THE TERMINAL OF THE FUTURE
IS HAPPENING TODAY

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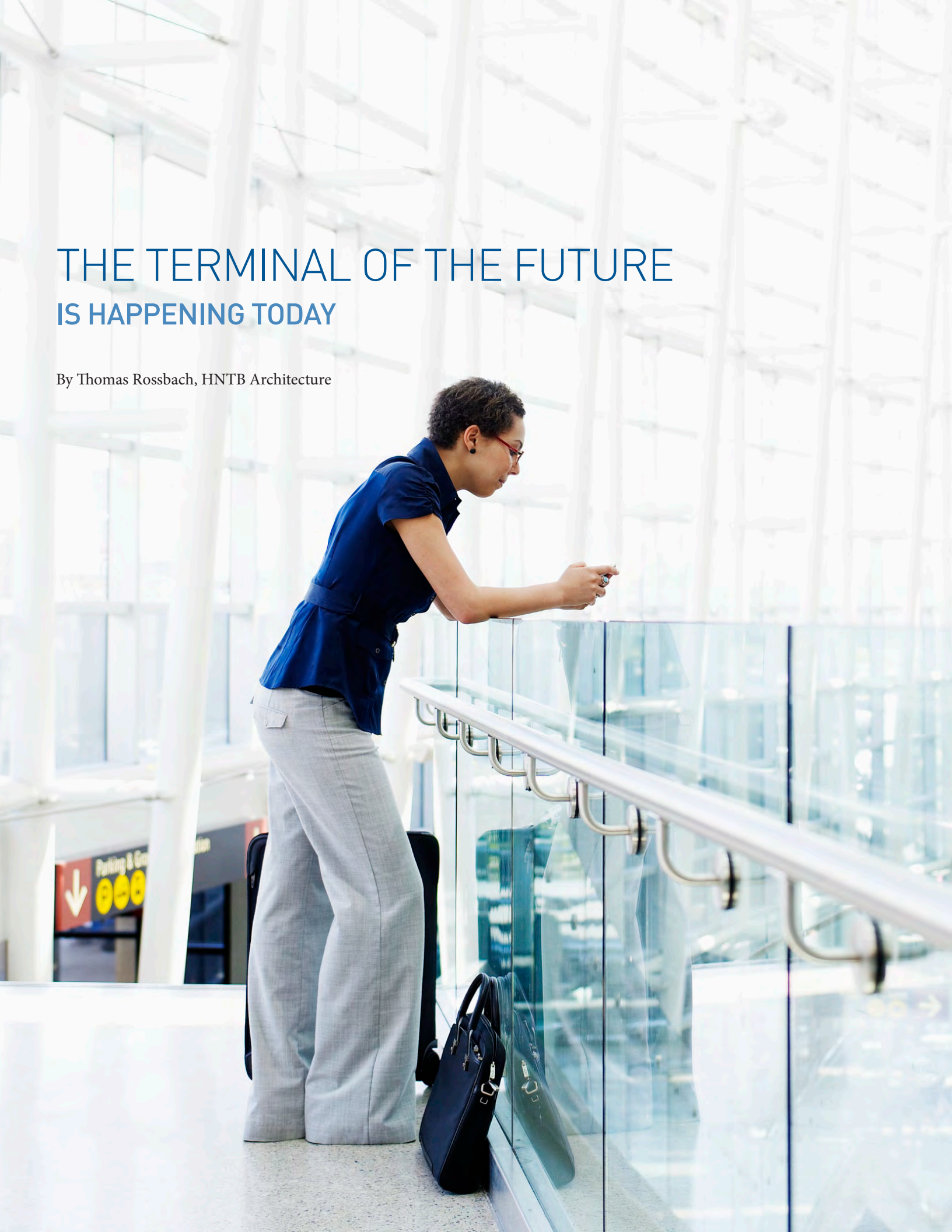

The model of how passengers and airlines use airport terminals today is in a significant shift. Airlines continue to sell unbundled services, charging separately for checked bags, meals and premium seats on aircraft, while continuously finding ways through technology to reduce staff. The use of technology provides a method to be connected to passengers at all times through mobile devices and on-line commerce which increases airline productivity and reduces labor.

