Problem:
• Specialty crops are hard to transport from the field to the destination of sale without damaging
  • Produce bruise and damage very easily
  • Less crop available for sell
  • Less appealing when crop is damaged
• Current way of transporting produce is with a rigid frame trailer with no cushion or shock absorbance
  • This wagon has no way of adding any cushion for specialty crops, especially over a wide range of loads
• Farmer near Battleground, IN specializes in produce (sweet corn, tomatoes, pumpkins)
  • These crops have no easy way to be transported from the field to Lafayette area to be sold without damaging
  • The farmer usually loads the wagon in the morning and pulls it to its destination where it sits most of the day to be picked through by the community
  • The customers choose the highest quality produce that is not damaged and leaves the damaged produce behind
  • The wagon needs to be able to vary a load weight of 1000 – 4000 lbs

Solution Requirements:
• Reduce impact on produce when traveling
• Relatively inexpensive
• Simple to install and maintain
• Able to accommodate varying loads

Solution Evaluation:
• Option 4 met all the constraints set for this project the best
  • Low comparative cost with low or easy maintenance
  • Simple design that can be adjusted to different loads
  • Weight capacity of 1500 pounds for each air bag with a total weight capacity of 6000 pounds
  • Variable inflation up to 100 PSI
  • Mounted to running gear and wagon bed in each corner

Economic Analysis:

<table>
<thead>
<tr>
<th>Crop</th>
<th>Cost per unit</th>
<th>Amount Saved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweet Corn</td>
<td>$6/ dozen</td>
<td>8 dozen</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>$5/ pound</td>
<td>20 pounds</td>
</tr>
<tr>
<td>Pumpkins</td>
<td>$7/ pumpkin</td>
<td>15 pumpkins</td>
</tr>
</tbody>
</table>

Total Saved: $253/ season

Background:
• Farmer near Battleground, IN specializes in produce (sweet corn, tomatoes, pumpkins)
  • These crops have no easy way to be transported from the field to Lafayette area to be sold without damaging
  • The farmer usually loads the wagon in the morning and pulls it to its destination where it sits most of the day to be picked through by the community
  • The customers choose the highest quality produce that is not damaged and leaves the damaged produce behind
  • The wagon needs to be able to vary a load weight of 1000 – 4000 lbs

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Alternative Solutions:
Option 1: Coil Springs
  • Increase bouncing
  • Doesn’t provide a wide range of load variability while maintaining cushion ride
  • Susceptible to swaying

Option 2: Leaf Springs
  • Doesn’t offer a wide range of load variability and a cushioned ride at the same time
  • Heavy and require a larger area to mount
  • Durable and simple

Option 3: A-arm design
  • Complicated and would require a lot of fabrication
  • Not extremely cheap to install or maintain

Option 4: Air Shocks/Bags
  • Simple to install
  • Very wide range of load variabilities with change of PSI
  • Absorbs small shocks, that damage produce, very well

Final Design