AV '21 CONFERENCE ASPHALT PAVEMENTS 2021

Surface dressing
Influence of the spraying nozzles

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Motto: We will not catch Europe without good-quality pavements

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Overview

- Surface dressing
- Nozzle test bench
- Nozzle geometry
- Binder distribution
- Summary

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Surface dressing

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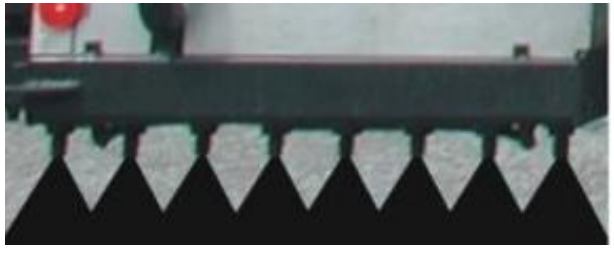
Application – surface dressing



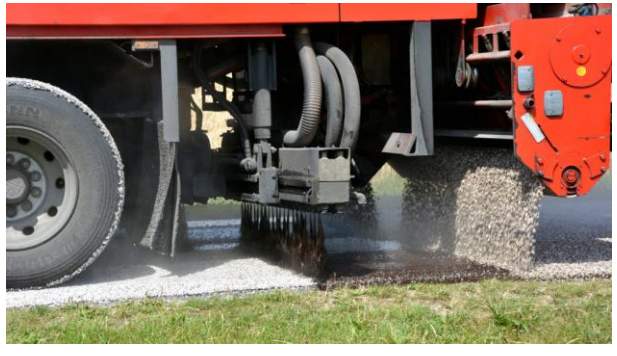
Spraying

Chipping

Compression

Distributor

Surface dressing machine



Types of Surface Dressings (SD)

