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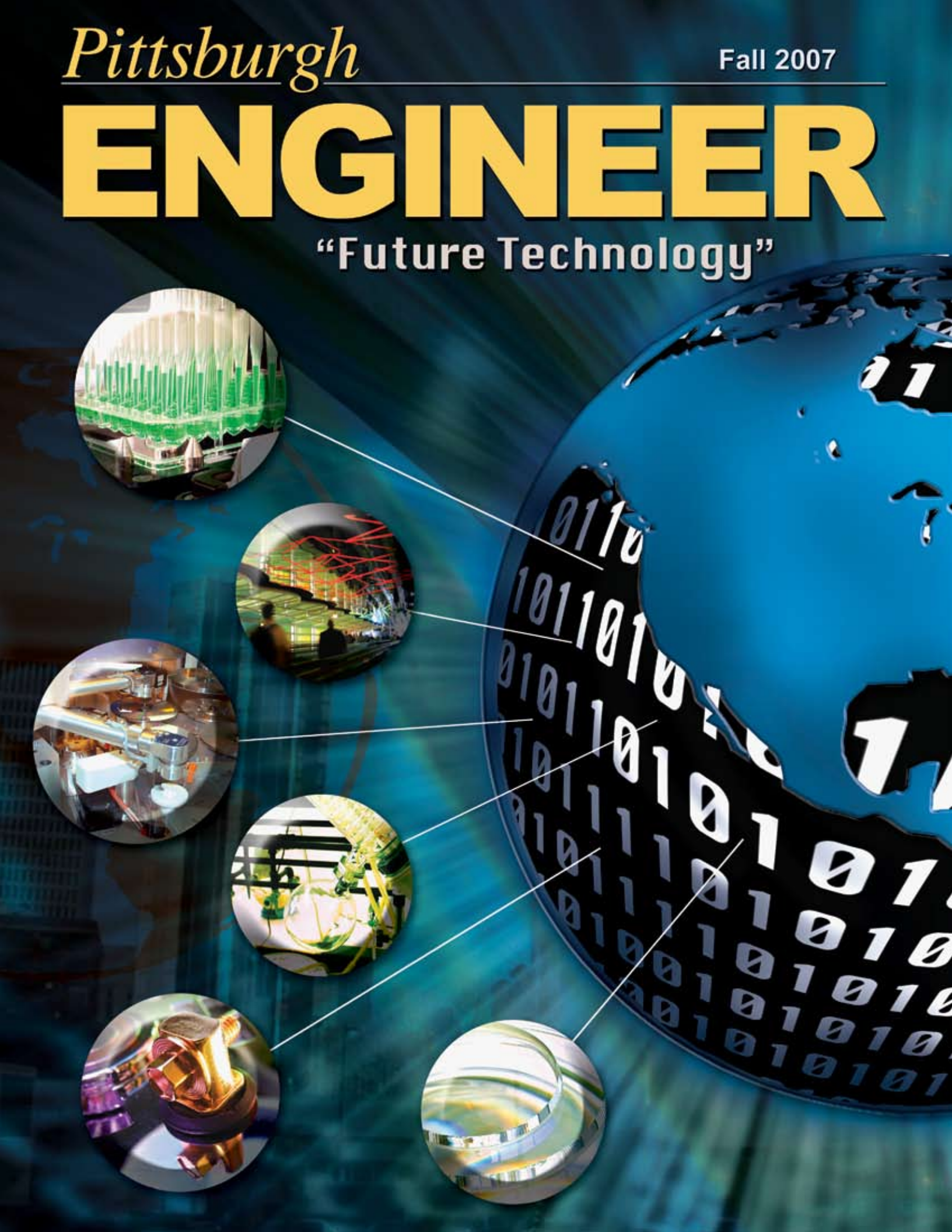

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FROM THE GUEST EDITOR...

Guest Editor
By: Dan Onorato
Chief Executive - Allegheny County, PA

When I was asked to serve as guest editor of this issue on the future of technology, I jumped at the opportunity to share some examples of the exciting things going on in our region. But discovery and innovation are nothing new around here – Southwestern Pennsylvania has long been a crucible of research and development.

From the Ferris Wheel to stainless steel, from the polio vaccine to organ transplantation, and from robotics to artificial intelligence, our region has revolutionized many industries. In fact, there's no place on earth that can demonstrate a tradition of innovation equal to Pittsburgh's. And our future is equally bright.

The University of Pittsburgh, Carnegie Mellon University, UPMC and other institutions are growing and thriving, and they continue to produce new discoveries, new technology and new advances. Working with these institutions and the private sector, we're capturing more and more spin-off businesses and keeping them here in our region.

Over the past few years, Heinz, U.S. Steel, Google, Mitsubishi Electric, NOVA Chemicals, Lanxess and others have chosen our region as the site of their new research and development operations. In this issue, we'll profile Medrad, Westinghouse and Bombardier, three local businesses that are developing cutting-edge technologies right here in Southwestern Pennsylvania.

The fourth feature article is one I find very compelling because it was written by Alex Pazuchanics, a bright young man who served as an intern in my office this summer. Alex is a senior at Central Catholic High School, and I asked him to highlight some of the new technologies being developed in Pittsburgh that he and his peers find exciting. I hope you'll enjoy reading about our future generation's view of the future of technology as much as I did.

My vision for Southwestern Pennsylvania is simple – continue building upon our great successes in economic development, continue reclaiming our region's brownfields, and continue creating and expanding high-tech businesses. New development and new technology bring new jobs to our region, which in turn keeps young people and families in Southwestern Pennsylvania, making it a vibrant place to live, work and play.

Dan Onorato was elected Chief Executive of Allegheny County, PA in 2004.

