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Advanced Sonic Technology for Log Scalers and their Customers

Timber Measurements Society Meeting

October 17-18 Longview,Washington, USA

Peter Carter – Chief Executive, Fibre-gen

Presented by Andy Dick – MD, Logjiztix

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Business Results – Sonics enabled

- Measure Wood Quality before processing:
  - In conjunction with scaling in mill yard for LVL and MSR
- Forecast actual mill LVL or MSR lumber out-turn from log supply
- Reduce waste and lower processing costs
- Reliably fulfill sales orders
- Improve profitability through process optimisation

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Portable tool for log scaling application

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HM200

LG640 Automated tool also available for log scaling application

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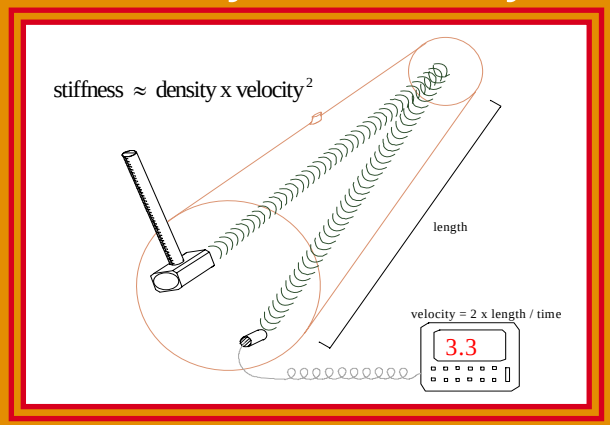
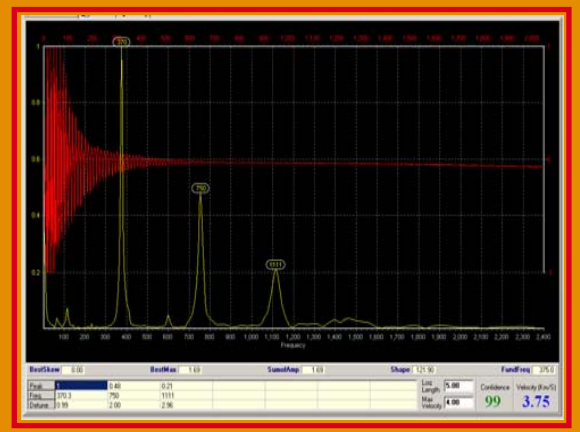
HM200 & LG640 – how they work

- Stiffness = density x (velocity)^2
- Velocity is derived from resonant frequency (2nd harmonic) and length
- Sensor/microphone detects frequency from hammer blow
- Green density is relatively constant





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Customer values are high - Veneer

Douglas Fir trials - sorted the log infeed at a 13,000ft/sec threshold.

Increase Yield of Veneer – 2 operational trial results:

1. 62% Yield of G1&G2 compared against 47% unsorted logs
2. 60% Yield of G1&G2 compared against 45% unsorted logs

Lodgepole pine trial results

- 0.1km/sec improvement in sonic velocity is worth US$16/$m^3$
- US$3.8m for a 300,000 t mill (at US$250/$m^3$ for G1 veneer)

Measuring and managing stiffness will increase profit
Scaling is a key opportunity to measure and add value

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Customer values are high - MSR

- MSR vs Standard or better lumber price differential US$15/$m^3$
- Average log infeed velocity improvement of 0.2km/sec will increase MSR YIELD from the mill by 10%

This equates to:

- US$450,000 for a 300,000 m^3 mill

Measuring and managing stiffness will increase profit

Scaling is a key opportunity to measure and add value

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ADVANCED SONIC APPLICATIONS

Breeding & Forest Management

HITMAN ST300

Rank genetic material and optimise silvicultural regimes based on structural properties

Dry Lumber or Veneer

OTHER SUPPLIERS

Integration of sonic measures through the Value Chain to the MSR or veneer stress grading machine

Forest Thinning

HITMAN PH330

Built into a processor head

Identifies structural logs and enables wood quality measures to be collected at thinning

Green Chain Lumber

HITMAN COMING SOON

A combination density and sonic tester provide MSR equivalent measures on green boards enabling optimum processing and reduced wastage

Pre-Harvest Assessment

HITMAN ST300
HITMAN HM200

Allows stiffness measures to be incorporated into harvest planning to optimise resource allocation and log delivery to structural needs

Debarker Log Chain

HITMAN LG640-L
HITMAN LG640-T

Log grading by sonic velocity provides merchandiser, primary breakdown saw, or lathe with processing decision support to optimise product grade out-turn

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Advanced Sonic Technology
Measuring Wood Quality

Forest Operations

Mill Operations

Harvest Operations

HITMAN PH330
HITMAN TAGGER -COMING SOON

Stiffness is incorporated into processor head log-making decisions delivering optimum lengths and segregation of structural logs. Maintains identity with RFID or paint tagging

Yard Management

HITMAN LG640-L
HITMAN LG640-T
HITMAN BM500 -COMING SOON

Add wood quality measures to automated log scaling of dimension and grade to support sale and purchase transaction and optimise log utilization

