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NEW VALUE FOR A CHANGING MARKETPLACE



Suitability of Changbai Larch Plantation for LVL Products

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Outline

- Key objective
- Changbai larch tree sampling and veneer processing
- Benchmarking larch veneer
- Property correlation between larch LVL and veneer
- Suitability of Changbai larch for LVL

Background

- ✓ Basic characteristics of Changbai larch (*Larix olgebsis* Henry)
- ✓ Commonly used in lumber and pulping
- ✓ Virtually no veneer research has been reported

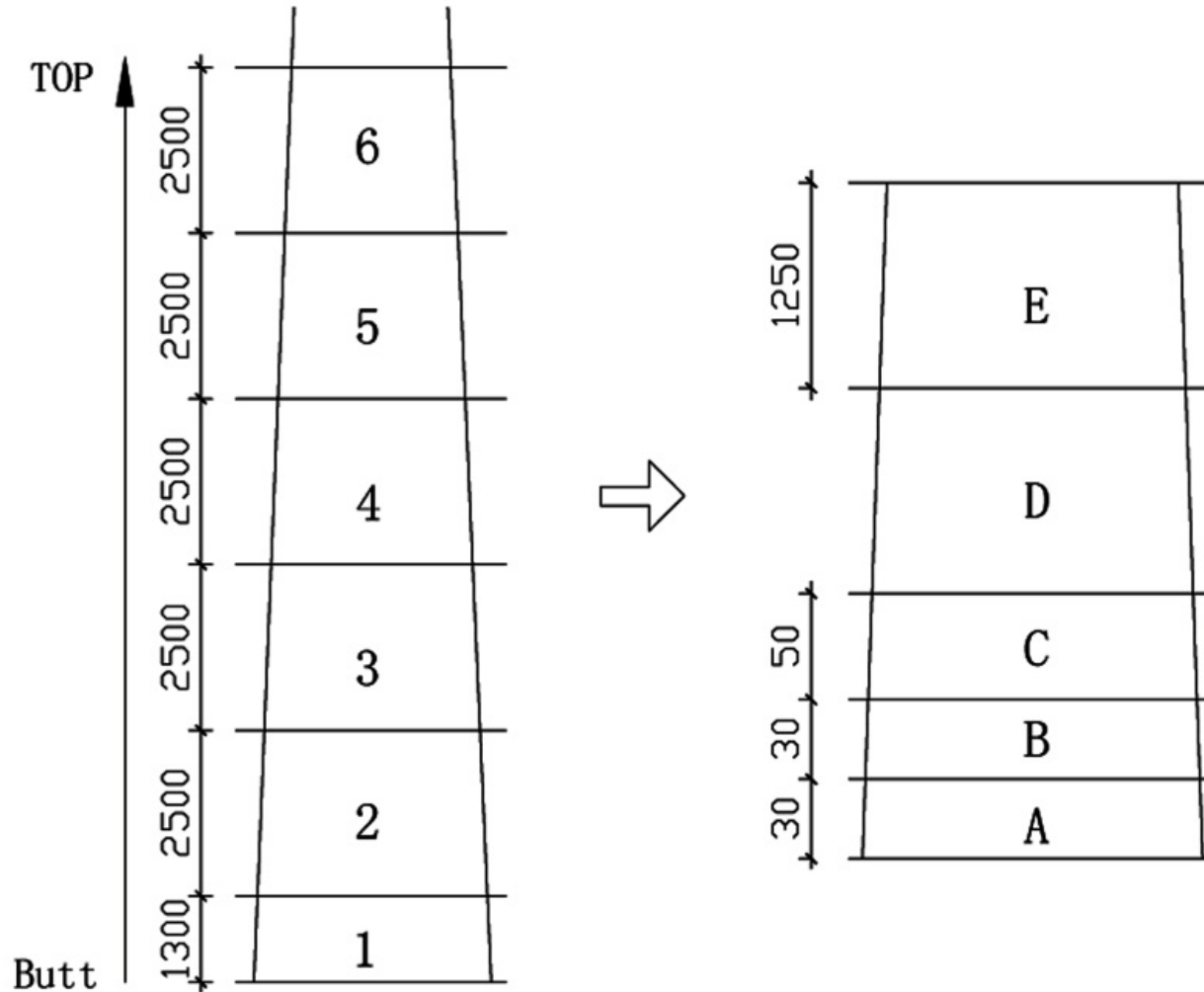
Key Objective

