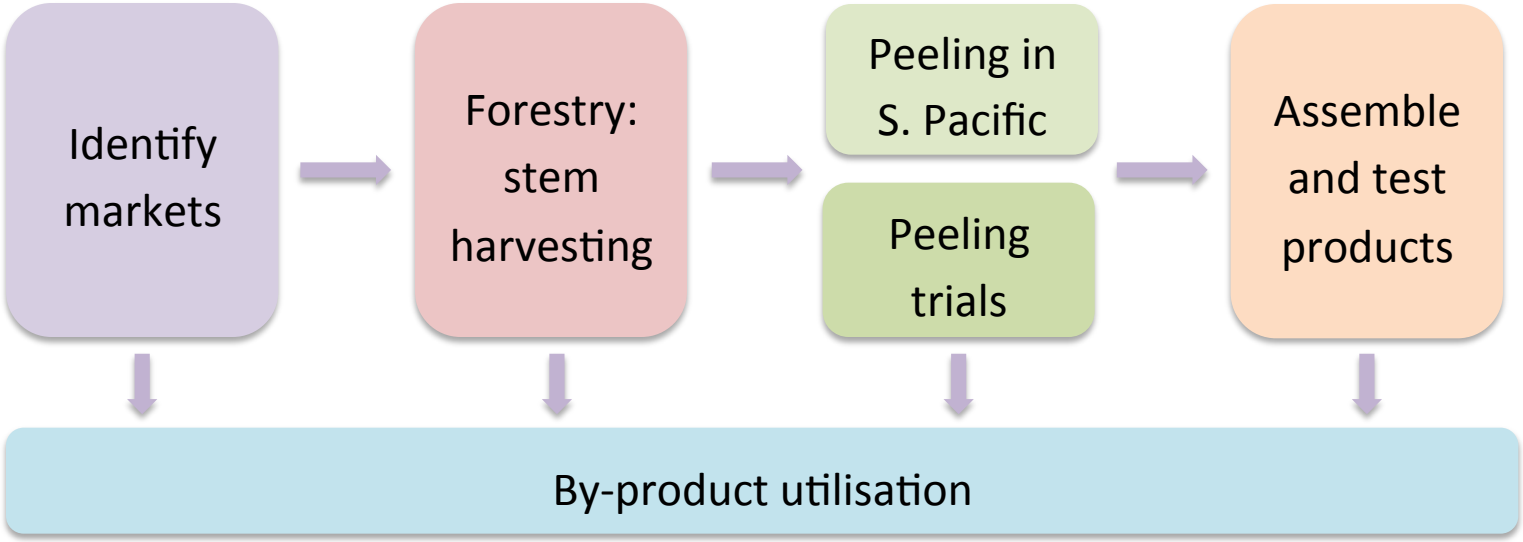
Objective 4

Determine the optimum processing parameters & protocols for peeling coconut stems & the properties of the recovered veneer

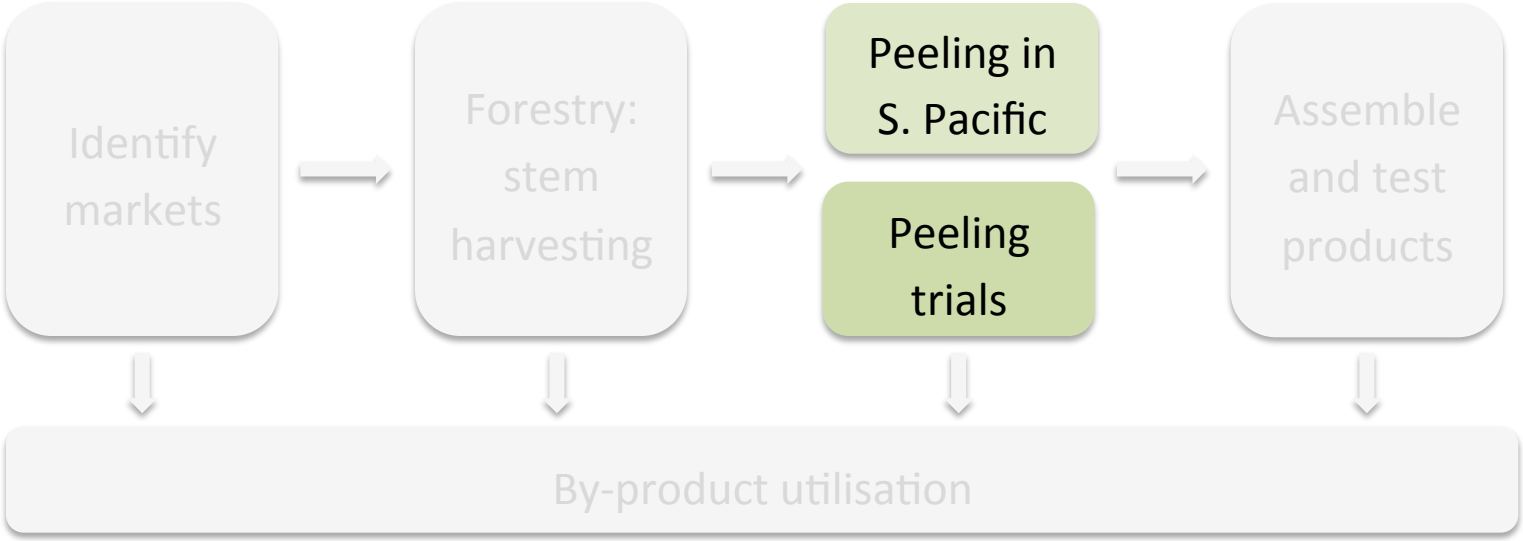
Rob McGavin

Research Facility and Project Manager, Qld DAFF

Project Objectives



Objective 4 – Peeling Trials



Objective 4 – Peeling Trials

Peeling in S. Pacific

Peeling trials

Objective 4 – Determine the optimum processing parameters & protocols for peeling coconut stems & the properties of the recovered veneer

4.1 – Assessing veneer processing parameters for cocoveneer (Trial 1)

4.2 – Calibrating processing parameters at QDAFF Salisbury Research Facility (Trial 2)

4.3 – Initial compact experimental peeling trial in Fiji (Trial 3)

4.4 – Compact commercial peeling trial in Fiji (Trial 4)

4.5 – Broad industrial peeling trial in Fiji (Trial 5)

