

Bicycle Helmet Design

THE PROBLEM

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Fall Semester 2013
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Definition

Design a bicycle helmet for the bicycle enthusiast or racing markets. Follow the basic form of a typical helmet - a foam shell to cover the head. Address all conventional problems of helmet design and solve one other problem of the bike riding experience or solve a conventional problem in a novel and effective way.

Initial Research

Safety

- Helmets are evaluated on how well they absorb impact energy
- Engineered to prevent concussions
- Helmets provide 66% - 86% reduction in head injuries

Structure

- Expanded poly-styrene is most commonly used for energy absorption with a plastic shell on top, all molded.
- Alternative materials include cork and styrofoam
- All based on density and compression.

Performance

- Aerodynamics are not a huge factor - helmets only contribute to 2% - 5% of air drag while riding
- Fluorescents often used for visibility, contrast between rider and background equally important.
- Wind noise originates from the flat strap orientation to the ear.

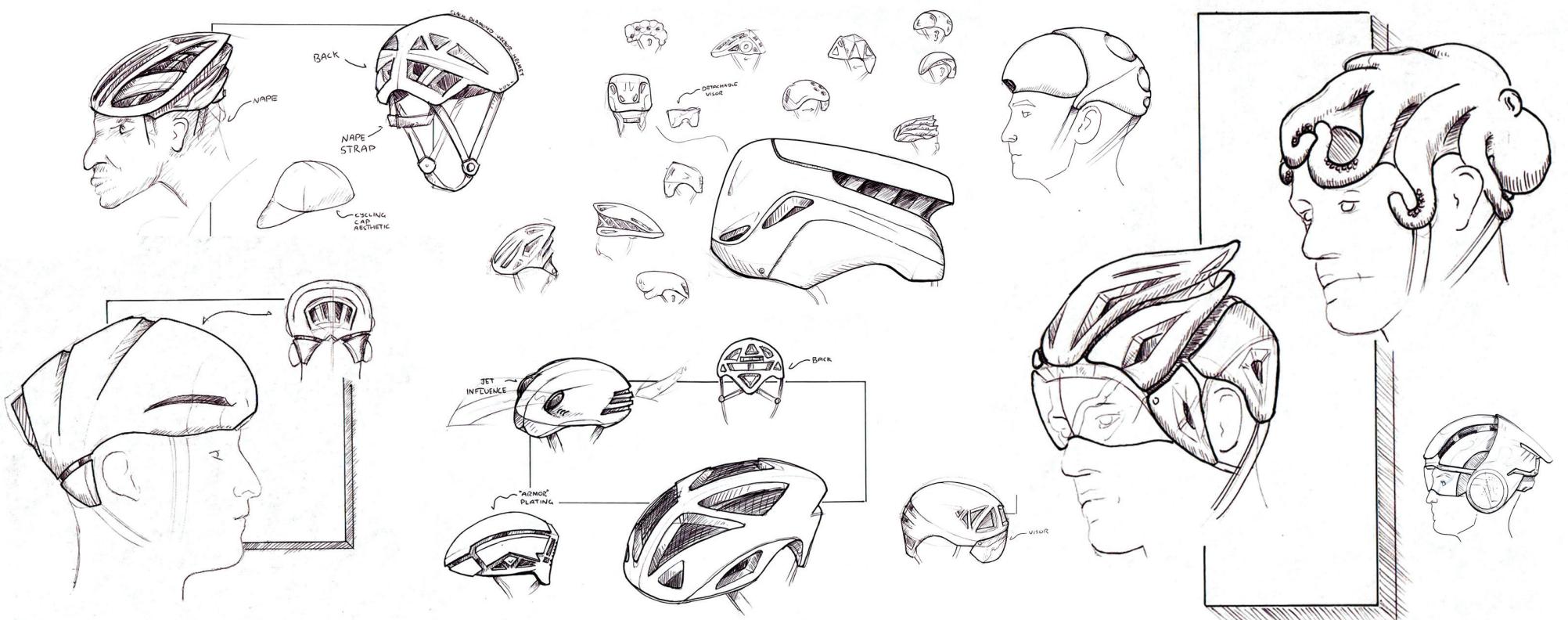
Business

- Most helmets are very cheap to produce. Straps and buckles are the majority of the cost.
- Fashion and style trends towards an organic form with many holes and ribs.
- Demographics mainly adults ages 18 - 65.

