 - Repeatability and reproducibility excellent
 - Requires only one test tire
 - Easy and inexpensive to perform
 - Insensitive to background noise if drum is well operated
 - Insensitive to meteorological conditions
 - Difficult to test tires on different road surfaces
 - Requires replica road surfaces
 - Not useful for testing wet road conditions
 - Less representative than the other methods

Pros and cons of the methods

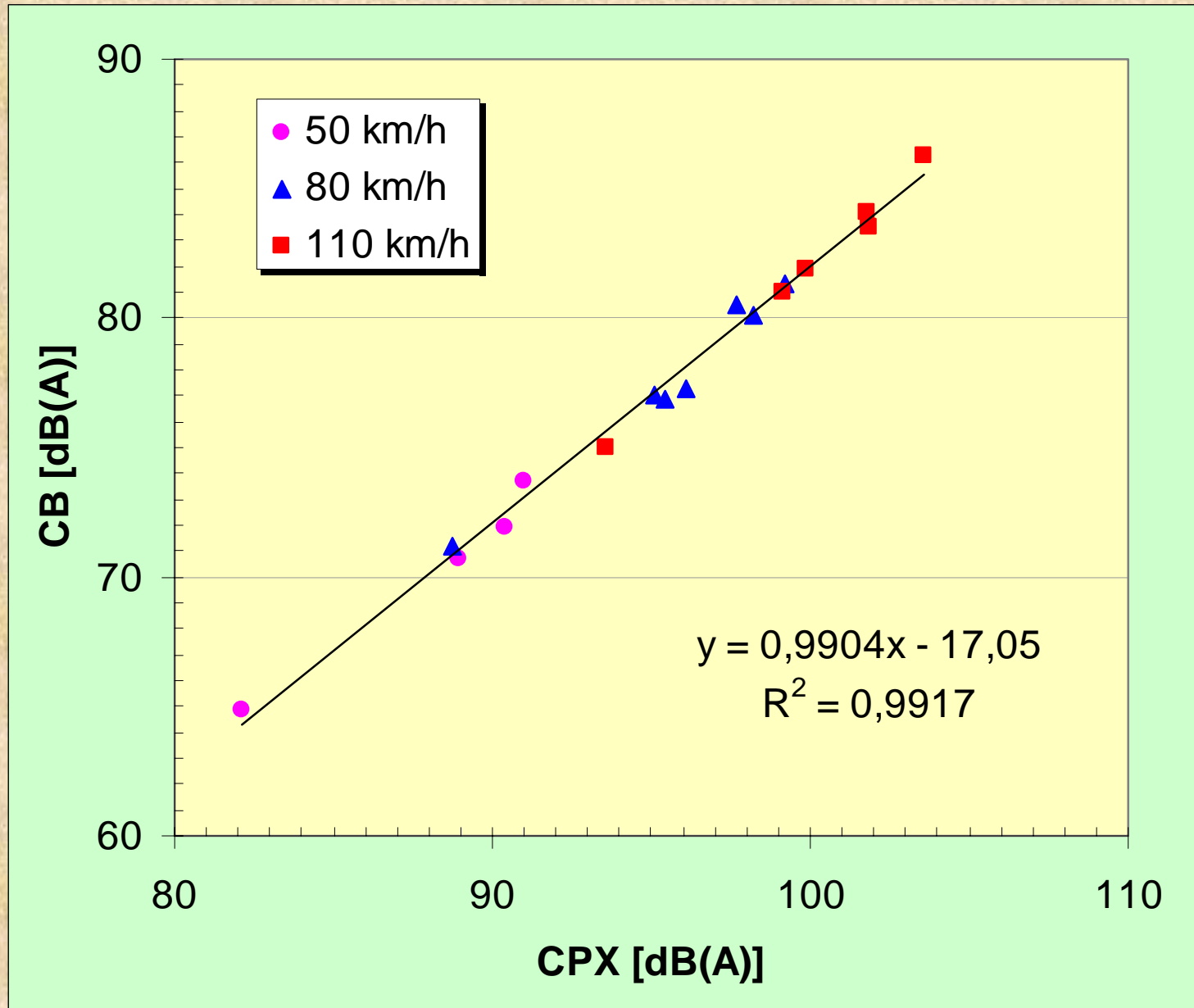
Method	Field of application	Overall merit	Representativity with respect to actual traffic	Accounting for propagation effects	Sensitivity to meteorological conditions	Problems with background noise	Time consumption of measurements	Initial cost of test equipment	Cost of measurements	Averaging results over desired length of road	Possibility to measure in dense traffic
CB	Tyre testing	±	+	++	-	-	-	+	-	-	- ⁽³⁾
	Road testing	±	+	++	-	-	-	+	-	--	- ⁽³⁾
	Type testing	+	+	++	-	-	-	+	-	-	-
	R&D	-	+	++	-	-	-	+	-	-	- ⁽³⁾
CPX	Tyre testing	++	±	-	±	±	+	-	+	++	+
	Road testing	+	±	-	±	±	++	-	+	++	+
	Type testing	±	±	-	±	±	+	-	+	++	+
	R&D	+	±	-	±	±	+	-	+	++	+
DR	Tyre testing	++	-	--	++	+	++	--	++	+	
	Road testing	--									
	Type testing	+	-	--	++	+	++	--	++	+	
	R&D	++	±	--	++	+	++	--	++	+	

