

Beam Bridge

The thickness of a beam affects how it bends.

Try this:

- Walk across one beam and then the other.
- Notice that no matter how the beams are arranged, the beam resting on its face sags under your weight much more than the beam resting on its edge does.
- Also notice that the beam resting on its edge wiggles from side to side more than the beam resting on its face does.

What's going on?

Thick objects tend to be much stiffer and harder to bend than thin objects are. In this exhibit, the beam on its edge has a greater top-to-bottom thickness than the beam on its side has. This top-to-bottom thickness makes the beam on its edge harder to bend downward. The beam on its side has a greater side-to-side thickness, which is why it's harder to bend this beam sideways.

So what?

Buildings and bridges are commonly made with steel girders known as I-beams. The cross section of I-beams has the shape of an "I"—a design that maximizes both the top-to-bottom and side-to-side thickness of the girders, while minimizing their weight. As a result, I-beams are nearly as stiff and strong as solid steel bars are, but are much lighter.