

How to Conduct a Return to Log Study



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Timber Measurements Society
Ferndale, Washington, April 10-12, 2013



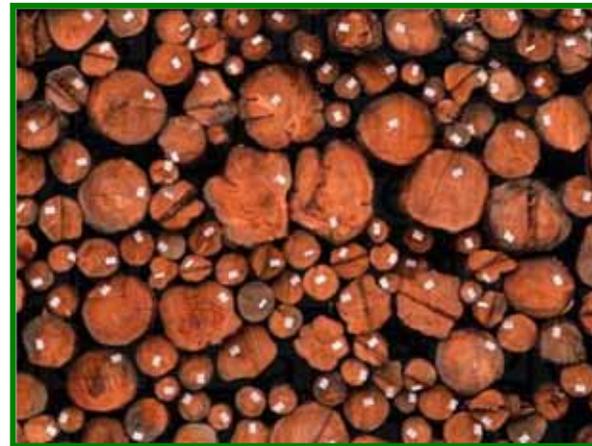
Return to Log Studies (RTL): Why?

- To get an overview on milling efficiency
- Test feasibility of new milling strategies
- Explore new raw materials strategies
- To fully understand the metrics and economics of logs with various attributes
- To form the basis of a breakeven log model



RTL Study procedures

- Measure a representative control group of logs
- Process them in the mill
- Measure output, accounting for volume and value
- Typically two variations:
 - Batch Test
 - Gorilla test



Batch test

- Logs are processed in a group or groups of logs
- Works well when not too many variables need to be accounted for, e.g., if more than 10 groups, probably better to use gorilla test
- Output in products is reconciled to the batch(s)
- Pro: Simple to account for and insure its integrity in the mill
- Con: May require clearing of the mill, one mistake can ruin the test, lower level of detail and more easily biased



Batch test procedures

- Select a representative sample for the group(s) and one may need to buck logs into mill processed lengths ahead of sorting and scaling (use actual taper not standard in R1)
- If more than one group, best to color code the log ends with a spray paint color that is identifiable from other colors
- Scale the logs and record volume and any other attributes
- Insure that the integrity of the log group(s) is protected



Batch test procedures (cont.)

- Before the test, empty chip and sawdust bins so total wet and dry weights can be established
- As each batch is run through the mill, paint all the lumber or veneer stack the color of batch
- You may want to clear the mill before running the next group



Batch test procedures (cont.)

- Communicate with the Hyster driver on the green end (tests are lost at this point)
- Stack kiln carts properly; not in jags. If veneer, insure that batches can be separated out of dryer (mark last sheet)
- Insure integrity of each batch in planning mill
- Talley finished product for each batch and get wet and dry weights of shavings and chipped off-cuts



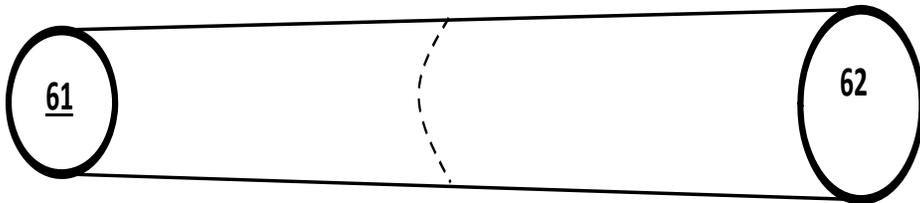
Gorilla test

- Logs are processed continuously
- Works well when many variables need to be accounted for (diameter, grade, length, etc.)
- Output in products is reconciled to each individual log
- Pro: Thorough understanding of output by log attribute; mistakes are not likely to compromise the whole test. The test logs as a group do not need to have a representative distribution of attributes
- Con: More complex to conduct, process and analyse the data from the test



Gorilla test procedures: log yard

- Select logs with enough representation of attributes (normally 175 to 300 logs will suffice).
- No need to buck logs prior to the test; tag each log end with one number for one segment logs, two numbers for two segment logs, odd top, even big-end
- Scale logs with tag number matching log scale and grade information



The screenshot shows a Microsoft Excel spreadsheet with the following data:

MILL	YARD	SMALL	LARGE	BF	BF	CF	CF	GRADE		
LOG #	LOG #	LNTH.	DIAM.	DIAM.	GROSS	NET	GROSS	NET		
212	205	211	16	10	11	6	6	9.6	9.6	3
213	206	212	16	11	12	7	7	11.6	11.6	3
214	207	250	16	15	16	14	14	21.0	21.0	2
215	208	249	18	12	15	8	8	18.1	18.1	3
216	209	248	16	12	13	8	6	13.7	11.1	2
217	210	247	16	12	12	8	8	12.6	12.6	3
218	211	193	16	9	10	4	4	7.9	7.9	3
219	212	194	16	10	11	6	5	9.6	9.0	3
220	213	217	16	10	12	6	6	10.6	10.6	3

Gorilla test procedures: mill

- Record the order of each log segment going into the mill, e.g., log 1 is tag number 194
- Record the mid-point diameter if two segment and correct assumed log segment length if bucked differently (if a third segment is cut, scale and record sawing order)
- Paint the log ends a color that corresponds with the sawing order: 1 red, 2 blue, 3 green, 4 yellow, 5 black, 6 red, 7 blue, 8 green, 9 yellow, 10 black...and so on.

