

# Effect of Sampling Location on the Air Void Analyzer Test Results on Concrete Pavements: Evaluation of Data from a Sixteen State Pooled Fund Study

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National Concrete Pavement  
Technology Center



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# Overview

- Objectives
- Literature
- Test Methods
- Results
- Conclusions
- Questions



# Objectives

- To evaluate the effect of sampling location on the air void structure of fresh concrete with respect to the results from the AVA
  - Looked at SS, SF, D300, air content
  - ASTM C 231 pressure air content



# Literature

- Trost and Freyne and Magura have evaluated AVA sampling and testing methods
- No literature directly comparing the effects of sampling location on AVA results



# Test Methods

- AVA sampling and testing was completed as recommended by AASHTO AVA Technical Implementation Group
- t-tests were conducted on the results using JMP statistical analysis software at  $\alpha = 0.05$



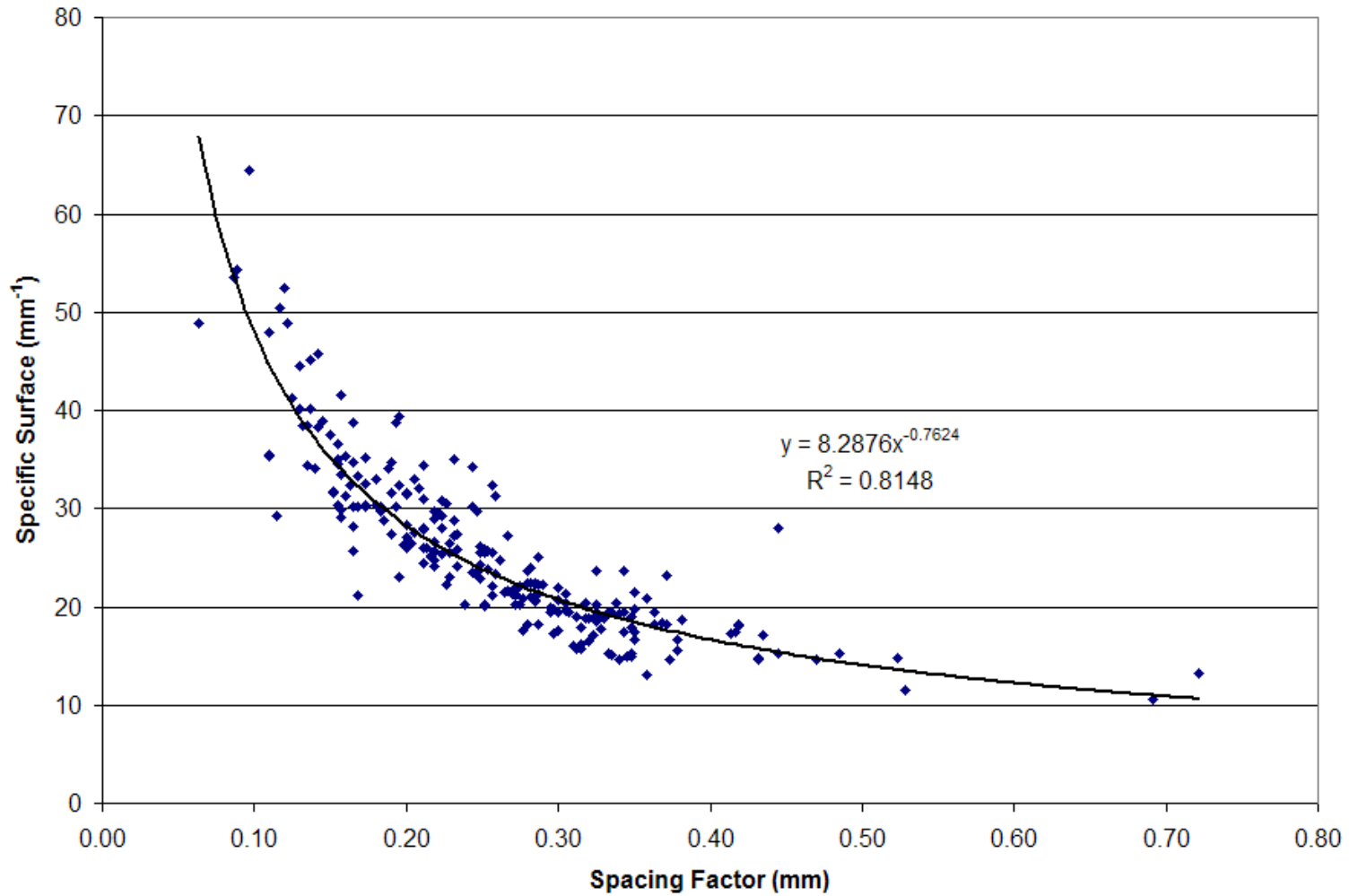
# AVA Sample Information

State	Total Number of AVA Samples	Number of Samples Before Paver	Number of Samples Behind on Vibrator	Number of Samples Behind between Vibrators
1	24	8	8	8
2	30	10	10	10
3	15	5	5	5
4	10	--	5	5
5	6	--	3	3
6	8	--	4	4
7	16	--	8	8
8	10	--	5	5
9	22	--	11	11
10	20	--	10	10
11	16	--	8	8
12	14	--	7	7
13	10	--	5	5
14	12	--	6	6
15	10	--	5	5
16	14	--	7	7
<b>Total</b>	<b>237</b>	<b>23</b>	<b>107</b>	<b>107</b>