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Photo by: Alexander Denmarsh Photography

Phipps Conservatory and Botanical Gardens

Implementing New Technology in a Historic Building

By: Richard V. Piacentini
Executive Director
Phipps Conservatory and Botanical Gardens

In recent years, Phipps Conservatory and Botanical Gardens has undergone its most ambitious projects to date. With two major expansions completed and one on the horizon, searching for new and efficient technology has become a priority. A Victorian-era glass house built in 1893, the building itself creates many challenges in terms of updating and adding to its uses and size. Phipps, the Green Heart of Pittsburgh, has accepted the challenge and is implementing cutting-edge technology that both expands the facilities and decreases the footprint on the environment.

Building an Energy Efficient Visitor Center

The first phase of Phipps' expansion involved the new Welcome Center, an 11,000 square foot, state-of-the-art building that added a café, gift shop and admissions area to the historic glasshouse. Pittsburgh architects IKM, Inc. designed the high performance building, nestling it into the earth to preserve the integrity of the original structure. The Welcome Center is both water and energy efficient, earning Silver LEED status. LEED (Leadership in Energy and Environmental Design) is the accepted standard of measurement for high performance, eco-sensitive green buildings established by the United States Green Building Council. Phipps' Welcome Center is the first LEED-certified building in a public garden.

With the Welcome Center resting below-ground, the issue of proper lighting was addressed by erecting a roof-top fritted glass dome above the central atrium. This addition allows daylight to illuminate the lobby, café and gift shop, reducing the demand for artificial lighting. Laminated, insulated windows run the length of the concave courtyard and constrain glare and heat while allowing the maximum amount of daylight into the building. The placement of the structure below ground also creates a green roof, providing a heat sink that enhances the Welcome Center's efficient climate control.

Outside the Welcome Center, the walkway slopes down to the below-grade main level, creating potential problems during winter months. To alleviate icy conditions, Phipps installed a network of heating pipes under the walkway to channel waste steam condensate from the greenhouses to warm the sidewalks and melt ice. The pipes then return to the steam plant shared by neighboring institutions. This system is controlled by an Argus Controls computer program, which is connected to a weather station that triggers heating when snow or ice is detected. The result of all these applications is a 40 % savings in energy costs.

Balancing Revolutionary Design with the Latest Eco-Technology

Phipps' second expansion phase included 36,000 square foot state-of-the-art production greenhouses, and a 12,000 square foot exhibit space designated as a tropical forest conservatory. While some conservatories spend considerable money on supplemental heating and cooling systems to overcome the original structure's limitations, Phipps took a fresh approach by deploying energy-saving strategies. The Tropical Forest Conservatory has an unconventional design, permitting the use of energy-saving insulated roof glass while still maintain-

ing proper light levels for growing plants. The structure is also 100% passively cooled. It is the most energy-efficient conservatory in the world.

Beyond the design of the space itself are several new technologies implemented to further increase the energy savings and efficiency. The Tropical Forest Conservatory is powered by a 5kW Solid Oxide Fuel Cell, manufactured by Pittsburgh-based Siemens Power Generation. This fuel cell converts natural gas into electricity with remarkable efficiency and is the first-ever fuel cell in the world in a conservatory. In addition to producing its own electricity, Phipps captures waste heat and uses it to heat a tempered water system.

"This fuel cell converts natural gas into electricity with remarkable efficiency and is the first-ever fuel cell in the world in a conservatory"

Energy blankets installed near the roof prevent convective and radiant heat loss during the winter, providing shade in the summer. These are powered by an Argus computer system again tied electronically to a weather station. A first-ever computer-controlled Venturi effect, run also by Argus Control System, uses the wind to draw hot air out of the Conservatory without the use of enormous exhaust fans. The computer system opens and closes vents according to internal conditions and wind direction and speed.

In addition to the roof design, cooling in the Tropical Forest Conservatory requires much less energy because of features such as earth tubes. Using German technology, the six 24-inch diameter concrete tubes are each 300 feet long and are installed at 15 feet below grade, where the temperature is a steady 55 degrees year round. Hot outside air cools as it travels through the tubes and into the Conservatory. A vacuum created by hot air exiting the roof vents pulls the air cooled underground into the building, making the space much more comfortable than traditional conservatories. In the winter these earth tubes partially heat makeup air that circulates back into the space.

Further energy savings are established in the Special Events Hall, where the windows are made of Solarban 70 XL solar control low-emissivity glass. The most energy-efficient glass made, it is designed and manufactured by Pittsburgh's own PPG Industries, Inc., and Phipps has the first commercial installation of this glass. The product features a combination of solar heat control and high visible limit transmittance in a transparent, color-neutral glass.

