PAVEMENT TEXTURE SIGNATURE

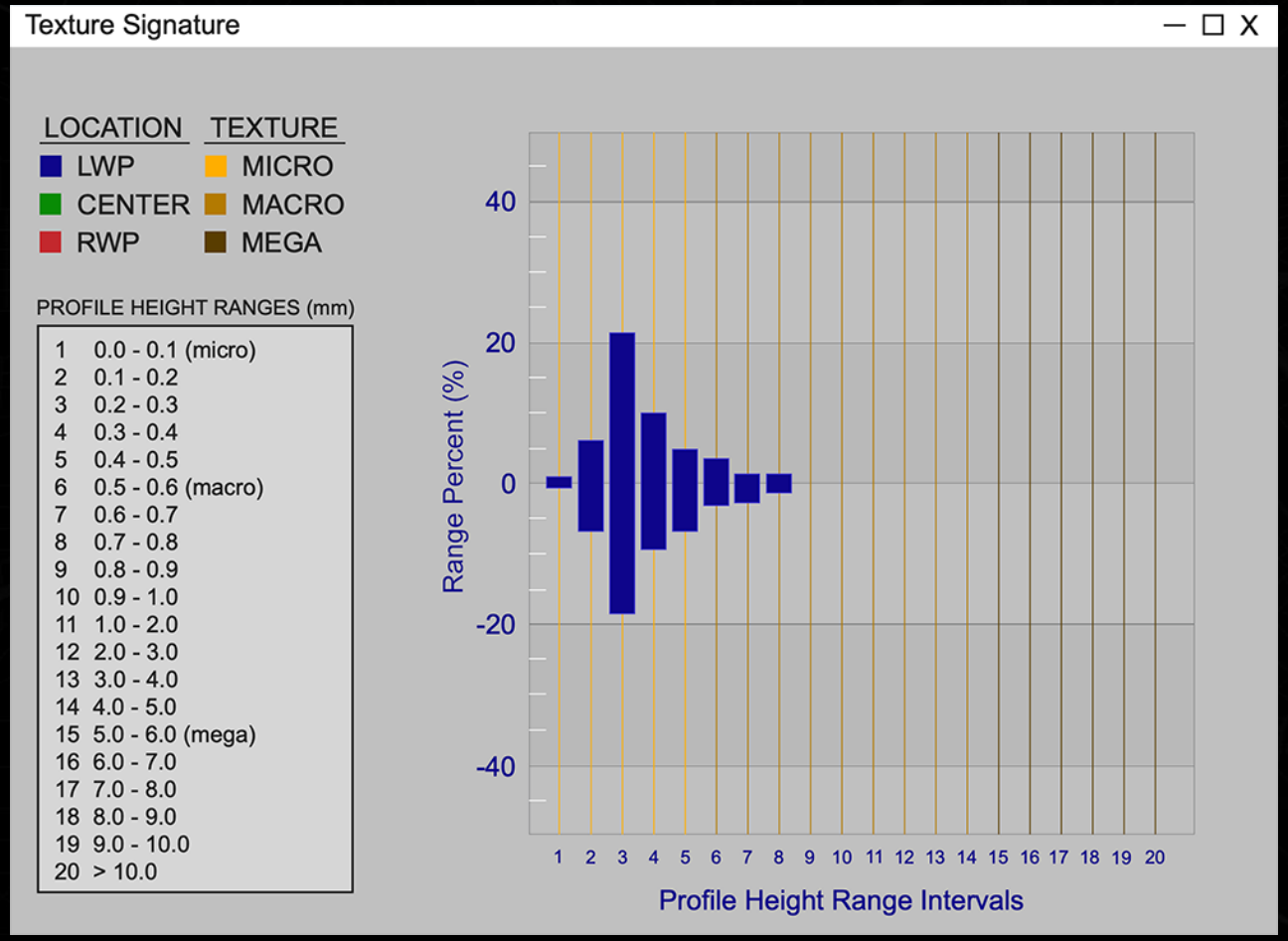
A STATISTICAL ANALYSIS OF PAVEMENT TEXTURE

Pathway Services Inc.

ERPUG

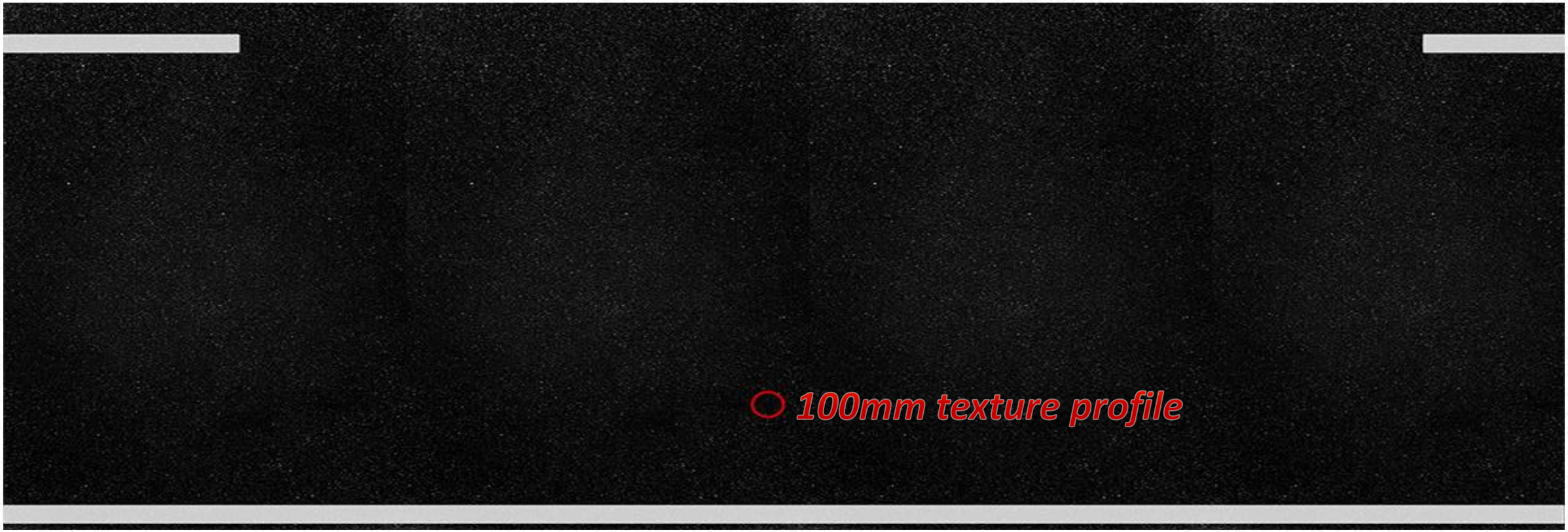
THE TEXTURE SIGNATURE SYSTEM

A NEW WAY TO LOOK AT PAVEMENT TEXTURE



ASTM E1845 – CALCULATING MACROTEXTURE MEAN PROFILE DEPTH

10M



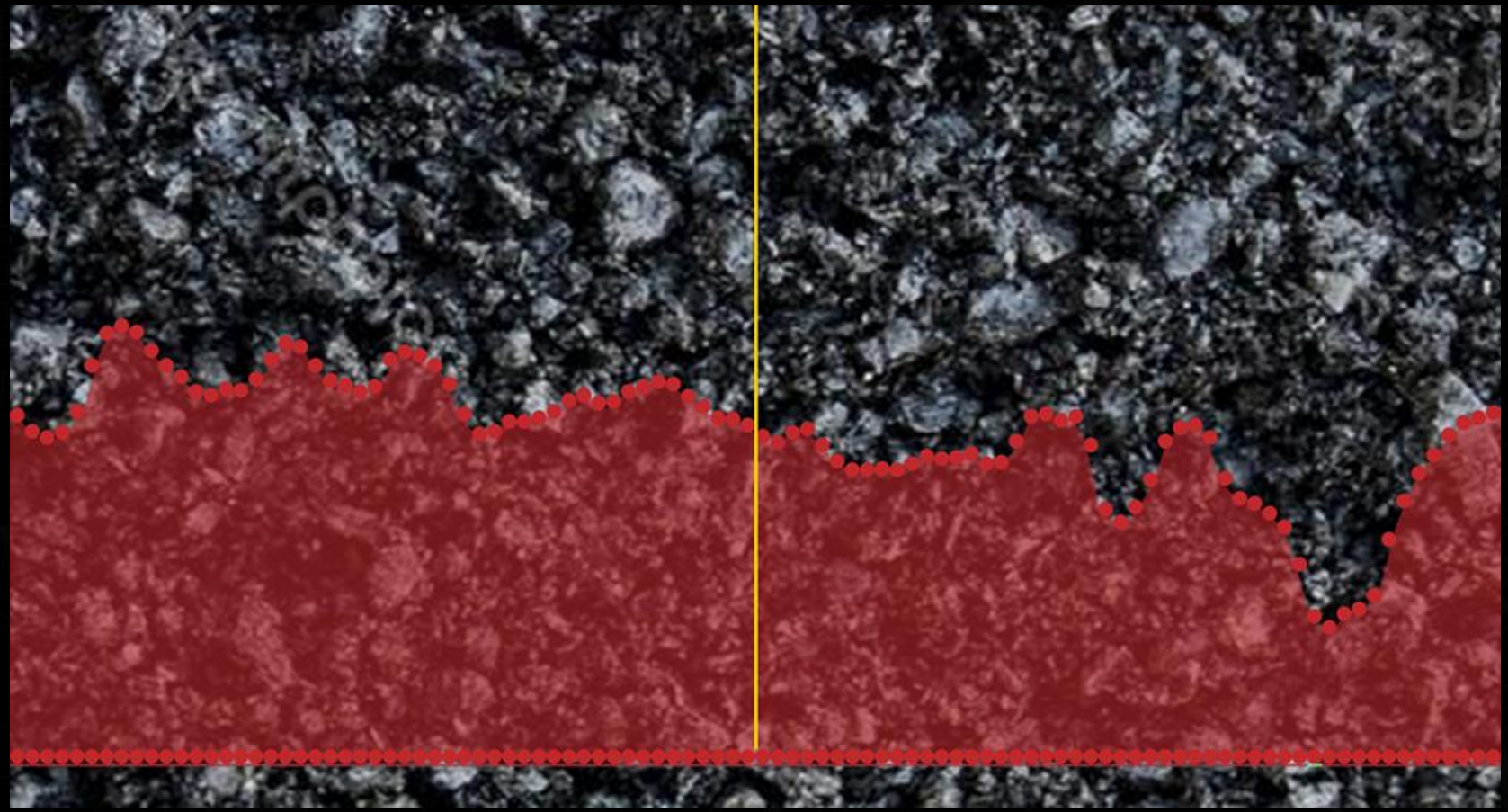
ASTM E1845 – CALCULATING MACROTEXTURE MEAN PROFILE DEPTH

100 DATA POINTS at 1MM RESOLUTION

100mm

ASTM E1845 – CALCULATING MACROTEXTURE MEAN PROFILE DEPTH

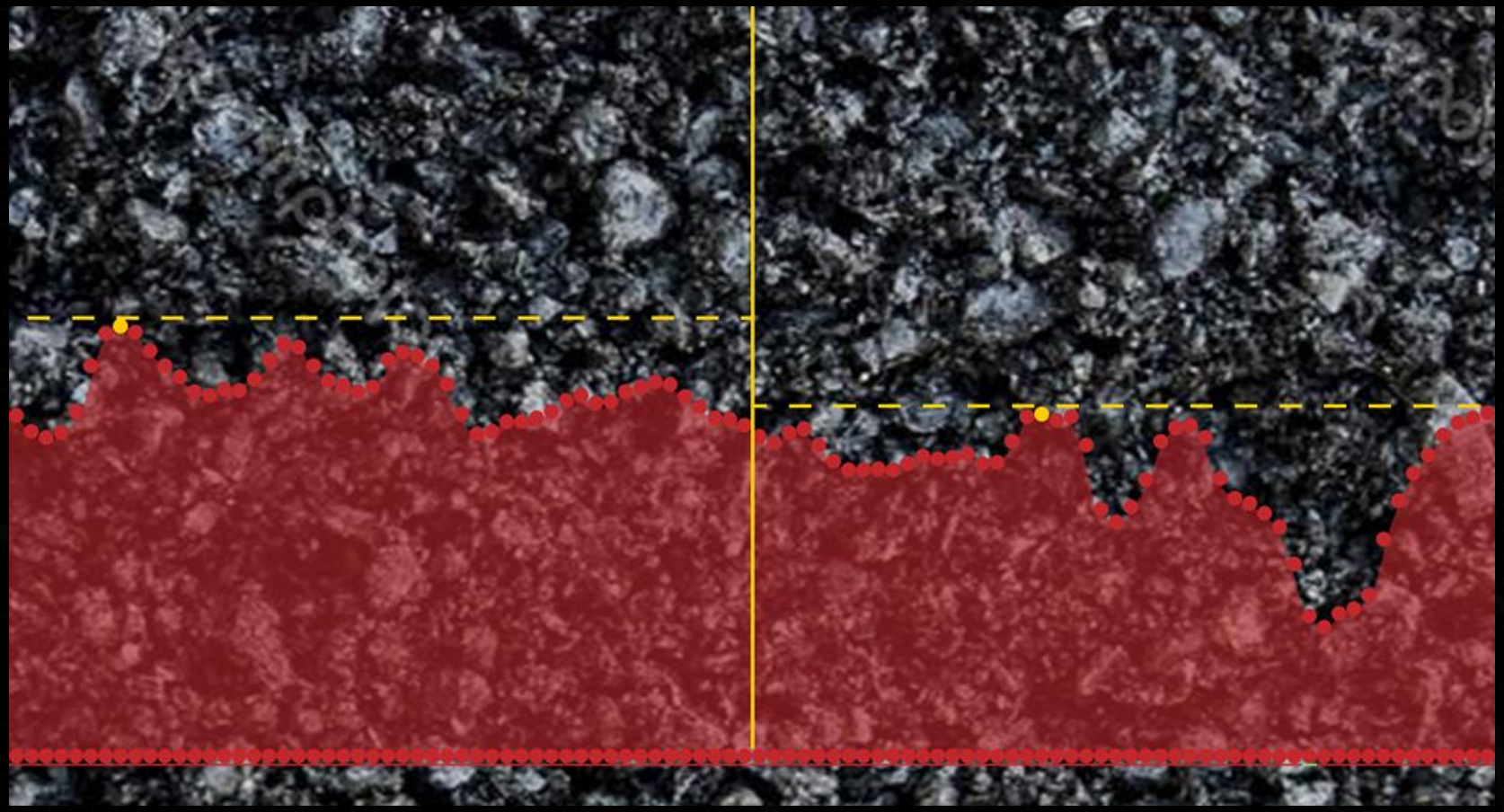
100MM TEXTURE PROFILE DIVIDED INTO 50MM SEGMENTS



