

BACKGROUND:

- Celilo Cycles has been experimenting with building carbon fiber reinforced wooden bike frames.
- Wood provides desirable strength and damping qualities that is amplified by the internal carbon fiber.



PROJECT GOAL:

- Add safety and reliability standards and checks to the manufacturing process.
- Decrease process time to ramp production.

AREAS OF FOCUS:

- Build bike frames to understand process deficiencies.
- Build new sanding room with improved layout and operator safety.
- Investigate internal carbon fiber inconsistencies and develop new manufacturing techniques.



# WOODEN BIKE FRAME DFM

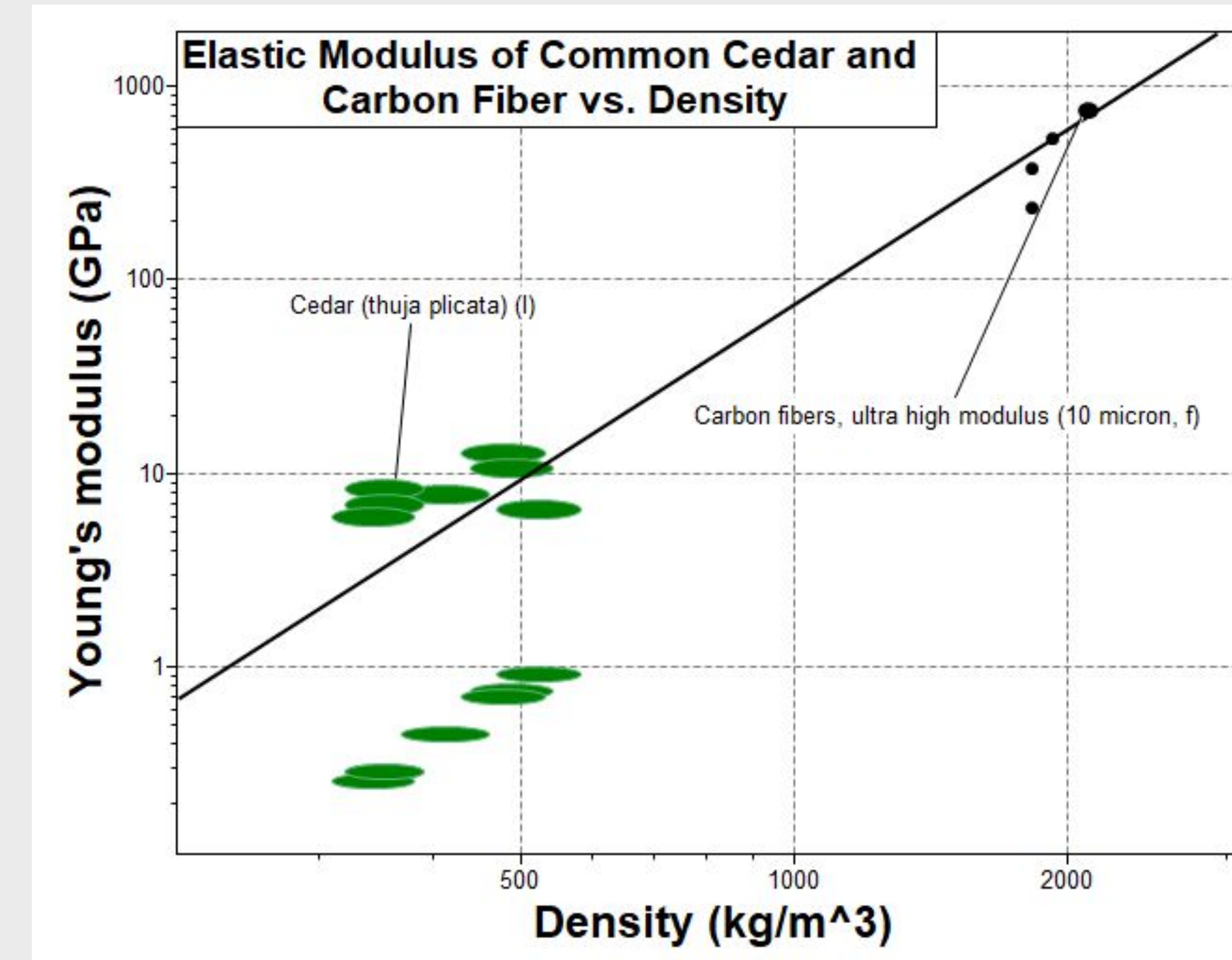
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WHY WOOD?

- Wood has excellent damping properties to reduce vibrations on rough rides.
- In deflection, wood has a better strength to weight ratio than many carbon fibers.
- By using thicker sections of wood and reinforcing with carbon fiber, the rider can benefit from the stiffness of the carbon and the damping of the wood.



PROJECT RESULTS:

SANDING ROOM

- Achieved airflow 4x greater than OSHA requirements
- Dust is removed from operator while shop is in use
  - This improves comfort and production efficiency
  - Reduces the FOD left on the part.
- New fan helps circulate air through entire shop
- More organized work area improves productivity



AIR BLADDER

- New bladder could supply 1.5x greater curing pressure.
- Carbon fiber cured directly to corners without gaps
  - Improving the strength and durability of the frame
- The improved custom bladder results in a stronger bond. (compared the the right.)
  - Image below shows one of the mold prototypes.
- Air bladder design helps reduce carbon layup process from 4 days to 1 day.



Initial System:

SANDING ROOM

- The original sanding room could not sufficiently pull debris from the work area.
- Debris would exit the sanding area and leave dust covering tools across the shop.



Air Bladder

- Bike inner tubes were used to press carbon sleeves into the frame while curing.
  - Inconsistent pressure left voids and had overall poor adhesion

