

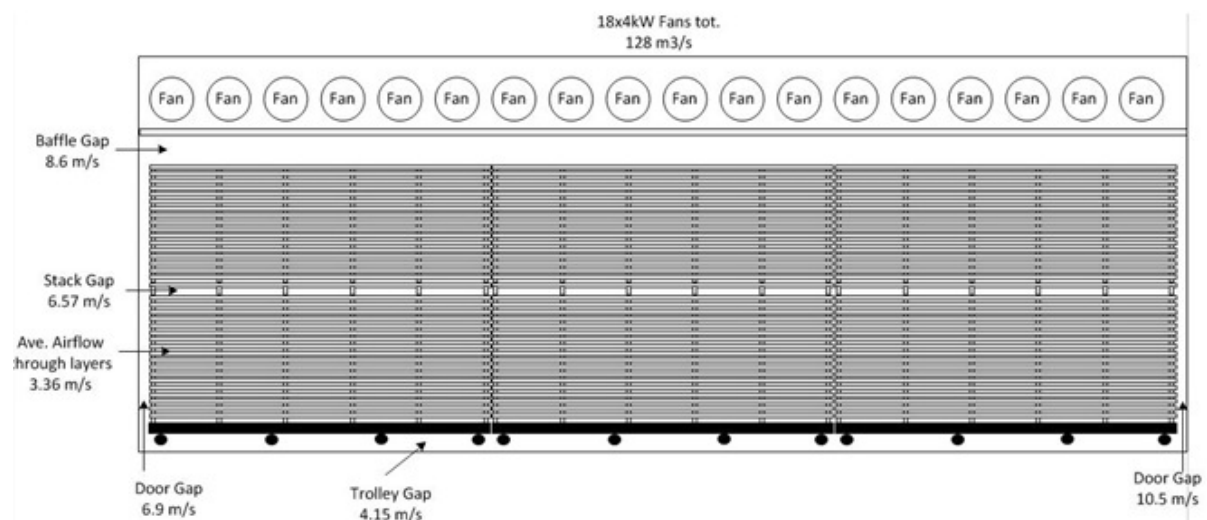
Loosing track of air flow – What happens when the basics go wrong: - A Case study

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Many things can go wrong in drying timber. Most of the time when kiln drying results in terms of quality and time takes a nose dive, the client phones the system/kiln designer looking for answers. Fact is, the logic in the kiln controller does not change, and is rarely if ever the cause of bad drying.

99.9% of the time, the cause of bad drying can be found in operational failure at ground level.

Timber soft recently did a case study at a saw mill, where they tested air speeds at various places in the kiln. (Shown in Picture 1)



Picture 1: Side view of kiln, showing average air speeds measured

Where	Gap Area (m2)	Air speed Measured m/s	Adjusted Value for Laminar flow	Volume m3/s	%
Below Trolley	4.5	4.15	2.07	9.315	7.4
Front door	5.5	6.9	3.45	18.975	15.1
Back door	6	10.5	5.25	31.5	25.0
Top baffles	5.8	8.6	4.3	24.94	19.8
Stack gap	1.68	6.3	3.15	5.292	4.2
Average through stacks	21	3.36	1.68	35.28	28.0
				125.302	99.4

Table 1: Places measured and calculated volumes.

Table 1 shows the air speeds measured and the physical area where the air flow passes through. The air speed measured and recorded was the highest speed in each gap. Due to laminar flow and turbulences, the air speed value was halved to calculate the volumetric flow through each gap. The result showed that only 28% of airflow generated by the fans are actually being utilised.

This specific kiln, has 18 x 4kW fans to generate $\pm 126\text{m}^3/\text{s}$, and uses $\pm 570\,000\text{kW}$ hours per year. **If only 28% of airflow generated was utilised, this means that $\pm 410\,000\text{kW}$ hours was wasted. Multiplying this with the cost of electricity per kilo watt hour equates to a lot of money lost.**

BUT, why did this happen? Bad stacking, loading and baffling were identified. Being the most visual parts of drying, it is supposed to be the easiest part to get right. In Timber soft's opinion, a lack of operational commitment from all staff involved, caused by a lack of proper training and focus (management) is the biggest problem.

Other symptoms of bad loading, stacking and baffling are numerous and includes patchy drying, top layers warping because of excessive air flow over the stacks, increase in downgrade, extended drying times, high steam usage, less accurate control by the controller due to increased turbulences caused by varying air speeds and different energy take up by air.

In this specific kiln, if stacking, loading and baffling can be done 100% correct, half the fans is not required. Sorting out stacking, loading and baffling issues and then using a Variable speed drive to reduce air speed by 20%, will save 50% on the electricity bill alone. It will also reduce all other drying problems.

Conclusion:

Can any sawmill not afford to give drying management the focus and attention it requires?

Managing the drying function is as important as sawing straight and wet mill recovery. It has a big influence on gate-in-to-gate-out recovery. Giving drying management the attention it requires can save thousands, if not millions of \$ per year in electricity alone, not to mention the other positive production and recovery spin offs.