

A close-up photograph of a Tacmina industrial pump assembly. The pump is primarily white with stainless steel components, including a spray head and various fittings. The brand name 'TACMINA' is embossed on the side of the pump housing. The background is a plain, light grey.

TACMINA

BETTER PROCESS, BETTER PRODUCT

CERAMIC SLURRY SPRAY-DRYING, PULSE-FREE PUMPS IMPROVE PROCESS PERFORMANCE

PROBLEM

Growing market demand for high-tech products has put pressure on fine ceramics manufacturers to deliver advanced materials, such as ferrites, carbides, nitrides and borides for several industries, particularly, the semiconductor, industrial machinery and pharmaceutical markets.

Increasingly, advanced material manufacturers are developing new processes to address market demands but in doing so are often met with difficulty in the form of product inconsistency and low yield, significantly increasing the cost to produce high-value, high-demand products.

KEY ISSUES

- ▶ Reduce particle size tolerance
- ▶ Improve yield rate and production efficiency
- ▶ Create a stable process for new material development

In molded ceramic products, strong particle adhesion is created by fusing similar size and shape particles under high temperature and pressure. The goal is to use materials that offer the greatest amount of surface contact area for strong particle adhesion. A wide variation in particle size and shape will lead to density anomalies and weaknesses in the molded

product, causing product failures. Additionally, removing granulated material produced outside of the specification range is costly and time consuming.

SOLUTION

With decades of experience in spray drying and advanced material production, Tacmina was asked to review the complete process for a fine ceramic materials manufacturer. The Production Engineer stated, "In the past, we used a peristaltic pump to supply the raw materials stock solution. It had an air chamber installed in the system, but since the pulsation was not completely eliminated, the particle size distribution became broad. The yield rate was bad and productivity did not improve, so we decided to start reviewing the pumps."

After studying the process, it was determined that pulsation in the flow of slurry materials to the spray head caused a wide variance in the particle size and ultimately the particle shape as oversized agglomerations broke apart and separated in the handling of the material. Although the drying process is capable of adjustment in order to accommodate different solids content and flow rates it is not able to counter the rapid fluctuations produced by the peristaltic pump, even when using an air chamber as a dampener. The result – approximately 20 percent of the material did not meet the process requirements.

Inconsistent flow and pulsation causes waste due to product manufactured outside of expected tolerances. Additional issues included hose wear causing unpredictable flow rate fluctuations and the potential for unplanned downtime caused by hose breakages, as well as the potential for process contamination from the pump and air chamber.

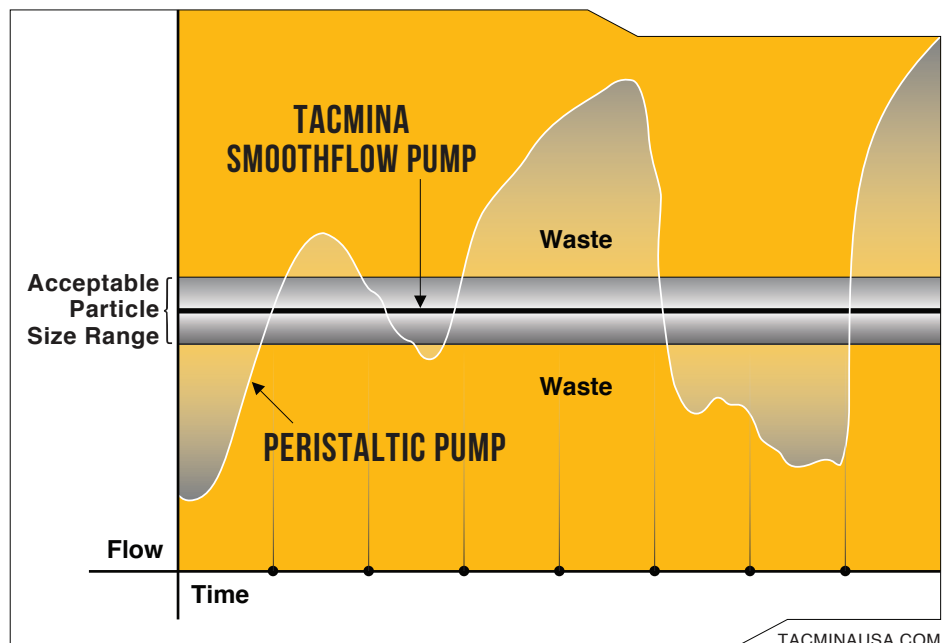
A Tacmina Smoothflow Pump (APL Series) was used to consistently deliver pulse-free slurry to the spray head resulting in a significant reduction in the particle size range, an improved yield rate and production efficiency as well as a stable process platform from which the company will use to develop new, advanced materials to address market demand.

Tacmina Smoothflow Pumps feature a highly-engineered, double diaphragm pump mechanism that delivers pulse-free flow with high repeatability, no air and no contamination. Tacmina motor-driven, Smoothflow Pumps deliver linear flow output over their entire range with event to event repeatability of less than one tenth of one percent for exceptional process consistency and reliability.

Smoothflow Pumps are a stand-alone solution when smooth, pulseless fluid flow is required even with aggressive, high solids content and highly-abrasive materials such as ceramic slurries.

Spray drying ceramic slurries is one of the most effective methods for converting liquid material into free-flowing powders used in countless manufacturing applications. Strict process control is critical in order to maintain a tight particle size tolerance and particle shape necessary to produce a material that is both functional and within specification.

WASTE CAUSED BY INCONSISTENCIES IN MANUFACTURING



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Smoothflow Pump APL



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