Single SD

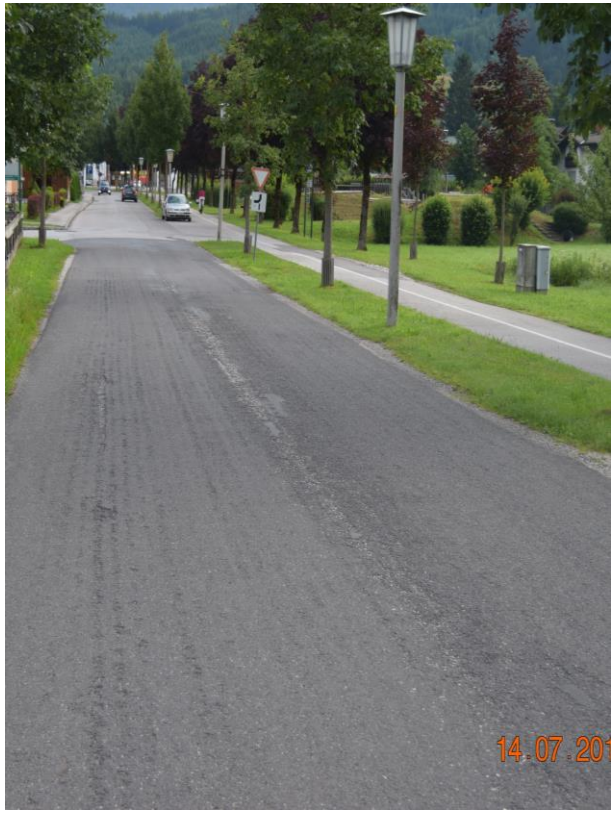
Double SD

Single SD with double chipping

Parameters which influence the quality of SD

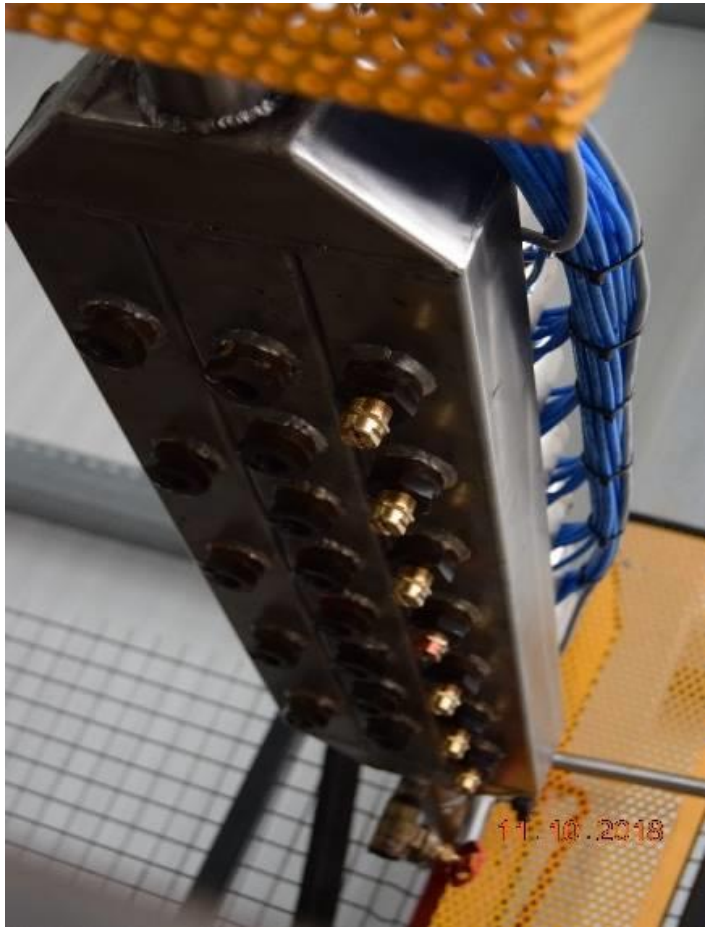
- Traffic load
- Condition of the substructure
- Weather conditions
- Quality of the raw materials
- Dosing of the binder (especially the binder distribution)

