

## Case Study: A problem with dust challenges the creativity at A&B Process Systems

“The problem we are having with the process is that, in transporting the powder to the mixing station, a large amount of dust is formed.”

### Problem

The formation of dust is not an unusual occurrence with fine powders and has been frequently observed in the food, pharmaceutical, chemical and plastics industries. This tendency for dust to form is found with powders having particle sizes ranging from perhaps 0.1 to 10 microns and with a fairly spherical shape, which can inhibit agglomeration. The engineers at A&B immediately recognized the hazards associated with the formation of dust when processing fine powders, i.e., pollution of the work environment and, of greater concern to the customer, the potential for an explosion.

### Solution

The process in question required the addition of the fine powder to an oil and mixing to form a stable emulsion. The engineers at A&B Process Systems had considered approaches to controlling the formation of dust when handling powder materials. A delivery system was designed in which the powders would be conveyed to the mixing station under a vacuum. The pressure in the delivery system could be reduced to approximately 0.5 atmospheres using a liquid ring vacuum pump. A partnership with Admix Inc. (Manchester, New Hampshire) resulted in the incorporation of a high shear mixer, the Rotosolver® unit and the stainless steel mixing tank was designed to allow top entry, avoiding the seal problems with bottom entry mixers. The Vacushear® Sanitary Liqui-Processor is the combination of the vacuum conveying system and the high shear mixer. An automated system has been added to provide control of the liquid metering, bulk solid dosing, mixing, de-aeration, liquid levels and or temperature controls.

### Benefits

Once installed at the customer's plant the Vacushear® Vacuum Liqui-processor performed as expected. The formation of dust was eliminated and the high shear mixer provided faster processing. An added benefit was identified. De-aeration, of the emulsion during the processing, significantly reduced the amount of air entrained. The client advised A&B Process Systems team members that the Vacushear process all but eliminated oxidation reactions and enhanced product quality when compared to the atmospheric mixing process.