

Instrumentation and Data Collection of a Debaler

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Introduction

Baled materials are commonly used as a feedstock for biofuels or other bio-based products. The industry needs a machine that takes the bales and returns them to loose material.



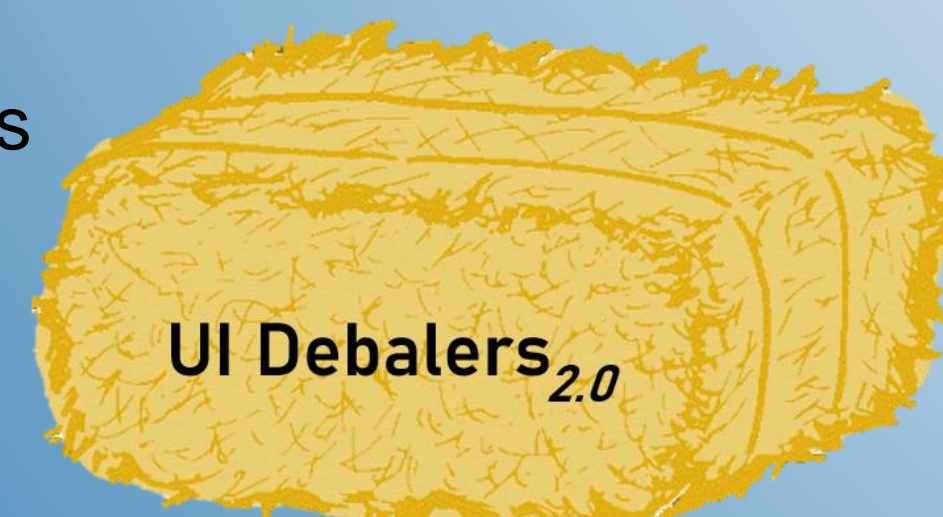
This project, UI Debalers 2.0, is a continuation of a previous capstone project. That team, the UI Debalers, built the prototype seen to the right, that our team inherited. The existing machine is comprised of a manual infeed table, a debaling head, and an outfeed chute.

Objective

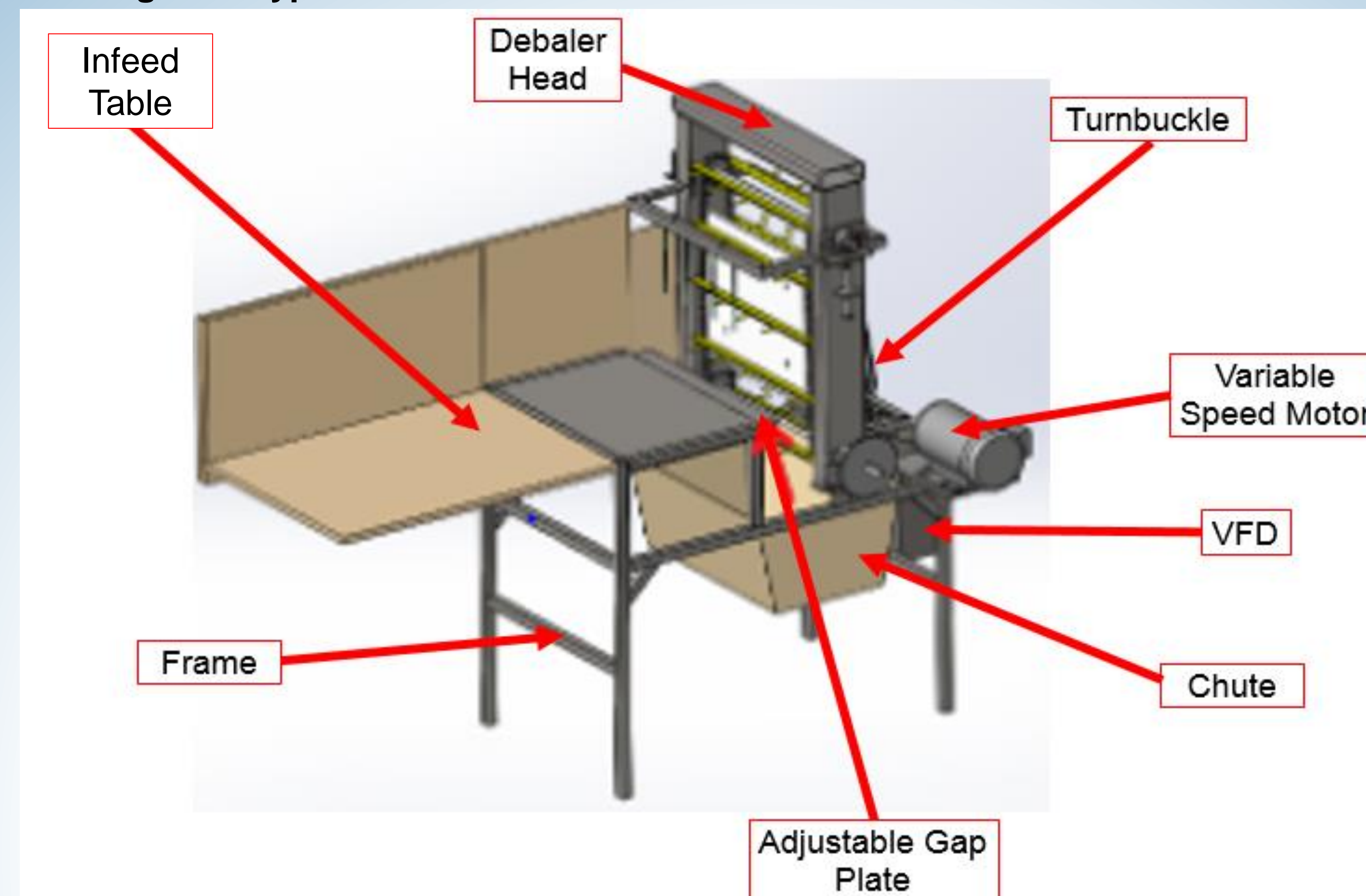
The objective of our project is to improve the current debaler prototype by making the system fully automated. Meaning a person loads a bale and machine takes it and debales without any further human interaction. We also need to incorporate a working control algorithm to sense bale jamming and chute clogs.

