

British Conference of Undergraduate Research



# SAILING TOWARDS SUSTAINABLE FUTURE WITH WOODEN CARGO SCHOONER

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**Ville Lindén**

BEng (Hons) Yacht and Powercraft Design

2lindv20@solent.ac.uk

**Jean-Baptiste R. G. Soupez**

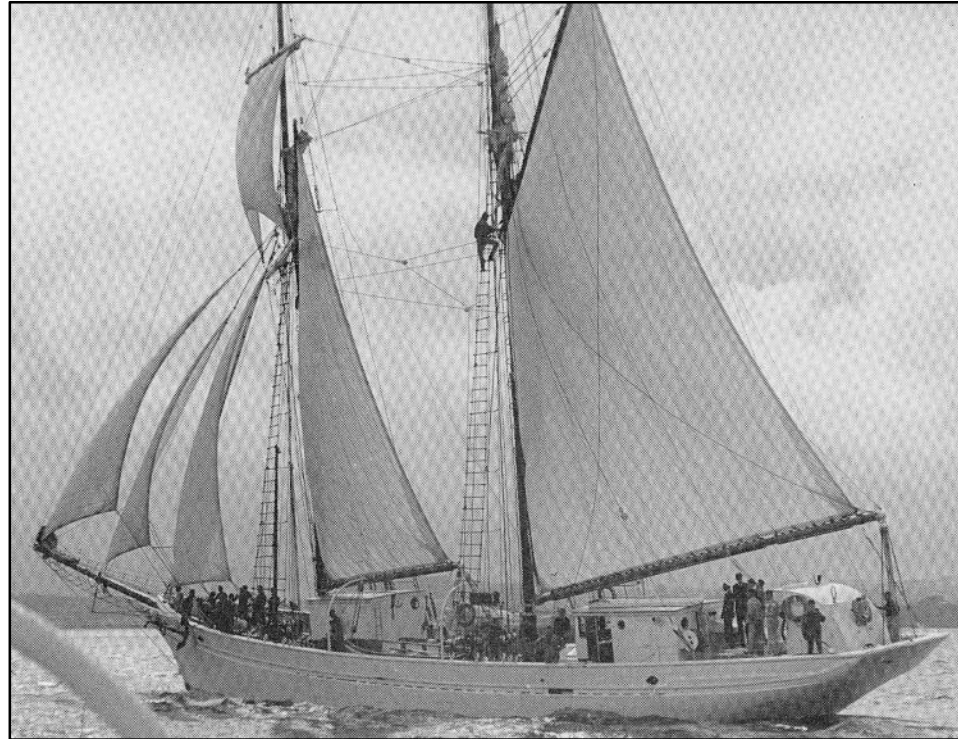
Senior Lecturer in Yacht Design and Composite Engineering

