

## News

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## News

## Nano World News

## NWN Talks with NETZSCH Fine Particle Technology's Technical Director, Harry Way

May 03, 2007 By: Vance McCarthy

*NETZSCH provides proven nanotechnology solutions for a broad range of industries, and is the world's leading manufacturer of grinding and dispersing machinery for media milling, powder processing, dispersing, de-aerating, and filling. With access to comprehensive global resources in engineering and research & development, NETZSCH brings customers the benefits of continually advancing technology.*

**Nano World News** talked with Harry Way, Technical Director at NETZSCH Fine Particle Technology (Exton, PA), about NETZSCH's recent movements in the nanotechnology world.

*NWN: NETZSCH paved the way to better understanding of grinding and dispersing nanoparticles. What has their role been in the industry?*

**Way:** NETZSCH leads the nano revolution in engineering production equipment designed to grind particles to 200 nanometers and below. Our mills are used to manufacture new materials with the exacting properties to meet specific customer application requirements, whether it is smaller, stronger, lighter, more resilient, and/or less expensive. Wet grinding technology with agitator bead mills easily achieves the production of nanoparticles, with an average fineness of 40-100nm. NETZSCH not only provides fine bead mills for consistent nano-size particle reductions, NETZSCH mills are designed for uniform dispersion of nanoparticles produced by other means, without destroying the particle morphology, structure or surface treatment.

*NWN: What is the principle of NETZSCH's fine bead mills for the production of nanoparticles?*

**Way:** The principle of our agitator bead mills is based on the grinding of suspended solid particles by impact and shearing forces between moving grinding beads. The achieved fineness of the product is determined by the stress intensity and the number of contact points. The stress intensity is a function of the kinetic energy, which must be high enough to produce the grinding process. The number of contact points determines how often the media interacts within the grinding chamber. Increased fineness is in direct correlation to increasing the number of contact points.

*NWN: As the nano market grows, have your customers experienced any challenges with grinding or dispersing nanoparticles?*

**Way:** Actually, one major challenge in the dispersion of nanoparticles is that the process can break down the primary particles, ruining the nanoparticles' surface condition, crystal structure and overall chemistry, rendering them ineffective. However, through a process we call 'mild dispersion,' it is possible to maintain the chemical integrity and structure of sub-micron particles.

*NWN: How is mild dispersion different from other methods? Essentially, how does it work?*

**Way:** Mild dispersing uses multiple mild contacts instead of one strong contact, which is what can cause breaking and destruction. The science is in using micro beads because if the diameter of the bead is decreased a few key things happen: the number of beads is dramatically increased; contact of the beads is dramatically increased; the weight of bead is dramatically decreased; and the energy of the bead is dramatically decreased. These four things result in increased mild contacts. NETZSCH suggests using ultra-fine grinding beads, down to 50µm, for dispersion that will not damage the nanoparticles.

*NWN: Working with such fine grinding media presents its own set of problems. How do you suggest overcoming these issues?*



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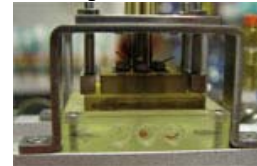
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R. Michael van Dam et al.  
Siemens MI Biomarker Research, Culver City, CA, USA  
**Nanotech Proceedings**

**Way:** Two major concerns come up when dealing with tiny grinding media: handling the media and the separation of the beads from the product. NETZSCH has resolved both issues with our Zeta RS wet grinding system. It was designed similar to a laboratory mill, whereby the grinding chamber can be rotated vertically into different positions for easy emptying, filling and operation.

A rotating screen provides for excellent separation even when using micro beads. The screen rotates with the rotor so products go out through the shaft via a rotary union. This screen system prevents beads from remaining in the product or discharging from the machine.

*NWN: Looking forward, what new NETZSCH technology has the potential to change the face of grinding and dispersing nanoparticles?*

**Way:** NETZSCH systems provide manufacturers and users with safe handling of these nanomaterials and we have the engineering competence to provide total system solutions for handling nano powders. NETZSCH has already proven, from lab scale through production scale, that our machines successfully scale-up for these demanding applications. We went through the learning curve with materials of construction and operating characteristics of the system. Now, from the powder-dispersing stage to fine grinding or dispersing, NETZSCH systems provide agglomerate-free dispersion. As nanotechnology companies move from laboratory operations to full production, they need the engineering expertise to provide a total solution with safety as a top priority.



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