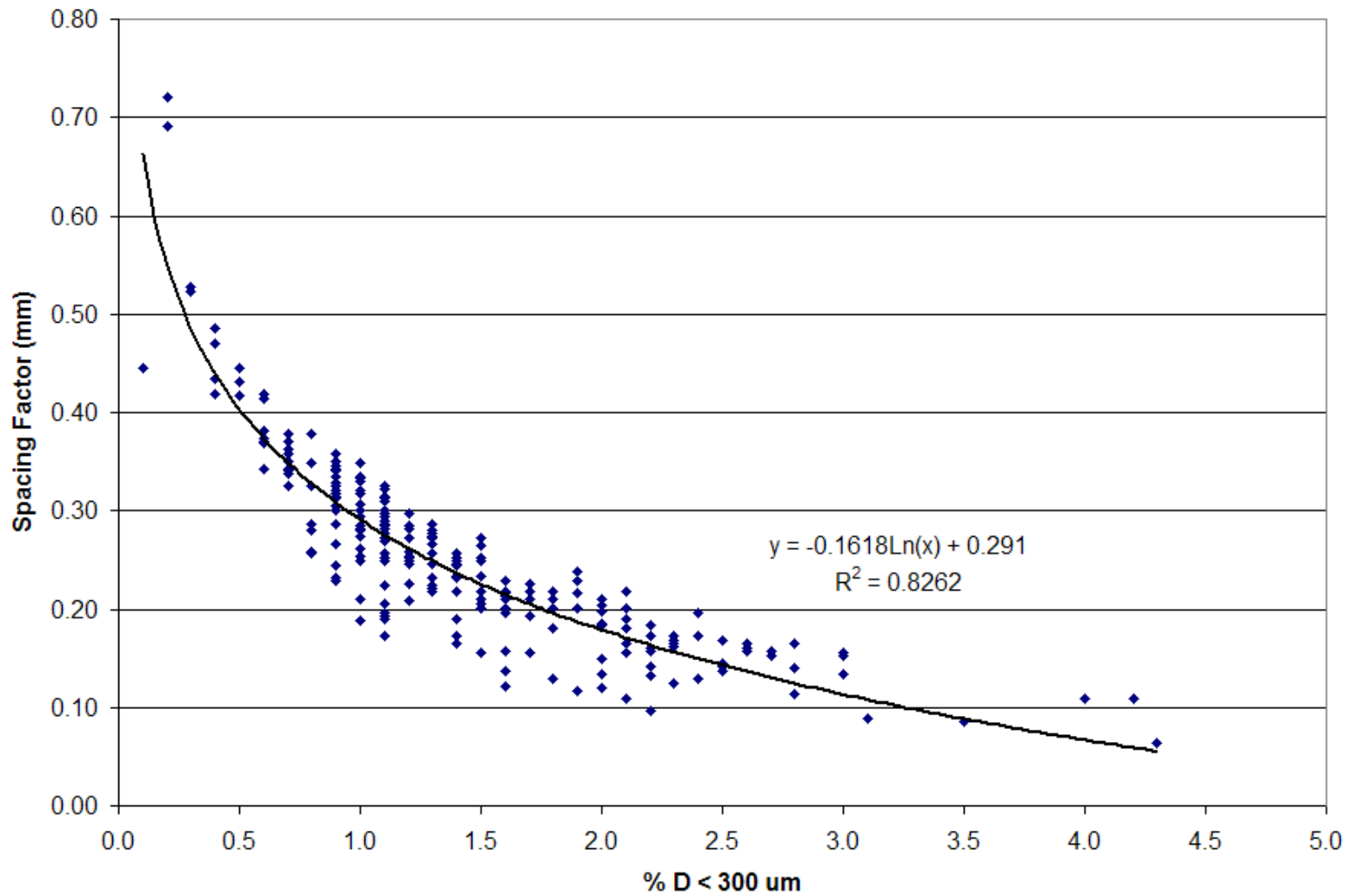


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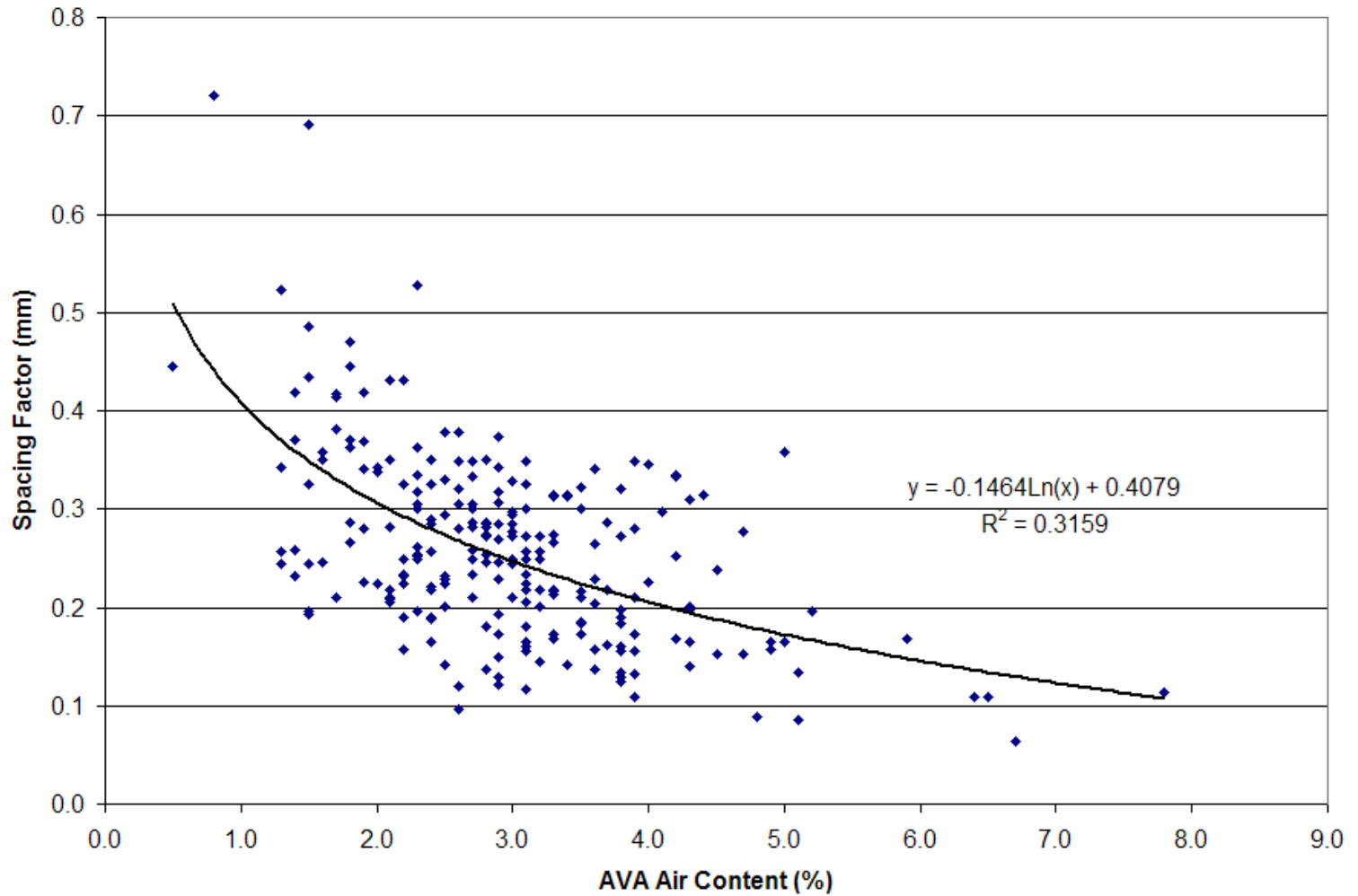
# Results