4.6 – Properties and recovery assessment

Objective 4 – Peeling Trials

Peeling in S. Pacific

Peeling trials

4.1 – Assessing veneer processing parameters for cocoveneer

- Optimum peeling parameters assessed from disc trials at ENSAM in France
- Micro-lathes used to determine lathe settings and stem pre-conditioning requirements
- Physical work completed, analysis and reporting in progress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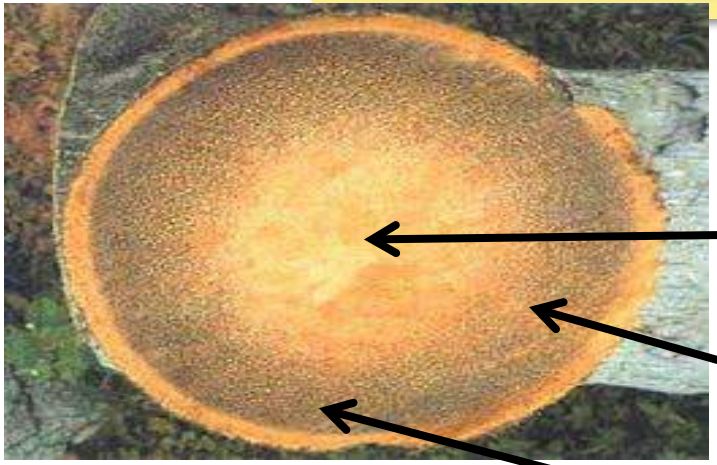
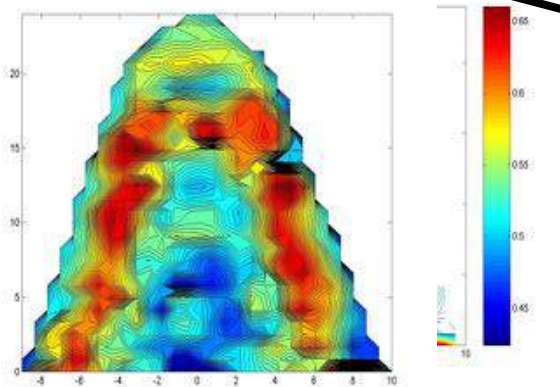
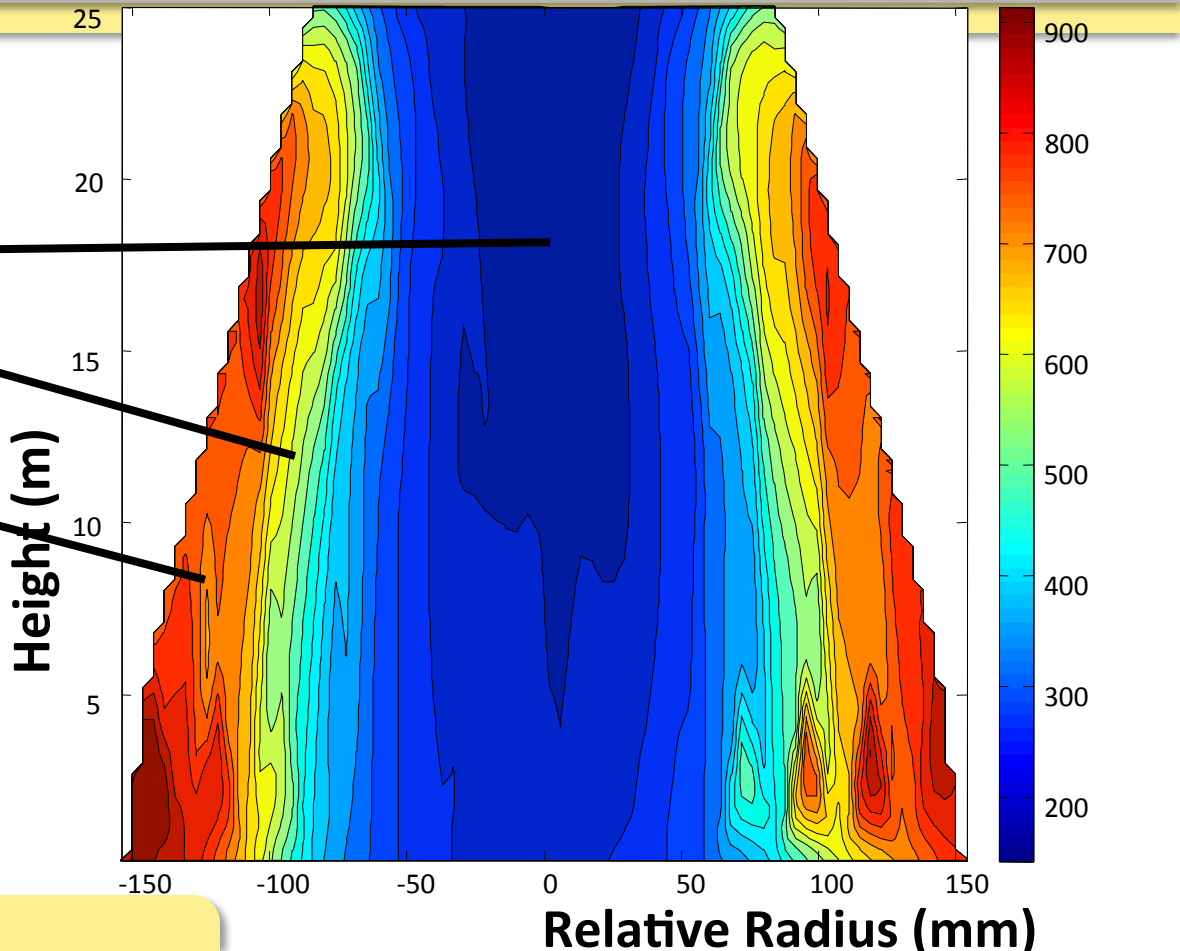
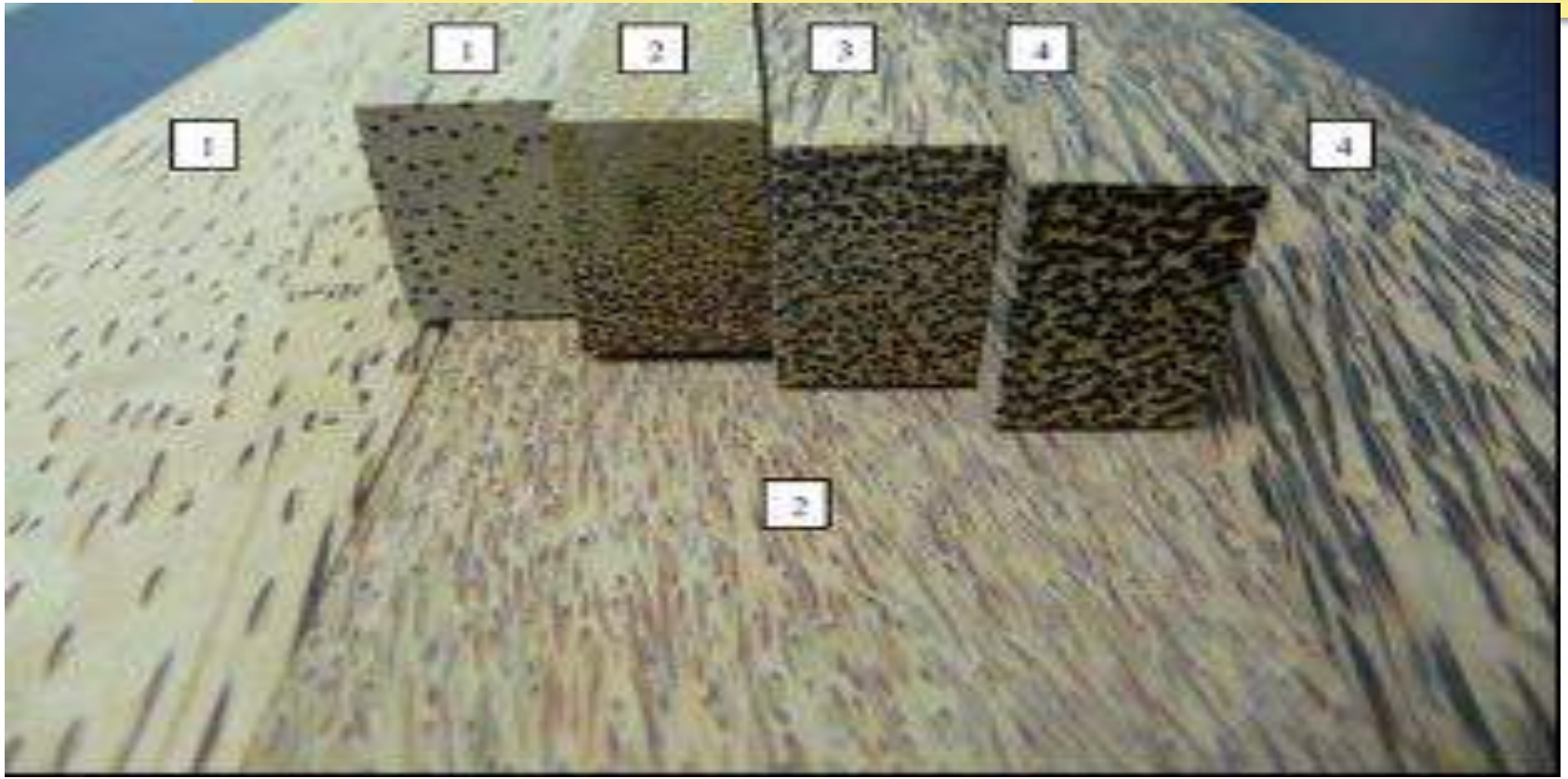
Cocowood

