TIMBER MEASUREMENTS SOCIETY

Central Meeting

Idaho – April 9-11, 2014

Automated Wood Measurement on Trucks
Logmeter Update

- Christian Paccot – Woodtech, Chile

Agenda

- Woodtech
- The problem ?
- How it Works ?
- Results on Pulp Wood
- Results on Sawmil Wood
- Conclusions - Benefits

WOODTECH

Automatic Wood Measurement on Truck

More than 20 years

Many millions trucks already measured

MARKETS:

PULP WOOD and CHIP → LATINOAMERICA

SAWMILL WOOD → USA

MEASUREMENT SOLUTIONS

OFFICES: CHILE, BRAZIL AND USA

WOODTECH MEASUREMENT SOLUTIONS | AN EXCELSYS COMPANY

D-401-

More than 50 Logmeters Worldwide

- Braz
il

CENIBRA
SUZANO PAPEL E CELULOSE
bsc Bahia Specialty Cellulose
Fibria
SIDERÚRGICA IBÉRICA
DOW CORNING
CR Almeida
ELDORADO BRASIL
ARAUCO
BERNECK a marca da madeira
VETORIAL
grupo ferroeste
COSIPAR
INTERNATIONAL PAPER

- Germany

ZELLSTOFF ROSENTHAL

- Poland

mondi

- United States

West Fraser

- Ecuador

EXPOFORESTAL Industrial S.A.

- Chile

SCL EnergiaActiva
Astex
COMACO
MASISA
ARAUCO

- Argentina

Celulosa Argentina

- Offices
  - Chile - Santiago
  - Brazil - Itapema, SC
  - USA – Portland, OR

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D-401-

The Problem ?

Which is the Value of Wood Truck Load at the Mill ?

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Typical Measurement Tool

To Measure the main raw material…

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Typical Measurement

measured like this….

Or is measured like this….

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Human Factor

- Need log inspection personnel
- Defect detection and log measurements based on scaler experience
- Several minutes **to do it right** (log count, average length and diameter, etc.)
- Accident risks

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Could be measured like this….

CONSEQUENCES…

- **Measurement Cost**
- **Differences :**
  - **Forest Inventories ←→ Wood at the Mill**
  - **Wood received ←→ Wood Paid/Mill inventories (MATTS..)**
  - **Mill Conversion Factors**
- **Perverse incentives ? H2O transport ?**
- **Fraud Risks**
- **Quality Control: difficult to follow – Cinderella Effect**
- **Lack of information for Auditing**

HOW TO MEASURE ?

*"The unit of quantity must be **OBJECTIVE, REPRODUCIBLE, EASILY AND COST-EFFECTIVELY DETERMINED** and **FAIR** to both the buyer and seller."*

•Measuring pulpwood quantity, Russell Morkel (1998)

1. **Objective:** Does not depend on human factors.
2. **Reproducible:** No variation with exogenous factors.
3. **Efficient:** Quick and low cost.
4. **Fair:** Equitable for both sides.
5. **Incentive:** Does not create perverse incentives

Beginning of Automated Measurement

Logmeter 2000 – Image Analysis

- Pulp Wood
- Very successful for +20 years

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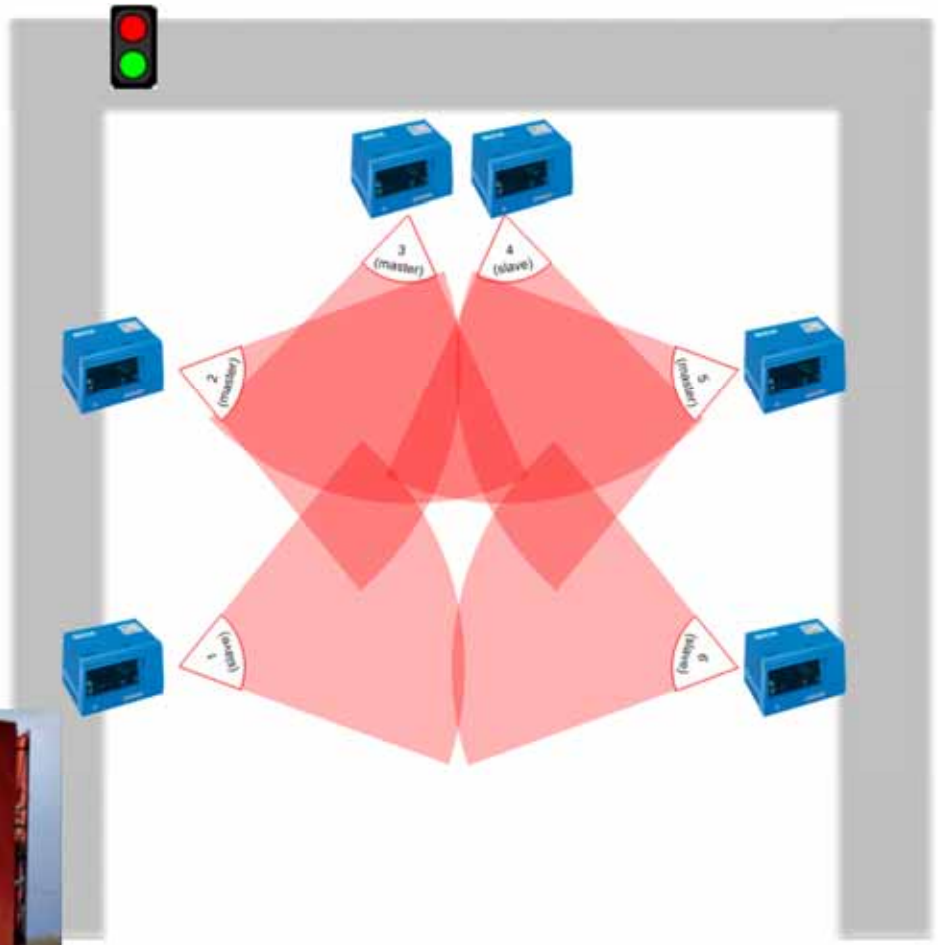
TODAY

LOGMETER: 7 Lasers to ……..



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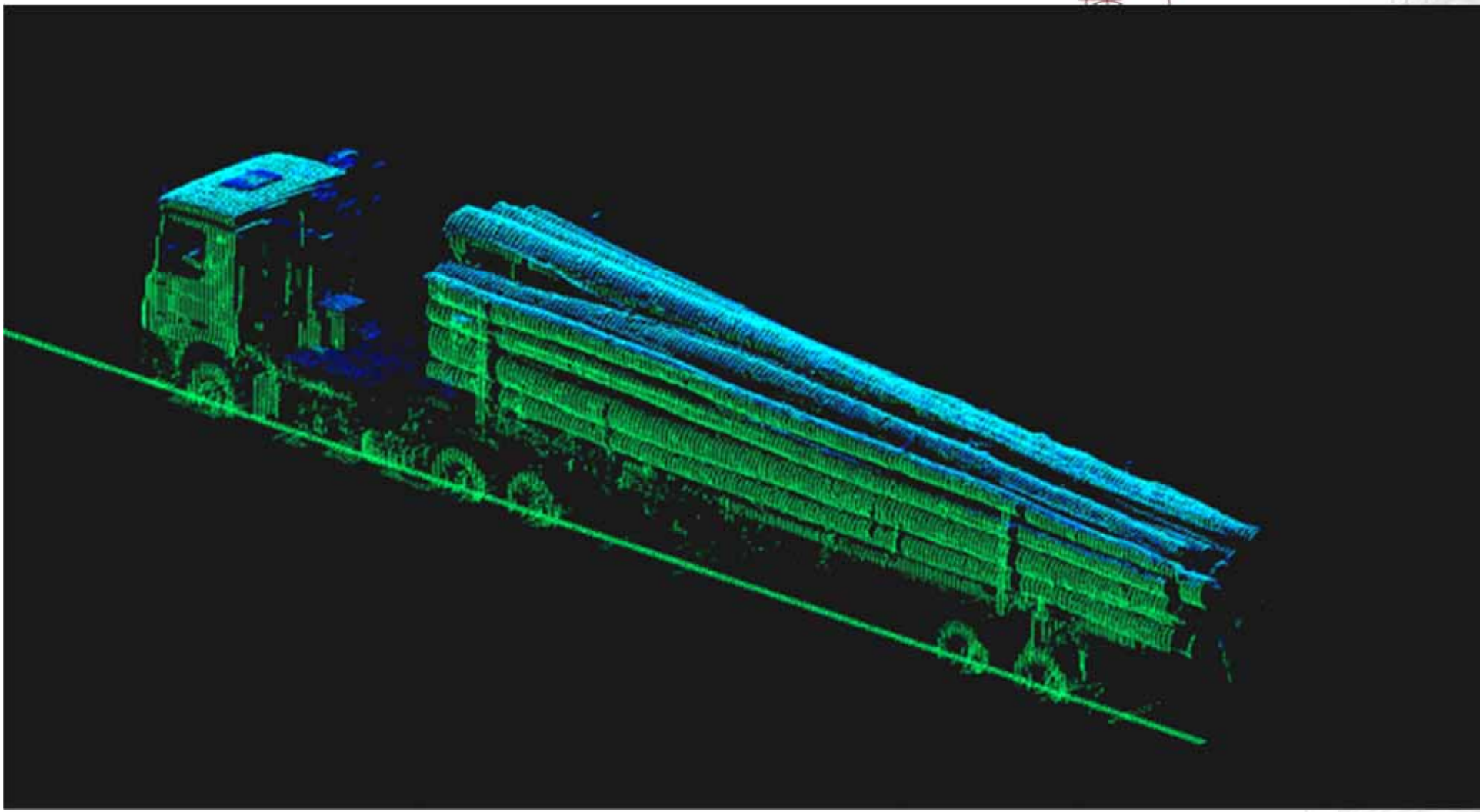
TODAY

LOGMETER: …. Up to 17 Lasers

CAPTURED 3D IMAGE



HOW IT WORKS ?

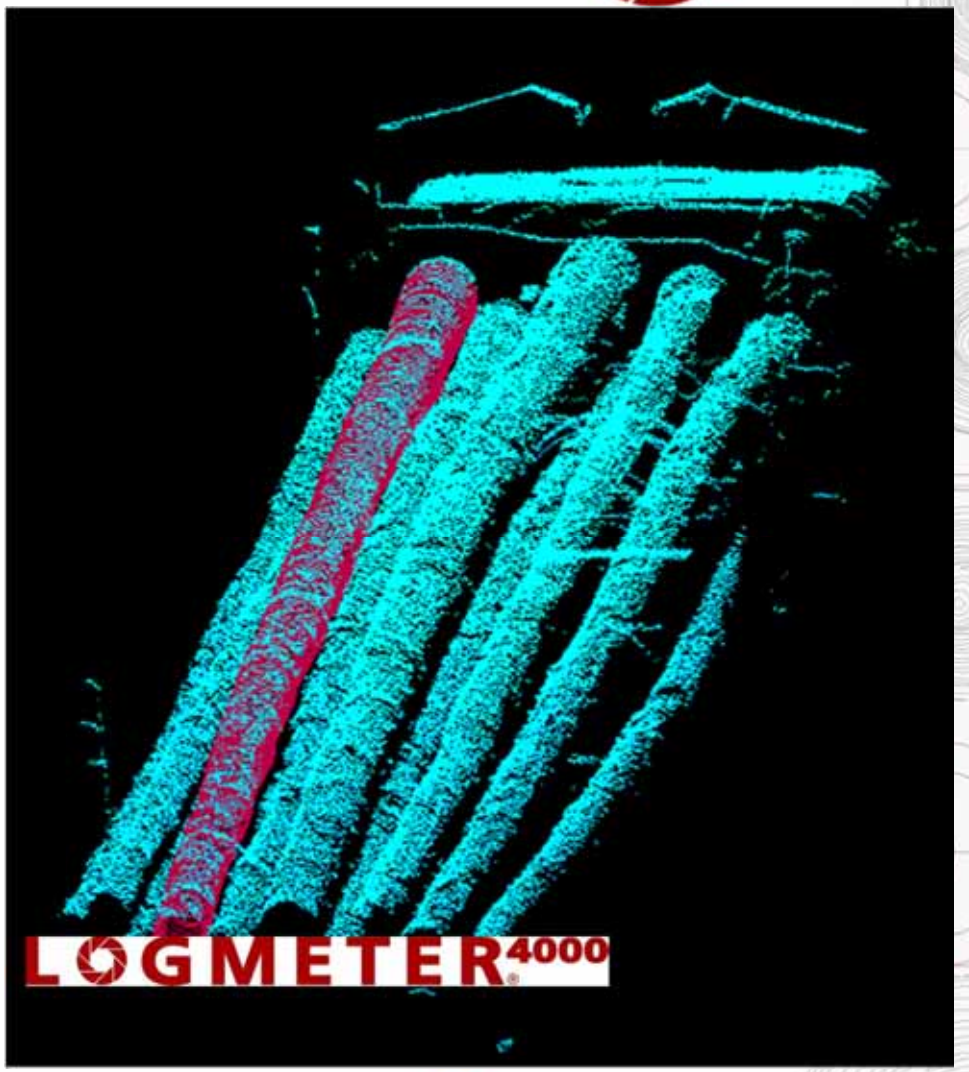
VIDEO

Logmeter in Pulp Wood

LOGMETER

Basic Outputs

- FRAME VOLUME
- SOLID VOLUME- MODELS
- BIOMETRIC CHARACTERISTICS



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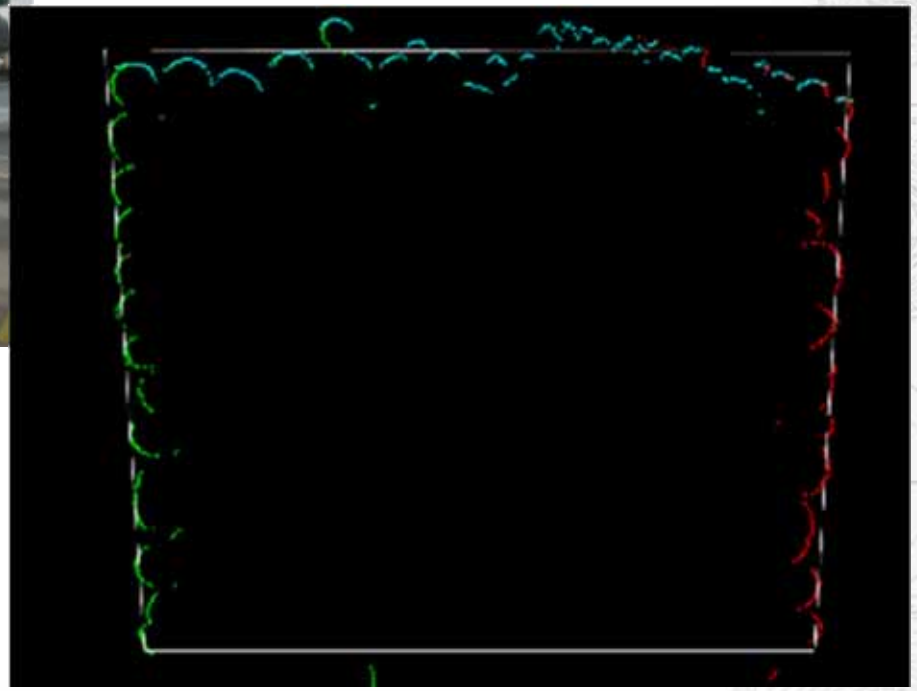
MONDI Poland – Pulpwood & Chips