100mm

ASTM E1845 – CALCULATING MACROTEXTURE MEAN PROFILE DEPTH

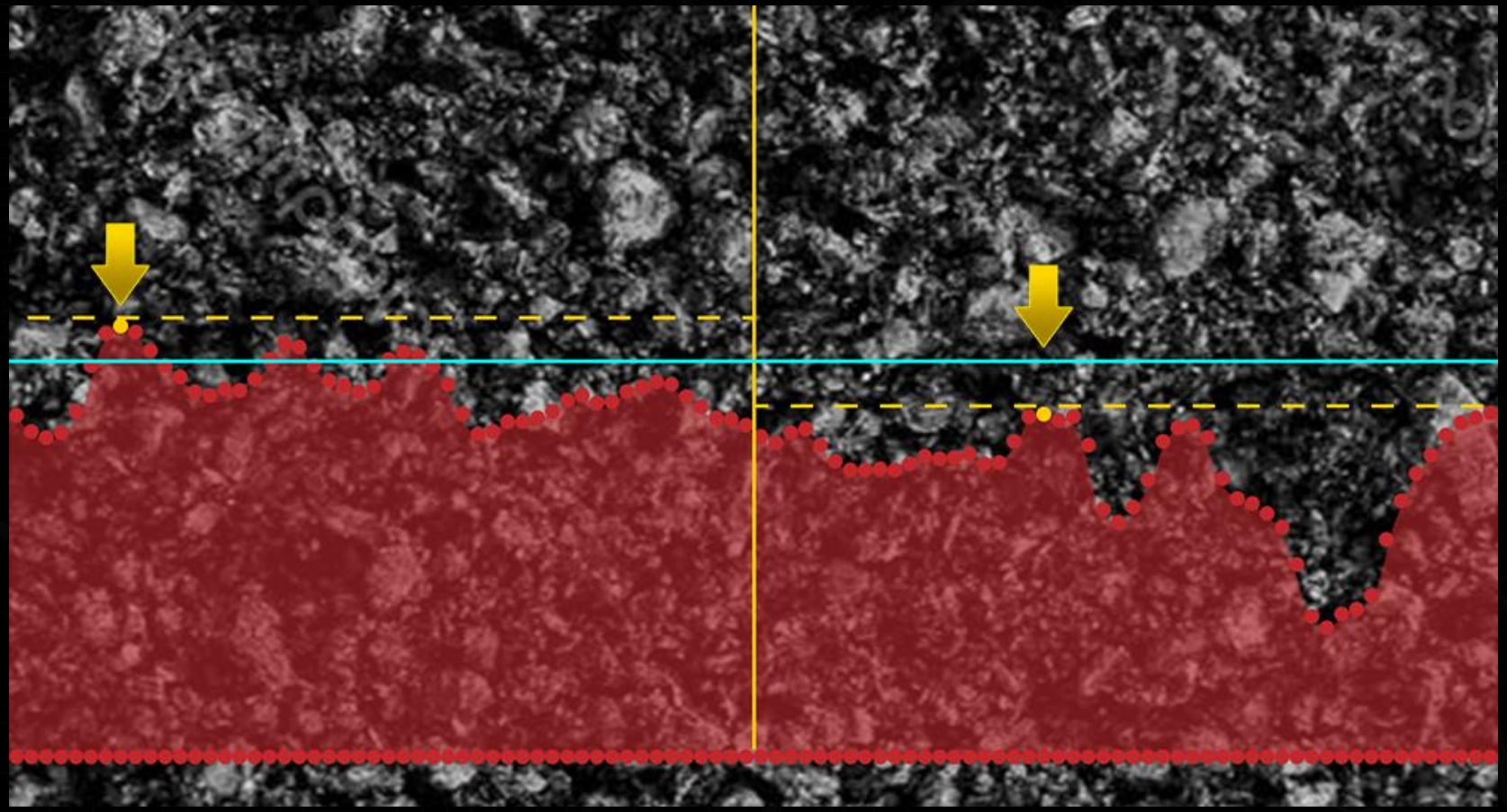
IDENTIFY THE MAX PEAK HEIGHT FOR EACH 50MM SEGMENT



100mm

ASTM E1845 – CALCULATING MACROTEXTURE MEAN PROFILE DEPTH

AVERAGE THE 2 PEAKS FOR MEAN SEGMENT DEPTH



100mm

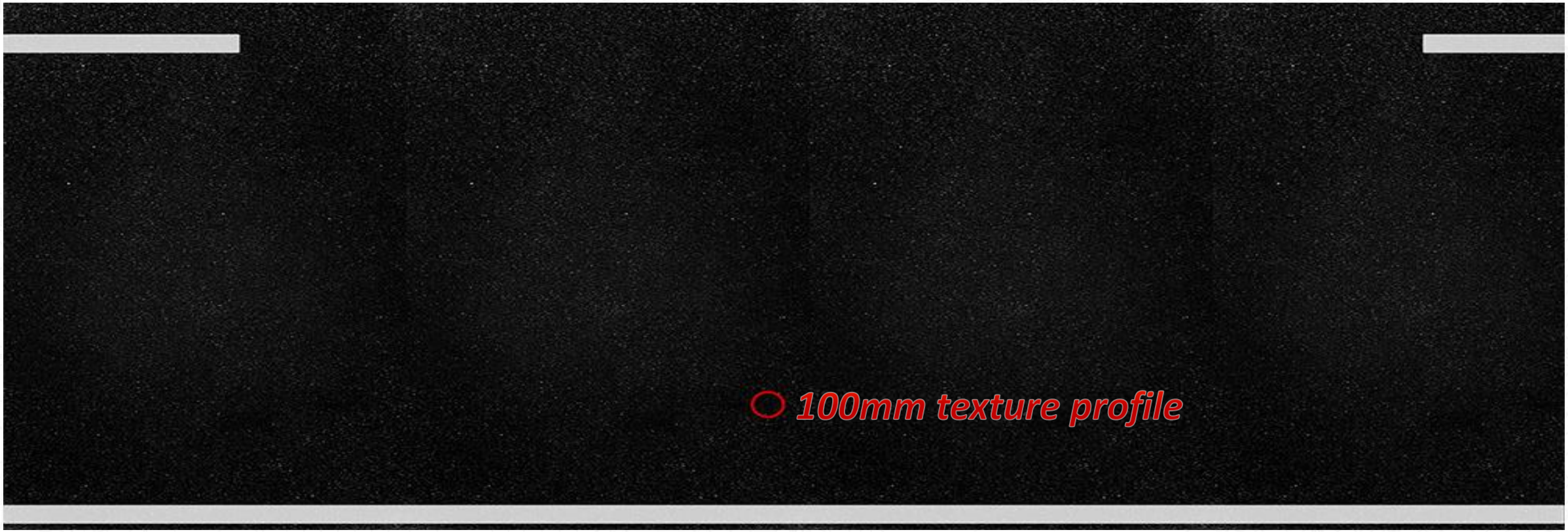
ASTM E1845 – CALCULATING MACROTEXTURE MEAN PROFILE DEPTH

MEAN PROFILE DEPTH

THE AVERAGE OF ALL MEAN SEGMENT DEPTHS COLLECTED IN A 100M SECTION

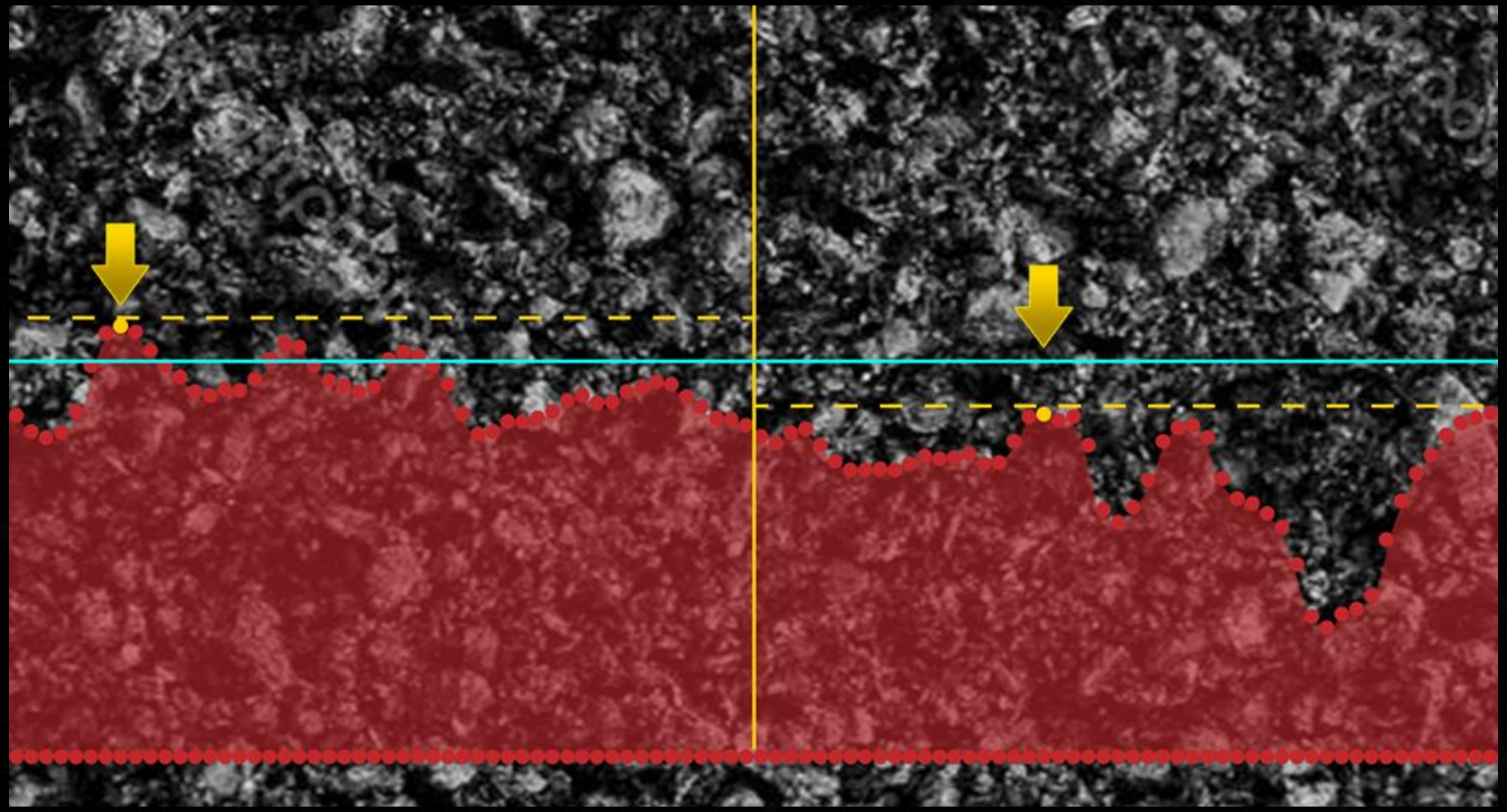
LIMITATIONS OF MEAN PROFILE DEPTH

ONE 100MM LINE REPRESENTS 400 SQUARE FEET OF TEXTURE



LIMITATIONS OF MEAN PROFILE DEPTH

MPD ONLY USES 2 PEAK DATA POINTS AND DILUTES THEM



LIMITATIONS OF MEAN PROFILE DEPTH

"Aggregate particle shape, size, and distribution are surface texture features ***NOT ADDRESSED*** *in this procedure. The method is* ***NOT MEANT TO PROVIDE A COMPLETE PICTURE OF SURFACE TEXTURE*** *characteristics. It is known that* ***THERE ARE PROBLEMS*** *in interpreting the result if the method is applied to* ***POROUS*** *surfaces or to* ***GROOVED SURFACES****. "*

LIMITATIONS OF SKID TESTING

- STILL COLLECTING DATA ON SAMPLE AREAS
- TESTING IS EXPENSIVE AND TIME CONSUMING
- IT'S MORE DANGEROUS THAN DATA COLLECTION
- IMPEDING TRAFFIC COLLECTING AT 65 KPH
- **GENERALLY IMPRACTICAL FOR NETWORK LEVEL COLLECTION**

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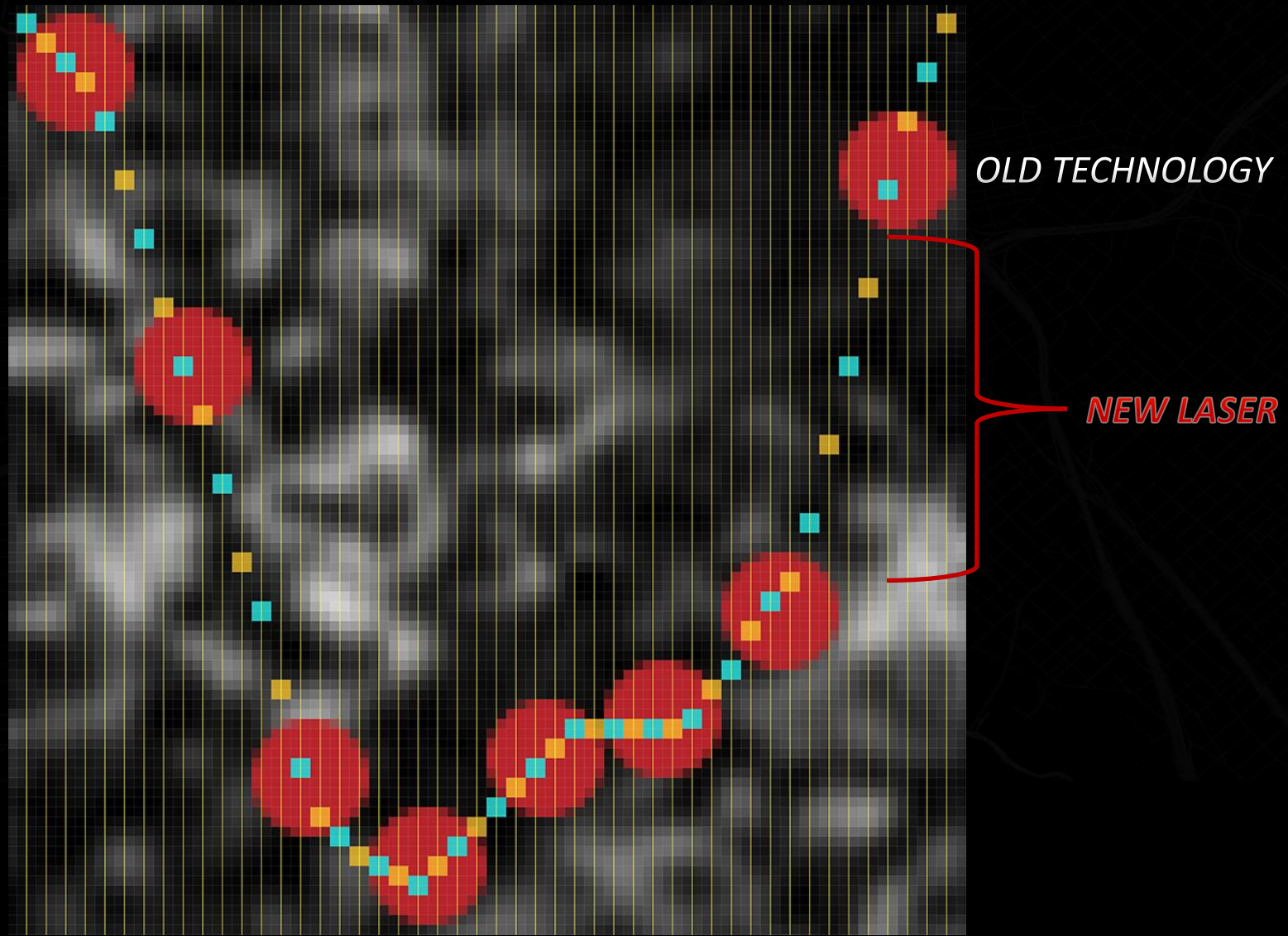
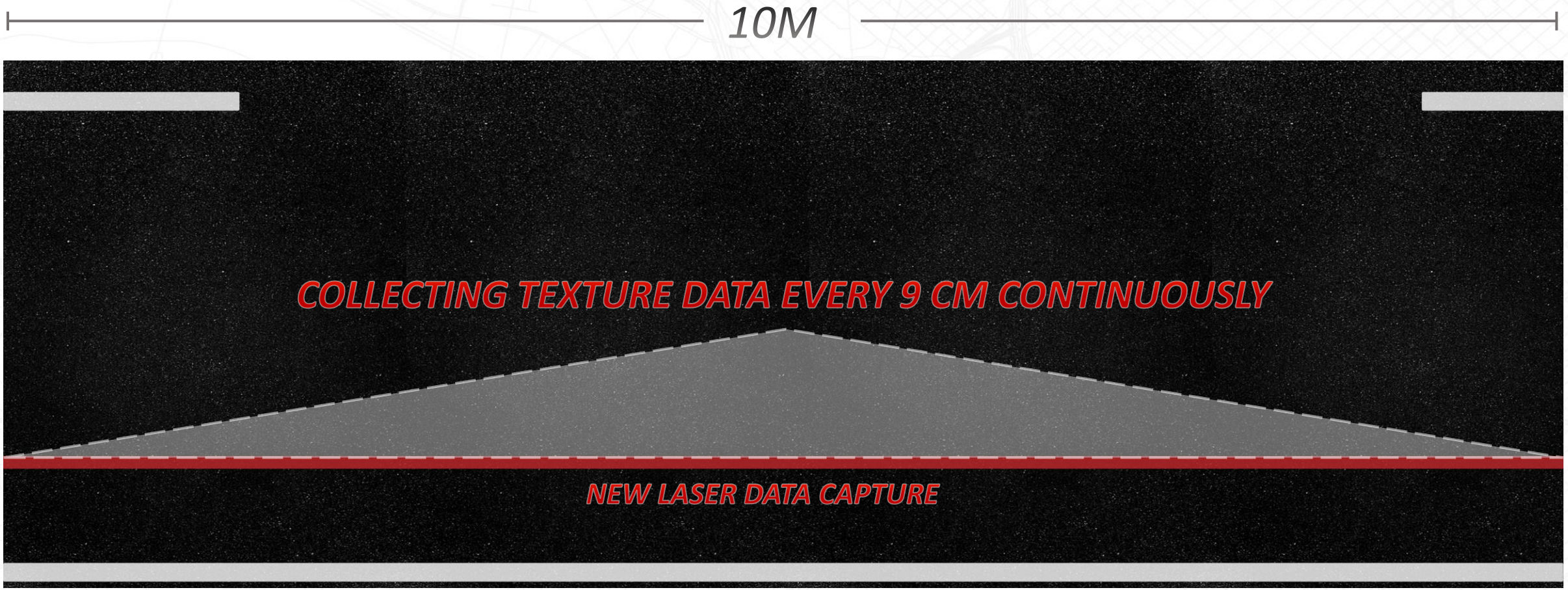
NEW TECHNOLOGY CAPABILITIES

