

What is the True Cost Difference Between Wood and Aluminum Kiln Sticks?

The comparison between using wooden dry kiln sticks and aluminum TUFF-STIK™ dry kiln sticks for an eight-foot length involves evaluating both the direct costs (purchase, replacement, and recycling or waste disposal) and the indirect costs (operational efficiency, safety, and quality of finished goods output). This analysis will help in understanding the overall cost savings and benefits of switching to aluminum sticks in the lumber drying process over a course of 500 cycles through the dry kilns.

Direct Cost Analysis

Wooden Kiln Sticks:

- **Cost per Foot:** \$0.20
- **Cost for an Eight-Foot Stick:** Ranges from \$1.60
- **Lifespan:** 4 to 7 cycles, with an average of 5.5
- Over 500 cycles, you would need approximately $500/5.5 = 91500/5.5 = 91$ times the replacement of eight-foot wooden sticks.

Aluminum TUFF-STIK™ Kiln Sticks:

- **Cost per Eight-Foot Stick:** \$8.00
- **Lifespan:** 500 cycles.
- After 500 cycles, recycling costs 5% of the energy used in extruding new material, suggesting a reduced cost for recycling.

Calculation of Costs Over 500 Cycles

Let's calculate the total costs for both wooden and aluminum kiln sticks over 500 cycles, including the initial purchase and, for aluminum, the recycling cost after their initial service lifespan.

Wooden Sticks:

- Total cost = Number of replacements needed * Cost per eight-foot stick. ($\$1.60 \times 91 = \145.60)

Aluminum Sticks:

- Initial cost for 500 cycles is straightforward, (\$8.00)

Indirect Benefits and Savings

Switching to aluminum TUFF-STIK™ kiln sticks can also provide several indirect benefits:

- **Operational Efficiency:** Aluminum sticks are always consistent in dimension and feed well through automated stacker systems. They do not warp or deteriorate under steam or high temperatures, leading to more consistent kiln drying conditions and potentially overall faster production cycle times.
- **Safety:** Reduced risk of safety incidents from collecting broken sticks, eliminating downtime and labor costs from cleaning up debris around equipment and conveyors of the broken pieces.
- **Quality of Dried Lumber:** More consistent support leads to better-quality dried lumber, with less warping and other de-grade or defects.

Given these parameters, let's proceed with the calculations to quantify the direct cost savings and then discuss the implications of the indirect benefits.

The cost analysis for using wooden versus aluminum TUFF-STIK™ kiln sticks over 500 cycles highlights significant direct cost savings when opting for aluminum sticks:

- **Total Cost for Wooden Sticks Over 500 Cycles: At \$145.60 per stick.** This is based on the need to replace wooden sticks approximately 91 times (given their average lifespan of 5.5 cycles) at an average cost of \$1.60 for an eight-foot stick.
- **Total Cost for Aluminum TUFF-STIK™ Kiln Sticks Over 500 Cycles: \$8.00 per stick.** This cost is for a single aluminum stick, as it can last through all 500 cycles without the need for replacement.

Therefore, the **difference in the direct cost savings** of using aluminum TUFF-STIK™ kiln sticks instead of wooden sticks for an eight-foot length over 500 cycles is **\$137.60 per stick.**

In more detail, a softwood mill that produces 250 MMBF per year would utilize 350,000 wood sticks. Typically, that mill has an annual budget of \$1 million for purchasing 625,000 replacement sticks. Over the course of ten years, the mill will expend \$10 million in direct cost. In that same time period, to purchase 350,000 aluminum TUFF-STIK™ would cost \$2.8 million which make the savings \$7.2 million in direct costs alone over the course of the 500 turns.

During that same period, the mill accumulates 6.25 million deteriorated/broken wood sticks that must be individually collected and disposed of. Typically, the expended wood kiln sticks have deteriorated at a cellular level after five to seven turns through the continuous kilns at elevated temperatures, so that their value is greatly diminished, without adding more cost to make suitable in use for pelletizing. In any event, the scrap wood sticks have become a liability versus an asset to the mill.

Over the course of that same time, significant labor for purchasing replacement sticks, which involves administrative, accounting and logistics office personnel, coupled with receiving and unloading production manpower requirements add a substantive operational loss to the mill's profitability.

This substantial savings is even before considering the numerous *indirect* benefits associated with aluminum sticks, such as:

- **Operational Efficiency:** Aluminum sticks, being unaffected by heat, moisture, or steam, offer more consistent conditions for running through the automated stacker system, kiln drying

lumber where they potentially reduce process cycle-times and improve kiln's energy efficiency, and finally through the tilt-hoist operations.

- **Safety:** The durability of aluminum sticks reduces the risk of safety incidents associated with collecting broken or deteriorated wooden sticks, which are strewn around the automated stacking equipment, conveyors and the tilt-hoist, thus improving workplace safety and reducing downtime and labor represented in man-hours needed for cleanup.
- **Quality of Dried Lumber:** The superior support provided by aluminum sticks leads to flatter, straighter lumber, and ease of heat transfer through the center of the kiln lumber package. With less warp, bow and crook, positive results are experienced in reducing de-grade of finished lumber products, waste and potentially increasing the market value of the final product.

In conclusion, the switch to aluminum TUFF-STIK™ kiln sticks not only offers direct cost savings, but also enhances operational efficiency, safety, and the quality of dried lumber, making it a financially and operationally prudent choice for lumber mills.