

Engineering Design Process

1) Concept Development

- a) Set end goals
 - i) Required goals
 - ii) Backpack Design
- b) Drafting
 - i) Vest design
 - (1) More volume
 - (2) Functional as backpack
 - ii) Minimal seams
 - (1) Point of failure for many designs
 - (2) Lessens weak points in contact with water
 - iii) Flap or cover
 - (1) Keeps water in if worn or carried
 - iv) Braided straps
 - (1) Strengthens the straps
 - (2) Can be done with additional fabric
 - v) Polyurethane Coating
 - (1) Prevents water from seeping through
 - vi) Rubber sealant
 - (1) Treats fabric
 - (2) Prevents water from seeping through
 - (3) Gives polyurethane a base to adhere to
 - vii) Laminate strips
 - (1) Allows to laminate whatever fabric is chosen
 - (2) Ensures water stays in
 - viii) Vaseline
 - (1) Prevents minor leakage
 - (2) Catches water leaking through pores
 - ix) Hot glue
 - (1) Solid that can be grafted to seams
 - (2) Prevents minor leakage between seams

2) Concept Selection

- a) Selected saddlebag design
 - i) Vest design could be interpreted as two buckets sown together
 - (1) Can be done in a continuous fabric in contact with water
 - (2) Easier for straps/handle
 - (3) Easier assembly

3) Prototyping

- a) First prototype = unsuccessful
 - i) Vaseline counteracted laminate
 - ii) Leaks remained an issue from sewing needle holes
 - iii) A hole was burned through the bottom
 - iv) Hot glue started building up and getting heavy

4) Testing

- a) First test
 - i) Water leaked through holes in corners from sewing the seams
- b) Second test
 - i) More hot glue was added to corners, but water still leaked at corners
- c) Third test
 - i) Patches were laminated to the corners, but a hole was burned through and water was seeping through the bottom
- d) Fourth test
 - i) A

5) Refinement

- a) Polyurethane would wash off in water, allowing leaking
 - i) Could not work alone
 - ii) Laminated 2 inner layers together to adhere and plug leaks
 - iii) Added vaseline and hot glue to catch leaks
- b) Restarted with same fabric and laminate
 - i) No hot glue or vaseline
 - ii) No liquid rubber spray or polyurethane
 - iii) Laminated patches to inside corners