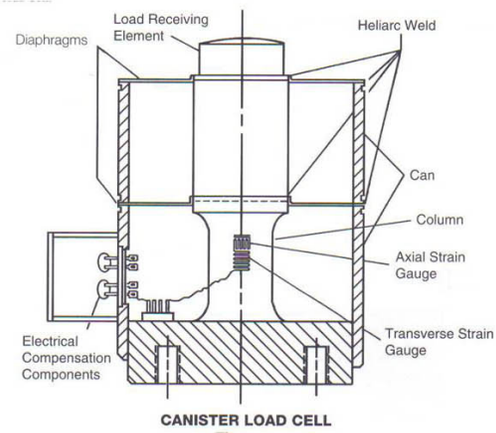
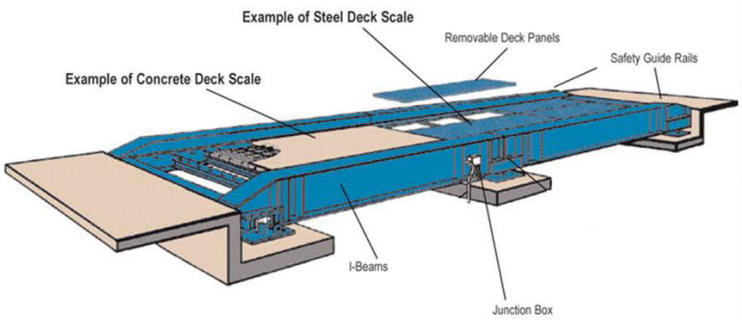
Load Cell Comparison Chart

	Analog Load Cells	Digital Load Cells	Hydraulic Load Cells
Lightning Immunity	Fair to Good	Good to Very Good	Excellent
Sevice Life	Good	Good	Excellent
Spare Part Availability	Excellent	Limited	Limited
Number of Manufacturers	Many >5	Few <5	Few <5

- **Electric Analog load cells were determined to be the elite load cell operating system**
- **Hydraulic Load cells have 3x the initial cost compared to Analog Load cells.**



Concrete Decking Outlives Steel



Steel	Concrete
Very portable and easy to move from one spot to the other	Not Portable at all and difficult to move after deck has been poured
Low inertia, very low resistance to lateral forces which increase wear on moving parts	High inertia, very high resistance to lateral forces which reduces wear on moving parts
Steel deck tends to be slippery when wet or when covered with ice or snow	Concrete deck can have a broom finish applied which forms a very rough surface and is excellent for traction
Deck plate is subject to wear over long periods of time	Minimal to no wear on the concrete deck
Can typically be installed and weighing in 1 day	Once installed and deck is poured, the concrete can take up to 28 days to cure.
Repairable if structure is damaged	If concrete is damaged, it must be removed and deck has to be re-poured

- **Concrete decking is superior to steel in terms of life expectancy, safety in wet conditions, and appeal**

Above Ground Scales Outweigh the Competition

Scale Type	Advantages	Disadvantages
Pit Type	1. No ramps required, level with pavement 2. Easy access to scale components 3. No accumulation of snow / dirt under deck 4. Can accept dump access to conveyor below	1. Requires expensive pit construction 2. Not good for high water table locations 3. Hazardous gases can collect in scale pit 4. Safety issues, confined spaces
Above Ground	1. Less expensive to purchase 2. Less complex foundation requirements 3. Available in a portable model 4. Fewer problems with water drainage 5. Can clean out with water hose easily	1. Have to have ramps at both ends of scale 2. May require guard rails to keep truck on scale 3. Inexperienced drivers may find it more difficult 4. Debris / snow can accumulate under deck

- **Pit scales are becoming obsolete in grain elevators**
- **Above ground scales are more common and have greater advantages**

PURDUE UNIVERSITY
Truck Scale Systems
Andrew McDaniel, Brent Kaufman, Jon Thorpe, Ken Gibbs ASM
April 19, 2007
ADM