To investigate the suitability of Changbai larch plantation for LVL products

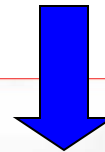
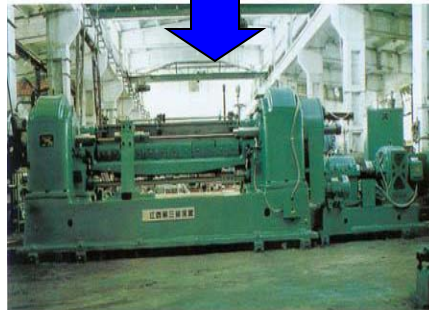
Larch Tree Sampling

Stand no.	Initial density (trees/ha.)	Final density (trees/ha.)	Site index		Mean DBH (cm)	Number of trees
			Age (year)	Mean tree height (m)		
1	3000	580	46	21.8 (1.59)*	24.5 (5.58)	1-9
2	4000	487	53	21.5 (1.06)	23.2 (4.54)	10-18
3	5000	305	53	22.3 (1.05)	25.0 (3.64)	19-27
4	6000	200	49	22.0 (1.03)	26.8 (4.80)	28-36

Larch Tree Cutting



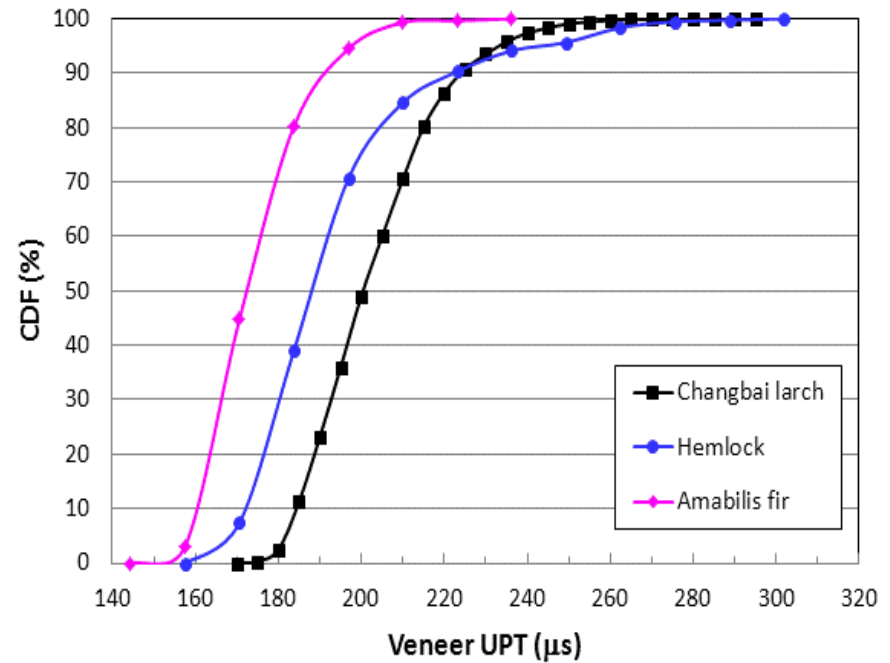
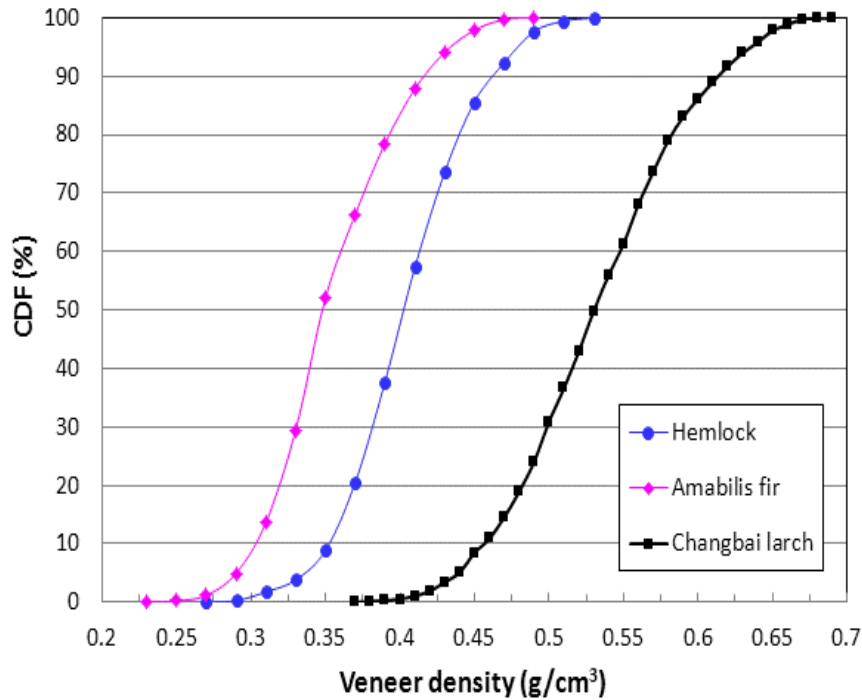
Larch Veneer Processing