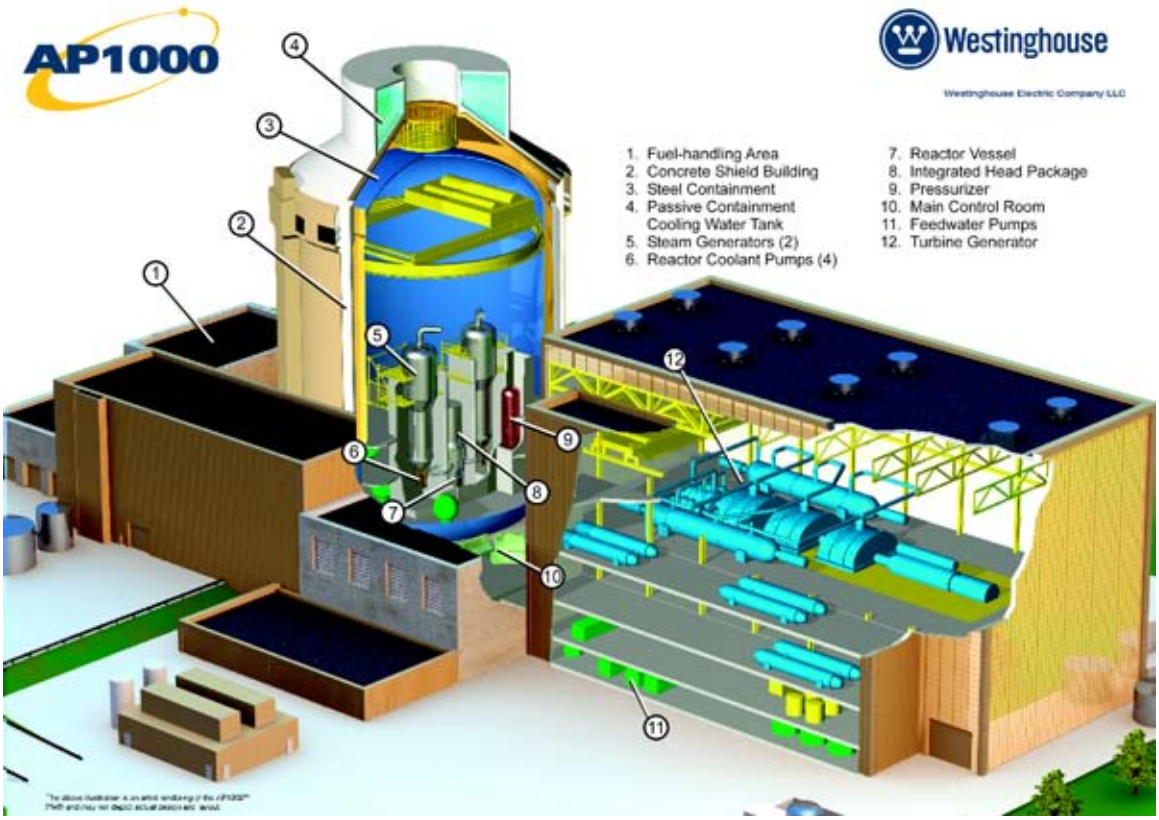
Looking Ahead

Future endeavors for Phipps will take these technologies and build on them, with plans for an anaerobic waste digester to compost all organic matter and create methane for electricity, and on-site wind power and photovoltaic systems. Also in the works is a 200,000 gallon cistern to be used as a heat sink to heat and cool a new building on site.

Phipps Conservatory Fuel Cell

With numerous innovations in place and more in the works, Phipps is planning a state-of-the-art building to support its research, administrative and education departments. This building will generate its own energy with renewable resources and capture and treat all its water on site.

With energy costs climbing and resources decreasing, Phipps takes opportunities to use technologies that will enhance the visitor experience as well as utilize technology to reduce the need for resources and energy. By implementing these and future features, Phipps hopes to set an example for other organizations not only in Pittsburgh, but for the world.



AP1000 is a trademark of Westinghouse Electric Company LLC

A GREEN AND GROWING FUTURE FOR THE WESTINGHOUSE AP1000

Courtesy of Westinghouse Electric Company LLC

Westinghouse Electric Company LLC once again has set a new nuclear industry standard with the AP1000™ power plant design, a simplified two-loop pressurized water reactor (PWR). China recently selected Westinghouse and its consortium partner, The Shaw Group, Inc., to provide four AP1000 units. Preliminary design, engineering, and long-lead procurement activities are already underway. The four plants are to be built in pairs at the Sanmen and Haiyang sites. Construction is expected to begin in 2009, with the first plant becoming operational in late 2013. The remaining three plants are expected to come on line in 2014 and 2015.

The selection of Westinghouse to supply new nuclear plants in China is the most recent in a series of positive announcements regarding the AP1000. Earlier, the AP1000 has been identified as the technology of choice for no less than 12 new projected plants in the United States. These include Progress Energy, Duke Energy, SCANA, and the team of Southern Company and Georgia Power.

Local and National Significance

Westinghouse, which has the world's largest installed base of operating nuclear power plants, estimates that the Chinese selection of the AP1000 will create or sustain a significant amount of design, engineering, and manufacturing jobs in the local region and throughout the United States.

Evidence of this growth is obviated by the company's plans to build a brand new 800,000 square foot campus in the Cranberry area of Butler County. Westinghouse has hired more than 3,500 employees over the last 5 years, plans to add 1,300 more this year, and then intends to increase by about 500 more annually for the foreseeable future. Westinghouse is attracting many new college graduates, not just from around the region, but from all parts of the country. This influx of new talent will bring a new vitality to the area.

Aside from the Pittsburgh area, additional Westinghouse jobs will be created in New England, South Carolina, and Utah. In 20 states, U.S.-based suppliers including major architectural, design, and construction organizations will also see significant job growth.

In addition to employment opportunities, there are other promising potential events. Local universities are increasing nuclear engineering course offerings and collaboration will likely grow between Westinghouse and these universities.

"The AP1000, and its smaller sister plant the AP600, are the only "Generation III+" nuclear power plants to have received Design Certification from the U.S. NRC"

History of the AP1000 and Westinghouse

The AP1000, and its smaller sister plant the AP600, are the only "Generation III+" nuclear power plants to have received Design Certification from the U.S. Nuclear Regulatory Commission (NRC). (Generation III+ is the Department of Energy's nomenclature for the new generation of competitive reactor designs that will follow the Generation III advanced light water reactors developed in the 1990s.) Design Certification for the AP1000 was granted in 2005. The AP600 received Design Certification in 1999. The standardized reactor design complies with the Advanced Light Water Reactor Utility Requirements Document. The design also recently passed all the steps of analysis for compliance with European Utility requirements, clearing the way for the AP1000 to be licensed on that continent.

