WOODTECH
MEASUREMENT SOLUTIONS

Logmeter Technology

Presented by Mario Angel

2016

50 installations worldwide

Brazil

- 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

- Shuqualak Lbr.
- 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

KEY

BULKMETER	○
CHIPMETER	○
COALMETER	○
LOGMETER	○

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One thing we have learned…

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When the mill does not run well the blame is usually on the logs (and log buyer).

Log quality impacts directly the manufacturing process and results are realized in the mill financial performance.

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60 - 65% of total production cost
4KP9365

Managers are always looking for ways to reduce log cost and improve log quality

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In the US South log inspection is on the truck at the scale

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Inspection difference among people

Typically, there is a big difference in log quality inspection performance between scalers. The human factor plays a big role in the inspection process. The following table shows the value of the Logmeter for a sawmill receiving 100 log loads/day.

Operator	Time Worked (minutes)	Number of trucks inspected	% Deduction	$/year based on trucks	Lbs/truck of deductions
Experienced	350	41	0.8	248,476	448
Unexperienced	68	14	0.2	54,464	100
Opportunity				**$194,011**	

1. The number of trucks per minute arriving to the mill doubled when the unexperienced scaler was inspecting.
2. Experienced scaler deducts more than double than unexperienced.
3. The unexperienced scaler allows the entrance of more defective logs compared to the experienced scaler.

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Experienced scaler inspection

Woodtech has observed that even an experienced and conscious log inspector has big variation of his/her performance throughout the day, specially when the inspector is being observed or he/she is focused in other matters (family issues, lunch time, truck driver friends, etc.)

Experienced Scaler	% Deduction	$/year based on trucks	Lbs/truck of deductions
Being observed (With Woodtech on site)	1.2	358,553	653
W/O Woodtech on site	0.5	153,409	273
Opportunity		**$205,144**	

1. Inspection performance declines more than twice when scaler is not being observed (e.g. in a normal day).

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Sample scaling (rolling out logs)

- Higher paid scalers ($60,000)
- Machinery to handle logs ($200,000)
- Space (yard) for roll out ($300,000)
- Possibility of accidents and log damage ($200,000)

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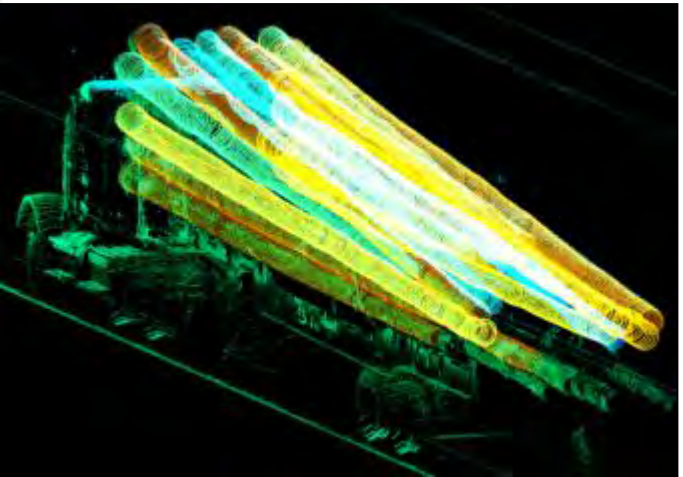
Manual data input and transferring

- Data is transferred person to person.
- Slow reporting and analysis.
- Possibility of making mistakes.

Understanding these challenges Woodtech developed a system that helps managers to:

- Measure and audit every incoming log load
- Assess opportunities related to log quality and size
- Improve log quality
- Increase mill profitability



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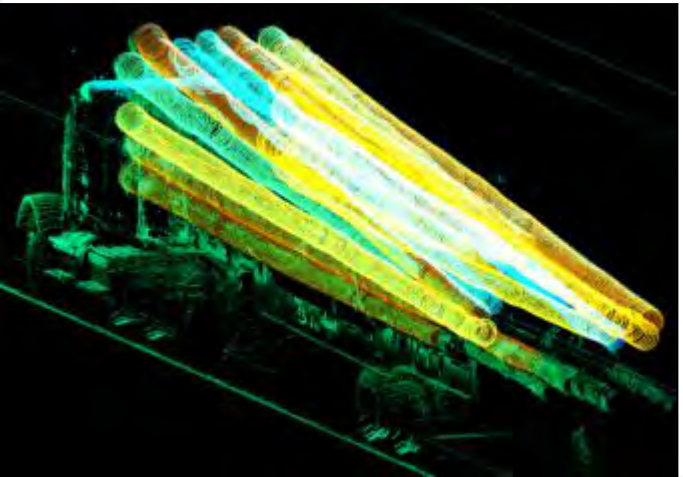
LOGMETER®

