Agricultural & Biological
E N G I N E E R I N G

ADM Dryer Monitoring

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Problem Statement: The problem that is being solved is sensing the flow of grain in a tower grain dryer to help detect and prevent fires.
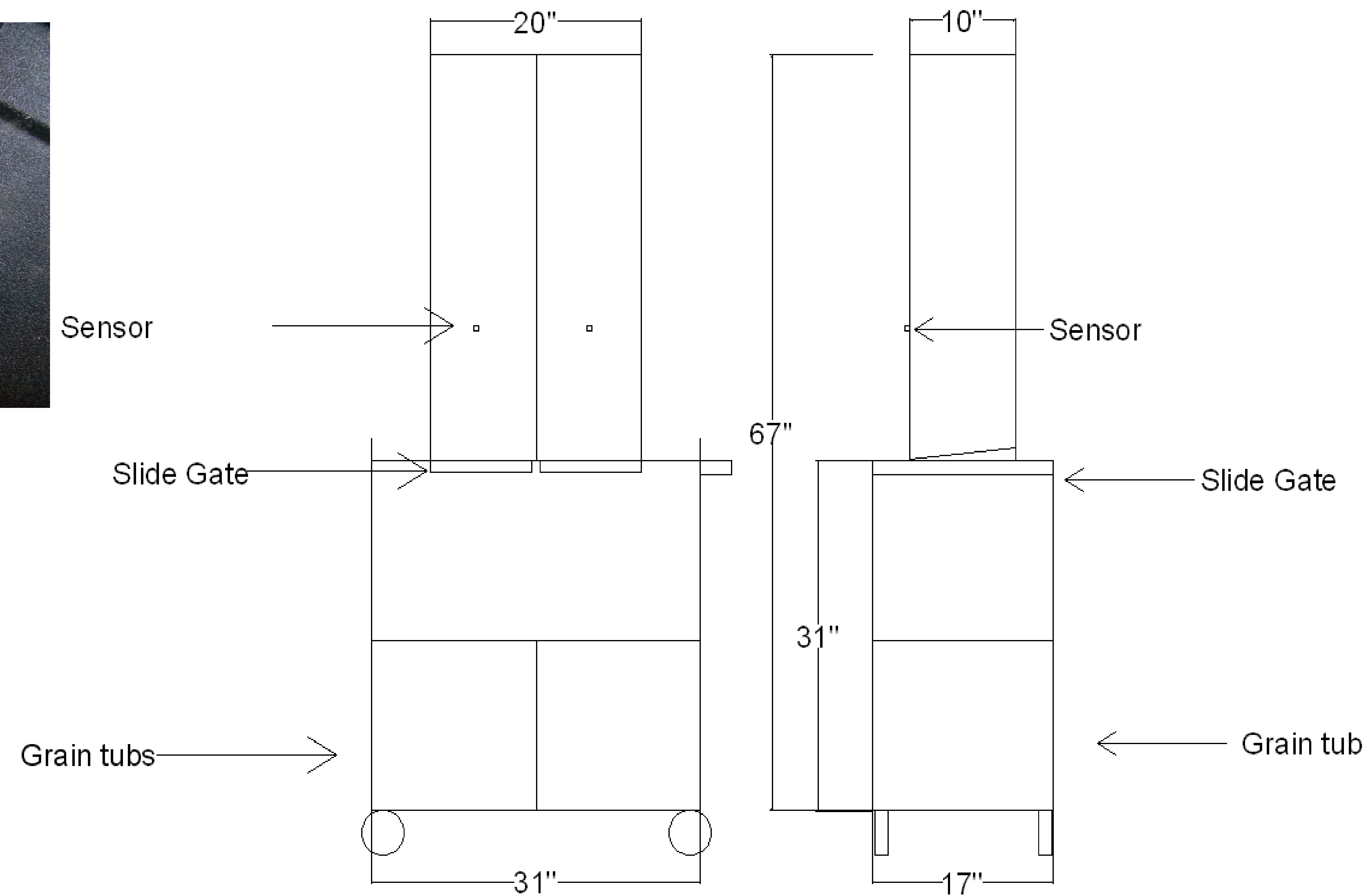
Background Information: Employees currently have to go out to the dryer every half hour, manually take a sample, and walk the entire dryer, making sure all the dryer columns/chambers are flowing correctly. This requires a lot of time that employees could be working on other jobs or projects. ADM would like to retrofit their existing tower dryers with sensors to ensure that grain is flowing through the dryer chambers properly. If the flow of grain stops the sensor will trigger a alarm, warning workers, therefore helping prevent dryer fires.

Alternate Solutions
First we started out with six mini chambers to represent three larger ones that represented grain above and below the inverter. Each of these mini chambers contained a sensor, but since the sensor was the most expensive part we eventually had it down to just one rather large chamber. In the end we decided to make two smaller ones. We were shipped one sensor so we had to do the best we could with what we were given.

Sensor

Control module for sensor

Sensor

Slide Gate

Grain tubs

Slide Gate

Grain tub

AutoCAD schematics for monitoring system

Economic Benefit
This design ultimately helps with the preventing of a tower dryer fire. There can't be a price placed on this economic impact depending on the damage done to the facility. Our budget is as follows.

	Budget
Sensor and Control Unit	$ 1,627.87
Perforated Sheet Metal	$ 158.80
Cart	$ 65.19
Tubs	$ 14.90
Miscellaneous	$ 128.94
TOTAL	$ 1,995.70

The finished grain dryer model

Final Solution: Our final solution for ADM was to mount 2 dryer chambers on a cart with slide gates underneath. With the slide gates, we can control the speed of the flowing grain. The grain then falls into tubs underneath the chambers so little mess is made.

Typical tower dryer found at an ADM facility

ADM

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