

This multi-year project is evaluating In-Bin Drying (IBD) technology which allows farmers to remotely monitor grain drying within a grain bin on a web-based dashboard. This lets farmers know when the targeted moisture content of the grain is reached in order to optimize drying operation, minimize energy consumption and reduce total input costs.

Objectives

Evaluate the:

- IBD digital technology during calibration and drying events.
- Effects of the orientation of IBD sensor under a stable airflow.
- Effectiveness of utilizing fan energy consumption to estimate fan airflow rate.
- Influence of ambient conditions on airflow estimation.

Introduction

OCCI is working with Top Grade Ag to evaluate the effectiveness of its IBD technology in estimating the moisture content of grain during drying events.

IBD digital monitors estimate water removal rates by measuring temperature and humidity levels at the inlet and outlet of the bin, while estimating airflow throughout the drying process. This algorithm further estimates grain moisture content during drying, allowing producers to know when the grain has reached an average moisture content that is safe to store.

Study Details

- IBD monitors were installed on four Olds College bins containing barley and canola.
- Tests were performed to confirm and improve the accuracy of the IBD algorithm.
- Physical and environmental factors were evaluated that could impact IBD sensor accuracy.

Results

- Top Grade Ag software is user friendly, effective and intuitive.
- IBD sensors are highly accurate at measuring air temperature, humidity and static pressure.
- Recommendations were provided to improve accuracy of moisture loss calculations.
- Ambient air properties have a substantial impact on estimated airflow rate.
- IBD algorithm adjustments can increase accuracy of the water removal rate calculation.

Learnings

- Grain is not dried uniformly within a grain bin.
- Drying efficiency is dependent on how well the bin is sealed.
- Combination of the shape of the fan plenum and orientation of the IBD sensor can have a minor impact on measurement accuracy.

Future Research

Validation work with the IBD technology is an ongoing multi-year project.

Current testing and research in 2021/22 includes:

- Increasing drying efficiency: moisture removal vs energy usage.
- Identifying conditions for condensation development.
- Validating air loss calibration factors and updated algorithm.