Measured relations between the methods

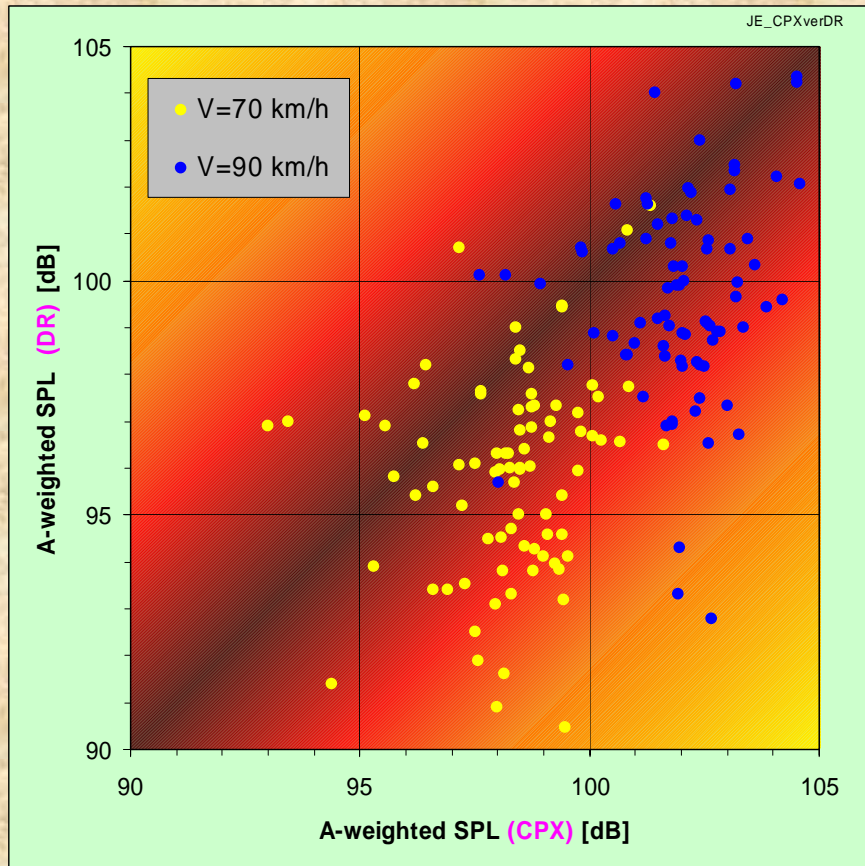
Sperenberg data:



Japanese data

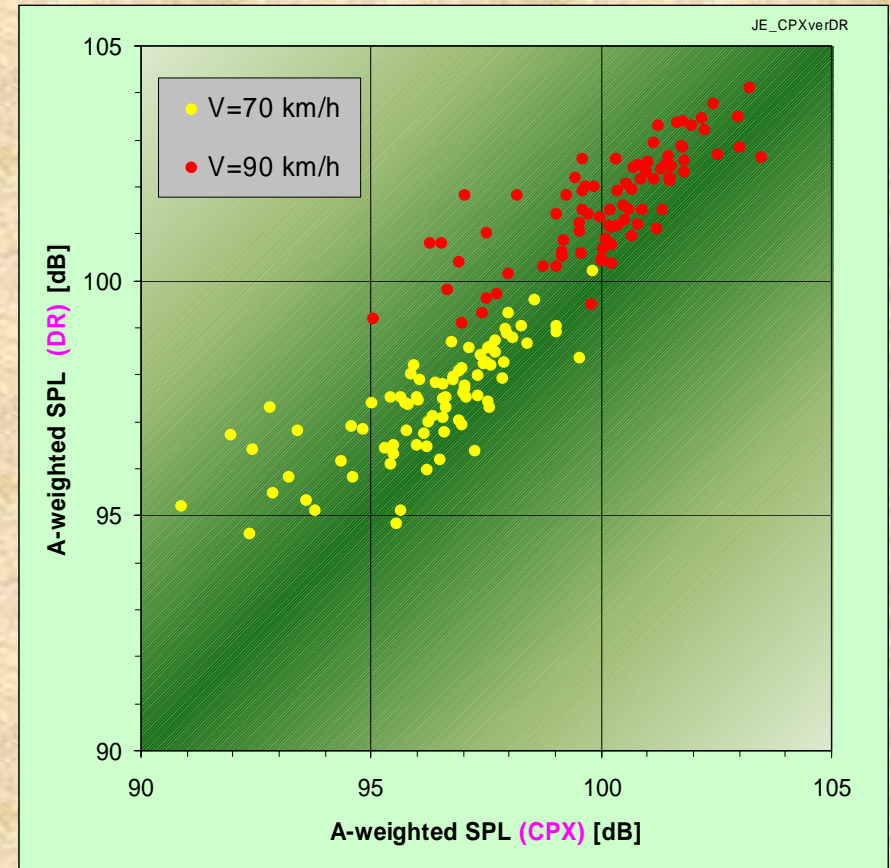


Relations between Close Proximity (CPX) and Lab. Drum (DR) method



DAC16 (CPX) – Safety Walk (DR)

