

Minimizing Volume-Weighted Mean of Seed Crystal Fondant by Optimizing Operation of Sweco Ball Mill

McKEWAN, WILLIAM, NICK MORITZ*, RAY DOBRATZ, HUDI KOBRINSKY, and DAVID GROOM
 American Crystal Sugar Company, 1700 11th St N, Moorhead, MN 56560

Introduction

- Beginning of the 2025 campaign, noticed that all factories have different fondant preparation procedure.
- Factories seeding with a D[4,3] of 9-11 μm

Factory	Sugar	Isopropanol	Grind Time
Moorhead	3,600 g	5.95 kg	2 hr
Hillsboro	3,600 g	6,000 g	2 hr
Crookston	2,500 g	5,000 mL	2 hr
East Grand Forks	4,540 g	6,000 mL	2 hr
Drayton	2, 4 lb bags	3 gallons	2 hr

- Sweco Ball Mill Setup:
 - 0.5 hp motor, 18" diameter drum, 200 lbs of 0.5" alumina media



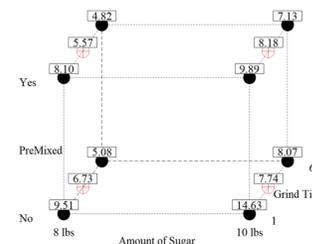
Comparison Before & After



Methods / Experimental Design

- Recommendations from Sweco
 - 0° lead angle
 - 0° phase angle
 - Target 1/4-inch vertical rise**
 - Pre-mix Sugar and Isopropanol
 - Liquid level to top of media
- Materials
 - Blue RTV Silicone Gasket Maker
 - Sugar
 - 99+% Isopropanol

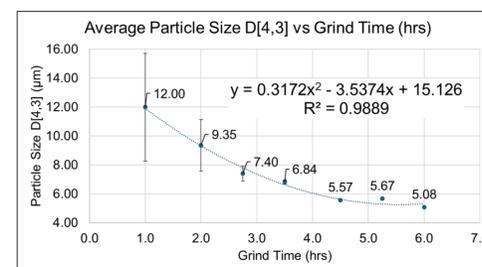
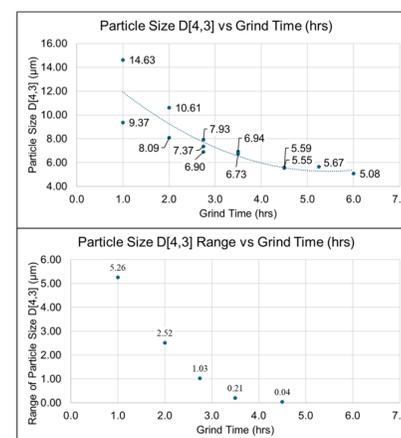
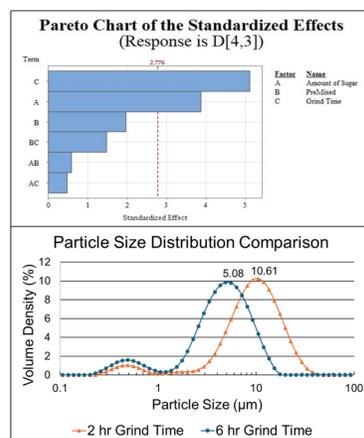
- Factors
 - Amount of Sugar
 - Pre-mixing
 - Grind Time
- Response
 - D[4,3]
- Design
 - Full factorial with centerpoints on grind time
 - Varied grind time with no pre-mixing and 8 lbs of sugar



Future Work

- Investigate mixing methods after the fondant has been created
 - Aeration vs vortex mixing?
 - Is D[4,3] increasing overtime after leaving the ball mill?
 - How to add fondant into pans?
- Update factory specific SOPs
- Recalculate fondant volumes needed for each pan based on new D[4,3] achieved at each factory.

Results



Factory	Sugar	Isopropanol	Grind Time
UPDATED	2, 4 lb bags	2.5 gallons	4 hr

D[4,3] of 6.00 μm with above procedure



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