Mill	Log #	LN	Mid	Notes
1	41	12	18	
2	132	20	15	
3	12	16	21	
4	19	20	15	
5	18	20	15	
6	12	12	18	} 40 cut into 3 seg
7	12a	12	17	
8	11	16	17	



Gorilla test procedures (cont.)

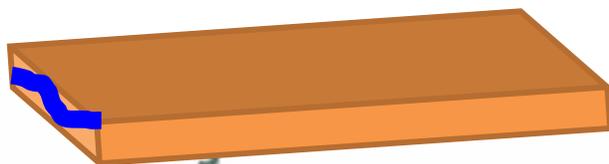
- Equip personal with appropriate lumber crayon and color coded check-off chart and clearly mark each board with the sawing order number.
- All boards and cants need to be clearly marked (underline numbers which can be read upside down)
- If two breakdowns in mill, only run one at a time (e.g., canter and headrig).
- If confusion; stop the process until logic is restored.
- Insure integrity of green product and stack properly in dry kiln
- Get the green and dry weight of chips and sawdust (consider hog fuel)

1	52	102	152	202
2	53	103	153	203
3	54	104	154	204
4	55	105	155	205
5	56	106	156	206
6	57	107	157	207
7	58	108	158	208
8	59	109	159	209
9	60	110	160	210
10	61	111	161	211
11	62	112	162	212
12	63	113	163	213
13	64	114	164	214
14	65	115	165	215
15	66	116	166	216



Gorilla test in planer mill

- Equip staff recording with product specific chart (e.g., 2x12; 2x10; etc.) corresponding to planning order for recording
- Record board number into planer (1 person); record length (1 person) and grade (1 person) coming out; if cut-in-two solution record each length and grade
- Mark every 10th or 20th board on the end so that people who are recording know if there is a problem



Arden 10-2-12		Product: 2 x 12				Log #			
1	122	51	147	101	146	151	20	151	234
2	122	52	151	102	197	152	23	152	221
3	131	53	175	103	131	153	161	153	102
4	19	54	194	104	209	154	175	154	10
5	33	55	98	105	206	155	221	155	87
6	33	56	9	106	8	156	10	156	156
7	43	57	71	107	240	157	218		
8	43	58	17	108	24				
9	43	59							

Arden 10-2-12		Product: 2 x 12				Length			
1	16	51	20	101	18	151	12	151	18
2	16	52	12	102	16	152	12	152	12
3	10/10	53	12	103	16	153	16	153	16
4	18	54	16	104	10	154	18	154	18
5	8/12	55	18	105	20	155	16	155	16
6	20	56	16	106	20	156	16	156	10
7	12	57	16	107	20	157	10	157	10
8	12	58	10	108	10/10	158	16	158	20
9	16	59							

Arden 10-2-12		Product: 2 x 12				Grade			
1	2	51	2	101	2	151	DSS	151	2
2	SS	52	2	102	2	152	DSS	152	2
3	2/3	53	2	103	2	153	DSS	153	2
4	4	54	2	104	2	154	2	154	2
5	DSS	55	2	105	2	155	2	155	2
6	2	56	2	106	2	156	2	156	2
7	2	57	2	107	2	157	4	157	4
8	2	58	4	108	4/2	158	2	158	2
9	2	59	2	109	2	159	2	159	3
10	2	60	2	110	2	160	3	160	2
11	4/2	61	DSS	111	2	161	2	161	DSS/2



Gorilla test data processing

- Enter each board into a spreadsheet by product dimension, by sawmill number, length, grade and calculate volume and value
- Match the log data from the tagged logs to the sawing order number with the sawing order becoming the new log number.
- Match the lumber data with the log data using the sawing order number
- The matching process is easiest with a database program or with Excel using the pivot table and lookup or match functions.
- Produce the semi-finished report showing the attributes that you want to view



Gorilla test data processing (cont.)

- Calculate theoretical chip yield in solid wood equivalent (SWE) per log (the following procedure is just one method that could be used):
 1. *Cubic content of log – cubic content of lumber as calculated from finished lumber but with green target sizes plus average sawkerf, e.g., log 1, 9.6 ft³ gross log volume - 5.0 ft³ lumber & sawkerf = 4.6 ft³ solid wood chipped (theoretically)*
 2. *Distribute total actual chips produced by dividing the theoretical SWE of chips from each log by the sum of all logs and multiplying this figure by the actual quantity.*
- Calculate theoretical shavings yield per log with the following formula: *cubic volume of lumber as calculated by rough & dry size – cubic volume of lumber as calculated by finished sizes and repeat step 2 (applied to shavings vol.) above to actualize the number.*
- Calculate theoretical sawdust volume: *log volume – theoretical lumber volume – theoretical chip volume – theoretical shavings volume and repeat step 2 (applied to sawdust vol.) above to actualize the number*