jean-baptiste.soupez@solent.ac.uk

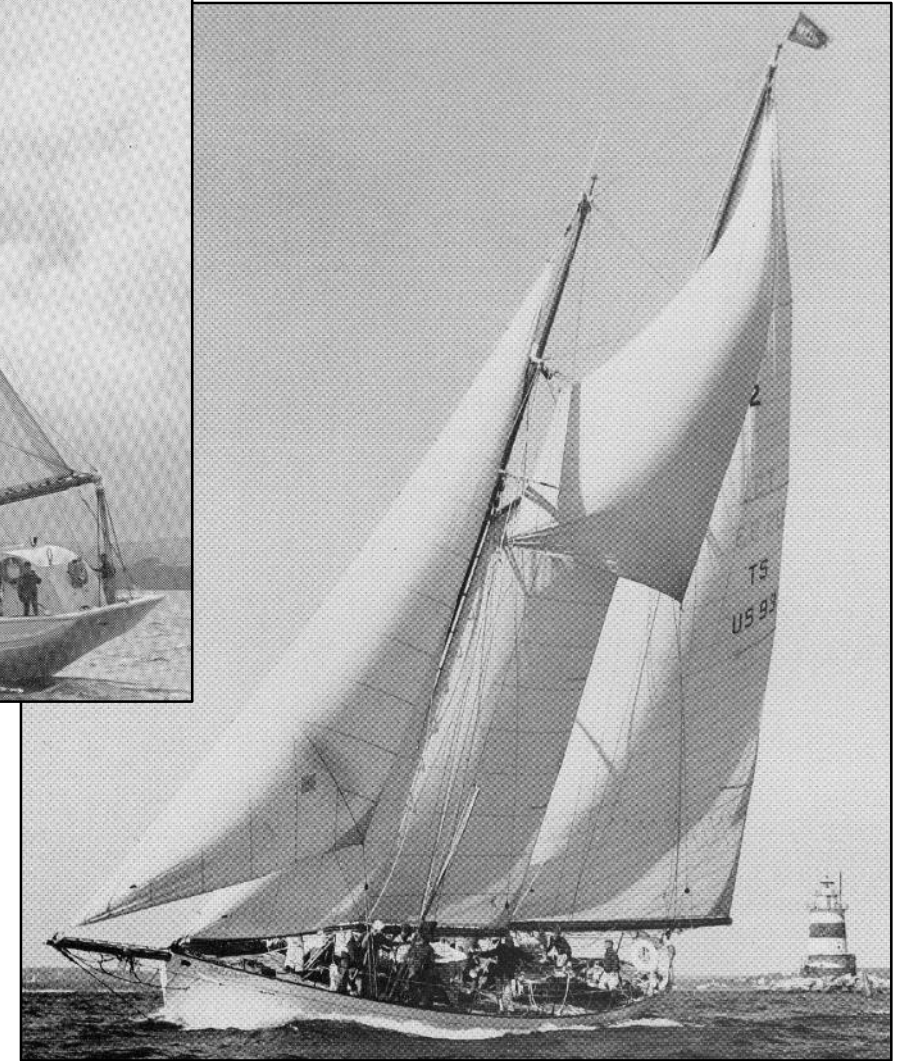


# INTRODUCTION

- AIM of the final year dissertation:  
Preliminary design of a cargo carrying sailing vessel about 60ft (20m) in length
- Intended for the use of small scale, sustainable transportation initiatives, mainly in 'third world' coastal communities



D. R. MacGrecor,  
The Schooner,  
p.177 & 182



**Introduction** – Background – Vessel Design – Research – Materials Testing – Results Analysis & Implications – Conclusions– Acknowledgements



# INTRODUCTION

- AIM of the final year dissertation:  
Preliminary design of a cargo carrying sailing vessel about 60ft (20m) in length
- Intended for the use of small scale, sustainable transportation initiatives, mainly in 'third world' coastal communities
- Local timber species as main construction material
- **OBJECTIVE:** Feasibility of using laminated timber instead of solid one investigated from the environmental impact point of view



Introduction – Background – Vessel Design – Research – Materials Testing – Results Analysis & Implications – Conclusions– Acknowledgements

## BACKGROUND

- Interest towards sailing cargo vessels growing with increasing climate change awareness
- Traditional or more high tech approach?



