MinnesotaGO

A Collaborative Vision for Transportation

State Aviation System Plan

MINNESOTA DEPARTMENT OF TRANSPORTATION

LAST UPDATE JULY 2013

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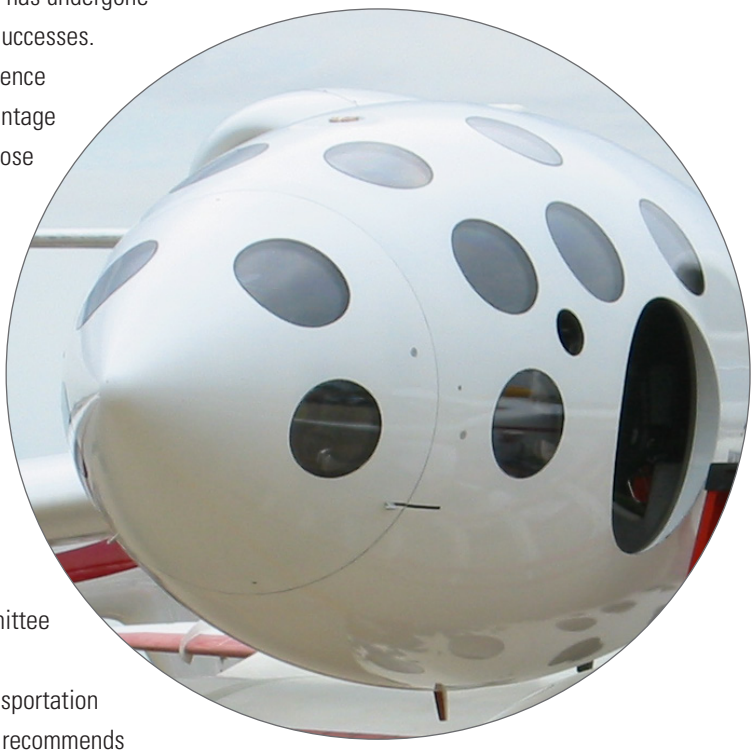
A FUTURE VISION OF AVIATION IN MINNESOTA



Over the past 50 years Minnesota's aviation industry has undergone considerable change while also experiencing many successes. Over the next 50 years, the industry will likely experience additional change and will again evolve to take advantage of technological advancements to succeed. The purpose of this chapter is to consider the future of aviation in Minnesota including the role of stakeholders in ensuring success. To that end, several trends in aviation and multimodal transportation are evaluated and their potential effects on Minnesota's airports are considered.

Several national and international research competitions, pilot projects, organizations studying aviation trends, concepts for futuristic aircraft, and model airports of the future exist. One such organization is the Future of Aviation Advisory Committee (FAAC) – a group of national aviation stakeholders established by the United States Department of Transportation (U.S. DOT). In a report published in 2010[30], the FAAC recommends several initiatives and policies to guide the aviation industry into the future. Several of the report's recommendations are discussed here with a focus on how they might impact Minnesota's aviation system.

The chapter's first section presents the concept of sustainability as it relates both to individual airports and the entire system. For example, airports may begin to consider "green" initiatives to help solve budget shortfalls and alleviate public pressures to be more environmentally friendly. The next section considers the concept of multimodalism and includes an overview of the Statewide Multimodal Transportation Plan and how pairing some key infrastructure projects with the aviation system could maximize mobility in the state. This section also considers how passengers and employees access airline service airports and the potential changes that could result from more multimodal decision making. The third section presents major trends in the physical characteristics of the next generation of aircraft and their potential effects on the aviation system. The fourth and final section summarizes the Federal Aviation Administration's (FAA) Next Generation Air Transportation System (NextGen) program which aims to revolutionize the aviation industry through new technology and procedures. These four sections provide a framework for discussions about what the aviation system might look like 50 years from now, in 2062.

[30] "2010-The Future of Aviation Advisory Committee Final Report", Department of Transportation. April 11, 2011

Sustainability

Sustainability is an international movement toward ensuring that "development…meets the needs of the present without compromising the ability of future generations to meet their own needs."[31] This movement has spread beyond its initial framework and expanded to many diverse industries including transportation and aviation. Transportation partners are beginning to focus on how they can make the most of what they currently have, plan for expansion only where necessary and justified, and consider if removal of some assets could save money without negatively impacting safety or mobility.