Formation of stripes

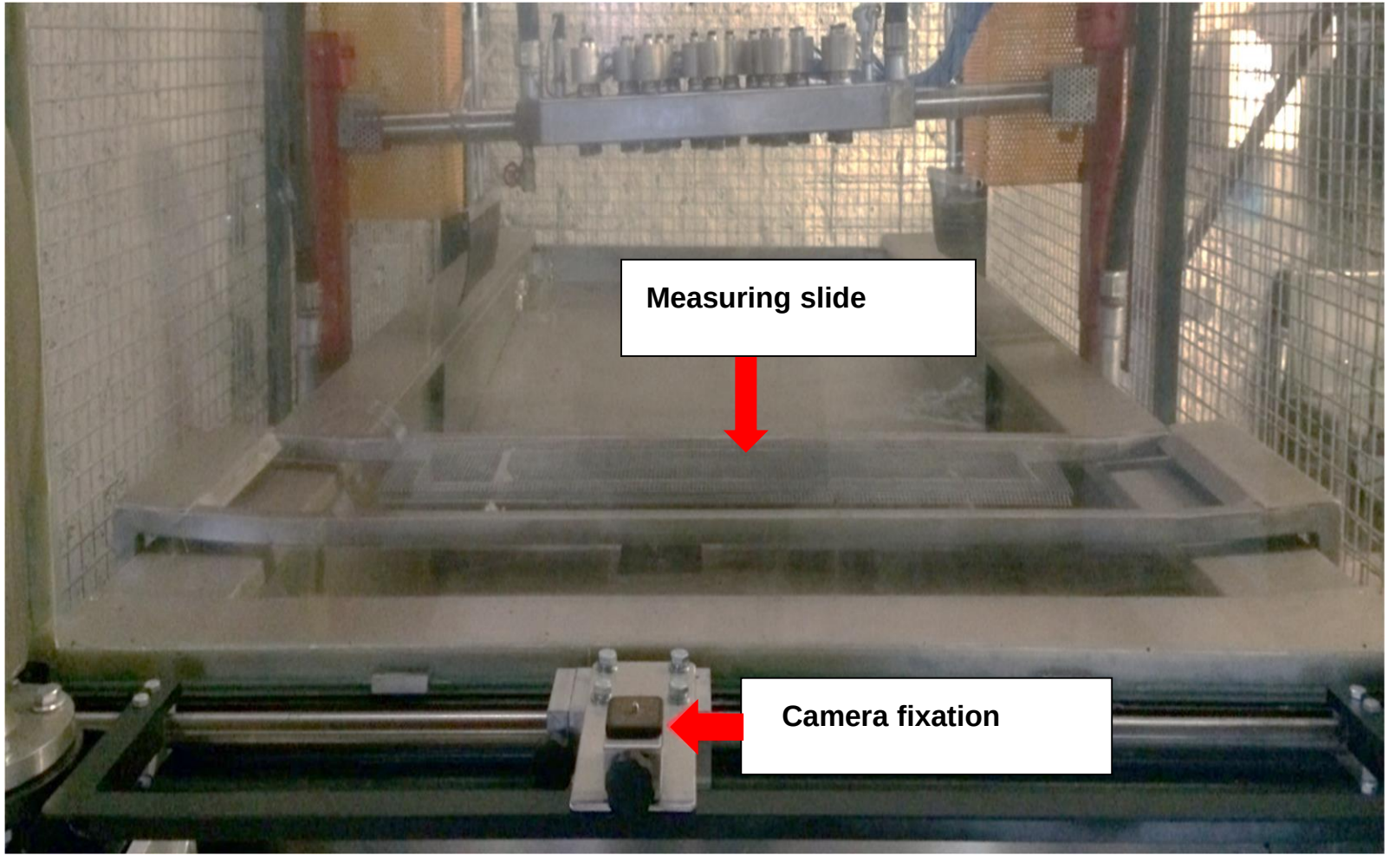


Nozzle test bench

Nozzle test bench overview

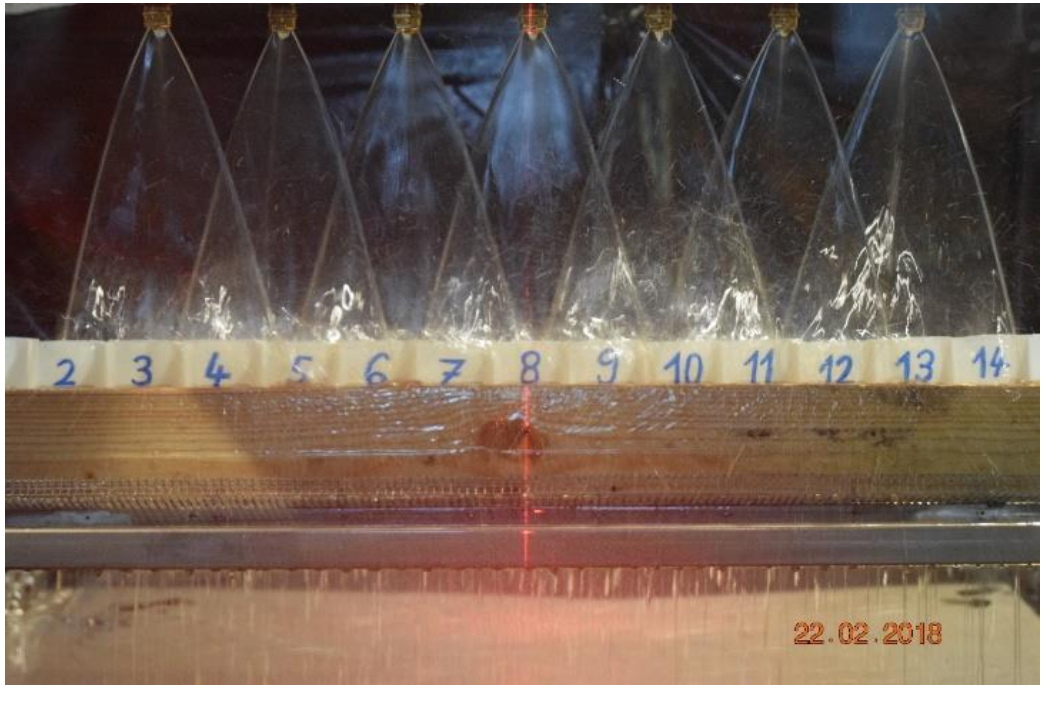


Division [mm]	Number of nozzles