Technology that helps companies to improve results managing logs



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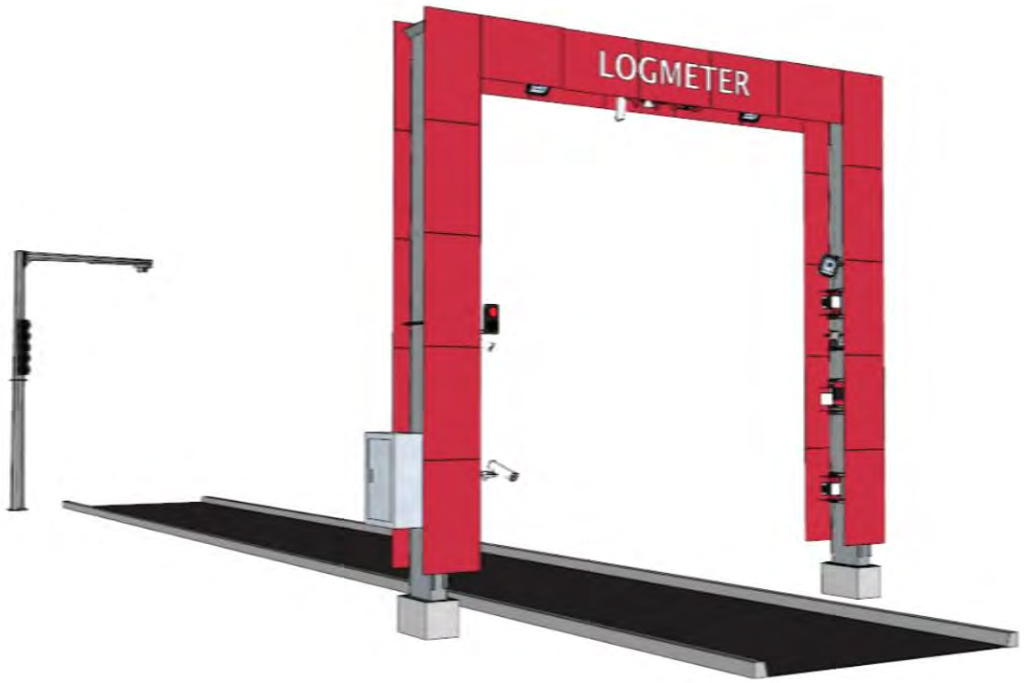
What is the Logmeter?

Logmeter® - measurement system



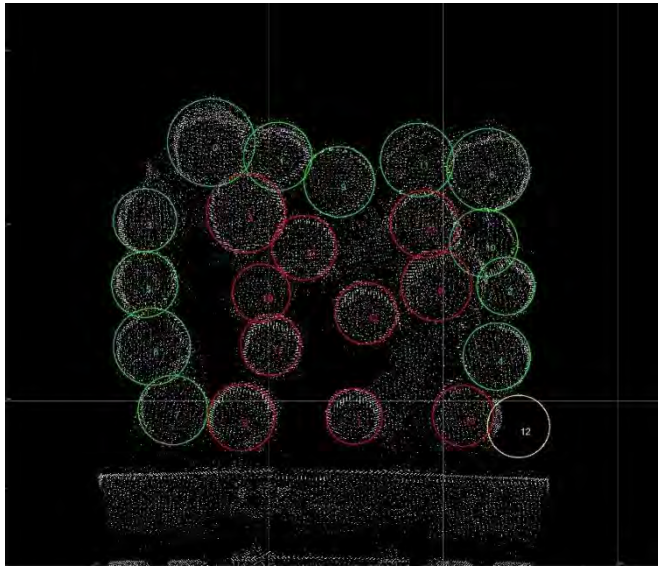
How Logmeter measures logs

How Logmeter measures logs

How Logmeter measures logs

Making log models

Logs' faces detection



Matching faces and logs' segments

Log Marker module

Scaler 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.