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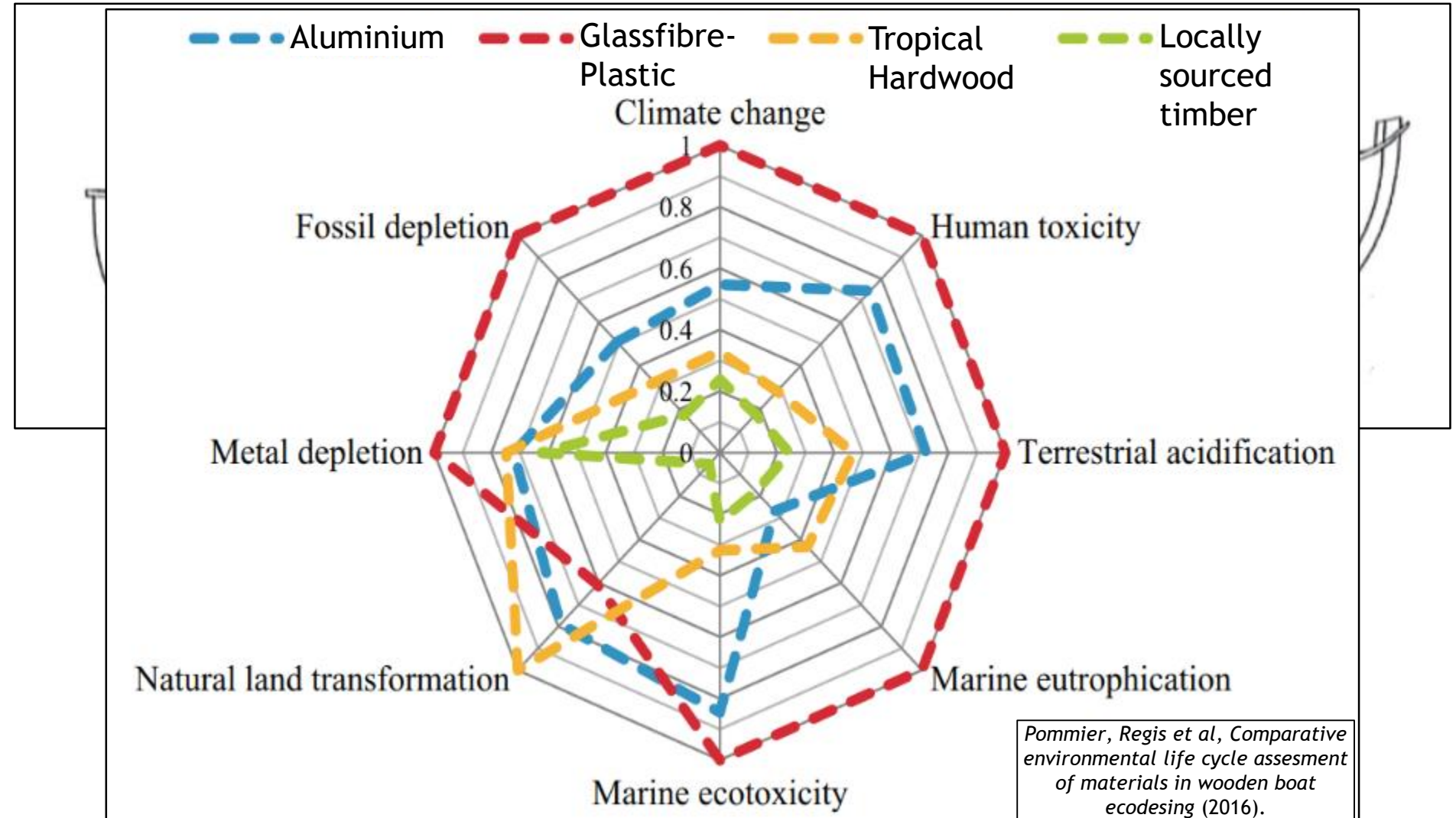
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