83	8
100	7
150	5


Measuring slide
Camera fixation

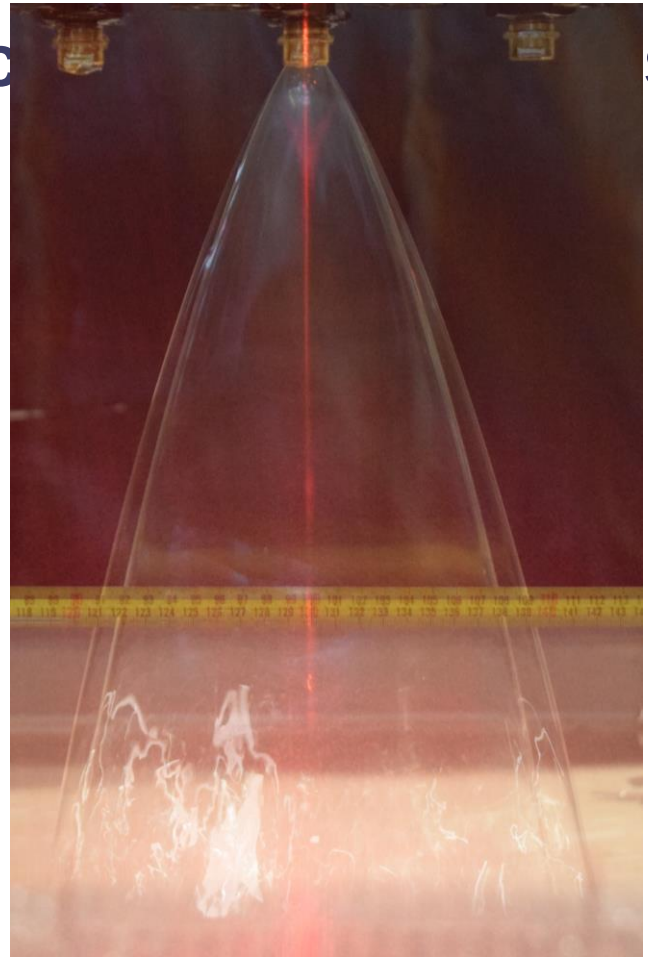
Single nozzle

Binder Distribution



Part of the measurement of single c s

