Pre-sorting timber for optimised downstream processing using the Surveyor LDS200 density sorter

Gavin Wallace
Isoscan Manager
GNS Science Ltd

Kiln drying of softwoods

The mission of all people involved in kiln drying is:

to dry each and every piece of timber to the same (known) moisture content
- without moisture gradient across the pieces
- without internal stresses developing in the pieces
- as quickly as possible
Why is this so hard?

Every piece of wood to be dried is different, for example:-

- Different initial moisture content
- Different grain orientation
- Different permeability

This means that when we put them all together in a kiln and dry them under the same conditions we end up with an equally diverse range of final moisture contents, induced stresses and consequent loss of value of the final product.

A solution??

What is needed is a means of assigning each piece of timber a “driability” rating i.e.:–

- The optimum time and conditions required to dry that piece of timber to its required final moisture content without causing any loss of value

Then grouping pieces with reasonably close driability ratings together

Putting them in a kiln for the time and under the conditions best suited to that group.

BUT HOW??
Green density = wood + moisture

1. It has been found that the green density of a piece of timber is a reasonably good indicator of the “driability” of the piece.

2. These two pieces have the same green density but different moisture contents and basic densities.

3. After drying the wood density remains different but the final moisture content is similar.
A trial was carried out to determine the benefits of using green density as a predictor of drying rate. Measurements gave the frequency distribution of green density.

The pieces were selected into 3 equal size groups and measured density was plotted against drying time.
We then plotted reduction in moisture content against drying time for:
- All-in
- <650 kg/m³
- >650 kg/m³

1. Overall drying time is shorter

2. Variability is greatly reduced
A machine was developed which can accurately measure green density at sawmill speeds using a non contact system.

Repeatability is very good, inferring measurement standard deviation of <1.5%
For the accurate rapid inline grading and sorting of lumber

**LDS 200**

- First system was originally developed by Institute of Geological and Nuclear Sciences and Wayne Miller of Fletcher Challenge Forests
- Installed in FCF Kawerau mill in 1999
- Agreement reached between FCF, IGNS and Fibre-gen to market the system
- Upgraded systems have been installed in 15 other mills since October 2001
**LDS 200**

Systematic sorting of green timber for appropriate downstream processing

- Installed upstream of sorters in the green mill
- Enables sorting of timber into slow medium and fast drying batches.
- Enables segregation of timber not suitable for further kiln drying and msg / msr processing

**LDS 200 - how it works**

- Uses very low energy gamma rays emitted by a source placed beneath the timber chain
- Gamma ray count is measured continuously by a detector placed above the timber chain, processed by sophisticated electronics
- When a board passes between the source and detector some of the gamma particles are absorbed by the timber, so the count rate at the detector goes down
- The amount of decrease is proportional to the green density of the timber and the thickness of the timber
LDS 200 - how it works

Gamma ray detectors
Thickness lasers
Gamma ray sources
Timber chains

LDS 200
LDS 200

- 120 pieces per minute at common lug spacings
- Continually self calibrating
- Non contact
- Small footprint
- Quick installation
- Manages power interruptions, safety requirements
- Self contained
- Easy interfacing to PLC by serial line or ethernet

LDS 200

- Reduces wets
- Reduces over-dries
- Reduces overall kiln drying time and power usage
  - High moisture batch is dried in same time as unsorted charge
  - Low moisture batch can have drying time reduced by 40% or more
  - Low moisture batches can be 50% of production
- Value to a (NZ / Australia) mill producing 100,000m³ of kiln dried timber per year = $US 185,000
LDS 200

- Cost of turnkey system installed depends on options selected and location.
- FOB price of hardware plus “normal” install $NZ 235,000 (up to 200 lpm)
- Cheaper versions/options now available for low volume mills (up to 85 lpm)
- There is a software data logging system for run statistics
- SM400 add-on enables simultaneous MOE measurement
For further information contact

Joe Manning
Isoscan, GNS Science Ltd
Ph +64 4 570 4675
J.Manning@GNS.CRI.NZ