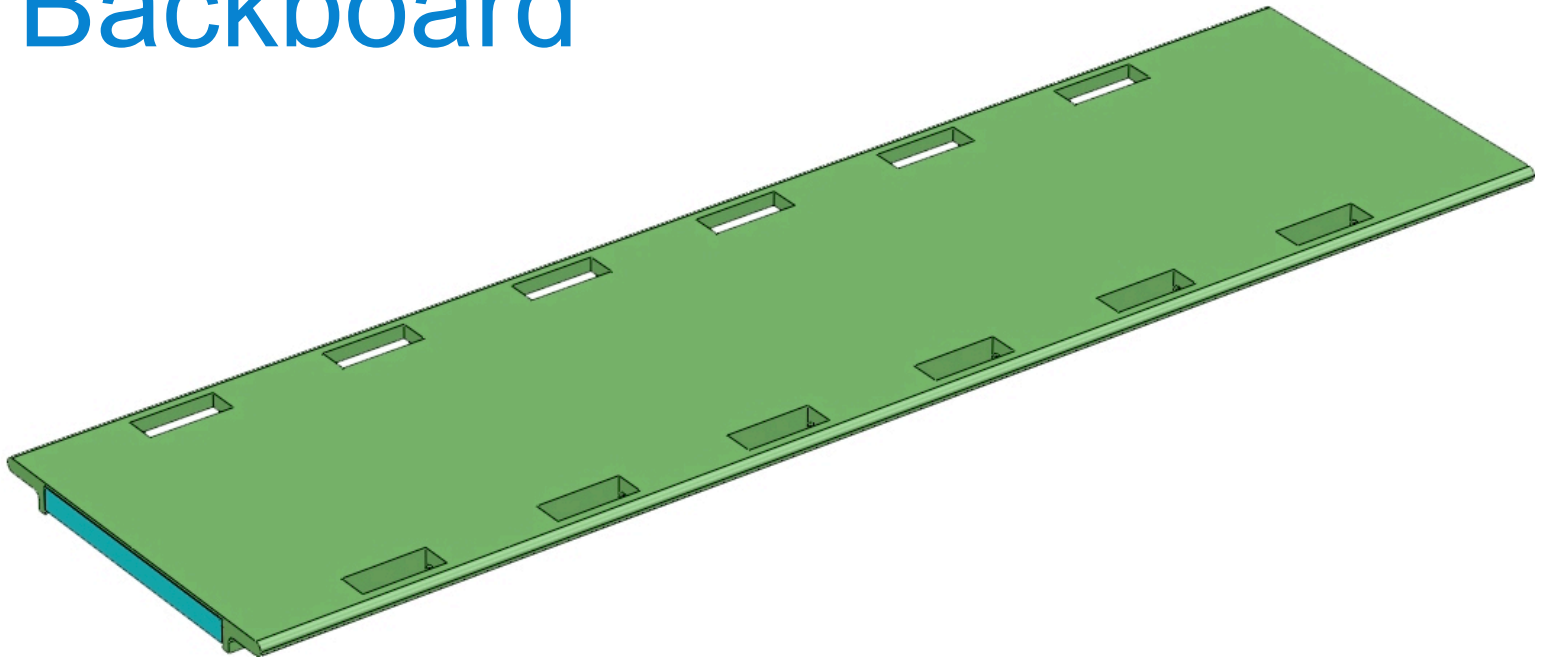


Variable Buoyancy Backboard



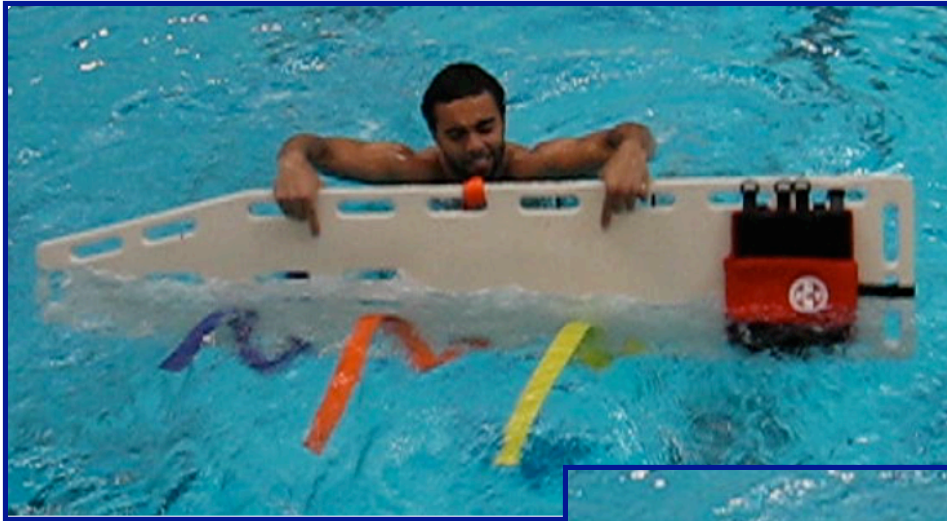
Blue B

Sketch Model • 10.8.09

What is a backboard?