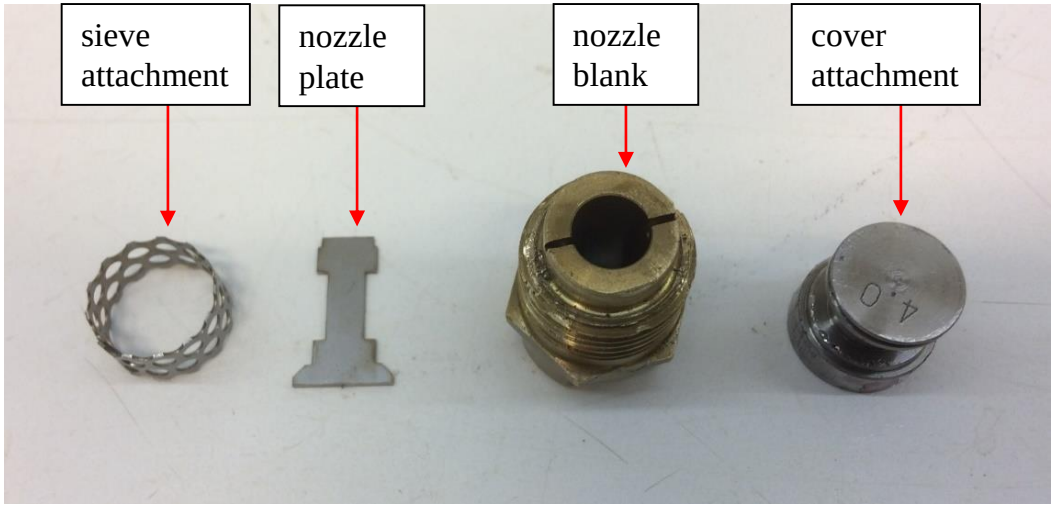
Nozzle Nr.	Flow [kg/min]	Spraying width [cm]
1	7,68	19,0
2	7,60	19,7
3	7,82	18,2
4	7,61	17,9
5	7,69	16,7
6	7,67	18,3
7	7,64	18,3
8	7,65	19,4
…	…	…



