

# A COMPARISON OF COSTS AND DRYING EFFICIENCY OF WOOD AND SIMPSON EKS STICKERS

O. S. Walrath  
American Forest Products Corporation  
Martell, California

## Introduction

This paper is an attempt to evaluate and compare, in an unbiased manner, the efficiency and costs of wooden stickers versus Simpson engineered kiln stickers.

The cost of stickers is a major cost area in the kiln-drying process which must be constantly evaluated in our attempts to minimize total operating expenses.

The studies and applications of methods used in this paper were done at American Forest Products Corporation, Martell, California. The stickering system at this mill is physically separate from the sawmill automatic tray sorter and package stacker. The system is of Moore-Oregon origin, with many modifications completed by mill personnel during the years this machine has been in operation. The kiln crib produced by this system is 9' wide, 12' high and length is determined by the lumber sort.

## Cost of Wooden Sticker

This mill does not have the raw material available, nor the proper equipment to manufacture kiln stickers; therefore, the stickers are purchased from another manufacturer. The delivered cost, including sales tax, is currently \$.48 per piece. These stickers are green, straight-grained Douglas-fir with a minimum growth rate of four rings per inch.

There is also a sticker repair and salvage operation at this mill. The broken wood stickers are collected, scarfed and cut to length. The scarfed pieces are then glued and stapled to form a new wooden sticker. The cost to repair the wood sticker is about 31.5 cents per piece. This includes amortization of the sticker repair work area, the radial arm saw and the air-powered staple gun. Also included are labor, glue, staples, sawblades and paint brushes. Of this, labor represents almost 28 cents per repaired sticker. There is about a 50% waste factor involved in making a repaired sticker from broken sticker parts. Therefore:

Salvage value of wooden stickers equals the difference of original price minus the cost to repair, multiplied by the percent of salvageable broken pieces; or

$$\begin{aligned}\text{Salvage Value} &= (\text{original price} - \text{cost to repair}) \times 50\% \\ &= ($.048 - $.315) \times 50\% \\ &= $.0825 \text{ per original piece}\end{aligned}$$

The cycle life has been determined from observation to be twelve cycles. It appears to be relatively the same for the repaired stickers.

Given this information, the cost per cycle can be determined:

Cost/cycle equals the difference of the original price minus the salvage value, divided by the cycle life; or

$$\begin{aligned}
 \text{Cost/cycle} &= \frac{\text{Original Price} - \text{Salvage Value}}{\text{Cycle Life}} \\
 &= \frac{\$.048 - \$.0825}{12} \\
 &= \$.0331/\text{cycle}
 \end{aligned}$$

#### Cost of Simpson EKS

The current delivered price, including sales tax, of Simpson EKS is \$1.47 per piece. This is in truckload quantities, and the freight per piece is quite high. However, a rail tariff has been applied that will allow a substantially better freight rate on future shipments.

The stickers used at this mill are quite long, and it would seem the breakage rate increases with the length of the sticker. A mill using a 48" or 52" sticker would probably suffer less breakage than a mill using 109" stickers. When one or two inches break off the 109" sticker due to mechanical breakage, the sticker-placer machine can no longer handle the sticker, and it becomes useless in this system. However, the sticker can be cut to a shorter length and resold at cost to another mill using the shorter length. It has been determined that the cost to collect, cut to length, stack, strap and load the salvaged stickers is 6¢ per original piece.

There is a waste factor of approximately 29% in the salvage operation; therefore:

Salvage value of the EKS equals the difference of the original price minus the cost to cut to new length, multiplied by the percentage of resalable pieces; or

$$\begin{aligned}
 \text{Salvage Value} &= (\text{original price} - \text{cost to cut}) \times 71\% \\
 &= (\$1.47 - \$.06) \times 71\% \\
 &= \$1.001
 \end{aligned}$$

From observation and Simpson literature, the cycle life of the EKS can be expected to be in excess of 60 cycles; therefore, the cost per cycle of the EKS can be calculated as follows:

Cost per Cycle equals the difference of the original price minus the salvage value, divided by the cycle life; or

$$\begin{aligned}
 \text{Cost/Cycle} &= \frac{\text{Original Cost} - \text{Salvage Value}}{\text{Cycle Life}} \\
 &= \frac{\$1.47 - \$1.001}{60} \\
 &= \$.008
 \end{aligned}$$

#### Other Factors Affecting Sticker Efficiency

The EKS is stiffer, more rigid, under use as compared to the wood sticker. Because there seems to be less sticker deflection due to thick and thin lumber, a more uniform air flow develops. A more uniform air flow usually results in a better final moisture content distribution which would indicate a possible decrease in percentages of degrade development. Certainly, the relative amounts of redry and overdry can be reduced.

Because the stiffness and other strength characteristics of the EKS are sufficiently higher than wood, thinner stickers can be employed. Using thinner stickers allowed this mill to increase its average kiln foot-ages by 10%. However, the 10% increase in volume also resulted in a 10%

increase in weight on already overloaded kiln trucks. There also developed substantial sticker depressions on the bottom courses of some cribs.

Using a thinner sticker and increasing the volume in each kiln charge results in a decrease in the total square footage of air space in the cross section of a kiln charge. Since the volume of air generated by the fans will remain relatively constant, the static pressure in the plenums will increase substantially. This will result in an increase in the horsepower requirement at the fan motors. Many modern kilns are designed to capacity and may require larger fan motors to accommodate the additional loads.

However, the increased static pressure will also result in increased velocity through the load. This increased air flow across the lumber may in fact increase the drying rate, and more work will have to be done in this area.

With the increase in static pressure, the importance of proper baffling becomes extremely important as air tends to follow the paths of least resistance. In fact, the thinner EKS will not allow the lumber to dry properly if baffling is not in excellent order.

The final item to be considered is the straightness and uniformity of the EKS during use. Definite decreases in sticker-placer downtime have been experienced. Jam-ups, missed stickers and double stickers are almost non-existent with the EKS. However, because of the thinner size, the EKS and wood stickers cannot be intermixed which causes some handling difficulties. The sticker-placer operator, who has to load the sticker magazines, definitely prefers the EKS, even though they weigh two to three times as much as the wood stickers.

#### Summary

The cost per cycle of wood stickers is \$.033 as compared to the cost per cycle of the EKS which is \$.008. This represents an annual savings in the order of \$47,000, based on the almost 2,000,000 sticker-cycles required to dry the 60 MM bd. ft. produced at this mill.

An increase in kiln capacity, a potential decrease in kiln residence time, and a potential decrease in degrade appear to be possible with the use of Simpson EKS.

Some degrade due to sticker depressions on the bottom courses have been experienced; also electrical consumption increases and baffling practices must be of excellent quality with the use of the EKS.

Other items that have not been covered in this paper, but that deserve consideration on the part of management, are: inventory costs, insurance costs, cost of capital, and the cost of additional steam to dry the additional volume possible with the EKS.

In conclusion, the circumstances at this mill dictate that a complete changeover to Simpson engineered kiln stickers is in order; and in fact, will be accomplished over a three-year period.