

Large Square Bale Accumulator

SAD Designs

ABE 485

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Bale Accumulator

- A device for collecting multiple bales and releasing them in a single group while baling
- Reduces time spent in the field gathering and loading bales

Our Design Need

- Some forage operations deal with bales in stacks of 2 for loading out of the field.
- Current accumulators are very large, expensive, heavy machines that use hydraulics and electronics to stack the bales
- Our goal is to design an inexpensive, simple, lightweight accumulator without the use of hydraulics or electronics

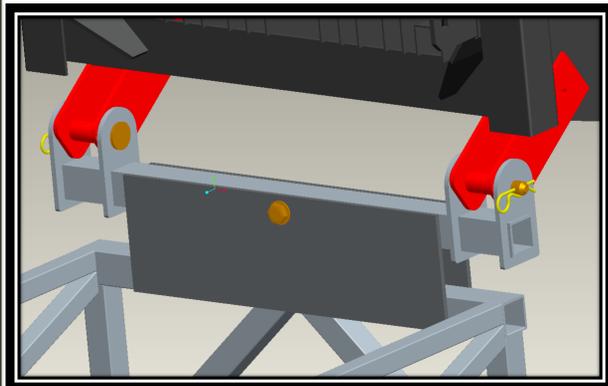
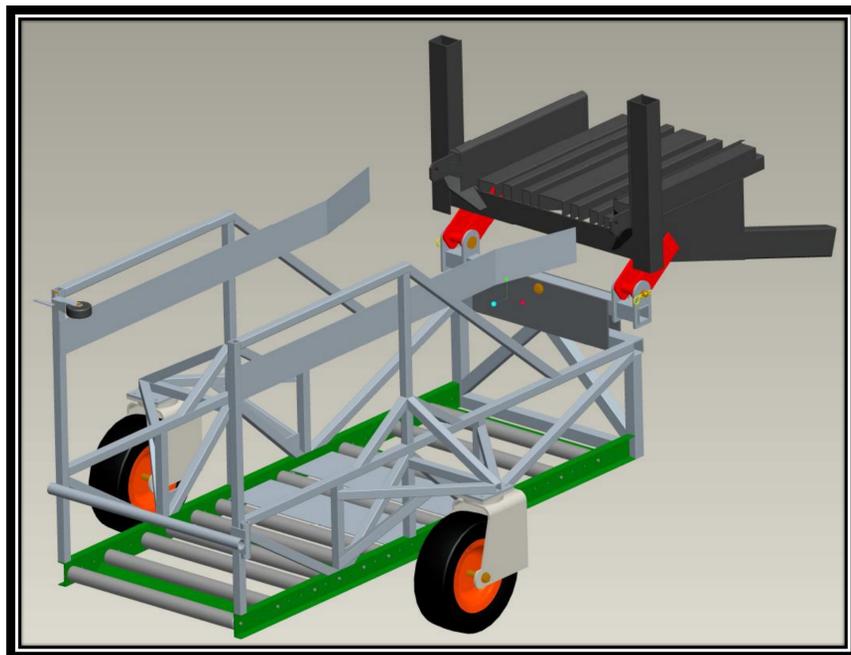


<http://www.agwaymfg.com/ag/twinstack.php>

Design

Accumulator

- Load Capacity: Two 3'x3'x8' large square bales (1500 lbs)
- Automatic stacking and unloading
- Easy attach/detach
- Low profile design
- 1 ½" sq. tubing, 3/16" thick



Hitch

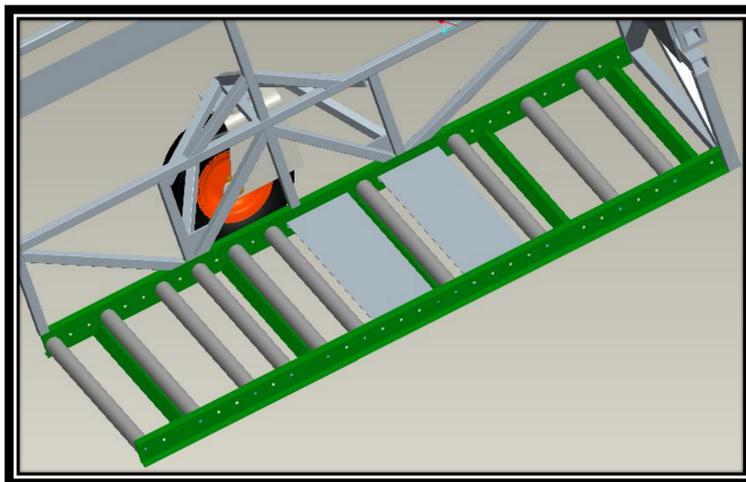
- Two Degrees of Freedom
- 10 degrees of roll
- Two 1 inch pins
- Two 3/8" swivel plates
- 2 ½" sq. tubing, ¼" thick

Caster Wheels

- ALBION 18" pneumatic wheels
- Load Capacity: 1590 lbs each
- Hardened double ball bearings
- Tapered roller thrust bearings
- Allows for single degree of freedom