In-Forest Log Stocks

HITMAN HM200

Logs or stems can be measured for wood quality and segregated to ensure best allocation of logs to highest value processing option

Transit

HITMAN TAGGER -COMING SOON

Tagged logs are traceable and provide key data on log properties at each stage in the value chain for optimised processing decisions

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Conclusions – Log Scaling

- **Sonic measures provide valuable log quality information for your customers**
- **Wood stiffness in logs is a key measure for LVL veneer and MSR lumber manufacturers**
- **Tools are available to quickly and easily measure stiffness at time of scaling**
- **Stiffness information measured at this time is key for value optimisation from subsequent processing**

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For further information

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Further detail for implementation

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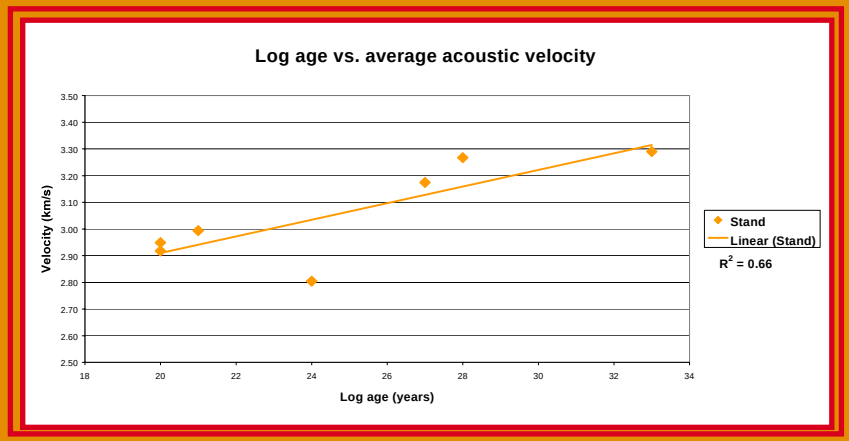
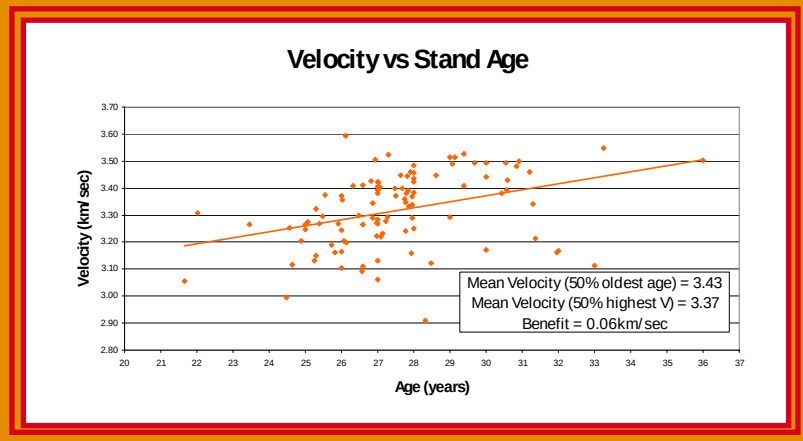
Velocity variation with Age

- Acoustic velocity generally increases with increasing age
- 0.06 Km/s increase on average per year
- Velocities do still vary widely within an single Age class
- Strategy - harvest highest Velocity rather than oldest age





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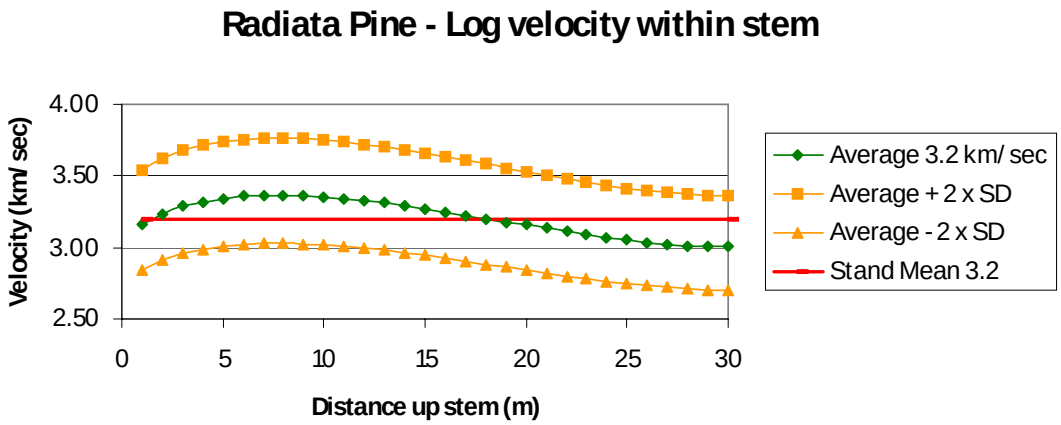
Velocity variation Butt Log to Top Log