5 TIMES THE RESOLUTION



NEW LASER TECHNOLOGY CAPABILITIES



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NEW TECHNOLOGY COMPARISON

100 vs. ½ MILLION DATA POINTS IN 10M

1MM vs. 0.2MM RESOLUTION

5000 x THE AMOUNT OF DATA

AT 5 x THE RESOLUTION

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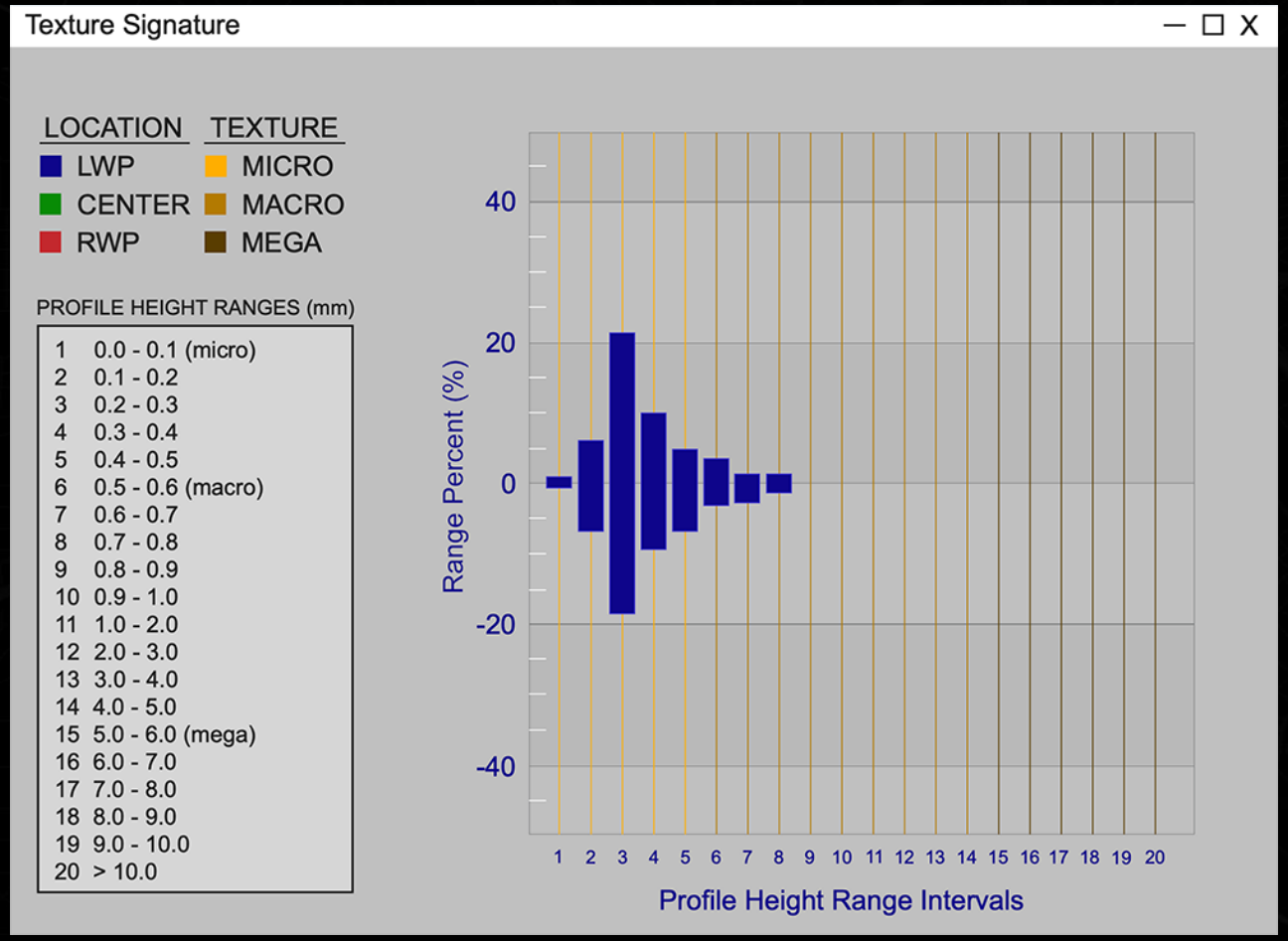
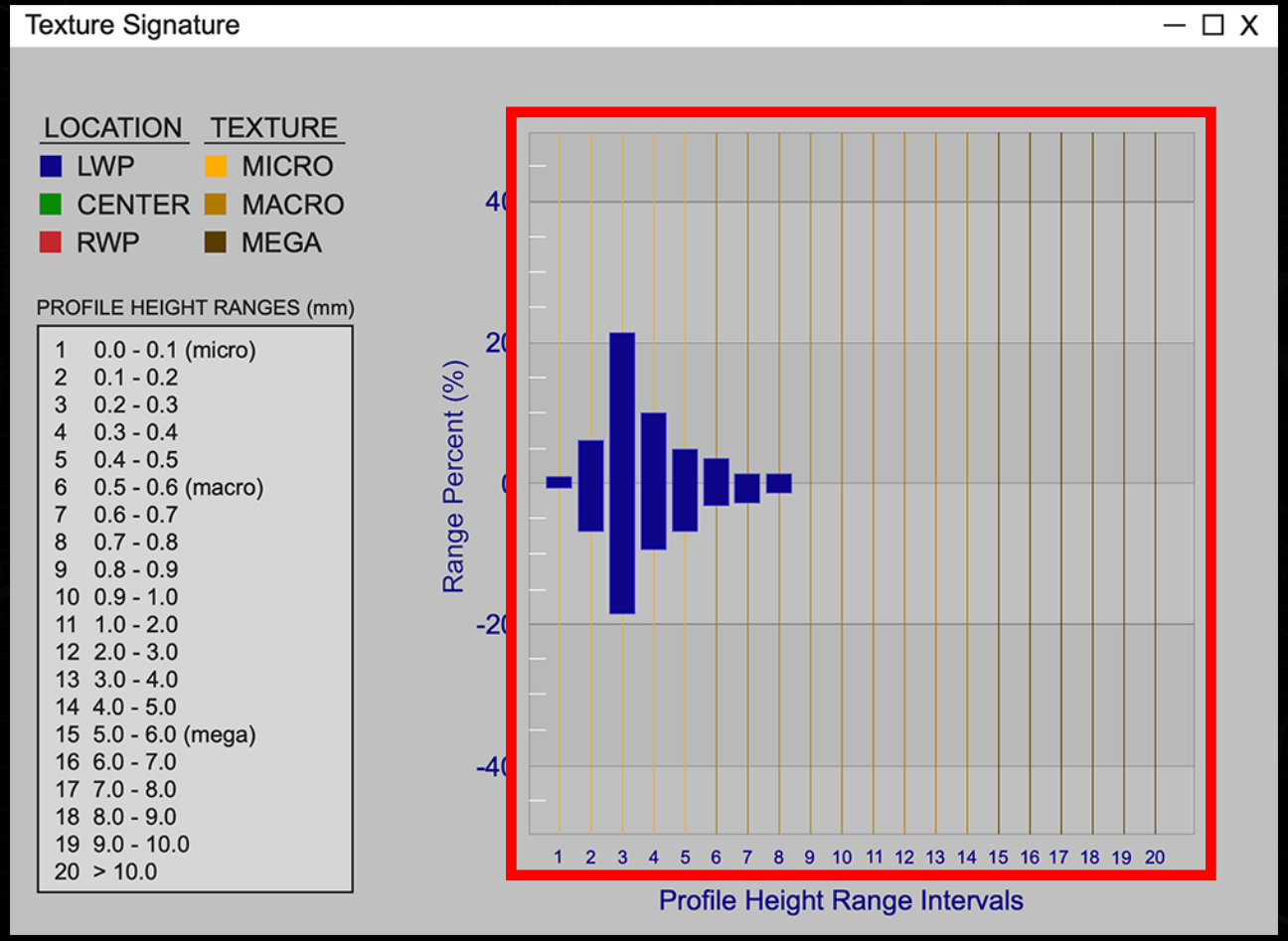
A NEW WAY OF EVALUATING TEXTURE DATA