Difference up to ± 3 cm

Nozzle geometry

Components of a commercial nozzle



Measuring the dimensions showed deviations up to 1 mm
→ Design of a „Vialit“ nozzle and precise construction

Part of the measurement of single „Vialit“ nozzles

Nozzle Nr.	Flow [kg/min]	Spraying width [cm]
1	8,05	23,0
2	8,11	22,0
3	7,93	22,1
4	8,04	22,1
5	8,18	22,1
6	7,98	22,2
7	8,05	22,1
8	8,00	22,0
9	8,07	21,3

- **Average 22,13**
- **Minimum 21,3**
- **Maximum 23,0**

Difference up to ± 1 cm

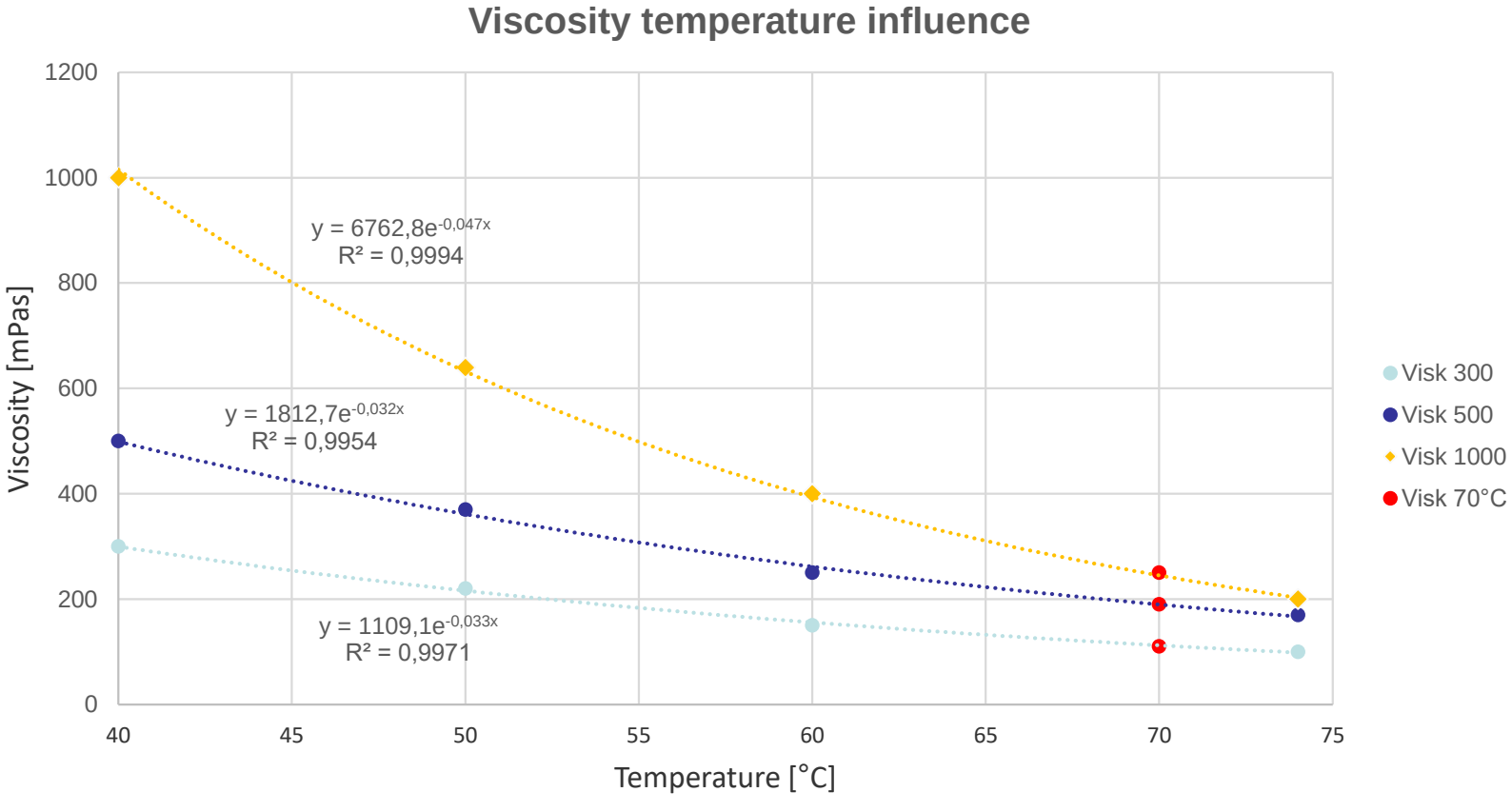
Binder distribution

Comparison of commercial and „Vialit“ nozzles

Influences on the binder distribution (C_v - coefficient)

- Nozzle geometry
- Viscosity
- Height of the spraying bar
- Position of the nozzles

Viscosity


Viscosity temperature influence
Viscosity [mPas]
Temperature [°C]
y = 6762,8e-0,047x
R² = 0,9994
y = 1812,7e-0,032x
R² = 0,9954
y = 1109,1e-0,033x
R² = 0,9971
Visk 300
Visk 500
Visk 1000
Visk 70°C

Choosing the nozzles for binder distribution

Nozzle Nr.	Flow [kg/min]	Spraying width [cm]
1	7,68	19,0
2	7,60	19,7
3	7,82	18,2
4	7,61	17,9
5	7,69	16,7
6	7,67	18,3
7	7,64	18,3
8	7,65	19,4
…	…	…

- **Random commercial nozzles → Cv > 10**
- **Selection of nozzles with similar spraying widths**
- **No selection of „Vialit“ nozzles**