Passengers are growing more accustomed, or being conditioned, to perform transactions for themselves such as checking in at home, self-checking bags and being continuosly updated via their mobile devices, and as a result passengers are finding that involvement in the process provides convenience and saves time and money.

A NEW "FLIGHT CHECK-IN" PARADIGM

In the not too distant future airline agents in the airport terminal will be a thing of the past. Passengers will self-check their bags and retrieve boarding passes on their own. A few roaming "customer service agents" will teach passengers how to self-check and board themselves.

Interactive terminal signage and video walls imbedded in the architecture of the terminal building will direct and aid passengers on how to check-in and where to find the security checkpoint.

This is evidenced by statistics in the historical shifting of how passengers check-in for a flight, going from traditional agent assistance in the ticket lobby, to self-serve e-kiosks for boarding passes, to "remote" on-line check-in, and now to a complete self-serve bag check process. Today, over 55% of passengers check-in on-line remote from the airport. Half of the remaining passengers use e-kiosks in the ticket lobby and less than 22% go to an agent at a ticket counter to complete the transaction of their checked bags.

Self bag check will quickly become the new reality where the passenger will weigh their own bag, check in via a kiosk, print the bag tags, place the bag tag on the bag, print a boarding pass and simply drop the bag on a conveyor input device, where an airline baggage handler (not an agent) confirms the passenger and the bags match. The passenger quickly heads to security and the baggage handler then pushes a button to send the bag to the screening and outbound baggage make-up system.

The first self bag check-in pilot program has been implemented at Austin Bergstrom Airport, and it has shown it reduces passenger queuing and processing time by 60% and reduces airline staff by half. HNTB is currently planning and designing similar self-serve bag check-in systems at San Diego and Denver airport terminal projects. The ticket lobby will take on a different configuration with pods of kiosks and baggage input stations for passengers to check in and drop off bags.

Providing customer service to passengers is paramount in today's terminal design. The airport terminal of the future will have dispersed check-in locations for both "carry-on only" passengers and full checked baggage passengers. This will include potential locations such as in parking garages, at the terminal curb, in the pedestrian bridges, in a transit center next to the terminal, and kiosks located on other levels of the terminal. Check-in kiosks and bag drops will be strategically placed in the path of passenger flow from the various interface points of the modes of ground transportation to the terminal and on the way to the security checkpoint.

THE FUTURE OF BAGGAGE SYSTEMS IN TERMINALS

Technology improvements will also streamline the screening and processing of checked bags from the passenger drop location all the way to the belly of the aircraft. Technology exists that will enable luggage to be purchased with a permanent RFID/GPS tracking tag electronically linked to the passenger. Both the airline and the passenger will be able to track the bag in real time with their respective mobile devices. From their aircraft seats, passengers will be able to confirm their bag is actually in the aircraft hold below, before the aircraft pushes back from the gate.

The TSA also is making advances in explosive detection screening technology for bags that increases throughput of screening bags. This will reduce the number of expensive explosion detection devices required, while simultaneously processing an ever greater number of bags. This also reduces the building space footprint necessary for the screening operation. With RFID/GPS tracking, lost bags will be virtually eliminated. Airlines are already using hand-held scanners to confirm which bags are being loaded into each aircraft belly on the ramp.

Baggage systems are also being designed to be much more energy efficient with highly efficient motors and automated shutdown sensors and systems to reduce electrical power consumption when conveyors are not being used.

PASSENGER SECURITY SCREENING CHECKPOINT

The departure lobby of the terminal building is changing. Less room is required for ticketing lobbies as more passengers check-in prior to arriving at the airport, and less queuing is needed with the advance of the self bag check process. Passenger security screening, however, continues to require more space both for queuing and for the screening process. The security process really begins as the passenger enters the terminal building, as Transportation Security Administration employs more soft analytic security techniques to interview passengers , conduct risk assessments and observe passenger behavior prior to the security screening.