THE TEXTURE SIGNATURE



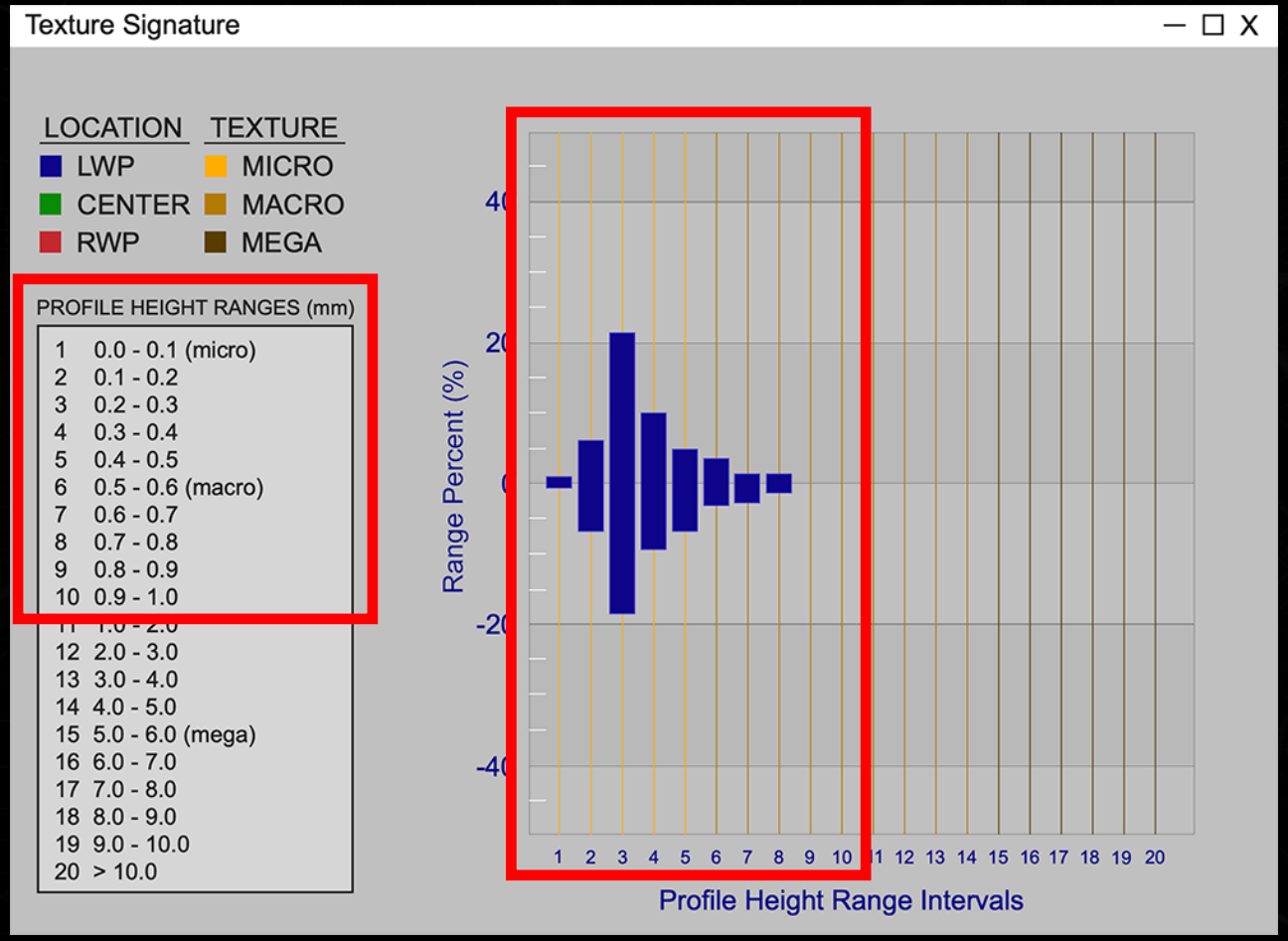
A NEW WAY OF EVALUATING TEXTURE DATA

THE TEXTURE SIGNATURE: BINS



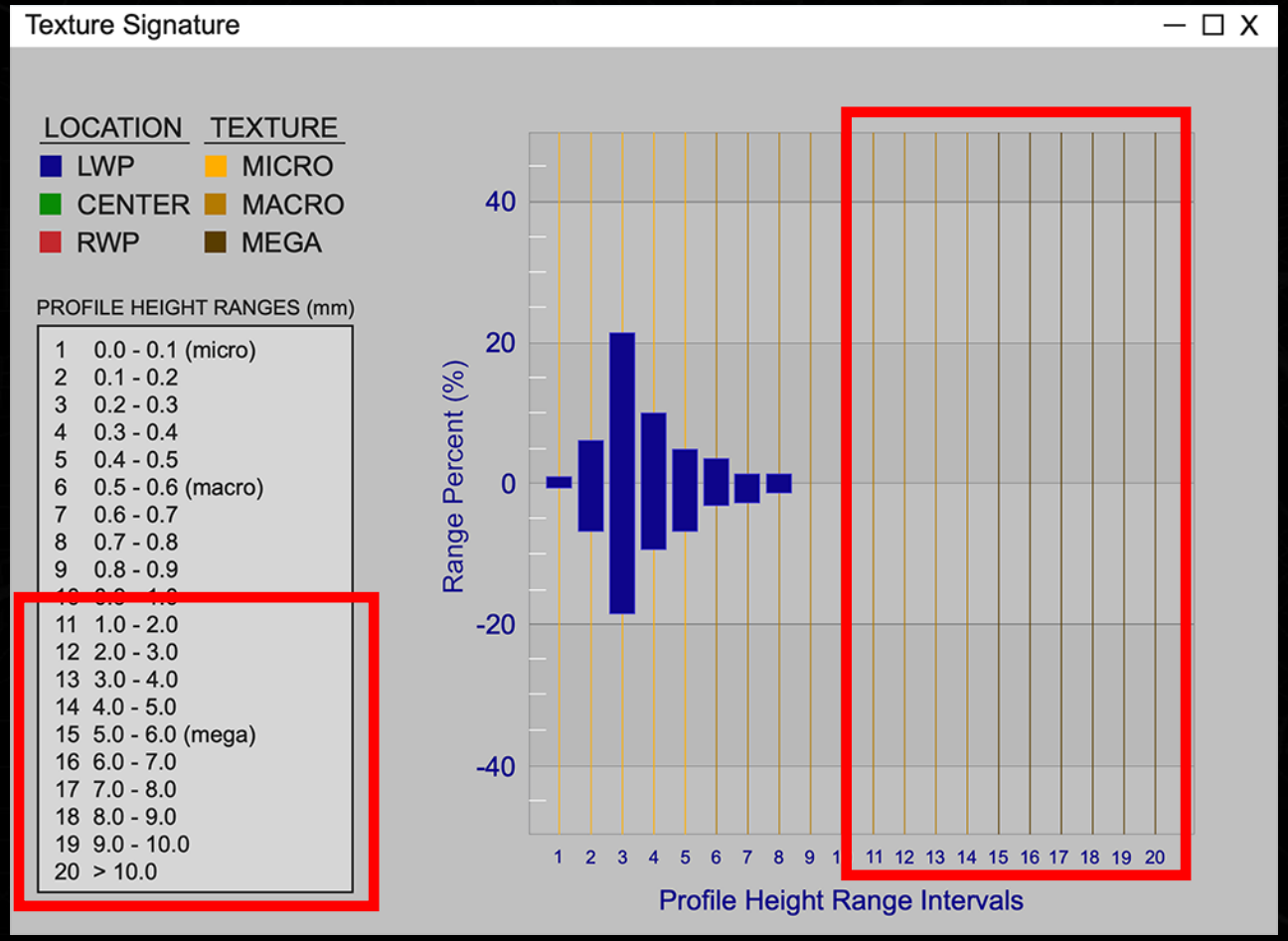
A NEW WAY OF EVALUATING TEXTURE DATA

THE TEXTURE SIGNATURE: 0.1MM INTERVAL BINS



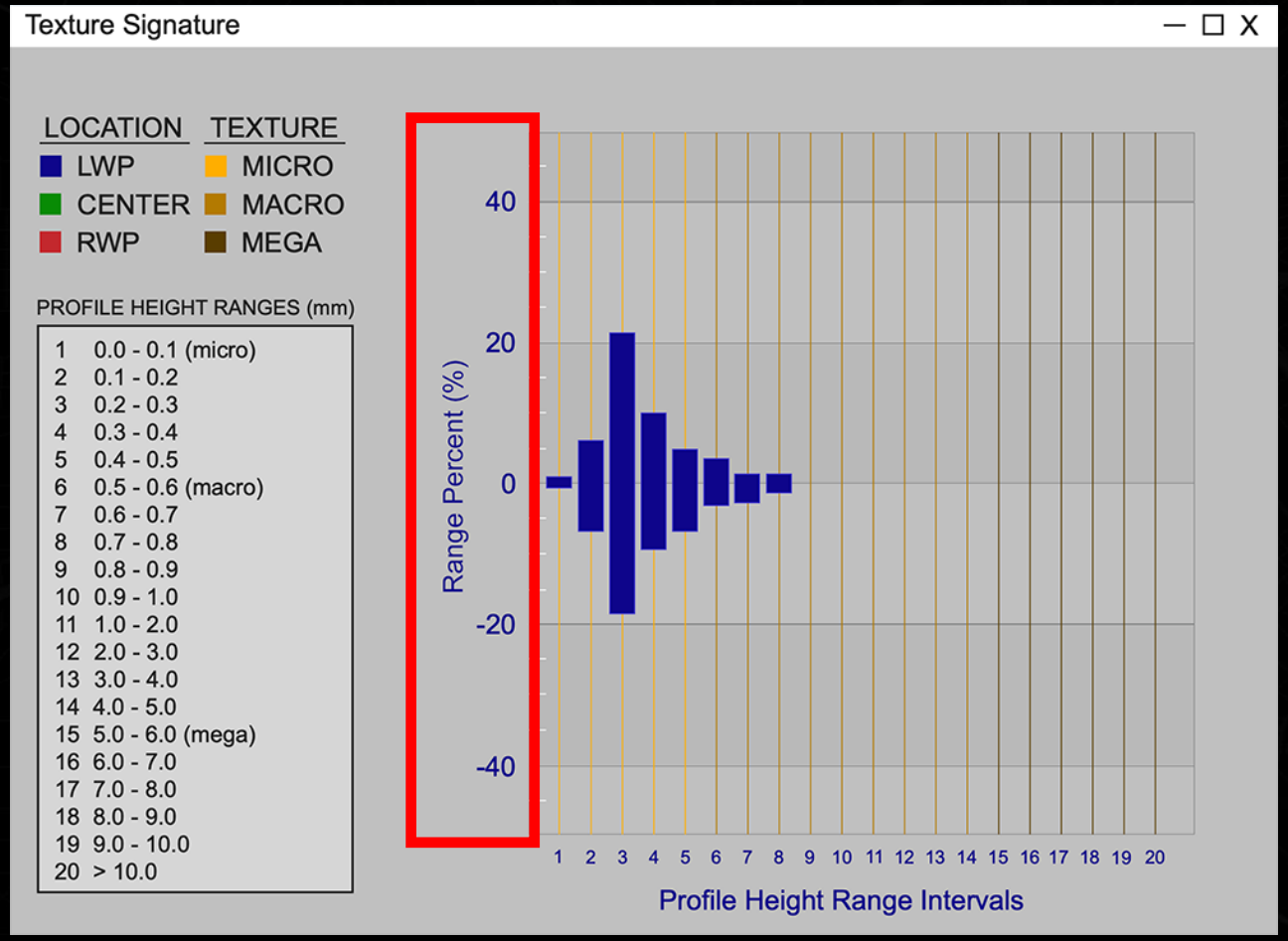
A NEW WAY OF EVALUATING TEXTURE DATA

THE TEXTURE SIGNATURE: 1MM INTERVAL BINS



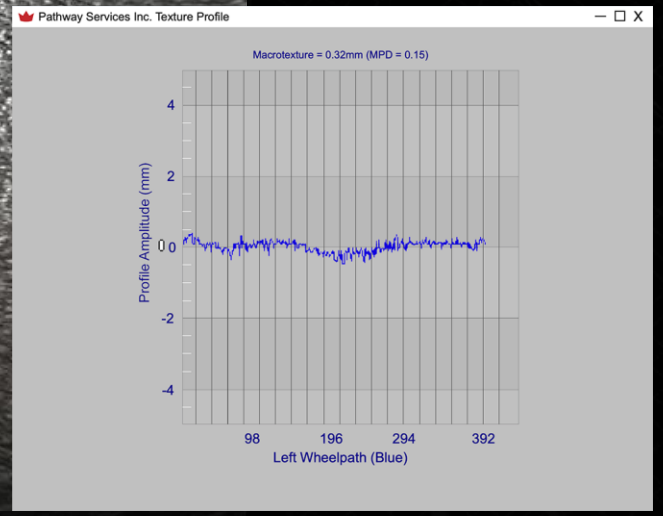
A NEW WAY OF EVALUATING TEXTURE DATA

THE TEXTURE SIGNATURE: PERCENTAGE OF DATA PER BIN



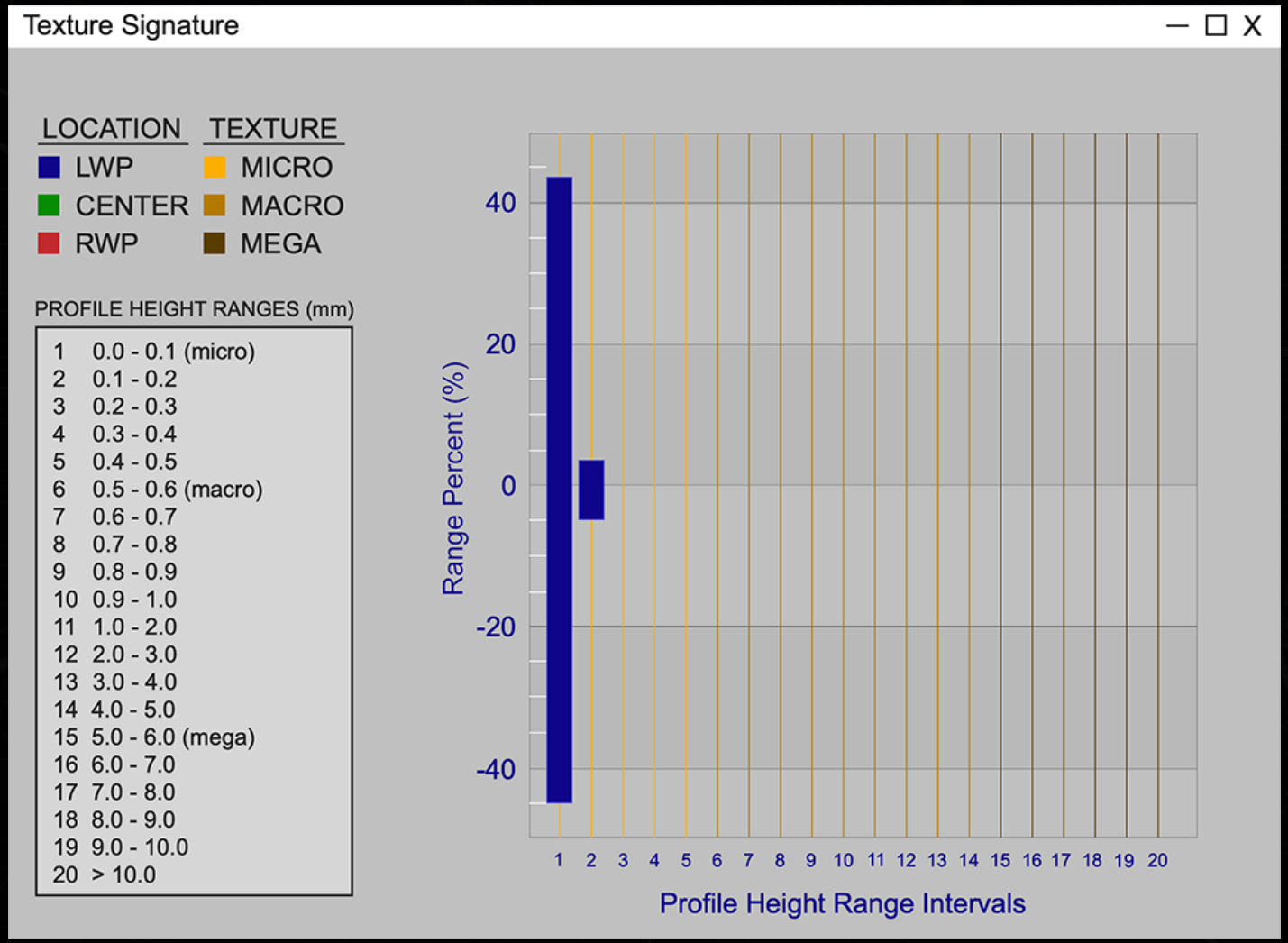
LAB EXAMPLE 1: TABLETOP SURFACE

TABLETOP SURFACE



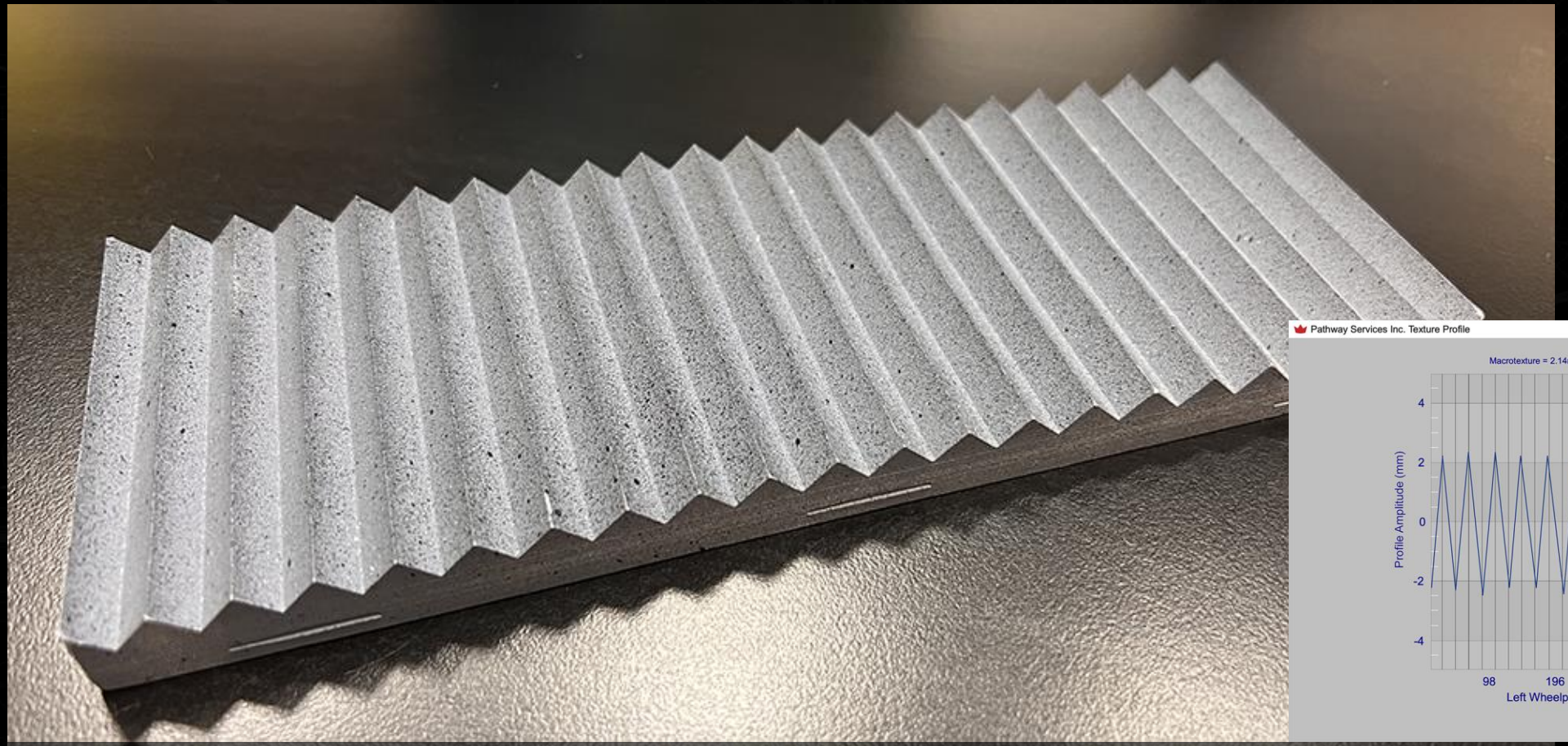
TABLETOP TEXTURE PROFILE

LAB EXAMPLE 1: TABLETOP SURFACE TEXTURE SIGNATURE



TABLETOP TEXTURE SIGNATURE

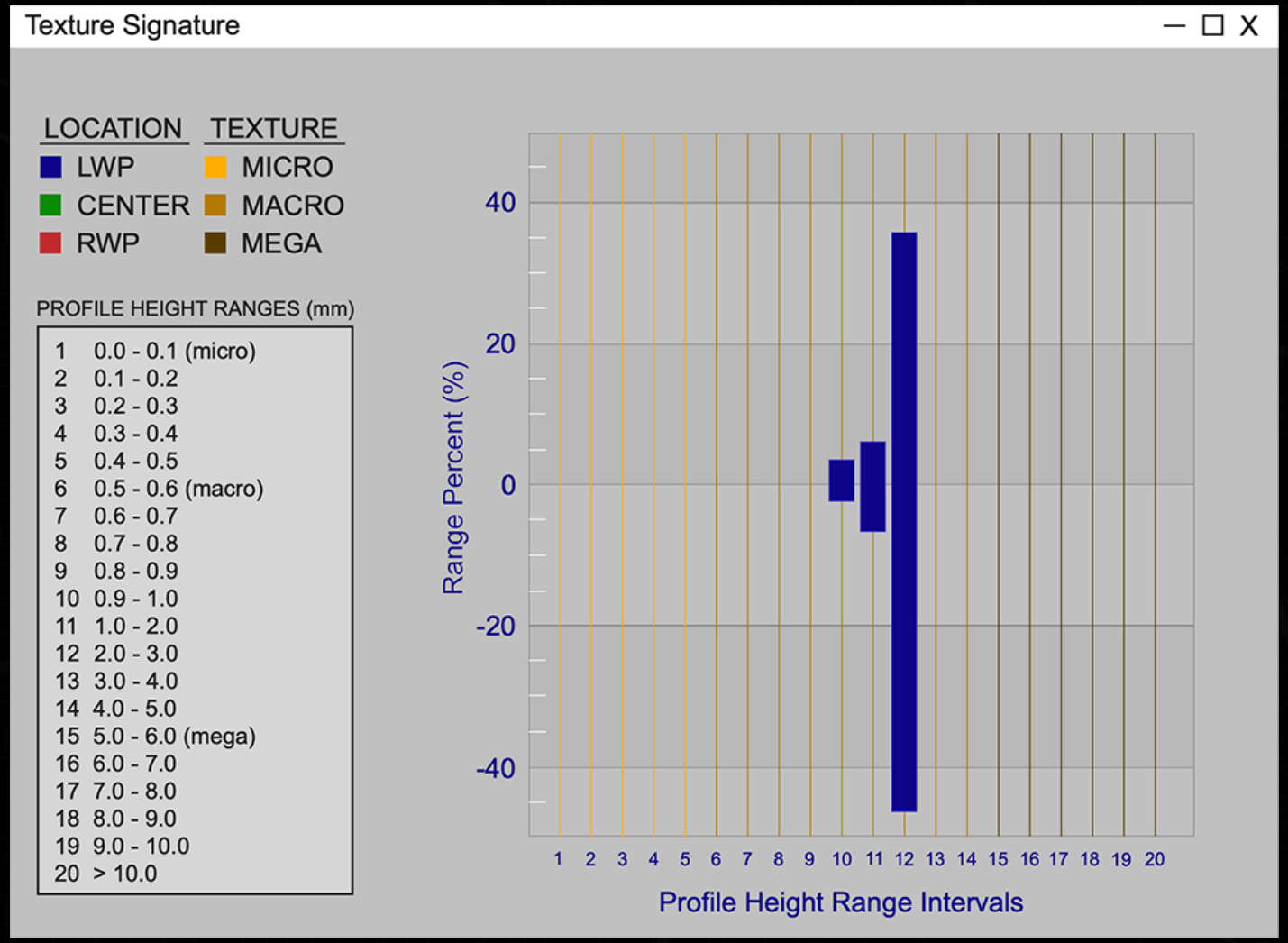
LAB EXAMPLE 2: METAL SAWTOOTH OBJECT



METAL SAWTOOTH OBJECT

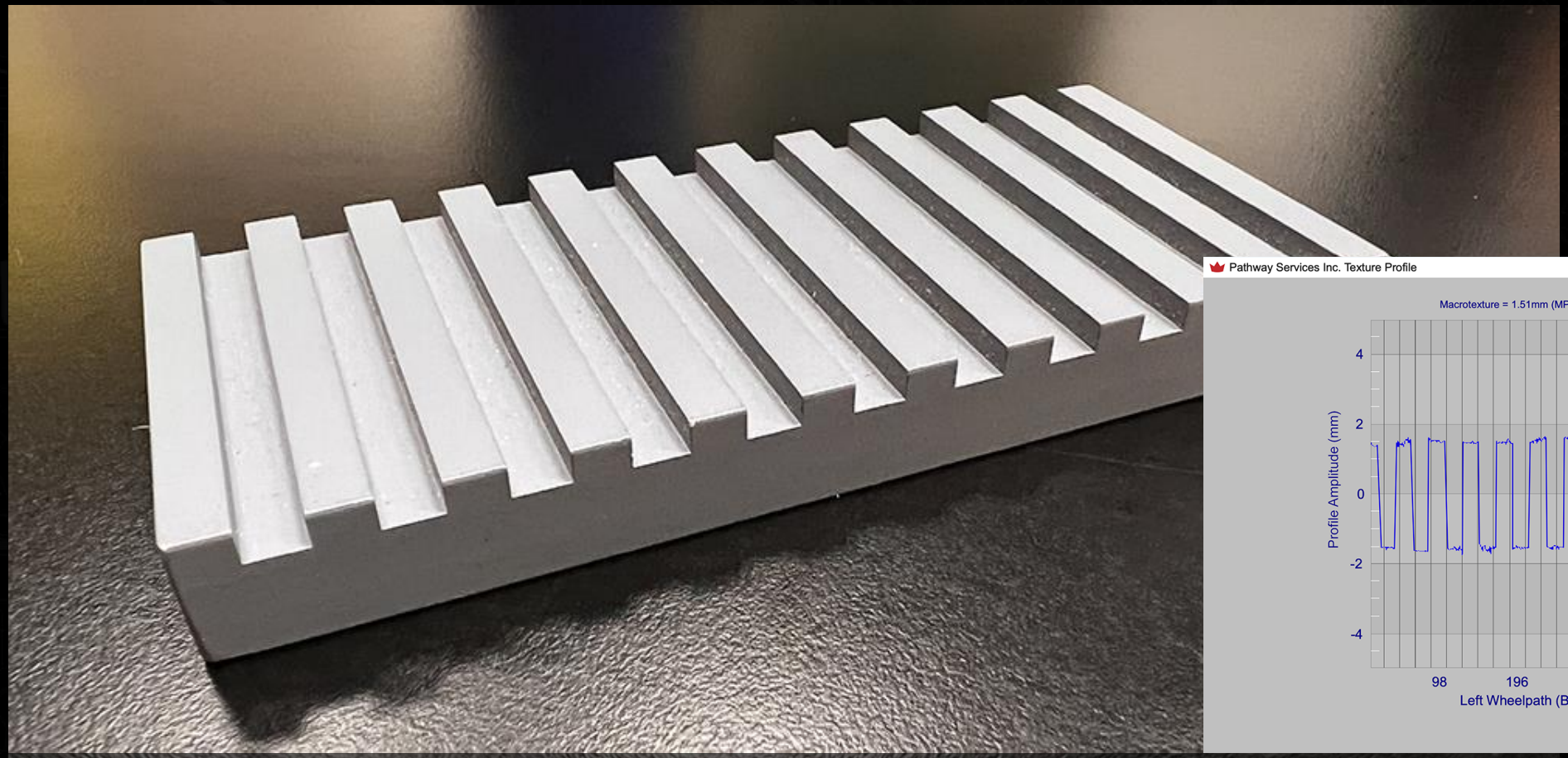
SAWTOOTH TEXTURE PROFILE