# Results



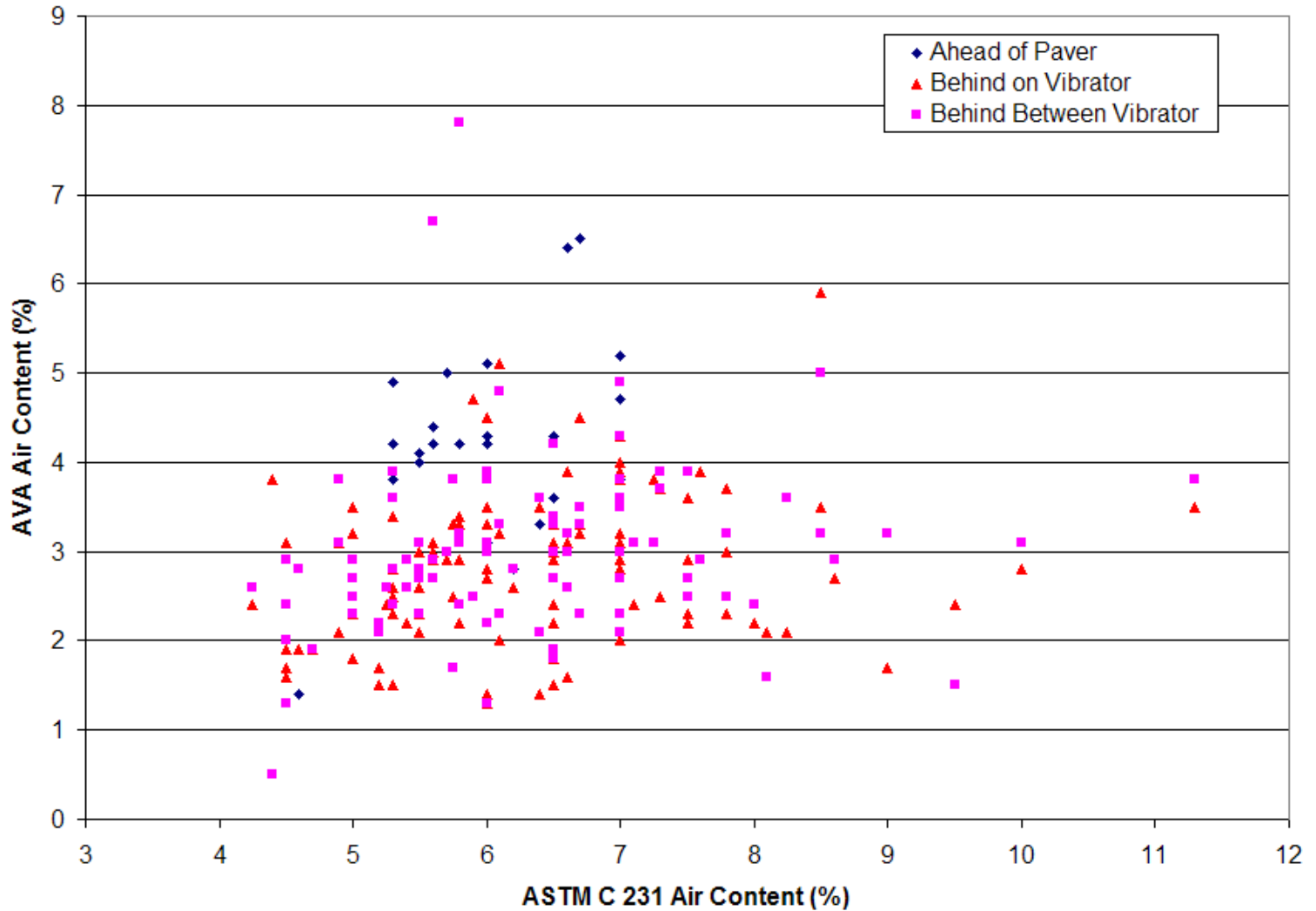
# Results



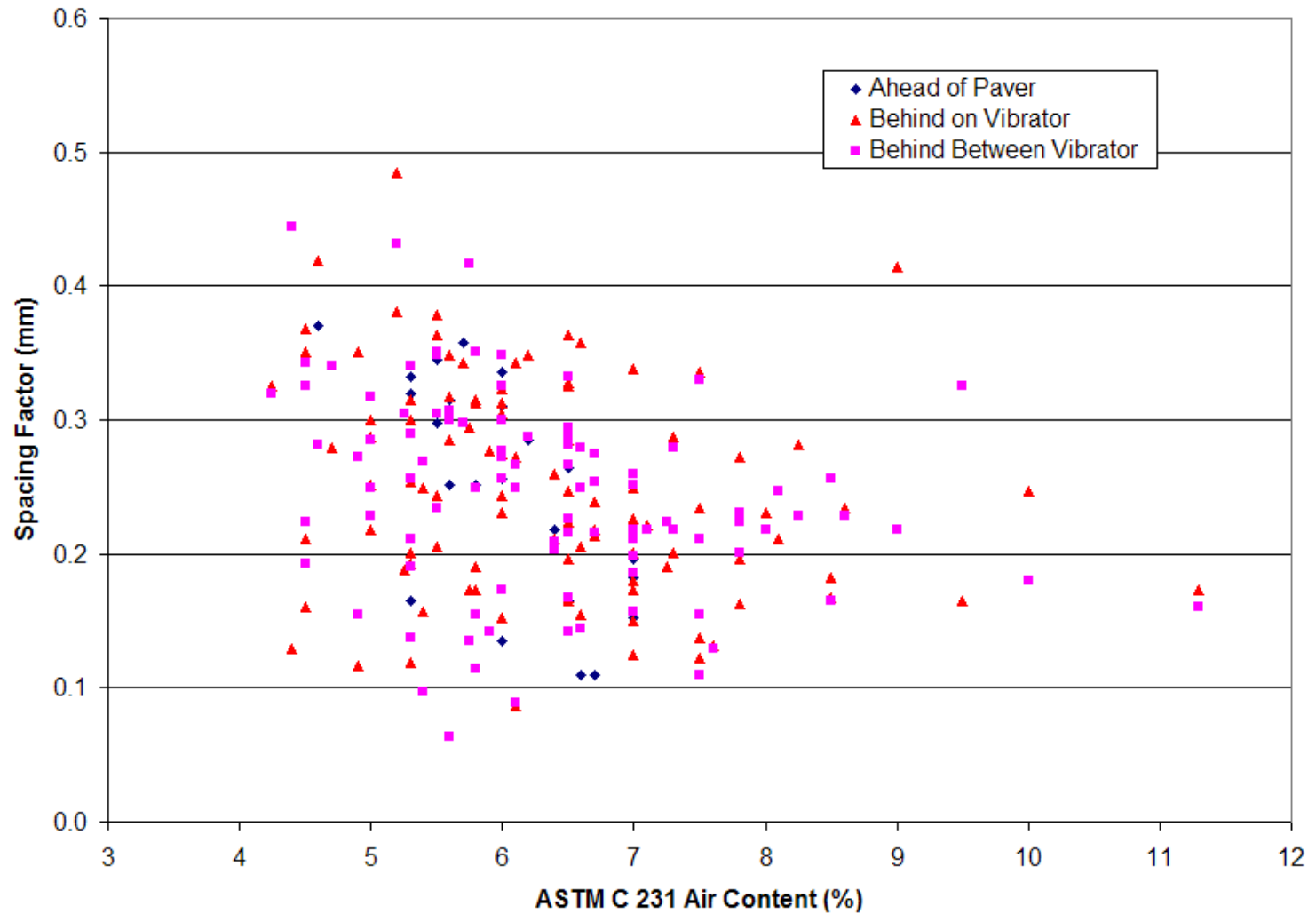
$$y = -0.1464\ln(x) + 0.4079$$
$$R^2 = 0.3159$$