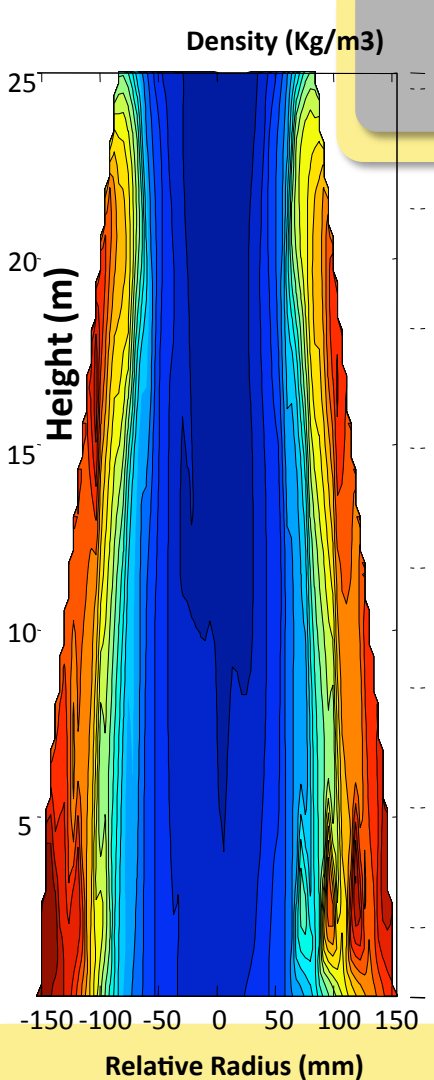





Density (Kg/m3
900
800
700
600
500
400
300
200
Height (m)
25
20
15
10
5
-150
-100
-50
0
50
100
150
Relative Radius (mm)

Cocowood

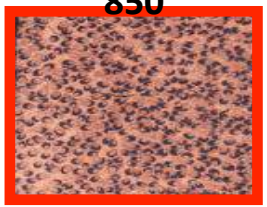








850



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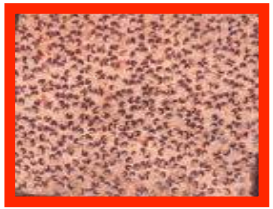

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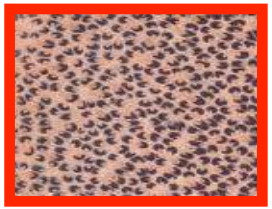


640

310

920

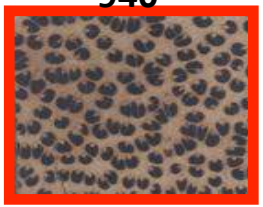
800

700

610

570

940



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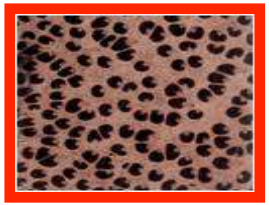

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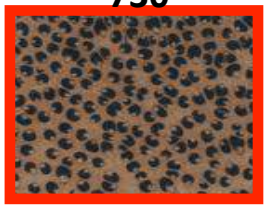

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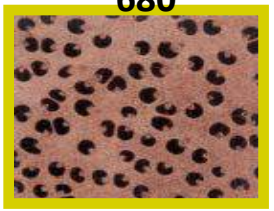