Based on nearly 20 years of research and development, the AP1000 builds and improves upon the established technology of major components used in current Westinghouse-designed plants currently operating around the world. A main design objective was simplification - to provide a plant that is easier and less expensive to build, operate, and maintain. The AP1000 results in considerable savings in capital investment and lower operation and maintenance costs.

"A main design objective was simplification - to provide a plant that is easier and less expensive to build, operate, and maintain"

Westinghouse is the world's pioneering nuclear power company and is a leading supplier of nuclear plant products and technologies to utilities throughout the world. Westinghouse, with Shaw, supplied the world's first PWR in 1957 in Shippingport, Pennsylvania. Today, Westinghouse technology is the basis for approximately one-half of the world's operating nuclear plants, including 60 percent of those in the United States.

Why AP1000

As the world's population increases, so does its reliance on electricity. Energy demands are soaring and new technologies are needed. While fossil fuels have traditionally powered the majority of nations, natural resources are dwindling. Also, concerns about pollution and global warming are growing. The world needs a dependable power source that is plentiful, economical, and clean.

"In the event of a design-basis accident...the plant is designed to achieve and maintain a safe shutdown condition without any operator action and without the need for any AC power or pumps. "

The AP1000 employs a simplified, innovative, and effective approach to safety. With a gross power rating of 3,415 megawatt thermal (MWt) and a nominal net electrical output of 1,117 megawatt electric (MWe), as well as a 157-fuel-assembly core, the AP1000 is ideal for new baseload generation.

Westinghouse believes the AP1000 is ideally suited for the worldwide power marketplace because it is:

- The safest, most advanced, yet proven nuclear power plant currently available in the worldwide marketplace
- Based on standard Westinghouse PWR technology that has achieved more than 2,500 reactor years of highly successful operation
- Modular in design, promoting ready standardization and high construction quality
- Economical to construct and maintain (less concrete and steel and fewer components and systems mean there is less to install, inspect, and maintain)
- Designed to promote ease of operation (features most advanced instrumentation and control in the industry)

"The AP1000 meets the U.S. NRC deterministic safety and probabilistic risk criteria with large margins, as documented in the AP1000 Design Control Document and the Probabilistic Risk Assessment"

Safety

Safety is paramount in this new design. In the event of a design-basis accident, such as a main coolant pipe break, the plant is designed to achieve and maintain a safe shutdown condition without any operator action and without the need for any ac power or pumps. Rather than relying on active components, such as diesel generators, the AP1000 relies on natural forces (such as natural circulation, gravity, convection, and compressed gas).

The AP1000 meets the U.S. NRC deterministic safety and probabilistic risk criteria with large margins, as documented in the AP1000 Design Control Document and the Probabilistic Risk Assessment.

Economics

The AP1000 is designed to reduce capital costs and to be economically competitive with contemporary fossil-fueled plants. The AP1000 achieves lower overnight construction costs as well as a higher confidence in the construction schedule.

Dan Onorato (center) visits new site for Westinghouse

Efficiency

The AP1000 has several design features that improve worker safety and production, as well as availability and capacity factors. These include:

- 18-month fuel cycle for improved availability and reduced overall fuel cost
- Significantly reduced maintenance, testing and inspection requirements, and staffing
- Reduced radiation exposure
- Less plant waste
- 93-percent availability
- 60-year design lifetime

A New Era

With this ground-breaking technology starting to blossom, the Western Pennsylvania region will continue to see Westinghouse grow at a quick pace. In 1886, George Westinghouse chose to establish his company in the Pittsburgh region. Since then, the organization has played a vital role in the economy. With parent company Toshiba, the company plans to plant strong roots here for a new and green future for all involved. This growth is good for the region and for the future of the global nuclear energy market.

MEDRAD Engineers Improve Patient Care Through Innovation

By: Don DeLauder
Executive Director of Product Innovation
MEDRAD

XDS Extravasation Detector

In nearly 44 years as a leader in the medical imaging industry, MEDRAD, INC. has patented hundreds of inventions. In many of those innovations, the secret to success was not found solely in a complex analytical model or brilliant technological breakthrough – although those are nearly always part of the equation. Rather, their success is attributable to a fundamental process of continual reinvention and improvement. The result has been solutions to clinical problems that have significantly improved the health care industry.

Technology is inherent in the MEDRAD solutions that have so greatly improved health care diagnostics. MEDRAD created the first flow-controlled, angiographic power injector in 1964. At the time, it was a revolutionary x-ray technology that made it possible to visualize blood vessels inside the body.

As a technology innovator, MEDRAD also introduced the first injector technology for computed tomography (CT) and magnetic resonance (MR) imaging. Today, the company continues to introduce state-of-the-art injection systems and related imaging products.

The combination of technology, innovation and continuous improvement has made MEDRAD a worldwide market leader in producing vascular injection systems that are used in CT, MR and cardiovascular (CV) scans. These scans are used to help physicians diagnose patients more accurately and deliver quality patient care.

Headquartered in Warrendale, Pa., MEDRAD employs more than 1,700 employees across the globe. The company's sales revenues grew to $478 million in 2006, an increase of 16 percent over the previous year. MEDRAD has achieved a 15 percent compounded annual growth in sales for more than 10 years.

MEDRAD's most recent product success – the XDS Extravasation Detector – is a prime example of its ability to deliver exceptional customer satisfaction with innovative products and excellent people. The XDS Extravasation Detector is an accessory that integrates with the Stellant® CT Injection System. It detects mild extravasations (the unintentional infiltration of injected agents into the tissue surrounding blood vessels) and is designed to prevent them from becoming moderate or severe. Using radio frequency (RF) wave technology and a physical property called permittivity, XDS can detect the start of an extravasation under the patient's skin and signal the Stellant to stop injecting until a clinician can examine the patient.

