

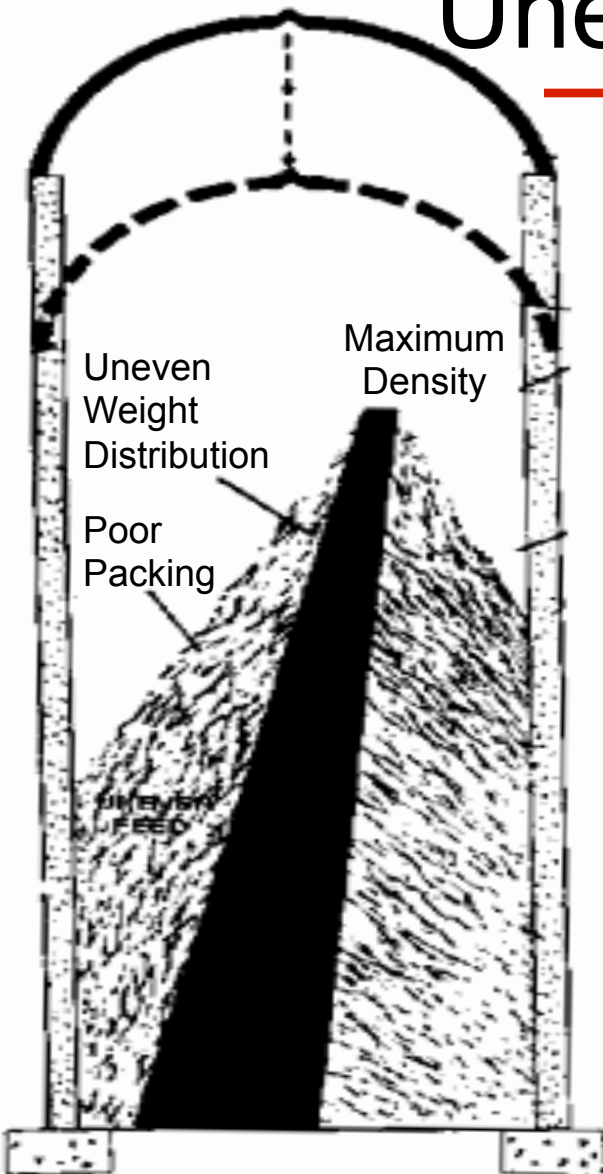
Team Red A

The Mega Spreader Concept

Sketch Model Review Presentation

October 5, 2005

Problem Definition: Uneven Distribution of Grain



- Air pockets, poor air flow
 - Spoilage
 - Greater risk of dust explosion
- Less bin capacity
- Uneven weight distribution
 - Poor packing

The Market and Customer

Annual corn production in the U.S.:

- \$15.1 billion sales
- 72.7 million harvested acres



Corn farmers:

- Over 400,000 U.S. farms, each with 3 grain bins
- Approximately 1.2 million corn grain bins



Design Requirements

Functional Requirement:

- Distribute grain evenly

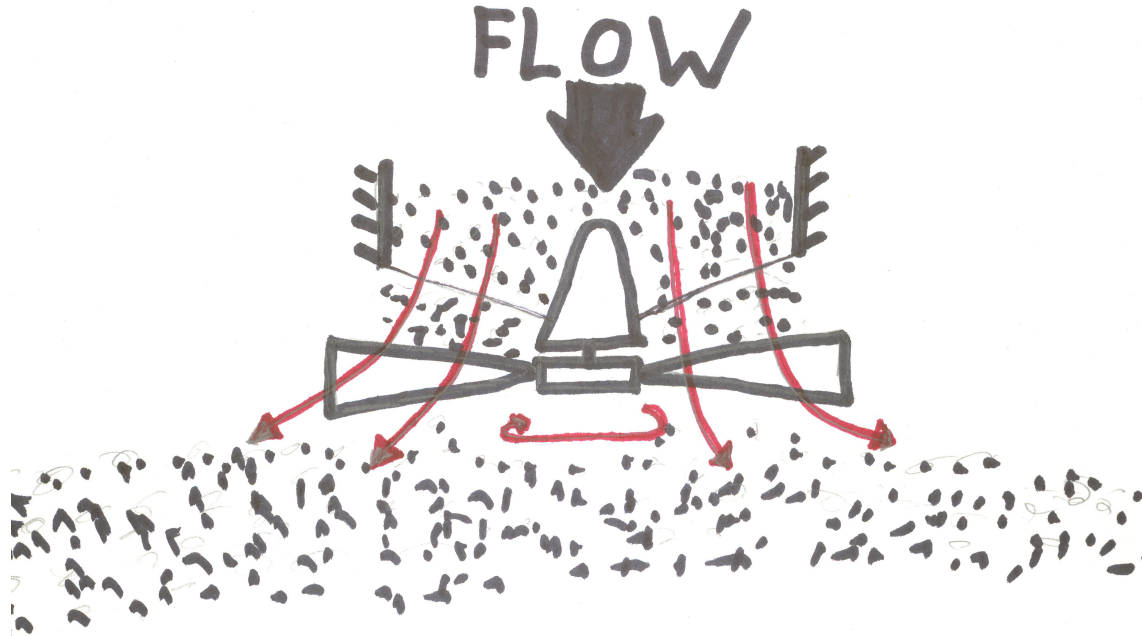
Dimensions:

- 2.5' – 3' grain bin loading diameter
- 24' – 48' grain bin diameter

Additional Customer Requirements:

- Will not spark and ignite dust
- Easily accessible
- Externally controlled
- Resistant to abrasion

Our Concept: Mega Spreader



- Powered by flow rate
- Rotating mechanism with directional blades

Sketch Model



- Optimal blade angle – 15 degrees
- For 2.5' fall, blade radius : spread radius = 1:14
- Design ultimately must spread 24' from center

Next Steps

- Test full flow of actual grain
- Build grain-powered, larger scale mock-up

Sources

- Keith Dittrich, Personal Interview Grain Farmer
- U.S. Environmental Protection Agency “Major Crops Grown in the U.S.” <http://www.epa.gov/agriculture/ag101/cropmajor.html> 2000.
- National Agriculture Safety Database “Silo Fires: Prevention and Control Conventional and Sealed Silos” <http://www.cdc.gov/nasd/docs/d000701-d000800/d000759/d000759.html> 04/2002.