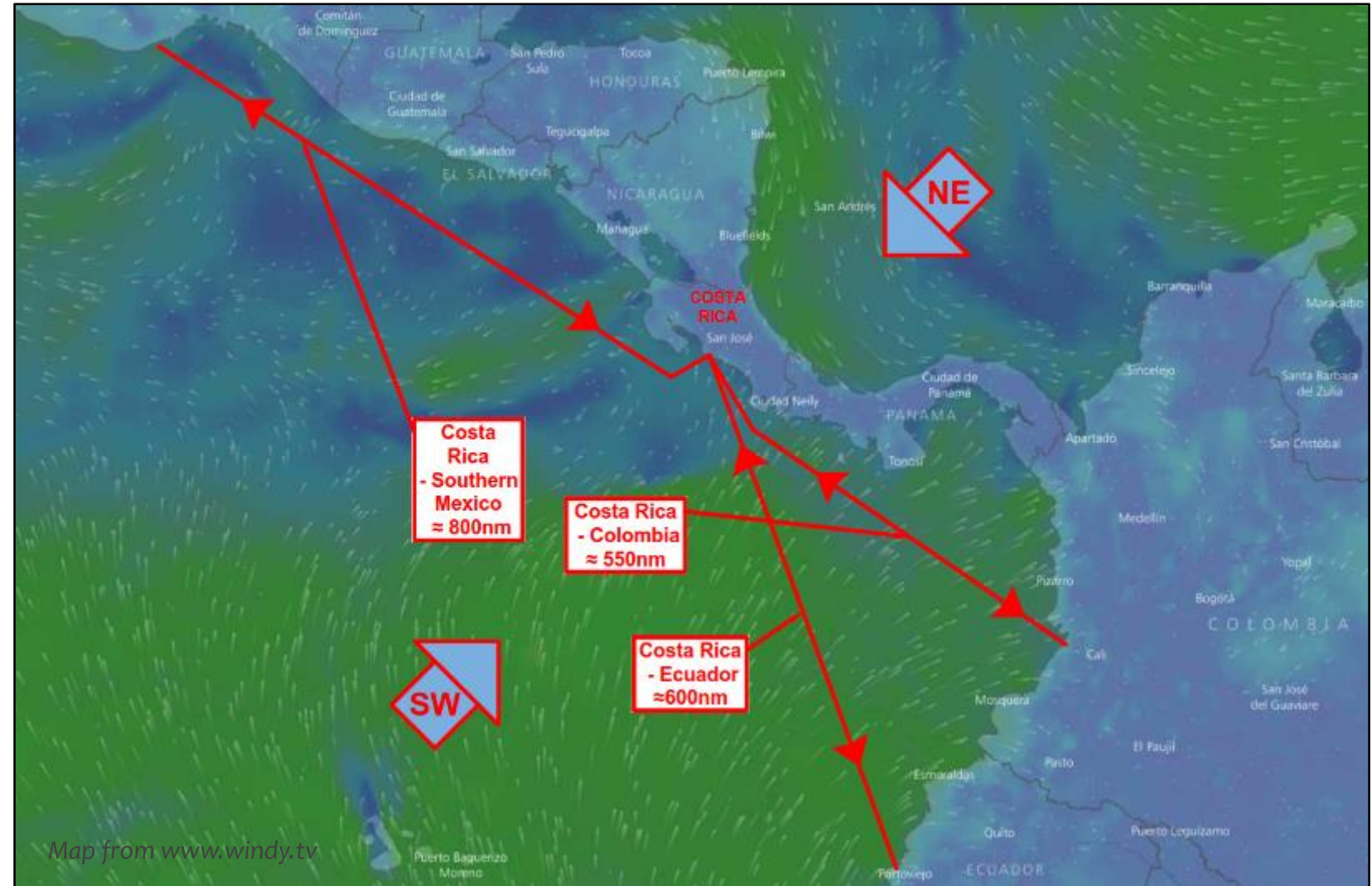
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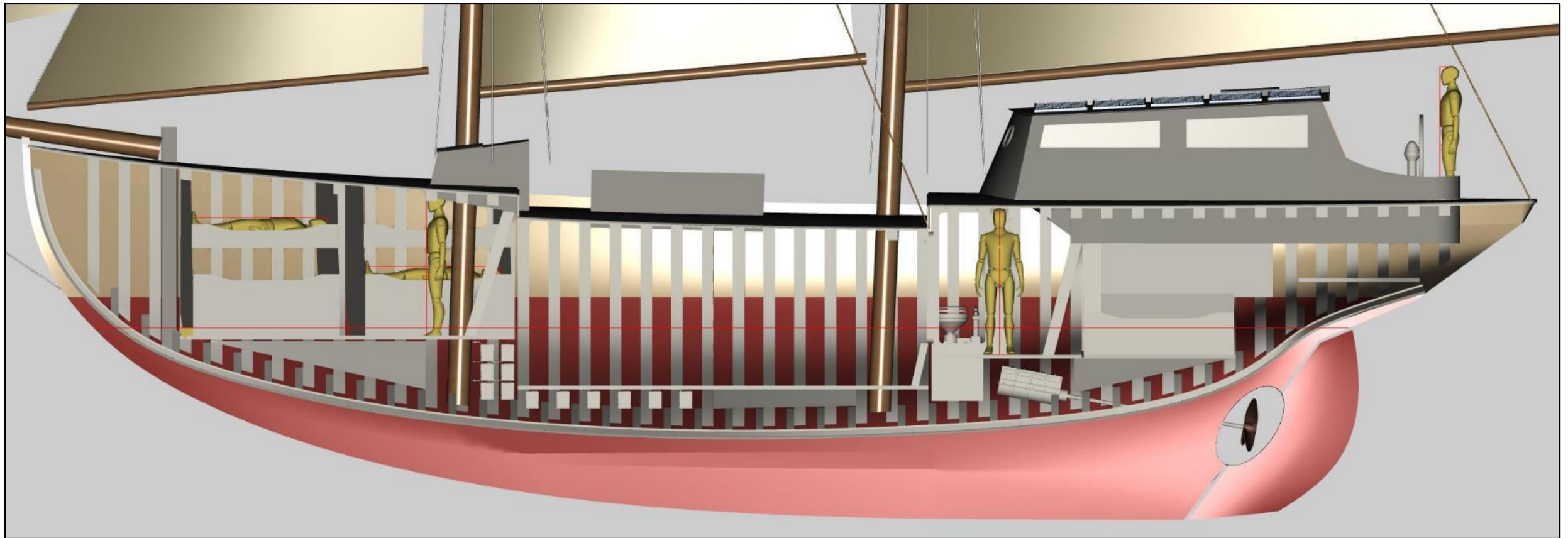
# VESSEL DESIGN

