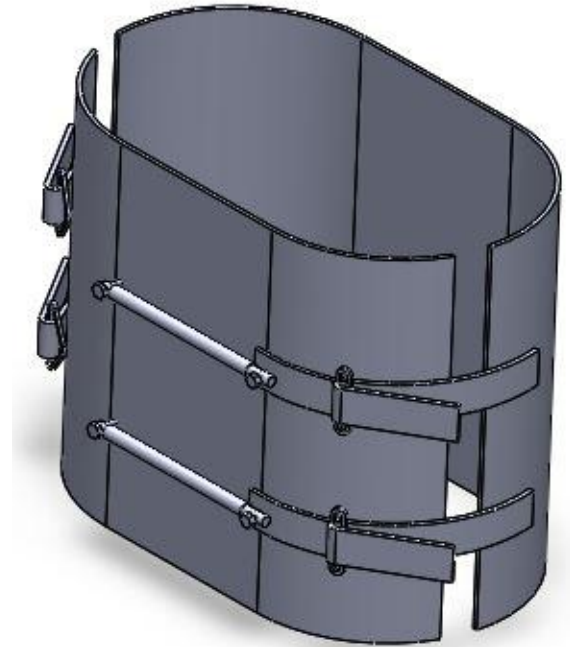


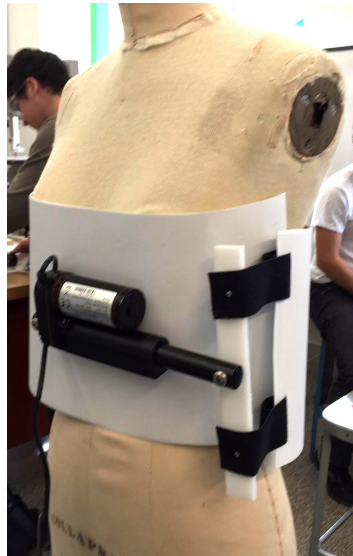
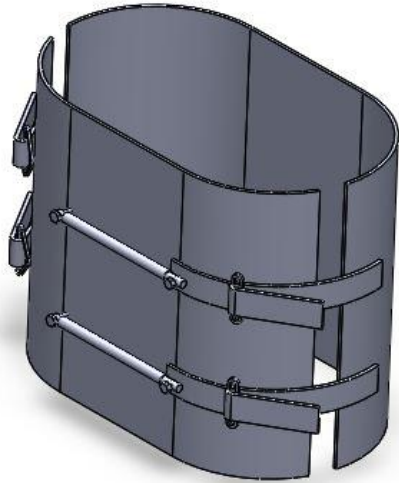
# Smart Back Brace for Scoliosis

Silver B



# Product Vision

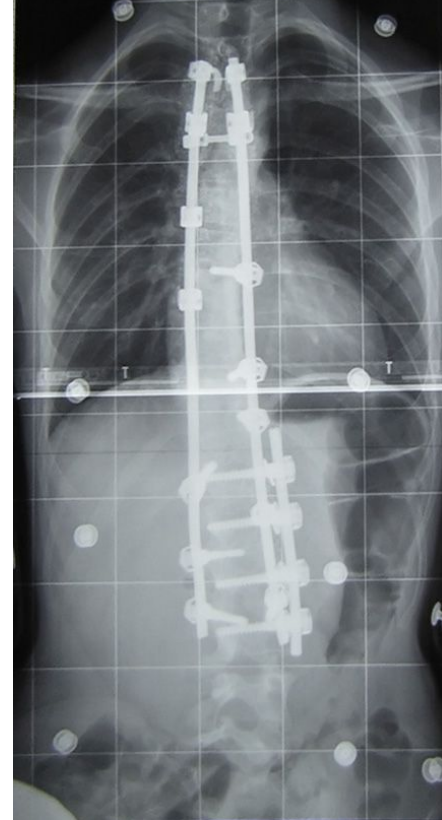
- Improve compliance
- Prevent corrective surgeries



	<b>Traditional Scoliosis Back Brace</b>	<b>Smart Back Brace</b>
Tighten automatically during sleep	✗	✓
Standardize back brace tightness	✗	✓
Collect data on brace usage	✗	✓

# Pricing

- Traditional brace price: \$2-6k
  - Braces fitted: 30k children/yr
  - Failure rate: 28%
- Surgery cost: \$100-150k
- Smart Back Brace price: **\$8k**



# Smart Back Brace Product Contract

<b>Customer Need</b>	<b>Attribute</b>	<b>Specifications</b>
Apply prescribed pressure to spine	Strap tightness	100 N peak load per strap
Minimize size of tightening component	Dimensions	< 4" x 2" x 1"
	Weight	< 5 lbs
Remain asleep as brace tightens	Tightening rate	< 1.5 N/s

# Technical Risk: Force

Can we apply enough force in a compact manner?

