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**Minimizing volume-weighted mean of seed crystal fondant by optimizing operation of Sweco Ball Mill.**

The purpose of this experiment was to optimize the operation of a Sweco Ball Mill in order to minimize the volume-weighted mean ( $D[4,3]$ ) and span in seed crystal fondant (SCF).  $D[4,3]$  and span of the SCF was determined using a Malvern Mastersizer 3000 Particle Size Analyzer and a Malvern Hydro SM sample dispersion unit. American Crystal Sugar Company (ACSC) utilizes batch vacuum pans to produce sugar. SCF is added to the vacuum pans at seeding. Uniform and reproducible SCF is essential for ideal operation of batch pans. Initially, a screening design of experiments (DOE) was used to determine the most significant factors. A response surface methodology (RSM) experiment was then used to determine the best setting for each significant factor that minimized  $D[4,3]$  and span. The screening DOE and RSM experiments were designed and analyzed using Minitab Statistical Software. With the optimized Sweco Ball Mill producing quality SCF, all five factories at ACSC will have improved batch vacuum pan operations.