- Pacific Coast of Central America as example area of operation
- 600+ nautical miles range with 4-6 crew
- Able to carry 20t in dry goods (e.g. cocoa or coffee beans)



## VESSEL DESIGN

- Economical and easy to build in low-tech environment
- Sustainability taken in account on all aspects of design



Introduction – Background – **Vessel Design** – Research – Materials Testing – Results Analysis & Implications – Conclusions– Acknowledgements



- Could modern adhesives reduce the amount of wood waste and promote the use of plantation grown timber in boat-building?



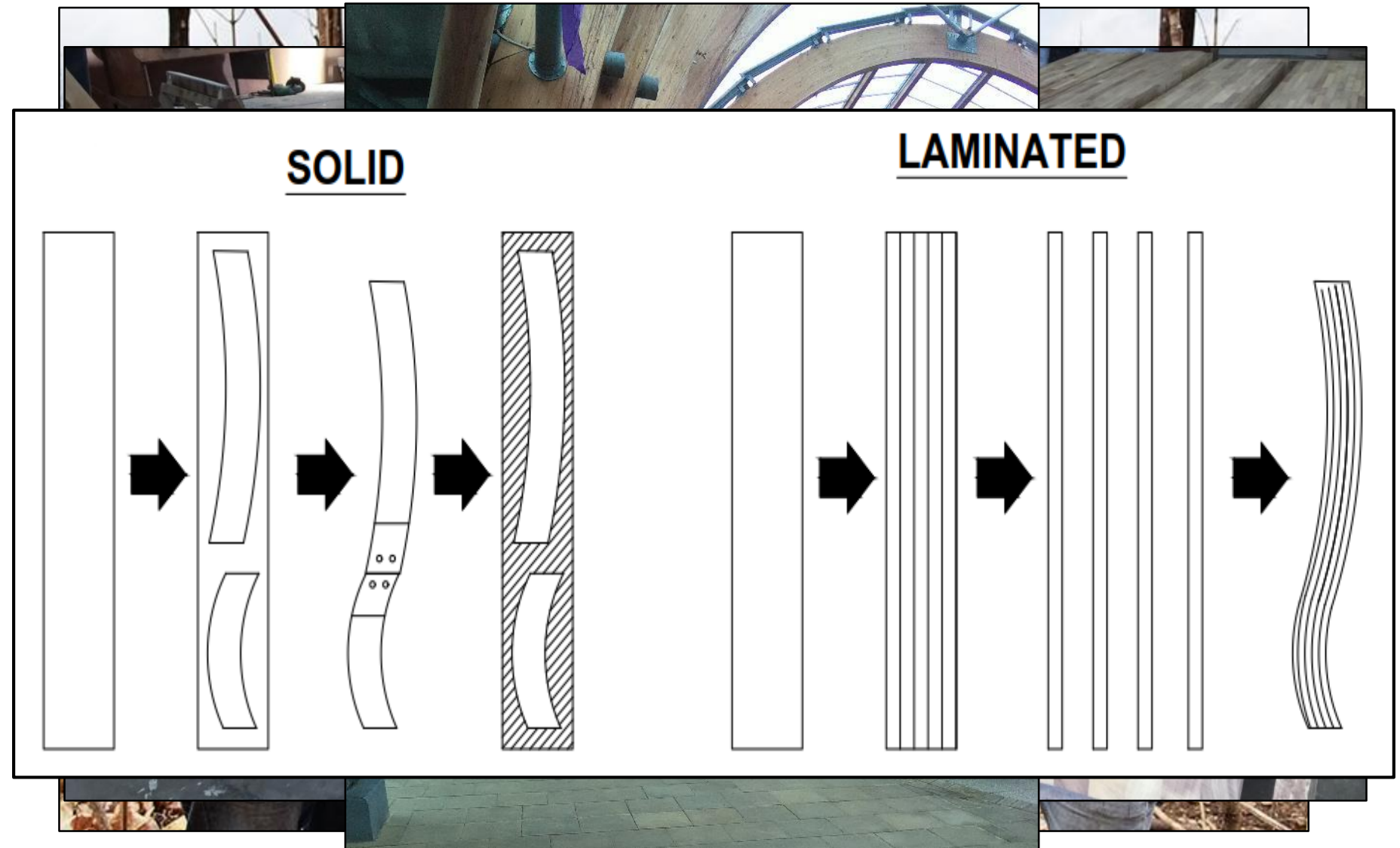
Sailcargo Inc



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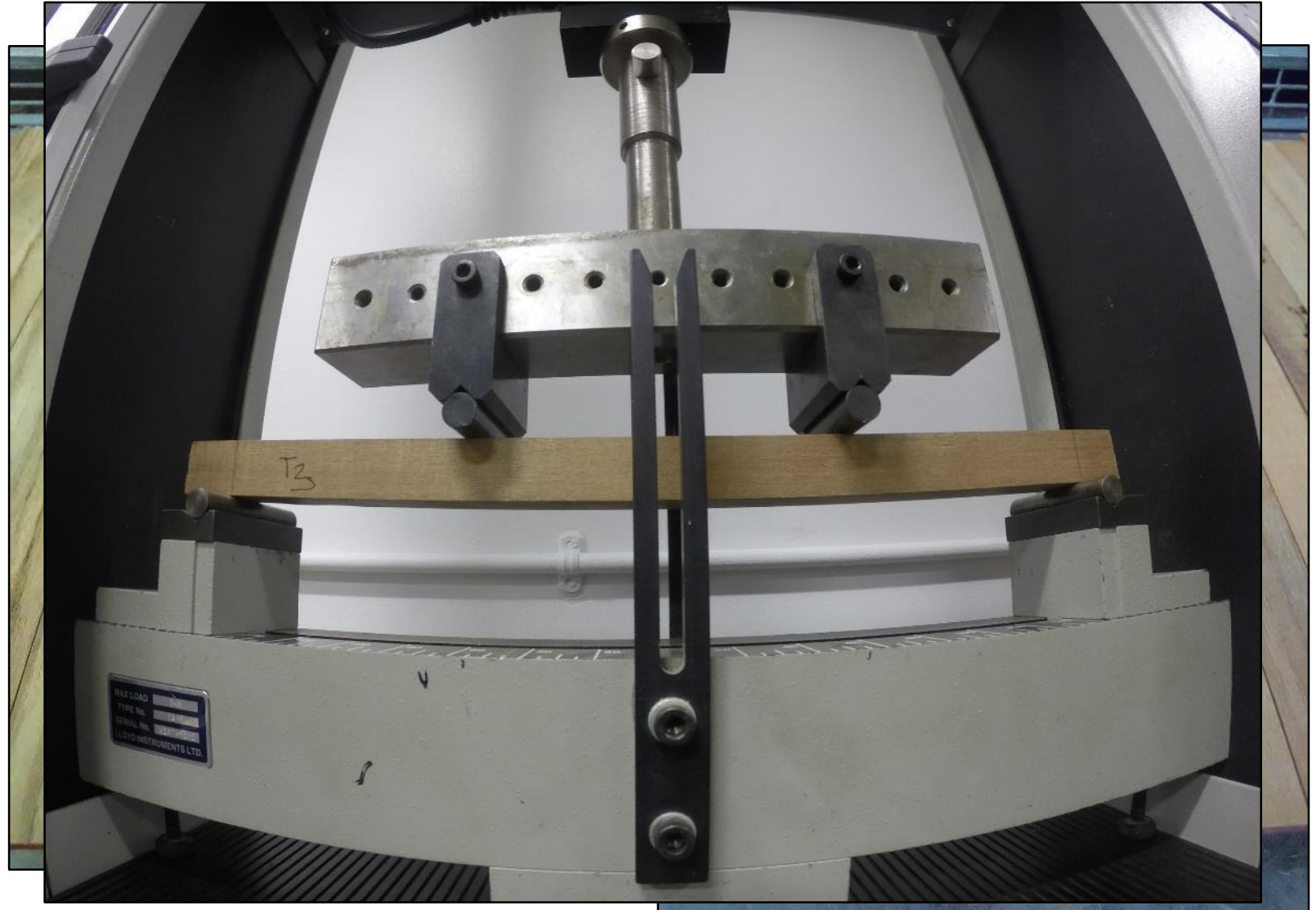
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## MATERIAL TESTING

- Timber samples from Costa Rica for 3 species with boat-building (and plantation) potential
- Cut to small strips and glued back together with 3 different types of glue
- Tested in lab conditions for their key mechanical properties
- Could the same strength be achieved by using smaller, slightly lower quality timber in laminated form, than with solid, high quality timber with large dimensions?