Example of 2 x 4 sizes for residue calculation



Finished 1.5 x 3.5



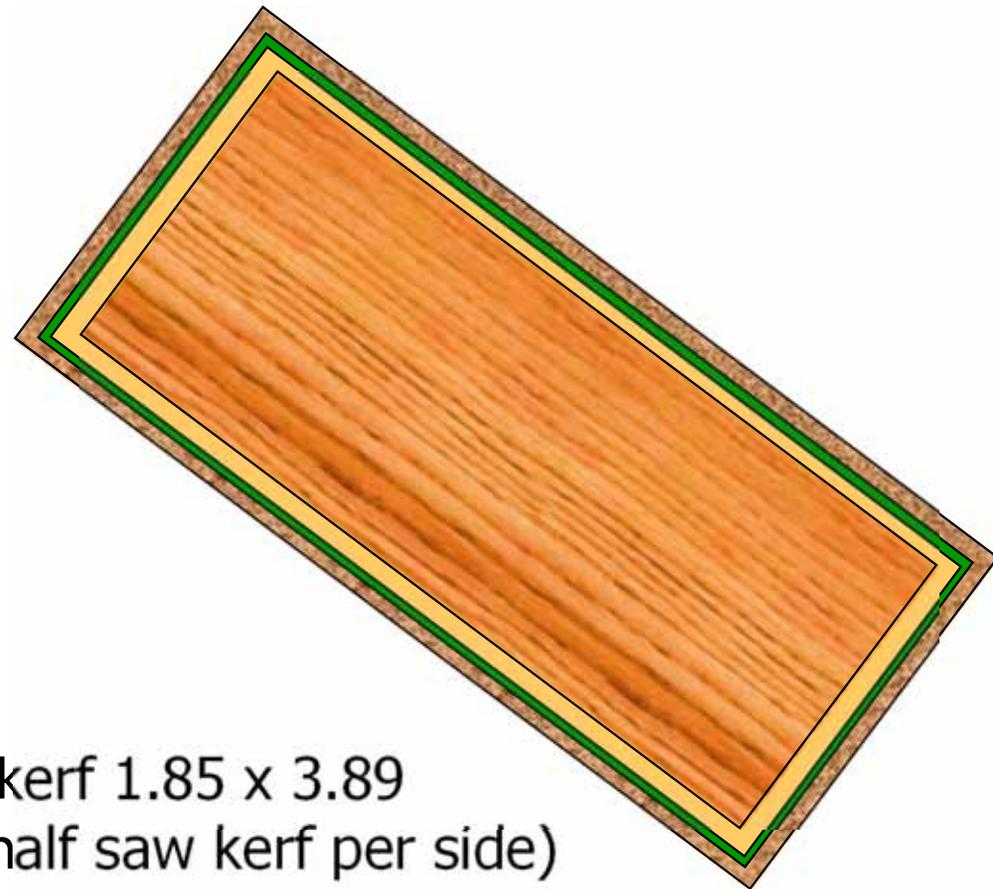
Rough Dry 1.64 x 3.6



Rough Green 1.7 x 3.74



Rough Green with saw kerf 1.85 x 3.89
(assumes 0.15" kerf; half saw kerf per side)



*note: chipping heads will reduce sawdust yield; fines will increase sawdust yield

Gorilla test log by log detail

LOG GRADE	LOG TOP DIA	LOG BUTT DIA	GROSS SCRIBNER LOG SCALE	DEFECT SCRIBNER LOG SCALE	NET SCRIBNER LOG SCALE	GROSS CUBIC LOG SCALE	DEFECT CUBIC LOG SCALE	NET CUBIC LOG SCALE	BOARD THICK	BOARD WIDTH	BOARD LENGTH	BOARD GRADE	LUMBER BOARD FOOT VOLUME	LUMBER VALUE	LUMBER CUBIC VOLUME
** LOGNUMBER 237															
3	11	13	0.07	0.00	0.07	12.7	0.0	12.7	1.00	6.00	14	3	7.0	\$4.52	0.0
									1.00	6.00	16	3	8.0	\$5.16	0.0
									1.00	6.00	8	3	4.0	\$2.58	0.0
									1.00	6.00	6	4	3.0	\$0.50	0.0
									1.00	6.00	10	3	5.0	\$3.23	0.0
									1.00	8.00	12	3	8.0	\$5.16	0.0
									1.00	8.00	16	3	10.7	\$6.90	0.0
									1.00	8.00	16	3	10.7	\$6.90	0.0
									1.00	8.00	14	3	9.3	\$6.00	0.0
									1.00	8.00	12	3	8.0	\$5.16	0.0
** Subtotal **													73.7	\$46.11	0.0
** LOGNUMBER 238															
3	13	15	0.10	0.00	0.07	17.2	0.0	12.9	1.00	4.00	12	3	4.0	\$2.58	0.0
									1.00	4.00	6	3	2.0	\$1.29	0.0
									1.00	4.00	6	3	2.0	\$1.29	0.0
									1.00	4.00	6	4	2.0	\$0.34	0.0
									1.00	6.00	16	3	8.0	\$5.16	0.0
									1.00	6.00	16	4	8.0	\$1.34	0.0
									1.00	6.00	8	3	4.0	\$2.58	0.0
									1.00	6.00	8	3	4.0	\$2.58	0.0
									1.00	8.00	16	3	10.7	\$6.90	0.0
									1.00	8.00	12	3	8.0	\$5.16	0.0
									1.00	8.00	16	3	10.7	\$6.90	0.0
									1.00	8.00	14	3	9.3	\$6.00	0.0
									1.00	8.00	12	3	8.0	\$5.16	0.0
									1.00	10.00	16	4	13.3	\$4.12	0.0
									1.00	10.00	10	3	8.3	\$6.96	0.0
** Subtotal **													102.3	\$58.36	0.0
** LOGNUMBER 239															
3	11	13	0.07	0.00	0.05	12.7	0.0	11.4	1.00	4.00	6	3	2.0	\$1.29	0.0
									1.00	4.00	10	4	3.3	\$0.55	0.0
									1.00	4.00	8	3	2.7	\$1.74	0.0
									1.00	4.00	6	3	2.0	\$1.29	0.0
									1.00	6.00	10	3	5.0	\$3.23	0.0
									1.00	6.00	8	3	4.0	\$2.58	0.0
									1.00	8.00	14	4	9.3	\$1.56	0.0
									1.00	8.00	8	3	5.3	\$3.42	0.0
									1.00	10.00	14	4	11.7	\$3.63	0.0
									1.00	10.00	16	4	13.3	\$4.12	0.0
									1.00	10.00	12	3	10.0	\$8.39	0.0
									1.00	10.00	14	4	11.7	\$3.63	0.0
									1.00	10.00	8	3	6.7	\$5.62	0.0
									1.00	10.00	8	4	6.7	\$2.08	0.0
** Subtotal **													93.7	\$43.13	0.0



