Breaking Point:
Calculating the Modulus of Rupture in Balsa Wood

PRESENTER:
Team F2

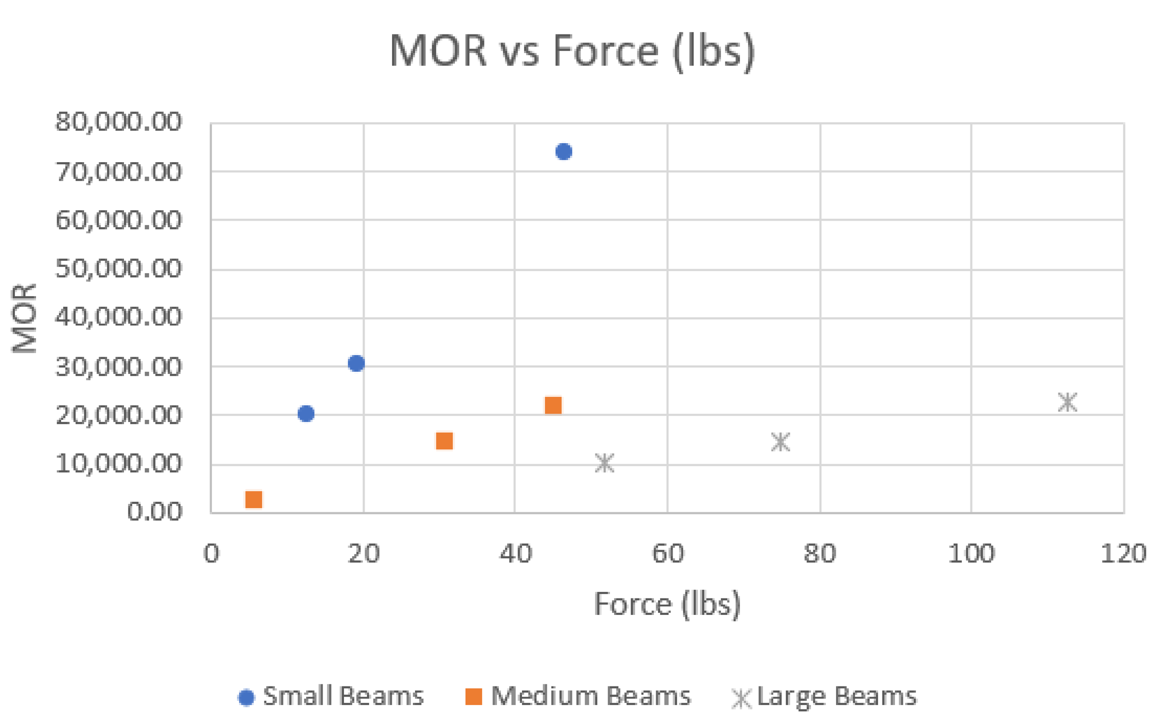
BACKGROUND: The modulus of rupture is the physical limitation of a material. It serves as the boundary separating a firm structure from a destroyed one. Without this value many lives could be lost due to the unknown limitations of a material.

Balsa wood was chosen as a cost effective and relatively low MOR option. This material perfectly demonstrates how the force applied correlates to the modulus of rupture.