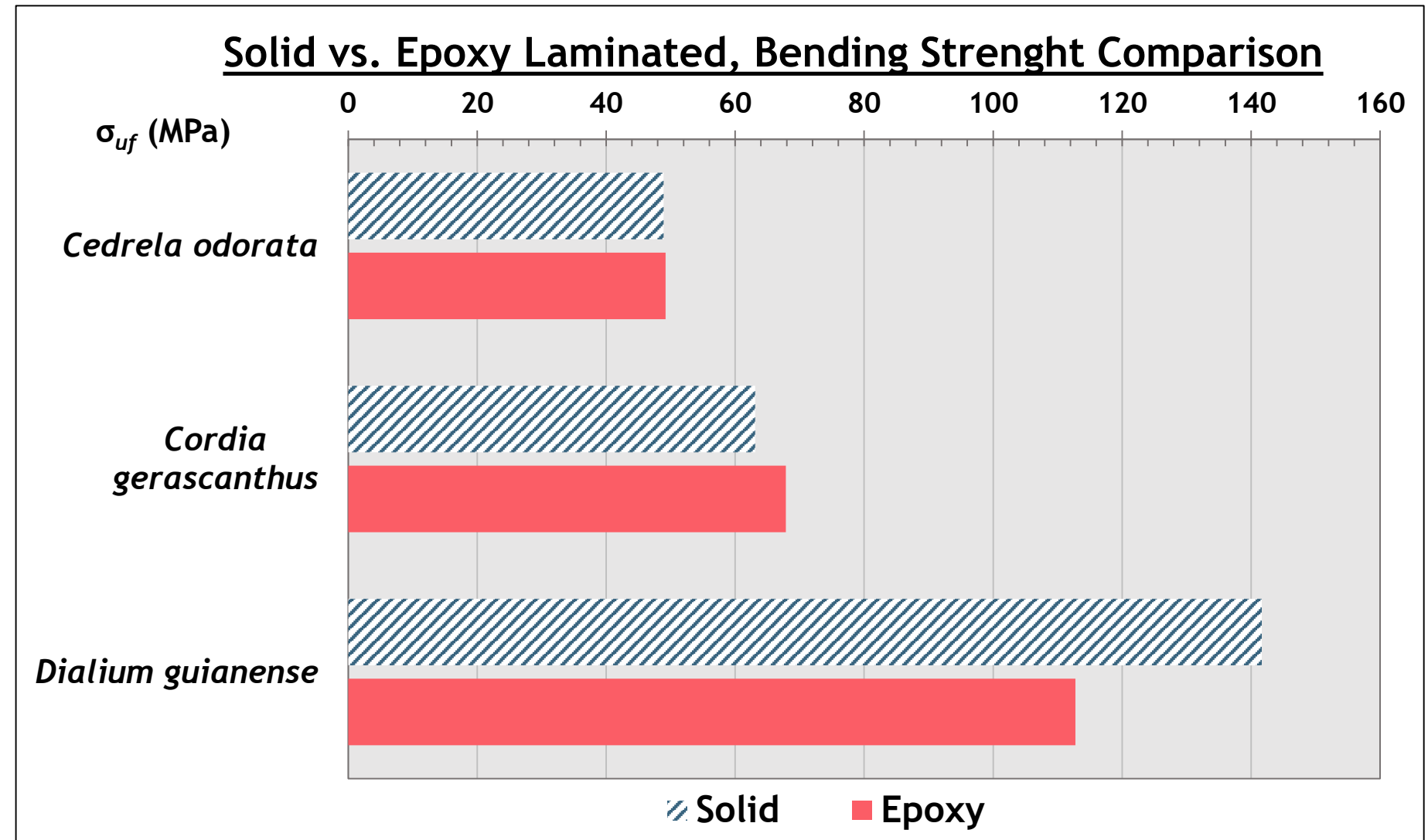


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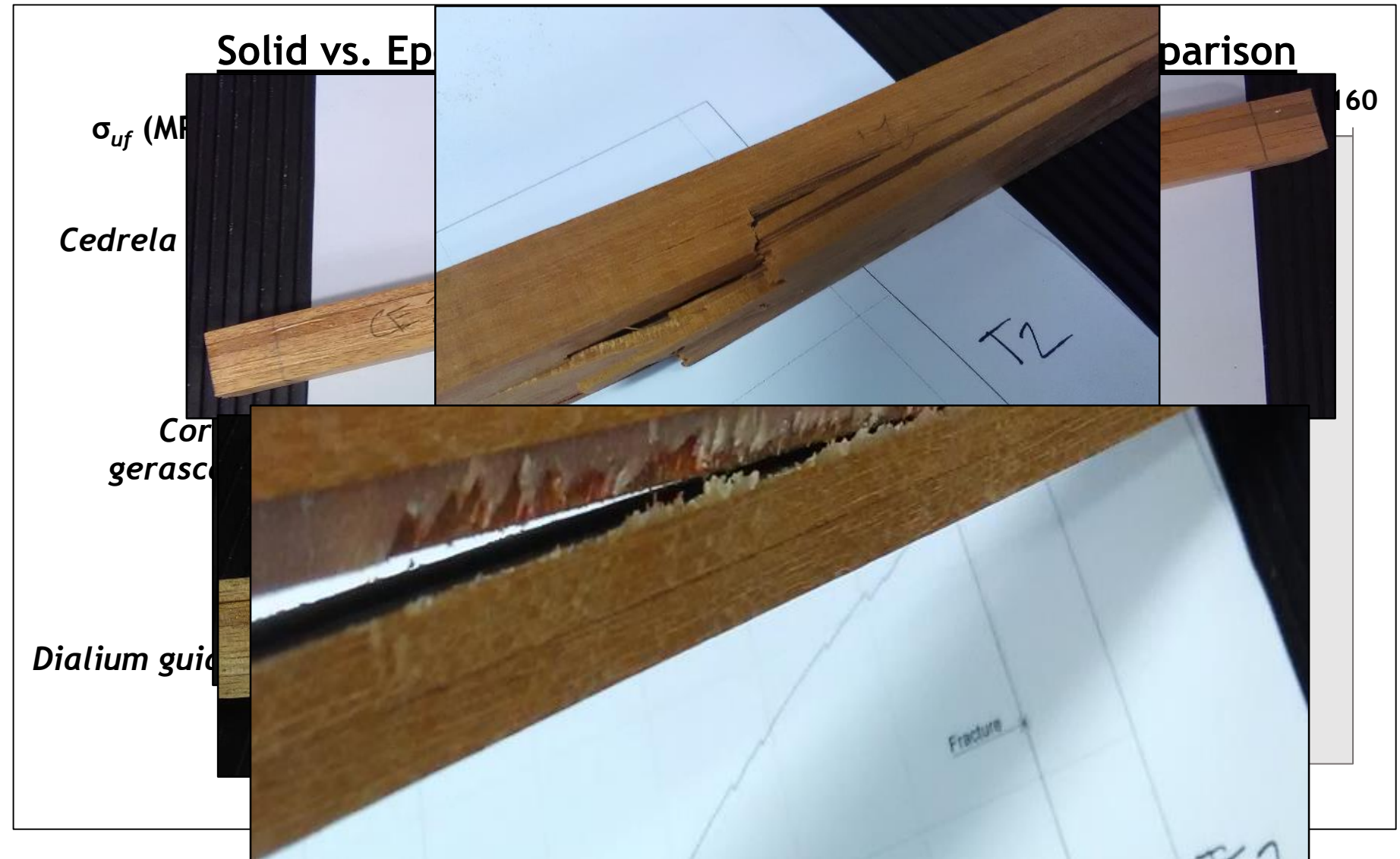
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- Very