LAB EXAMPLE 2: METAL SAWTOOTH OBJECT TEXTURE SIGNATURE



SAWTOOTH TEXTURE SIGNATURE

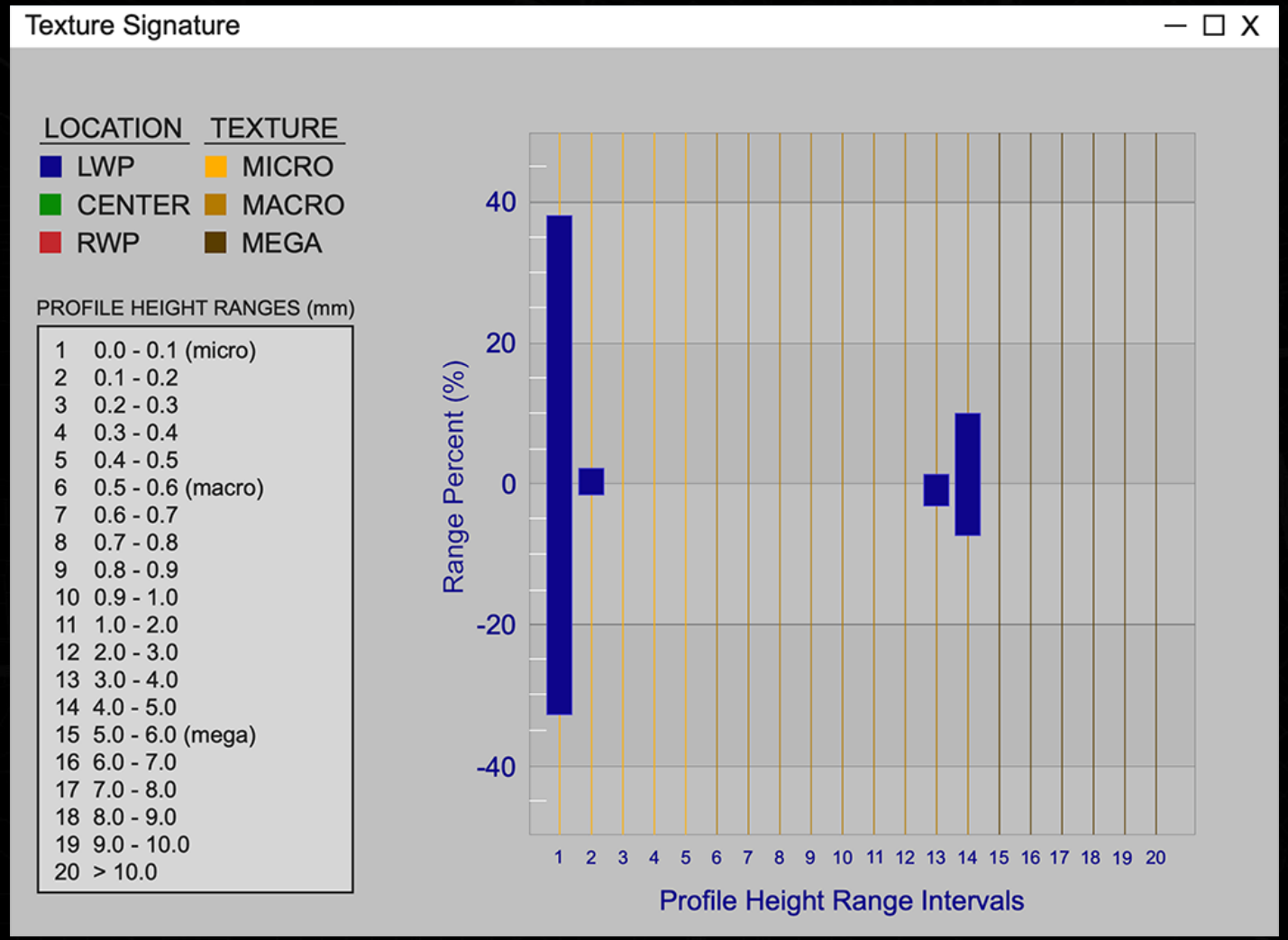
LAB EXAMPLE 3: METAL SQUARETOOTH OBJECT



METAL SQUARETOOTH OBJECT

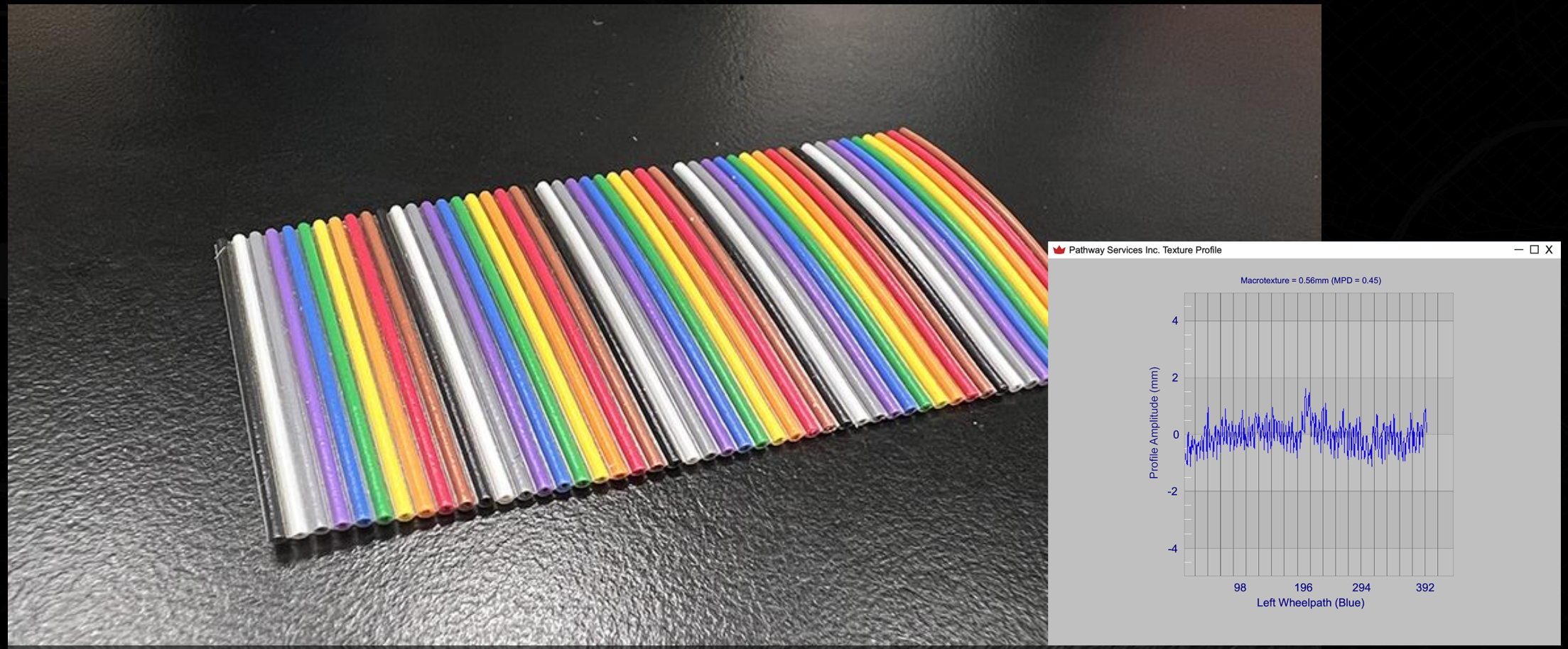
SQUARETOOTH TEXTURE PROFILE

LAB EXAMPLE 3: METAL SQUARETOOTH OBJECT TEXTURE SIGNATURE



SQUARETOOTH TEXTURE SIGNATURE

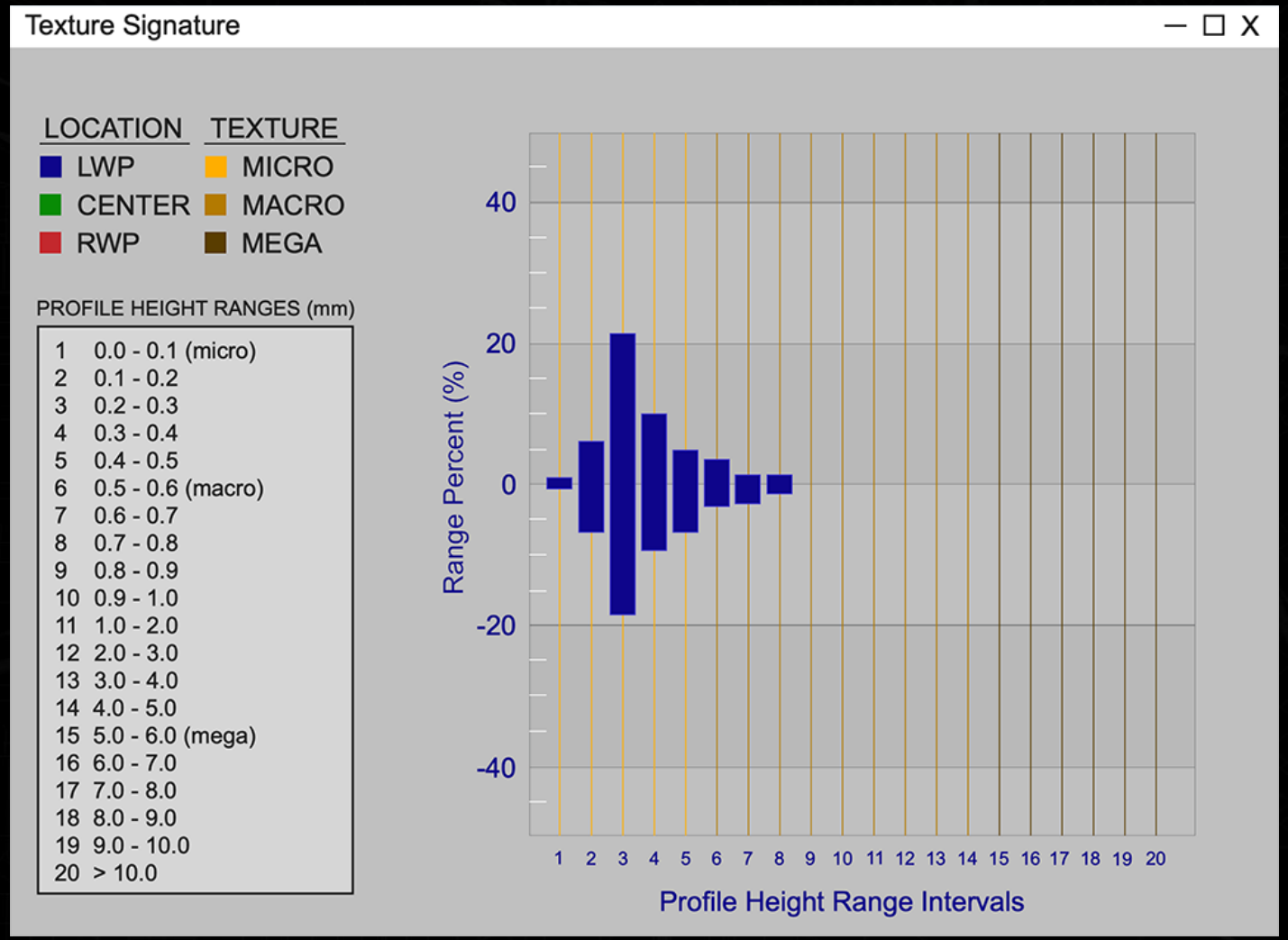
LAB EXAMPLE 4: WIRE RIBBON



WIRE RIBBON

WIRE RIBBON TEXTURE PROFILE

LAB EXAMPLE 4: WIRE RIBBON TEXTURE SIGNATURE



WIRE RIBBON TEXTURE SIGNATURE

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OHIO DEPARTMENT OF TRANSPORTATION CORE SAMPLES

ERPUG

OHIO DEPARTMENT OF TRANSPORTATION CORE SAMPLES

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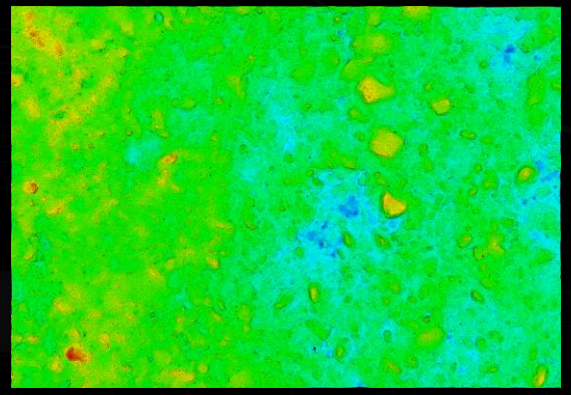
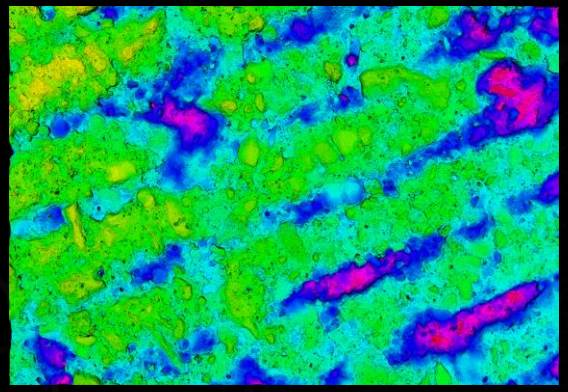
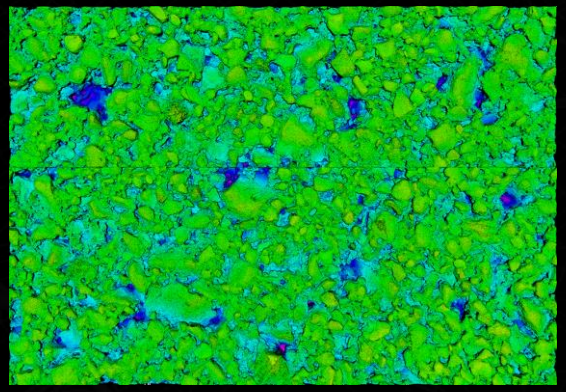
OHIO DEPARTMENT OF TRANSPORTATION CORE SCANS