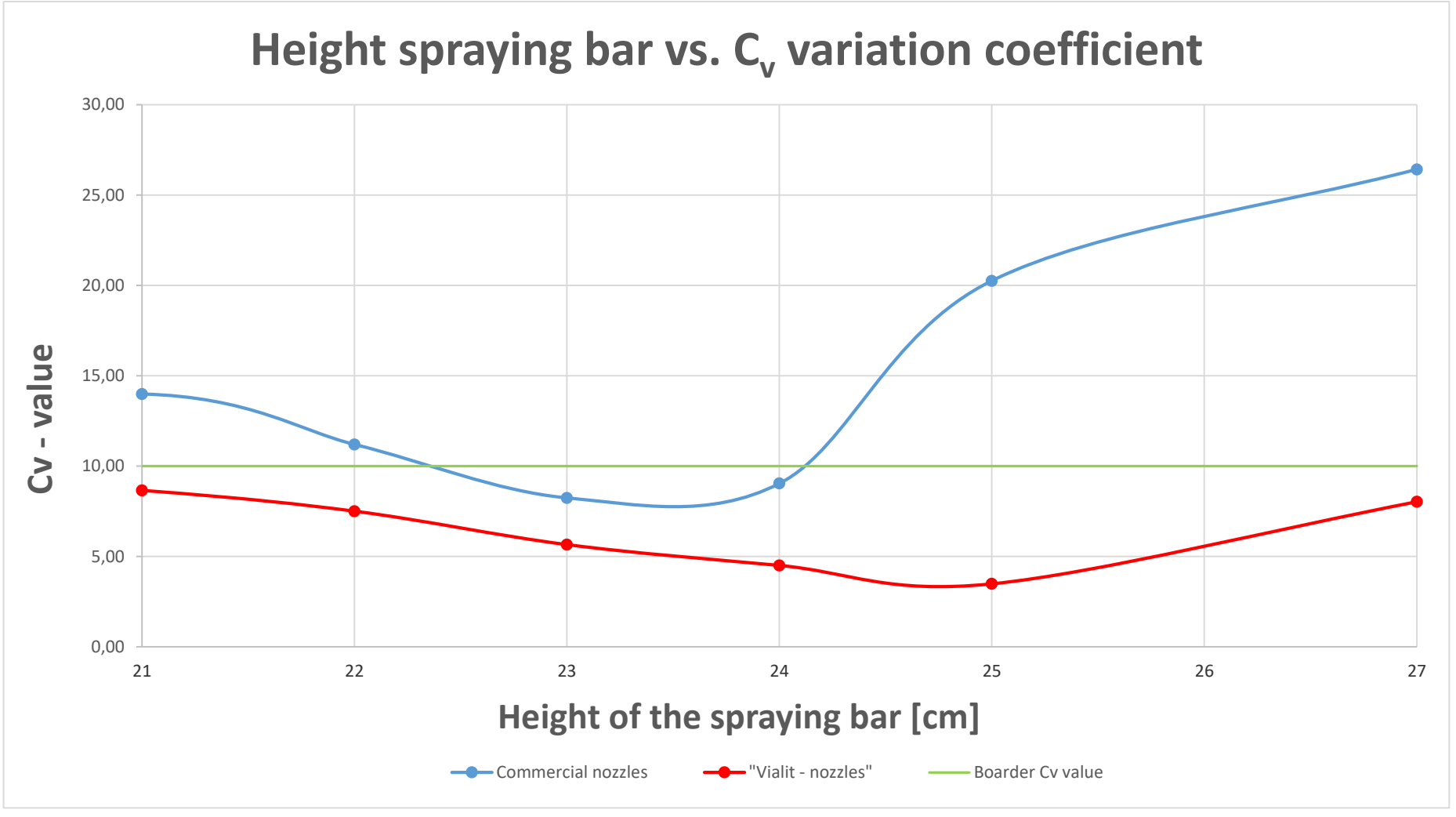
Height of the spraying bar

Bar height [cm]	C_v - coefficient
18	12,4
21	13,99
22	11,19
23	5,65
24	9,4
25	15,57
27	23,76

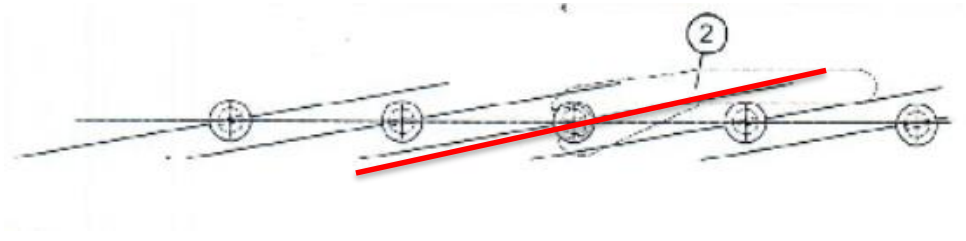
Measurements of selected commercial nozzles

Bar height [cm]	C_v - coefficient
21	8,65
23	5,65
25	3,48
27	8,02

Measurements of „Vialit“ - nozzles


Height spraying bar vs. C_v variation coefficient
Cv - value
30,00
25,00
20,00
15,00
10,00
5,00
0,00
21
22
23
24
25
26
27
Height of the spraying bar [cm]
Commercial nozzles
"Vialit - nozzles"
Boarder Cv value

Position of the nozzles



Nozzle 1	Nozzle 2	Nozzle 3	Nozzle 4	Nozzle 5	Nozzle 6	Nozzle 7	C_v – value
7	7	7	7	7	7	7	3,66
7	7	7	12	7	7	7	6,34
7	7	12	7	12	7	7	6,00
12	12	12	12	12	12	12	5,60
7	7	2	12	2	7	7	8,97
0	0	0	0	0	0	0	19,92

