The Shaft

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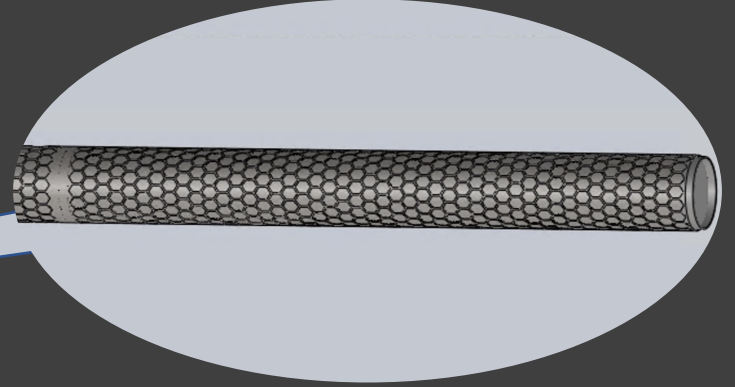
The Real Shaft

DFX Factors

- Quality
  - Perform function without fracture
  - Maximize muscle activation
  - Maximize user experience
- Reliability
  - Suitable for a range of environments
  - Long lasting performance
- Cost
  - Remain affordable and accessible



Design Modification

- Hexagonal leather grip attachment
  - Friction
  - Slipping from sweat
- Bar indentation to accommodate for grip attachments

Prospective Materials

- 3 candidates: Low Alloy Steel, Nickel based superalloy, low carbon steel
- All materials are durable within built environments.
- Nickel has the best properties, but too expensive, so it is unfeasible.
- Low carbon steel is the industry standard, but poorest physical properties.
- Low allow steel is the best choice. Low cost with strong physical properties.

Material Physical Properties

Table 1: Materials Picks and their Physical Properties

	Density (kg/m^3)	Yield Strength (MPa)	Fatigue Strength at 10^7 cycles (MPa)	Stiffness index	Young's Modulus (GPa)	Price (USD/kg)
Low Alloy Steel	7800-7900	400-1500	248-700	0.00355	205-217	0.7-0.76
Nickel based superalloy	7750-8650	300-1900	135-900	0.00336	150-245	15.8-19
Low carbon steel (A-36)	7800-7900	250-395	203-293	0.00183	200-215	0.65-0.7