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Solar Timber Seasoning Kiln of 15 Cubic Metre Capacity

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The design and performance of a solar timber seasoning kiln with the capacity to season 15 cu m timber per batch are described. The cost of construction of the kiln is much less compared to that of a conventional kiln. It takes much less time to season various kinds of timbers in comparison to air seasoning.

Research and developmental work on solar timber seasoning kiln carried out at the Central Building Research Institute, Roorkee, has been reported earlier[1-4]. Keeping in view the huge demand for seasoned wood, need was felt to design a higher capacity kiln than the prototype built in the Institute. Consequently, a kiln-having capacity to season 15 cu m wood at a time was designed. M/s Intop Seasoners, Hardwar constructed this kiln at their works. This paper gives the details of the design and performance of the kiln and data on seasoning collected in collaboration with the Institute from time to time.

Design of the kiln

The kiln consists of a double walled chamber having 21.6 sq m floor area, with transparent glass, except in the north wall which is of brick masonry (Fig. 1). Black painted aluminium fins (5 × 12.5 cm) of 24 SWG are fitted inside the glass walls at an angle of 45°. The roof is made of black painted corrugated G I sheet and has a slope of 27°.

Two black painted G I sheets of 22 SWG, each of 7.2 sq m area are used as solar energy collectors. With the help of a wooden frame, transparent glass sheets are fitted around the collectors having an air gap of 5 cm for the movement of fresh air. One collector is attached to the bottom of the south wall and the other to the west wall at an angle of 45°.

To provide stack effect inside the seasoning chamber, a chimney (30 × 30 × 180 cm) is fixed vertically at a hole provided in the roof of the seasoning chamber.

Performance of the kiln

The performance of the kiln was studied by seasoning *sheesham* (*Dalbergia sissoo*), teak (*Tectona grandis*) and *deodar* (*Cedrus deodara*) (Fig. 2) in the form of planks of size 30 × 15 × 5.0 cm. The initial moisture content of the three woods was 25, 18 and 15% respectively. In these experiments, the results of solar seasoning were compared with those of usual air seasoning of the same woods done simultaneously under a shed. The experiments were carried out during February-March 1980.

Sheesham wood, which is refractory in nature[5], took more time to season in comparison to other