Project Goals

- Improve prototype chute
- Modify head
- Full automation
- Control algorithms

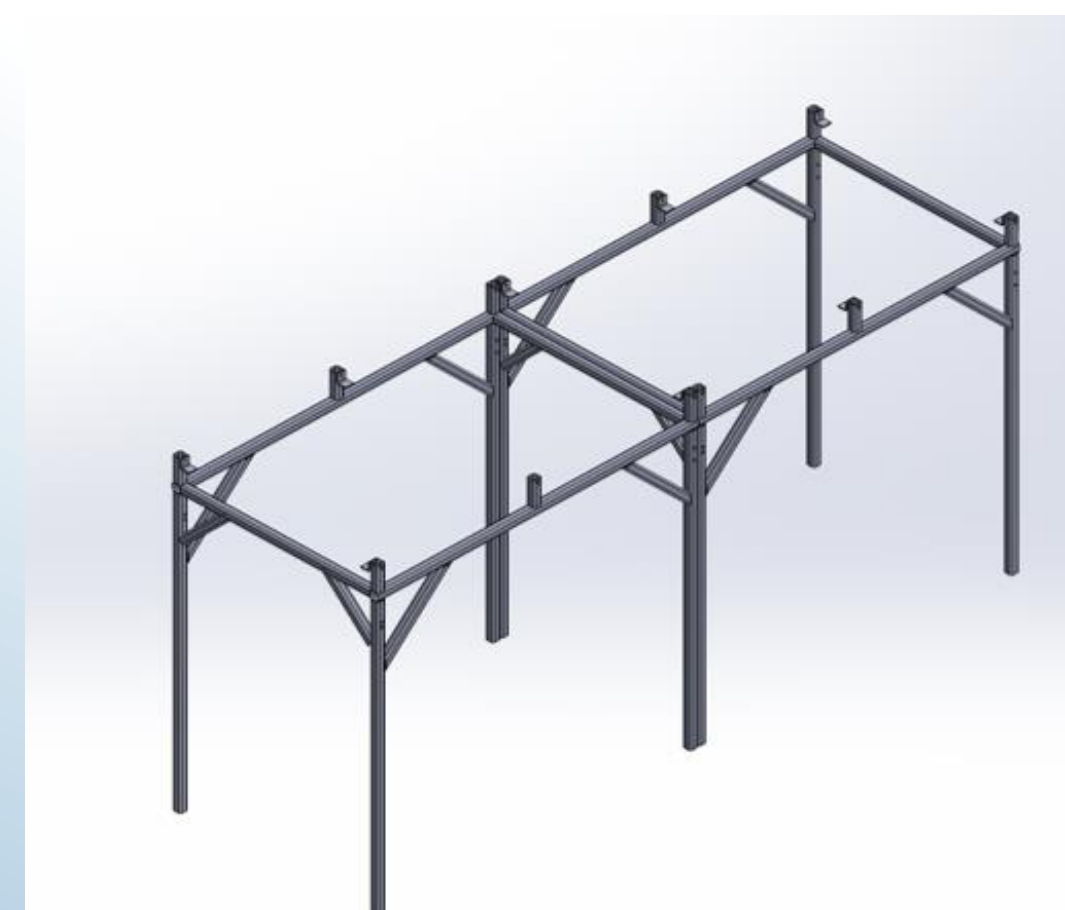


Existing Prototype



Current Design Ideas

- Add more paneling and connect it to the chute to ensure that all loose material flows the chute
- Install a door into the paneling to allow the operator to access the turnbuckle
- Place a brush on the processing head to clear loose material from the tines during operation
- Add a chain driven infeed conveyor
- The figure below is the current conveyor frame
- Exploring different sensors to detect bale jamming and chute clogs
- Hall-effect sensors- measure motor angular velocity
- Ultrasonic motion sensor – detects movement



Plan

The first step in our project is to begin designing our inlet conveyor system. We will attempt to source an old hay elevator and cut it down to size. We will also be adding several sensors to system to automate the prototype. These will monitor the material outlet flow rate, bale jam, and how fast is each motor spinning. Once the prototype meets our design objectives, we will begin testing different types of material to find the best settings.



References:

UI Debalers Design Report:
http://mindworks.shoutwiki.com/wiki/Debaling_Agricultural_Materials