

# Case IH AFX Combine Simulator

Greg Swank

Lanty Armstrong

David Lee

Kyler Knotts

Jeremiah Faulk

April 29, 2004

## Objective:

The objective was to demonstrate the functions of the new AFX combine cab and the touch screen display without requiring a fully operational combine. The solution had to be portable and durable enough to travel to farm and trade shows. We needed to complete the following:

1. Build support chassis for cab
2. Build display board
  - A. Construct mechanisms to simulate header up and down movements in response to commands from cab
  - B. Construct mechanisms to change upper and lower sieve openings in response to signals from cab
  - C. Header return-to-position function is displayed
  - D. Simulate drive wheel forward and reverse rotation
  - E. Show unload auger in and out function in response to commands from cab
3. Eliminate CAN Bus error codes caused by non-existent combine components



Operational Display Board



Operational Simulator Cab

The intended use of this simulator will be to show the benefits of the AFX touch screen system to consumers, and to educate them on its use.

## Objective 1: Building the Chassis

- Constructed from 3"x6"x.25" steel tubing.
- Can be fork lifted from all sides.
- Utilizes the factory cab mounts.
- Portable due to four pneumatic castor wheels.



The chassis is supported on four corners by swivel pneumatic castor wheels, and can be fork lifted from all four sides.



Plans for the actual cab mounting system were used to build mounts that utilized the existing brackets to attach the cab to the chassis.

## Objective 2: Building the Board

- Supported by a 2"x 2" steel Uni-Strut frame.
- Self supporting stands and stabilizing stakes.



Completed display board with combine model and sieve sections.



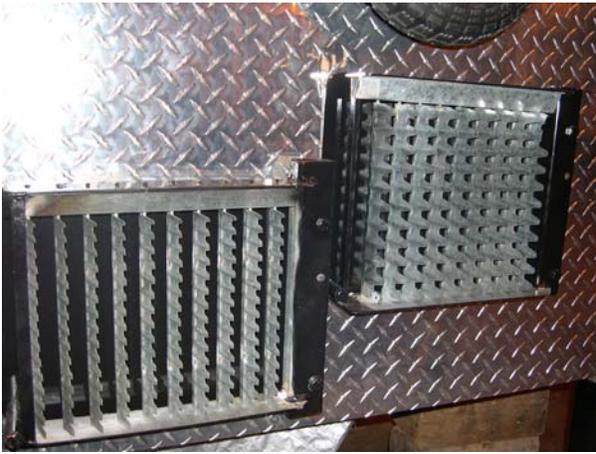
The legs are 20" disk blades welded to steel tubing.

## Objective 2A&C: The Header

- Controlled from the cab.
- Utilizes an actuator and lever arm behind the board.
- Attached using locking grip washers and nuts.

The header will raise and lower by using the header-return-to-position button while gathering and threshing are being simulated.





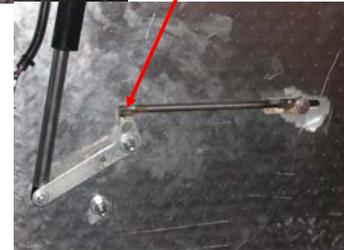
The lower and upper sieves as displayed on the board. Sieves will open and close as the operator desires.

### Objective 2B: The Sieves

- One small section of both the upper and lower sieves are displayed.
- The control arms from the sieves are moved by the actual sieve actuators found on an AFX machine



Each set of sieves is controlled by an actuator that is manually adjusted from the cab, and can be preset for certain crops.



The actuator moves the adjustment arms, causing the sieves to open and close.

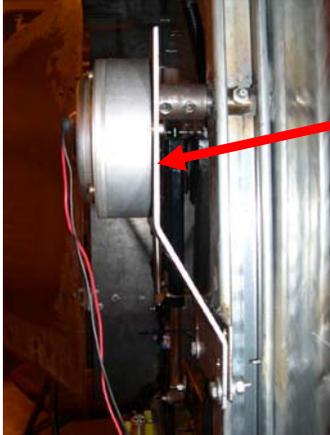


### Objective 2D: The Drive Wheel

- A small tiller tire simulates the drive wheel.
- It is driven by a small electric motor used in transmissions to shift gears. This reduces space taken up by the motor while providing adequate power.

### Objective 2E: The Unloading Auger

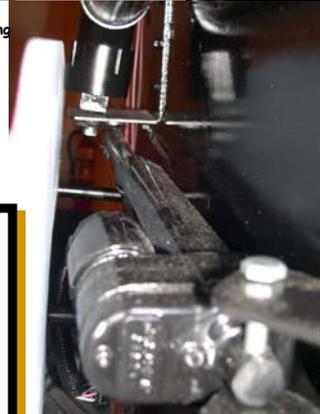
- The unloading auger is constructed from PVC piping and is secured to a hinged mechanism.
- An arm and actuator pull the auger out to unloading position and back to resting position.



The compact size of the motor delivers power and saves space.



The actuator to the right will retract, extending the unloading auger out as in the picture above.



### Objective 3: Error Codes

- The error codes were eliminated by fooling the computer modules in the combine. Resistors in circuits, computer controllers, and reprogramming were used on the the control computers themselves. This resulted in a cab that believes a real combine is operating.

A special thanks to Scott Brand, Garry Williams, Russell Skewes, Leo Bose, Kelly Burgess, Kevin Breneman, David North, Roy Horst, and CNH America for donating time, knowledge, and equipment that helped us complete this project.