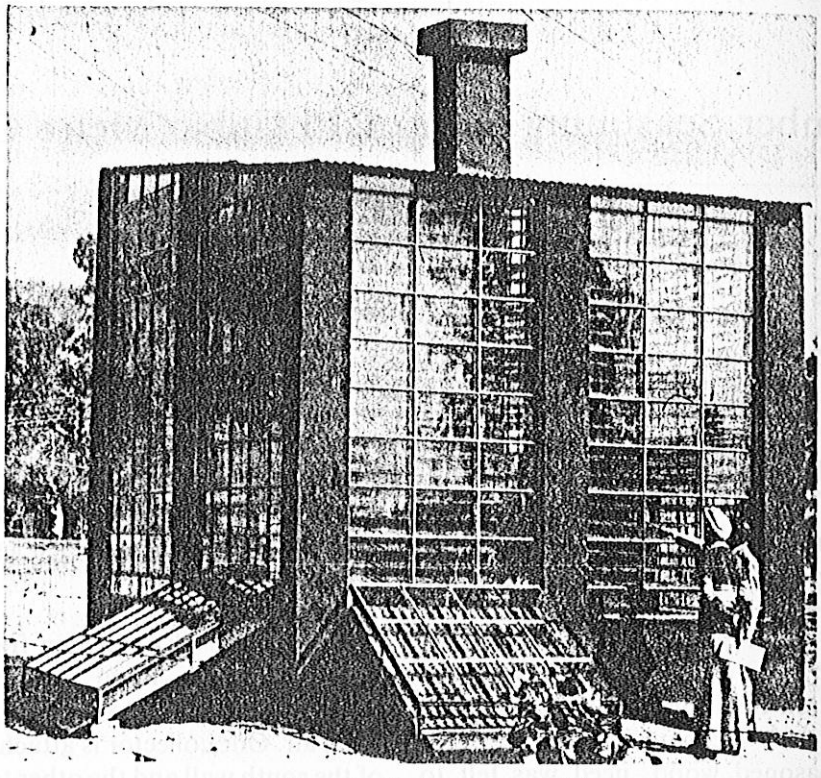

Fig. 1—The solar timber seasoning kiln

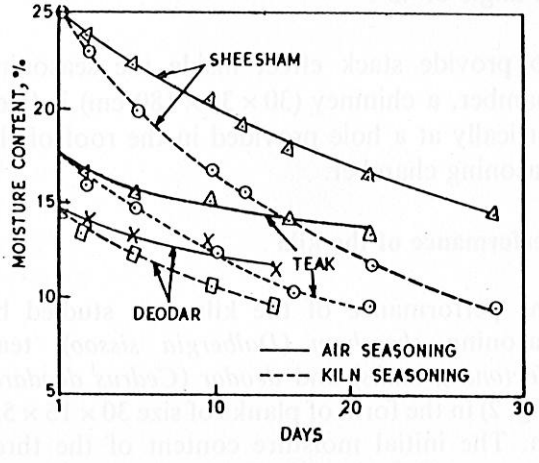

Fig. 2—Rates of seasoning of different timber varieties in the solar kiln and the relative rates of air seasoning

species. The moisture of the wood inside the kiln was reduced by 2% up to the 3rd day, while in the shed it was reduced only by 1%. On the 12th day, the moisture content of the wood kept inside the solar kiln was recorded as 16%, while in the shed it was 20%. Finally, the wood inside the kiln was seasoned up to 10% residual moisture content on the 28th day; in the shed it reached only up to 15% moisture content on that day.

Teak wood, which had an initial moisture content of 18%, was dried up to 15% moisture content in the kiln on the 5th day. In the shed its moisture content came down to 16% on the same day. The wood had 10% moisture content on the 20th day inside the kiln, while in the shed it reached up to 14% on this day. The moisture content of *deodar* wood reached up to 10% inside the kiln on the 14th day, while in the shed it was 12% on the same day.

The higher temperature inside the kiln helped in lowering its relative humidity. However, in the initial stages it was somewhat more than the prevailing atmospheric relative humidity due to quick release of moisture. The maximum difference between the inside and outside temperatures of the kiln was 15°C. In the last

week of March 1980, due to rainfall, the moisture content of the planks kept inside the shed increased due to the high relative humidity outside. In the kiln there was no appreciable change, as the entry of fresh air was prevented.

Cost of the kiln

The cost of construction of the kiln came to about Rs 24500 with the following break-up:

(i) Masonry work with material		Rs 2200.00
(ii) Hardware		Rs 7512.00
(iii) Cost of glass and labour on framework		Rs 12341.00
(iv) Paints and putty		Rs 1720.00
(v) Door		Rs 296.00
(vi) Glass fittings		Rs 600.00
	Total	Rs 24669.00

Conclusions

(1) There is sufficient saving in time in seasoning of various woods in the solar kiln in comparison to air seasoning.

(2) In comparison to conventional steam heated kilns, the cost of construction of the solar kiln is much lower. Further, as the kiln operates on the natural draft system, the use of the energy generated to drive out moisture is eliminated. Thus, there is good scope for large scale use of solar timber seasoning kilns of this design.

Acknowledgement

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References

1 Singh Y, *Advances in seasoning of wood*, Paper presented at the Forest Products Conference, FRI, Dehradun, Dec. 1973.

2 Singh Y, *IPIRI*, 6(1) (1976), 42-44.

3 Singh Y & Ashok Chandra, *Proceedings, International Solar Energy Congress*, New Delhi, Vol. 3 (Pergamon Press), 1978, 2086-88.

4 Singh Y & Goswami N L, *Proceedings, National Solar Energy Convention* (CSMCRI, Bhavnagar), 1976, 291-96.

5 IS: 399-1963, *Classifications for commercial timbers and their zonal distribution* (Indian Standards Institution, New Delhi), 1963.