Deliverables:

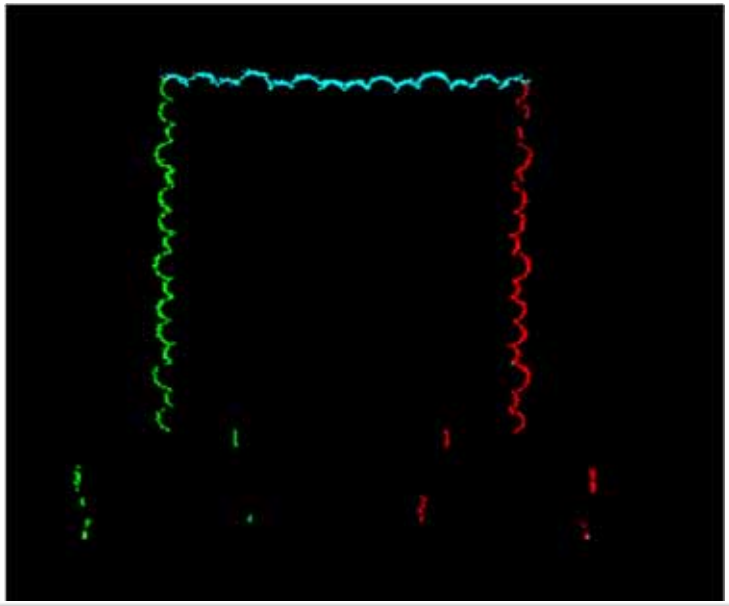
- Bundle Dimensions
- Log Lenght
- Frame Volume

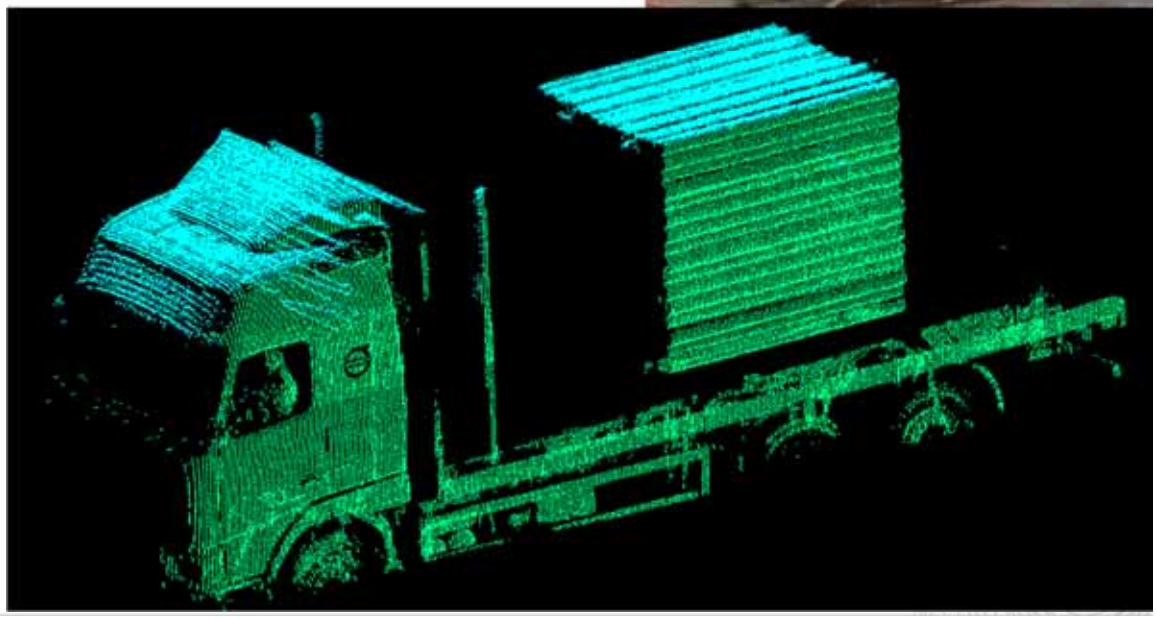
WOODTECH

MONDI Poland

VALIDATION BUNDLE – 2013

- 50 Times Standard Validation Bundle Measurement
  - **Accuracy: 0.19% (Contract: 1.75%)**
  - **Repeatability: 0.54%**
- **Average Differences**
  - **Height: -0.1 cm**
  - **Width: -0.1 cm**
  - **Length: 0.0 cm**





MONDI Poland

Standard Practice: one Log Length on each Bundle

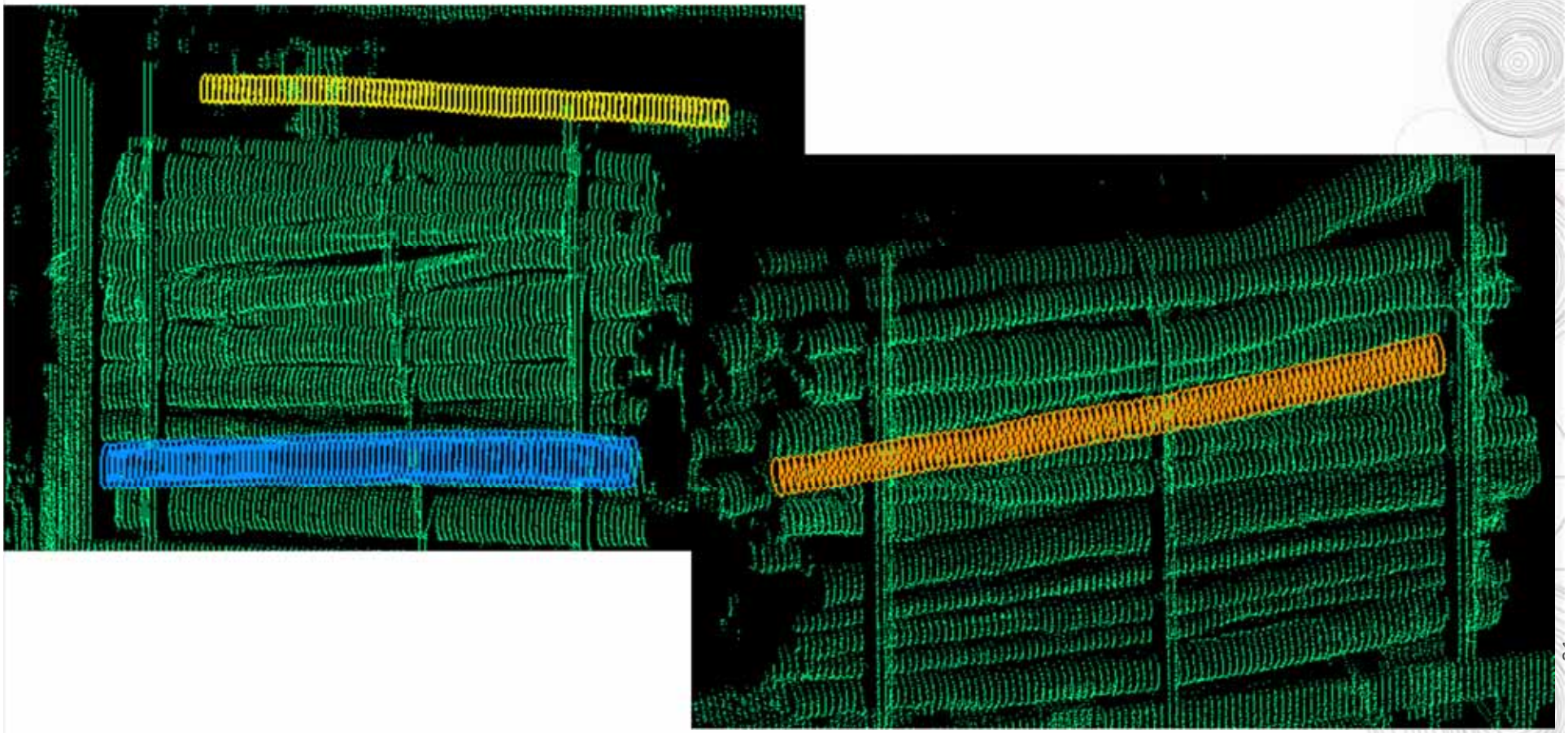
Which Length you will measure ???

LOGMETER

Measures Length on each visible Log

MONDI Poland: 80 bundle measurements

- 6 with length differences between 15 and 20 cm.



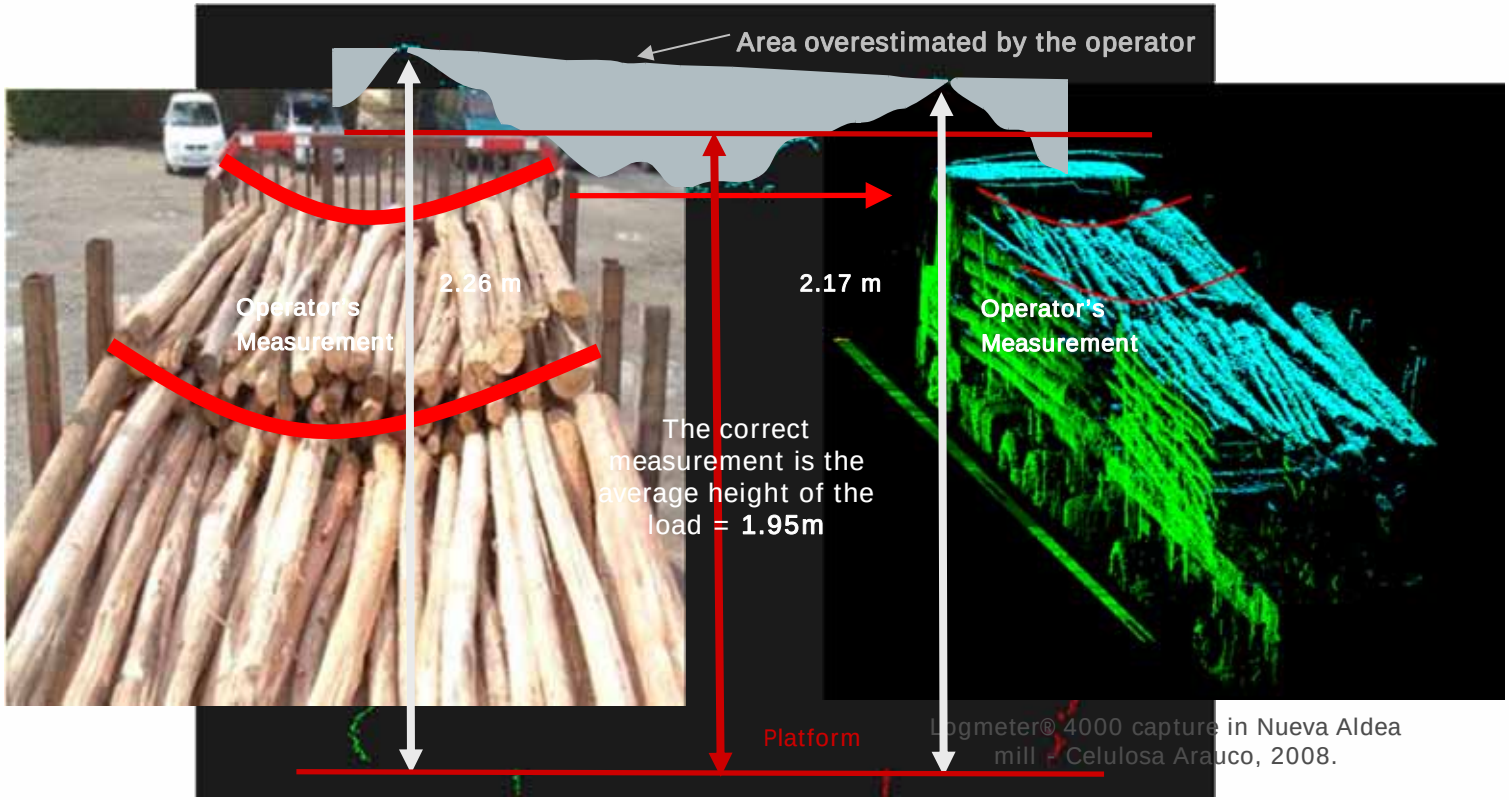
MONDI Poland

Standard Practice: one Height on each Bundle

Height always measured on the side

Perverse Incentive – Potential Fraud ?