# Results

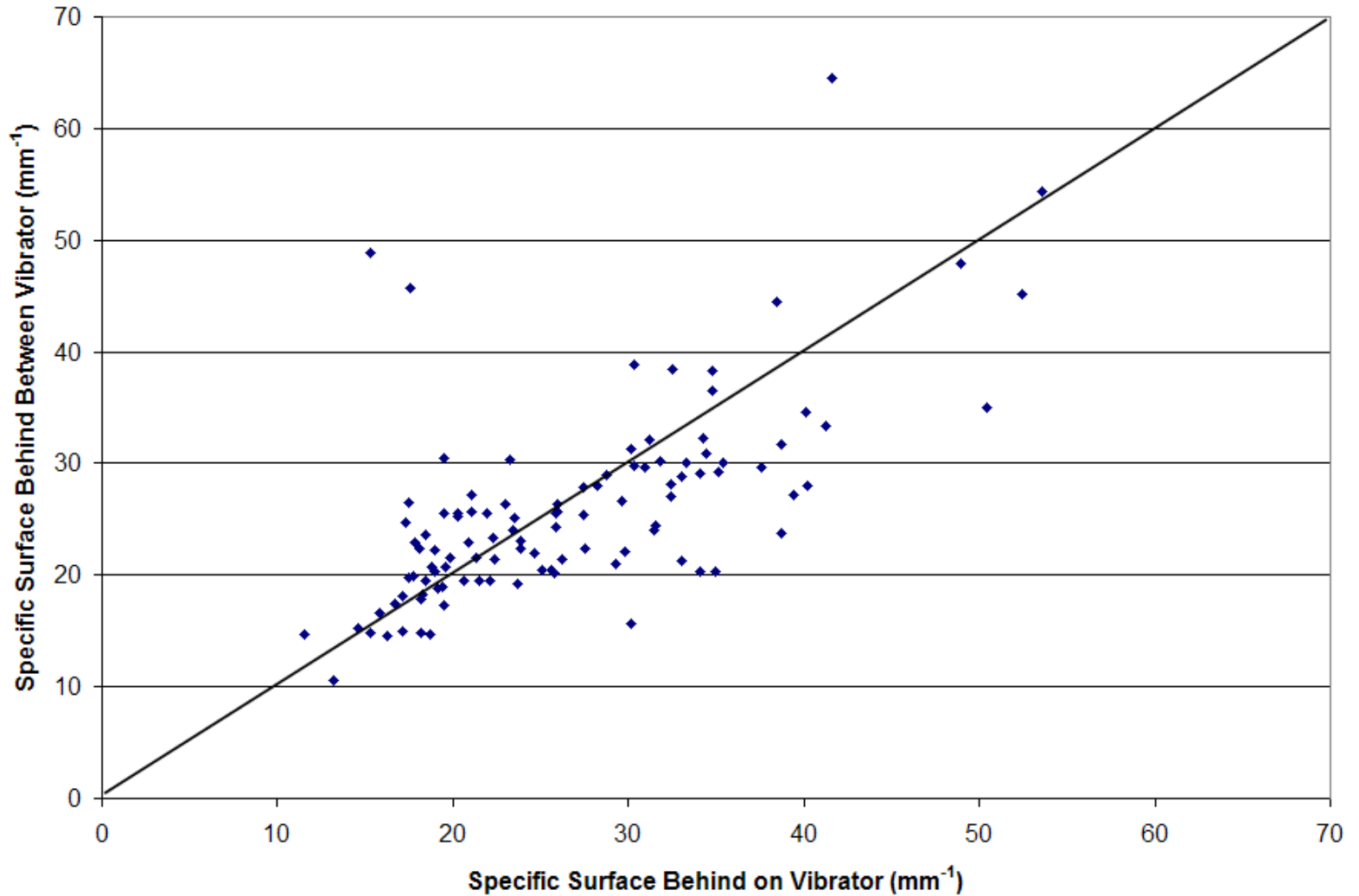


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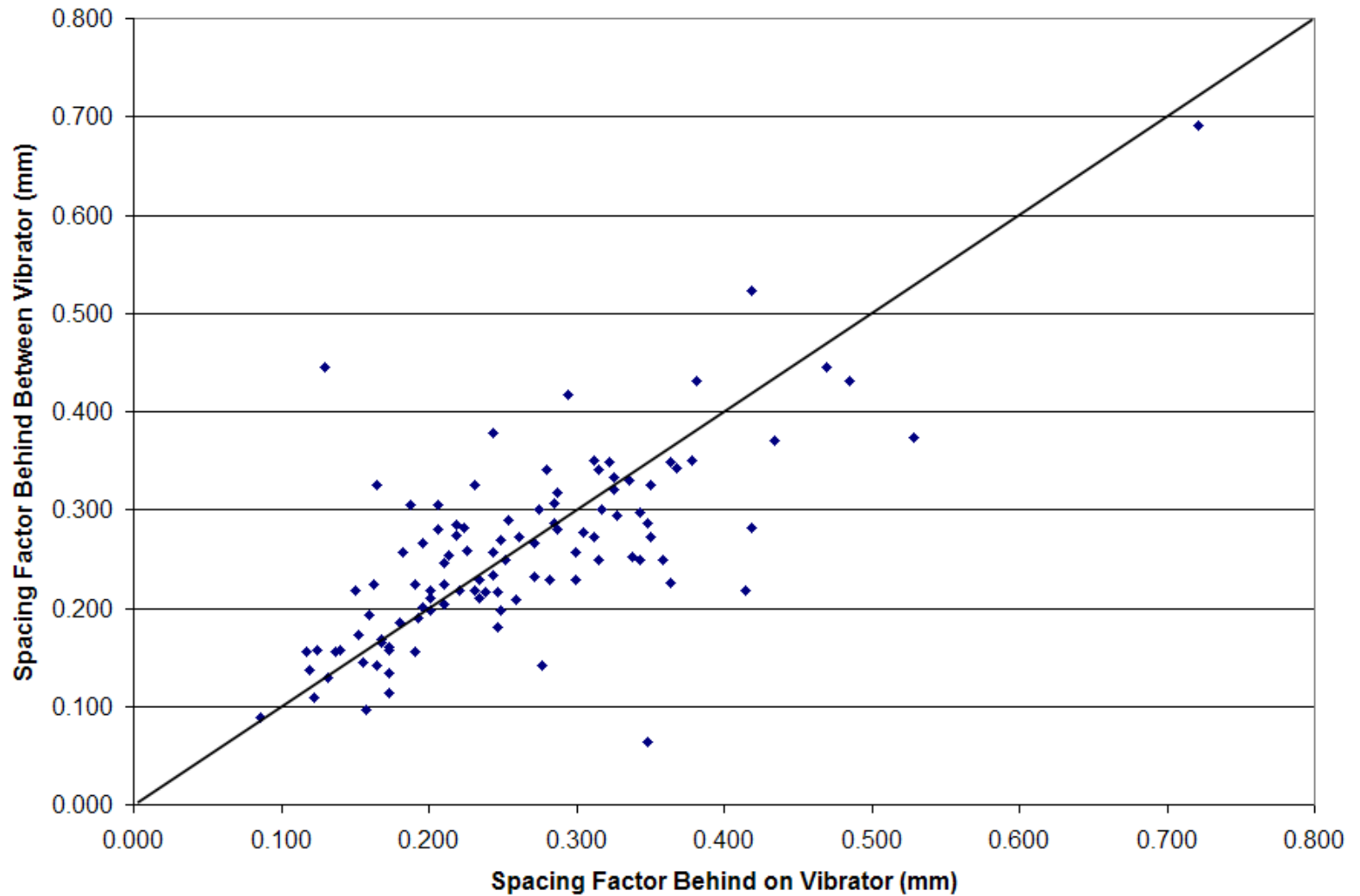




