

Fasten(at)ing Technology—Paper Clips

Context

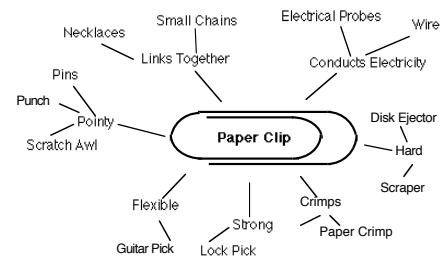
In the family of fasteners, paper clip is what you might call a simple, elegant solution to the problem of squeezing or clenching paper. Paper clips are easy to reproduce, easy to use, hold papers together without causing damage or crimping, and have many other uses besides clenching. This is only partially true. Paper clips do cause damage. Some get rusty and stain the paper. Some are too inflexible and leave a permanent crease or crimp in the paper. Your challenge is to improve fastening technologies by designing the perfect paper clip.

Problem

Design and construct a fastener for paper.

Design Constraints

- The fastener must be designed so it is reproducible.
- The fastener or clench must be made of one or two single, continuous pieces of material.
- The fastener must hold two and more sheets of paper together.
- The fastener must be portable and reusable.
- The fastener must not damage the paper.
- The fastener can be made from any material.
- The design must be scalable (e.g., from paper clip to money clip)



Design Considerations

- Pay close attention to the elegant function of the fastener: does it effectively clench?
- Consider a wide range of possible fastener designs.
- Review the range of paper clip designs presented, but do not duplicate these.
- Is the fastener reproducible and scalable?

Construction Sequence

- Brainstorm ideas for the fastener's operation and appearance.
- Sketch four or five designs and choose appropriate features, forms and materials.
- May use 2D computer aided design (CAD) or 3D modeling techniques to lay out mechanisms and parts.
- Locate recycled materials or new materials.
- Test the materials for the properties.
- Bend and finish the final prototype fastener.
- Test the fastener.

Management Issues

- End of Day 1: Approval of fastener ideas.
- End of Day 2: Fastener prototype and sketches explained, presented and submitted.

Related Studies

- Physics
- Business
- Social Studies
- Sociology
- Psychology
- Engineering

Honest Self (Group) Evaluation

1. We stayed within the design constraints and deadlines _____ out of 5 marks
 2. Our fastener is unique in its design _____ out of 5 marks
 3. Our fastener has makes effective use of materials _____ out of 5 marks
 4. Most of the excess materials can be reused or recycled _____ out of 5 marks
 5. Our use of materials was creative, economic and efficient _____ out of 5 marks
 6. Our fastener successfully satisfies all the design brief requirements (i.e., holds two and more sheets of paper together; is portable, reproducible, reusable, scalable) _____ out of 5 marks
 7. The demonstration of our fastener was creative and entertaining _____ out of 5 marks
- Total** _____ out of 35

Assessment

- Group's Self Assessment _____ Total/ 35
- Design Principles**
- Features and Form _____ out of 10
 - Originality _____ out of 10
 - Economics and Ecology _____ out of 10
 - Craft and Quality _____ out of 10
- Clenchability _____ out of 15
- Deadlines, Safety and Participation _____ out of 10
- Total** _____ out of 100