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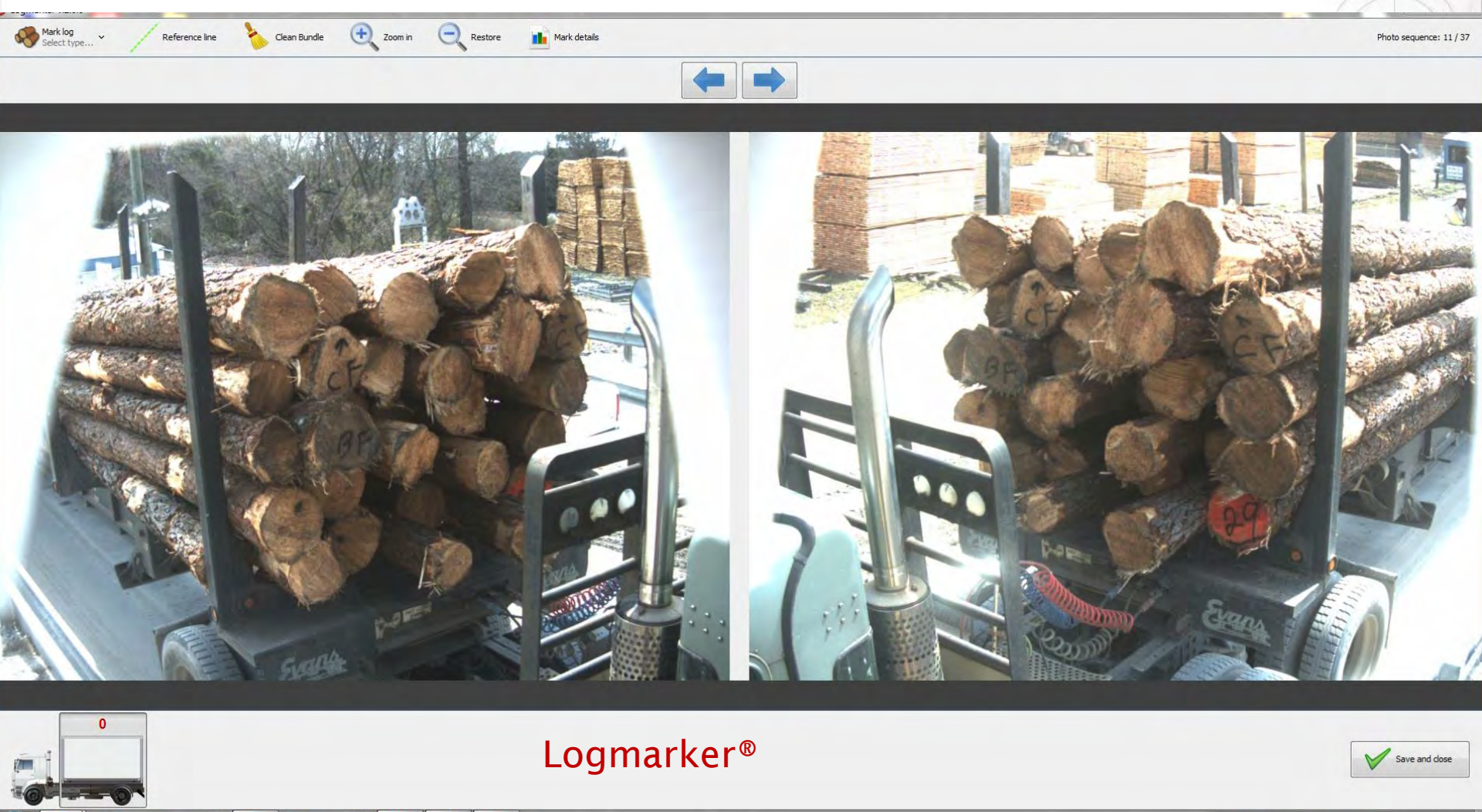
How Logmeter measures logs

Marking visual defect manually



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Event information

Event ID	LM-WNE1-M-0000000015	Source ID	N2000796
Start Code	1234	Source Name	Holmes Timber
Load Number	10382	Vendor Name	JEREMY'S & TIMBER INC
Creation Date	2015-05-07 07:05:45	Producer ID	714
Category	SP_13-7	Producer Name	RIDGE LUMBER CO
Type Length	LL	County	SALUDA
Species	southern yellow pine	State	SC

Summary

Number of Stems	30		
Average SED	8,7 in	Average Length	40 ft
Average LED	15,7 in	Average Sweep	3,3 in

Diameter Distributions

Small End Diameter

Large End Diameter

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General Data

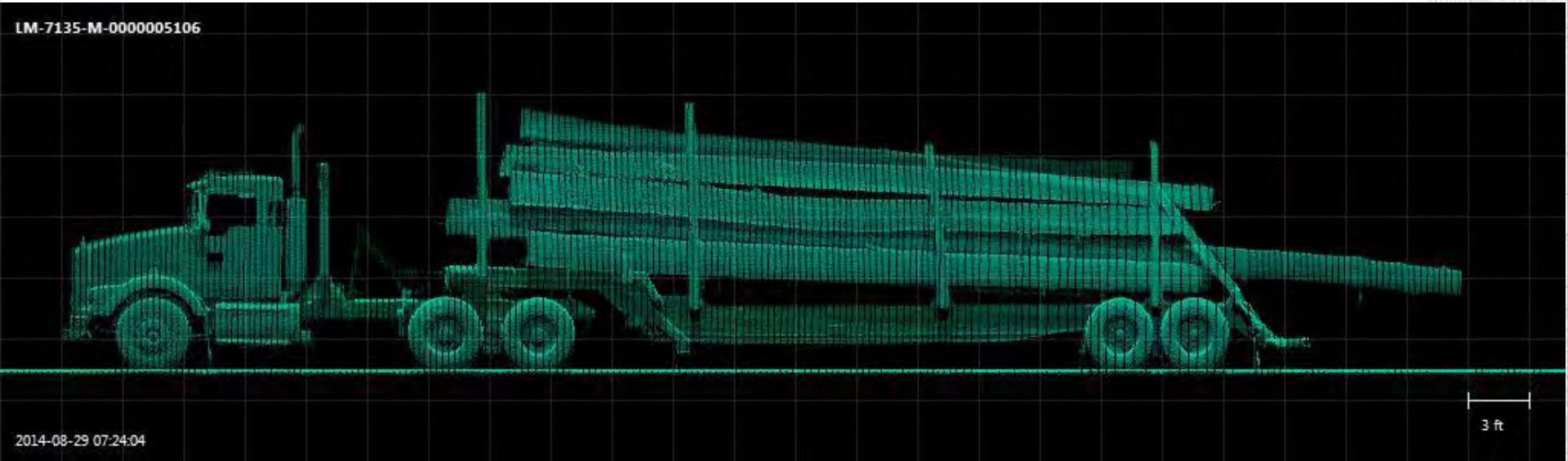
Event Id	LM-7135-M-0000008502	Load number	130519
Creation Date	12/04/2014 13:24	Land owner name	Kapstone Charleston Kraft
Producer	LAND & TIMBER # 2	Vendor name	KAPSTONE CHARLESTON KRAFT LLC
Contract name		Start Code	126136

