

Powder and Bulk Engineering

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- Agglomeration • Nanotechnology
- Grinding to improve blend quality

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Munson Machinery

Case History

Bringing powdered metal blending in-house, rotary-style

Mi-Tech Metals switched from purchasing of blended metal powders to buying of raw powders for in-house blending of tungsten-based alloys.

Mi-Tech engineers researched different types of production-scale blenders, with emphasis on their ability to produce homogeneous blends rapidly with no segregation upon discharge, to evacuate the batch with no residual material, and to handle exceptionally heavy materials with bulk densities over 200 lbs/cu ft (3.2 gm/cc).

Ross Stahl, engineering manager, said, "After researching several companies, we visited Munson Machinery, Utica, NY, spending two days in the laboratory to perform compositional tests at different mixing intervals to prove out blend consistency. We also tested for cross-contamination because we process 15 to 20 different blends, and it's critical that the equipment be easy to clean thoroughly, which we found it to be," he said.

Mi-Tech purchased two Munson 700-THX-15-MS rotary batch mixers, each of which can handle 5500 lb (2500 kg) batches of the company's powdered metal compositions.

How powdered metal ingredients are blended and stored

Thorough blending is crucial. "There are industry standards for the various composite heavy metals," says Stahl. "Our powder has to be within specifications for tungsten, nickel, iron and so on, for each of the different materials."

"During the blending cycle the material is in motion 100 percent of the time, and because we know how homogeneously the blenders mix the powders, and that static blends will not separate during storage, separation of blended ingredients is not a concern," he explains.



Munson Rotary Batch Mixer processes 5500 lb (2500 kg) batches of powdered metal components. Raw powder ingredients enter from surge hopper above and blended powders discharge into intermediate bulk



Mi-Tech Metals manufactures powdered metal products such as this crankshaft, from tungsten-

Tumbling action befits powdered metal application

The rotary mixers consists of a horizontal, rotating drum that has a stationary inlet at one end and a stationary outlet with a discharge gate at the other. The mixing vessel has no internal moving parts.



Blended powders are discharged from Rotary Batch Mixer into intermediate bulk containers before they are verified, then compacted to form "green" parts, ready for sintering. Broken pieces are loaded into a Pin Mill, also from Munson, reducing them into powders that are screened and blended with virgin

Internal mixing flights tumble and fold the batch materials in a multi-directional manner, achieving 100 percent batch uniformity in less than three minutes. The flights also serve to elevate the material as the drum rotates, directing material to the discharge gate for total evacuation of the batch with no segregation upon discharge. Unlike stationary horizontal blenders with mixing blades that are forced through the material, the rotary-style blender uses a low horsepower motor, and imparts little to no energy into the material as it gently tumbles, preventing product degradation.

Interior mixing flights were specified with large radius, ground and polished weldments, eliminating areas where material could lodge. "We rarely have to clean out between mixes," says Stahl. "Periodically, we'll open a door on the mixer, pass air through it and turn on the dust collector to the mixer. If there's any buildup, it cleans quickly. We do this as more of a preventative maintenance function than out of necessity."

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