What's wrong with current backboards?

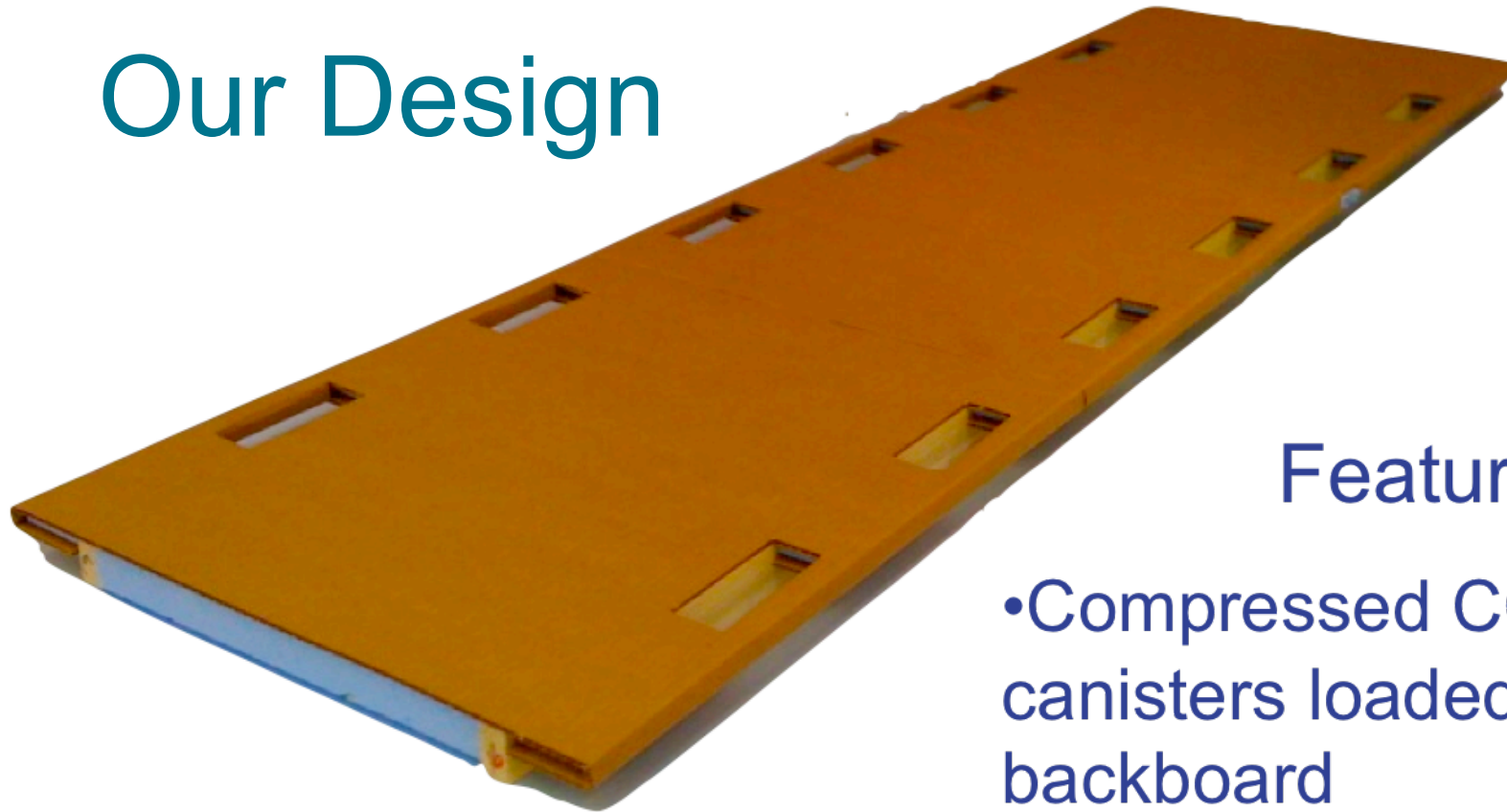


Our Concept: Variable Buoyancy

- stage one: neutrally buoyant
 - easy to position under victim
- stage two: buoyant
 - once positioned, inflate bladder for easy rescue



Our Design



Features:

- Compressed CO₂ canisters loaded on backboard
- Inflatable semi-elastic bladder beneath rigid surface of backboard
- Ergonomic, intuitive inflation controls

Who needs our backboard?

