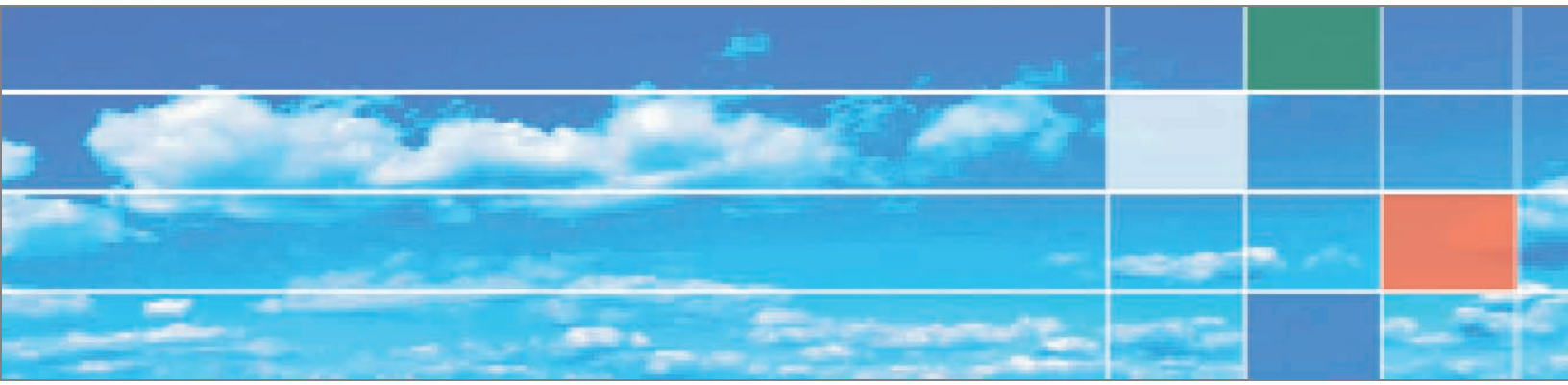
# FAR FROM NANO:
# HEPA-Filtered Industrial Vacuums Help Solve Critical Safety Concerns



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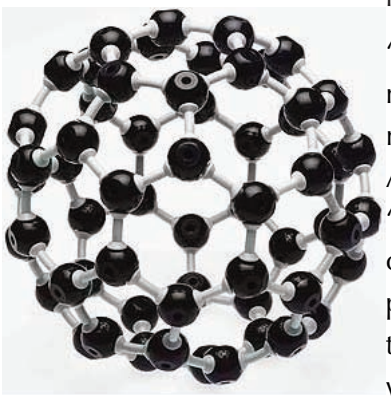
At a recent sales meeting, Paul Miller, general manager of Nilfisk CFM, one of the world's leading suppliers of HEPA-filtered industrial vacuums, gave a presentation titled, Nanotechnology. The word itself, written boldly across a power point slide, immediately conjured up images of a high school science room overflowing with microscopes and atomic models.



Simply stated, nanotechnology is a system of innovative methods to control and manipulate matter at near atomic scale to produce new materials, structures, and devices[i]. Manufacturers across the board are embracing the technology, coined nanomanufacturing, and the process is creeping up everywhere. Nanomanufactured materials can today be found in everything from auto bumpers that are 60% lighter and more resistant to scratching than standard bumpers, to sunscreen, where nanoparticles absorb UV light, to nanostructured polymer films used to make vibrant computer, TV and cell phone displays that consume less power.[ii]

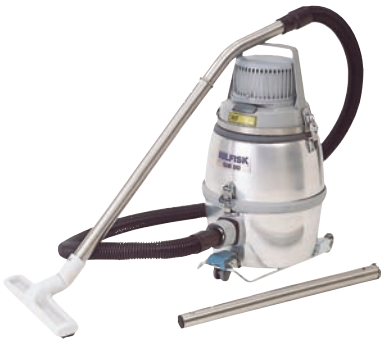
Although nanomanufacturing is resulting in better, state-of-the-art products, it is still filled with a lot of unknowns, especially regarding exposure and worker safety. Environmental groups are raising concerns about potential toxicity since research studies have found that nanoparticles, thousands of times smaller than the diameter of a human hair, could spur peculiar biological reactions when inhaled or absorbed through the skin in high concentrations.[iii] In addition, nanomaterials also present a safety concern for potential fire and explosion. Studies show that decreasing the particle size of already combustible materials may increase the risk for explosion, and even though the explosion risk appears to plateau on order of 10 microns for many dust particles, some nanomaterials are designed specifically to generate heat through the progression of reactions at the nanoscale, presenting a fire hazard that is unique to engineered nanomaterials.[iv]

Workers maybe exposed to these dangers during many phases of the manufacturing process, including packaging, transfer, and cleaning of the products containing nanoscale materials, thus making safety the utmost importance.