The process of innovation

For as long as contrast dye has been part of the imaging procedure, extravasation has been an issue and clinicians have sought a solution. As part of a CT scan, contrast agent (or dye) is injected into the patient to accentuate particular areas of the body. Contrast extravasation is leakage of the contrast agent from a vein into the surrounding tissue while it is being administered. The American College of Radiology has found that, though rare, extravasations are increasingly a concern because faster flow rate protocols, which are common in cardiac CT work, may increase the severity of the extravasation. The increased severity is caused by the large quantity of contrast media that is rapidly injected into the tissue before a clinician is able to stop the injection.

Not only does extravasation compromise the diagnostic image and prevent physicians from getting the clearest picture pos-

sible, it also can cause tissue damage in the patient. Therefore, several years ago, MEDRAD engineers began down a research path aimed at alerting clinicians to extravasation so that the injection of the contrast dye could be stopped immediately.

MEDRAD engineers initially focused on a thermal technology that would detect extravasation through tissue temperature change. But slow response time coupled with other factors that affect tissue temperature eliminated it as a solution.

Other ideas, including the use of x-ray technology, followed but were also dropped before entering the product development phase. In fact, only a small percentage of MEDRAD's research makes it into the company's product portfolio because the risk profile is too high. Research proves many ideas to have no clinical merit. Other times, profit margins, market competition or patent issues can stop development of an idea.

Although MEDRAD engineers began their quest for the XDS Extravasation Detector in response to a need clearly identified by clinicians, the company is also developing new technologies based on ethnography – the study and systematic recording of human activities in their natural environments (which originated in the field of anthropology). By immersing themselves in clinical environments either physically or by way of video recordings and closely observing behavior patterns and habits, engineers are discovering customer needs that might otherwise go unnoticed.

"There was no immediate need in the market when the technologies were developed. Yet today, the applications and uses of each technology are so ingrained in business that it's difficult to imagine business without them."

At the same time, MEDRAD engineers are also developing technologies for which there is no expressed need, but that fit within the medical device manufacturer's business model and product category mix. From another field, HyperText Markup Language (HTML) and the web browser are simple, well-known examples of putting technology before the need. There was no immediate need in the market when the technologies were developed. Yet today, the applications and uses of each technology are so ingrained in business that it's difficult to imagine business without them.

In the search for the extravasation solution, engineers eventually focused on RF and permittivity. The concept involves sending an electrical signal into a patient's arm and then pulling the signal back out. Contrast media that had leaked into surrounding tissue would alter the radio frequency of the signal coming back out of the body.

Analytical modeling

With a viable solution on the board, the next step was determining whether the technology could be created. MEDRAD engineers used numerical electromagnetic modeling to simulate the technology without having to actually create the device. The analytical modeling validated the concept, allowing MEDRAD to begin laboratory testing and clinical trials.

With extravasations so rare – less than 1 percent of scans – ensuring a technology that minimized false positives was critical. Employing RF wave technology and permittivity enabled MEDRAD's new extravasation detector technology to minimize false positive detections. False positives can interrupt workflow and inhibit productivity. They are also a major reason why previous extravasation devices that use the indirect detection method of impedance changes have not been readily adopted.

The future of health care and medical devices

Just as MEDRAD created technology to enable information integration between the Stellant CT Injection System and the XDS Extravasation Detector, a much broader information integration effort is key to the future of the medical device and the greater health care industry.

Taking better advantage of the connectivity the Internet provides will be critical to the future of the health care industry, particularly as hospitals work toward greater efficiencies in the delivery of care. Distributed computer systems are central to that efficiency and will enable such technologies as Radio Frequency Identification (RFID). RFID, which is being used effectively in warehousing to track products, holds similar promise in health care. RFID tagging can be used to ensure the right patient is given the right drug. The challenge in better using distributed systems and related technologies is working closely with industry regulators, specifically the Food and Drug Administration, to gain approval.

Analytical modeling will continue to be critical to the future of the industry. Plastics technology and tools for modeling mechanical systems will continue to save companies money and create a better product. Mathematically determining whether a plastic molded into a particular shape will fracture under use, before actually creating the product, is invaluable in the research and development process.

The role of Western Pennsylvania in the future

With the prevalence of internationally renowned health care, research and higher education institutions in Western Pennsylvania, MEDRAD has developed relationships that are enhancing its technology and product development efforts as well as the health care industry overall.

As it looks to the future of injection systems through modeling, MEDRAD is working closely with Carnegie Mellon University in the area of computational fluid dynamics (CFD). CFD uses numerical methods and algorithms to solve and analyze problems that involve fluid flows. Computer modeling performs calculations that simulate the interaction of fluids and gases with the complex surfaces used in engineering. Through its relationship with CMU, MEDRAD is able to conduct research in this area that would otherwise be too costly to duplicate in house.

Through its relationship with the McGowan Institute for Regenerative Medicine, MEDRAD is exploring cell therapy technologies to repair damaged or depleted tissues. MEDRAD also has taken advantage of external funding through a relationship with the Pittsburgh Tissue Engineering Initiative and NASA to develop technologies in the field of regenerative medicine. These relationships allow MEDRAD to research technologies that today are beyond the scope of the company's core business strategy and product portfolio.

The MEDRAD influence on health care

MEDRAD is focused on improving patient care by enabling or enhancing diagnostic and therapeutic imaging procedures. Since the company's inception, it has continually brought to market innovations that have been born of reinvention and continual process improvement. From concept to product development, the right balance of engineers is a must in developing leading technologies that drive innovation. Engineers who bring creative ideas about solving clinical problems juxtaposed with those who turn the ideas into a safe, reliable system have proven to be linchpins in the equation. It's an equation that has driven the company to market-leading positions. It's also the equation that will keep MEDRAD there well into the future.

