



CNSE features world-class nanotechnology tools and facilities.

## **CNSE of the University at Albany, New York, USA**

**Nation's top college for  
nanotechnology and  
microtechnology uses PSP® to  
safely exhaust clean room  
manufacturing process exhaust**

The dramatic changes the computer revolution of the 1980's brought to our lives will be dwarfed in comparison to the changes that will occur through the new scientific field of nanotechnology. Applications will affect everything from the batteries we use, to new ways of generating and transmitting electricity, to the way we treat cancer. Nanotechnology is the science of managing and manipulating matter at the atomic level. It is for us today what plastic was in the 1940's. Universities, state and regional development councils have been investing in nanotechnology research in hopes of getting in on the ground floor of this revolution.

This Case Study highlights the impressive College of Nanoscale Science and Engineering of the University at Albany (CNSE). CNSE is the first college in the world devoted exclusively to the research, development and deployment of innovative nanoscience, nanoengineering, nanobioscience and nanoeconomic concepts. Its campus complex - a \$3 billion, 450,000 square foot facility - is the most advanced

research complex of its kind at any university in the world. With more than 250 companies worldwide as partners, CNSE students and faculty work along side industry scientists on fundamental cutting-edge research underlying real-world problems. The Albany complex houses the only pilot prototyping facilities in the academic world for the two standard sizes in computer chip design; the 200 millimeter (8 inch) wafer and the 300 millimeter (12 inch) wafer.

### **Background:**

Nanotech research employs many of the same manufacturing protocols as microprocessor "chip" manufacturing, the most critical of which is an environmentally clean space or "clean room" free of airborne contaminants. But just as clean room manufacturing requires the intake of clean, filtered air, so too must the by-products of the manufacturing process be safely exhausted. Process exhaust can contain potentially hazardous, highly corrosive, combustible and even toxic fumes and liquids. The safety and health of personnel, the environment and the integrity of the facility and its systems are important considerations in the design of any nanotech lab, but especially critical in a university setting where student and faculty safety is paramount.

### **Utilizing Semiconductor Successes:**

The University selected the design services of M+W Zander, to execute the clean room design of their facility. M+W Zander's success in the electronics and nanotech industries is based on planning, construction and operation of many semiconductor production facilities. One of the construction materials M+W incorporated into the clean room design was a proven product they had used many times before for corrosive fume exhaust - PermaShield Pipe (PSP®) fluoropolymer coated stainless steel exhaust duct.

The evolution of fluoropolymer coated stainless steel duct began in the semiconductor industry of the early 1990's. Fires spreading through manufacturing buildings via a ventilation system made of combustible materials resulted in a string of catastrophic losses. To address these challenges, Fab-Tech developed a process to integrally bond

a fluoropolymer material to the inside surfaces of stainless steel duct. The use of coated duct was a revolutionary breakthrough and has now become the material of choice for both the semiconductor and nanotech industries as they meet the extreme demands of both safety and corrosion resistance.

Building codes and insurance companies prefer the use of non-combustible materials (i.e. stainless steel) for fume exhaust lines versus materials requiring suppressant devices such as sprinklers. When selecting duct for corrosive exhaust applications, it was critical to choose a product that was rated by Factory Mutual (FM), an affiliate of the insurance company FM Global which is devoted to reducing commercial and industrial property losses and maintaining the continuity of its policyholders' business operations. Fab-Tech uses Factory Mutual Research's services to earn the FM Approval mark, certifying through rigorous testing, the reliability of their products. Fluoropolymer coated stainless steel duct is tested and approved under FM Research Standard Number 4922. By using PermaShield coated stainless steel duct, structural integrity is maintained in the event of a fire. With extremely low flame and smoke characteristics, these systems will not burn, melt or generate large quantities of smoke, an extremely important issue in any lab environment.



PSP® duct staged for installation by MCD Mechanical Contracting Technicians. Note clean room protocol is already in effect at this point of assembly.

The PSP® duct at CNSE was expertly installed by MCD Mechanical Contractors of Albany, NY. "Working with your Jim Dion has been a very positive experience", commented John Rhude, Project Manager for MCD. "Jim did an excellent job of taking care of our orders and insuring that all material arrived when promised."

MCD Project Foreman Dave McDonald added, "We especially appreciated the fact that we could cut and shorten coated duct without hurting the coating." The ability to cut and modify PSP® duct is one of the unique features of this product. PSP® duct can be shortened, flared or "cut into" for saddle taps or sample ports with no weakening of the bonded proprietary fluoropolymer coating.

## Conclusion:

CNSE, working closely with M+W Zander and MCD Mechanical, has completed three NanoFab clean room projects and installed several thousand feet of Fab-Tech PSP® duct at the Fuller Road site. Installed duct ranged from 3 inch tool hook-up lines to 60 inch process exhaust mains. Several thirty six (36) and forty eight (48) inch vertical stacks were also supplied. In sizes 3 inch through 14 inch, Fab-Tech's innovative "EZ" clamped duct was used to significantly reduce installation time in the clean rooms.



PSP® duct installed on exterior of NanoFab 300 North.

Fab-Tech is proud to be an integral part of the nanotechnology research being conducted at CNSE. Through its mission of academic excellence and providing future generations of scientists with state-of-the-art facilities, CNSE is truly an incubator of discovery and a gateway to greatness!