Which is the correct height of this load?

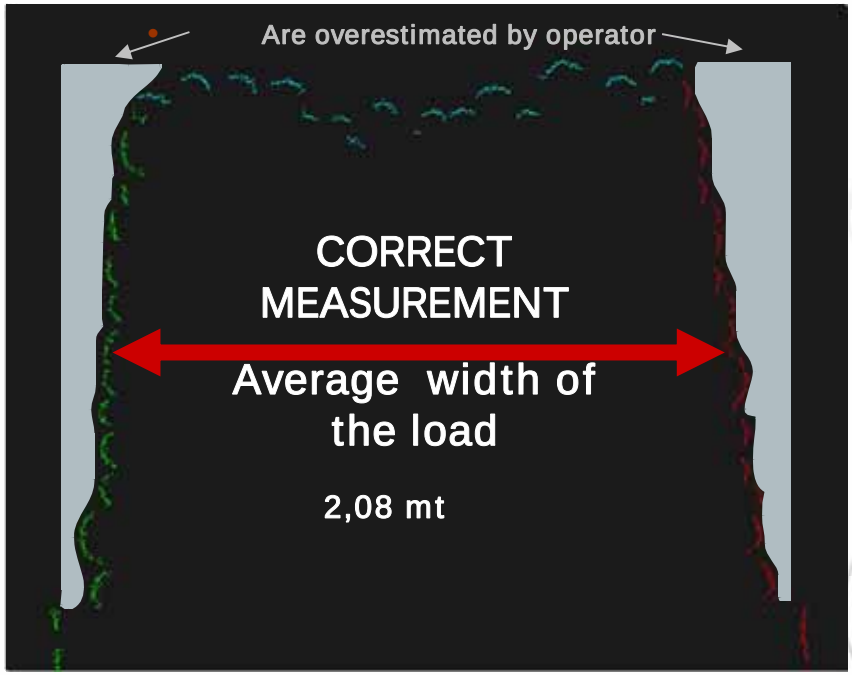


Logmeter® 4000 capture in Nueva Aldea mill - Celulosa Arauco, 2008.

Height overestimate: **+ 12.8%**

Width Measurement ….. Always at bottom

Which is the Width of this Truck?



- Detected by Logmeter® 4000 in Nueva Aldea mill, 2008.

MONDI Poland

Standard Practice: Some trucks Width from Database

TEST TRUCK PNT 5106 2x3

Width Differences

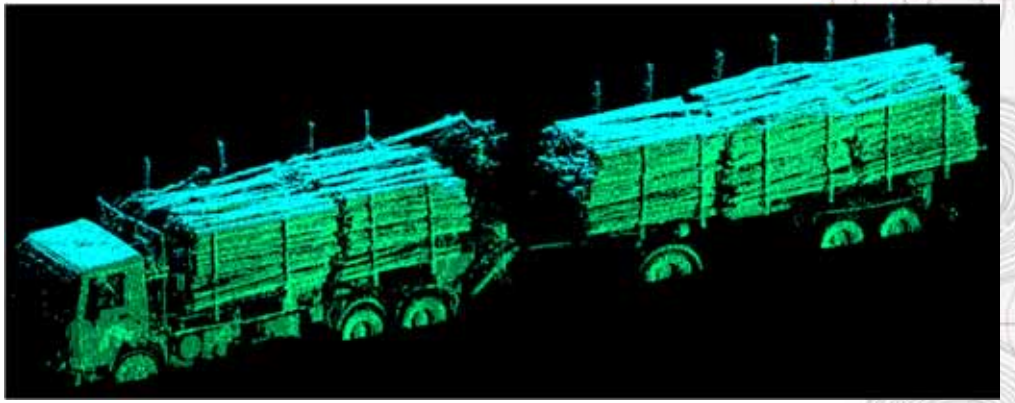
Data Base Value: 230 cm
Real Value : 228 to 212 cm

MONDI Poland
Overall Test Results

LOGMETER comparison with Precise Manual Measurements

TRUCK 1

ID	SV [MP]	Difference %
18442	45.64	0.52%
18443	45.12	0.63%
18444	45.63	0.49%
18445	45.25	0.34%
18447	45.39	0.04%
Average	**45.41**	**0.40%**



TRUCK 2

ID	SV [MP]	Difference %
18451	45.92	0.24%
18454	45.7	0.24%
18455	45.92	0.24%
18456	45.67	0.31%
18457	45.85	0.08%
Average	**45.81**	**0.22%**

Chipmeter in Pulp Chip

CHIP CONTAINER
Standard Measurement Process

MONDI Poland

- 1 or 2 height measurements
- Container size in database
- Volume calculation by difference

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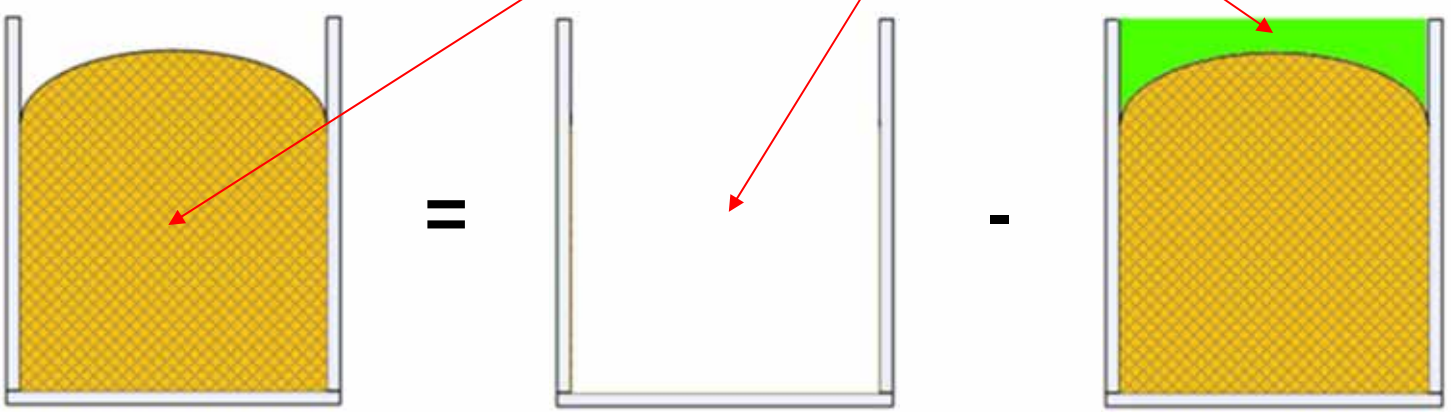
CHIPMETER
Load volume calculation principle

Load volume is calculated by the difference between the Empty container capacity and the “air volume”

$$V_{Load} = V_{Empty} - V_{Air}$$



Empty Containers Measurement

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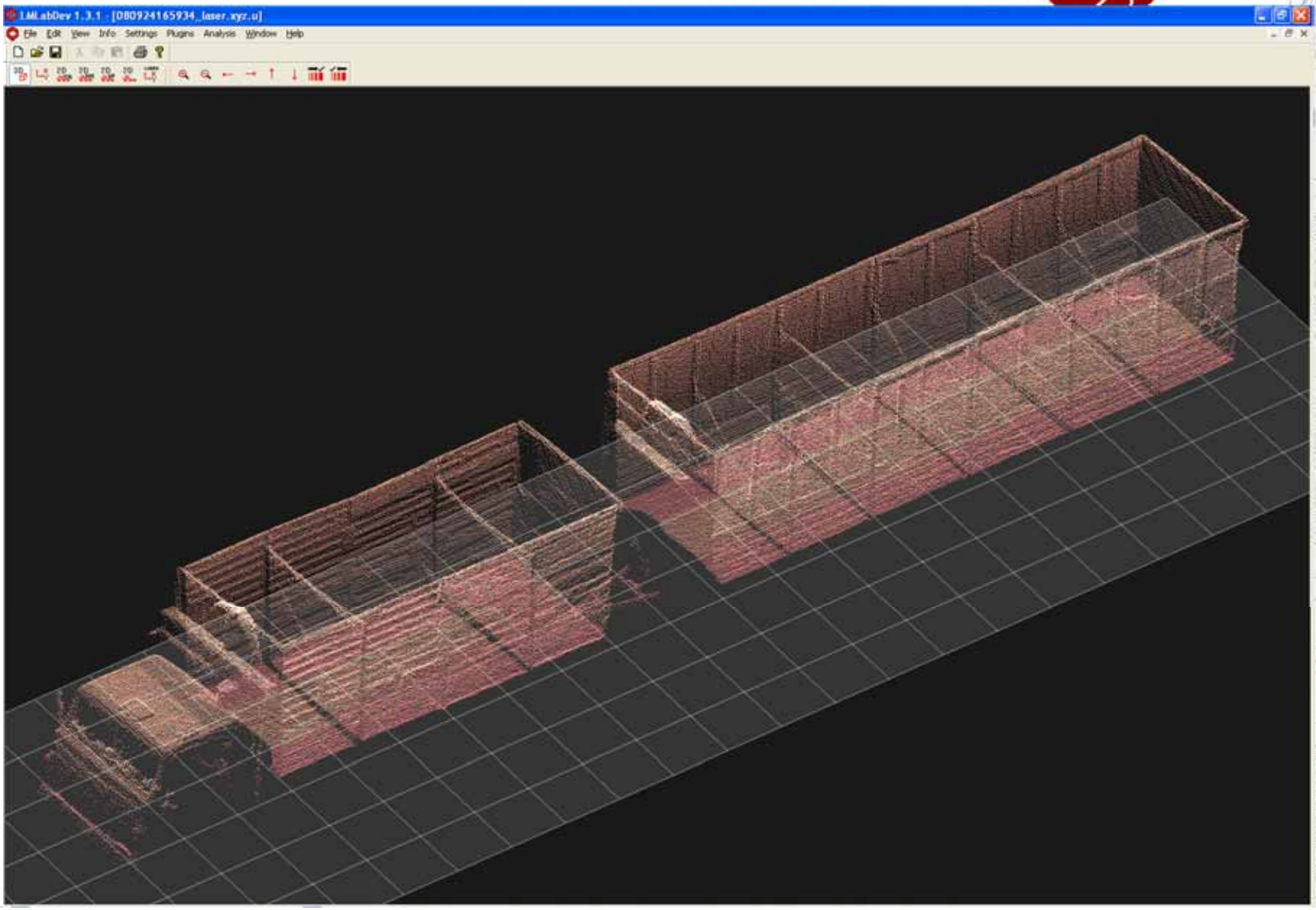
Database Value: 36,2 M3
Precise Manual Measurement: 37,4 M3
Logmeter: 37,97 M3