THE FUTURE OF TECHNOLOGY FROM THE FUTURE GENERATION

By: Alex Pazuchanics

Photos courtesy of Carnegie Mellon University

Just as Pittsburgh has historically been the incubator for new innovations in iron, steel, and glass, it is now fast becoming one of the leading centers of development in new industries, particularly those involving technology. This transformation of the region's industries is particularly exciting for the young people living in the area. As these new industries open up, more jobs will come to the area, and more young people will choose to stay in the area or to move back.

Web browsing, robotics, nanotechnology, and video games are all areas of interest to young people hoping to find technology-oriented jobs. Pittsburgh is fortunate enough to have produced innovators in all of these areas, and will likely be in the vanguard for years to come.

"It's A Must to Use the Clust"

Google appears to be so ubiquitous as a web search engine that it is often used as a transitive verb . But one Pittsburgh-area company is increasingly making its name known on the webseach stage. Vivisimo, located in Squirrel Hill, is using unique and innovative technological process called "clustering" to make searching the web easier and simpler.

Vivisimo was founded by CMU staff in 2000, and has since steadily developed an international reputation. It now operates out of Pittsburgh and Paris, with several other smaller field offices.

Instead of the typical websearch engine method of displaying all of the results of a query as a list in order of popularity, Vivisimo's software organizes results into "clusters"; groups with other word associations. Clustering allows the searcher to see relationships between their query and the categories that results are listed in. This system makes weeding through long documents or common searches exponentially easier. For example, a demo on the website allows users to search the 585 page long 9/11 Commission Report, and results are returned in word groupings that the query is most associated with.

Vivisimo clustering technology is already being used on the public searches for websites such as usasearch.gov, the public site for RAND Corporation, and the website for the City of Pittsburgh. In order to make finding internal information easier, businesses such as Airbus, P&G, and Cisco also use Vivisimo software for searches on their intranets .

Vivisimo also offers the public an opportunity to use clustering technology with its consumer search engine, Clusty. Launched in 2004, Clusty uses Vivisimo technology for searches on the web. Because it is a metasearch engine, Clusty organizes results found on several different search engines together on a clear and uncluttered interface. A Clusty search of the term "Pittsburgh" returned suggestion clusters such as "Pittsburgh Pirates", "Weather", "Hotels", and "Pittsburgh Symphony" .

Clusty has a dedicated following in the Pittsburgh area, particularly on the college campuses. Its quirky yet effective marketing campaign has the Clusty label on everything from T-Shirts to Silly Putty. The physical space of the company itself has also turned some heads. The Pittsburgh office has been rated "One of the Best Places to Work in Western Pennsylvania", and is known locally for its quirky attributes, including Pilates balls in place of office chairs.

Cars without Drivers

For many years, Robotics has been a fundamental part of Carnegie Mellon's technological program, and the school and its affiliates continue to lead the way in robotics technology. CMU programmers have found ways to utilize robots in new and creative ways. The CMU Robotics Institute was founded in 1979, when Robotics was still in its infancy. It has grown to become one of the most important and largest facilities for robotic study in the world.

Two of CMU's most well-known robots are Sandstorm and H1ghlander, the driverless vehicles operated by Red Team Racing, who finished second and third, respectively, in the 2005 DARPA Grand Challenge through the Nevada desert. The contest was sponsored by The Defense Advanced Research Projects Agency, with the goal of researching robots that could eventually drive in combat situations. Sandstorm, who also competed in 2004 (the initial year of the contest, in which no robot finished) is a 1998 model 998 HMMWV (High Mobility Multi-purpose Wheeled Vehicle). H1ghlander is a 1999 H1 Hummer. Though both are retired, their accomplishment remains impressive.

Recently, CMU has been selected as a semi-finalist to compete in the 2007 DARPA competition, this time going through a simulated urban environment at the George Air Force Base in California. Vehicles must be able to stop at signs, merge into traffic, and perform, as DARPA director Tony Tether said "as well as someone with a California driver's license". Red Team's successor, Tartan Racing, is fielding "Boss", a 2007 Chevy Tahoe that is widely expected to be a contender.

Advances Smaller Than the Eye Can See

The University of Pittsburgh is by no means without its share of new and exciting developments. Historically, Pitt and the University of Pittsburgh Medical Center have been leaders in medical and technological research, and one emerging area that is focusing on is nanotechnology, which combines Pitt's strong programs in the health and engineering sciences.

"The Peterson Institute is home to several dozen leading experts on the study of nanotechnology, from departments all over the university including chemistry, biology, and engineering"

Nanotechnology, the study of particles about 1/80,000 the diameter of a single human hair , is widely considered to be the future of technology. Pitt is fortunate enough The Peterson Institute is home to several dozen leading experts on the study of nanotechnology, from departments all over the university including chemistry, biology, and engineering . They are one of only two locations in the world to have a unique nanofabrication workstation .

The University of Pittsburgh has produced spin-off businesses that now lead the A leading nanotech firm in Western Pennsylvania is Nanomat, based in Irwin . Nanomat is attempting to use nanomaterials in a myriad of ways, including more durable power tools, better insulation, more precise weapons systems, and clearer optical devices . Nanomat is credited with

the design of NanoCalc and NanoTalc, which are synthetic minerals now produced by Nanomat's spin-off: Nanova .

Nanotechnology is being used to make existing procedures simpler and quicker. NanoLambda had been developing smaller and less invasive spectrometers to replace bulkier models. Projected to be a tenth of the cost of conventional equipment, NanoLambda's product could be used for medical testing supplies.

The Future of Gaming

One of the best examples of Pittsburgh's forward looking attitude is the new Pittsburgh Technology Center. The Center is located in Second Avenue, just past the Hot Metal Bridge, and on the former site of the Jones and Laughlin steel mill. The site was transformed over a period of two decades, and now hosts departments of the University of Pittsburgh and Carnegie Mellon University, as well as nearly a dozen private businesses.