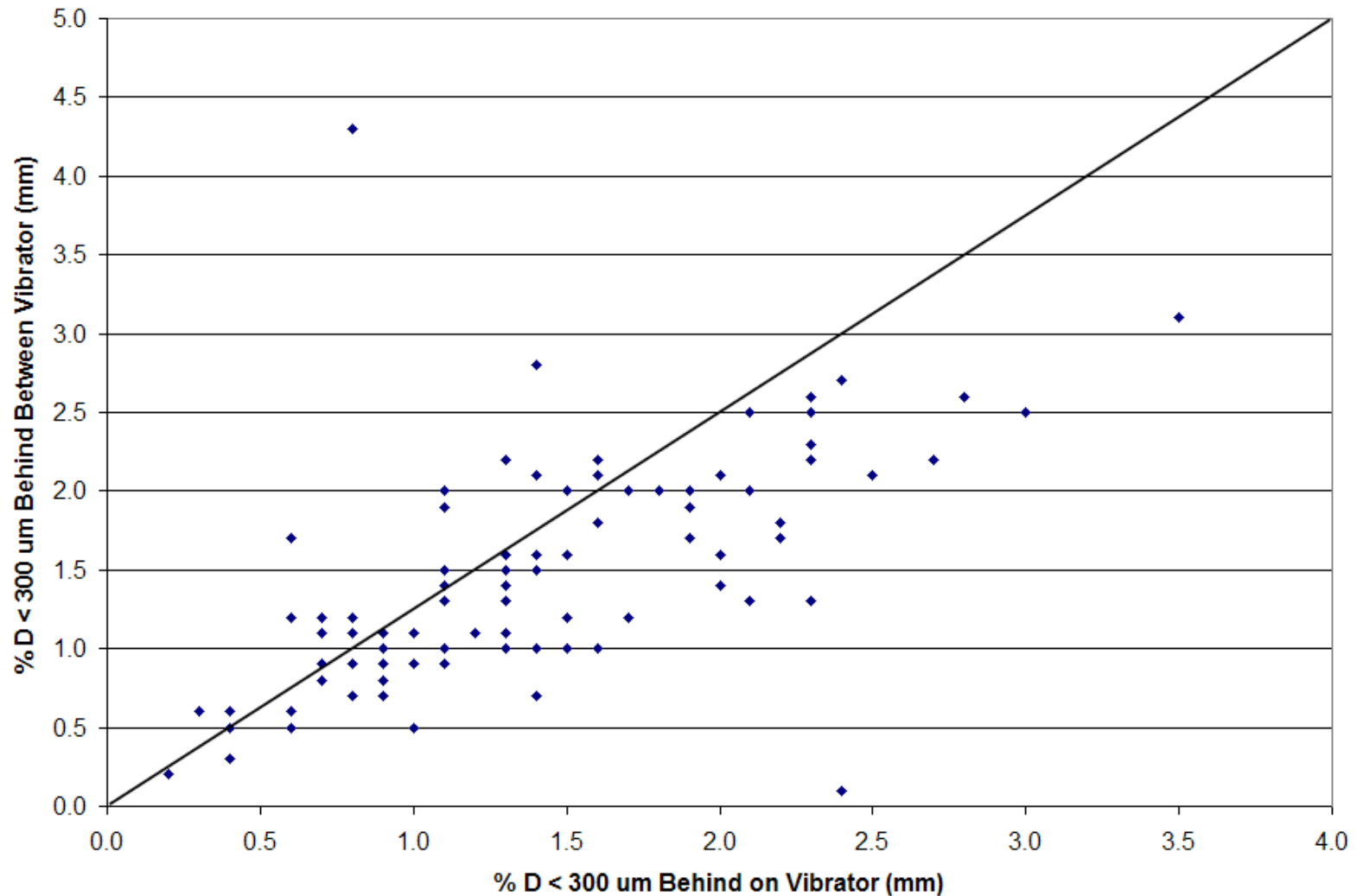
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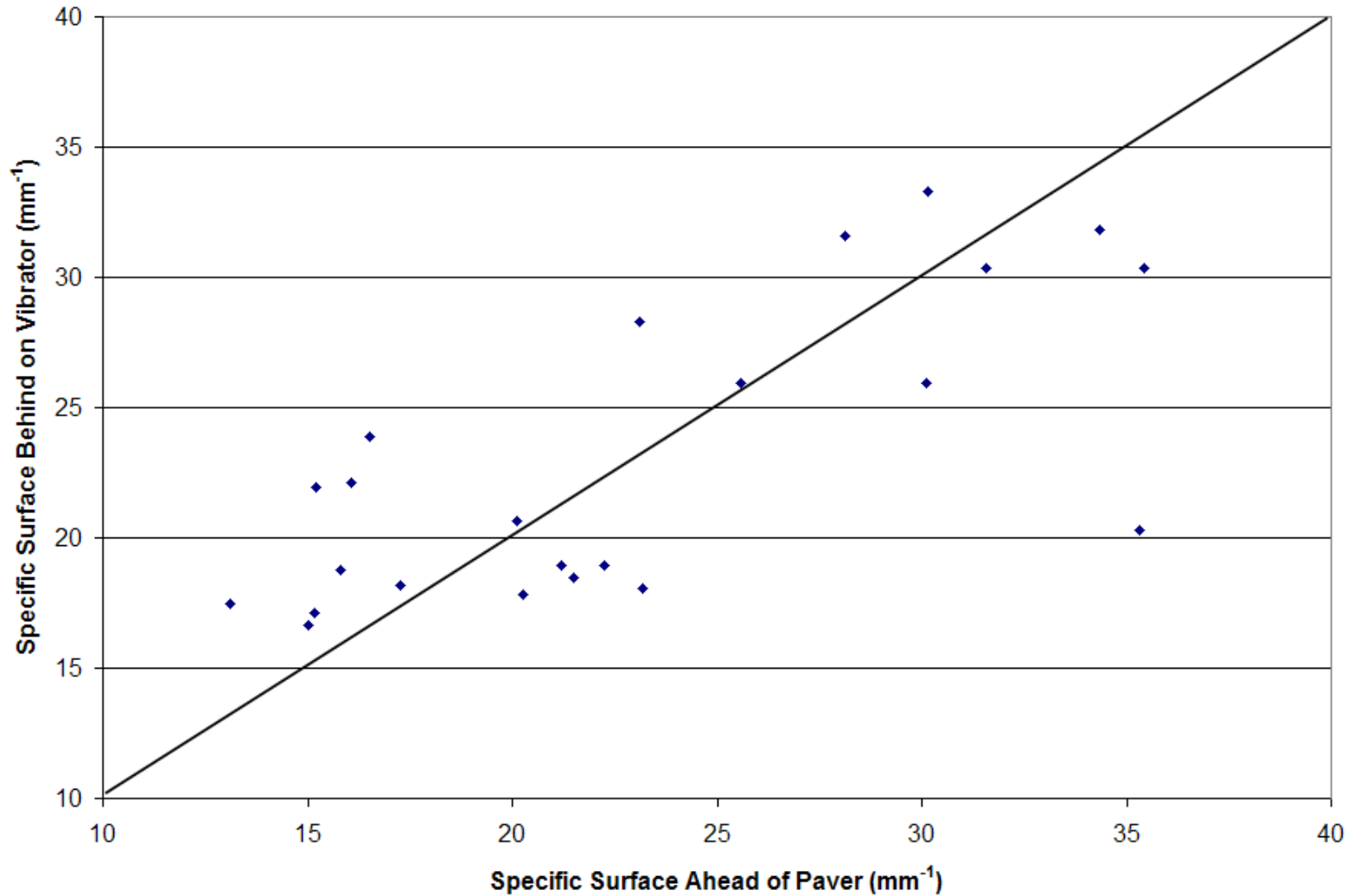
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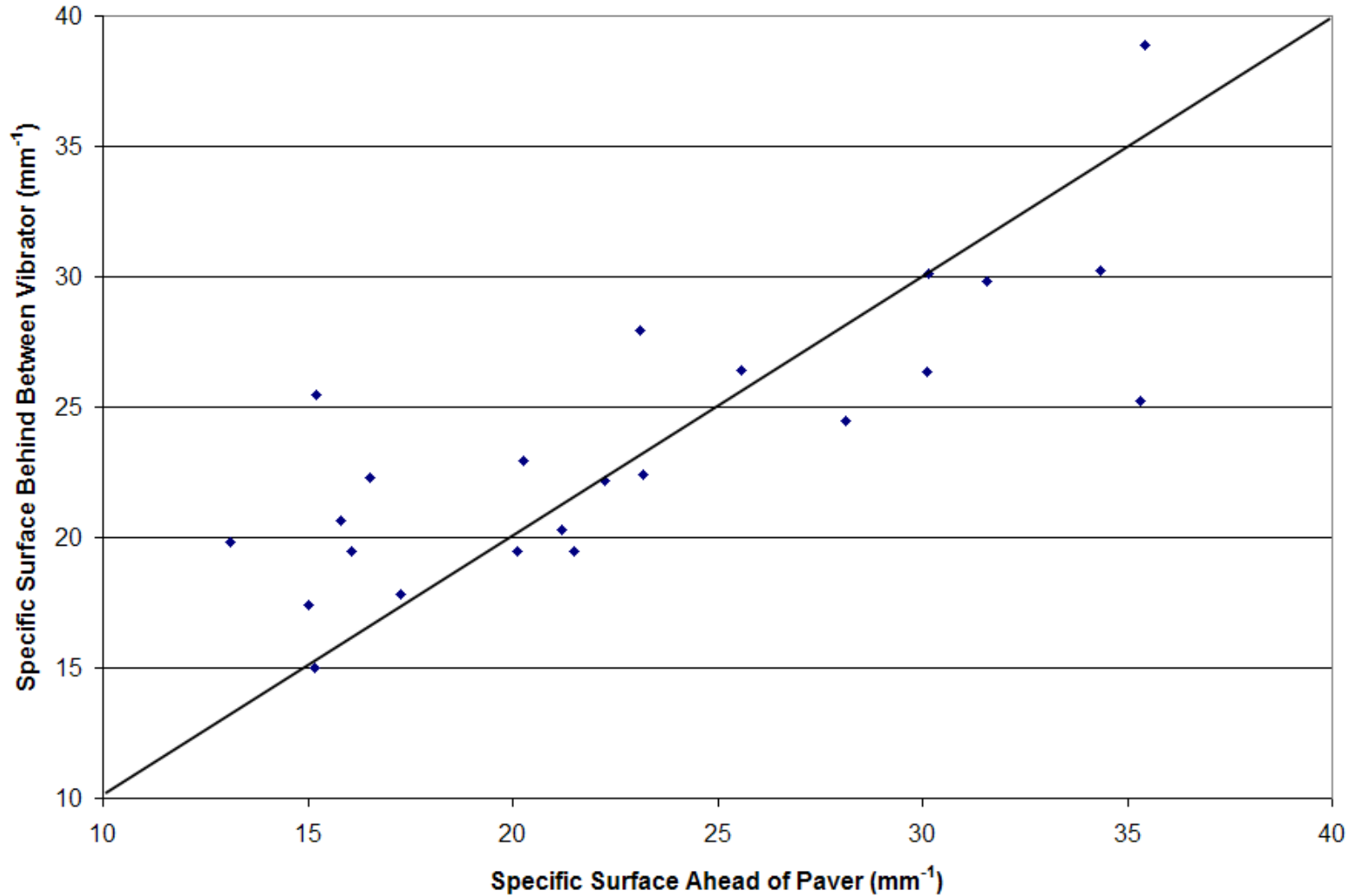