450

820

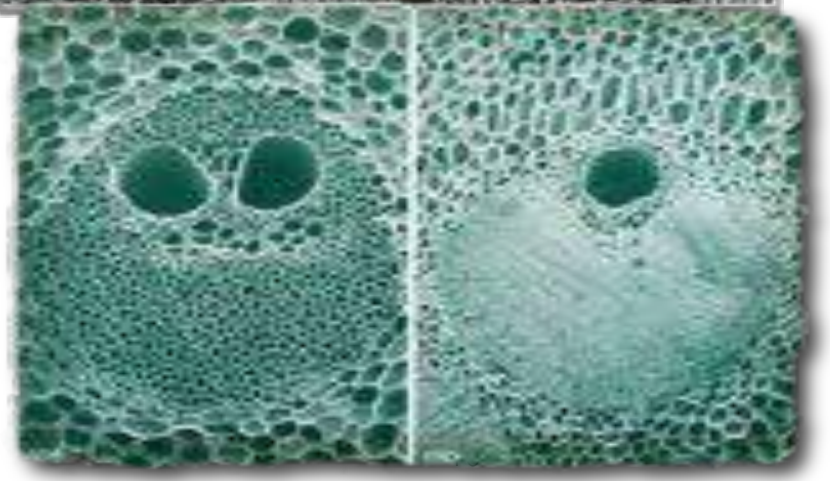
833

730

620

500

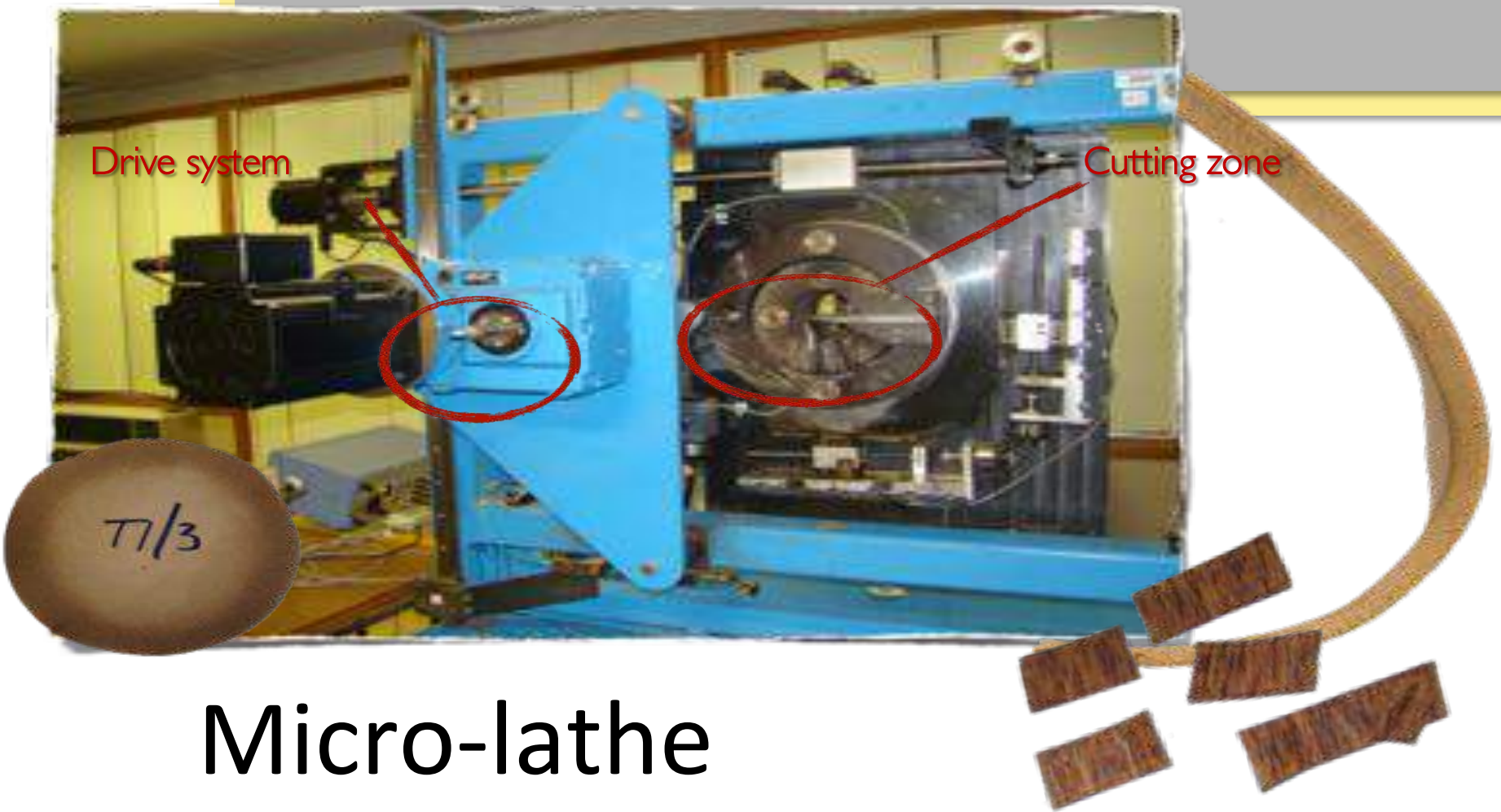
Cocowood



Peeling

+

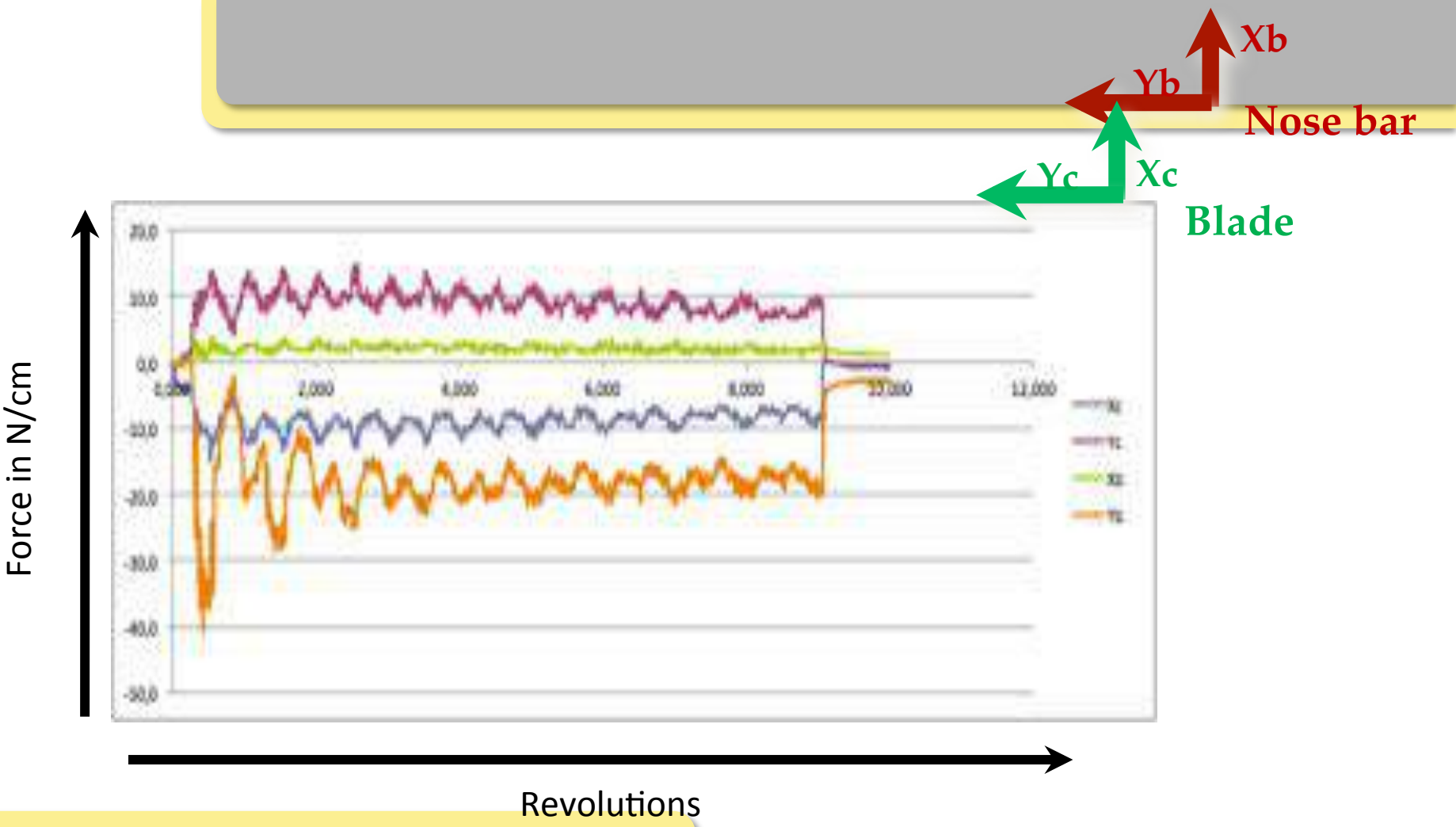
