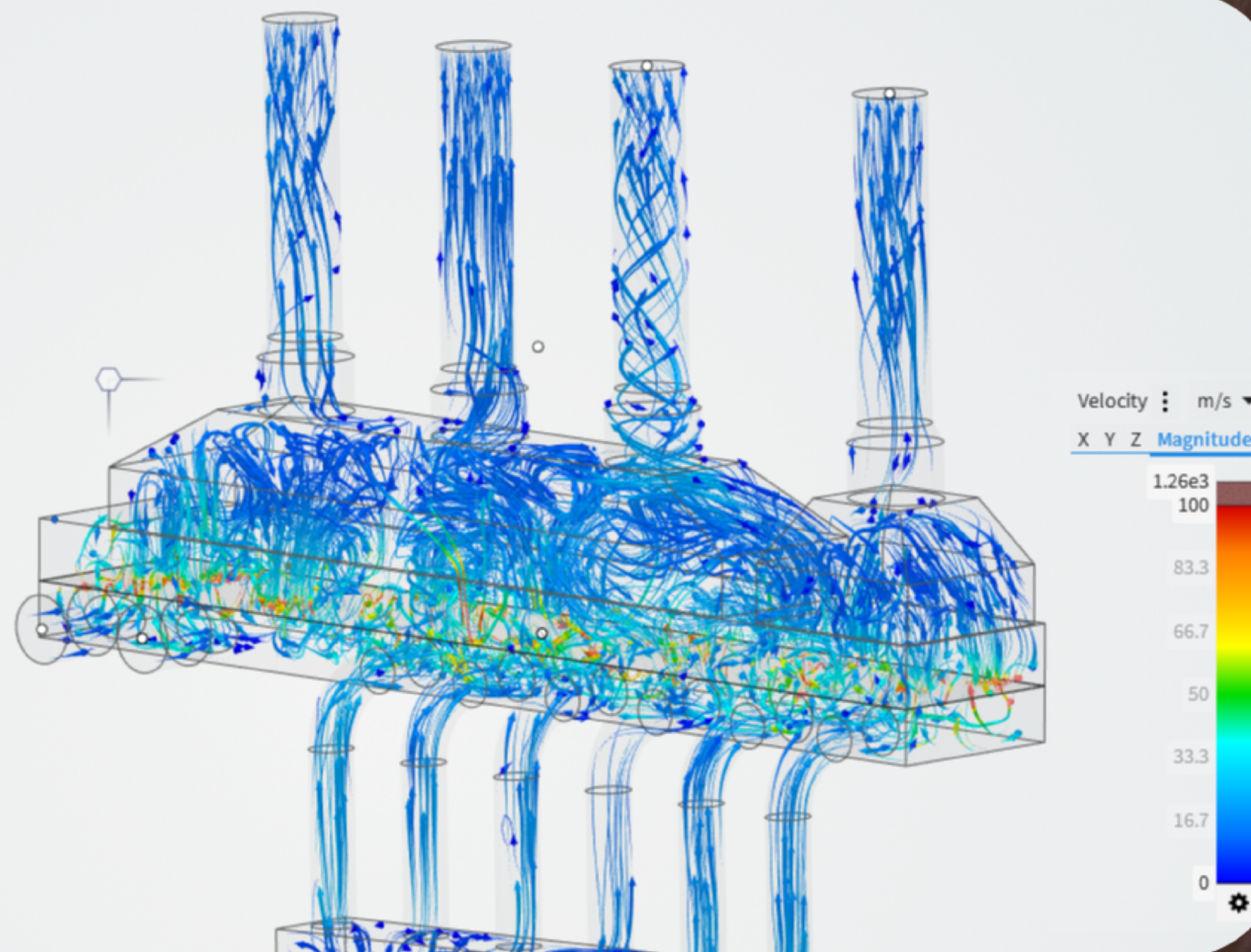


Background

- Dryer cooler is large-scale fluidized vibratory bed
- Moves up to 200 tonnes/hour of Granular Potash
- Vibration causes:
 - Structural damage
 - Process shutdowns, equipment disturbance
 - Broken counter weight structure
 - Perforated plate cracks & falls through

Theory & Simulation

- Modelling software: Autodesk Inventor
- Simulation Software: ANSYS Fluent - Discovery
- Simulation type: Computational Fluid Dynamics
 - Porous media flow analysis