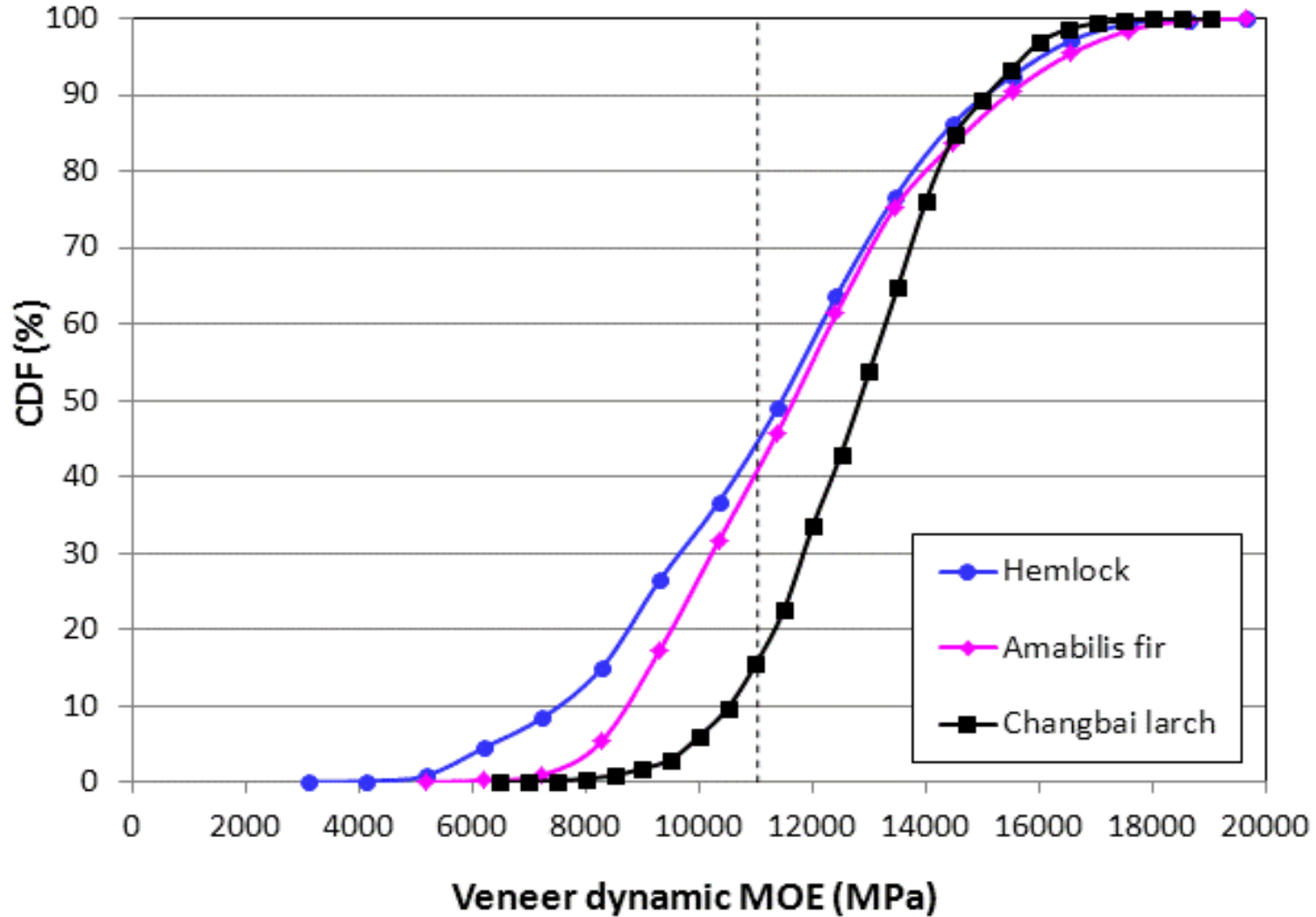
Properties of Larch Veneer

Stand no.	No. of sheets	Density (g/cm ³)		UPT (μs)		MOE (GPa)	
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
1	517	0.539	0.046	200.9	15.9	13.1	1.7
2	490	0.535	0.061	203.6	14.3	12.8	1.7
