

## Fluoropolymer coated stainless steel helps emerging nanotech industry grow safely



PSP® duct installation at NonoFab 300 South Annex, Albany Nanotech, NY

The computer revolution of the mid 80's dramatically transformed business and the way people work. Today, at the dawn of the 21st century, nanotechnology has the potential to impact everyday life in the same way. The pursuit of scientific innovations in this field of research and consequent commercial applications has been increasingly financed with an eye on future dividends. Universities, state and regional development councils continue to invest in nano-technology research in hopes of getting in on the ground floor of this latest revolution. As a result research facilities are sprouting up all over the country. Most noticeable of which are the construction of multi million dollar nano-facilities on university campuses from Boston to Los Angeles.

Nanoscience is the study of microscopic particles as small as one nanometer or one billionth of a meter. Nanotechnology builds on this information with the express goal of atomic scale manufacturing. Scientists claim this technology holds the promise of new materials and products from smaller, more powerful computers, environmentally sensitive clothing and futuristic swarm-like weapons. Recognizing the potential of this science, major corporations such as IBM, Fujitsu and Intel are also pouring vast sums of money into research along with the United States government.

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 particulate. Clean rooms are designated by class, such as Class 1000, 100 or 10. A Class 10 clean room maintains less than ten particles larger than 0.5 microns in each cubic foot of airspace.

Just as clean room manufacturing necessitates the intake of clean, filtered air, so too must the by-products of manufacturing processes be safely exhausted. These by-products all contain potentially hazardous, highly corrosive, combustible and even toxic fumes and liquids. Therefore, the safety and health of personnel and the integrity of the facility and its systems are important considerations in the design of any lab but especially important in a university setting where student safety is paramount. The challenge is to incorporate reliable, cost-effective, easy-to-install, fire and corrosion resistant transfer systems into a facility. Building codes and insurance companies prefer the use of non-combustible materials for fume and chemical transfer systems versus materials requiring suppressant devices such as sprinkler systems. To address these challenges, Fab-Tech developed a process to integrally bond a fluoropolymer material onto stainless steel. Fab-Tech's coated stainless steel process pipe and duct delivers unparalleled corrosion protection, ease of installation, and structural integrity in the event of a fire since it does not melt, burn or generate smoke.

Also important in the choice of construction materials is the FM rating. Factory Mutual ( FM ) is an affiliate of FM Global, the world's largest insurance company, specifically devoted to reducing commercial and industrial property losses and maintaining the continuity of its policyholders' business operations. In addition, manufacturers such as Fab-Tech use Factory Mutual Research's services to earn "FM" approval, certifying, through rigorous testing, the reliability of their products and services.

For more information about stainless steel process pipe and duct coated with fluoropolymer barrier coating from Fab-Tech, visit the website [www.fabtechinc.com](http://www.fabtechinc.com) or contact a sales representative @ [sales@fabtechinc.com](mailto:sales@fabtechinc.com).

On the Brightwater project, PSP® was included in their specification as a fiberglass duct "substitute". Design engineers realized that they would benefit greatly from the use of stainless steel duct internally coated with a highly corrosion resistant fluoropolymer barrier in lieu of FRP (fiberglass reinforced plastic) thermo-setting duct. The combination of extreme corrosion resistance, Factory Mutual Research (FM) smoke and fire ratings, ease of installation and overall low installed cost led them to conclude that a switch to **PSP® duct would save the project both time and money.**

Corrosive fume exhaust should be just that..... corrosion resistant. A fluoropolymer is a polymer that contains fluorine atoms and is characterized by a high resistance to solvents, acids, and bases. Its corrosion resistivity exceeds even that of glass, exotic metal alloys and plastics. Based on published data, PSP® far surpasses FRP in chemical resistance and the robust stainless steel substrate will not burn, collapse or leak. Fab-Tech's PermaShield fluoropolymer barrier coating with proprietary resin technology assures superior adhesion to the stainless steel resulting in a coating that will not delaminate. And with a 300 series stainless steel exterior, the system never needs painting or an ultraviolet protective coating.

Review of smoke and fire ratings revealed that PSP® duct carried a Factory Mutual flame spread value of "0". More important was comparison of the Smoke Generation index for vinyl ester fiberglass duct (over 400) and fluoropolymer coated stainless steel duct (20). When exposed to flame, FRP duct generates large volumes of thick black smoke several hundred times the value of Fab-Tech's coated stainless steel.

#### ***Dollar Savings In Material And Labor!***

A key consideration for the selection of PSP® duct was cost and low labor dollars to install. FRP duct joints are accomplished by a labor intensive "butt and wrap" procedure. Duct ends are ground smooth, sealed with catalyzed resin, and finally overlaid with several layers of resin and reinforcing fiberglass. Adhesive curing at an ambient temperature of 70°F takes at least 24 hours, so electric heating blankets must be used to accelerate the needed cure time. Even then, cure time for a joint could take over one hour. FRP duct also requires an internal corrosion wrap and lengthened time to "heat cure" each joint. Work site temperatures below 69°F or above 90°F, as well as high humidity (which the Seattle area is noted for), can adversely affect the adhesive, the cure of a joint or the overall integrity of the connection. Conversely, PSP® connections are quick and easy.

Standard "vanstone" flanges are bolted together, sandwiching a PTFE gasket between them.

The calculated dollar savings in labor alone were huge! PSP® coated duct can be installed in a third of the time needed for FRP. And the labor savings increase as duct diameters get larger. Coated stainless steel duct is not affected by ambient temperature or humidity. And the actual material cost was less than FRP, which is highly dependent upon petrochemical based oil prices. In a closely scrutinized sealed bid, the combination of material and labor costs for PSP® duct came in below fiberglass, netting the county savings that will result in hundreds of thousands of dollars. And the guaranteed 3 week delivery cycle bested fiberglass duct manufacturers by months!

If you would like to begin saving time and money on your next odor control project, please contact us at 802-655-8800 or [sales@fabtechinc.com](mailto:sales@fabtechinc.com)



King County Brightwater waste water project.