A unique client of the Pittsburgh Technology Center is the Entertainment Technology Center. The Center, a joint program launched by the CMU's College of Fine Arts and School of Computer Science, is the only one in the nation to offer an MET, or Masters in Entertainment Technology . The goal of the program is to join together CMU's world-class arts and technology programs to develop new and innovative ways to use technology to inform and entertain.

Participants in the ETC's program work together in teams to develop a unique and interdisciplinary project. It brings together artists and technicians in order to create new programs. The results have been very impressive. Many of these projects have applications in real life. For example, two previous projects were Hazmat: Hotzone, and Biohazard, which were both programs built on video game platforms but designed to prepare first responders for crisis situations. Other ETC projects include Gamenomics, a game designed to teach basic economic principles, and Ben Franklin's Ghost, a projected image of Benjamin Franklin that answers in a presentation at the Lights of Liberty Exhibit in Philadelphia.

One of the most interesting and successful ventures launched from an Entertainment Technology Center project has been ImpactGames, LLC. The venture was started by two ETC graduates, one an American artist, the other a former officer in the Israeli intelligence service. ImpactGames has developed a new and innovative game, Peacemaker, which gives players the opportunity to learn about the Israeli/Palestinian conflict in a unique way.

"...the fact that Southwestern Pennsylvania is rediscovering itself as a center for new and innovative technologies is a reassuring sign for...the younger generation who would like to be able to remain here"

In Peacemaker, players have the opportunity to play as either the Israeli Prime Minister or the President of the Palestinian Authority, and to respond to real time crises while watching approval ratings with the United States, the Arab world, and fanatical constituents within their own territories. The ultimate goal in the game is to achieve a peaceful, two-state solution, but the game demonstrates how difficult it is for leaders to continue on the path to peace when situations outside of their control arise. The game was tested with critical success at CMU's campus in Doha, Qatar, and in schools in Israel, and it has a lot of potential to be used as an educational tool around the world.

As a high school student in Pittsburgh, preparing to go to college, I often get the question "So are you going to stay here?", or, "If you leave, are you going to try to come back after you graduate?" My parents would have had difficulty answering that question, given the nature of Pittsburgh's economy when they were in college. But the fact that Southwestern Pennsylvania is rediscovering itself as a center for new and innovative technologies is a reassuring sign for those of us in the younger generation who would like to be able to remain here.

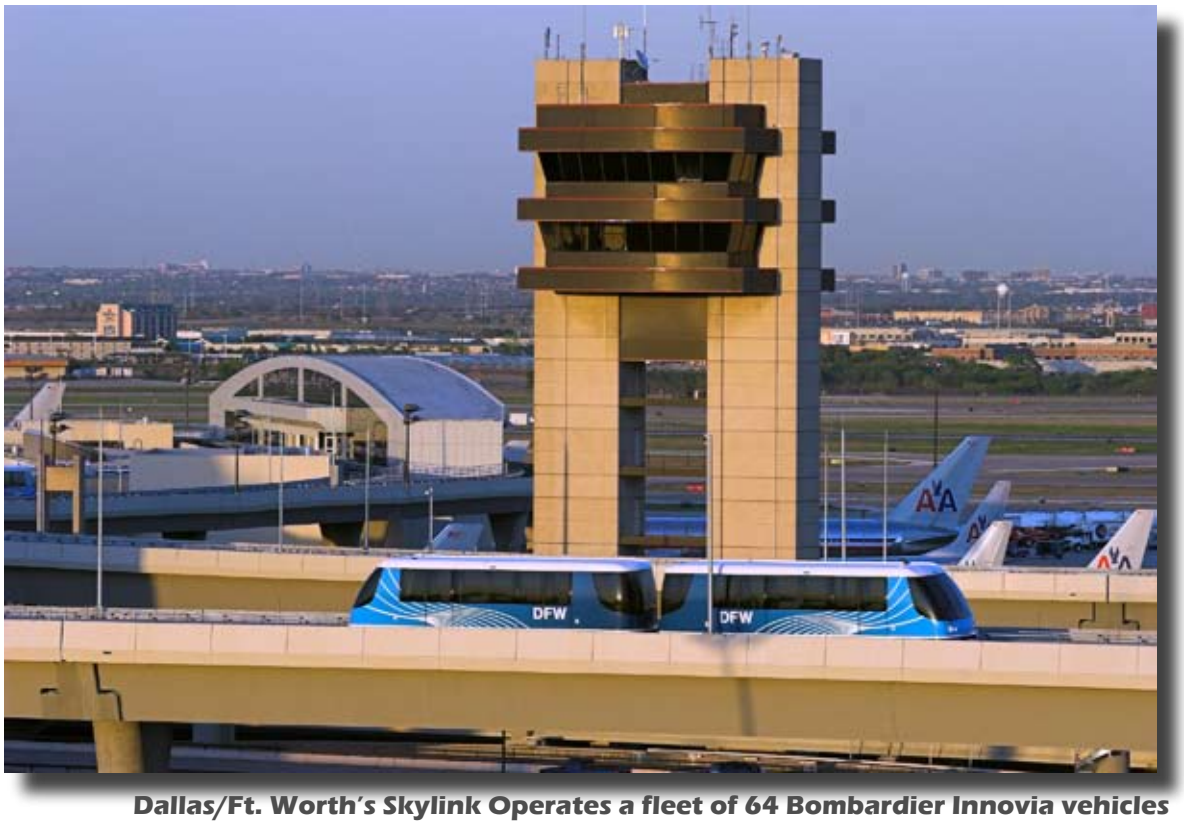
Feeling Out of the Loop?