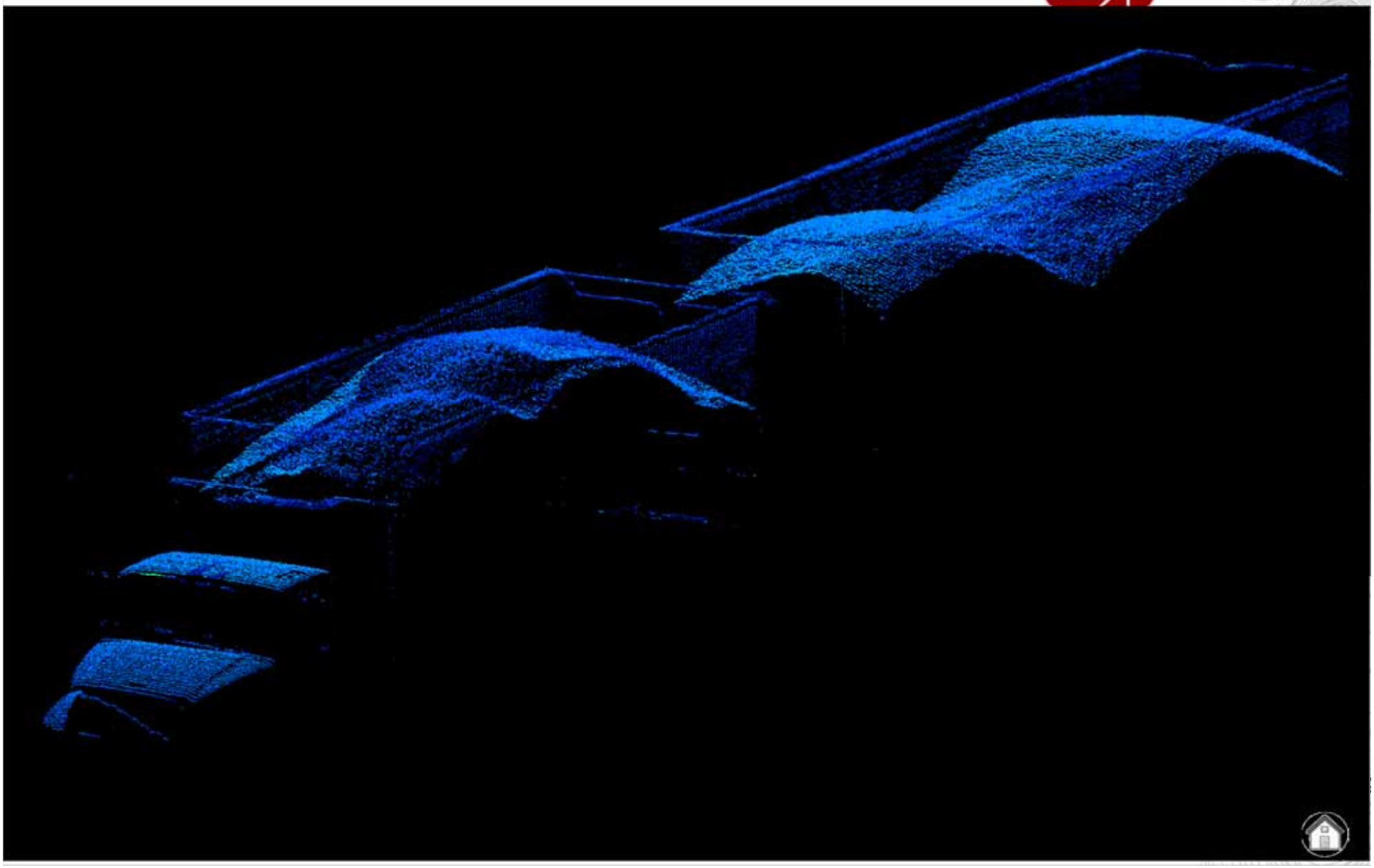
Chipmeter®4000

Empty Container Measuremet



Chipmeter®4000
Loaded Container

Chipmeter®4000
Loaded Container



Logmeter in the Lumber Industry

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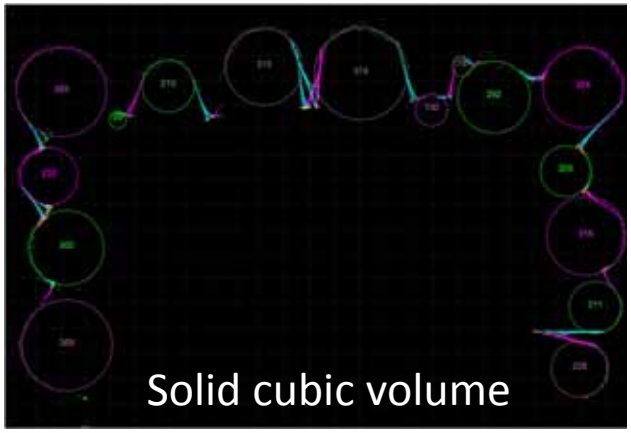
Logmeter for Sawmills

Radiata Pine, Arauco - Chile



Solid cubic volume

Log Couter Module

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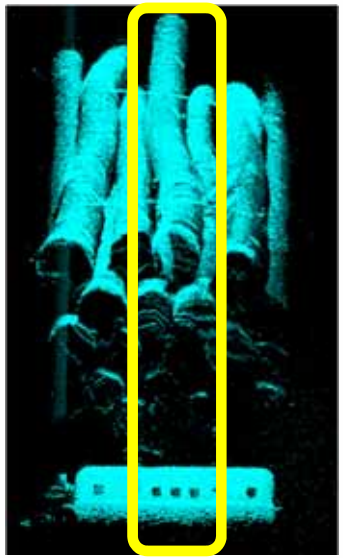
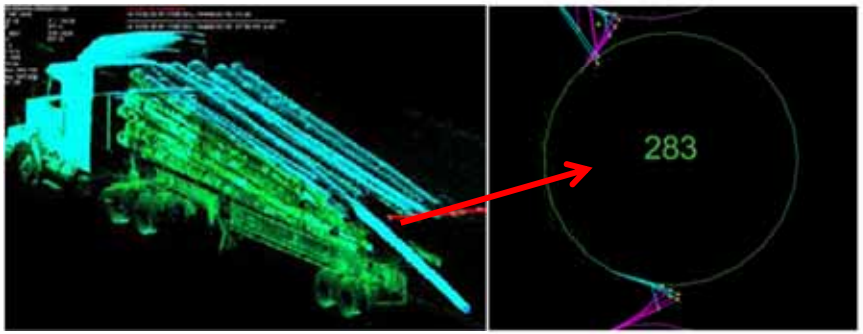
Logmeter for Sawmills

Southern Yellow Pine, T.R. Miller - AL





Logmeter provides:

Automatic detection of:

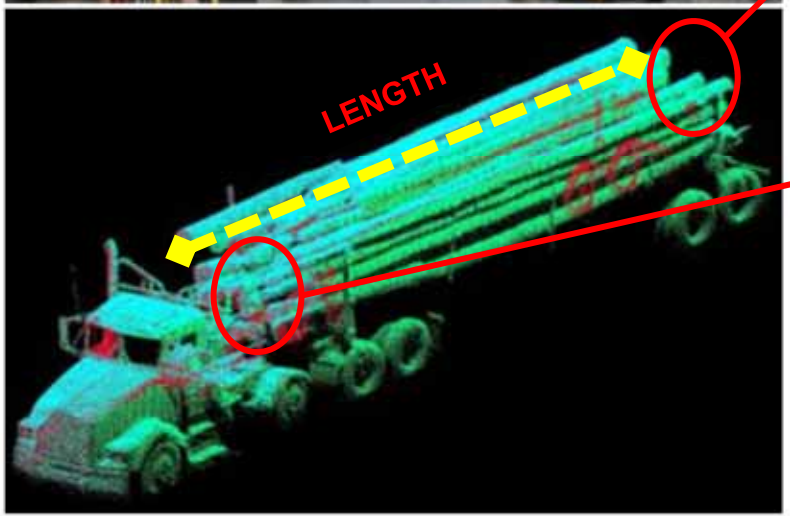
- Small tops
- Large butts
- Excessive sweep

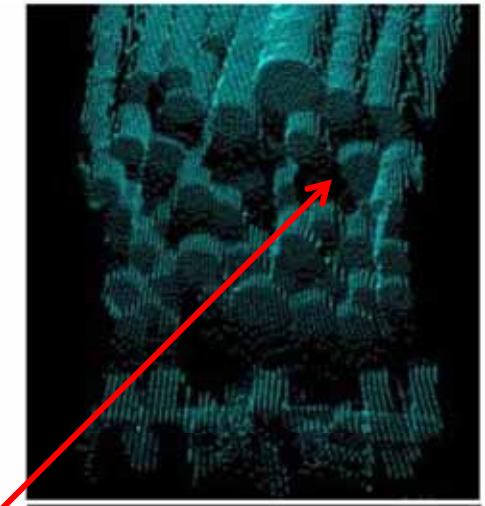
Stem count

Cubic volume

WOODTECH
MEASUREMENT SOLUTIONS

Log detection and Measurement





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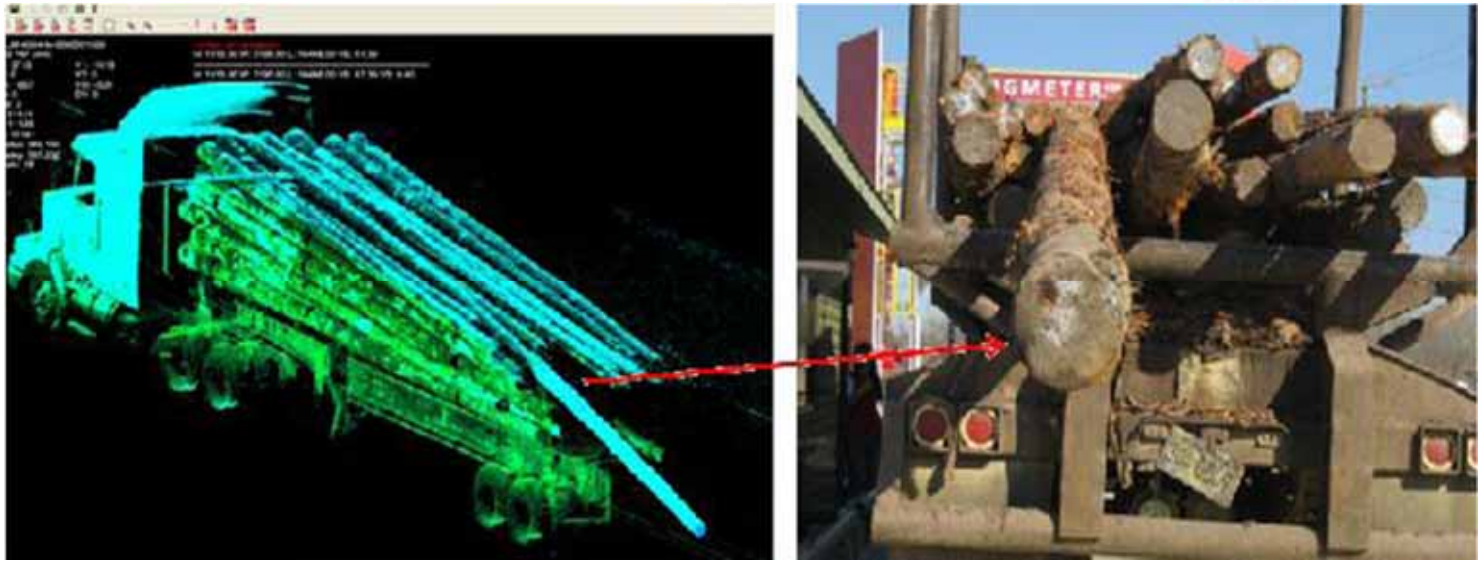
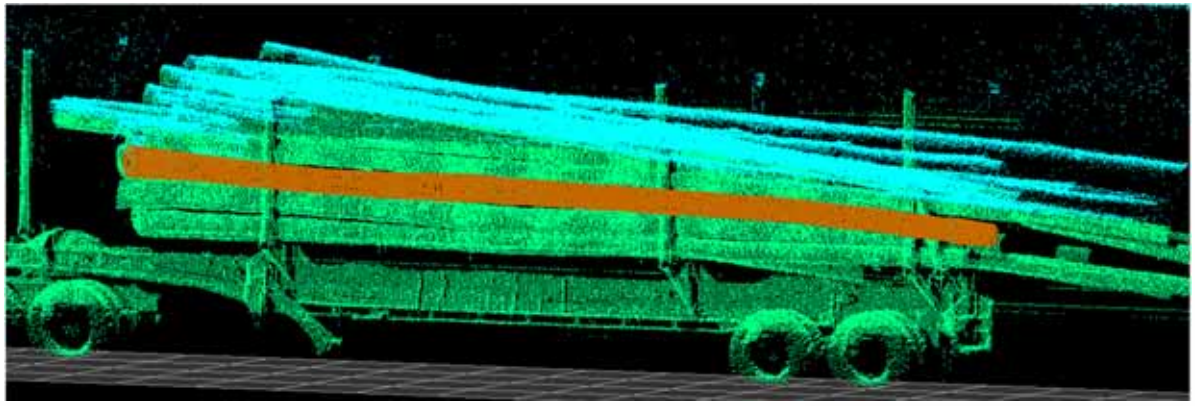
Automatically detects Defective Logs



<u>According to the client log specifications:</u>

- Small tops
- Large butts
- Sweep/crook
- Unwanted length (e.g. logs < 33')