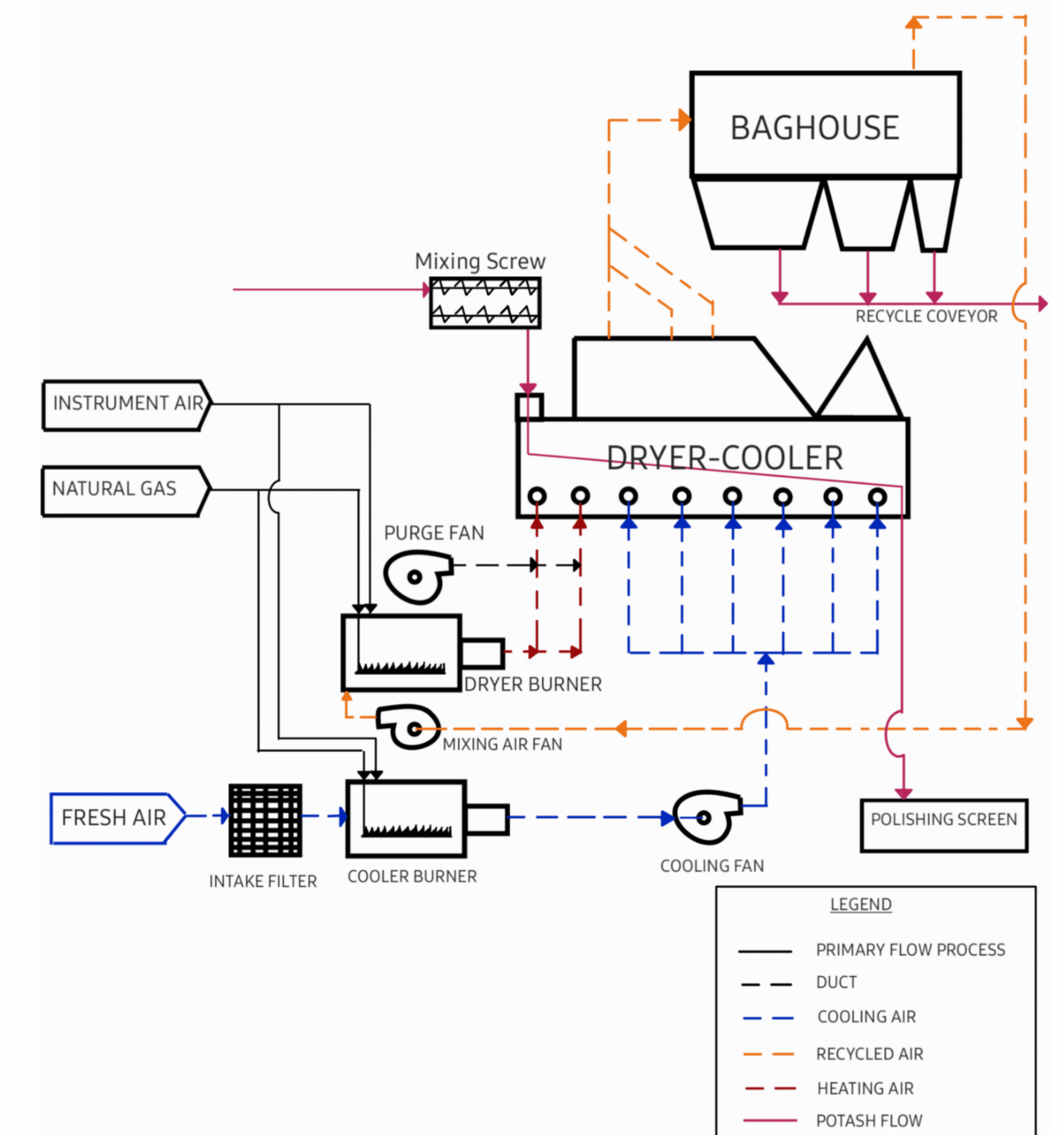


Objectives

- Eliminate vibration through process changes
 - Fluidize and convey potash with air only
- Achieve equivalent product flow rate
- Reduce downtime due to maintenance
- Simulate through software and test benching



Process Flow



Site Test - Results

- Fluidization is achievable from fans over speed
- Upgrade of fans to avoid over-speeding reliance and equipment lifespan reduction
- Increase heating burner flow and pressure threshold as per functional recommendation
 - Avoids interlock shutdown of equipment

Test Bench

On display at ED 134

Materials:

- Acrylic, Aluminum, PLA 3D Print

Testing:

- Fluidization velocity
- Conveyance without vibration
- Particle size variation
- Effect of bed angle