=

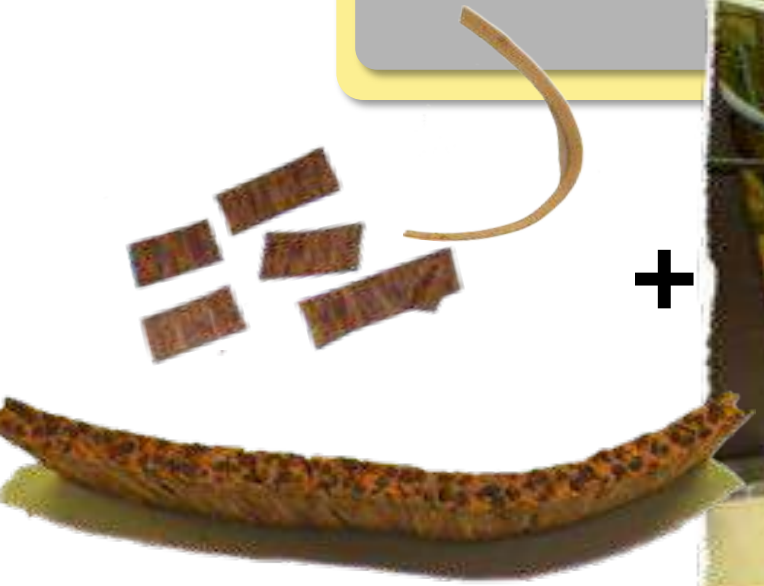


Micro-lathe

Classical
chuck system

Modification for
coco-disk


Xb
Yb
Nose bar
Yc
Xc
Blade
Force in N/cm
Revolutions



