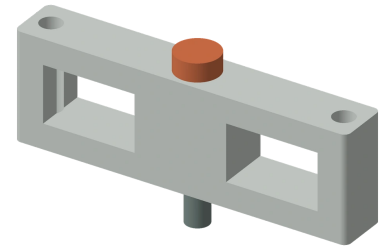


## STRUCTURAL ANALYSIS

# Test fixture crosshead

Limit fixture movement so it does not obscure the specimen's response.



CONCEPT ILLUSTRATION

Structural brief; loads and supports to define

## THE PROBLEM

A benchtop fixture applies force to a specimen, but the fixture also deflects. Its movement can become part of the reported displacement. This study compares crosshead profiles within a fixed mounting envelope.

## SCOPE

- Compare a solid crosshead with alternative machined profiles.
- Evaluate centered and off-center loading using small-deflection elastic analysis.
- Check how the predicted movement changes when the support assumptions change.

## PLANNED DELIVERABLES

- Baseline and candidate CAD models
- Reproducible structural model, load cases, and convergence data
- Selected drawing and a report comparing stiffness, stress, and manufacturability

## CONSTRAINTS

### Working load

500 N, proposed

### Deflection allowance

Less than 0.05 mm, proposed

### Interfaces

Fixed mounting points and specimen clearance

### Model scope

Small elastic deflections under specified static loads

## VERIFICATION PLAN

### Analytical comparison

Compare a simplified version with a beam calculation before analyzing the detailed shape.

### Mesh refinement

Refine the mesh until displacement and representative stress values are stable. Treat support singularities separately.

### Support sensitivity

Vary realistic support stiffness and load placement to show how much the assumptions affect the result.

---

## NEXT STEP

Choose the material, crosshead envelope, and a defensible representation of its supports.

The load and deflection values are proposed requirements. No analysis results or load rating are being claimed.