Designing and machining stages for flexural testing of rodent bones

Healthy bone is a complex hierarchical composite that is both strong and tough. However, the skeleton can lose its ability to resist fracture with aging as well as with diseases such as diabetes and kidney disease. In order to understand how aging and disease interfere with the strength and toughness of bone, we usually need to study bones from small animals (mice and rats).

In my research, femurs from mice and rats need to be tested in three-point bending (3PB) and four-point bending (4PB). Bending stages currently available at MSU are not suitable for these small bones (typical femur length 10-20 mm). The stages need to have sliding spans and appropriate dimensions of supports. The stages also need to interface with a specific load frame on the MSU campus. The team that takes on this challenge will need to research and understand specifications for flexural testing (3PB and 4PB) of rodent bones, propose designs that meet these specifications and interface appropriately with the load frame, and then machine these two stages.

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