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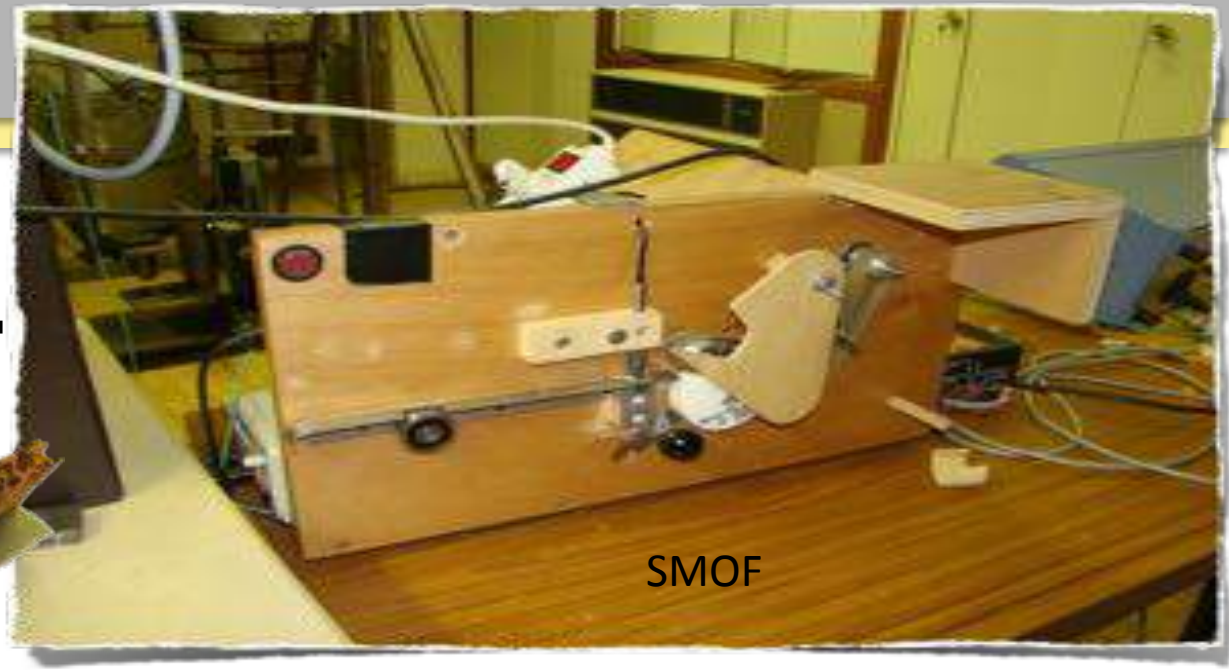
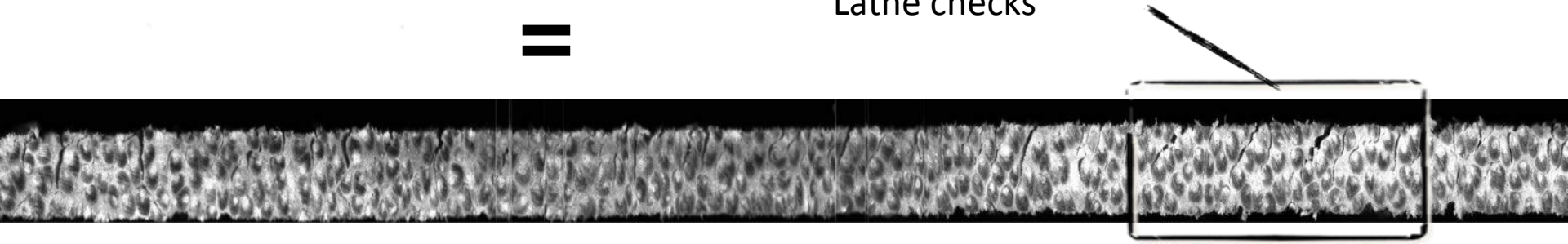
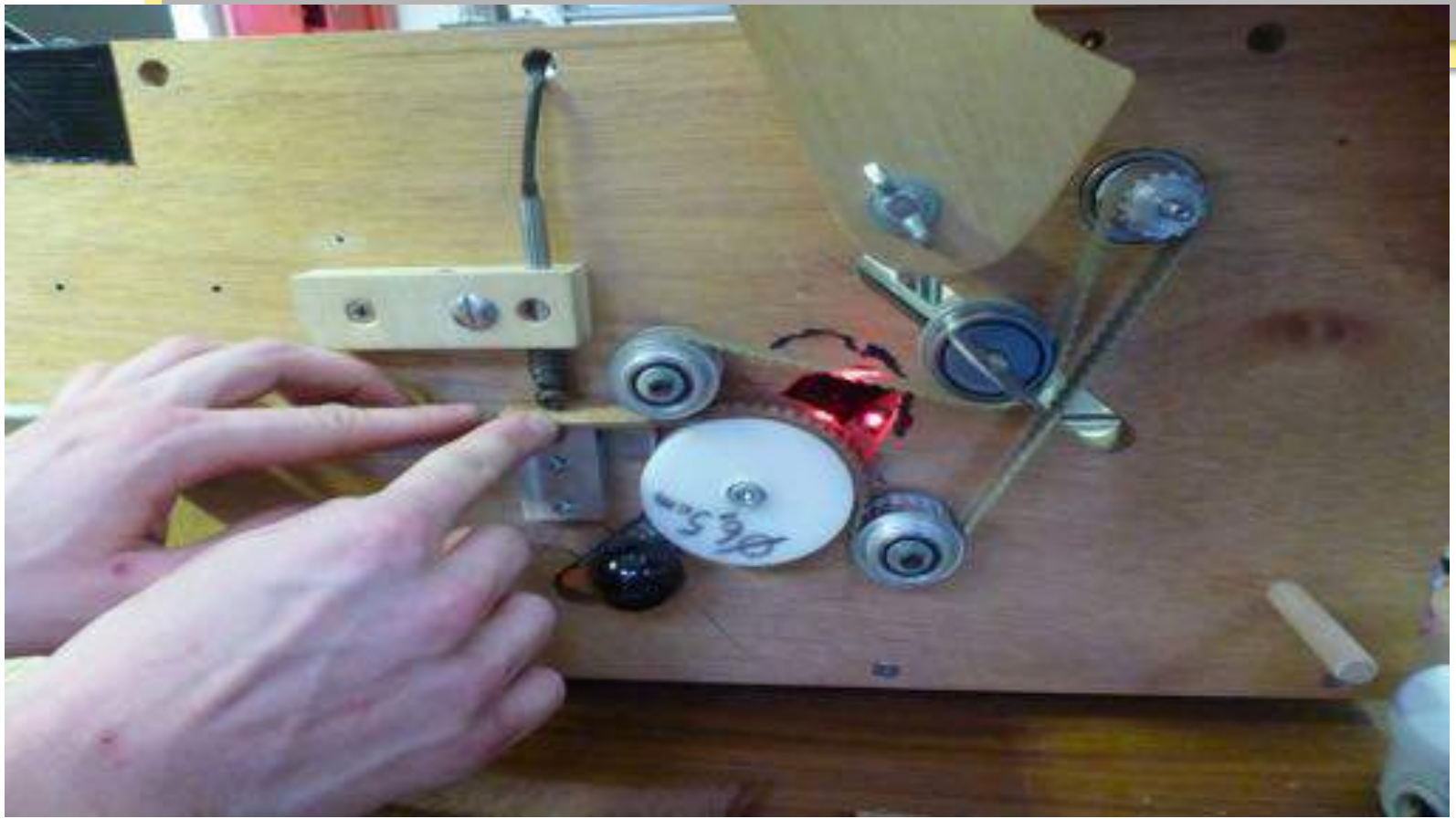