similar bending strength between solid and laminated timber
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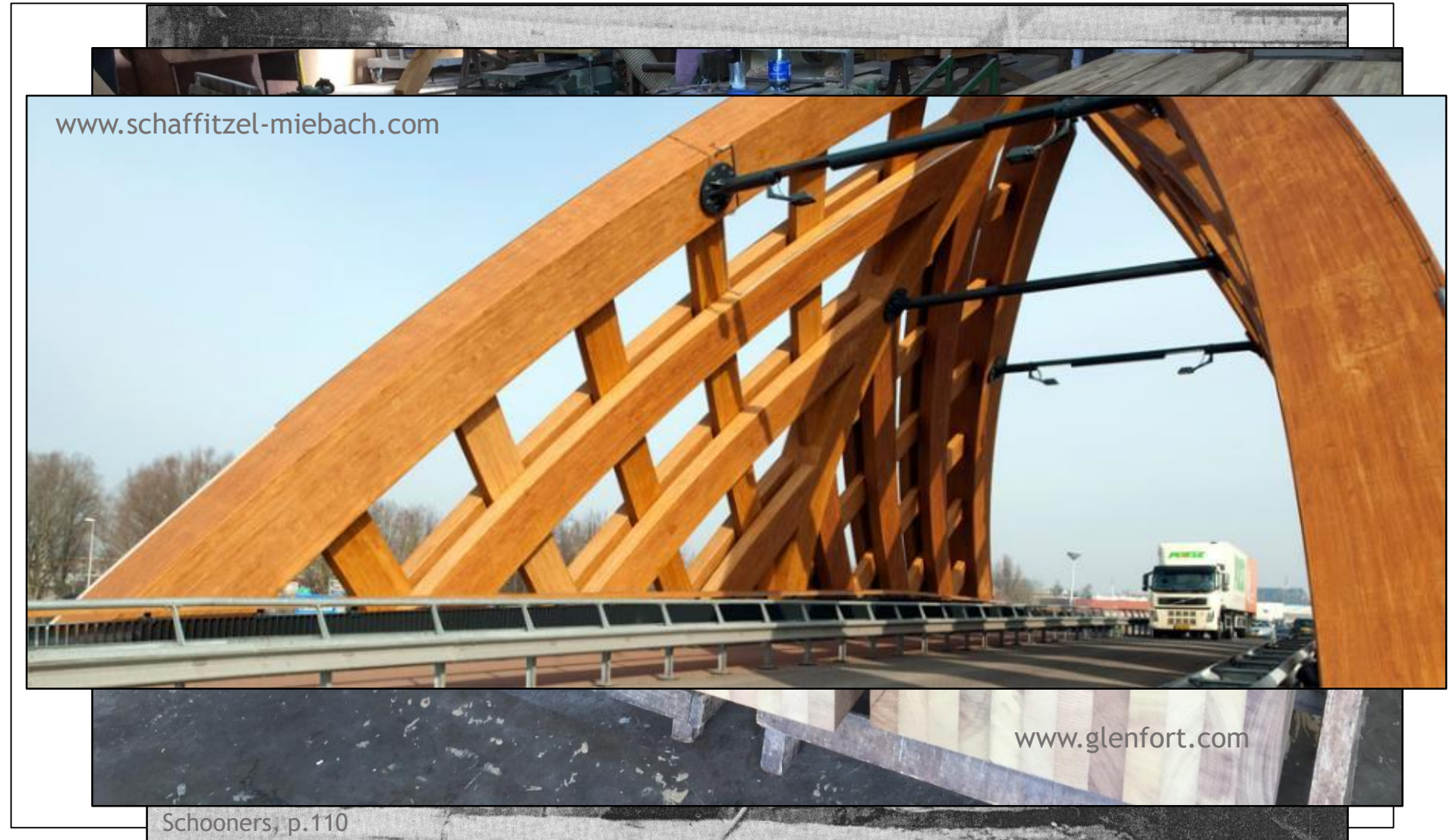