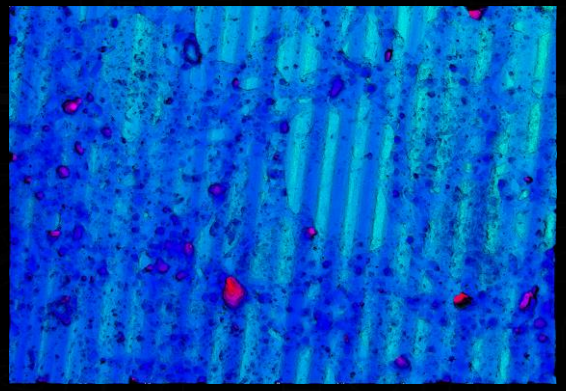
Polished Microsurfacing



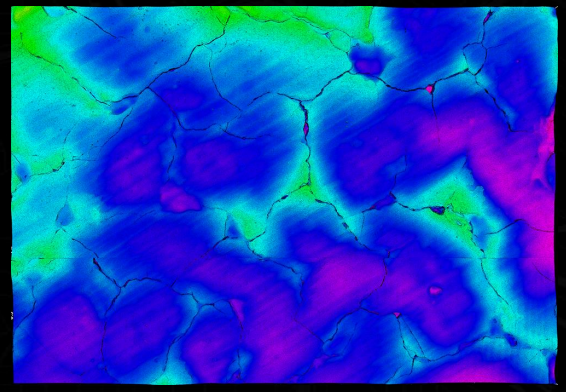
Worn Jointed Concrete



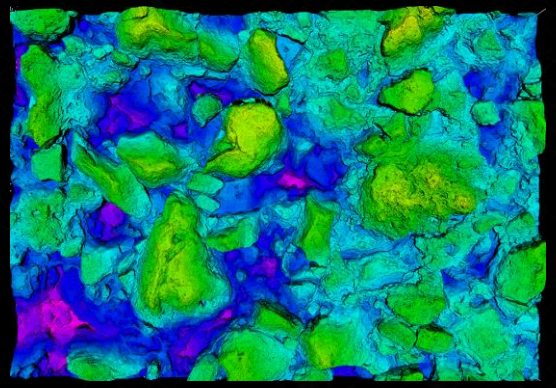
Hot Mix Asphalt



Diamond Ground Concrete



Jennite



Chip Seal

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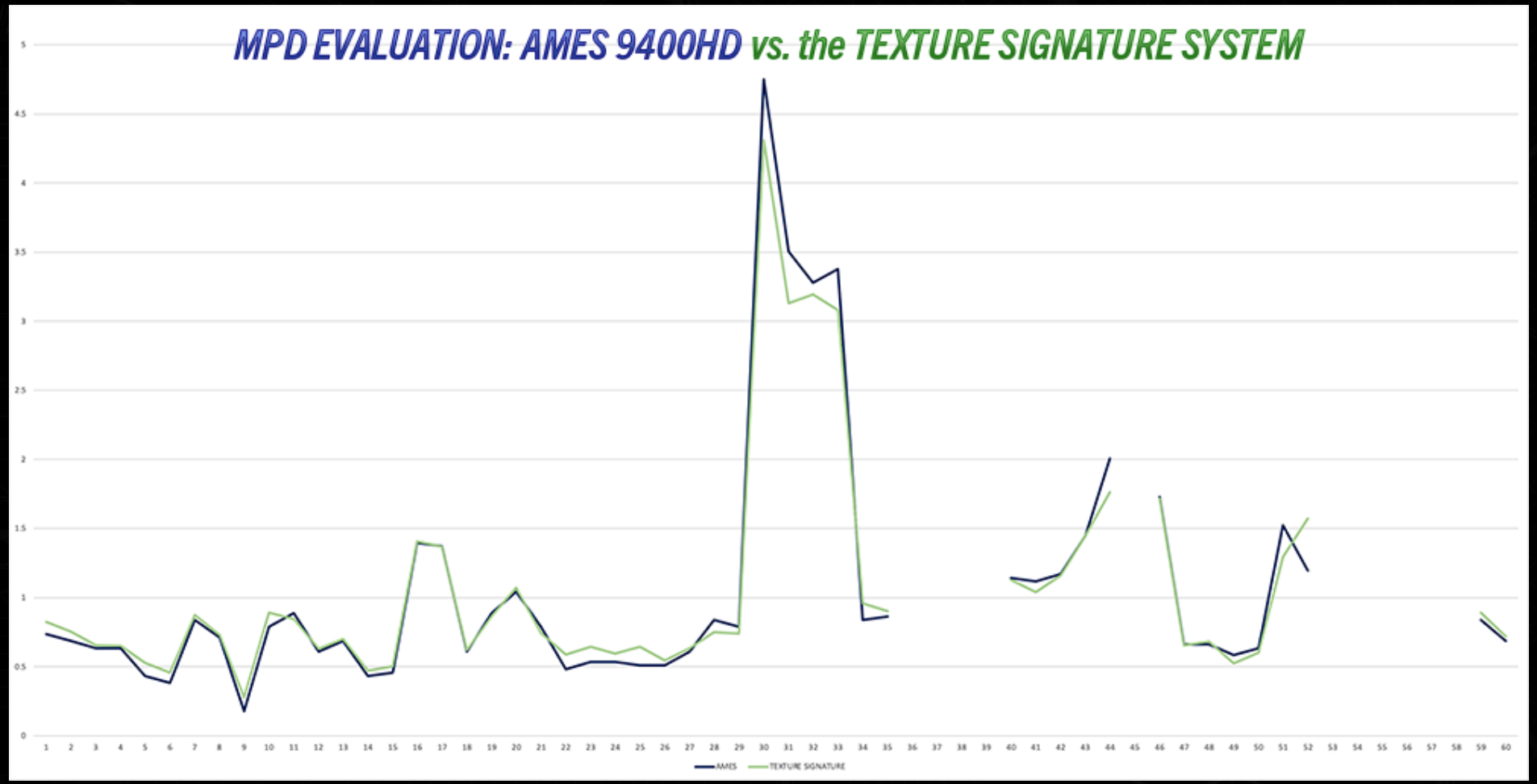
MPD COMPARISON – TEXTURE SIGNATURE vs. AMES 9400HD



99.4% CORRELATION

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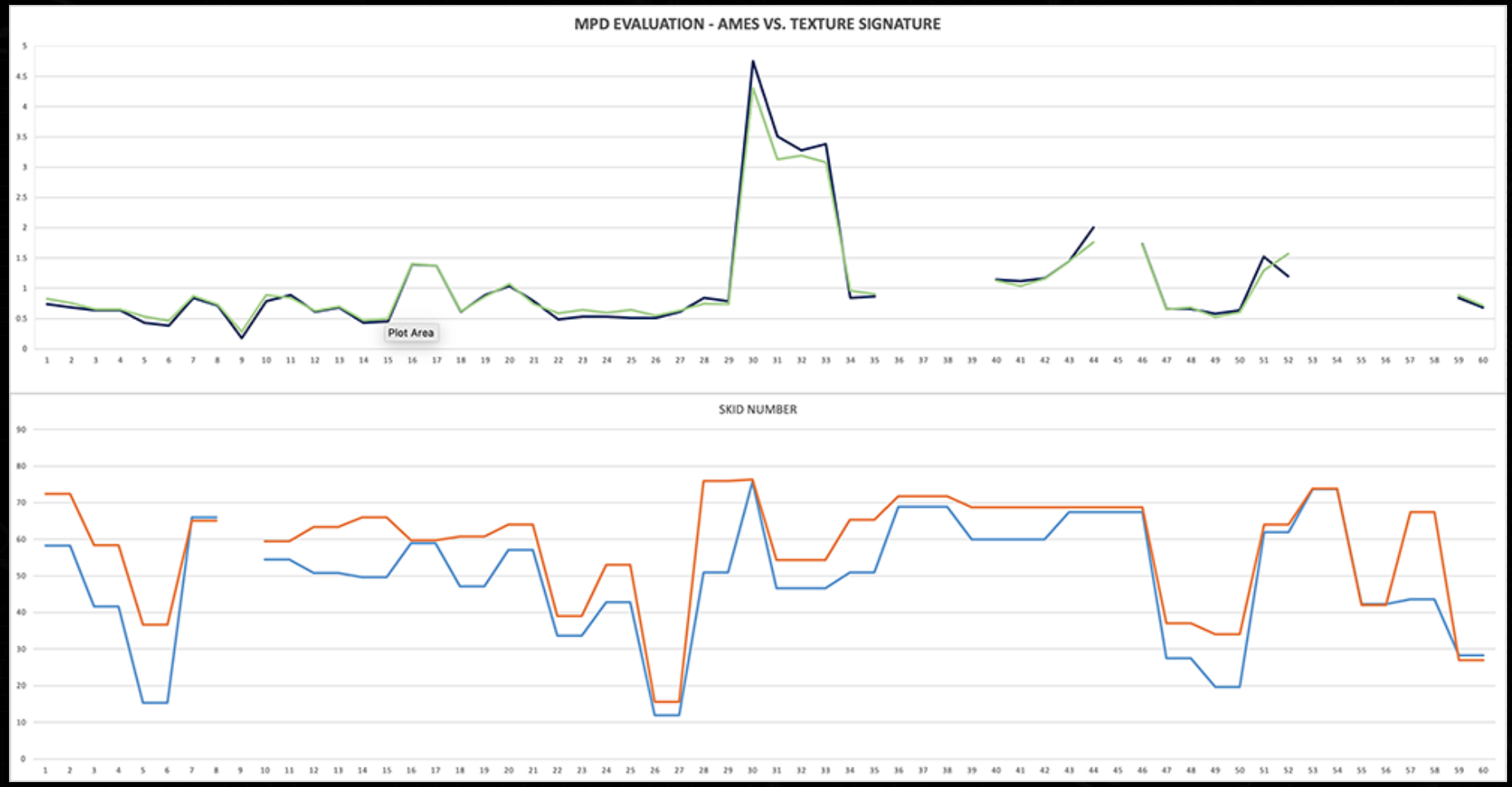
TEXTURE SIGNATURE MPD, AMES MPD & SKID NUMBER



41% CORRELATION TO SMOOTH TIRE SN

27% CORRELATION TO RIBBED TIRE SN

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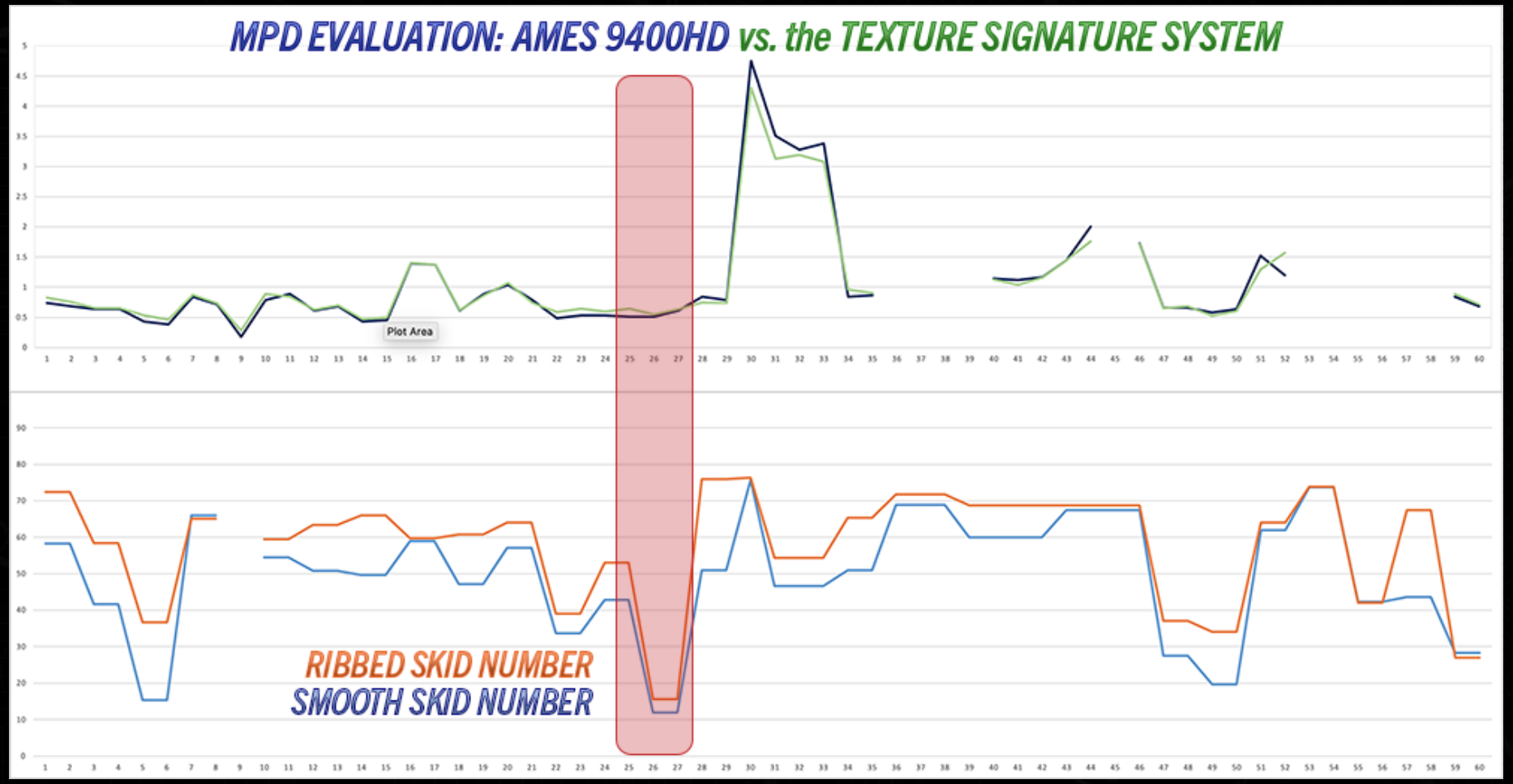
"AH HA" MOMENT



MPD IS FLAT

SKID NUMBER VAIRES SIGNIFICANTLY

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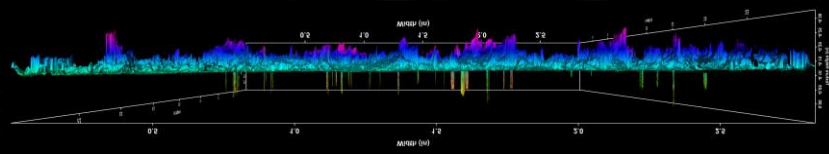
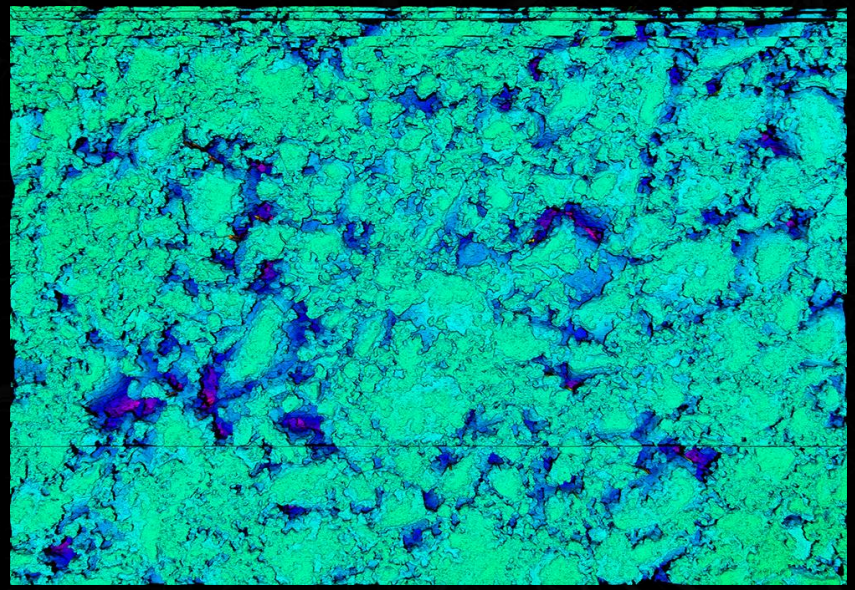
ODOT CORE 25