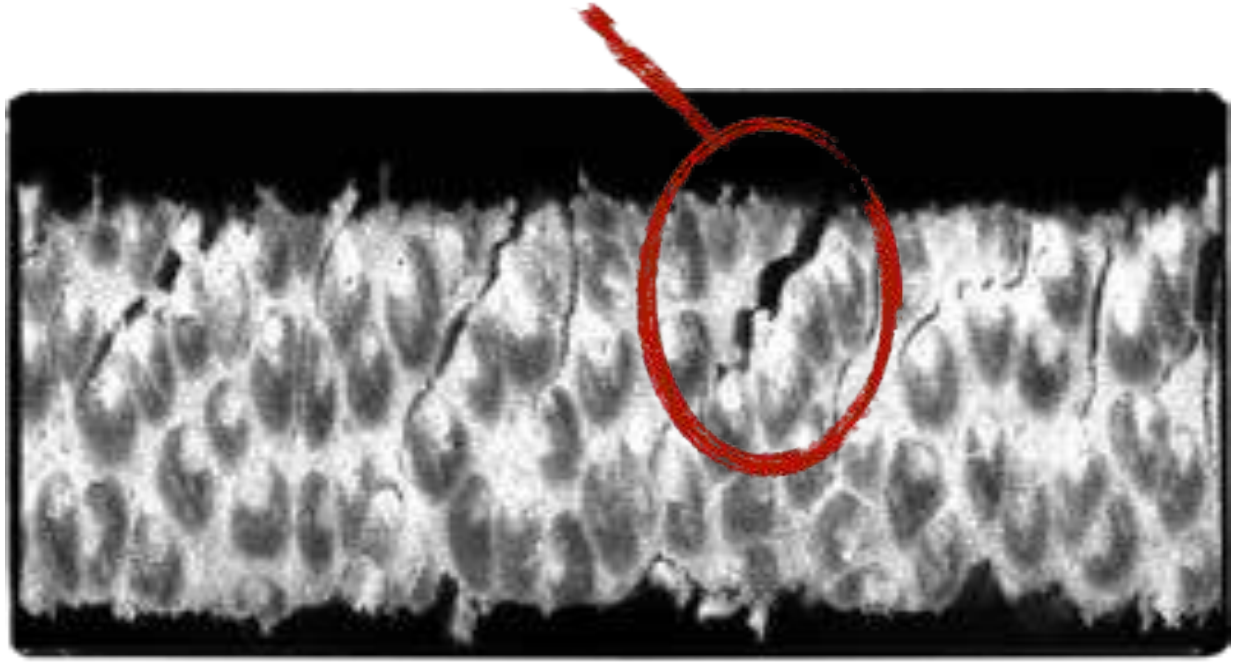
Lathe checks

=





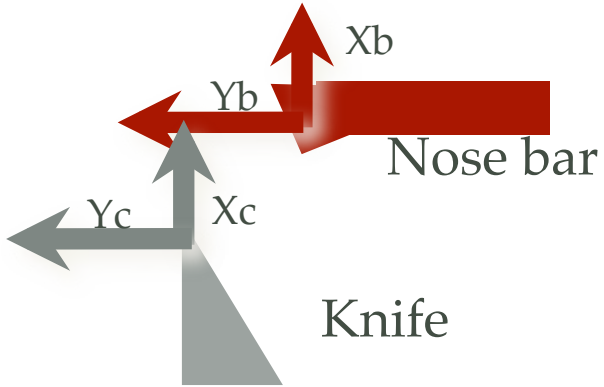
Lathe checks



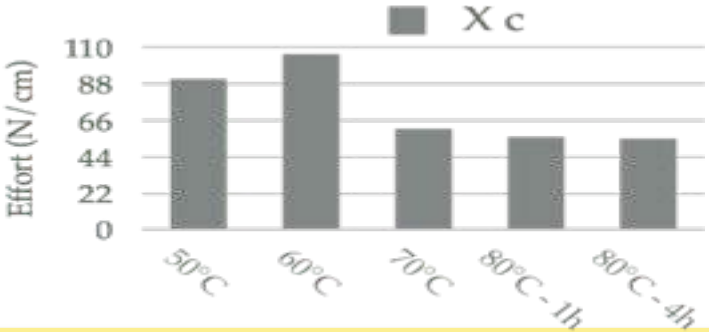
Temperature effect

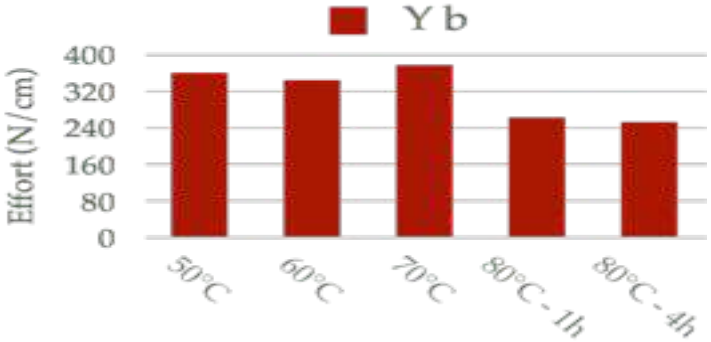
Experiment plan

	50 °C	60 °C	70 °C	80 °C
1h	x	x	x	x
4h	x	-	-	x



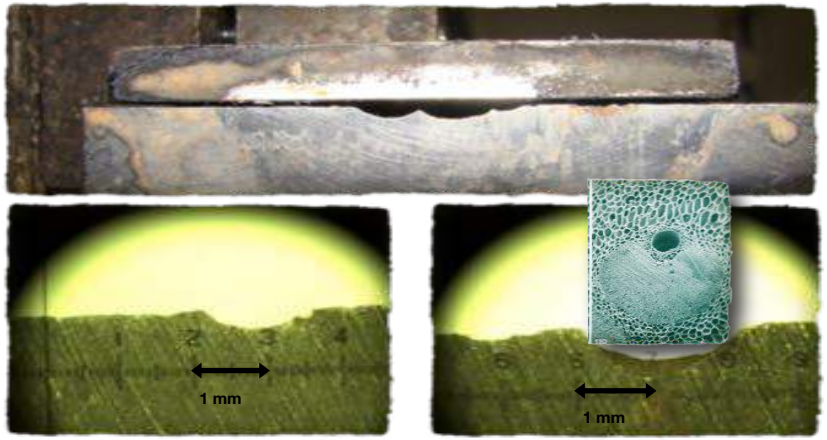
Results





Ambient Temperature

Damages on the knife



Conclusion

- Temperature
- Time

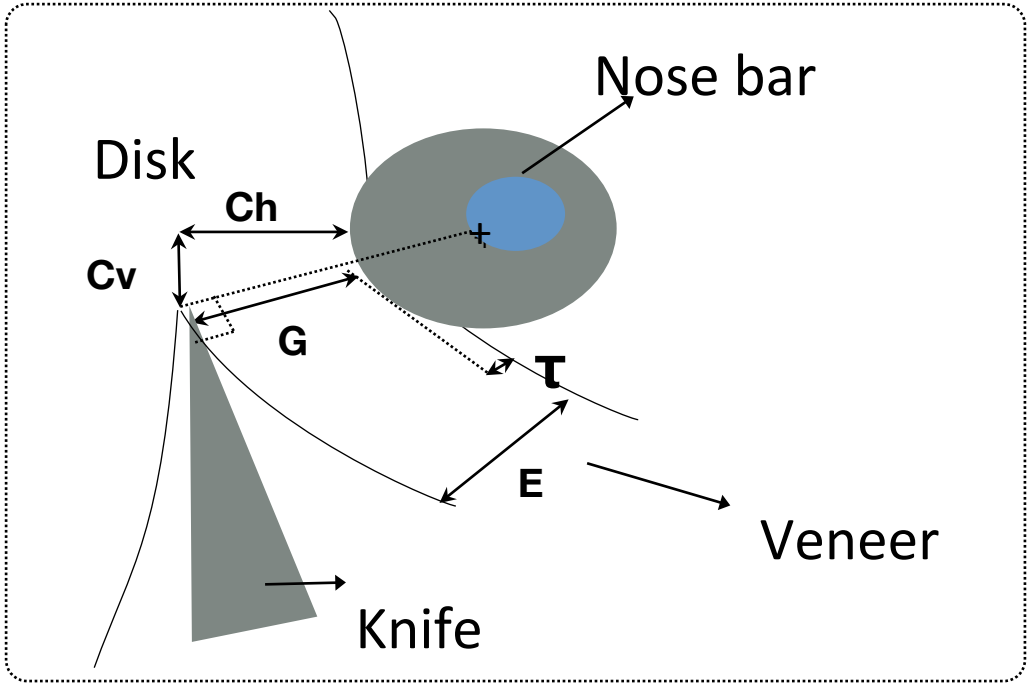
→

- 80°C
- 1 hour (disc)

Pressure

Definition

$$P = \frac{E - G}{E}$$



G : Gap between knife and nose bar

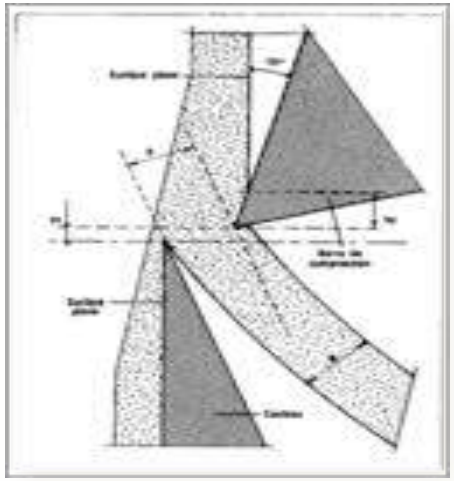
E : Veneer Thickness

Ch : Horizontal Gap

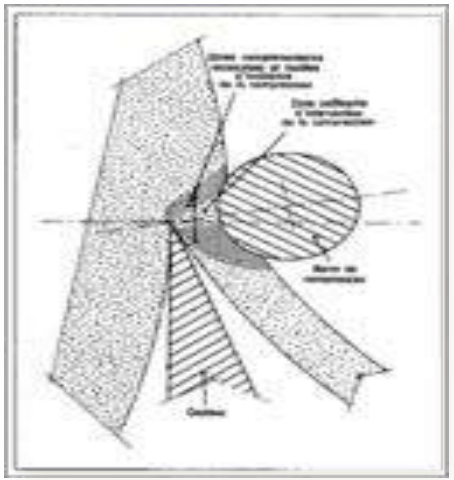
Cv : Vertical Gap

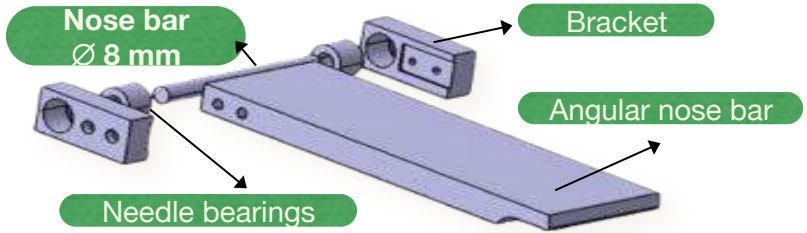
Nose bar

Angular



Cylindrical





Pressure

Experiment plan

Nose bar	5 %	7 %	10 %	12 %	15 %	20 %
Angular	x	-	x	-	x	x
Cylindrical	x	x	x	x	x	x

Observations

Angular:

