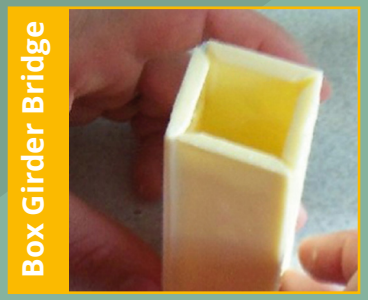
The Welding Institute

Welding with Chocolate

Welding with chocolate is a fun hands-on activity exploring welding principles and mechanical testing and is one of The Welding Institute and TWI's education outreach activities involving welding a box girder bridge.



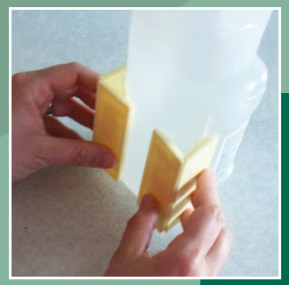
Process: Welding your Box Girder Bridge

Step 1

Hold the edges of your chocolate bars against the bottle of hot water until they melt slightly.

Step 2

Press the melted edges together in a right angle, and leave to cool - this is half of the box section. Repeat this step again to produce both parts of the box girder bridge.

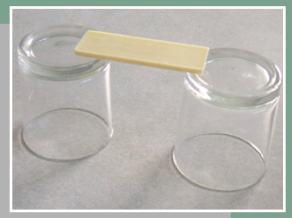


Step 3

Once both parts are cooled, melt the edges of both halves and join together to form your box girder bridge and leave to cool for 20 mins. HINT: it should look like the image above!

Experiments: Mechanical Testing of the Bridge

Single Chocolate Bar - Plank Bridge



1. Place a single chocolate bar between the two span points (see image above).
2. Gradually begin adding weights to the centre of the bridge.

Observations:

- How much load have you added when the bridge breaks?
- Does another chocolate bar break at the same load?

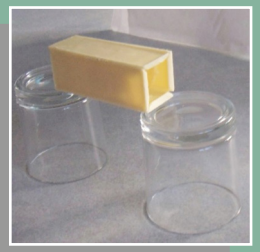
Box Girder Bridge

Once your box girder has completely cooled and solidified along the edges it's time to test its strength.

1. Non-Destructive Visual Test

Weld defects: is your box girder melted and joined perfectly along each edge? Can you see any weld defects or distortions (HINT: distortion means the beam is not a perfect square in section)?

Will any of these visual findings affect the strength of the box girder bridge?



2. Destructive Testing

Repeat the first test using your constructed box girder bridge, gradually adding weights.

If the box girder bridge is made of 4 bars, will the bridge be 4 times stronger than the single bar bridge?

How much more load can you add to your box girder bridge compared to the plank bridge?

Did your bridge break? Were the welds the weak points of the bridges that broke?

How much stronger would your box girder bridge be if all the welds and joints were perfect quality?