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EFFECT OF HIGH TEMPERATURE DRYING ON BOW AND SPRING IN REGROWTH JARRAH

W.R. Hanks

May 1989
W.U.R.C. Technical Report
Limited Distribution

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SUMMARY

Bow and spring were assessed in 386 pieces of 50 mm thick regrowth jarrah (*Eucalyptus marginata* Donn ex Sm.) before and after high temperature seasoning. The timber was dried from a mean of 16.3 per cent to a mean of 8.0 per cent. The results showed a decrease in bow of 0.9 mm which was statistically significant at $p < 0.001$, and a non-significant increase in spring of 0.2 mm. These results indicated that high temperature drying does not have an adverse effect on these properties.

INTRODUCTION

As the state of timber-drying technology advances, more timber is being dried to equilibrium moisture content (E.M.C.) or below, using high temperature ($100^{\circ}C+$) kilns.

When high-temperature drying pine, weights are applied to the stack of timber to minimize warping and to give a more stable end product. Weight restraint is effective for softwoods because at high moisture contents the lignin starts to soften above $72^{\circ}C$ (Hillis 1975).

Because of its effect on lignin, high temperature drying may reduce the high levels of distortion that are generally encountered with sawn regrowth eucalypt timber. This report describes a trial which assessed the effect of high temperature drying on bow and spring in sawn timber of regrowth jarrah (*Eucalyptus marginata* Donn ex Sm.).

METHODS

Regrowth jarrah logs from Inglehope Block near Dwellingup and Kent Block near Harvey were cut into 50 mm thick timber. The widths varied from 50 to 150 mm nominal and the lengths from 1.2 to 2.2 m.

This timber was seasoned to below fibre saturation point in a progressive tunnel kiln and then air dried for two to three months. It was then restacked into bundles of 1.5 m wide x 1.0 m high x 2.4 m long, suitable for the commercial high temperature kiln. The bundles were strapped and restrained with half-weights (with a restraining weight of 535.7 kg/m^2) before being dried in the kiln using the schedules shown in Tables 1 and 2.

Three hundred and eighty six boards were measured for bow and spring before and after kilning, using a straight-edge and steel rule. The data were compared using a standard t-test.

RESULTS AND DISCUSSION

The results of bow and spring measurements before and after high temperature kilning were:

Pre HT Kilning

	Bow	Spring
Mean (mm/m)	3.2	1.6
S.D. (mm/m)	2.4	1.2

Post HT Kilning

	Bow	Spring
Mean (mm/m)	2.3	1.8
S.D. (mm/m)	1.4	1.5

The standard t-test on the data gave the following results:

	Bow	Spring
Mean	0.91	-0.14
S.D	2.91	1.86
t	6.15	1.53
Prob|t|	0.0001	0.1278

The data showed a mean decrease in bow of 0.9 mm, which was statistically significant at $p < 0.001$, while mean spring showed a non-significant increase of 0.2 mm. The standard deviation for bow values decreased considerably, while that for spring increased. This tendency may be explained by the fact that the restraining weights are placed on the faces of the boards, thus acting through the plane in which bow occurs. The only restraint on the spring plane was that of the straps on the bundle which should act to prevent increased spring rather than decreasing the spring.

In summary, the results suggested that high temperature kiln drying does not adversely affect bow and spring deflection in 50 mm regrowth jarrah timber.

REFERENCE

HILLIS, W.E. (1975). The role of wood characteristics in high temperature drying. Journal of the Institute of Wood Science 7(2): 60-67.

Table 1. Schedule for drying a commercial high temperature kiln charge of 50 mm regrowth jarrah.

Time	Comments	Vents (°C)	DBT (°C)	oWBT %	RH	Wood Temp (°C)
16/12/87						
0800	kiln on	shut	25			
0900	charge in kiln	"	60	40	33	40
1245	vents open	1/8	115	75	23	110
1300		"	115	68	18	110
1500		"	115	58	11	110
1530	water spray on	shut	118	58	11	105
1600	"	"	118	75	21	108
1630	"	"	118	85	32	110
1700	water spray off	"	115	80	28	110
2230	kiln off	"	94	60	25	95
17/12/87						
0730	monitor	shut	60	40	33	50
0830	kiln on					
1000		"	100	58	18	95
1030	water spray on	"				
1100		"	103	86	53	95
1130	water spray off	"				
1200		"	115	78	26	110
1400		"	115	70	18	110
1430	kiln off fans on water spray on					
1500		"	100	85	57	105
1600	fans off water spray off	"	95	86	70	100
18/12/87						
0800	monitor		75	50	32	75

Table 2. Schedule for reconditioning in a commercial high temperature kiln charge of 50 mm regrowth jarrah

Time	Comments	Wood Temp (^{o}C)
18/12/87		
900	steam on	25
1000		82
1100		92
1200		97
1500	steam off	98
1600		80
1800		68
2400		60