Cake Transporter
Market

• Retail Bakeries
  – $2.9 billion retail bakery products shipped in 2008

• Wedding Cake Industry
  – Transportation costs $50-$100
  – Disassembled before transportation
Design and Feasibility

• Passive Damping System
  – Absorb up to 6 m/s² of acceleration (cargo van)

• Spring constants between 0.3 lb/in and 2 lb/in

• Viscous dampers with viscosity between 1 Pa·s and 100 Pa·s

• Non-Newtonian damping fluids
  – Shear Thickening
  – Shear Thinning
Sketch Model #1

• A.k.a “Springboard”
• Not constrained in any direction
• 4 extension springs
  – 12 lb working load
• Memory foam damper
Sketch Model #1
Sketch Model #1 Data

Z-Axis Acceleration

Acceleration (m/s²)

Time (min)

speed bump

Van
Apparatus
Sketch Model #2

- Focused on damping
- Constrained in x-y directions
- 4 compression springs
  \[ k = 0.32 \text{ lb/in} \]
- 2 damping pistons
  - Corn Syrup, Mayo, Corn starch
Sketch Model #2 Data

Z-Axis Acceleration

- Acceleration (m/s²)
- Time (min)

speed bumps

Graph showing Z-axis acceleration over time for different substances: Van, Corn Syrup, Mayo, and Corn Starch.
Conclusion

• Lower spring constant
• Corn syrup most effective damper
• More damping causes platform movement to lag
• Next steps
  – Test active damping system
  – Develop lifting mechanism
  – Incorporate damping control in x-y
Questions? Comments?