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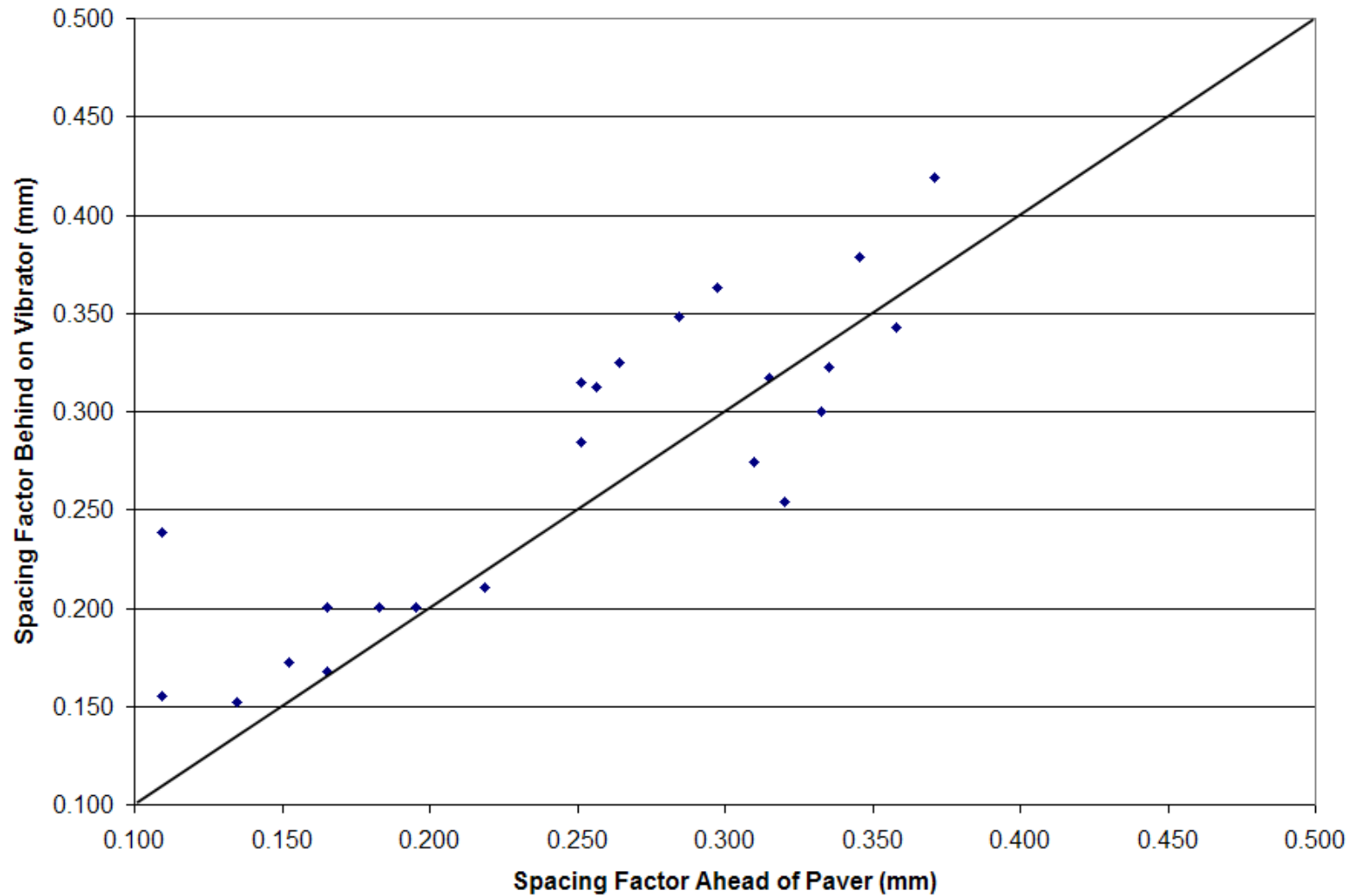
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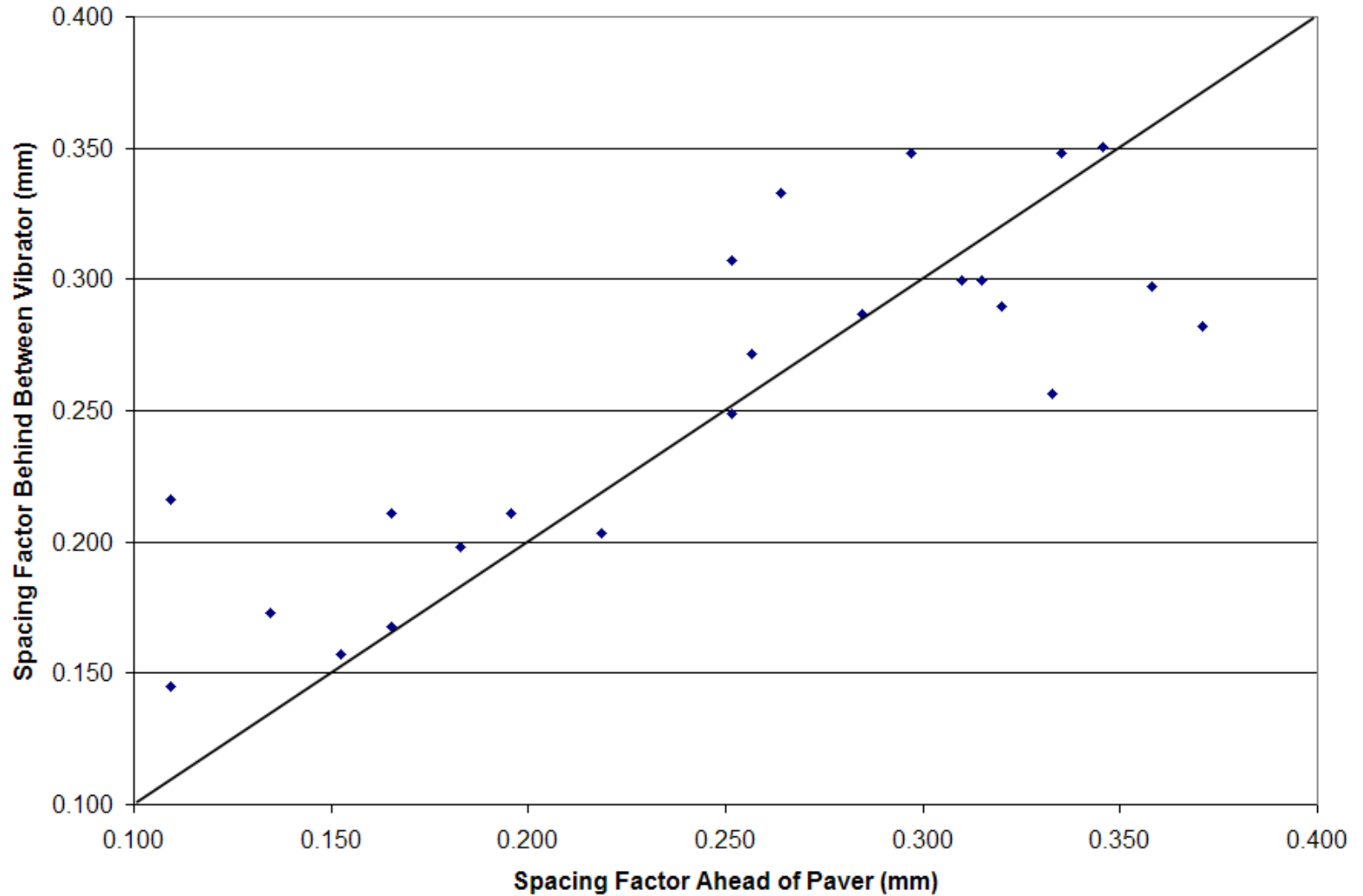
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