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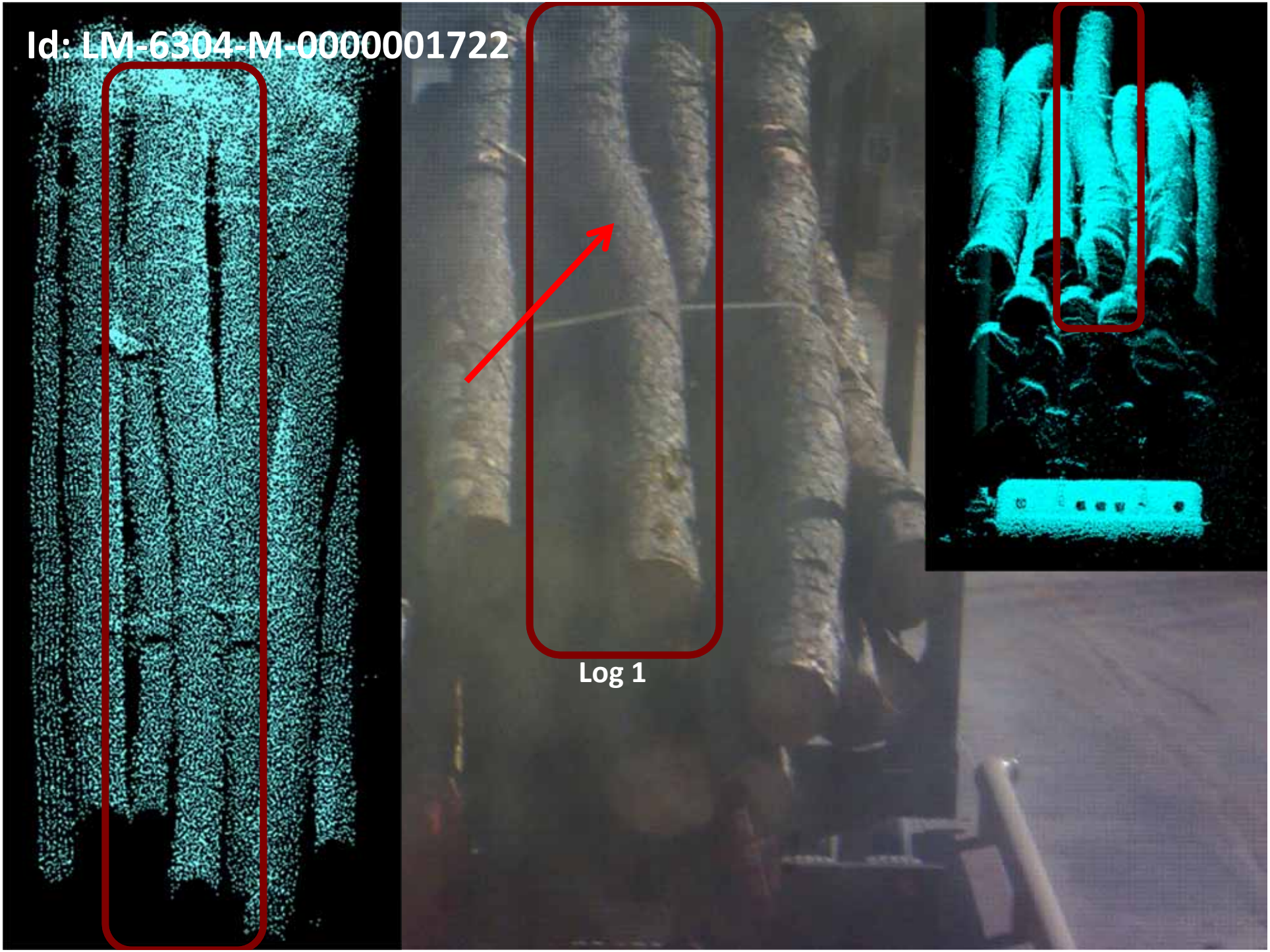
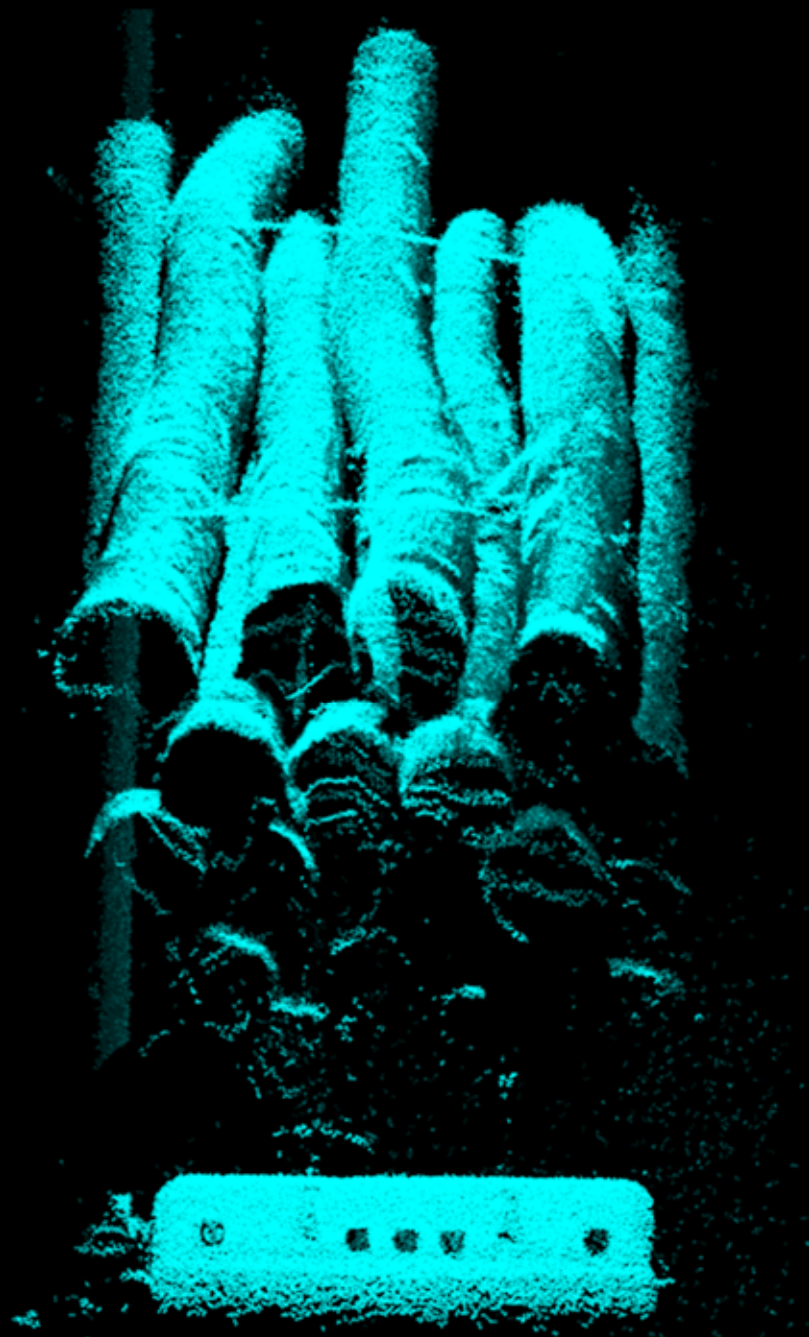
Crook / Sweep