Summary

Average Sweep	4.49 in	Average LED	14.80 in
Average Length	39.54 ft	Average SED	8.70 in
Defects Sweep	3	Defects LED	0.00
Defects Length	0.00	Defects SED	0.00
Estimated Number of Stems	34		

Speed Statistics

How is the Logmeter® helping the industry?



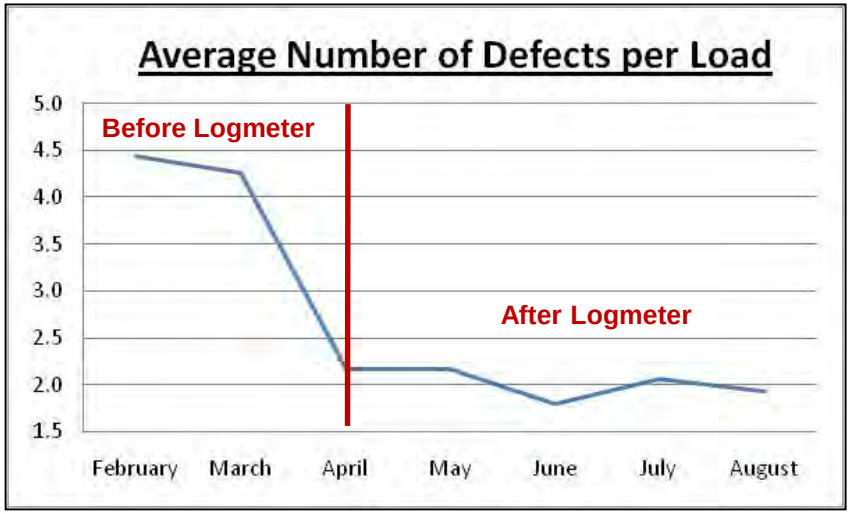
The impact of scanning, measuring and auditing every single log load entering the mill and before it is unloaded is realized in the

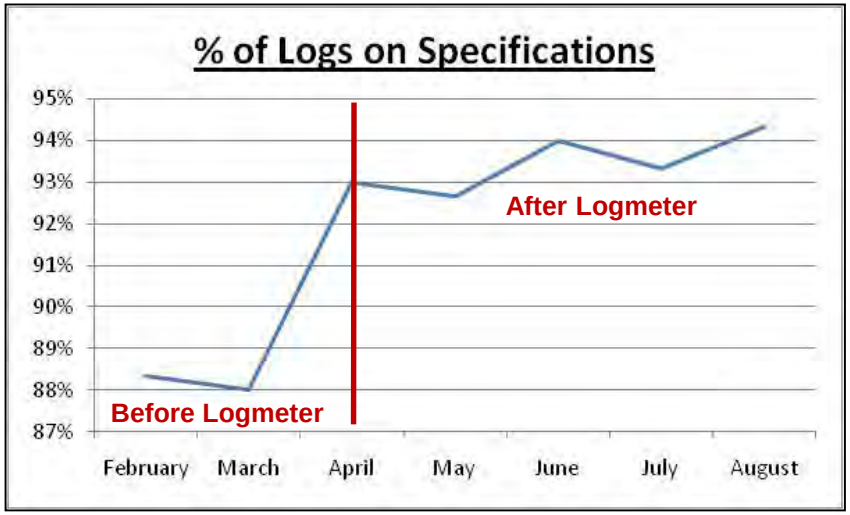
improvement of log

size and quality

enabling smoother running in the mill and resulting in increased efficiencies, recovery and profitability of the operation.

Log quality improvement after Logmeter (T.R. Miller)





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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Log quality improvement

T.R. Miller sawmill (Brewton, AL) is receiving bigger logs in each log category since they have the Logmeter. Log suppliers know the system is measuring each load therefore they meet the log specifications regularly allowing T.R. Miller to increase the average SED, LED and length.