The FAA formally acknowledged the sustainability trend in 2010 through creation of a sustainable master plan and management plan pilot program.[32] This pilot program looked to integrate socioeconomic factors, operational factors, and environmental factors into the current safety-focused planning process. A sustainable master plan is only one example of what an airport can do to be more environmentally focused. Sustainability at an airport could also be as simple as a series of small projects aimed at better utilizing existing facilities. Sustainability across the system could be as comprehensive as reprioritizing how projects are funded or as basic as encouraging electronic pay requests on projects to reduce resource consumption.

This section outlines two approaches to sustainability which can impact airport operations in the near term. The first approach relates to the capture and utilization of natural and renewable energy at an airport. The second approach considers revenue generation to assist in funding the operations of an airport. These approaches may help airports become more financially self-reliant.

31 "Sustainable Development: From Brundtland to Rio 2012", United Nations Brundtland Commission. http://www.un.org/wcm/webdav/site/climatechange/shared/gsp/docs/GSP1-6_Background percent20on percent20Sustainable percent20Devt.pdf. Accessed June 9, 2012.

32 "Airport Sustainability", Federal Aviation Administration. https://www.faa.gov/airports/environmental/sustainability/. Accessed June 5, 2012.

SUSTAINABLE PRACTICES

There are numerous potential benefits to initiation of sustainable practices at an airport, ranging from improving the surrounding community to reducing airport operational costs. Airports across the country that have begun to implement sustainable practices have reported benefits including reduced waste, greater utilization of assets, improved work environment for employees, positive community relationships, and reduced operating costs.

Two Minnesota airports recently completed projects with significant sustainable components. Both the Duluth International Airport and the Bemidji Regional Airport recently expanded and modified their existing terminal buildings. As a part of the project, both airports incorporated a geothermal energy source into the renovations, allowing for significant reductions in terminal heating costs. Beyond alternative energy sources, airports can also incorporate sustainability into administrative procedures, land use plans, and stormwater management plans.

Federal regulations tied to airport construction and funding provided by the FAA create a challenge for airport efforts to become more financially independent. When trying to incorporate new materials or technology in a project, airport sponsors will spend time and money requesting and supporting "modifications of standards" before the project is approved by the FAA. The additional effort to gain approvals may deter an airport from pursuing sustainability practices. However, as the practices become more commonplace, airports will need to be creative on how they incorporate this into construction and airport operations.

ALTERNATIVE AIRPORT USES

It is very difficult for smaller-sized airports to be completely self-sustaining – that is, generate enough revenue to cover operational costs. However, to help achieve this goal, airports may generate revenue on airport property as long as the revenue generation activity does not affect the efficiency and safety of the airport operations area (AOA). Examples include usage fees from hangar rentals or parking as well as use of airport land for farming, commercial development or industrial park development. Airports can also utilize non-AOA land for community gathering and/or green space. While not revenue generating, construction of a playground or a park in select approved areas can help create a sense of community between citizens and the airport.

Multimodalism

Multimodalism is a concept which considers multiple modes of transportation as a network rather than several individual modes operating independently of one another. An example of multimodal planning could be establishing a park-and-ride facility where a new highway access point is to be constructed. A well-placed park-and-ride facility can encourage transit ridership, resulting in the reduction of passenger vehicles on the highway. This principle also applies to aviation for both air passengers and the freight network. Nationally, the US DOT and individual state DOTs are looking to multimodalism to maximize usability of existing transportation networks and increase accessibility and mobility.

In terms of interconnectivity with other modes of transportation airports face two particular challenges. First, funding restrictions limit the extent of off airport improvements an airport can support, resulting in little control or influence over neighboring regional transportation systems. Second, accessing an airport by foot or by bicycle is often a challenge for passengers. Many airports are surrounded by highway infrastructure while others are located far from population centers. Each of these factors present significant obstacles for those seeking access to an airport via non-motorized transportation.

This section presents the status of multimodalism in the US and Minnesota and considers opportunities in Minnesota to interconnect aviation with other modes of transportation to enhance accessibility and mobility.

NATIONAL AND STATE INTERCONNECTIVITY

One significant challenge facing the country is to determine how best to manage an aging infrastructure while simultaneously pursuing new transportation technologies. Threats to the federal budget have increased the difficulty of this effort.