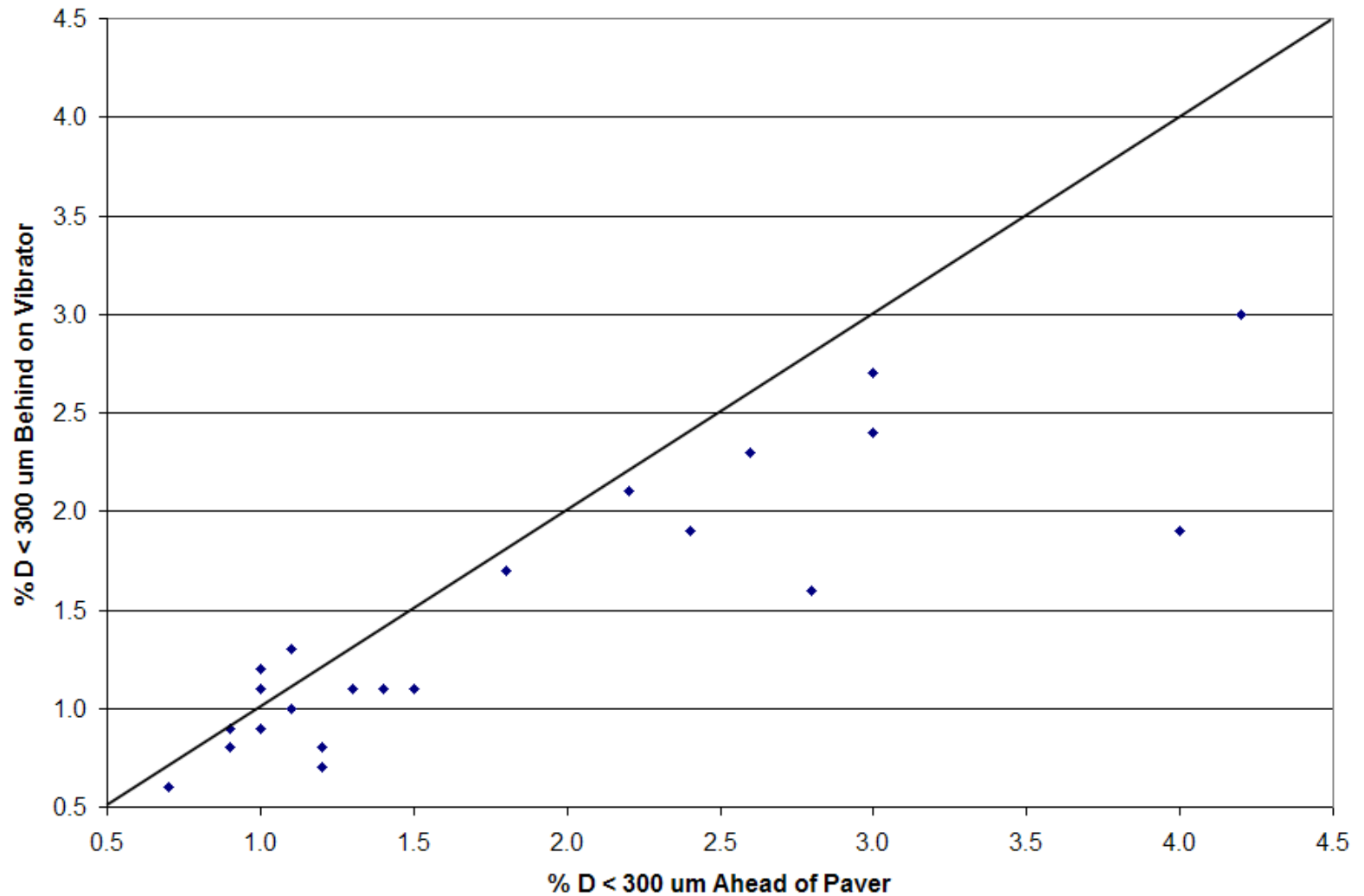
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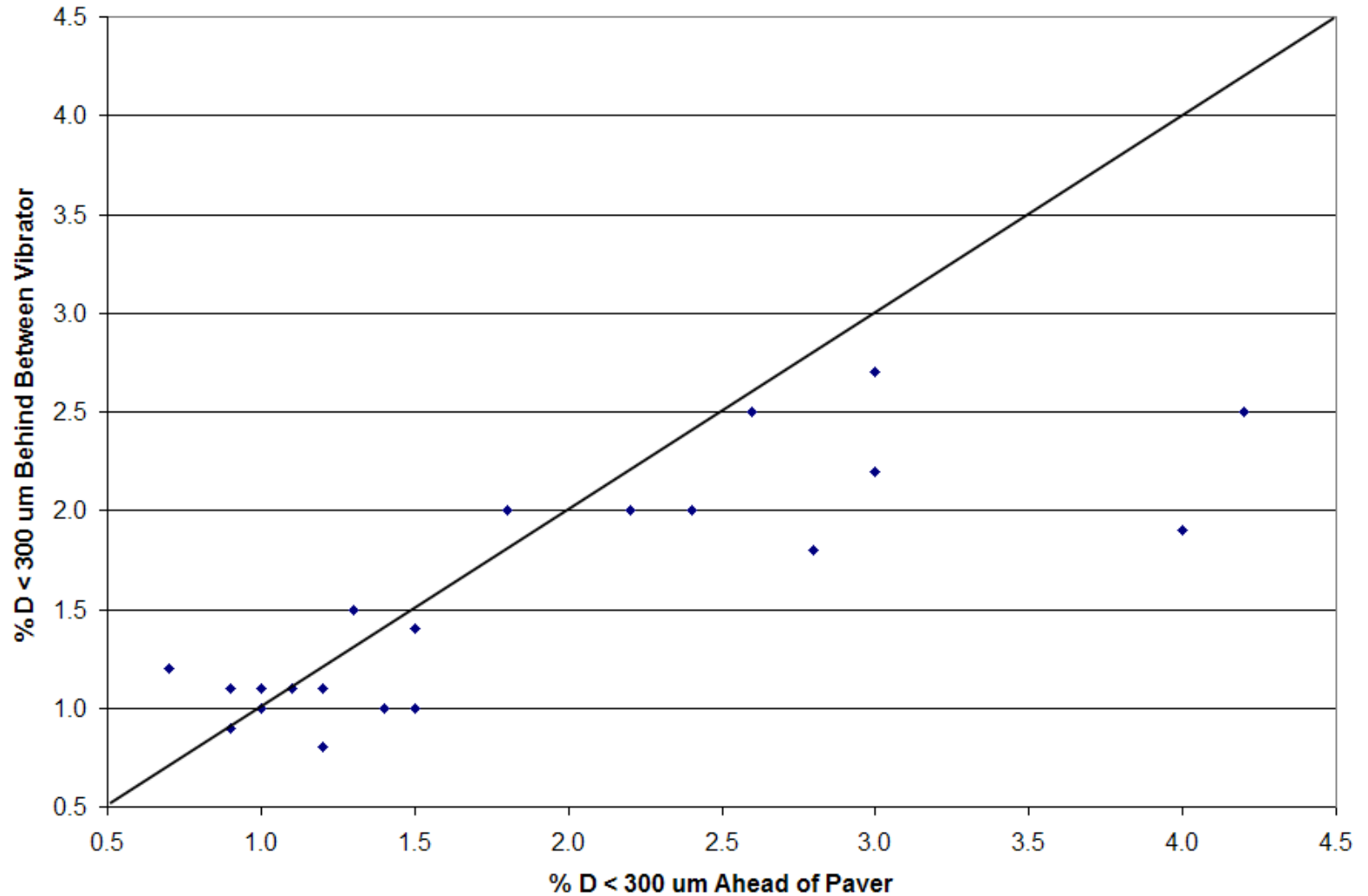
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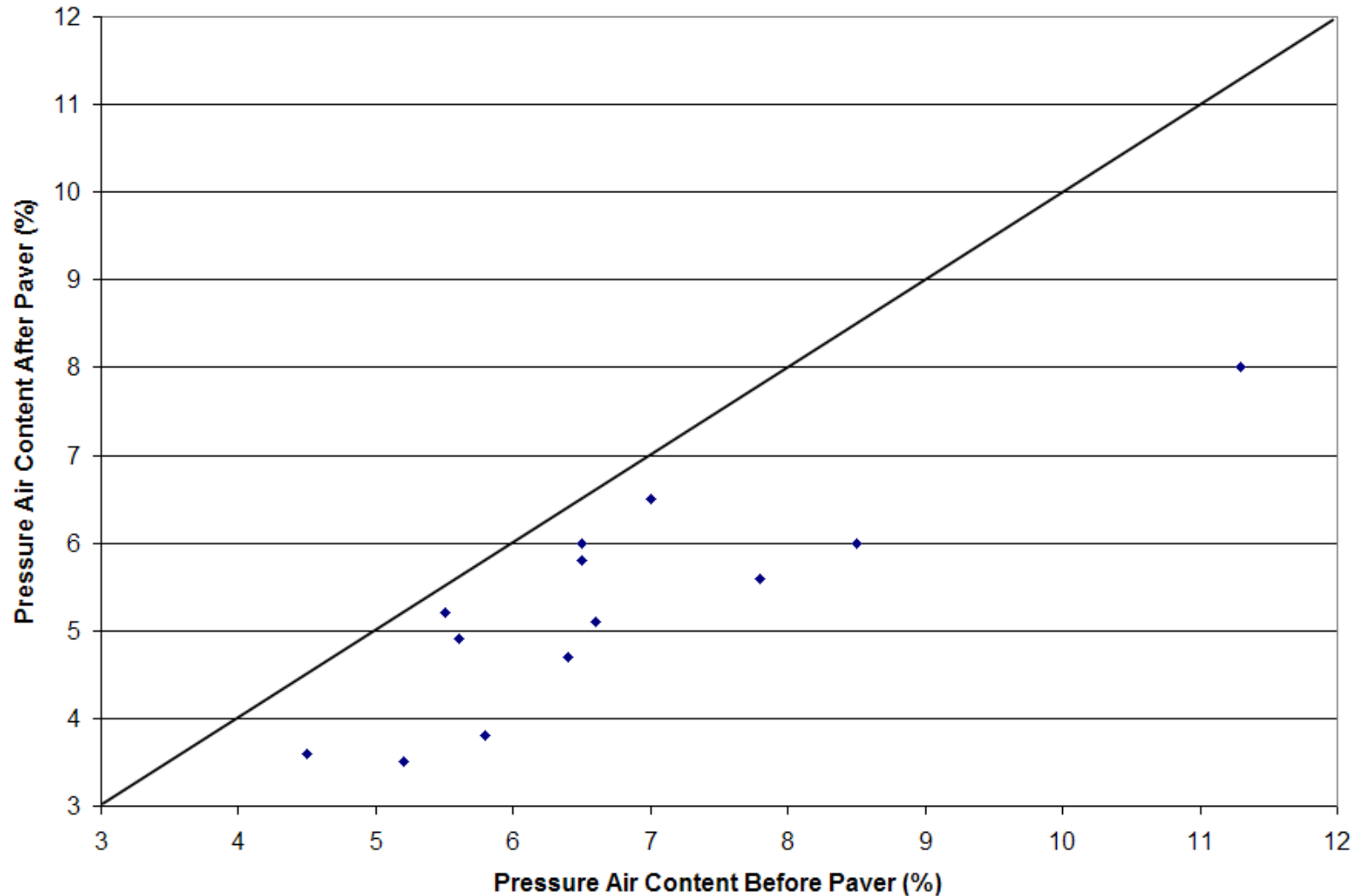
# Results