Log Size Improvement

Log Meter	Category	Stem	Before	After	% Change
	Big logs	L.E.D.	15.3"	18.2"	19%
		S.E.D.	9.1"	10.8"	19%
		Length	39.5'	43.3'	10%
	Regular logs	L.E.D.	15.2"	15.9"	5%
		S.E.D.	9.1"	9.6"	5%
		Length	40.9'	41.7'	2%
	CNS	L.E.D.	12.0"	12.0"	---
		S.E.D.	7.6"	7.7"	1%
		Length	34.6'	36.2'	5%
	Average	L.E.D.	14.9"	16.0"	7%
		S.E.D.	8.9"	9.7"	9%
		Length	40.0'	41.5'	4%

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Better logs = mill improvement

BF/hour : 5.7%
Tons/MBF : 2%

Logmeter (T.R. Miller, Brewton, AL)

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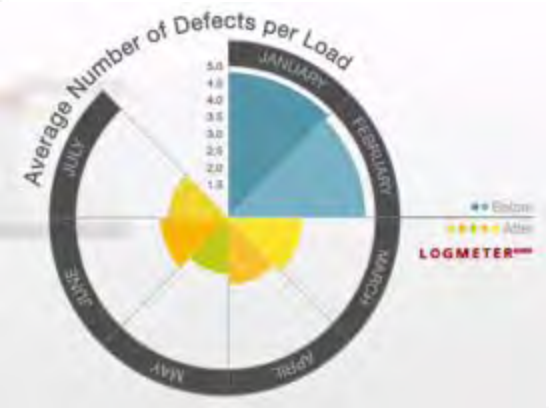
T.R. Miller evaluation

T.R. Miller evaluated the Logmeter benefits in over **$1.3 million** during the first year in operation.

The company is taking full advantage of the technology controlling log quality and cost.

Productivity	$ 798,000
Yield	$ 228,000
Deductions	$ 116,000
Bad wood avoidance	$ 173,000



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Real time load detail information for acquiring the right logs

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Minimum Load Criteria

Report parameter	
From:	Jun 1, 2015
To:	Jun 5, 2015

Warning	Odd
Undersize	Oversize

#	Event ID	Vendor	Load number	Creation date	Category	LED	SED	Length	Sweep
1	LM-WNE1-M-0000015554	CHARLES K DOOLITTLE INC	137675	Jun 1, 2015	SP_14-8	16.7	11.8	36.1	4.1
2	LM-WNE1-M-0000015555	CHARLES K DOOLITTLE INC	137676	Jun 1, 2015	SP_14-8	16.6	11.4	38.7	4.0
3	LM-WNE1-M-0000015556	CHARLES K DOOLITTLE INC	137677	Jun 1, 2015	SP_14-8	16.4	10.2	36.0	3.2
4	LM-WNE1-M-0000015557	CHARLES K DOOLITTLE INC	137678	Jun 1, 2015	SP_11-7	13.1	7.6	41.9	2.8
5	LM-WNE1-M-0000015558	JOHN R FRAZIER, INC	137679	Jun 1, 2015	T3-NWB	15.0	8.6	35.1	2.8
6	LM-WNE1-M-0000015559	GRACEWOOD FORESTRY LLC	137680	Jun 1, 2015	T5-NWB	12.9	8.1	29.8	3.5
7	LM-WNE1-M-0000015560	HENTZ FOREST PRODUCTS INC	137681	Jun 1, 2015	SP_10-CUT	16.5	15.8	15.7	2.4
8	LM-WNE1-M-0000015561	FOOTHILLS FOREST PRODUCTS, INC	137682	Jun 1, 2015	SP_10-7	13.7	7.5	38.4	3.1
9	LM-WNE1-M-0000015563	CHARLES K DOOLITTLE INC	137683	Jun 1, 2015	SP_14-7	15.4	8.2	46.8	2.5

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Identifying bad logs with real time information

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Feedback to log suppliers with real time information

Report parameter	
From:	Jun 1, 2015
To:	Jun 5, 2015

Selected categories
01-NWB
P1-NWB
P3-NWB
S13-NWB
SP_10-6
SP_10-7
SP_10-Cut
SP_11-7
SP_12-6
SP_12-7
SP_12-8
SP_14-7
SP_14-8
SP_15-8
SP_16-7
SP_8-Cut
T1-NWB