While the country has been considering how best to manage these challenges and threats, much attention has recently been focused on plans for developing a nationwide high-speed rail (HSR) network. HSR trains travel at sustained speeds over 125 miles per hour. Only two HSR projects have been funded to date; one in the New England states and the other in southern California. Higher-speed-rail lines, with trains that travel at speeds greater than 90 mph but less than 125 mph, are also being developed in the northwest states and around Chicago. **Figure 8-1** illustrates the currently-planned, high-speed and higher-speed routes. The national strategic plan for HSR is to continue expanding and interconnect various regions of the US.[33] In Minnesota, the national strategic plan includes a line connecting Minneapolis to Chicago through La Crosse and Milwaukee.

[33] "Vision for High-Speed Rail in America", U.S. Department of Transportation – Federal Railroad Administration. April, 2009.

Figure 8-1: US HSR Development Map

Source: U.S. DOT Federal Railroad Administration

On the aviation side, the FAA is pursuing two programs to balance the funding of new technology while improving existing infrastructure. The first effort is the FAA's NextGen program, which is discussed in greater depth later in this chapter. The second effort is the FAA's National ASSET study, described in **Chapter 1: Introduction and System Goals**. This study classifies general aviation (GA) airports by how they support connectivity of local communities to state, regional, and national communities. By understanding these impacts of system airports, the state will be able to better understand which airports would complement the services being provided by another mode of transportation.

EXISTING MINNESOTA TRANSPORTATION NETWORK

The Minnesota Department of Transportation (MnDOT) has a role in planning and funding all modes of transportation shown in **Figure 8-2** to provide for transportation of people and goods across the state.

Figure 8-2: MnDOT Transportation Modes

In late 2003, MnDOT was authorized to establish the first MnPASS express lanes west of Minneapolis. This program converted the existing inner lanes of Highway I-394 into high occupancy toll (HOT) lanes. This program was expanded to include new managed lanes on I-35W in 2009. Future plans for expanding the HOT lane system include extending the two existing segments and adding new HOT lanes on I-35E.

To complement Minnesota's extensive bus transit and emerging bus rapid transit (BRT) networks, the Hiawatha Light Rail Transit (LRT) Line opened to passengers in 2004. The line travels from the Mall of America in Bloomington to the MSP Airport, and continues to downtown Minneapolis. The second LRT segment scheduled to open in the state is currently under construction and will connect downtown Minneapolis and downtown St. Paul. There are also several other potential routes currently in the environmental or planning phases.

MODES AT THE MINNEAPOLIS-ST. PAUL (MSP) INTERNATIONAL AIRPORT

MSP is the busiest airport in the state of Minnesota. The airport has eight concourses in two terminal buildings. Over 35,000 passengers use the terminals on an average day in July. In 2004 two light rail transit/bus transit stations opened at MSP, one serving each terminal. MSP also provides bicycle parking facilities at both terminals.

Considering both terminals, the airport can be accessed by all modes of transportation under MnDOT's jurisdiction, with the exception of waterways. Unique to airline service airports, passengers travel to airports using a variety of high occupancy vehicle (HOV) options. This is especially true at MSP, which has seven HOV options regularly available at the airport including: taxis, limousines, hotel shuttles, shared ride vans, off-airport parking shuttles, rental car shuttles, and employee shuttles.

Although MSP offers numerous methods for passengers to access the airport, the dominant mode remains private cars. Consequently, the airport has begun experiencing capacity problems with parking and curbside facilities. The airport has renovated to increase the efficiency of their existing parking infrastructure and is currently in the environmental review process to build more facilities. The airport has also undertaken projects to decrease vehicle demand. Two remote parking facilities have been constructed designed to allow vehicles to park while waiting for passengers, rather than idle at the terminal. One facility is a remote commercial vehicle staging area which monitors the number of taxis and commercial vans at the terminal at any one time. The other is a cell phone lot which allows free parking while waiting for passengers to deplane and arrive at the roadway curb.

Multimodal transportation options should be considered not only for passengers but also for employees working at the airport. Employees are currently the largest ridership base of LRT and bus transit at MSP; this is in part due to their frequency at the airport and because they are not commuting with luggage.

MODES AT OUTSTATE AIRPORTS

Outstate airports (those outside of the seven county Twin Cities metro area) are also connected to the multimodal transportation network, though to a lesser degree. A few airports, in areas popular for tourism, have close connections to bike trail systems. Numerous airports in the state have scheduled bus transit routes to the airport, and even more have buses connecting the airport to the local transit system. In most instances these are general aviation airports.