# Results



# Results



# Overall T-Test Results

<b>Sampling Location*</b>	<b>Air Content</b>	<b>Specific Surface</b>	<b>Spacing Factor</b>	<b>% D &lt; 300 <math>\mu</math>m</b>
BOV - BBV	No	No	No	No
AP – BOV - BBV	Yes	No	No	No



# State by State T-Test Results

State	Sampling Locations*	Air Content	Specific Surface	Spacing Factor	% D < 300 $\mu$ m
1	BOV - BBV	No	No	No	No
	AP - BOV	Yes	No	No	Yes
	AP - BBV	Yes	No	No	Yes
2	BOV - BBV	No	No	No	No
	AP - BOV	Yes	Yes	No	No
	AP - BBV	Yes	Yes	No	No
3	BOV - BBV	No	No	No	No
	AP - BOV	No	No	No	No
	AP - BBV	No	No	No	No
4	BOV - BBV	No	No	No	No
5	BOV - BBV	No	No	No	No
6	BOV - BBV	No	No	No	No
7	BOV - BBV	Yes	No	No	No
8	BOV - BBV	No	No	No	No
9	BOV - BBV	No	No	No	No
10	BOV - BBV	No	No	No	No
11	BOV - BBV	No	No	No	No
12	BOV - BBV	No	No	No	Yes
13	BOV - BBV	No	No	No	No
14	BOV - BBV	No	No	No	No
15	BOV - BBV	No	No	No	No
16	BOV - BBV	No	No	No	No



## Conclusions

- ASTM C 231 does not correlate to spacing factor or specific surface
- Spacing factor, specific surface, and  $D < 300 \text{ um}$  were not significantly affected when using all data
- AVA air content was affected when comparing ahead of the paver locations to behind the paver locations when using all data



# Conclusions

- Specific surface and  $D < 300\mu\text{m}$  were significantly affected when comparing data state by state
- Sampling location does not significantly affect spacing factor



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