Id: LM-6304-M-0000001722
Log 1

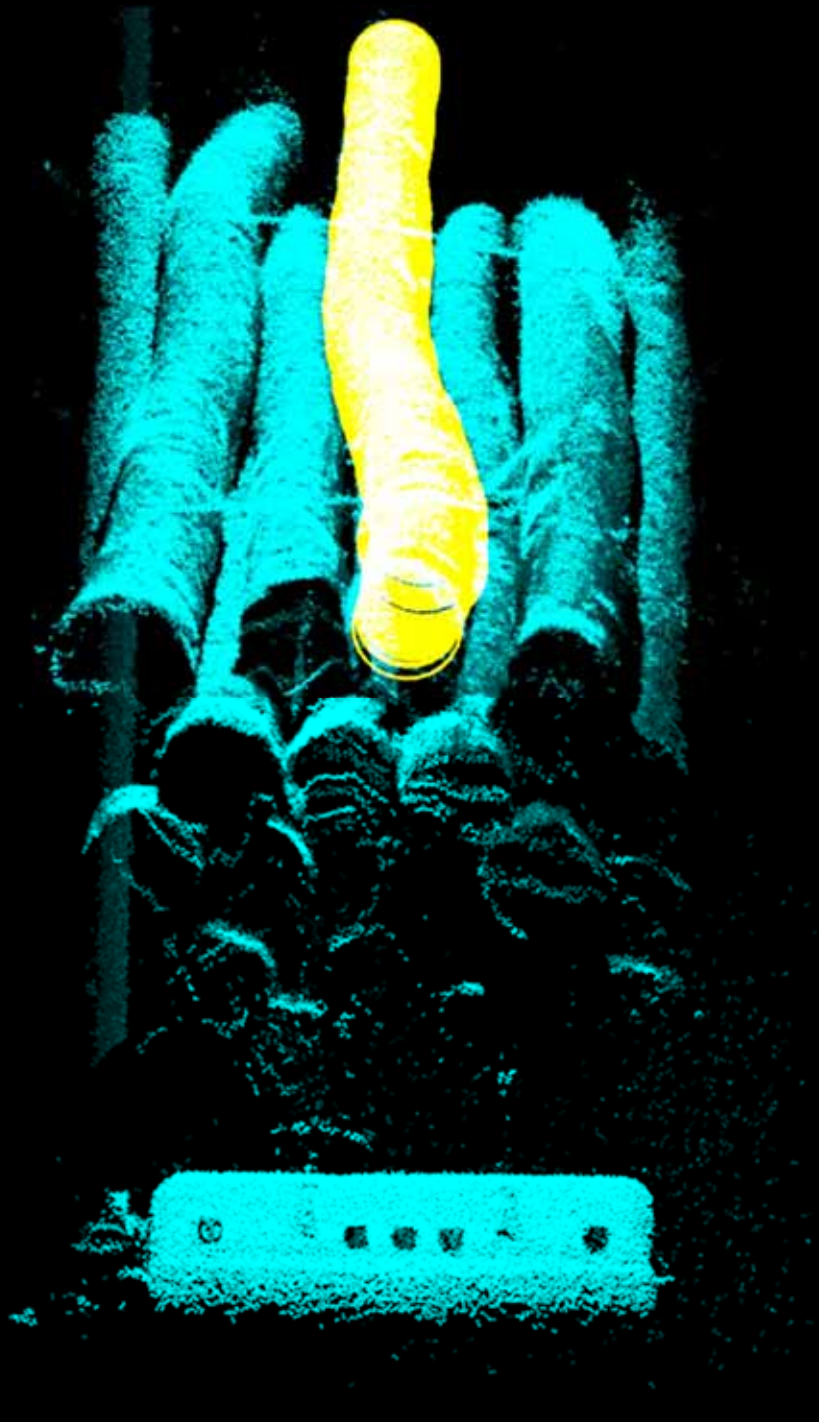
Trunk 1

Capture



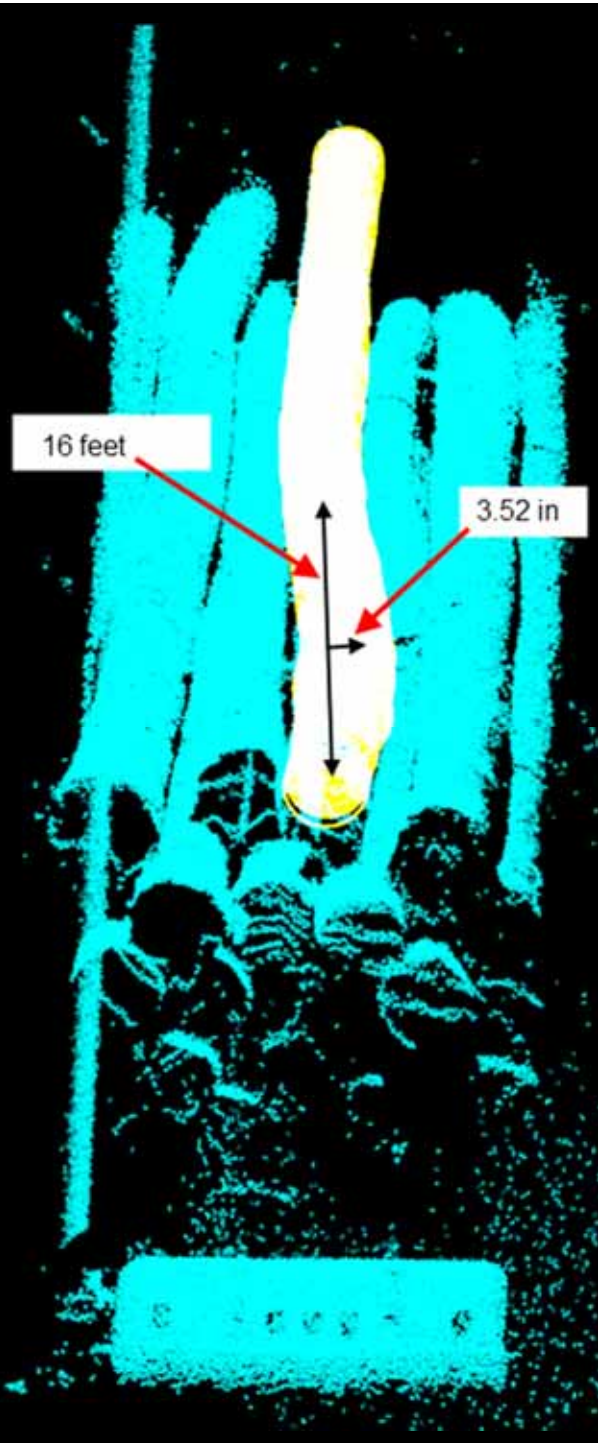
Trunk 1

Detection

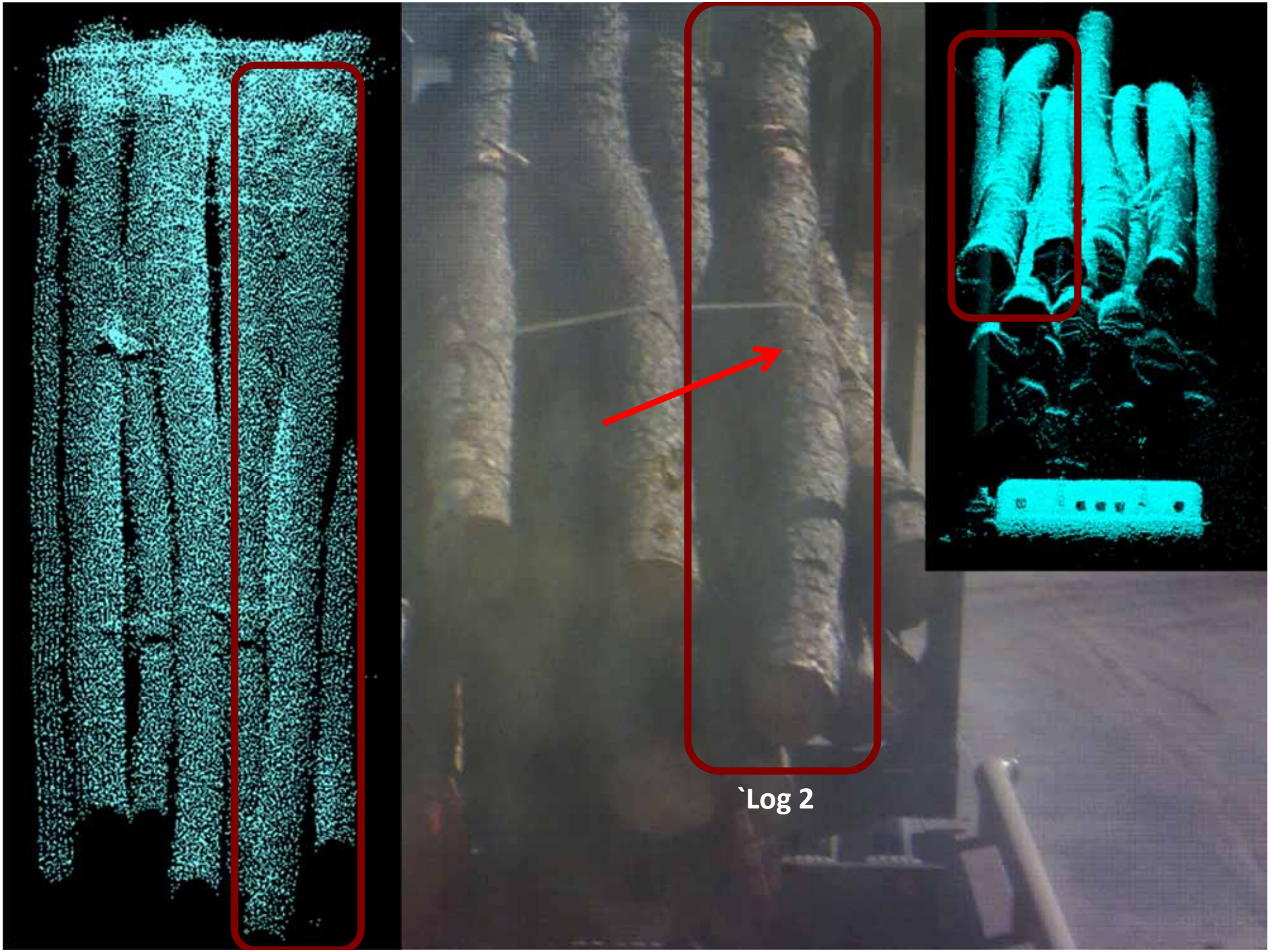


Trunk 1

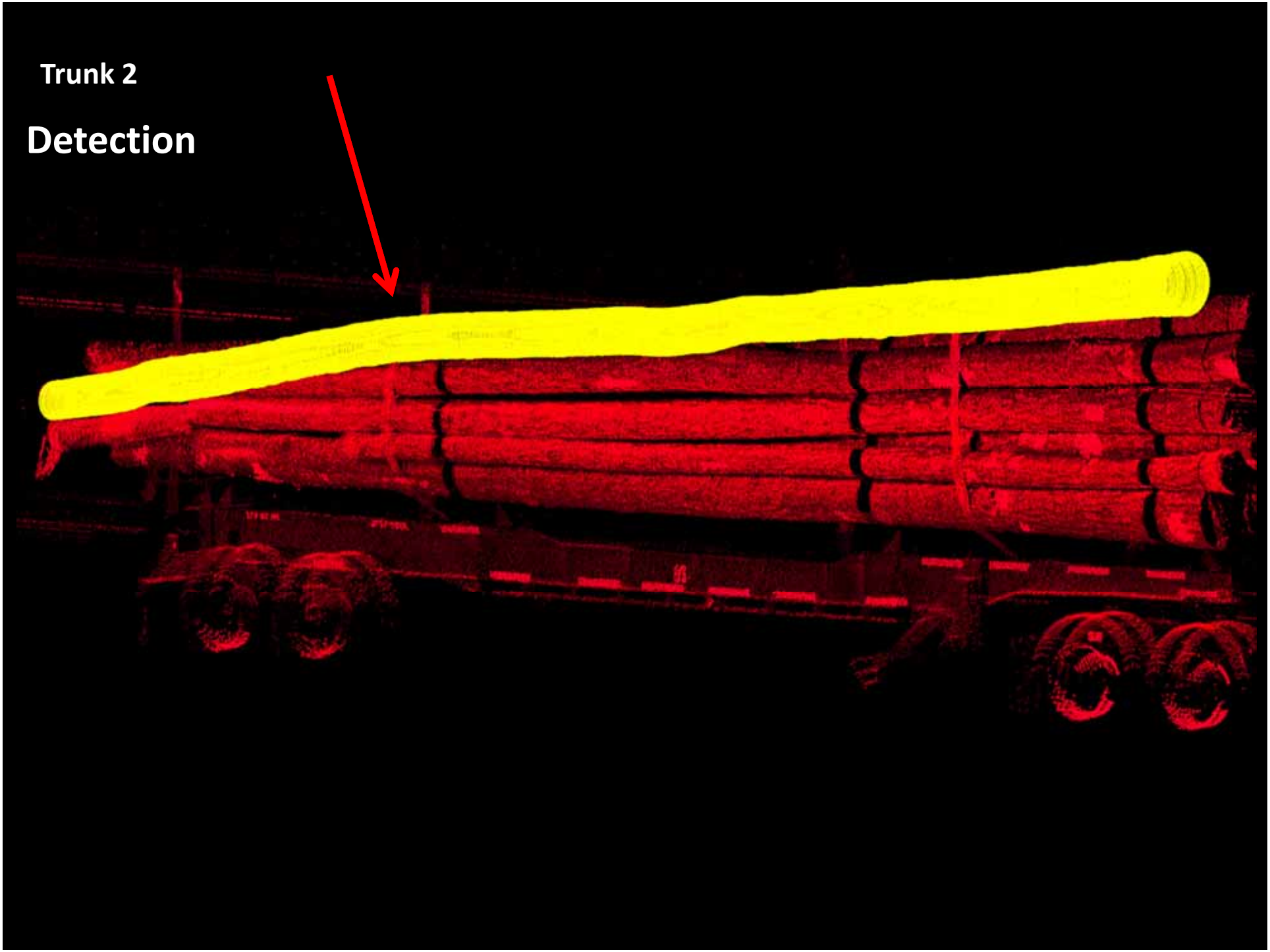
Evaluation



NO DEFECT


`Log 2

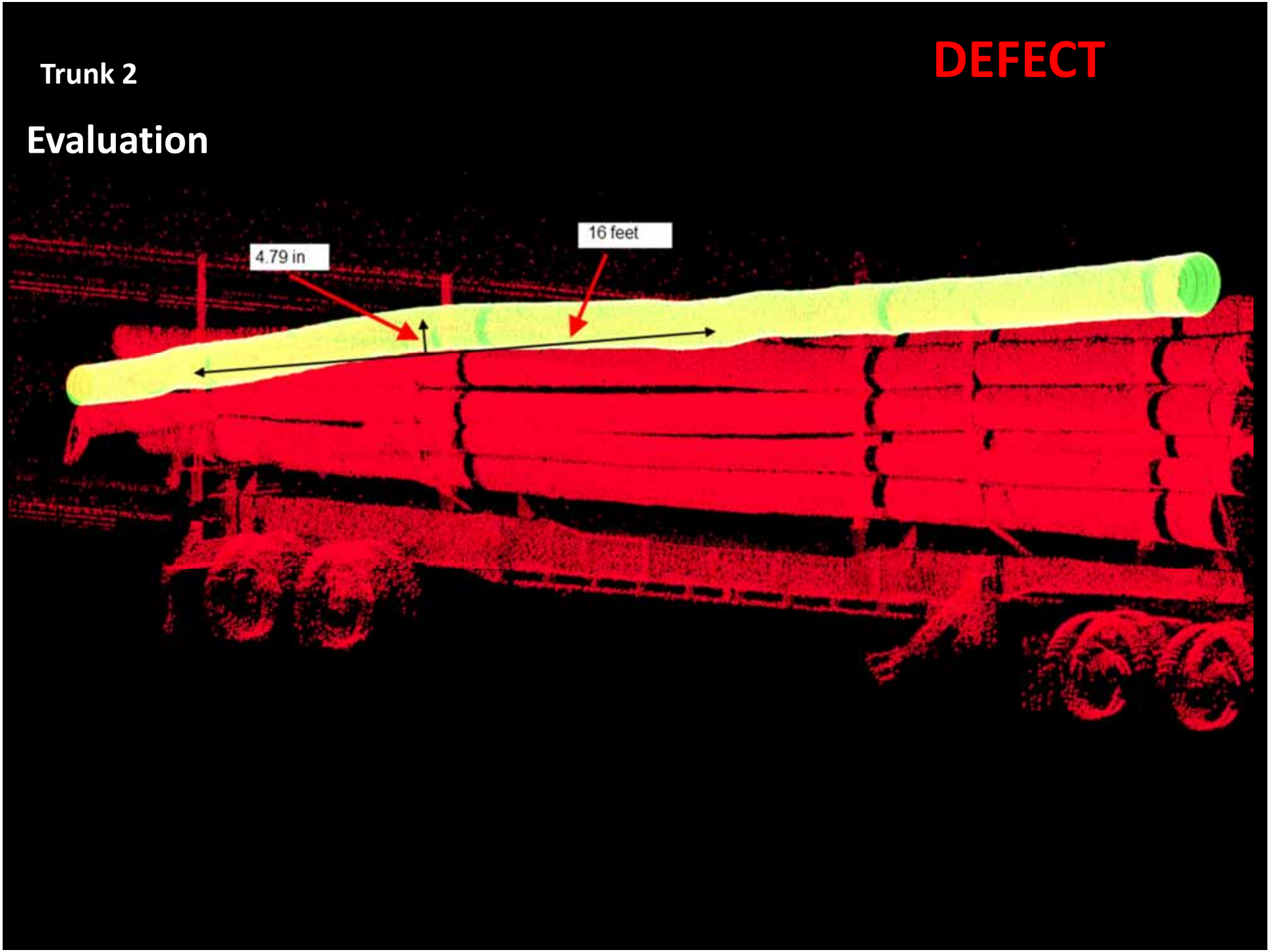
Trunk 2
Capture


Trunk 2
Detection

Trunk 2

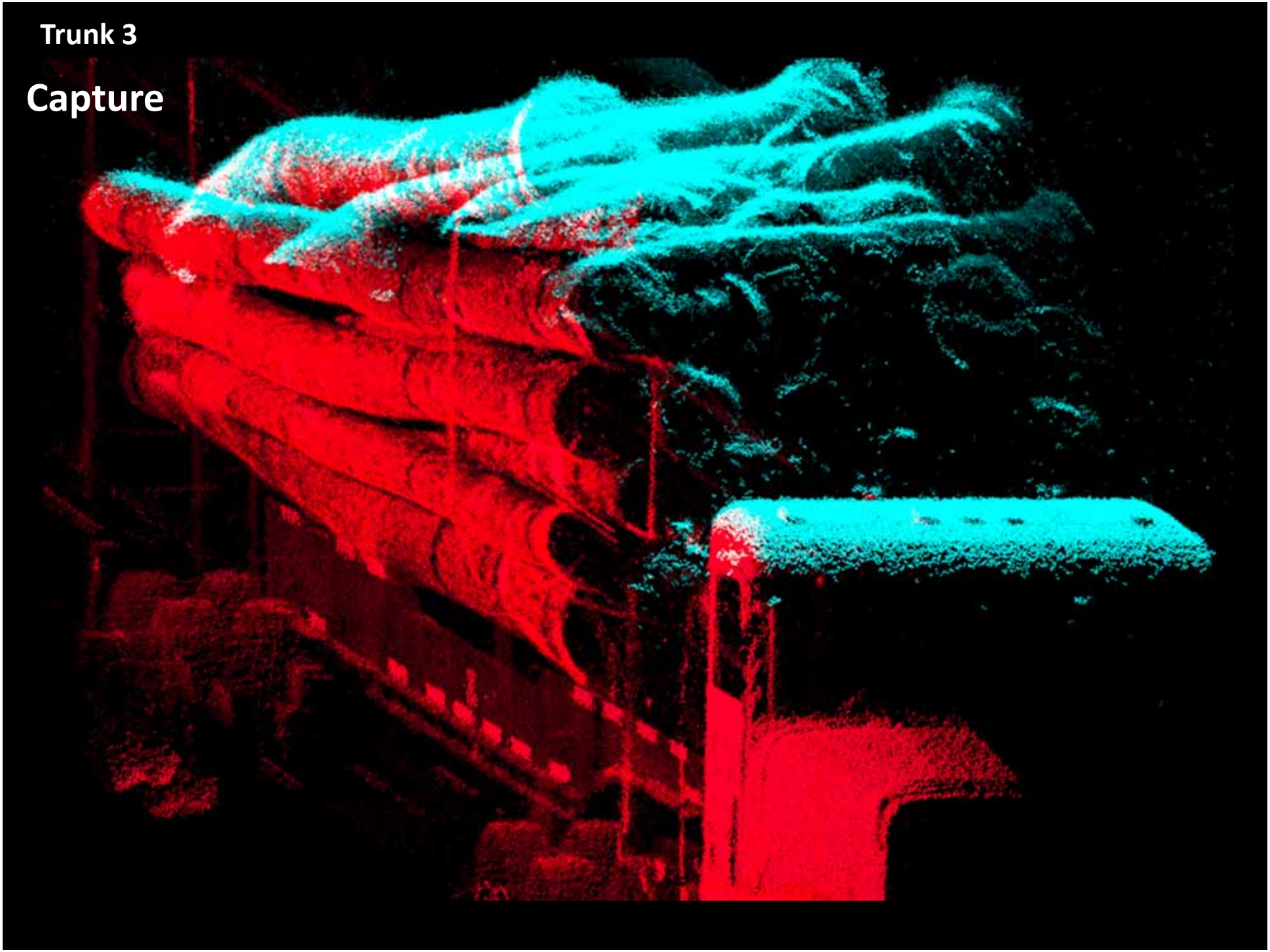
Evaluation

DEFECT



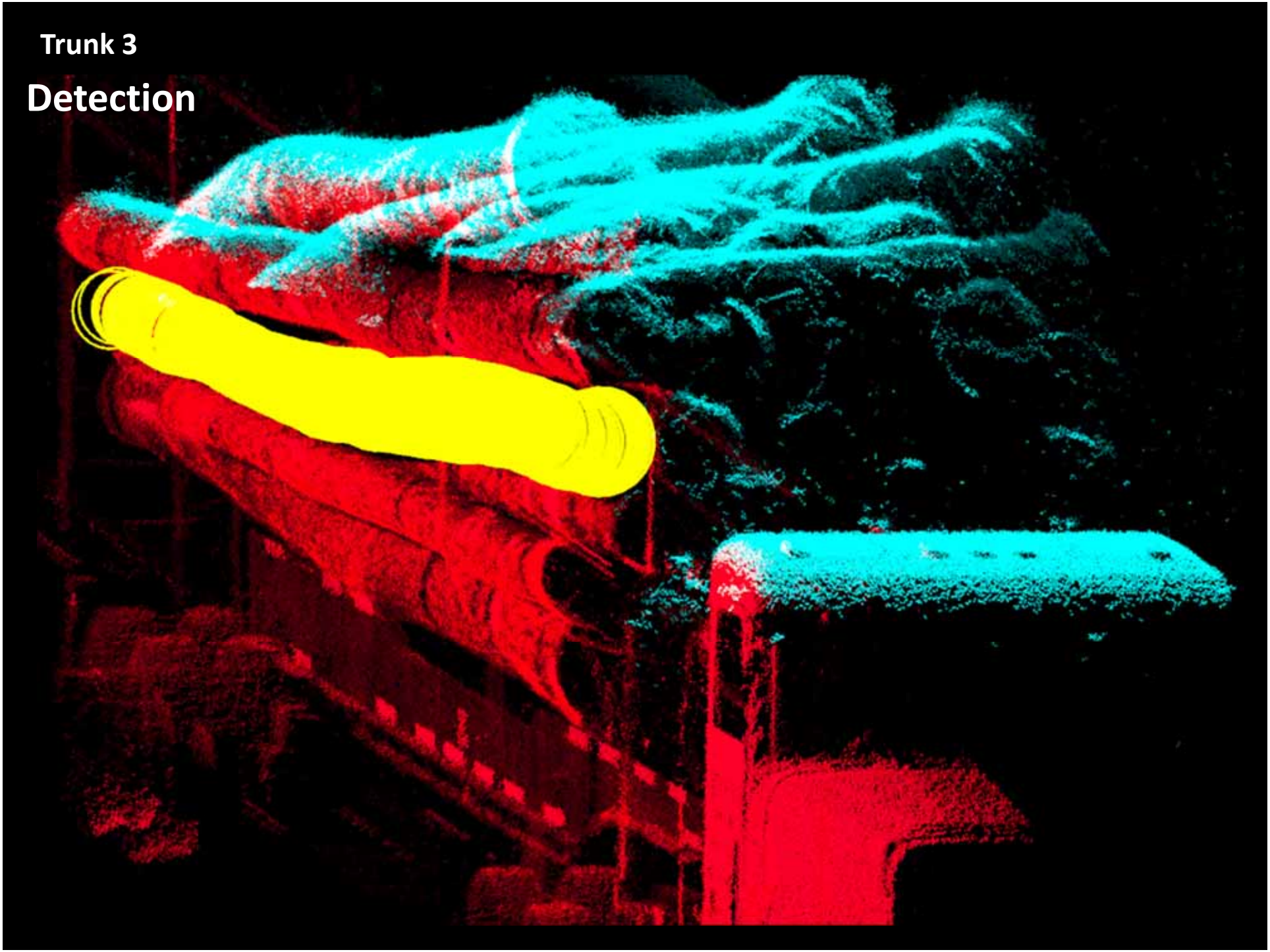
Trunk 3

Capture



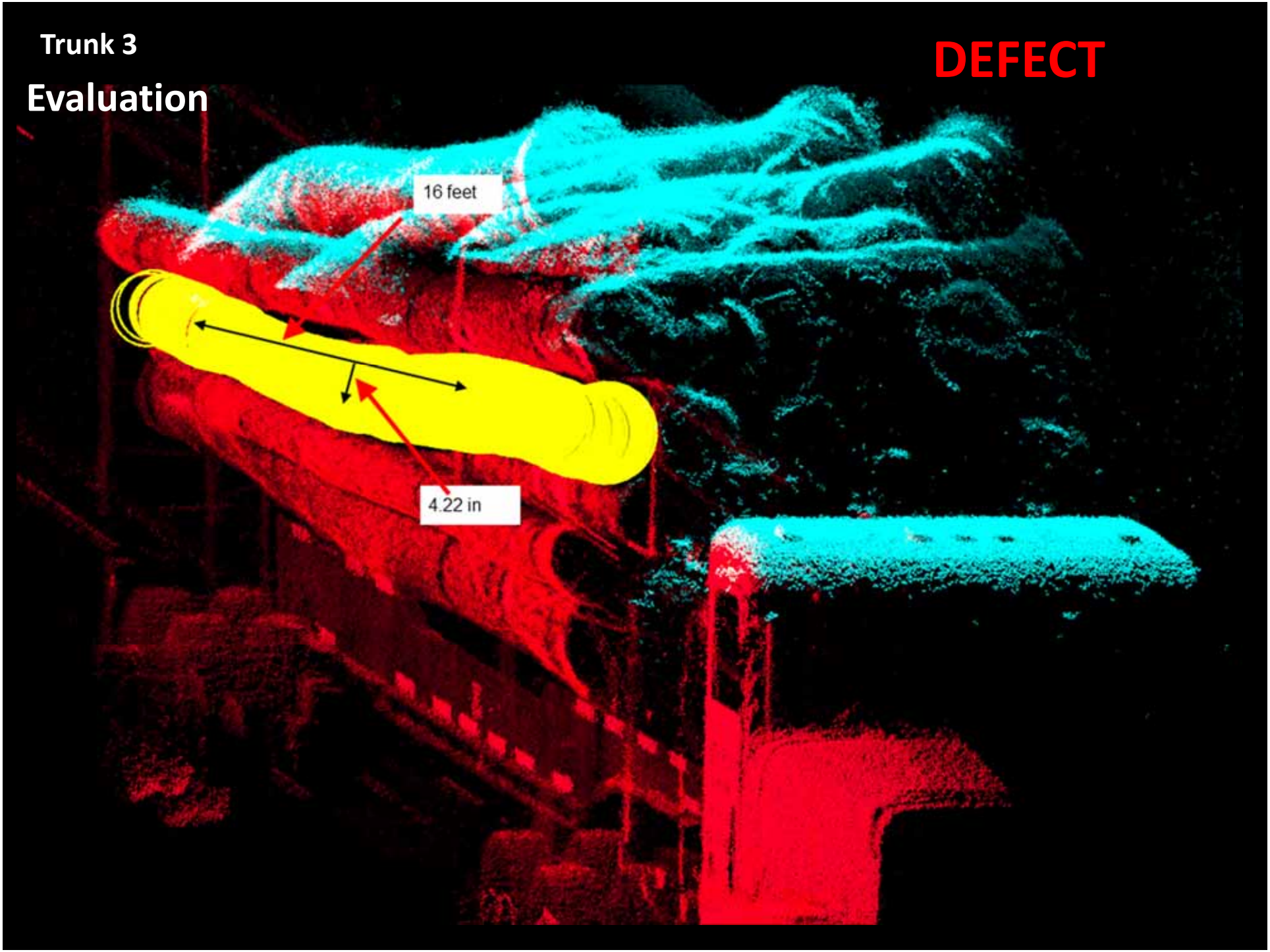
Trunk 3

Detection



Trunk 3

Evaluation



Automatic or Manual log count

Log Counter Module

Automatic piece count accuracy: 97%

WOODTECH

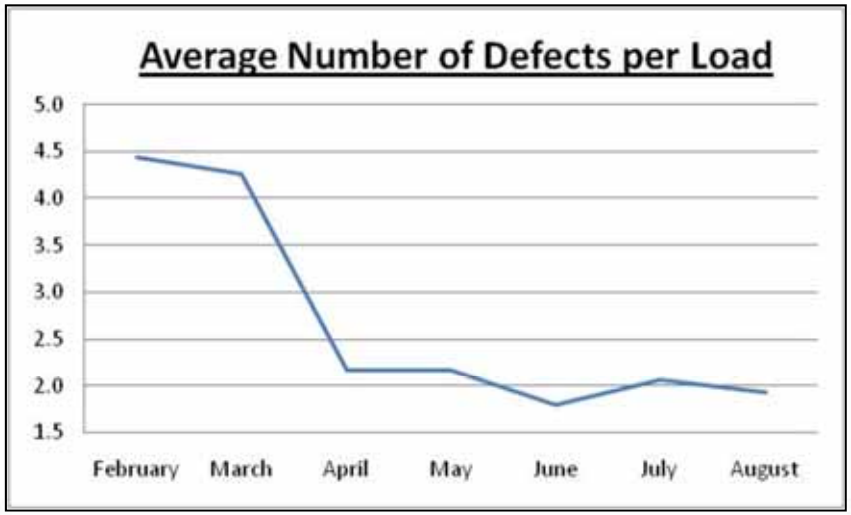
Log Marker module

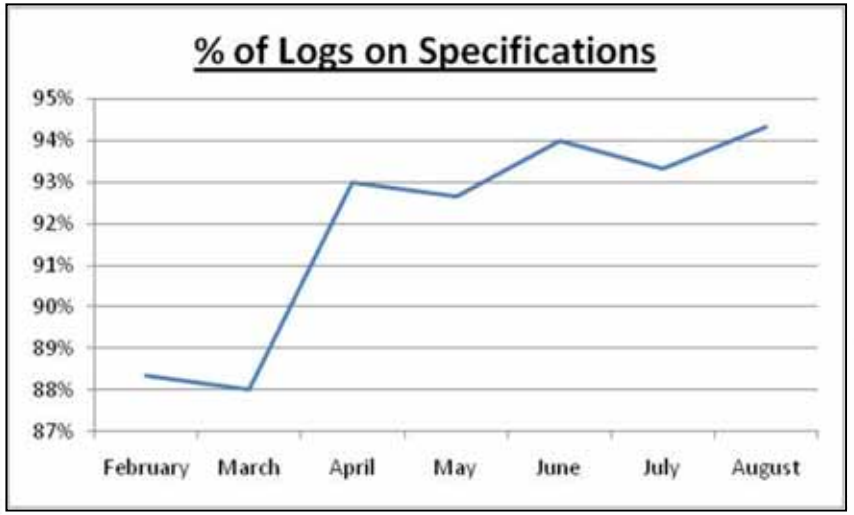
Operator selects defective logs on the picture and the Log Marker incorporates defects on data and report for weight deduction.

Defect detection is done before the logs are unloaded.

WOODTECH

Log Quality Improvement





2011	Big Log		Regular		CNS		Average	
	Defects/load	Logs on Spec	Defects/load	Logs on Spec	Defects/load	Logs on Spec	Defects/load	Logs on Spec
February	5.4	82%	3.0	92%	4.9	91%	4.4	88%
March	5.7	81%	3.1	91%	4.0	92%	4.3	88%
April	2.6	89%	1.7	94%	2.2	96%	2.2	93%