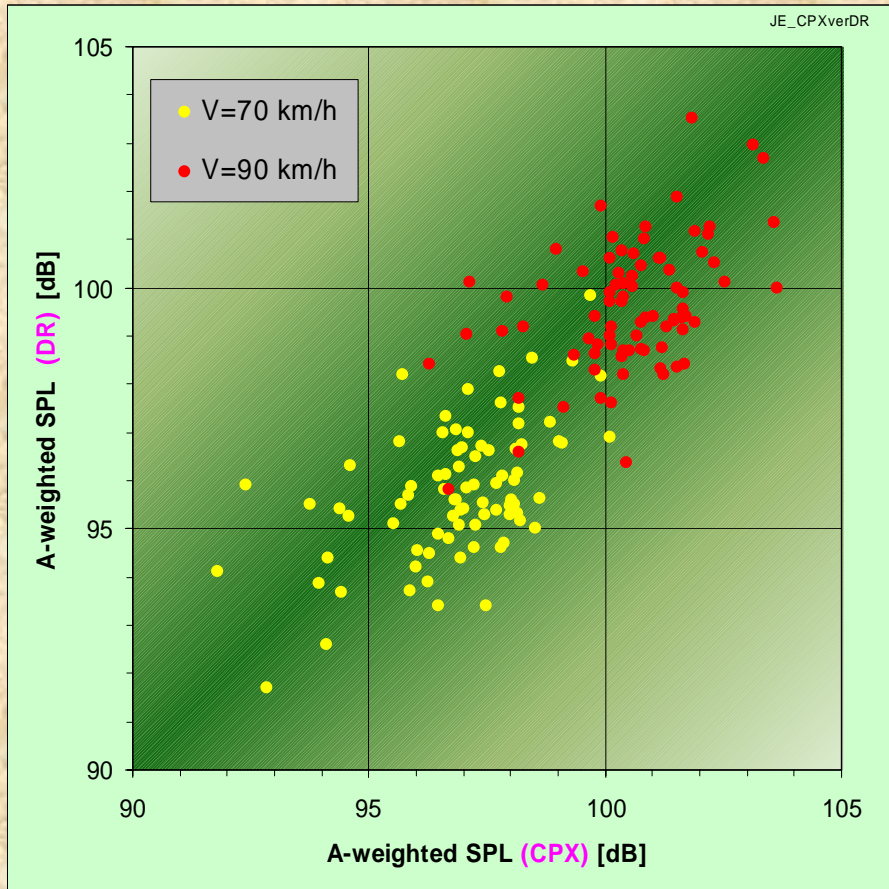
Surfaces are very different



Surf dressing CS 12 mm (CPX) –
SurfDress replica (DR)

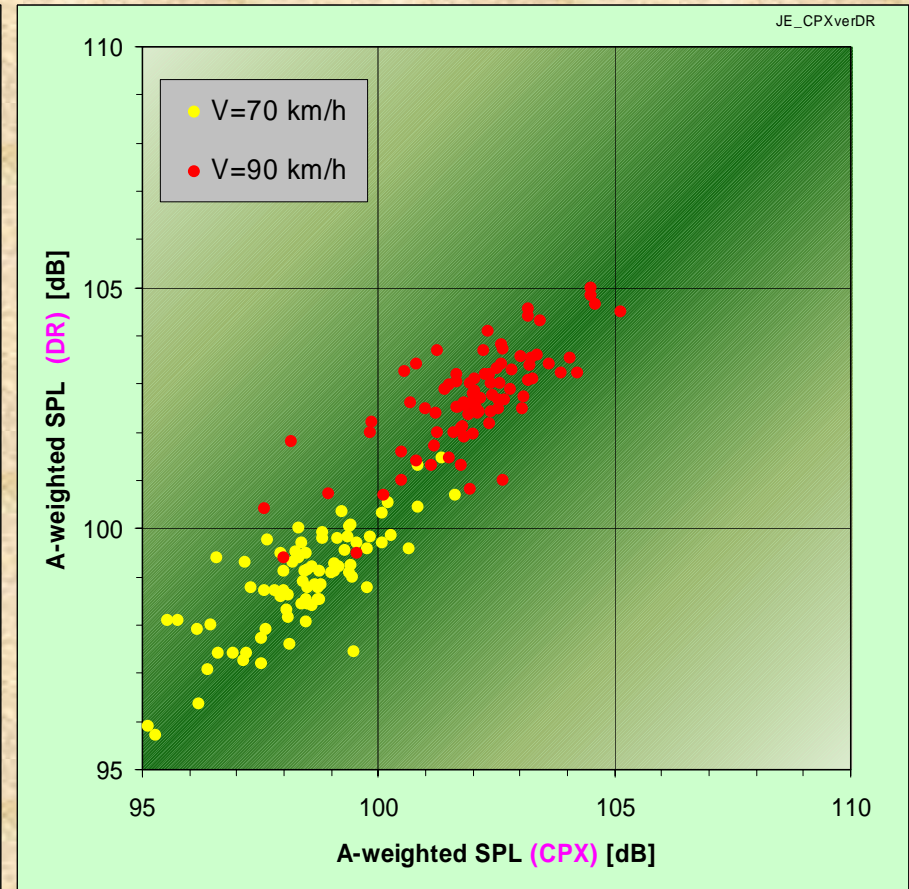
Surfaces rather similar but not identical

Relations between Close Proximity (CPX) and Lab. Drum (DR) methods



SMA 8 (CPX) – ISO replica (DR)

Surfaces somewhat similar



DAC 16 (CPX) – DAC 16 replica (DR)

Surfaces rather similar but not identical

Bridgestone study

