

Build it, Test it, Break it!

Engibear's Tips for Paper Bridge Building



No.	Title	Description
1	Specifications	Make sure you understand and follow the specifications. The bridge has to be big enough (with some tolerance) but don't make it too big – this makes it harder to support the loads and uses excess materials.
2	Design	Consider the basic bridge types and / or combinations (beam, truss, arch, suspension, cantilever, cable-stayed). It is ok to combine types. Remember the deck can be supported from above as well as below.
3	Forces	Think about how the test load (the weight) will be transferred through the parts of the bridge. Which parts will be in compression (squashed) and which parts will be in tension (pulled)? What will the forces be on each join?
4	Strength	Make sure that the individual elements of the bridge are strong enough will not deform under load (compression or tension). A good example is rolling paper tubes – notice the difference between a tightly rolled tube and a loosely rolled tube in terms of its ability to withstand a compressive load. Use or connect multiple parts (pieces of paper / tape) to do the same job in places where you think they are justified.
5	Shapes	Make and use the right paper shapes for the job: <ul style="list-style-type: none"> • Circles – tubes are strong in compression • Triangles – give good strength / rigidity in corners and make good trusses (they are good “additions” for stability) • Square and rectangular beams - are good in compression and easy to join to each other (make these by folding rather than rolling paper). Arches – good in compression • Cables / strips – good in tension
6	Balance	If a bridge is not balanced and sitting well on the floor / table the forces may be concentrated on one side or even in one part – this may cause a part to fail or the bridge to fall over. Symmetry is one good way to achieve balance.
7	Care	The parts must be manufactured carefully, consistently and within tolerances. Mark, fold, roll, cut and stick paper neatly and exactly. Do not crumple or tear the paper (especially at joins) as this provides a weak point and likely failure location. A bridge is only as good as its weakest part – don't be afraid to discard or redo parts that are not good enough.
8	Teamwork	Work together as a group – make sure that you are all contributing and working together towards the same goal. Divide tasks up so that they are efficiently done and feed into each other (e.g. rolling and sticking paper tubes – one person rolls and one person cuts and sticks the tape).
9	Persistence	Keep on trying and learning and never give up; “failing” is actually one of the best ways to learn. Remember to keep thinking, experimenting and testing as you go.
10	Fun	The best way to do a good job is to have fun - it's a great exercise and you have the opportunity to design, build and test your own bridge – enjoy it!