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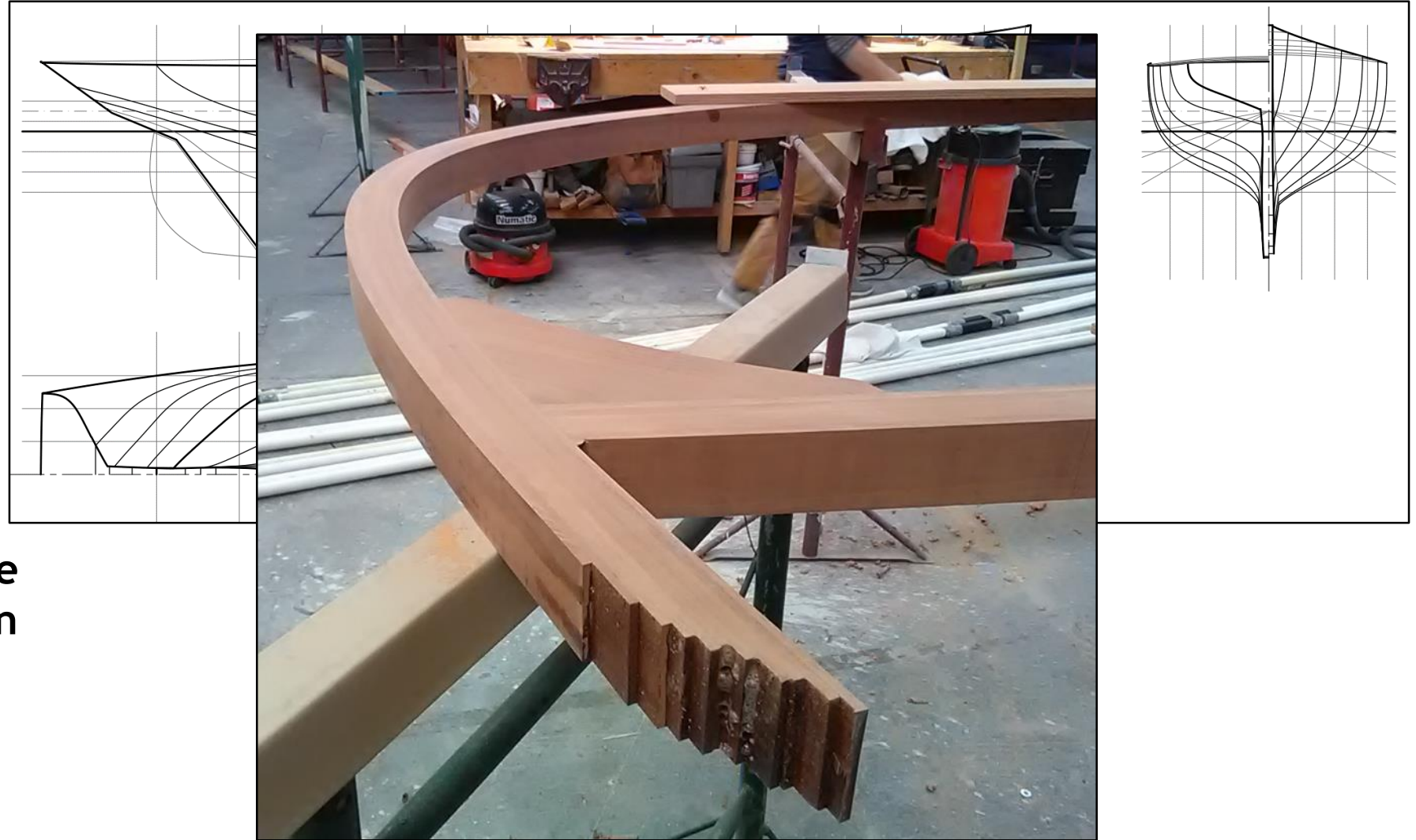
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- Very similar bending strength between solid and laminated timber
- Only marginal gains in strength achieved by lamination
- Different failure modes between species → How well the glue is working
- **Laminated timber deemed to be viable option from sustainability point of view**



## CONCLUSIONS

- Preliminary design of small scale sailing cargo vessel
- Material testing based study for environmental implications of the usage of laminated timber on vessel's structure
- **Positive results of the materials testing endorse the usage of laminated timber on vessels structure with clear on other industries too**





# ACKNOWLEDGEMENTS

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- *Lynx Guimond* from *Sailcargo Inc.* in Costa Rica who helped to source the timber and get it sent over







THANK YOU!

*Ville Lindén*

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2lindv20@solent.ac.uk



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