Objective

Engineering Characteristics
• Resilience
• Compaction Ratio
• Weight
• External Dimensions
• Power Source
• Safety Systems

Concept Generation

Scissor Jack
Advantages:
• Low weight and cost
• Material can snap inside chamber

Rack and Pinion
Advantages:
• Self collapsing
• Exposed parts
• Uneven force

Prototype and Testing

Results
• Material tests revealed a target force of 10487 lbf for significant compaction
• Computer analyses show the chassis can withstand forces

\[ \sigma = \frac{F}{A} \]

\[ A_{\text{max}} = 41875 \text{in}^2 = 17.535 \text{m}^2 \]

\[ F_{\text{max}} = 12770 \text{lbf} \]

\[ \sigma_{\text{max}} = 72826 \text{psi} \]

\[ A_{\text{min}} = 2\text{in.} = 50.8 \text{mm}^2 \]

\[ F_{\text{min}} = 41948 \text{lbf} \]

\[ \sigma_{\text{min}} = 1166 \text{psi} \]

\[ F_{\text{error}} = 10487 \text{lbf} \]

Test Results and Future Work

Summary
• Identified a need for a product
• Conducted market analysis
• Identified customer requirements and engineering characteristics
• Generated feasible concepts
• Selected a final concept

Test Results
• Use a stronger motor to power scissor jacks
• Incorporate controls system to regulate force