3	619	0.523	0.543	202.9	15.3	12.7	1.7
4	665	0.520	0.631	204.1	15.1	12.4	1.6

Benchmarking Larch Veneer



Benchmarking Larch Veneer



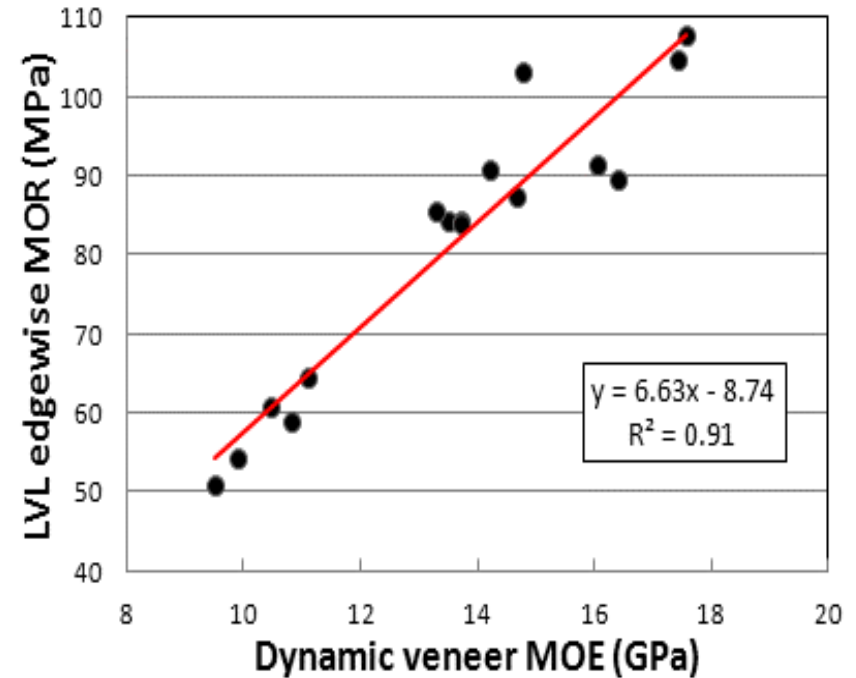
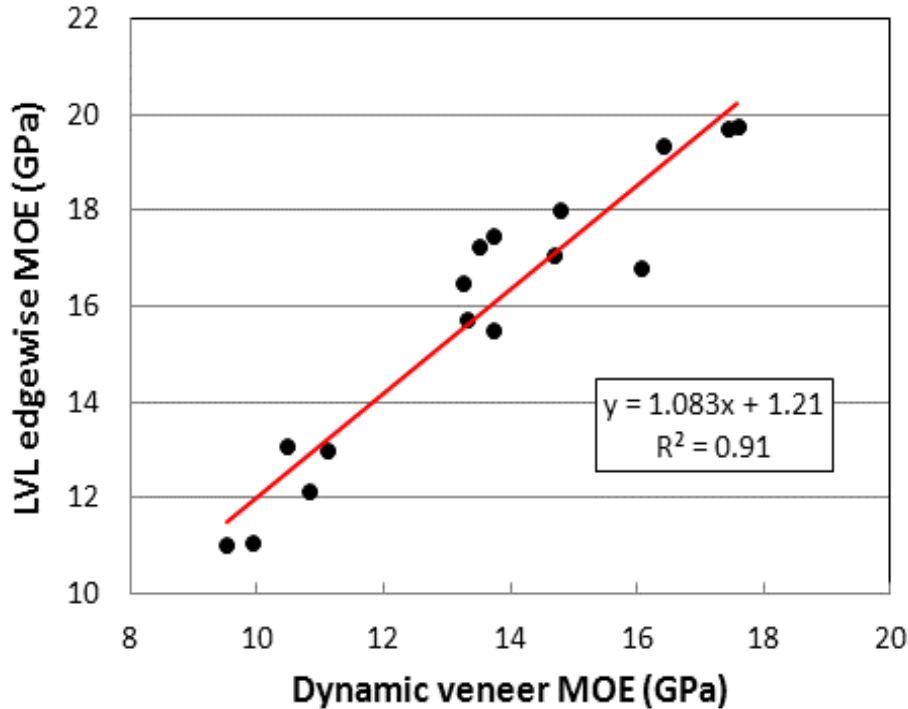
Larch Veneer Grading for LVL