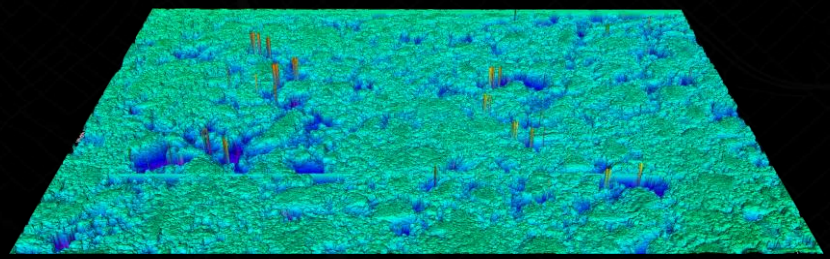
COARSE LIMESTONE AGGREGATE
MPD: 0.647



SIDE



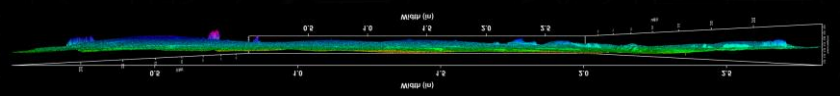
TOP



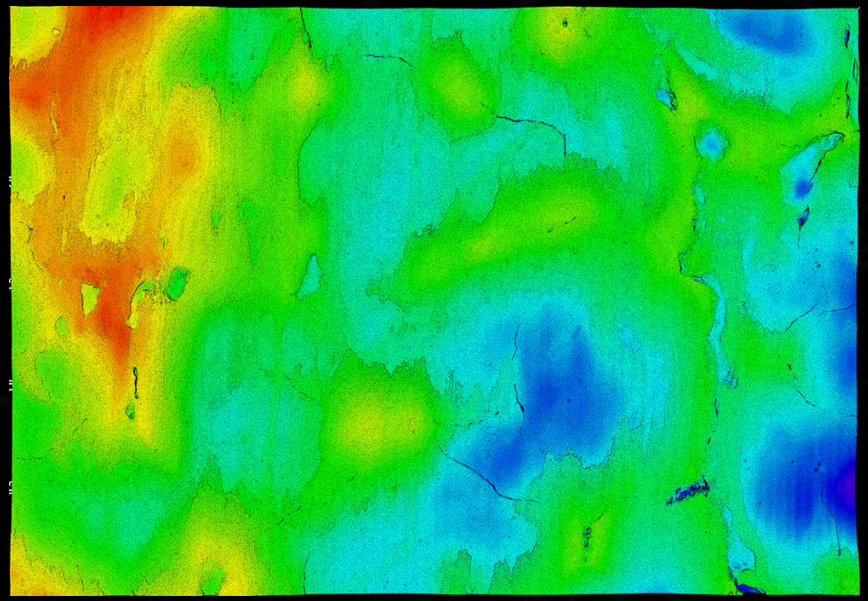
ANGLED

ODOT CORE 26

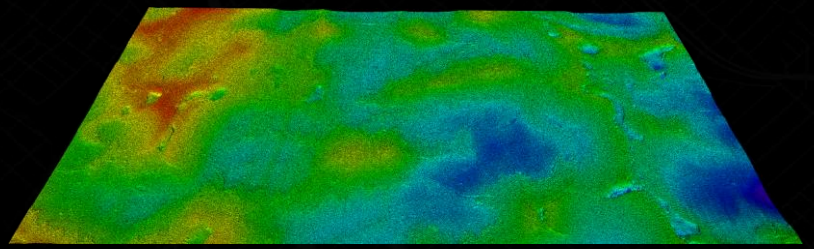
JENNITE
MPD: 0.546



SIDE



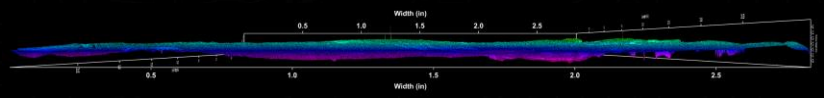
TOP



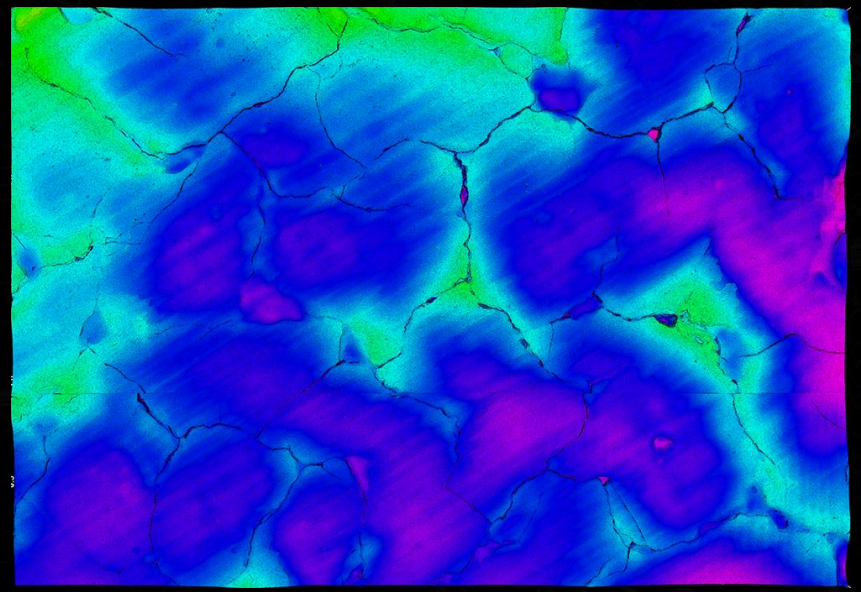
ANGLED

ODOT CORE 27

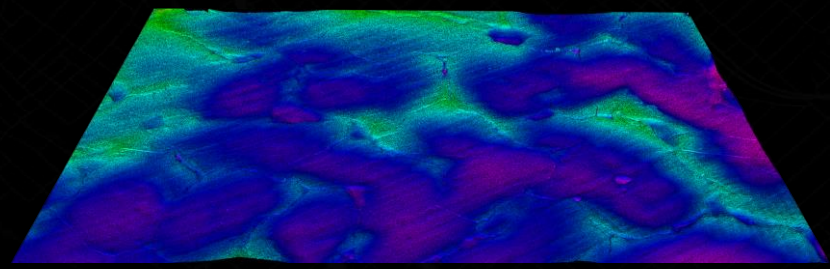
JENNITE
MPD: 0.658



SIDE



TOP



ANGLED

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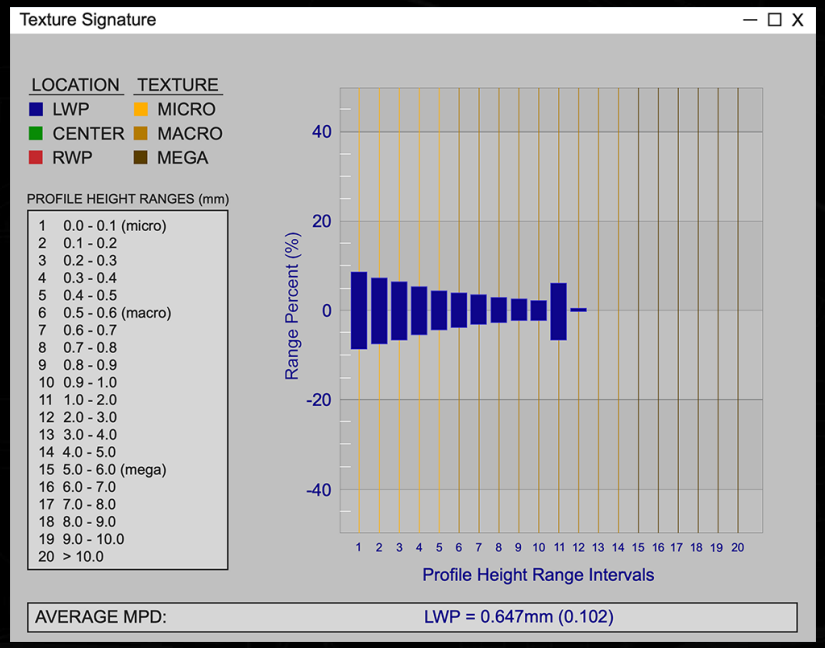
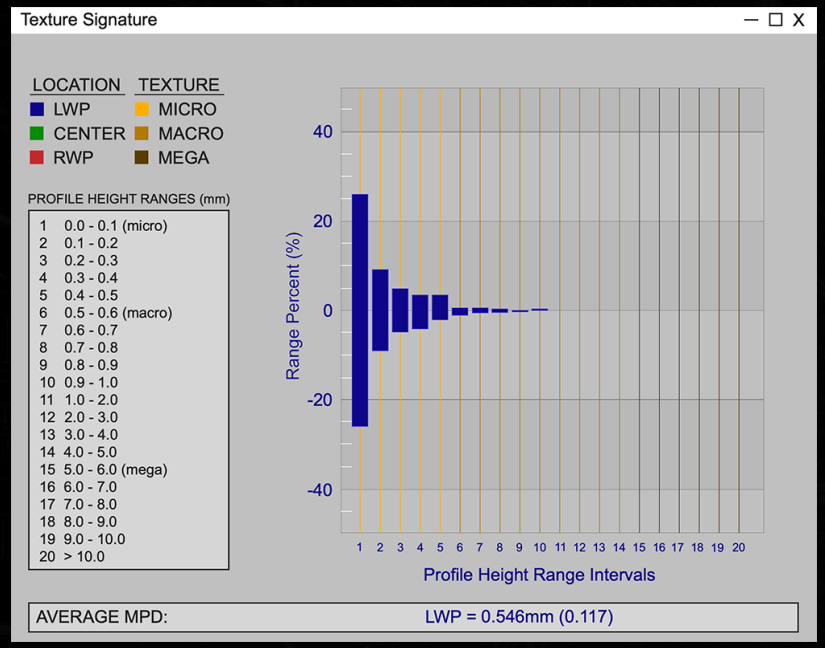
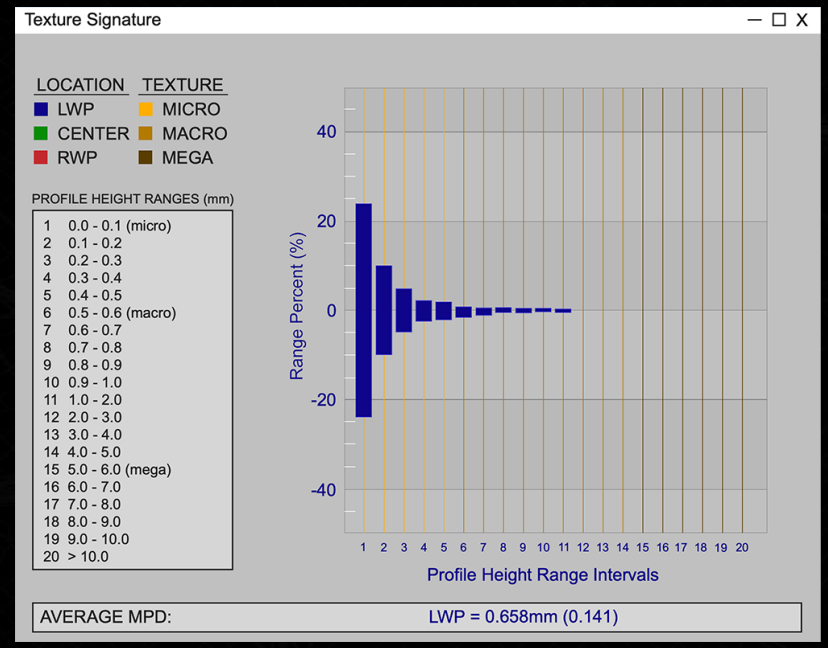
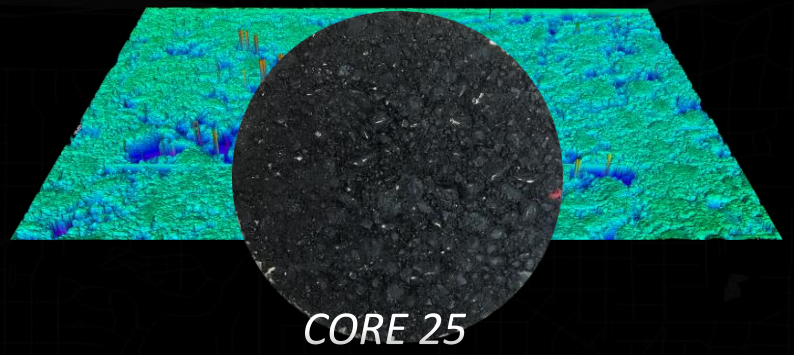
TEXTURE SIGNATURE COMPARISON WITH EQUIVALENT MPDs

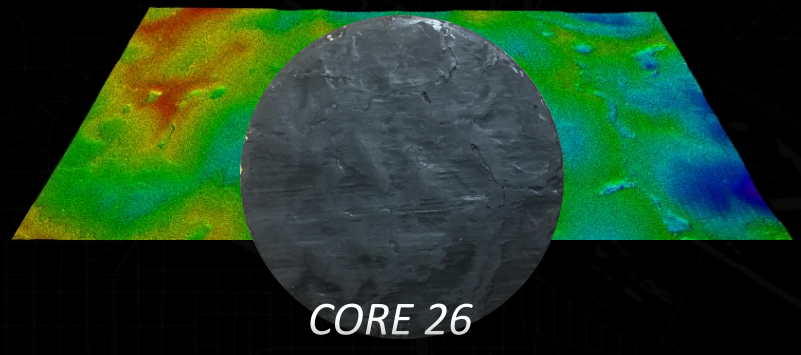




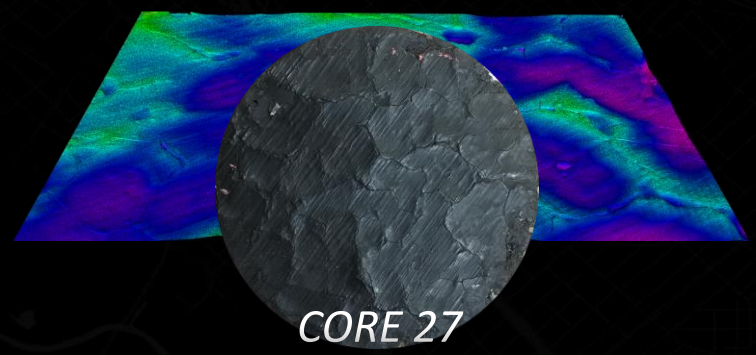




CORE 25



CORE 26



CORE 27

RESEARCH PROJECT GOAL

FIND A METHOD TO COLLECT NETWORK LEVEL TEXTURE DATA THAT IS A BETTER PREDICTOR OF SKID NUMBER THAN MPD.