Truck Scale Systems

Andrew McDaniel, Brent Kaufman, Ken Gibbs, Jon Thorpe

April 19, 2007

Objectives:

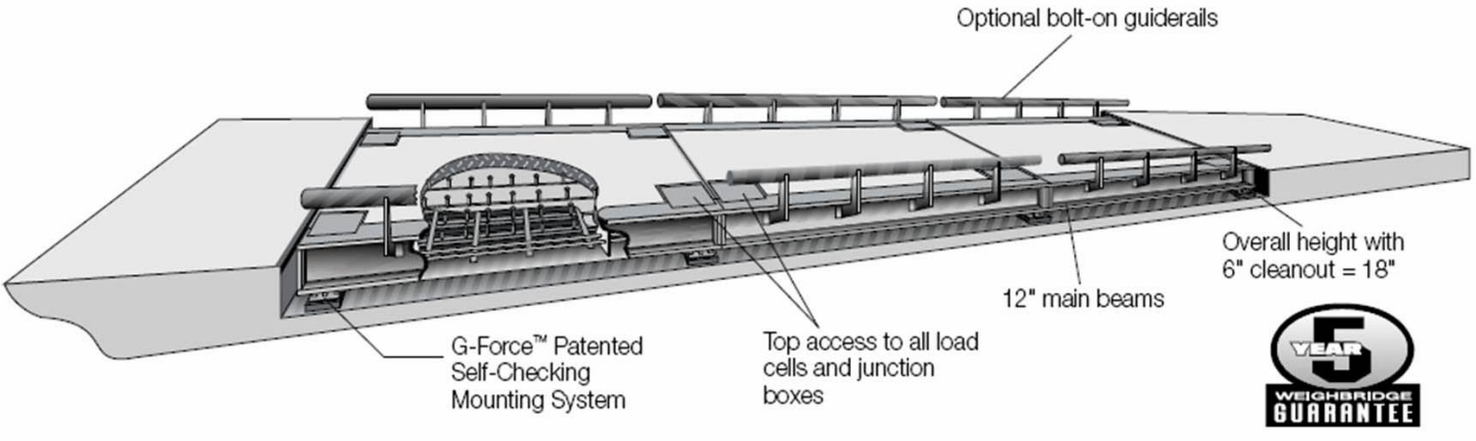
- Explore the different types of truck scales used in the grain industry and propose the best possible system for Archer Daniels Midland
- Research different aspects of the scale system to find the elite truck scale
- Provide a technical report of the best products we have found

ELITE TRUCK SCALE SYSTEM

Rice Lake Survivor OTR Flat-top Truck Scale 70' x 11' Concrete Deck

- **Top access electronic analog canister load cells and junction boxes**
  - **Greater accessibility**
  - **Compatibility with replacement parts**
    - **Cheaper parts**
    - **Less downtime**
- **75,000 lb electric analog load cells**
- **Up to 270,000 lb full scale capacity**
- **6" concrete deck**
- **Five year weighbridge warranty**
- **Two year parts warranty**

RICE LAKE™ WEIGHING SYSTEMS



Other aspects of truck scales researched:

- Ticket Printers
  - Thermal Transfer
  - Direct Thermal
- Safety
  - Guide Rails, Lighting, Cameras
- Communication
  - Stop and Go Lighting, CB radio
- Location
  - Drainage, Traffic Flow, Approach Length

Cardinal Scale Manufacturing Co.
WALZ ISO 17025 SCALE
Emery Winslow SCALE CO.
CompuWeigh COMPUTERIZED WEIGHING SYSTEMS
RICE LAKE SURVIVOR® TOUGHEST SCALES ON EARTH™
INDY SCALE Indianapolis Scale Company Since 1985.