Summary

Comparison of commercial and „Vialit“ nozzles

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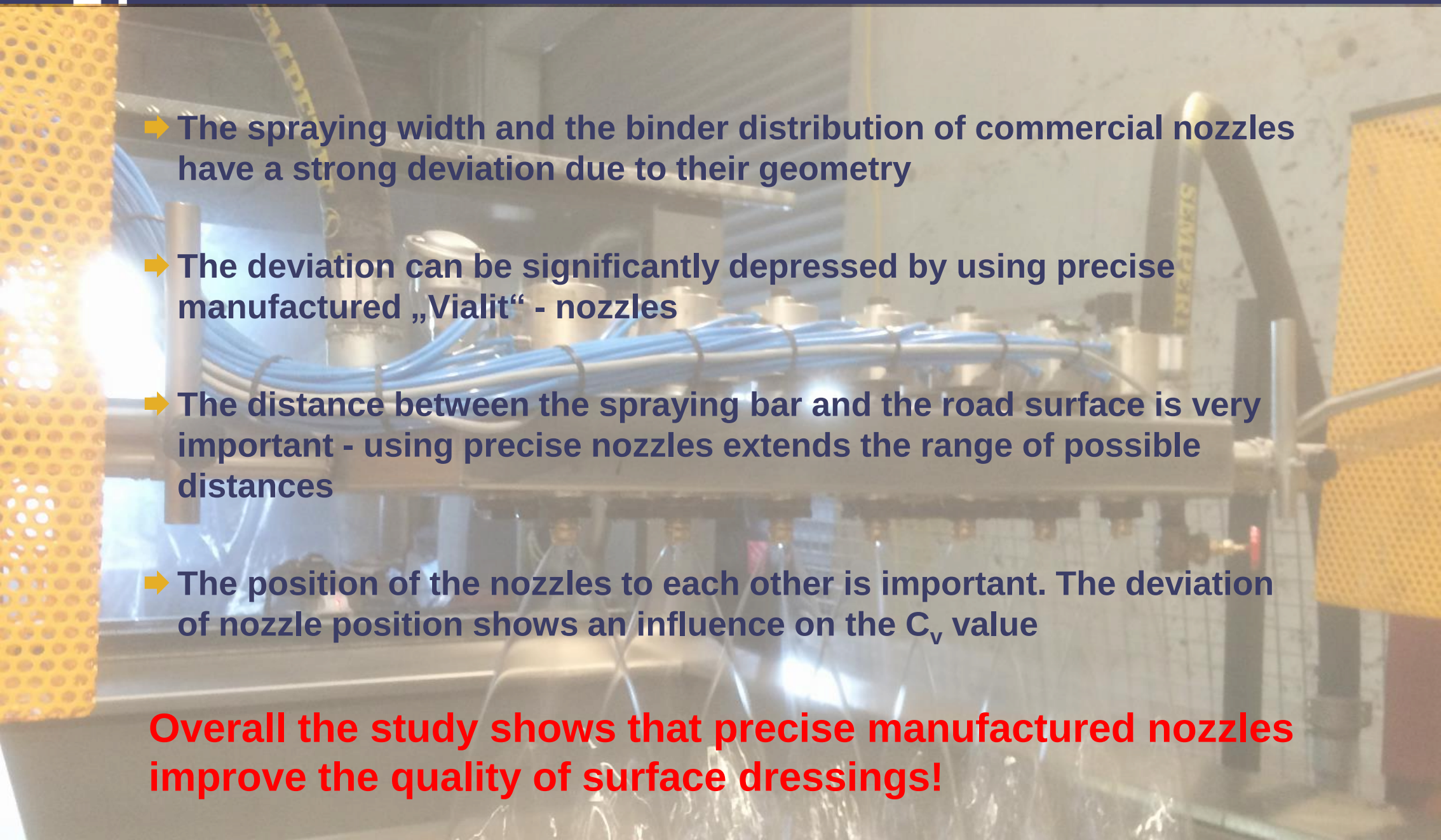

- The spraying width and the binder distribution of commercial nozzles have a strong deviation due to their geometry
- The deviation can be significantly depressed by using precise manufactured „Vialit“ - nozzles
- The distance between the spraying bar and the road surface is very important - using precise nozzles extends the range of possible distances
- The position of the nozzles to each other is important. The deviation of nozzle position shows an influence on the C_v value

Overall the study shows that precise manufactured nozzles improve the quality of surface dressings!

Vialit