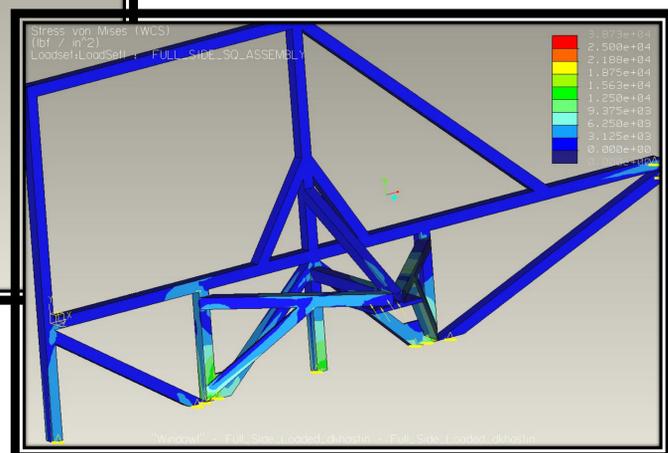
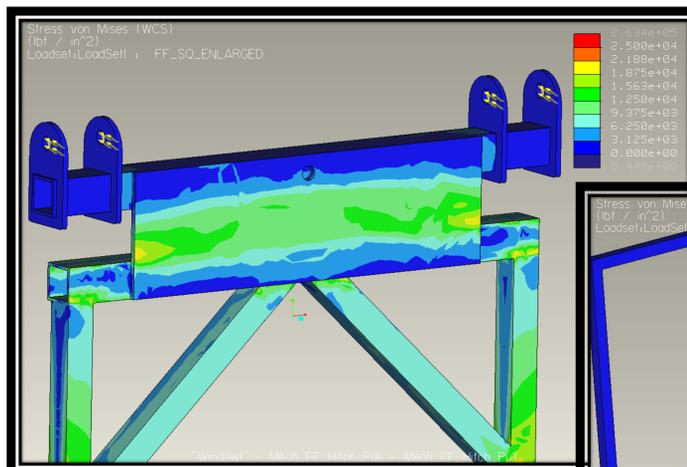
Roller Bed

- ROACH Gravity Roller Conveyor
- 96"x 38" with 2 ½" rollers
- Load Capacity: 290 lbs/roller
- Spring loaded rollers for adjustable roller placement



Verification

- Finite Element Analysis (Pro/Engineer Mechanical)
- Worst case loading:
 - 2000 lb downward load
 - 1200 lb horizontal pull
- Check for deflection and max stress



Results & Testing



Manufacturing

- Horizontal Band Saw
- Vertical Band Saw
- Drill Press
- Wire Welder
- Angle Grinder



Testing

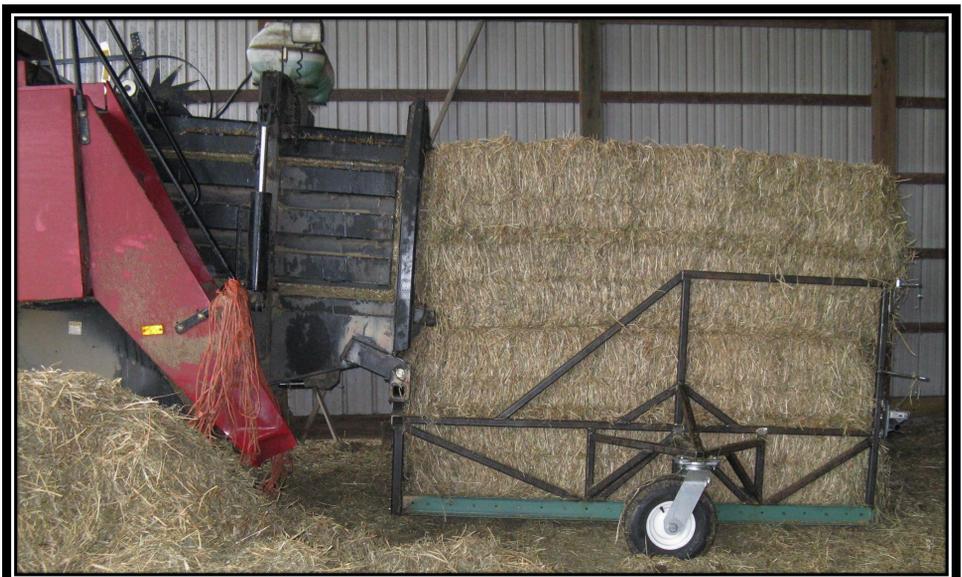
- Caught and Stacked two bales
- Structurally supported two bales while maneuvering in the field
- Trip gate successfully released at proper time
- Bale stack was released with force on top bale only



Future

Improvements

- Fold up mechanism for transport
- Increased ground clearance
- Torsion spring trip gate
- Design for easier manufacturability



Results

- Finished under budget ≈ \$1800
- Manufacturing time ≈ 60 man- hours
- Testing time ≈ 20 man-hours
- Working prototype, tested & verified

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