Gorilla test diameter summary

LOG #	LOG GRD	DIAM SM LG	GROSS SCRIB	NET SCRIB	% DEF	BF LBR	BF RECOV	AVE SALES PRICE	LBR REVENU \$/MBF LOG SCALE	GROSS CUBIC LOG	NET CUBIC LOG	FINISH CUBIC LUMBER	GREEN CUBIC LUMBER	CUBIC RECOV	LOG VALUE \$/100 CU FT LMB SCALE	LOG VALUE \$/100 CU FT LOG SCALE	LRF
101	3	9 10	40	40	0%	38.7	0.97	\$645	\$624	7.9	7.9	0.0	0.0	0%	\$*,***	\$316	4.90
87	3	9 10	40	40	0%	45.7	1.14	\$586	\$669	7.9	7.9	0.0	0.0	0%	\$*,***	\$339	5.78
189	3	9 10	40	40	0%	53.6	1.34	\$487	\$652	7.9	7.9	0.0	0.0	0%	\$*,***	\$330	6.78
122	3	9 10	40	40	0%	58.0	1.45	\$646	\$936	7.9	7.9	0.0	0.0	0%	\$*,***	\$474	7.34
22	3	9 10	40	30	25%	44.3	1.48	\$443	\$654	7.9	7.4	0.0	0.0	0%	\$*,***	\$265	5.99
164	3	9 10	40	40	0%	59.9	1.50	\$613	\$919	7.9	7.9	0.0	0.0	0%	\$*,***	\$465	7.58
6	3	9 11	40	40	0%	63.3	1.58	\$610	\$966	8.8	8.8	0.0	0.0	0%	\$*,***	\$439	7.19
171	3	9 11	40	30	25%	47.7	1.59	\$625	\$994	8.8	7.2	0.0	0.0	0%	\$*,***	\$414	6.63
14	3	9 11	40	40	0%	66.4	1.66	\$645	\$1,071	8.8	8.8	0.0	0.0	0%	\$*,***	\$487	7.55
46	3	9 10	40	40	0%	66.6	1.67	\$645	\$1,074	7.9	7.9	0.0	0.0	0%	\$*,***	\$544	8.43
110	3	9 12	40	40	0%	66.7	1.67	\$568	\$948	9.8	9.8	0.0	0.0	0%	\$*,***	\$387	6.81
109	3	9 11	40	40	0%	69.1	1.73	\$571	\$987	8.8	8.8	0.0	0.0	0%	\$*,***	\$449	7.85
142	3	9 10	30	30	0%	51.9	1.73	\$645	\$1,116	6.9	6.9	0.0	0.0	0%	\$*,***	\$485	7.52
194	3	9 11	40	30	25%	52.4	1.75	\$661	\$1,154	8.8	8.4	0.0	0.0	0%	\$*,***	\$412	6.24
94	3	9 11	30	30	0%	52.8	1.76	\$645	\$1,135	6.6	6.6	0.0	0.0	0%	\$*,***	\$516	8.00
240	3	9 11	40	40	0%	70.7	1.77	\$629	\$1,112	8.8	8.8	0.0	0.0	0%	\$*,***	\$505	8.03
143	3	9 11	30	30	0%	55.1	1.84	\$604	\$1,110	6.6	6.6	0.0	0.0	0%	\$*,***	\$505	8.35
7	3	9 12	40	40	0%	74.7	1.87	\$645	\$1,205	9.8	9.7	0.0	0.0	0%	\$*,***	\$497	7.70
51	3	9 11	40	30	25%	57.3	1.91	\$533	\$1,018	8.8	8.3	0.0	0.0	0%	\$*,***	\$368	6.90
43	3	9 11	40	30	25%	58.0	1.93	\$601	\$1,163	8.8	7.7	0.0	0.0	0%	\$*,***	\$453	7.53
184	3	9 11	40	30	25%	58.9	1.96	\$626	\$1,229	8.8	7.2	0.0	0.0	0%	\$*,***	\$512	8.18
30	3	9 11	40	40	0%	80.7	2.02	\$652	\$1,316	8.8	8.8	0.0	0.0	0%	\$*,***	\$598	9.17
16	3	9 10	40	30	25%	64.4	2.15	\$645	\$1,385	7.9	7.4	0.0	0.0	0%	\$*,***	\$562	8.70
203	3	9 12	40	40	0%	85.8	2.15	\$634	\$1,360	9.8	9.8	0.0	0.0	0%	\$*,***	\$555	8.76
173	3	9 11	40	30	25%	65.0	2.17	\$567	\$1,228	8.8	8.3	0.0	0.0	0%	\$*,***	\$444	7.83
107	3	9 10	40	30	25%	66.0	2.20	\$568	\$1,249	7.9	7.4	0.0	0.0	0%	\$*,***	\$506	8.92
119	3	9 11	40	30	25%	66.7	2.22	\$645	\$1,434	8.8	8.3	0.0	0.0	0%	\$*,***	\$518	8.04
31	3	9 11	40	30	25%	68.7	2.29	\$645	\$1,477	8.8	8.3	0.0	0.0	0%	\$*,***	\$534	8.28
132	3	9 12	40	30	25%	72.7	2.42	\$520	\$1,260	9.8	9.2	0.0	0.0	0%	\$*,***	\$411	7.90
202	3	9 10	40	30	25%	75.1	2.50	\$654	\$1,636	7.9	7.4	0.0	0.0	0%	\$*,***	\$663	10.15
85	4	9 11	30	20	33%	37.4	1.87	\$645	\$1,207	6.6	5.3	0.0	0.0	0%	\$*,***	\$455	7.06
200	4	9 11	20	10	50%	32.7	3.27	\$529	\$1,730	5.5	5.2	0.0	0.0	0%	\$*,***	\$333	6.29
105	4	9 12	40	20	50%	73.7	3.69	\$587	\$2,163	9.8	8.9	0.0	0.0	0%	\$*,***	\$486	8.28
84	4	9 11	30	10	67%	54.7	5.47	\$567	\$3,101	7.7	6.3	0.0	0.0	0%	\$*,***	\$492	8.68
176	9	9 10	40	0	100%	26.0	*. **	\$409	\$*,***	7.9	0.0	0.0	0.0	***%	\$*,***	\$*,***	**.**
#LOGS	35	9	1330	1100	17%	2081.4	1.89	\$604	\$1,143	290.2	269.0	0.0	0.0	0%	\$*,***	\$467	7.74