Trends



Sketches



Inspiration



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THE METHOD

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Form

Forms were chosen based on flow and harmony, inspired by concept spaceship illustrations. The rear of the helmet was greatly influenced by jet engine exhausts and vents. Multiple variations of sketches were drawn to explore proportions and sweeps.



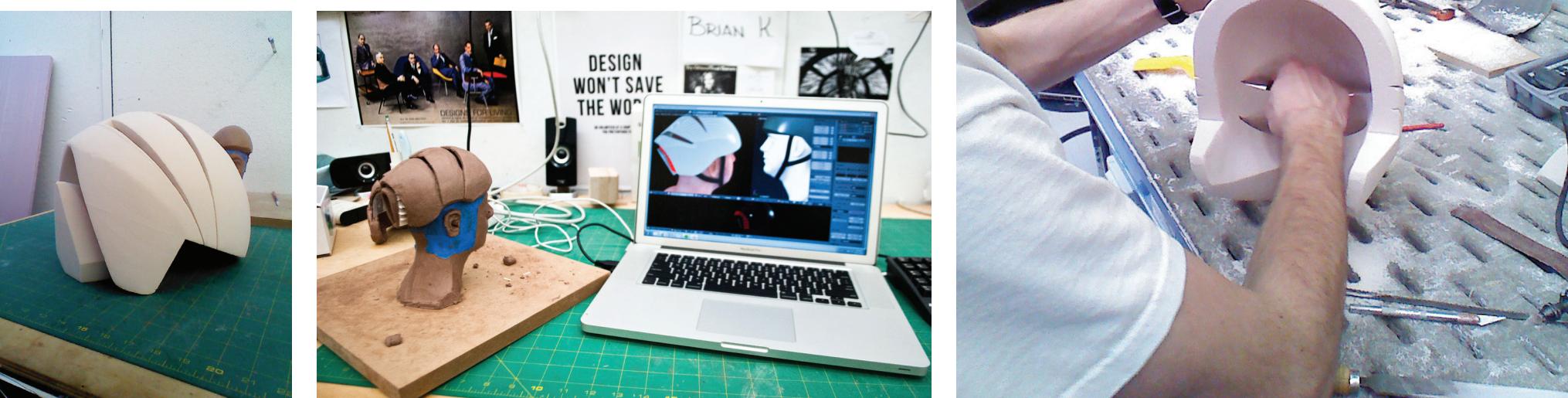
Clay

Initially, a proportional head was sculpted in automotive clay to fit a helmet to. Clay was piled on to appropriate thickness at half scale. Multiple overall forms were tried until an appropriate one was found, then vents were cut to highlight the form.



Foam

Once the form was worked out in clay, tan foam was used to craft a full scale model. Refinement details were worked out in the foam as it provided for a sharper model. The surface was primed, wet sanded, and painted to simulate the hard plastic shell usually found on conventional helmets.



Bicycle Helmet Design **THE SOLUTION**

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Form Story

Drawn from the quick and graceful sweeps of concept spaceships, the helmet cascades back to an exhaust vent in the rear. The layers of the main form peel back revealing vents, while the back drop-fins are sliced away. The nape block anchors the grace of the form into a concentrated rigid element. Ribs between the main form and the nape block keep the helmet structured and regimented.

Features

- Adjustable block in the back for superior nape fitting and safety.
- Implanted LED lights in the rear ribs for increased visibility.
- Implemented accelerometer to detect braking and brighten rear light, much like a car
- Rechargeable batteries for longevity and sustainability
- Venting designed to promote air-flow: in the front, pulled from the back.
- Swept aerodynamic styling
- White, red, and a plethora of other colors to match your favorite kit.