Vendor name	Defects	Loads	Defects / Load	Estimated No of stems	Defects / stems
BROAD ARROW TIMBER COMPANY - SOUTH	58	9	6.4	433	13.4%
CANAL WOOD LLC	17	3	5.7	116	14.7%
CENTRAL CAROLINA TIMBER CO LLC	8	2	4.0	88	9.1%
CHARLES K DOOLITTLE INC	747	109	6.9	3227	23.1%
DAVENPORT LAND & TIMBER LLC	69	12	5.8	353	19.5%
FOOTHILLS FOREST PRODUCTS, INC	95	18	5.3	771	12.3%
GRACEWOOD FORESTRY LLC	160	23	7.0	731	21.9%
HARMON PULPWOOD INC	2	1	2.0	49	4.1%
HENTZ FOREST PRODUCTS INC	177	32	5.5	1195	14.8%
HUGHES LAND & TIMBER COMPANY INC	21	5	4.2	228	9.2%
JOHN R FRAZIER, INC	72	11	6.5	373	19.3%
KAPSTONE CHARLESTON KRAFT LLC	6	1	6.0	49	12.2%

Knowing what type of logs the mill receives versus needs

Logmeter provides log distributions, stem count and cubic volume for each load received at the gate automatically and in a matter of minutes

Two loads with different value in $/MBF of lumber produced

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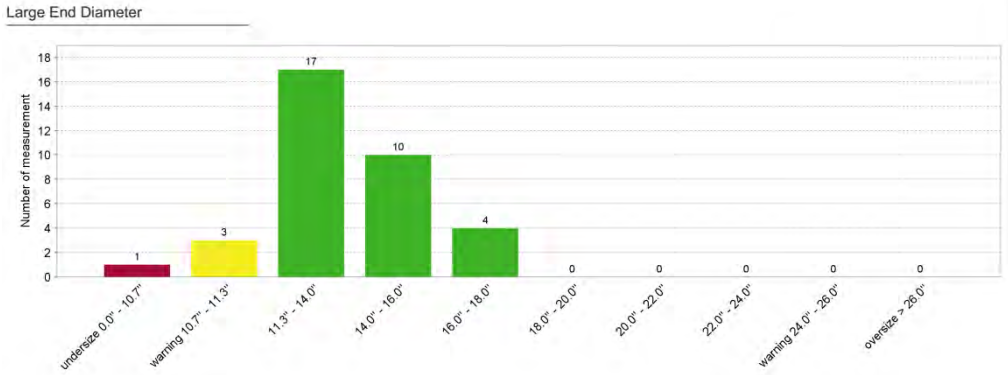
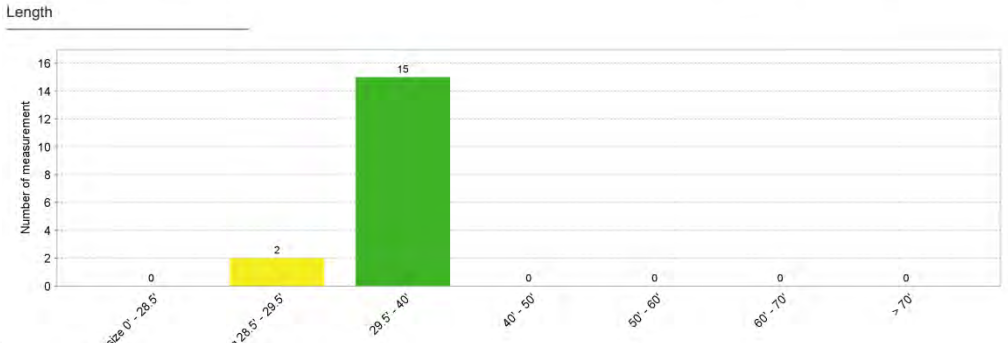
Real time load detail information for acquiring the right logs

- Top diameter distribution
- Butt diameter distribution
- Length distribution
- Average length
- Number of logs