- 270,000+ public pools in the United States
- All legally required to have a backboard
- Red Cross trains more US lifeguards than any other organization

Benchmarking

- Standard Backboards: \$150 to \$300
- Similar Patent: Neutral Buoyancy Recovery Device
US Patent 6,352,460
(not on market)

← bottom panel

Feasibility of Variable Buoyancy

- What is our **desired buoyancy**?
- What **bladder volume** gives our desired buoyancy?
- Can this volume **fit within the dimensions** of a standard backboard?
- Can the backboard carry **enough compressed CO₂** to displace this volume of water?
- Is a neutrally buoyant backboard **still light enough** to handle easily on land?

Feasibility of Variable Buoyancy

- What is our desired buoyancy?

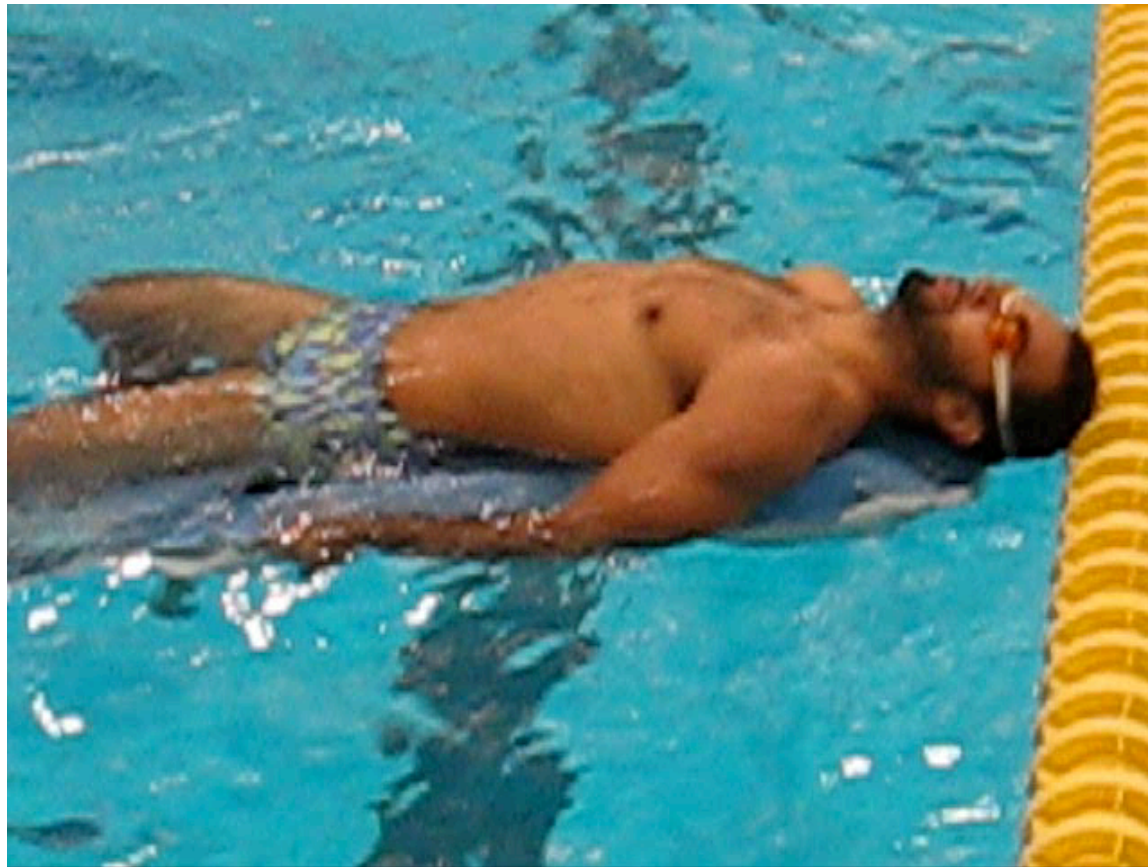
200 N (20 kgf or 45 lbf)

- What bladder volume gives our desired buoyancy?

17 L displaces 17 kg of water
(plus 3 kgf of initial buoyancy)

3 kgf	+	17 kgf	=	20 kgf
Initial		H2O		Total
buoyancy		displaced		buoyancy

Feasibility of Variable Buoyancy



Feasibility of Variable Buoyancy

- Can this volume fit within the dimensions of a standard backboard?

Yes: current bladder dimensions of
167 cm x 36 cm x 3.2 cm

- Can the backboard carry enough compressed CO₂ to displace this volume of water?

Yes: one 36-g canister of CO₂ provides
necessary volume

Feasibility of Variable Buoyancy

- Is a neutrally buoyant backboard still light enough to handle easily on land?

Yes: projected weight of 7.5 kg (16.5 lbs)

Where Do We Go From Here?

- Separate bladder chambers for balance control
- Redundant controls
- Retractable, reconfigurable straps
- Even smaller initial backboard volume and weight