May	2.5	89%	2.2	93%	1.8	96%	2.2	93%
June	1.9	91%	1.6	95%	1.9	96%	1.8	94%
July	2.0	91%	1.8	94%	2.4	95%	2.1	93%
August	1.7	93%	1.7	95%	2.4	95%	1.9	94%

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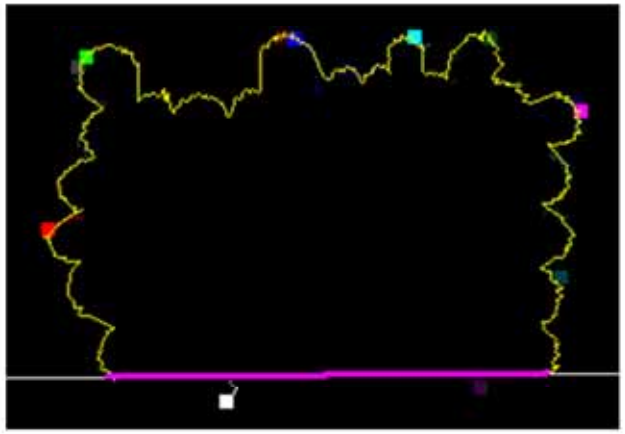
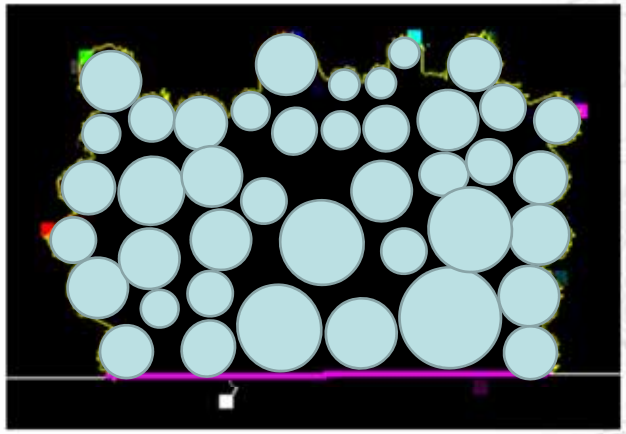
MEASUREMENT SOLUTIONS

Logmeter capability to scale logs under Scribner rule





Scribner volume:

List of logs per load with:

- Small End Diameter
- Large End Diameter
- Length
- Scribner volume
- Cubic volume

WOODTECH
MEASUREMENT SOLUTIONS

Automatic Measurement

Some Impacts…

- **Reduced Measurement Cost**
- **Reduced Truck Waiting Time**
- **Pay for what you get**
- **Minimum Inventories Differences**
- **Avoid Cinderella Effect /Human Factor**
- **No Perverse incentives**
- **Diminish Fraud Risks**
- **Information for Auditing**

➔ **BUSINESS PROFITABILITY IMPACT**

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Some Automatic Measurement Impacts…

- The impact of scanning, measuring and auditing every single log load entering the mill and before it is unloaded is realized in the improvement of log size and quality enabling smoother running in the mill and resulting in increased efficiencies, recovery and profitability of the operation.