METHODS

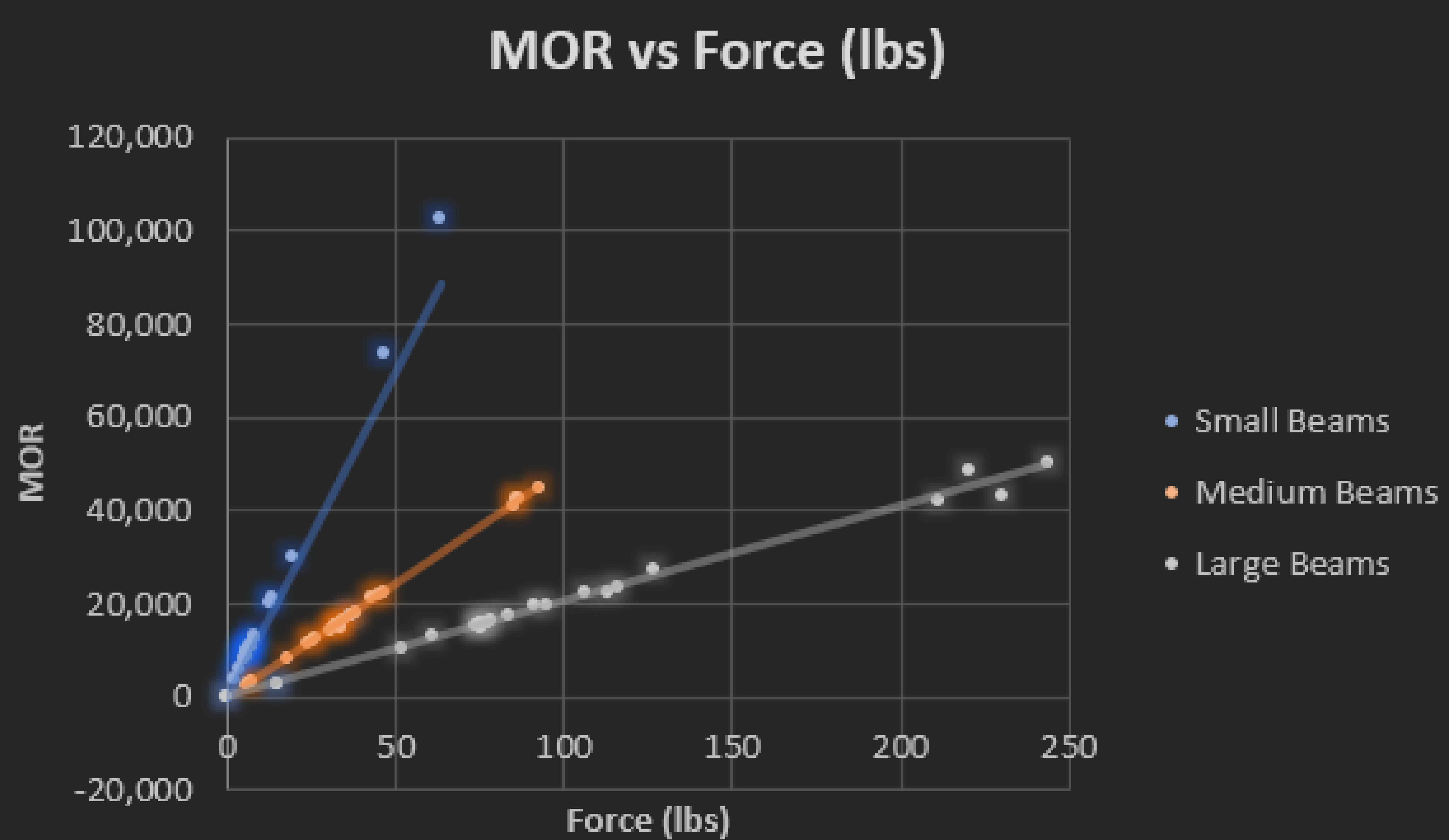
1. This study found the modulus of rupture in balsa wood dowels.
2. Using a lever and sensors, the recorded force is compared to the time in which the wood ruptures.
3. These inputs were recorded in MATLAB to visualize the amount of force until the object finally broke.
4. The calculated MOR was done using a series of equations within the MATLAB program.

Figure 1
Visualizing how much force was required to rupture balsa wood dowels.



The modulus of rupture is correlated with the dimensions of the material. As size **increases** the required force to **rupture** also **increases**.

Figure 2
Visualizing the correlation between force and beam size.



Data collected from 20 other experiments performed by colleagues..

AMMO BAR

	Width (in)	Height (in)	Length (in)	Force (lbs)	MOR
Trial 1	0.263	0.249	4	6.043	8,894.25
Trial 2	0.249	0.250	4	7.033	10,846.07
Trial 3	0.249	0.245	4	5.004	8,035.21
Trial 4	0.372	0.362	4	26.080	12,839.81
Trial 5	0.368	0.367	4	84.907	41,112.59
Trial 6	0.368	0.367	4	24.241	11,737.67
Trial 7	0.486	0.490	4	77.399	15,919.09
Trial 8	0.474	0.485	4	126.846	27,304.00
Trial 9	0.473	0.481	4	91.341	20,032.06

Gabe DiMartino, Payton Peters, Alex McCulloch, Noah Sabra