Gorilla test log grade summary

GRADE 3 LOGS CEDAR LOG STUDY

LOG DIAM	# LOGS	NET SCRIB	% DEF	BF LBR	BF RECOV	AVE SALES PRICE	RESID \$/MBF LBR SCL	MFG COST LBR SCL	RTL \$/MBF LOG SCL	RTL \$/100 CF LOG SCL	NET CUBIC LOG	FINISH CUBIC LUMBER	ROUGH CUBIC LUMBER	CUBIC RECOV	LRP
7	21	600	2%	827	1.38	\$635	\$*,***	\$241	\$543	\$293	111	0	0	0%	7.44
8	25	710	4%	1270	1.79	\$623	\$*,***	\$212	\$736	\$305	171	0	0	0%	7.41
9	30	1040	11%	1857	1.79	\$609	\$*,***	\$166	\$790	\$338	243	0	0	0%	7.63
10	36	1810	15%	2540	1.40	\$590	\$*,***	\$137	\$636	\$344	335	0	0	0%	7.59
11	25	1400	17%	2280	1.63	\$572	\$*,***	\$130	\$719	\$358	282	0	0	0%	8.10
12	18	1340	6%	1960	1.46	\$597	\$*,***	\$199	\$582	\$305	256	0	0	0%	7.67
13	15	1230	18%	1783	1.45	\$539	\$446	\$202	\$494	\$268	227	0	0	0%	7.86
14	12	1070	19%	1661	1.55	\$597	\$208	\$200	\$630	\$342	197	0	0	0%	8.42
15	6	730	13%	1047	1.43	\$551	\$174	\$196	\$517	\$286	132	0	0	0%	7.92
16	4	520	16%	674	1.30	\$573	\$168	\$198	\$491	\$275	93	0	0	0%	7.26
17	2	190	47%	318	1.67	\$506	\$318	\$196	\$521	\$205	48	0	0	0%	6.58
18	2	400	5%	509	1.27	\$590	\$254	\$203	\$495	\$311	64	0	0	0%	7.97
19	4	770	20%	893	1.16	\$472	\$223	\$198	\$323	\$209	119	0	0	0%	7.50
20	2	390	30%	376	0.96	\$586	\$188	\$184	\$389	\$244	62	0	0	0%	6.06
21	2	440	27%	656	1.49	\$494	\$328	\$194	\$451	\$293	68	0	0	0%	9.70
24	1	250	38%	354	1.42	\$330	\$354	\$186	\$206	\$145	36	0	0	0%	9.95
10.9	205	12890	16%	19001	1.47						2442	0	0		