Findings:

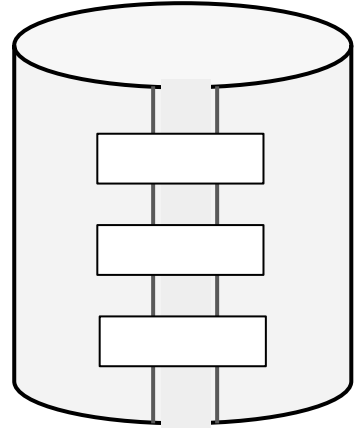
- Adequate force can be applied to tighten brace to prescribed pressure
- Max load required: **100N** (middle strap<sup>[1]</sup>)
- Mockup actuator was too large (900N)

**Required loads:**

30-68N

72-**100N**

52-80N



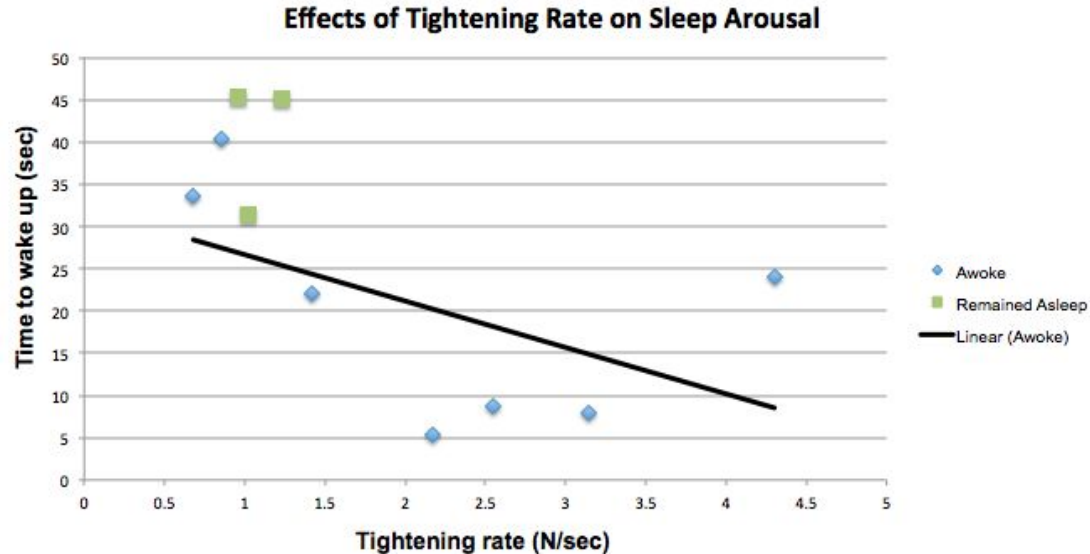
<sup>[1]</sup>E. Lou, N. G. Durdle, V. J. Raso, and D. L. Hill, "A system for measuring pressures exerted by braces in the treatment of scoliosis," *IEEE Transactions on Instrumentation and Measurement*, vol. 43, no. 4, pp. 661–664, Aug. 1994.

# Technical Risk: Sleep Arousal

Would tightening wake up the user?

Findings:

- Subjects slept through an average increase of 38 N
- Slower tightening woke subjects up later
- Underestimation



# Future Steps

- Incorporate manual override option to prevent dangerous tightening levels
- Include sensor to detect sleep
- Collect data (track usage for individual, send reports to doctor)

*“I like the idea of your product being used to slowly tighten the straps during the night...Perhaps having a brace that slowly increases its force will help with compliance and get more correction.”*

**Jeffrey Thomson, MD**  
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