Airport terminal design architects working in conjunction with the TSA have made great strides in creating passenger screening checkpoints that are efficient, comfortable and easy to manage for passengers. This includes creating flooring which is comfortable for passengers without shoes, providing soothing and comfortable lighting, designing ample room for passengers divesting their personal items prior to the screening devices and TSA processing equipment, creating private search rooms, and creating a pleasant area with comfortable seats for passengers to re-compose themselves after completing the screening process. HVAC systems are specifically designed for the concentrated queuing areas to adequately “sense” and provide environmental comfort for the large crowds of people while waiting for the screening. Amenities such as water bottle refill stations or concessions which are adjacent to the recomposing area are important since passengers may have been compelled to dispose items in the screening process. In the recomposing area access to flight information and intuitive wayfinding within a pleasing architectural environment will guide passengers to concessions and gates without an over abundance of signage.

The TSA is continuing to develop new processes and technology at the checkpoints to provide better customer service while fully screening all passengers. This includes automatic bin return systems, secondary conveyors and inspection stations for suspect bags, so that non-suspect bags are not delayed for the majority of passengers.

Future sophisticated security checkpoint equipment will not require passengers to divest all their belonging from the bags or their person, which will speed up the screening and post-screening process.

FOCUS ON THE PASSENGER EXPERIENCE THROUGH THE USE OF TECHNOLOGY

Terminal buildings and their operations are more business focused, providing services and amenities that passengers want with a high level of customer service. Technology will continue to drive innovation in our travel experience. At the heart of this technological revolution is the more "informed" passenger. The digitally connected passenger of today demands information and services delivered on their preferred personal computing device at all points of their journey and specifically inside the airport terminal. Silos of stand-alone automation are being replaced with integrated systems that allow the exchange of information between the airline, airport ground handlers and customer. For airlines and airports the emerging mobile computing platforms provide a new way to communicate and control passenger flow. This includes more accurate and instantaneous information on flight arrival and departures sent directly to passengers mobile devices. Airlines can manage the passenger's expectations if they keep them constantly informed on flight status. This includes information on flight delays, gate changes, overbooking and irregular operations management. In addition, passengers would have the capability with their mobile devices to order on-line and pay on-line for food and drinks they want on the flight, which will be waiting for them on the aircraft.

With mobile connectivity via GPS technology passenger location information can also be used by the terminal building automation system to control cooling and heating based on where passengers actually are in the terminal. This in turn saves energy, operations and maintenance costs for the airport terminal building which improves the bottom line for the Airport.

Mobile technology can go further to providing customer service, where an airport retailer can target specific mobile promotions based on the customer's precise location in the terminal. As retailers offer specific targeted mobile promotions to airport terminal visitors, passengers will come to expect this same type of one-to-one marketing at the airport. In the future, authorized airport advertisers could also be customized to send on mobile offers with a portion of the revenue going to the airport. As passengers walk past certain interactive advertising displays the electronic ads will change for each customer.

A MORE SYNERGIZED CONCESSION MARKETPLACE

A synergistic concession marketplace within terminal buildings is the future in maximizing the revenue from passengers by incorporating food and beverage venues, retail stores, customer service providers, entertainment, integrated art and interactive advertizing in a space that interacts with all components. It generates more excitement and choices for passengers and increases revenue opportunities for the airport. Airports such as Austin Bergstrom, Atlanta and San Diego provide entertainment in conjunction with their combined food and beverage and retail hubs within their terminals to draw passengers to stores. HNTB has just completed the design of a new "Sunset Cove" synergy market at Terminal Two at San Diego Airport. With a great view to the airfield and the integrated art, entertainment and shopping are co-located to raise the revenue synergistically for the airport in one centralized space with easy access to multiple gates. In the future, as fight information and announcements from the agents at the gate are broadcast via each passenger's mobile devices, passengers will be able to stay at the marketplace until the very last moment of

their assigned boarding time. Each passenger will be sent a countdown clock to the exact time it is their turn to board.

As public eating habits continue to move towards achieving a more healthy body and the reduction of obesity, healthier food choices will be available at airport concessions, with calorie and food preparation information provided. This will require the terminal design to dedicate a larger back of house kitchen space in order to prepare fresh food in lieu of pre-prepared food made off-site.