Gorilla test grade matrix (basis for an RTL model)

Breakdown by Diameter Class

Lumber Breakdown of 18" Logs						BF=	508.7
Size	3COM	4COM	5COM	DSEL	RIP	Total	
1.00 X 4.00	3.5%	3.1%	1.0%			7.7%	
1.00 X 6.00	19.1%	3.5%				22.6%	
1.00 X 8.00	10.8%					10.8%	
1.00 X 10.00	6.2%					6.2%	
1.00 X 12.00	24.8%	26.7%		1.2%		52.7%	
	64.4 %	33.3%	1.0%	1.2%		100 %	

Lumber Breakdown of 19" Logs						BF=	892.7
Size	3COM	4COM	5COM	DSEL	RIP	Total	
1.00 X 4.00	2.8%	5.6%	0.4%	0.9%		9.6%	
1.00 X 6.00	7.4%	4.4%		1.3%	0.8%	13.9%	
1.00 X 8.00	4.8%	8.1%		2.3%	0.6%	15.7%	
1.00 X 10.00	2.6%	2.4%		1.1%		6.2%	
1.00 X 12.00	17.9%	35.0%			1.8%	54.7%	
	35.5 %	55.5%	0.4%	5.6%	3.2%	100 %	

Lumber Breakdown of 20" Logs						BF=	375.5
Size	3COM	4COM	5COM	DSEL	RIP	Total	
1.00 X 4.00	4.8%	14.3%	1.8%	3.7%		24.6%	
1.00 X 6.00	2.4%	10.4%		3.2%		16.0%	
1.00 X 8.00	9.6%	4.6%		2.8%		17.0%	
1.00 X 10.00	3.1%			6.2%		9.3%	
1.00 X 12.00	6.9%	20.8%		5.3%		33.0%	
	26.8 %	50.1%	1.8%	21.2%		100 %	