WOODTECH

Logmeter®

Measure, Audit and Manage Wood on Truck

Wood Purchase

- Better relationship with suppliers
- Greater transparency –less human intervention
- Reduce truck waiting time & administrative time
- No dependency on conversion factors

Operation

- Production planning
- Log handling cost reduction and possibility of log damage, machinery breakdown and accidents.

Inventory

- Greater certainty about the inventory level
- Reduction in the risk of running out of stock
- Reduction in Safety Stock costs

Quality Control

- Better information about the quality of the wood received
- Better product received
- Greater efficiency

New installation

West Fraser Newberry, South Carolina

WOODTECH
MEASUREMENT SOLUTIONS

¡THANK YOU !

christian.paccot@woodtechms.com

mario.angel@woodtechms.com

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MEASUREMENT SOLUTIONS

Logmeter biometrics Accuracy

The latest tests comparing the performance of the Logmeter system versus manual measurements have been conducted to evaluate the Logmeter 6000. This system measures biometric variables and Scribner volume of *Douglas fir* saw logs.

Woodtech conducted a test of 12 loads containing 153 scanned logs with the following characteristics: Average SED: 11.38'', Average LED: 15.92'', and Average Length: 36.49'

The Logmeter measurements were compared to manual scaling (roll out). The differences between the two methods were:

Small End Diameter (SED)

Average difference: -0.18” Standard Deviation of difference: 0.83”

Large End Diameter (LED)

Average difference: -0.32” Standard Deviation of difference: 1.34”

Length

Average difference: -0.14’ Standard Deviation of difference: 0.28’

Also it is important to mention that these results are for individual log measurements (Logmeter versus scaler) of those logs where the Logmeter was able to scan a good portion of the log. Since the Logmeter measurement models are based on statistical analysis the difference of all measurements (diameter and length) for all logs (external, partially hidden and completely hidden logs in a load) tend to zero when a large number of logs and loads are considered for evaluation permitting the Logmeter to be utilized as a tool for log purchasing.

WOODTECH
MEASUREMENT SOLUTIONS

Logmeter Piece Count Accuracy

Number of logs per load

Woodtech conducted a test to evaluate the performance of the Logmeter log count model compared to manual count (completed by a scaler) using roll out scaling. The sample size of this test was 530 loads. The results were as follow:

Average difference: -1.1 logs

Standard Deviation of difference: 5.6 logs

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What are the latest developments?

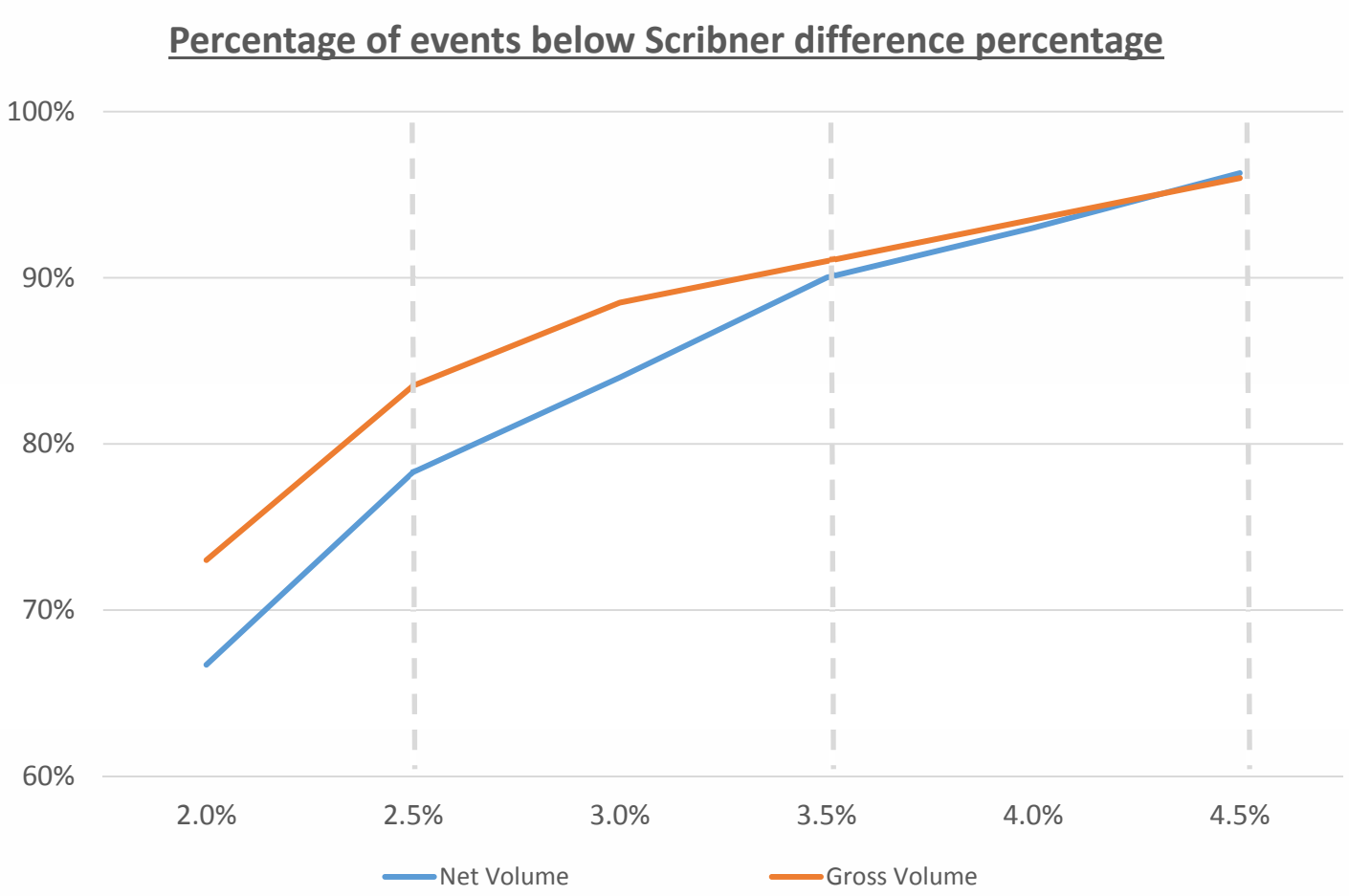
WOODTECH

Logmeter Performance

Logmeter performance was tested using similar approach as check scaling where 100 groups of 12 log loads (50 MBF) were measured by the Logmeter and scalers (using rollout) to compare Scribner volume measurements.

WOODTECH

Scribner Volume Accuracy



Using 12 log load sample tests to compare Logmeter vs. rollout scaling measurements

WOODTECH

Logmeter biometrics Accuracy

The latest tests comparing the performance of the Logmeter system versus manual measurements have been conducted to evaluate the Logmeter 6000. This system measures biometric variables and Scribner volume of *Douglas fir* saw logs.

Woodtech conducted a test of 12 loads containing 153 scanned logs with the following characteristics: Average SED: 11.38'', Average LED: 15.92'', and Average Length: 36.49'

The Logmeter measurements were compared to manual scaling (roll out). The differences between the two methods were:

Small End Diameter (SED)

Average difference: -0.18” Standard Deviation of difference: 0.83”

Large End Diameter (LED)

Average difference: -0.32” Standard Deviation of difference: 1.34”

Length

Average difference: -0.14’ Standard Deviation of difference: 0.28’

Also it is important to mention that these results are for individual log measurements (Logmeter versus scaler) of those logs where the Logmeter was able to scan a good portion of the log. Since the Logmeter measurement models are based on statistical analysis the difference of all measurements (diameter and length) for all logs (external, partially hidden and completely hidden logs in a load) tend to zero when a large number of logs and loads are considered for evaluation permitting the Logmeter to be utilized as a tool for log purchasing.

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What is Woodtech's contribution to the forestry industry?

WOODTECH

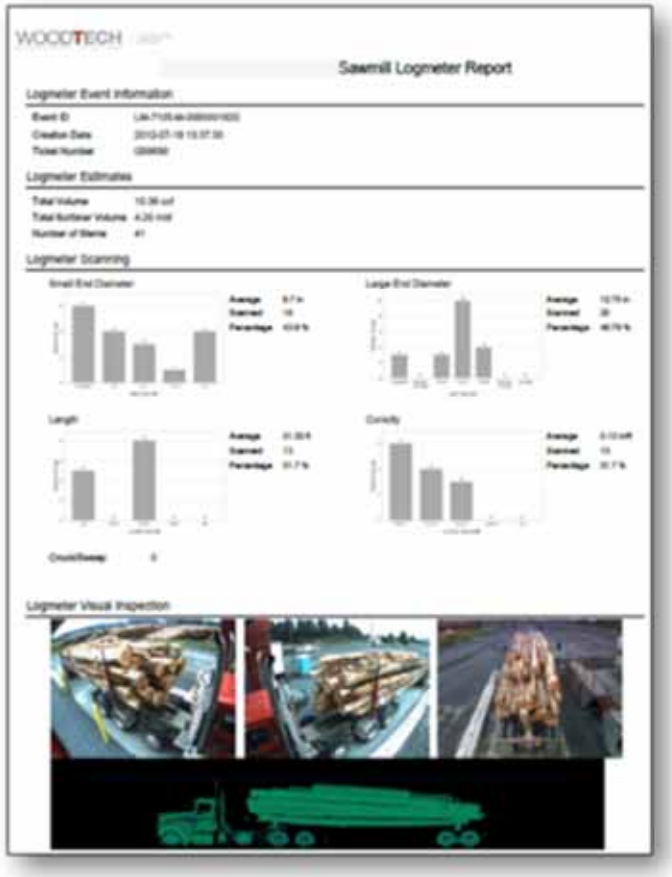
Developing an unbiased system that operates 24/7

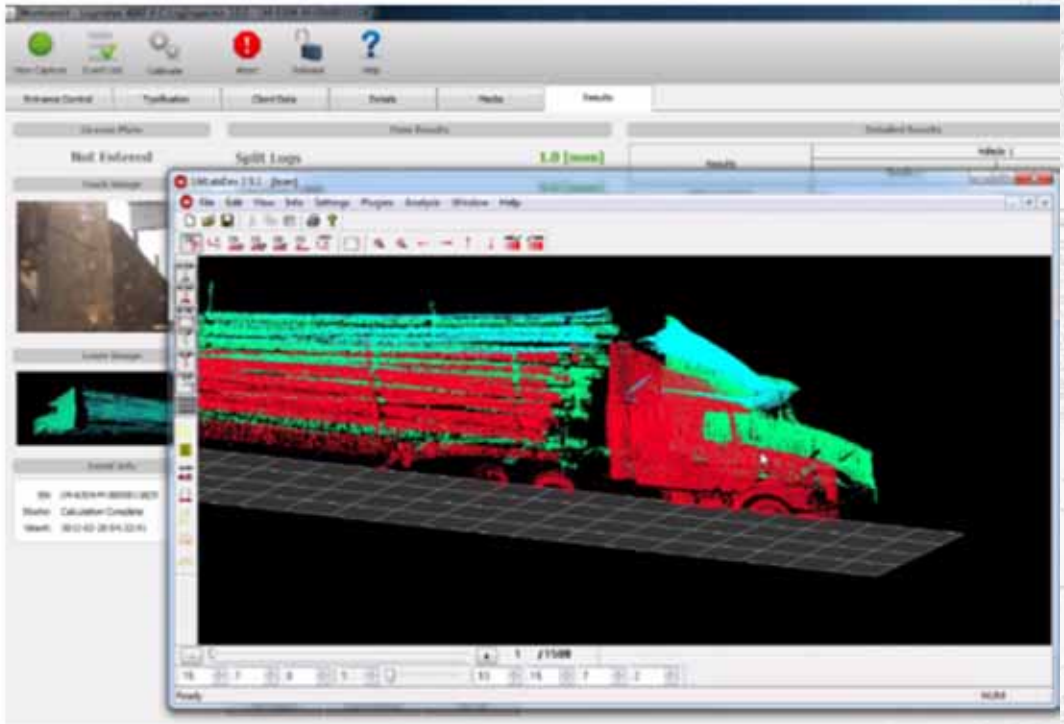
- In a couple of minutes, the Logmeter automatically provides stem count and measures volume of each load **saving scaling time and costs (labor, space, machinery, etc.) and all risks associated to scaling (fiber damage and accidents)**

WOODTECH

Enhacing log procurement

- Forest product companies, due to the Logmeter, have incorporated technology to audit and measure every log load providing key information to purchase and manage the highest cost resource.





WOODTECH

Helping forest products companies to improve profitability

- The impact of scanning, measuring and auditing every single log load entering the mill and before it is unloaded is realized in the improvement of log size and quality enabling smoother running in the mill and resulting in increased efficiencies, recovery and profitability of the operation.

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