Remember! the e-Technicalendar (e-TC), ESWP's monthly electronic newsletter, is e-mailed to you on (or about) the 1st of every month!

If you haven't recently received a copy of the e-TC, please ensure that the ESWP Office has your current e-mail address. You may e-mail your updated information to eswp@eswp.com, or phone the ESWP office at 412-261-0710.

BOMBARDIER TRANSPORTATION

by: Chriss Swaney



Dallas/Ft. Worth's Skylink Operates a fleet of 64 Bombardier Innovia vehicles

Bombardier is bullish about its global transportation systems and its new portfolio of ubiquitous security tools. Since 9/11/01, most travelers continue to take a cautious glance over their shoulder and often carry some duct tape for emergencies. Still, consumers are traveling. By 2010, it is estimated that 8 out of every 10 business executives will log more than 250,000 miles to promote products or attend high-level meetings.

The 24-hour economy is here to stay. Because the stock market never sleeps, global leader Bombardier Transportation rouses the rest of the world from its economic slumber as it deploys the next generation of integrated, onboard passenger security safety systems to protect passengers and property.

"We're dubbed the problem-solvers of the industry because we use sophisticated wireless networks seamlessly tied to our transportation systems," said Paul Overby, a senior director of strategy and performance at Bombardier.

Overby's team at Bombardier's Total Transit Systems in Pittsburgh, Pa. implements transportation systems globally from concept to completion.

In the areas of electrical and mechanical systems, for example, Bombardier designs and supplies the vehicles, automatic train control, communications and power distribution systems; as well as platform screen doors and safety systems.

"We develop customized solutions that meet our customers' expectations," said Overby. "We expect high returns from high tech."

And much of those returns are flowing now from a new onboard mobile security management system that combines reliable, high-quality audio/video recording with advanced security event management. The Bombardier *SEKURFLO* system is both novel and unique and can be applied to new projects as well as retofit jobs.

This new "intelligent rail system" features a reliable, secure broadband communication system that integrates wired ethernet and wireless broadband communications for high performance switching and routing of safety and security systems spanning video, audio and data content.

"One of the major features of this new security system is the real-time (or stored) security information," said Overby.

Industry analysts applaud the SEKURFLO security solution for its ability to offer continuously recorded integrated digital information that can be programmed to automatically download stored security content on a regular basis to centralized or on-site facilities.

In fact, the Bombardier security systems are so sensitive that during a recent system demonstration in Germany, the system alerted authorities to the theft of some critical equipment during the demo.

In addition to a train-based broadband network, the new Bombardier system relies heavily on the use of sensor systems, including the all-purpose RFID tags. These radio frequency identification tags with a microchip can be embedded in a product, even under your own skin. Passive RFID tags have a tiny antenna, but no internal energy source – batteries are

Bombardier provides a spectrum of operations and maintenance services

not included because they are not needed. The energy comes from the reader, a scanning device that sends a pulse of electromagnetic energy (for example, radio waves) that briefly activates the tag.

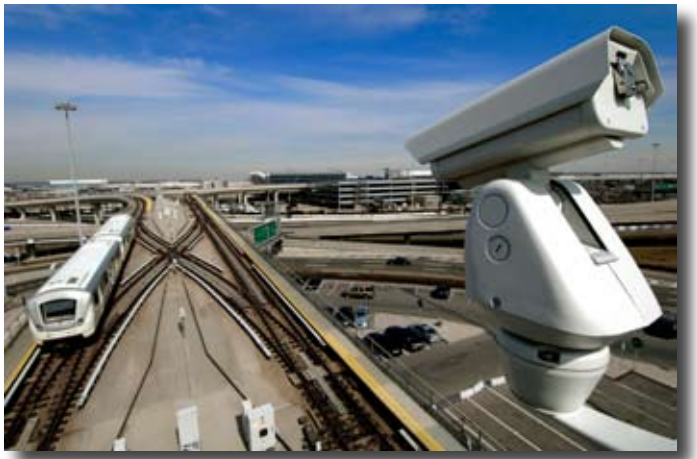
Unlike a traditional bar code label, a tag carries information specific to that object, and the data can be updated. Bombardier has tapped into RFID technology and can track everything.

"Unlike a traditional bar code label, a (RFID) tag carries information specific to that object, and the data can be updated"

Because rail vehicle security is a critical link to all transportation systems, Bombardier engineers have created a uniquely innovative secure system with novel architectural features like on-board and remote recording systems, a secure broadband network and interior and exterior vehicle surveillance.

Since its launch in September 2006, the SEKURFLO security solution has been selected by major transit agencies, such as the London Underground (UK), Ile-de-France SNCF Commuter Rail (France), Gautrain Rapid Rail Link (South Africa) and the Toronto Transit Commission (Canada).

As well as introducing new products, Bombardier Transporta-



Security feature at JFK International Airport

The SEKURFLO system is intelligent rail security

tion has consistently offered the broadest product portfolio of rail technology in the industry, now with a presence in over 60 countries and an installed base of over 100,000 vehicles worldwide. Its sister operating unit, Bombardier Aerospace, builds planes, from regional aircraft to business jets.

But Bombardier people know that innovation is not enough. One has to add business insight and make it useful.

In addition to building the driverless monorail systems that transport business leaders in Las Vegas or the light rail transit system that skims along some of the rustic haunts of Britain's famous Harry Potter, Bombardier also excels in project management.

The world's largest rail transportation company has decades of experience in breaking work packages into manageable segments.

"We identify major project milestones and then establish a hierarchy of activities necessary to complete the project objectives," Overby said. "Our goal is to always exceed customer expectations."

The Las Vegas monorail has traveled over one million miles

All photos courtesy of Bombardier Transportation

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