Test results to model breakeven log values

	Weighted All Species	5"	6"	7"	8"	9"	10"	11"	12"	13"	14"	15"	16"+
Cash RTL													
MBF Lodgepole Pine	\$ 480.37	\$ 266.87	\$ 445.07	\$ 458.65	\$ 625.97	\$ 561.99	\$ 483.43	\$ 524.57	\$ 536.55	\$ 585.58	\$ 474.54	\$ 650.82	\$ 633.74
MBF Ponderosa Pine	\$ 462.55	\$ 277.96	\$ 448.91	\$ 437.84	\$ 640.64	\$ 492.16	\$ 491.30	\$ 465.46	\$ 497.31	\$ 487.77	\$ 517.13	\$ 481.98	\$ 544.78
MBF Spruce	\$ 497.76	\$ 264.80	\$ 422.70	\$ 485.90	\$ 675.16	\$ 570.33	\$ 524.78	\$ 515.29	\$ 571.13	\$ 600.66	\$ 622.71	\$ 692.08	\$ 681.13
MBF Weighted All Species	\$ 466.45												
CCF Lodgepole Pine	\$ 255.75	\$ 165.76	\$ 209.94	\$ 253.40	\$ 281.97	\$ 275.48	\$ 277.83	\$ 296.37	\$ 308.36	\$ 352.95	\$ 289.35	\$ 425.37	\$ 426.28
CCF Ponderosa Pine	\$ 225.80	\$ 157.93	\$ 176.74	\$ 224.53	\$ 251.23	\$ 236.62	\$ 253.25	\$ 258.59	\$ 264.52	\$ 295.62	\$ 295.50	\$ 319.19	\$ 360.78
CCF Spruce	\$ 246.97	\$ 151.32	\$ 169.76	\$ 251.76	\$ 273.35	\$ 267.76	\$ 283.66	\$ 289.49	\$ 302.18	\$ 361.84	\$ 345.95	\$ 443.64	\$ 449.80
CCF Weighted All Species	\$ 234.53												
Ton Lodgepole Pine	\$ 84.10	\$ 50.31	\$ 64.01	\$ 79.19	\$ 90.23	\$ 90.62	\$ 93.70	\$ 103.62	\$ 112.34	\$ 128.58	\$ 105.41	\$ 154.96	\$ 155.29
Ton Ponderosa Pine	\$ 61.26	\$ 40.83	\$ 45.82	\$ 58.93	\$ 67.08	\$ 64.21	\$ 70.05	\$ 72.54	\$ 75.31	\$ 85.87	\$ 87.17	\$ 95.42	\$ 108.51
Ton Spruce	\$ 82.64	\$ 48.04	\$ 53.22	\$ 81.61	\$ 90.06	\$ 89.55	\$ 96.32	\$ 99.82	\$ 106.40	\$ 129.93	\$ 125.12	\$ 164.01	\$ 169.74
Ton Weighted All Species	\$ 68.43												
RTL W / D.D.A.													
MBF Lodgepole Pine	\$ 454.99	\$ 248.90	\$ 418.64	\$ 434.76	\$ 594.73	\$ 533.20	\$ 458.57	\$ 498.01	\$ 510.13	\$ 560.10	\$ 449.35	\$ 627.32	\$ 610.90
MBF Ponderosa Pine	\$ 436.40	\$ 259.09	\$ 420.87	\$ 413.11	\$ 607.85	\$ 464.30	\$ 464.96	\$ 439.74	\$ 469.44	\$ 463.02	\$ 489.93	\$ 458.52	\$ 521.32
MBF Spruce	\$ 470.62	\$ 245.27	\$ 394.01	\$ 459.70	\$ 640.75	\$ 539.90	\$ 498.01	\$ 488.90	\$ 543.11	\$ 576.05	\$ 595.71	\$ 668.68	\$ 658.14
MBF Weighted All Species	\$ 440.66												
CCF Lodgepole Pine	\$ 242.23	\$ 154.59	\$ 197.47	\$ 240.20	\$ 267.90	\$ 261.37	\$ 263.54	\$ 281.36	\$ 293.18	\$ 337.59	\$ 273.99	\$ 410.01	\$ 410.92
CCF Ponderosa Pine	\$ 213.02	\$ 147.21	\$ 165.70	\$ 211.85	\$ 238.37	\$ 223.22	\$ 239.67	\$ 244.30	\$ 249.70	\$ 280.62	\$ 279.96	\$ 303.65	\$ 345.24
CCF Spruce	\$ 233.58	\$ 140.15	\$ 158.24	\$ 238.19	\$ 259.41	\$ 253.47	\$ 269.20	\$ 274.67	\$ 287.36	\$ 347.02	\$ 330.95	\$ 428.64	\$ 434.62
CCF Weighted All Species	\$ 221.57												
Ton Lodgepole Pine	\$ 79.68	\$ 46.92	\$ 60.21	\$ 75.06	\$ 85.73	\$ 85.98	\$ 88.89	\$ 98.38	\$ 106.80	\$ 122.98	\$ 99.81	\$ 149.37	\$ 149.70
Ton Ponderosa Pine	\$ 57.81	\$ 38.06	\$ 42.95	\$ 55.60	\$ 63.65	\$ 60.58	\$ 66.30	\$ 68.53	\$ 71.09	\$ 81.52	\$ 82.58	\$ 90.78	\$ 103.83
Ton Spruce	\$ 78.19	\$ 44.49	\$ 49.60	\$ 77.21	\$ 85.47	\$ 84.77	\$ 91.41	\$ 94.71	\$ 101.18	\$ 124.60	\$ 119.69	\$ 158.46	\$ 164.01
Ton Weighted All Species	\$ 64.67												



Plywood mill breakeven model (veneer grade matrix)

Enter Plywood
Price for 1/2"
Panel 3/8" Basis

		A	B	CP	C	D	
AA	\$ 461.18	\$ 461.18					
AB	\$ 436.92	\$ 461.18	\$ 430.86				
AC	\$ 334.85	\$ 461.18			\$ 303.27		
BC	\$ 291.16		\$ 430.86		\$ 256.24		
CCPTS	\$ 320.60			\$ 478.32	\$ 281.17		
CCX	\$ 281.17				\$ 281.17		
CDX	\$ 220.11					\$ 204.85	Chips \$/BDU
Enter Veneer Price----->		\$ 461.18	\$ 430.86	\$ 478.32	\$ 280.60	\$ 204.85	\$ 55.58

	Grade	Diameter Group	A	B	CP	C	D	STRIP	FT
LARCH	1	16"+	44%	23%	5%	2%	8%	17%	1%
LARCH	2	16"+	3%	4%	3%	58%	18%	12%	2%
LARCH	2	12-15"	10%	24%	7%	15%	21%	22%	1%
LARCH	3	16"+	4%	10%	14%	17%	40%	11%	4%
LARCH	3	12-15"	1%	2%	4%	70%	14%	8%	1%
LARCH	3	8-11"	7%	17%	31%	18%	15%	10%	2%
LARCH	4	16"+	0%	0%	0%	1%	74%	15%	10%
LARCH	4	12-15"	0%	0%	0%	69%	23%	8%	0%
LARCH	4	8-11"	0%	0%	0%	42%	47%	9%	2%

	Grade	Diameter Group	A	B	CP	C	D	STRIP	FT
Doug Fir	1	16"+	8%	40%	19%	13%	2%	17%	1%
Doug Fir	2	16"+	0%	11%	1%	35%	27%	24%	2%
Doug Fir	2	12-15"	11%	28%	9%	23%	10%	16%	3%
Doug Fir	3	16"+	6%	19%	9%	26%	24%	14%	2%
Doug Fir	3	12-15"	0%	19%	11%	31%	23%	14%	2%
Doug Fir	3	8-11"	3%	9%	16%	42%	16%	11%	3%
Doug Fir	4	16"+	0%	0%	3%	10%	62%	21%	4%
Doug Fir	4	12-15"	0%	6%	21%	40%	21%	8%	4%
Doug Fir	4	8-11"	0%	0%	0%	42%	47%	9%	2%