Key information for obtaining the highest value logs for your operation





Date range	
From:	Apr 1, 2015
To:	Oct 31, 2015

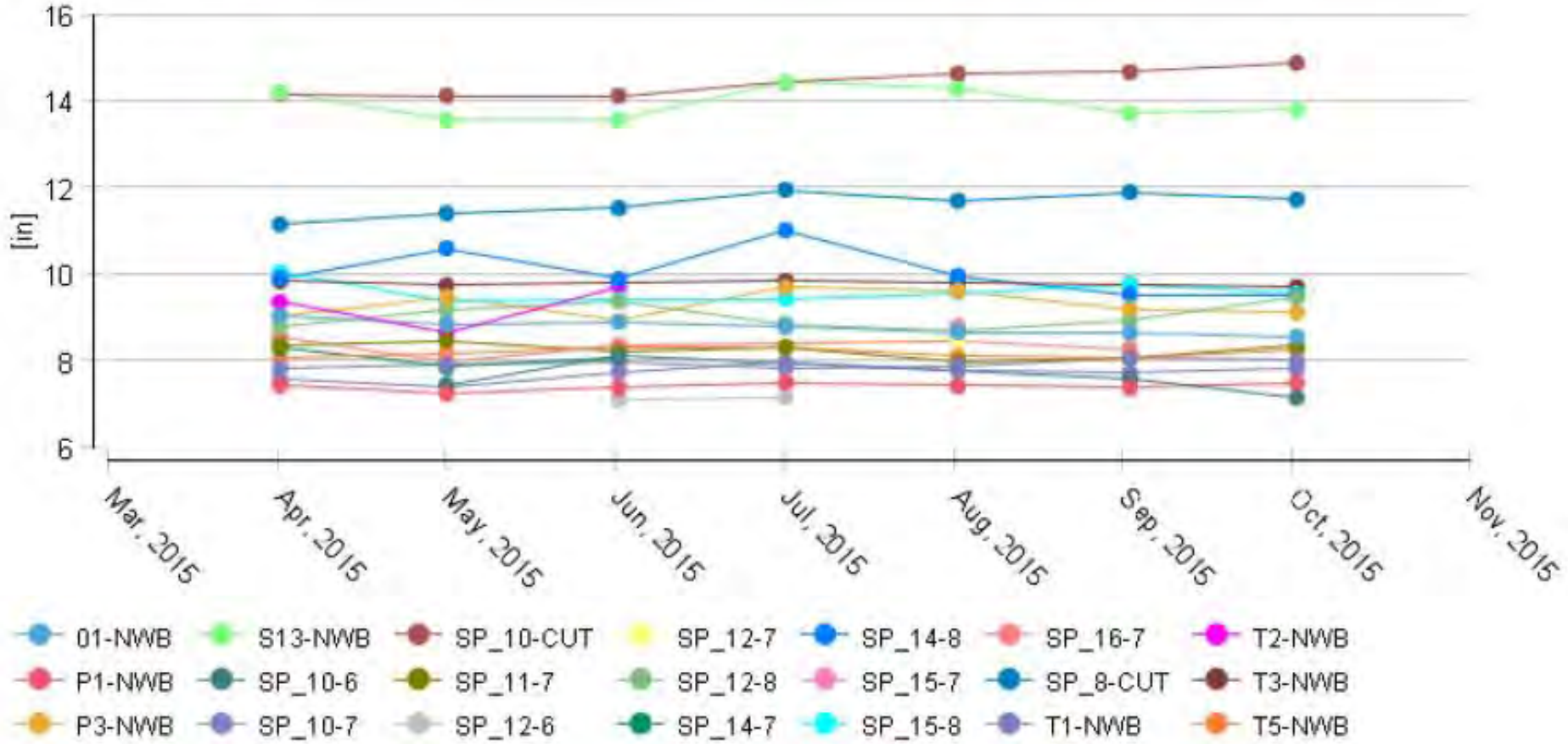
Vendor Name
ALL

Source Name
ALL

Producer Name
ALL

Category
ALL

SED Average



Better logs = Better wood products

Report parameter	
From:	Jun 1, 2015
To:	Jun 5, 2015

Sweep		
Range	Count	%
< 1.5	5	1.71%
1.5 - 3.0	136	46.58%
3.0 - 4.5	116	39.73%
> 4.5	35	11.99%
Total number of stems	292	

Defects summary

Automatic inspection	Count
Length Odd	0
LED Oversize	0
SED Oversize	0
Sweep Oversize	35
Length Oversize	0
LED Undersize	9
Length Undersize	6
SED Undersize	34
Total	84

Visual inspection	Count
Blue Stain (Top)	0
Blue Stain (Tree)	4
Broken End	2
Catface/Canker/ Scar (Butt)	33
Catface/Canker/ Scar (Middle)	6
End Split (Butt)	4
End Split (Top)	0
Butt Flare	9
Fork (Top)	0
Fork (main Stem)	0
Heart Rot/Red Heart (Top)	0
Heart Rot/Red Heart (Butt)	0
Knots	0
Equipment Damage	4
Poor trim	17
Uneven Butt	7
Total	86

"We are producing better lumber and higher percentage of 2x12"

Charlie Thomas III. VP Shuqualak Lumber.

Logmeter (Shuqualak Lumber, Shuqualak, MS)

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Logmeter operation findings

Defect	Count %
Sweep	17.0%
ScarButt	13.0%
LED Under	13.0%
Butt Flare	11.5%
SED Under	11.0%
Poor Trim	8.5%
Length Under	6.5%
EquipmentDamage	4.0%
UnevenButt	4.0%
Knots	3.0%
EndSplitButt	3.0%
ScarMiddle	3.0%

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Higher log defect deductions

Measurement distributions

# Loads	30

Large End Diameter (LED)		
Range	Count	%
< 10.5	9	1.74%
10.5 - 12.0	38	7.36%
12.0 - 14.0	182	35.27%
14.0 - 16.0	179	34.69%
16.0 - 18.0	81	15.70%
18.0 - 20.0	19	3.68%
20.0 - 24.0	8	1.55%
24.0 - 26.0	0	0.00%
> 26.0	0	0.00%
Total number of stems	516	