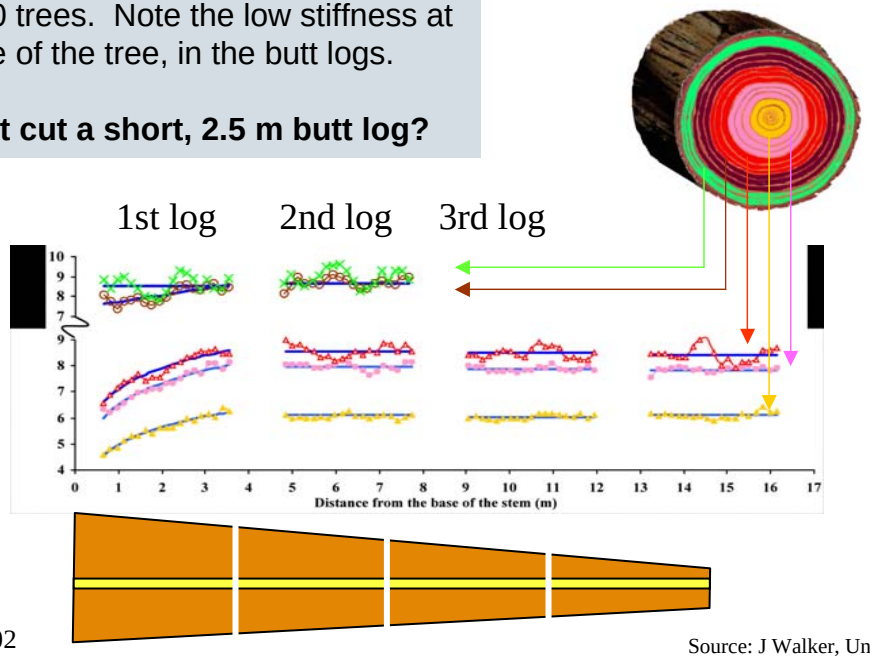
- Acoustic velocity varies from butt to top
- Highest velocity logs are in mid section of stem – log 2 & 3



Velocity variation – Pith to Bark

Average stiffness of lumber cut from some 60 trees. Note the low stiffness at the base of the tree, in the butt logs.

Why not cut a short, 2.5 m butt log?



Ping Xu, 2002

Source: J Walker, University of Canterbury

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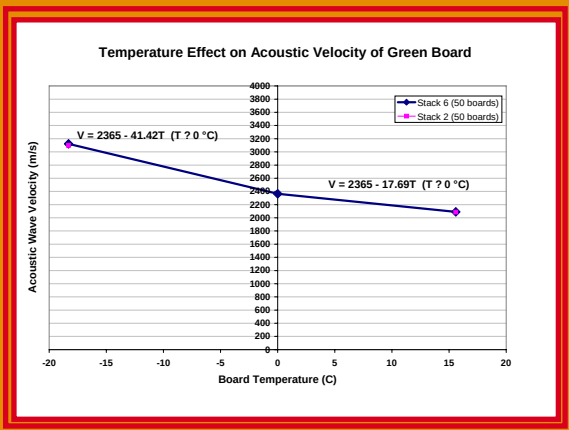
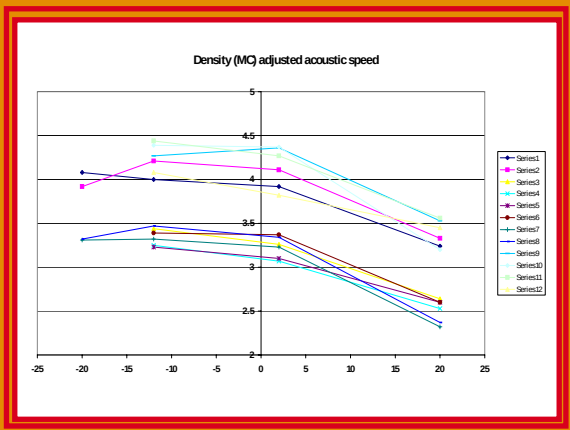
Velocity variation with Temperature

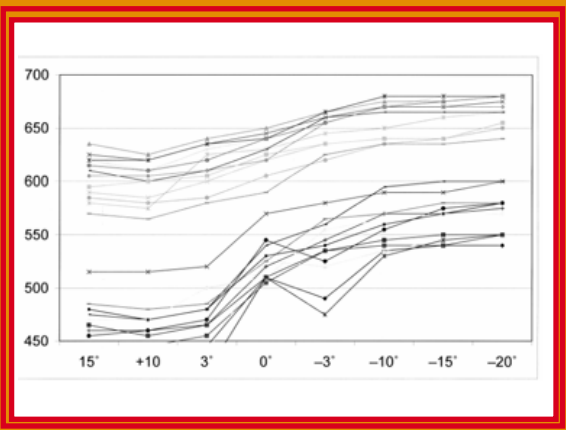
- Acoustic velocity increases with lower temperature
- Rate of change defined best in Swedish log study
- Moisture content changes may compensate on logs, but not in trees



Source: X Wang, University of Minnesota



Source: P Harris, IRL



Source: L Bjorklund, VMR, SDC

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Velocity variation with Moisture Content

- Acoustic velocity varies with moisture content
- MOE = Green Density x Velocity^2
- Therefore green density decrease is proportional to increase in V^2
- Potential application
  - MC of Beetle killed wood

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