Discussing truck scale issues with an ADM superintendent at the Frankfort, IN elevator

Special Thanks to These Companies for Their Contribution

23,600 lbs Contains More Structural Steel for the Price When Compared to the Competitors

Truck Scale Competitive Matrix
Above Ground Concrete Deck Models

MANUFACTURER	SERIES		MODEL	CAPACITY	PLATFORM SIZE	DECK MATERIAL	DTA	NUMBER OF LOAD CELLS	SHIPPING WEIGHT	LIST PRICES
Rice Lake										
Rice Lake-Flat Top	Survivor		OTR-7011-SC-100	100 Ton	70' x 11'	Concrete	90,000 lbs	8	23,600 lbs	$29,400
Weigh-Tronix										
Weigh-Tronix BMC	BridgeMont	Heavy Duty	BMC-7010	100 ton	70' x 10'	Concrete	80,000 lbs	8	17,754 lbs	$28,995
Weigh-Tronix BMC	BridgeMont	Heavy Duty	BMC-7011	100 ton	70' x 11'	Concrete	80,000 lbs	8	18,871 lbs	$29,580
Weigh-Tronix FCXT	SteelBridge	Heavy Duty	FCXT-7010	100 ton	70' x 10'	Concrete	90,000 lbs	8	23,512 lbs	$34,746
Weigh-Tronix FCXT	SteelBridge	Heavy Duty	FCXT-7011	100 ton	70' x 11'	Concrete	90,000 lbs	8	25,711 lbs	$36,251
Mettler Toledo										
Mettler Toledo	TruckMate	Commercial	7460	100 ton	70' x 11'	Concrete	60,000 lbs	10	14,600 lbs	$27,373
Mettler Toledo	TruckMate	Commercial	7560	100 ton	70' x 11'	Concrete	60,000 lbs	10	14,600 lbs	$29,094
Mettler Toledo	TruckMate	Cycle	VTC210	100 Ton	70' x 11'	Concrete	80,000 lbs	8	18,550 lbs	$36,615
Mettler Toledo (SR)	TruckMaster	Commercial	7431KA (Side Rail	100 ton	70' x 11'	Concrete	45,000 lbs	8 Analog	13,100 lbs	$24,860
Mettler Toledo (SR)	TruckMaster	Commercial	7531(Side Rail)	100 ton	70' x 11'	Concrete	45,000 lbs	8 Digitol	13,100 lbs	$28,061
Mettler Toledo (PIT)	TruckMaster	Commercial	7541 (Pit)	100 ton	70' x 10'	Concrete	45,000 lbs	8	12,800 lbs	$28,200
Fairbanks										
Fairbanks (Field Pour)	Talon	HV Series	89508	100 ton	70' x 10'	Concrete	90,000 lbs	8	15,107 lbs	$28,147
Fairbanks (Field Pour)	Talon	HV Series	89520	100 ton	70' x 11'	Concrete	90,000 lbs	8	15,846 lbs	$29,239
Fairbanks (Field Pour)	Talon	HVX Series	89532	100 ton	70' x 10'	Concrete	95,000 lbs	8	15,980 lbs	$31,676
Fairbanks (Field Pour)	Talon	HVX Series	89544	100 ton	70' x 11'	Concrete	95,000 lbs	8	16,565 lbs	$33,347
Fairbanks (MegaBar)	Rodan	Heavy Duty	90121	100 ton	70' x 11'	Concrete	60,000 lbs	8	49,561 lbs	$37,802
Cardinal										
Cardinal	EPR Series		13570-EPR-C	135 ton	70' x 11'	Concrete	80,000 lbs	8	16,900 lbs	$30,560
Cardinal	GroundHugger		13570PRC-I-C	135 ton	70' x 11'	Concrete	80,000 lbs	10	15,237 lbs	$37,666
Cardinal Hydraulic	Guardian		H13570-EPR-C	135 ton	70' x 11'	Concrete	80,000 lbs	8	16,900 lbs	$34,000
Emery Winslow										
Emery Winslow	Genesis II		94-10070-10	100 Ton	70' x 10'	Concrete	80,000 lbs	8	14,500 lbs	$31,790
Emery Winslow	Genesis II		94-10070-11	100 Ton	70' x 11'	Concrete	80,000 lbs	8	15,500 lbs	$32,945