Problem Background

- Dissolving polyvinyl alcohol granules (PVOH) in de-ionized water
- Heat, agitate, and dissolve in mixing tank

Problem Definition: Optimize performance by reducing process time

Objective: Reduce Process Time

- Current Process Time: 7-8 hours
- Our Goal: Reduce Process Time

Process Constraints and Areas for Improvement

Constraints:
- Impeller Speed
- Heating System
- Tank Geometry
- Materials Added
- Mixing Ratios

Potential Improvements:
- Agitation System: Impellers
  - High Shear Mixer
- Tank Baffles (current tank has two)

System Concept – Combination of 3 Design Elements

1 – Four Baffles
- Reduce swirling
- Increase: particle suspension, turbulence

2 – High Shear Mixer
- Strip “slime” coating
- Eliminates particle “clumping”

3 – Radial Impeller
- Increase particle suspension
- Reduce “clumping” at bottom of tank

Prototype and Concept Validation

Testing Station

- Heat up
- Dissolving
- Done

- Our Goal: Reduce Process Time

Computational Fluid Dynamics

- Scale model batch tank
- Tested individual design elements versus current tank design

- Tank flow velocity modeling

Benefits of Concept

- System Benefit:
  - Faster process time

- Benefits to Customer:
  - Cost and Time Savings
  - More product throughput

Current Design: Quicker Heating, less mixing

High Shear Mixer: incomplete heating due to fouling

Four Baffles & Bottom Radial blade: slower heating, quicker dissolving, no high shear mixer

Best Concept