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THE "TEXTURE SIGNATURE NUMBER"

- THE **TEXTURE SIGNATURE NUMBER** IS MORE CONSUMABLE
- THE **TEXTURE SIGNATURE NUMBER** IS A SINGLE VALUE THAT CAN BE CORRELATED WITH SKID NUMBER
- THE **TEXTURE SIGNATURE NUMBER** PROVIDES PROGRAMATIC CONTROL TO POSITIVELY AND NEGATIVELY WEIGHT BINS THAT DRAMATICALLY AFFECT SKID NUMBER

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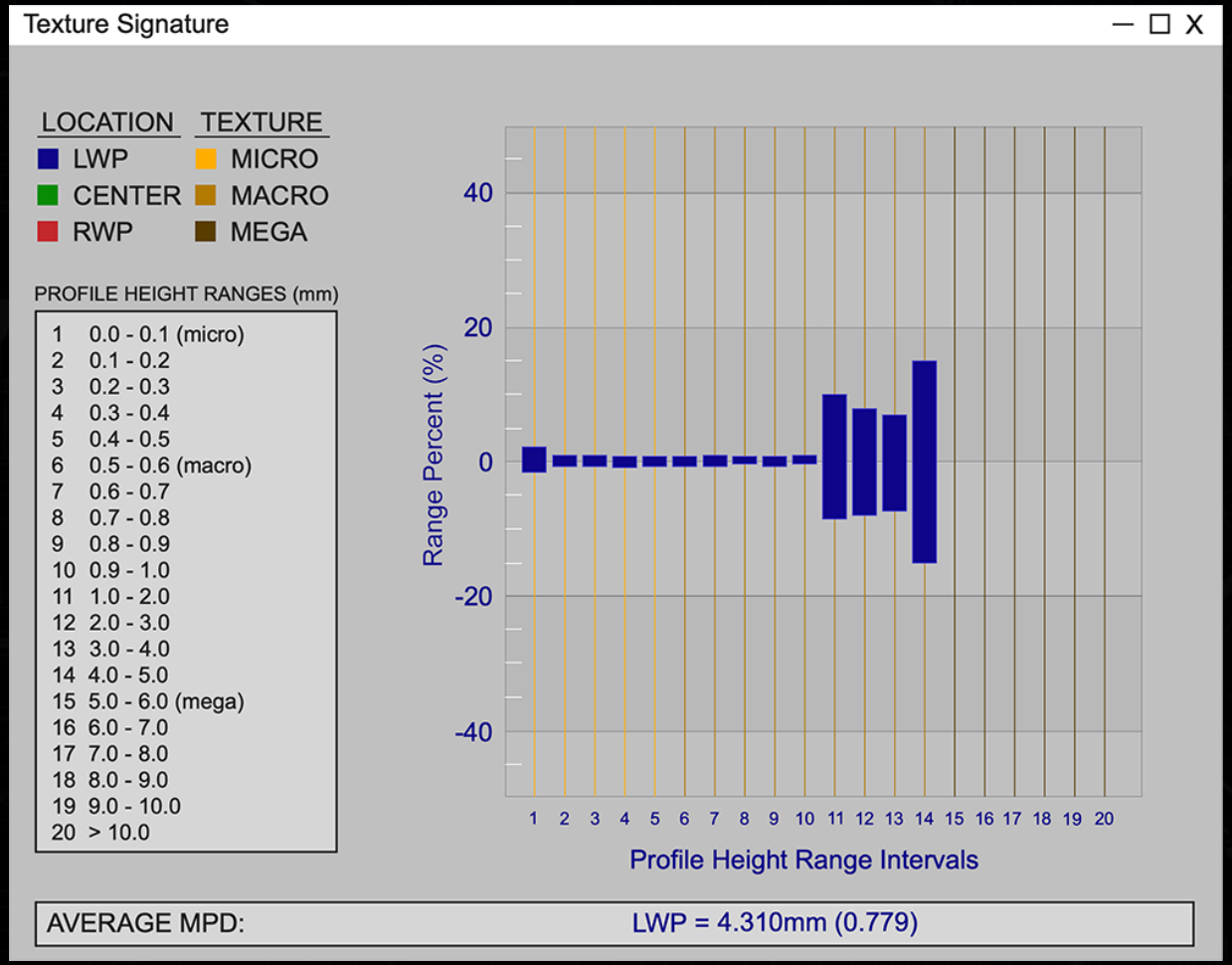
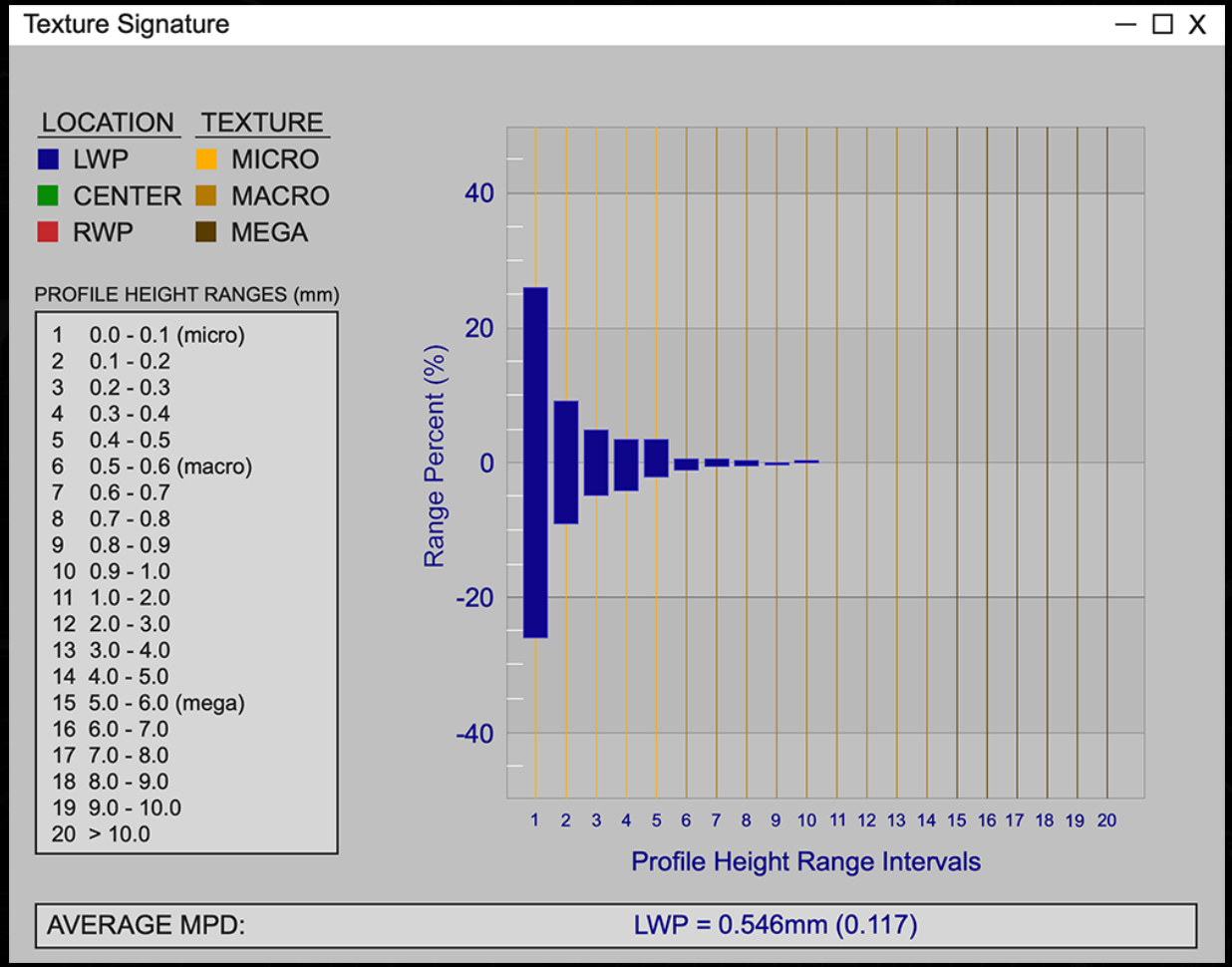
COARSENESS POSITIVELY AFFECTS SKID NUMBER

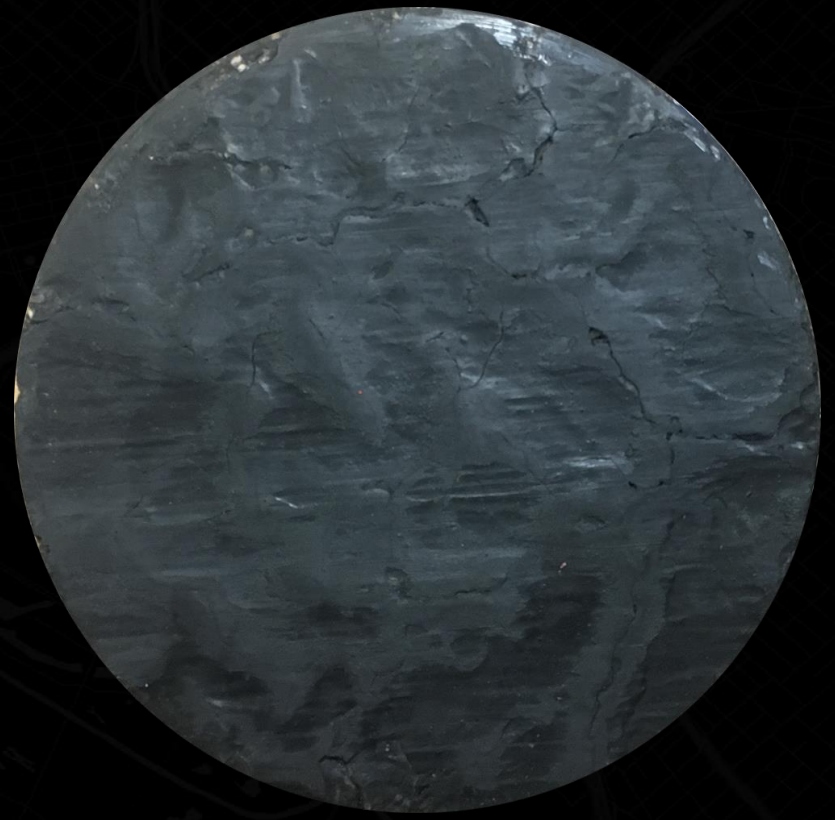


CORE 30

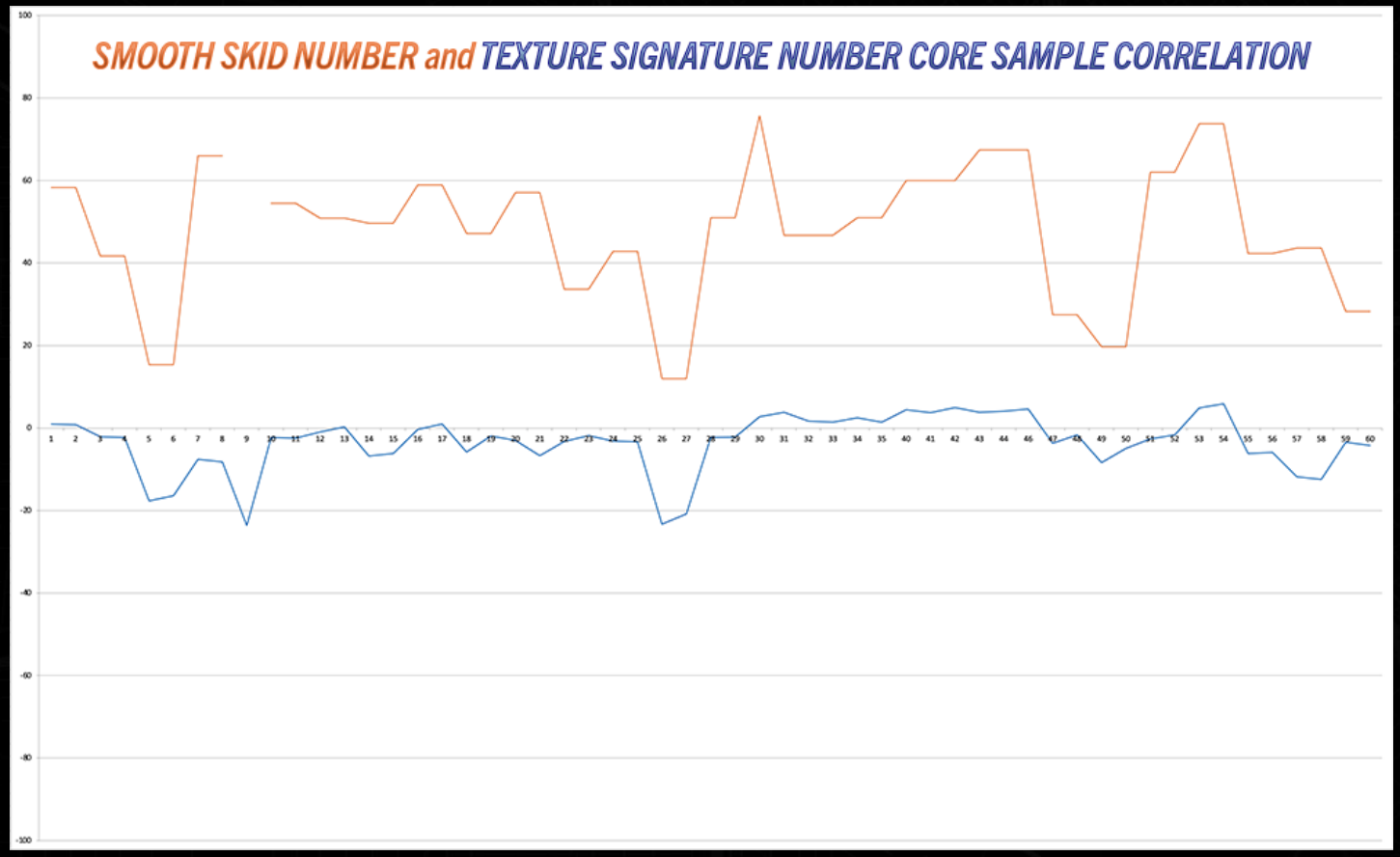
SMOOTHNESS NEGATIVELY AFFECTS SKID NUMBER



CORE 26



THE "TEXTURE SIGNATURE NUMBER" TRENDS WITH SKID NUMBER



SN

TSN

ERPUG

THE "TEXTURE SIGNATURE NUMBER" PERFORMANCE vs. MPD

% CORRELATION WITH SKID NUMBER

	MPD	TEXTURE SIGNATURE NUMBER
RIBBED TIRE SKID NUMBER	27% NEGLIGIBLE	72% HIGH
SMOOTH TIRE SKID NUMBER	41% LOW	82% HIGH

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THE TEXTURE SIGNATURE SYSTEM

- **5000x** THE AMOUNT OF DATA AT **5x** THE RESOLUTION
- **COLLECTING EVERY 9mm:** ½ MILLION DATA POINTS vs. 100 in 10M
- **BINNING ALL** THE COLLECTED DATA
- **NETWORK LEVEL REPORTING** – USER DEFINABLE INTERVALS
- **DATA** CAN BE **SPATIALLY PLOTTED**
- **REDUCED DATA COLLECTION COSTS** vs. SKID TESTING
- **PROACTIVELY TRACK TEXTURE CHANGES** OVER TIME / ANNUALLY

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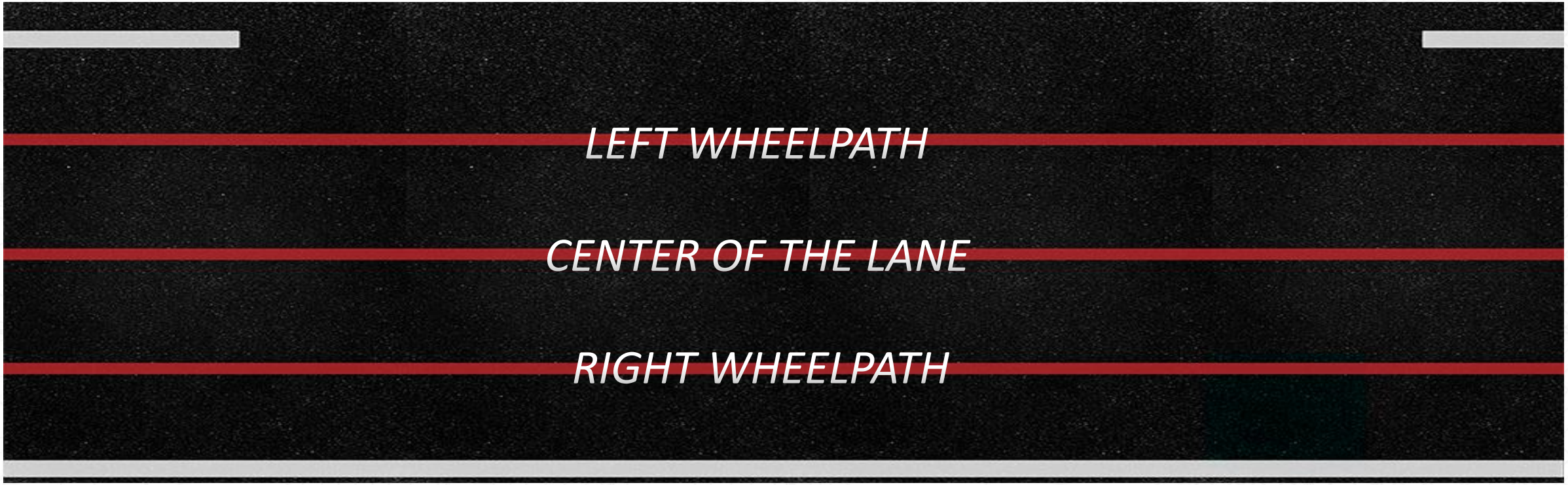
THREE ZONE DATA COLLECTION



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THREE ZONE DATA COMPARISONS