



Moving People: Dulles Airport Automated People Mover

APM Trend Riding on Extruded Aluminum Rails



ALuminum Extrusion

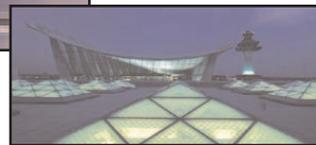
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I N N O V A T I O N S T A K I N G S H A P E

MOVING PEOPLE



Extruded aluminum paves the way for new airport APM trains.



One of the busiest and fastest-growing airports in the country, Washington Dulles International Airport, faces a monumental traffic problem. Traffic congestion isn't just in the skies. An unprecedented demand for air transportation has pushed the overcrowded airport to the brink of gridlock, creating a major on-the-ground logistics problem: terminals, gates, and walkways are packed with passengers trying to reach their destinations on time.

The innovative solution: a \$204 million new two-mile-long, dual-lane Automated People Mover (APM) underground train and passenger walkway system that connects the airport with its three existing concourses—and ultimately a fourth terminal. Its purpose: to keep people moving efficiently through the terminal of this burgeoning hub while the airport rapidly expands. The annual growth rate at Dulles is 25.7 percent, compared to 2.9 percent at other airports throughout the country.

Currently, Dulles handles 20 million passengers per year. The new system will soon boost its people-moving capacity to 55 million passengers per year. The key material chosen for the system's rails: extruded aluminum.

Most major U.S. airports have, or are planning to install, APMs—a trend that spotlights the necessity of bringing airport ground transport technology into the twenty-first century. As congestion at airports like Dulles increases, the need to efficiently shuttle passengers between terminals and ground transit or mass transit options becomes essential.



APM will increase efficiency in transporting passengers on the ground at Dulles airport.

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The APM system's success rests heavily on the reliability and durability of extruded aluminum high-powered rails, which play a crucial role in the implementation of the Dulles APM system. The APM system will replace existing mobile lounges and is a key part of long-term Dulles expansion plans, which will be completed by 2012.



New APMs serve renovated Dulles Main Terminal.

The 22,000-foot train system rides along 28,000 feet of extruded aluminum power rails; aluminum extrusions also comprise all of the 128 door headers and thresholds at the station, as well as the door thresholds of the 29 train cars according to Brock Fletcher, the APM system's lead engineer and project manager for Parsons Management Company, consultants to the Airport Authority. Since the 40-foot-long and nine-foot-wide trains have rubber tires, extruded aluminum is the material of choice for the rails; its light-weight and structural strength properties exert less wear and tear on the overall system, as opposed to the fiberglass used in some competitors' products, said Fletcher.

With its crystal-cut design and color scheme of off-white and dark blue, the rubber-tired *Crystal Mover* APM readily projects an ultramodern image for Dulles. The *Crystal Mover* cars and key operating components of the North Terminal APM will be supplied by Mitsubishi Heavy Industries, one of the world's premier manufacturers and builders of APMs for nearly three decades.

"We're trying not to get caught in the tidal wave of growth, but our challenge is to forge ahead with new construction and not allow any part of the airline traffic to slow down," said Frank Holly, vice president of engineering for the Metropolitan Washington Airports Authority, which is over-seeing construction.



Crystal Mover cars will soon move to underground transport tunnels at Dulles Airport.



Each Crystal Mover car has interior room for 105 passengers.



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"This is a modern APM system that has never been seen in the U.S. before," notes general contractor Gino Antoniello, Sumitomo's director of transportation systems. "This people-mover technology sets a new standard for APMs. It offers a smoother ride in large modern cars that will make getting around Dulles easier for passengers. We are confident that it will be recognized as the smoothest running and most efficient APM in the country," said Antoniello. Dulles and Miami International Airport are the first such APM installations in the U.S. for Sumitomo. A system similar to Dulles was put into place in 2002 at Miami International Airport and offers enhanced security and safety protection for passengers.

The Crystal Mover train makes a test run in preparation for its installation.

The APM is capable of speeds up to 50 miles per hour, and each car accommodates 105 people. The APM system is being built to reduce vehicular traffic on the airfield and reduce walking distances for travelers. Twenty-nine *Crystal Mover* cars are scheduled to be running by 2009. The APM trains will consist of two, three, or four cars per train, with more trains potentially needed when the new terminal is eventually completed.

Construction traffic and security are tightly controlled in the underground APM, which is located 60 feet under the existing terminal and alongside an operating airfield. The excavation had to be squeezed into a narrow space without interrupting operations, said Michael Huffstetler, construction manager for Parsons, the consulting and coordinating company for the project.

Mitsubishi APMs of the type installed at Miami International Airport, and now under way for Dulles, are currently operating in Japan and many Asian cities and airports. In addition to Miami, their most recent installation is at the new Hong Kong Airport. Sumitomo and Mitsubishi partnered in all aspects of the Hong Kong Airport APM. In Singapore, the *Crystal Mover* is used to link railway terminal stations.