- Chipping
- Image analysis (SMOF) **impossible**

Cylindrical:

- Continuous ribbon
  (low and medium density)
- Image analysis (SMOF) **possible**
  (low and medium density)

Pressure

Results

Ribbon quality	- -	-	+	+ +
Mean. Xc (N/cm)	-14,39	-11,35	-10,06	-7,50
Std Dev. Xc	2,34	1,78	1,62	1,09

Pressure	5 %	10 %	20 %
Mean. Xc (N/cm)	-9,05	-10,17	-15,10
Mean. Thickness (mm)	2,55	2,53	2,43
% lathe checks	47,89	45,48	49,97

5%

10%

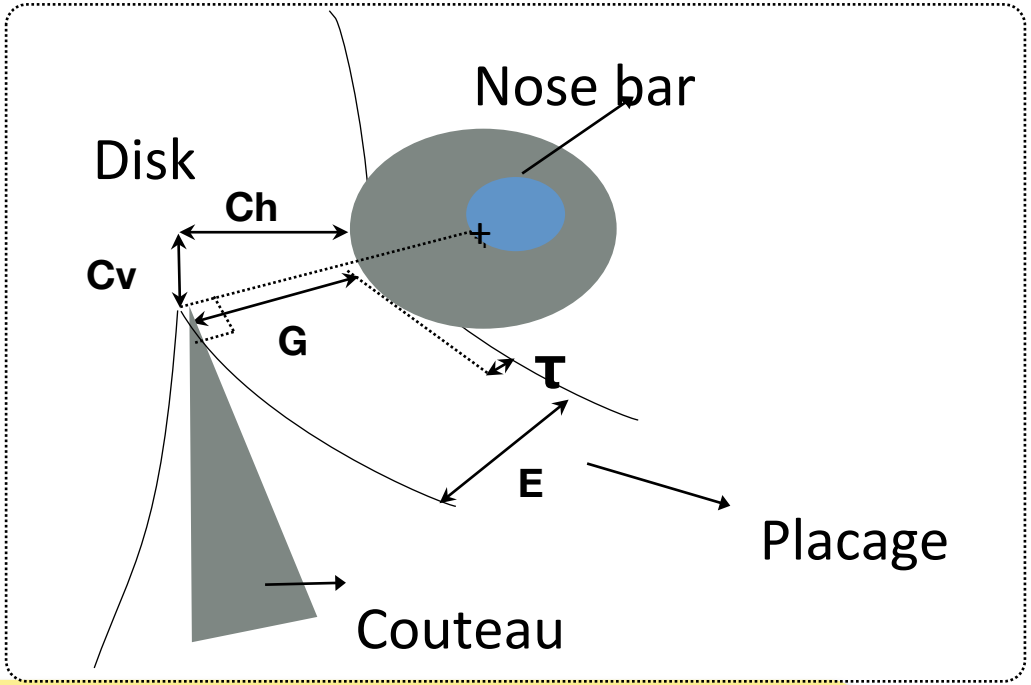
Conclusion

- 20% unfavorable
- 5% et 10% favorable
- 10% : Best quality

→ 10%

Vertical gap

Définition



Experiment plan

Cv	5 %	10 %	20 %
1,26	-	x	-
1,1	-	x	-
1	x	x	x
0,9	-	x	-
0,7	x	x	x
0,5	-	x	-
0,4	x	x	x
0,3	-	x	-
0,1	x	x	x

Vertical gap

Results

- Correlation -0,61 between thickness standard deviation and vertical gap.
- Effect of the diameter of the cylindrical nose bar?

Conclusion on the best settings

- temperature 80 °C and time (1h)
- cylindrical bar pressure
- 10% pressure

The implementation on production lathe will require a larger diameter cylindrical nose bar in order to make the pressure more uniform and get away from the stress field model of the angular bar.

Objective 4 – Peeling trials

Peeling in S. Pacific

Peeling trials

4.2 – Calibrating processing parameters at QDAFF Salisbury Research Facility

- Peeling trials in order to validate and refine parameters established during Trial 1
- Trial includes
  - Pre-conditioning
  - Peeling
  - Grading
  - Drying
  - Handling
- Using QDAFF lathe and new lathe

4.2 QDAFF Calibrating Trials

- Trial 2 – either with QDAFF or new lath
- Stems sourced from North QLD but low density
- Stems harvested in Taveuni, cored at Pacific Green and being shipped to QDAFF

Objective 4 – Peeling trials

Peeling in S. Pacific

Peeling trials

4.3 – Initial compact experimental peeling trial in Fiji

•Stems from two sites in Fiji processed to verify parameters developed

- Recovered material shipped to QDAFF used for production trials
- Stems to be
  - Peeled
  - Dried
  - Graded

Objective 4 – Peeling trials

Peeling in S. Pacific

Peeling trials

4.4 – Compact commercial peeling trial in Fiji

- Trial to asses viability of commercial production
- Stems from two sites in Fiji processed at VTB mill at Labasa
- Lathe setup verified
- Processing and handling protocols tested and refined
- Recovered material shipped to QDAFF used for product trials

Objective 4 – Peeling trials

Peeling in S. Pacific

Peeling trials

4.5 – Broad industrial peeling trial in Fiji

- Peeling trial at experimental facility in established in Fiji
- Stems from each resource centre peeled
- Material characteristics determined
- Peeling, handling and grading protocols tested
- High quality recovered material shipped to QDAFF for product tests

Objective 4 – Peeling trials

Peeling in S. Pacific

Peeling trials

4.6 – Properties and recovery assessment

- Recovered veneer quality assessed
- Strength, dimensional stability, gluing characteristics etc will be determined
- Recovery data collected for economic assessment

Objective 4 – Peeling Trials

Peeling in S. Pacific

Peeling trials

Key completion dates –

Activity	Planned	Actual
Disc peeling at ENSAM micro-lathes	Feb 2013	July 2013
Calibration peeling trials at QDAFF	Sep 2013	Feb 2014*
Peeling trial in Fiji	Sep 2014	Sep 2014*
Compact commercial peeling trial in Fiji	Jan 2014	
Commercial peeling trial	August 2015	
Recovered material assessments	after each peeling trial	

* Revised planned date

Objective 4 – Peeling Trials

Peeling in S. Pacific

Peeling trials

Key activities next 12 months –

Activity	**Anticipated completion**
Peeling trial 2 complete on modified lathe at QDAFF	February 2014
Advanced planning for Trial 3	

Questions