Veneer E grade	MOE threshold (GPa)	Sheet #	Dynamic MOE (GPa)		UPT (μ s)		Density (g/cm ³)	
			Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
E1	>14	545	15.86	0.65	191.0	9.3	0.59	0.04
E2	12-14	1023	13.37	0.79	199.0	11.7	0.54	0.05
E3	10-12	628	11.21	0.54	210.5	15.1	0.50	0.06
E4	<10	95	9.22	0.74	226.8	17.3	0.47	0.05
Popula -tion	Unsorted	2291	12.79	1.75	203.4	16.0	0.53	0.06

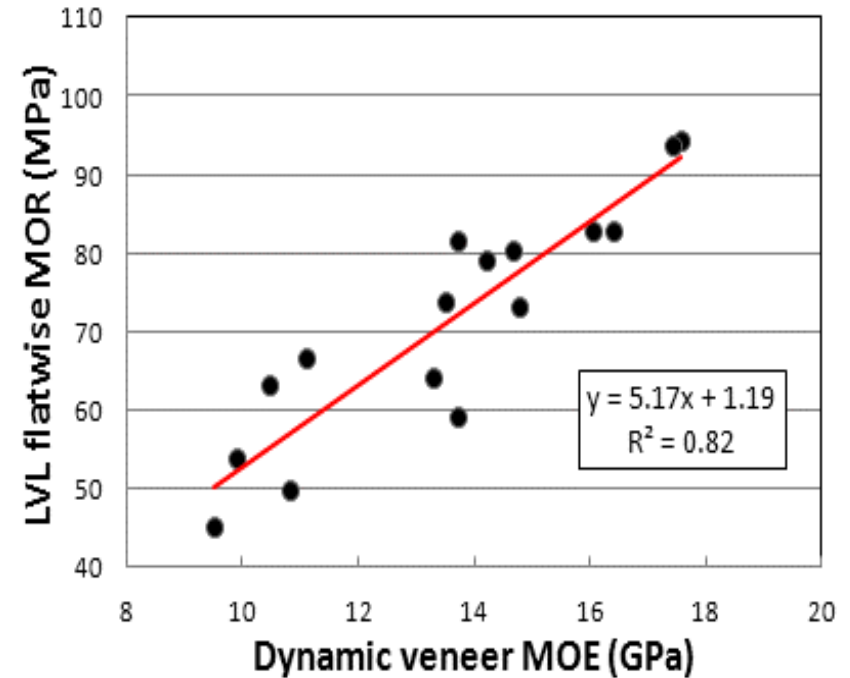
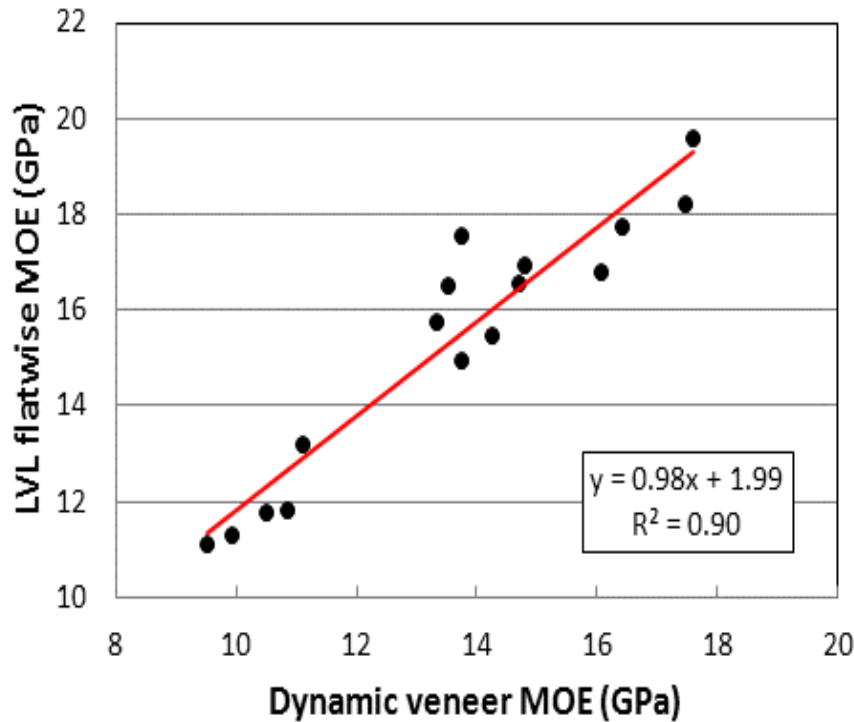
Properties of Larch LVL

Veneer E grade	Veneer MOE (GPa)		LVL MOE (GPa)				LVL MOR (MPa)			
			Edgewise		Flatwise		Edgewise		Flatwise	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
E1	15.79	0.53	19.53	0.75	18.35	0.98	98.27	9.51	90.88	8.25
E2	13.41	0.30	16.79	0.81	16.36	1.04	86.00	6.76	75.81	11.70
E3	11.01	0.35	12.86	0.64	12.29	0.72	61.28	5.23	61.53	7.52
E4	9.15	0.64	10.96	0.34	11.02	0.52	53.06	4.32	48.57	4.99
Total	12.34	2.55	15.73	3.20	15.10	2.91	79.68	18.99	70.97	17.04

Property Correlation between Larch LVL and Veneer (Edgewise)



Property Correlation between Larch LVL and Veneer (Flatwise)



Suitability of Changbai Larch for LVL

- ✓ A significant variation exists in Changbai larch veneer properties within each of 4 stands, veneer stress grading is thus required
- ✓ Comparing with Canadian hem-fir (68 yrs), this larch has significantly higher veneer density and UPT, and also higher veneer MOE
- ✓ Of all larch veneers, about 85% is suitable for manufacturing 1.8E or higher grade commercial LVL
- ✓ A high correlation exists between larch LVL MOE/MOR and veneer MOE for both edgewise and flatwise bending applications

Thank you! Any Questions?



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