The terminal food and beverage vendor menus will be easily accessed via locally broadcast to mobile devices so passengers can order without waiting in a line. For example, a passenger waiting in the security screening queue could order and pay on-line from a mobile device, and then stop by the concession, on the way to the gate, to pick it up. Advertising for the airport concessions would also be provided in the security queue and other pre-screening locations.

DEPARTURE LOUNGES AND SELF BOARDING

Airlines are researching and experimenting with self boarding at departure lounges. Passengers in the future will self board through control gates at the gate door at the boarding bridge. A few roaming customer service agents or security personnel will teach passengers how to "self board" by swiping their mobile device or boarding pass. Airline agents will primarily be engaged in specialty passenger issues, accommodating upgrades for passengers and conducting airline pre-flight tasks rather than checking in passengers at the loading bridge door. Interactive terminal signage and video walls integrated into the interior architecture of the departure lounges will aid and direct passengers to the boarding process. Self boarding and self ticketing check-in will substantially reduce airline personnel in the terminal, thus reducing labor costs.

To respond to the highest complaint identified through airport passenger surveys, airport terminal designers are providing ample electrical outlets for passengers in the departure lounges for charging of mobile equipment that every passenger carries today. Some designs provide as much as one outlet for every two seats. Stand-up and sit-down workstations are also an amenity business professionals appreciate while waiting in the departure lounge.

Airport departure lounges will have interactive electronic "destination" advertising monitors for passengers. The advertising will change automatically since it is linked to the flight information display system for every new flight in each departure lounge, based on the destination. This will be another source of revenue for the airport. The airport business manager will seek out tourism businesses at the destination sites to advertize in real time to the passengers destined to that location.

SUSTAINABILITY - HIGH PERFORMING BUILDINGS

Airports will continue to focus on operating and constructing new terminal facilities which represent the airport as a leader in sustainable stewardship. However, the focus is shifting from achieving LEED certification to analyzing true Return-on-Investment for sustainable and energy strategies. This will include on-site alternative energy generation, energy conservation strategies, and more energy efficient baggage handling systems. HNTB provided this analysis at San Diego International Airport by analyzing a myriad

of energy saving and generating strategies and calculating the net present value return on investment for the airport to select the best strategies with the highest payback.

Alternative energy technologies are developing rapidly. In the future "quantum dot" photovoltaic integrated building skin and roof panels will enable all the sun exposed airport terminal building surfaces to generate electricity at double the efficiency of today's commercial solar cells. And they won't even look like solar panels. Thermal energy storage systems and other energy strategies will be commonplace for airports.

Terminal design today incorporates recycling centers in the terminal complex for airline aircraft waste, general terminal building waste, and concession vendor waste including the composting of coffee grounds and recycling of glass and aluminum. Daylighting strategies will use more daylight with artificial lighting controls to automatically dim or shut off lighting in the terminal when it is not needed. The use of geothermal wells, thermal storage tank systems, and solar panels on terminals are just some of the cutting edge sustainable systems HNTB has implemented at airports around the country.

LANDSIDE ENHANCEMENTS

Terminals in the future need to be seamlessly connected to the ground transportation infrastructure. This can connect the passenger to the entire airport complex or "Aerotropolis" and the city and region beyond. Landside roadway curbs, transit stations and multi-modal transit centers must be integrated with the airport terminal to make the total travel experience simple and convenient for passengers. This includes providing passenger amenities within these facilities. The terminal of the future will have baggage systems incorporated with the transit station and the multi-modal transit center where baggage feeds placed in these locations are linked to the screening and baggage make up system in the terminal. Various other concessions and amenities can be incorporated in the transit center and adjacent to parking, such as electric charging stations for electric vehicles, valet parking, car washing and detailing service, laundry drop off, and naming rights for each level of the parking structure.

To be a terminal of the future means to focus on customer service for the passenger by embracing the trends presented in this discussion. However, the designer must be able to envision not only what is needed today but anticipate what will be needed in the future. Key this is point is the vision to design a terminal that has the flexibility to adapt with changing times.

Traveling through airport terminals can once again be the fun and easy experience it used to be, while accommodating future technologies and processes, and energizing and recreating the allure and adventure of air travel.

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