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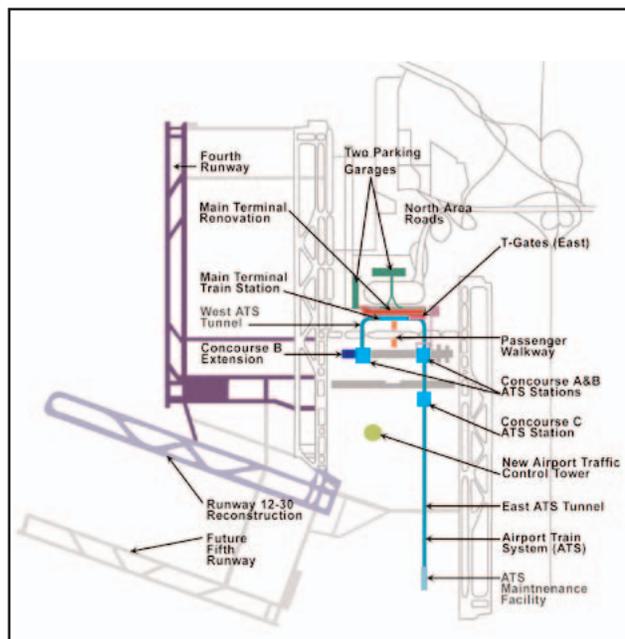
Dulles Airport development plan illustrates the scope of the project.

Dimensions:

Distance of Train Route:
11,000 feet (Terminal to
Concourses B and C);
22,000 feet (Full buildout)

Stations: 200 feet long x 160
feet wide x 35 feet high

Tunnels: 16 feet x 18 feet



Project Description:

The APM system now under construction replaces current mobile lounges that transport passengers between the terminal and concourses. The trains will operate on an underground dual-track system. This phase of the project connects the terminal to concourses B and C. The stations will be located at convenient points along the concourses to minimize walking distances to the airline gates. Each station will have a center platform for boarding the train from each direction and two side platforms for exiting the train. Escalators, elevators, and stairs constructed as part of the facility will provide the connection between the concourse level and the stations. The terminal station will be

accessed through two new spacious subsurface security screening areas. Once beyond security, passengers will continue to the T-Gate concourse, the passenger walkway to concourses A or B, or board the train system.

APM Plans Integral to Airport Security

Security issues at the airport have been a high-priority concern from the beginning of the expansion project, Huffstetler said. The terror attacks on the World Trade Center towers and the Pentagon in 2001 have caused a paradigm shift in the way airports must be designed, constructed, and operated.

At Dulles, new advanced security equipment is being installed and a new security mezzanine is being built, bringing more than double the number of security checkpoint stations up to 80 from the existing 36. During APM construction, security checkpoints are being relocated from the east side of the main terminal to the west, removing a waiting room and moving some of the mobile lounge docks. To accommodate the new security scheme and keep pedestrian traffic flowing, the planners created extensive communication enhancements, including the installation of information kiosks.



New security mezzanine is part of expansion project.



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S H O W C A S E

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THE AIRPORT APM TREND RIDING ON EXTRUDED ALUMINUM RAILS



New APM system will include service to DFW International Terminal D.



Extruded aluminum rail system guides new Skylink APM trains.

Airport APMs across the nation ride on extruded aluminum power rails to withstand the constant daily strain of fully loaded APM cars transporting millions of airline passengers between gates and terminals at a growing number of U.S. airports.



Skylink trains on guideway at DFW Airport travel along thirty-three miles of extruded aluminum rails.

Thirty-three miles of extruded rails power *Skylink*, the high-speed airport train that begins service in late spring in the Dallas-Ft. Worth (DFW) Airport. Manufactured by Bombardier Transportation of Canada, the train system's bidirectional rails span approximately 26,000 linear feet of dual-lane guideway circling the terminals, with stations located between the two lanes. Rails are elevated an average of 50 feet above ground. An average five-minute ride on this APM system of *Innovia* vehicles unites four domestic terminals with the new international terminal at speeds up to 35 miles per hour, carrying an estimated 5,000 passengers per hour, per direction. Two *Skylink* stations feature escalators and elevators for easy platform access. This fast-paced transport system ultimately allows DFW airport to provide a smooth 30-minute-or-less connection time for air travelers.

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Orlando's airport APM system has expanded over the past 25 years.

Extraordinary tourist growth spurred the Orlando APM system's expansion, designed with passenger convenience, low operational costs, and high growth rate in mind.

For travelers in and out of San Francisco International Airport in California, the two-year-old AirTrain APM system features 24 miles of extruded aluminum power rails guiding the low-maintenance, energy efficient, and electrically powered people movers. The AirTrain system's efficiency in the first month averaged 99.55 percent. Six miles of elevated rails connect airport terminals to parking garages, the Bay Area Rapid Transit (BART) system, and Rental Car Center. This Bombardier system eliminates hundreds of rental car shuttle trips per year, reducing vehicle emissions.

Another 12 miles of high-powered extruded aluminum rails form the hub of Orlando International Airport's bustling APM complex in Florida. Eighty-five thousand visitors per day rely on this fully automated system running flawlessly on four extruded aluminum rail lines to anchor this airport's trouble-free reputation. This Bombardier system has been expanded and refurbished over 25 years of trouble-free operation from eight C-100 cars to a fleet of 24 cars (eight three-car trains) including six new CX-100 vehicles with minimal service interruptions. The APM system connects four remote locations to the Airside North and South terminals.



Electrically powered AirTrain APM is environmentally friendly.

With new-era APM systems in place, air travelers will routinely navigate airport terrain in a matter of minutes, counting on strong and dependable extruded aluminum rails to provide reliable APM customer service. As the magnitude of the APM trend grows, so does the important role aluminum extrusions play at airports nationwide: keeping ground transit "flying" and moving millions of passengers swiftly to their destinations.

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