Plywood RTL model results

Specie	Grade	Diameter		Weighted	CCF/MBF	Tons/CCF	Breakeven RTL			Cash RTL			Variable RTL		
		Group					\$/CCF	\$/MBF	\$/Ton	\$/CCF	\$/MBF	\$/Ton	\$/CCF	\$/MBF	\$/Ton
LARCH	1	16"+	2%	1.51	3.24	\$513.50	\$775.39	\$158.49	\$552.71	\$ 834.59	\$170.59	\$554.83	\$ 837.79	\$171.24	
LARCH	2	16"+	4%	1.51	3.24	\$281.13	\$424.50	\$ 86.77	\$319.25	\$ 482.07	\$ 98.53	\$321.31	\$ 485.18	\$ 99.17	
LARCH	2	12-15"	6%	1.69	3.26	\$368.91	\$623.45	\$113.16	\$407.75	\$ 689.10	\$125.08	\$409.85	\$ 692.65	\$125.72	
LARCH	3	16"+	12%	1.51	3.24	\$314.53	\$474.94	\$ 97.08	\$353.19	\$ 533.32	\$109.01	\$355.28	\$ 536.48	\$109.66	
LARCH	3	12-15"	22%	1.69	3.26	\$262.38	\$443.43	\$ 80.49	\$296.35	\$ 500.83	\$ 90.90	\$298.19	\$ 503.94	\$ 91.47	
LARCH	3	8-11"	47%	1.80	3.31	\$385.22	\$693.39	\$116.38	\$416.66	\$ 749.98	\$125.88	\$418.36	\$ 753.04	\$126.39	
LARCH	4	16"+	2%	1.51	3.24	\$133.08	\$200.96	\$ 41.08	\$164.34	\$ 248.15	\$ 50.72	\$166.03	\$ 250.71	\$ 51.24	
LARCH	4	12-15"	3%	1.69	3.26	\$239.13	\$404.13	\$ 73.35	\$275.26	\$ 465.19	\$ 84.44	\$277.22	\$ 468.50	\$ 85.04	
LARCH	4	8-11"	2%	1.80	3.31	\$179.76	\$323.58	\$ 54.31	\$209.94	\$ 377.89	\$ 63.42	\$211.57	\$ 380.82	\$ 63.92	
		Total	100%	1.71	3.28	\$333.60	\$569.76	\$101.69	\$367.44	\$ 627.55	\$112.01	\$369.27	\$ 630.68	\$112.57	
Specie	Grade	Diameter		Weighted	CCF/MBF	Tons/CCF	Breakeven RTL			Cash RTL			Variable RTL		
Doug Fir	1	16"+	1%	1.51	3.14	\$496.27	\$749.36	\$158.05	\$535.37	\$ 808.41	\$170.50	\$537.49	\$ 811.61	\$171.17	
Doug Fir	2	16"+	2%	1.51	3.14	\$263.08	\$397.25	\$ 83.78	\$303.88	\$ 458.85	\$ 96.78	\$306.08	\$ 462.18	\$ 97.48	
Doug Fir	2	12-15"	5%	1.69	3.23	\$389.90	\$658.94	\$120.71	\$426.00	\$ 719.94	\$131.89	\$427.95	\$ 723.24	\$132.49	
Doug Fir	3	16"+	5%	1.51	3.14	\$356.47	\$538.27	\$113.53	\$395.95	\$ 597.89	\$126.10	\$398.09	\$ 601.11	\$126.78	
Doug Fir	3	12-15"	20%	1.69	3.23	\$312.62	\$528.32	\$ 96.79	\$347.59	\$ 587.42	\$107.61	\$349.48	\$ 590.62	\$108.20	
Doug Fir	3	8-11"	65%	1.90	3.40	\$306.30	\$581.97	\$ 90.09	\$338.64	\$ 643.41	\$ 99.60	\$340.39	\$ 646.73	\$100.11	
Doug Fir	4	16"+	1%	1.51	3.14	\$148.85	\$224.76	\$ 47.40	\$177.61	\$ 268.19	\$ 56.56	\$179.17	\$ 270.54	\$ 57.06	
Doug Fir	4	12-15"	0.9%	1.69	3.23	\$314.57	\$531.62	\$ 97.39	\$348.59	\$ 589.12	\$107.92	\$350.43	\$ 592.23	\$108.49	
Doug Fir	4	8-11"	0.1%	1.90	3.40	\$182.23	\$346.24	\$ 53.60	\$213.63	\$ 405.89	\$ 62.83	\$215.33	\$ 409.12	\$ 63.33	
		Total	100%	1.81	3.33	\$313.66	\$567.89	\$ 94.12	\$347.29	\$ 628.77	\$104.21	\$351.71	\$ 636.77	\$105.54	



Thank you for your attention!



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