Edger & Trimmer Optimization:
High Density Profile Scanning with Colour Vision Technology

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President – Sensors That See
To be discussed:

• **Who is LMI Technologies?**
• Quick review of optimization
• Leading Scanner Technologies
• FireSync® platform
• Implementation examples
• The DynaVision® chroma+scan solution
Who is LMI Technologies?

- Since 1976, the longest established vision sensor supplier in the world
- DynaVision®, Selcom®, chroma+scan® are respected trade names
- Over 50,000 sensors installed since 1976
- More than 100 existing technology patents
Global Presence

- World Headquarters
- Regional Operating Companies
- Regional Sales Companies
- Distributors

- 90 employees world-wide
- 7 offices in 5 countries
- More than 7000 sensors per year
- R&D = 30% of staff
Supporting OEMs & SI’s

LMI technologies; vision engineering specialists.
Since 1976, LMI is the longest established vision sensor supplier in the world. We work closely with OEMs and System Integrators from Automotive Markets to Wood Processing and multiple industries in between. Learn more >>

**Sensors That See™**
Dynavision, Sekom and LMI branded Sensors That See: pre-calibrated, pre-programmed, plug-and-play vision sensors inside industrial housings for OEM applications.

**FireSync™**
Vision hardware and software, scalable networking, simple cabling and microsecond synchronization let OEMs rapidly develop unique vision systems.

**HexSight™**
A mature, robust, highly-optimized machine vision library offering a world-class pattern recognition Locator tool and an effective set of inspection and OCR/symbology tools.
LMI Industries Served +

- Rubber and Tire
- Road Surface
- Automotive
- Metals
- Wood and Sawmill
Rubber & Tire

EyeCon 2x00
Sidewall Inspection & Runout Measurement

Bulge Depresssion
Road Surface

RoLine
3D Pavement Profiling at High Speed
SO = 200 mm
MR = 200 mm
FOV = 75 – 150 mm
Automotive

Smart+Gage
Sheet Metal Inspection
Multi-Sensor Configuration
Molten Metal

SLS 6000
Level measurement of molten iron and steel
Dimensional measurement of hot and cold steel slabs

DynaVision
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Quick review of optimization

- What is Optimization?
  Achieving the best value return

For the most $$$
Quick review of optimization:

- What are Your Assumptions:
  
  - Your optimization system has the:
    
    • Best scanning
    • Best software
    • Best mechanicals
    • Best trained staff
    • Operating at peak performance 100% of the time
The 98% solution

(What is this ???? )
The 98% solution

- Equipment suppliers typically guarantee 98% recovery to the sawmills
- With only 2% potential gain, why invest more $$$?

How can systems offer anything better?
The 98% solution

98% is based only on 3D scanning

To increase recovery, we need to introduce something MORE that 3D…

What is that something?
Value added scanning:

- **3D Scanning + Color Vision:**
  - Identifies defects to make higher value decisions
  - IMPORTANT: the 3D profile + Color Vision are scanned at the same time in the same sensor:
    = exact data matching for better optimization
Value added ...

• Value Added Scanning / Optimization
  – Adds to 3D only scanning
  – Makes a higher value decision than 3D only
  – Detects the important defects consistently

therefore . . .
Value added optimization

Identifying higher value boards will increase the dollar return to the sawmill

– Such as knots and other characteristics like stain (blue, red), pitch, cracks, etc.

– Defects detected at the edger are eliminated earlier in production

– Defect detected at the trimmer reduce remanufacturing & drying costs
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LMI Technologies developed:

DynaVision®
chroma+scan 3300
sensor
3D Log Scanning

chroma+scan 20x0

3D Shape at High Speed
SO = 592 mm
MR = 940 mm
FOV = 482 – 1219 mm
DynaVision® chroma+scan 3300
Board Edger / Trimmer solution

1. Higher Density True Differential 3D,
2. Color Vision,
3. Light curtain function

*All features built into the same scanner*
DynaVision® chroma+scan 3300 solution

Provides MORE information

making higher VALUE decisions

increasing dollar RECOVERY for a;

VALUE ADDED SCANNING
Combining 3D & color in one

• Provides elements of grading at the edger and trimmer
• Reduces cost and floor space with a narrow scan frame
• Improves reliability with less components and less wiring
Combining 3D & color in one

chroma+scan
3D Shape and Color at High Speed
SO = 559 mm (22”)
MR = 152 mm (6”)
FOV = 610 mm (24”)

DynaVision
Chroma+scan 3300 / 4300

Camera image

Chroma+scan 3300.
3D profile with 1mm color resolution @ 2 kHz

Chroma+scan 4300.
3D profile with 0.25mm color resolution @ 4 kHz

DynaVision
Chroma+scan 3300 / 4300

Chroma+scan 3300.
3D profile with 1mm color resolution @ 2 kHz

Chroma+scan 4300.
3D profile with 0.25mm color resolution @ 4 kHz
Chroma+scan 3300 / 4300
The importance of Scanning

- Scanning matched to line speed. Why?
- Colour & 3D in same enclosure. Why?
- Lasers & Camera in same enclosure. Why?
- Multiple Cameras in same enclosure. Why?