Despite these concerns, government standards for the industry do not currently exist, but many organizations, including the National Institute for Occupational Health & Safety have developed precautionary measures to decrease or eliminate potential risks, and incorporating vacuums with High Efficiency Particulate Air (HEPA)-filters into maintenance plans is a common theme.

"The use of good work practices can help to minimize worker exposures to nanomaterials," states NIOSH's Safe Approaches to Nanotechnology report. "Examples of good practices include; cleaning of work areas using HEPA vacuum pickup and wet wiping methods, preventing the consumption of food or beverages in workplaces where nanomaterials are handled, and providing hand-washing facilities and facilities for showering and changing clothes."[v]

Because nanoparticles follow airstreams, vacuums are an effective and efficient tool for protecting nanomanufacturers. HEPA filters will collect 99.97% of particles down to and including 0.3 microns. A vacuum with graduated filtration adds even greater protection. For peak operating efficiency, a vacuum with a multi-stage or graduated filtration system uses a series of progressively finer filters to trap and retain particles as they move through the vacuum. This multi-stage system protects the HEPA filters from blockage and excessive wear and tear, maintaining peak performance. Optimally, the industrial vacuum should feature a HEPA-filtered exhaust stream to further ensure that any air exhausted out of the vacuum is decontaminated and, therefore, safe to breathe. For ultimate safety, an ULPA filter may want to be considered, as it filters 99.999% of microns, down to and including 0.12 microns.



And for workers handling high-risk materials, explosion-proof vacuums (EXP) should be factored into the maintenance plan. These grounded machines are made of non-sparking stainless steel with special motors designed to

prevent potential explosions within the vacuum. Because not all vacuums are created equal, it is imperative that electric EXP's are approved by nationally recognized testing laboratories and meet the requirements for use in nanomanufacturing environments. Intrinsically-safe pneumatic vacuums also exist, and although there are no testing bodies for air-operated machines, they should also absolutely meet the necessary requirements.

In a separate report done for the Campus Safety Health and Environmental Management Association, researchers from MIT and the University of Massachusetts Lowell also concluded that even though the dangers of nanotechnology are still unclear, HEPA-filtered vacuums should be used in university nano-research centers for general maintenance and spill response.[vi]

"High uncertainty does not equal high risk," the authors wrote. "High uncertainty equals high precaution."

District sales managers at Nilfisk CFM have already begun to see an influx in calls related to nanotechnology, including a well-known Ivy League school, which uses one of the company's cleanroom vacs in their nanotech department. In what is being referred to as the next industrial revolution, Nilfisk CFM staff is grateful for their important role in the emerging technology. In fact, they see it as the beginning of an opportunity to solve contamination issues that are anything but nano.


[i] "Safe Approaches to Nanotechnology." The National Institute of Occupational Safety and Health. (01 Apr 2008). <www.cdc.gov/niosh/topics/nanotech/safenano/intro.html>.

[ii] "Current Nanotechnology Applications." (29 Mar 2008). Nanotechnology Now (01 Apr 2008) <www.nanotech-now.com/current-uses.htm>.

[iii] "Safe Approaches to Nanotechnology." The National Institute of Occupational Safety and Health. (01 Apr 2008). <www.cdc.gov/niosh/topics/nanotech/safenano/healthconcerns.html >.

[iv] Nanotechnology Workgroup, a group of EPA's Science Policy Council. "EPA Nanotechnology Whitepaper." EPA 100/B-07/001, February 2007.

[v] "Safe Approaches to Nanotechnology." The National Institute of Occupational Safety and Health. (01 Apr 2008). < www.cdc.gov/niosh/topics/nanotech/safenano/intro.html >.

[vi] Tsai, Candace Sujung. Hallick, Marilyn."Workplace Airborne Nanoparticle Exposure Measurement at University Research Centers." (2007). Campus Safety Health and Environmental Management Association. (01 Apr 2008). <www.cshema.org/conf07/presentations/43_CSHEMA_Tsai_Hallock_07.pdf>


## About Nilfisk CFM

Nilfisk CFM, the industrial vacuum division of Nilfisk-Advance America, helps its industrial customers meet their individual cleaning requirements and challenges with an extensive range of high-performance vacuum cleaners. From its Malvern, PA headquarters, Nilfisk CFM provides industrial vacuums for heavy-duty applications that require maximum suction power; and specialty vacuums for clean applications that demand "absolute" air purity and facility cleanliness. The company's vacuums are equipped with industry-specific features and exceptionally efficient filtration systems, ensuring dust- and debris-free facilities in the food, chemical/pharmaceutical, electronics, metalworking/powder coating, and a variety of manufacturing industries. For more information, visit www.pharmaceuticalvacuum.com