Small End Diameter (SED)		
Range	Count	%
< 7.4	34	6.40%
7.4 - 8.0	62	11.68%
8.0 - 9.0	167	31.45%
9.0 - 10.0	171	32.20%
10.0 - 11.0	64	12.05%
11.0 - 12.0	19	3.58%
12.0 - 13.0	9	1.69%
13.0 - 14.0	2	0.38%
14.0 - 15.0	1	0.19%
15.0 - 24.0	2	0.38%
24.0 - 26.0	0	0.00%
> 26.0	0	0.00%
Total number of stems	531	

18%

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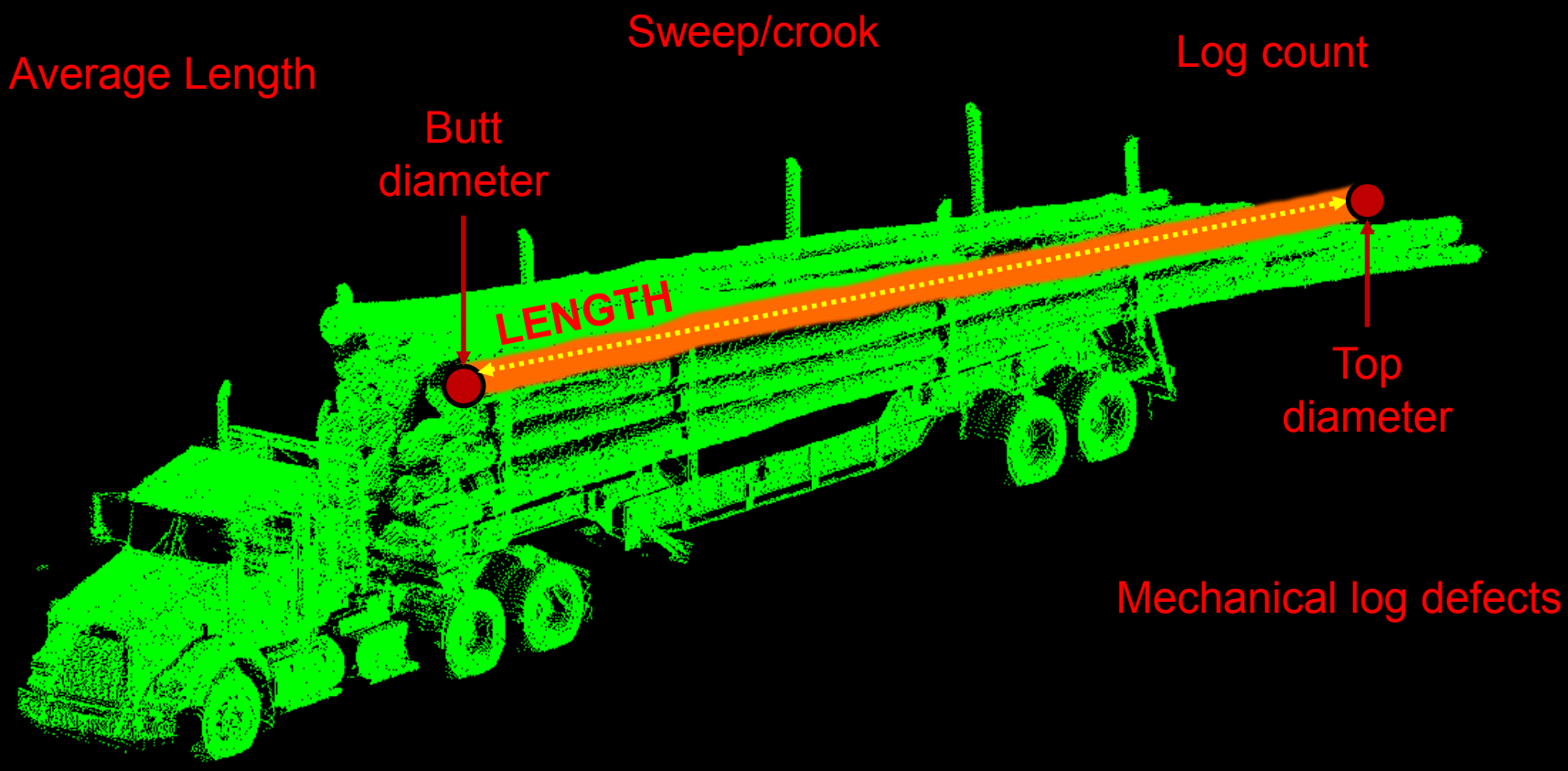
- Log load reception time has been reduced with Logmeter improving wood flow to the mill.
- The majority of loads get penalized by the Logmeter. Less than 1% of loads enter the mill without deductions.
- Logmeter semiautomatic inspection is deducting about 30% more than prior methods (roll out & at scale).
- Logmeter is deducting about 1.5% of log cost more than prior inspection methods.

“What gets measured gets managed”

Peter Drucker



Automatic Accurate Precise Real Time Information

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Logmeter® = Best tool to improve log quality and mill profit

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

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