- Stop movement of the board or log.
- Color camera is accurately mapped.
- Accurate and Temperature stable.
- Best technology for application.
## Log Speed vs Camera Speed

<table>
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<th>Frequency (Hz)</th>
<th>Log Speed (M/min)</th>
<th>Camera Speed (in/sec)</th>
<th>Log Speed (Ft/Min)</th>
<th>Camera Speed (M/sec)</th>
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<td>1000</td>
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LMI’s FireSync® platform

• Simplifies multiple scanner integration

• Provides tight (1μ sec.) synchronization of all scanners and encoders

• Eliminates external hard wire triggers
LMI’s FireSync® platform

• Transforms all data to common coordinate system in a single profile

• Multi-threaded pipelined execution for high speed processing

• Scaleable architecture for “n” scanners
LMI’s FireSync® platform

- Single cable carries GigE data, power, laser safety and synchronization
- Inexpensive cables to 100m length
- Ethernet broadly used and understood
- Provides simple, easy integration
- Provides high reliability
Typical FireSync® connections
LMI’s FireSync® platform

- LMI was awarded the **North American Laser Based 3D Vision Sensors Technology Innovation Award** by Frost & Sullivan (F&S).
- LMI was selected by the F&S analyst team currently tracking technology innovation in key hi-tech markets.
- LMI was chosen for the 2007 award for:
  - exhibiting technology advancement from 2D vision to 3D, based on the number of installations worldwide and the diversity of applications. Additionally,
  - LMI scored high on their extensive range of patents, including patent applications of new machine vision systems being developed and integrated.

If you require more information, please contact Susan Hancock, Marketing Manager at shancock@LMItechnologies.com.
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Lets review some implementations

• Lakeland Mills, Prince George, BC
  – Processing pine beetle kill logs

• Beetle kill issues:
  – Splits or cracks – boards break, reducing line speeds 20 to 25%
  – Blue stain – reduces marketability
Lakeland Mills

- Input 8’ logs processing ~7,000 logs/shift
- Center cants to fixed gang edger
- Side boards to Comact edger optimizer
  DynaVision® chroma+scan 3300 scanners
- Output 800,000 bdft per day in 2 shifts!!
Lakeland Comact Edger Optimizer
DynaVision® chroma+scan 3300 color defects

- Highlighted boxes identify defect areas
Lakeland Edger Optimization (Videos)
DynaVision® chroma+scan 3300 color images
Lakeland – dry side

• 2 Comact Gradexpert systems
  – DynaVision® chroma+scan 3100 for dimensions
  – Comact vision and light curtains
Lakeland – dry side

(Image)
M24 upgraded to DynaVision® chroma+scan 3100

- Upgrade of DynaVision M24 (scan increment of 1”) to DynaVision® chroma+scan 3100 (0.3”/8mm) provided:
  - better detection of edge shape
  - increased produce of #1 lumber
  - increased production (up to 37%) & number of grades (limited by previous manual grading) !!
Comact Gradexpert provided:

- Benefits to the mill:
  - #1 grade increased from 12% to 30%
  - Economy dropped from 15% to 6%
  - Number of 6’ & 7’ boards dropped from 15% to 3% in favour of 8’ boards
Trimmer – dry side

Notice the high density of laser points along the board surface.

(Video)
Lakeland – dry side
Other implementations

Edger Optimizer by Baxley Equipment

• Yakama Forest Products, Washington
  Status: July 2007 with 3D/Colour Vision July 2008

• LM Co., North Carolina
  Status: May 2008 with 3D/Colour Vision online
Yakama Forest Products

Example Scanned Board Images from Yakama:

Ponderosa Pine
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Conclusion

• Adding color vision with 3D is the most beneficial next step for the sawmill to achieve …

Increased Recovery at the Edger & Trimmer to achieve

*Value Added Scanning and Optimization.*
High Density Profile Scanning with Colour Vision Technology

Thank you for listening …