VISION OF FUTURE AVIATION CONNECTIVITY

Although there has been progress toward new transportation technologies in Minnesota, continued focus on interconnectivity and emerging technologies which support interconnectivity is likely. As the state continues to focus on related goals such as increasing safety, connectivity, and accessibility, the aviation community needs to work with the other modes of transportation to be a part of the evolution. This is important because aviation provides connections for Minnesotans to regional, national, and international markets. Minnesota airports may consider the following opportunities in an effort to include connectivity options.

The Northstar commuter rail currently runs from downtown Minneapolis to Big Lake. The proposed extension of the Northstar from Big Lake to St. Cloud could provide residents of the St. Cloud area (and those along the commuter route) alternate access to MSP. When the St. Cloud Regional Airport lost airline service in 2009, residents were forced to find another way to access airline service, such as travel to MSP to fly. The most common method of traveling between the two cities is by car. However, with completion of the proposed Northstar rail extension, air passengers along the corridor would be able to commute to MSP or the St. Cloud Regional Airport as they add flights and regain airline service.

Part of the US DOT's high-speed rail plan includes the construction of high-speed rail between Minneapolis and Chicago. Although high-speed rail could compete with the airlines for passengers, it is more likely to complement airline travel service along the corridor by either providing air passengers a means of traveling to MSP without needing to park their car or by providing a travel alternate when weather conditions ground or delay flights.

The Northern Lights Express passenger rail is a proposed high-speed rail that would provide service between the Twin Cities and downtown Duluth. Another proposed high-speed rail, the Zip-Rail, would connect the Twin Cities and Rochester directly from airport to airport. High-speed rail lines may play a role in providing a higher level of service to passengers connecting between these communities and beyond.

As the light rail transit network expands to provide access to more communities, these areas will have an alternate means of accessing MSP, and other airports. Nationally, utilization of rail transit to airports remains one of the least utilized modes of travel, but in markets with rail access to residential centers these percentages increase. The Atlanta International Airport, for example, has one of the higher US percentages in part due to the expansion of the region's rapid transit system in the early 2000s. European airports typically see much higher usage of rail transit as well, so it is not unprecedented that an expansion of the light rail transit and bus rapid transit networks could increase transit as a mode to an airport. In the short-term, transit will likely have the greatest impact for airport employees because they make regular trips to the airport and are not burdened with luggage.

Expansion of the interstate High Occupancy Toll (HOT) lane network also presents a unique means of creating a multimodal connection. As a benefit to MnPASS users, there may be an opportunity to link the revenue system of the HOT lanes with the parking revenue system at MSP. This may not only increase the efficiency of parking for patrons, alleviating the need to swipe their credit card as they enter the parking garage, but also, as more drivers possess transponders more cars could utilize the congestion-decreasing HOT lanes network. This opportunity could benefit both the airport and the highway system.

Including the airport in a community's regional bus transit route also has the potential to increase multimodalism at airports across the state. Airports such as the Bemidji Regional Airport have created a bus stop at their new terminal building, as one illustration of the increased interest in creating multimodal transportation links. Increased bus transit options provide citizens the opportunity to choose their mode of access to Minnesota airports rather than being forced to drive. Another method of providing new modal opportunities could be the construction of a bike path or identification of bike lanes to an airport, and providing bike racks.

Aircraft Characteristics

The types of aircraft in use by both the airlines and the general aviation community have and will continue to evolve. This evolution includes the reprioritization of aircraft being utilized day to day, modernization of aviation fuels, and the development of new aircraft and engine technologies. Changes to the fleet mix affect both the economics of flying as well as demands on infrastructure supporting aviation. Improvements range from increasing the capacity of aircraft to increasing the fuel efficiency of aircraft. In recent years the industry has seen the phasing out of less fuel efficient aircraft types and an increase in building aircraft with increased fuel efficiency. Due to the increased size and weight of aircraft, many airports have undergone infrastructure improvements to support them. The following section discusses potential changes to aircraft in the future.

AIRCRAFT UTILIZATION

In recent years, due in part to the sluggish economy and volatile fuel prices, the trend in aircraft utilization shifted. Airlines are utilizing larger airplanes with more passenger seats and offering fewer flights. This trend is also driven by the airlines' revamped business model of greater utilization of fewer hub airports. For example, the introduction of the Airbus A380 and Boeing 787 have provided airlines with a fuel efficient, high capacity aircraft which can transport a large number of passengers, and as a result, airlines are reducing the number of trips between destinations. Similar trends can be seen in narrowbody aircraft (aircraft with a single aisle but over 100 seats) as well as regional jets. The major airlines are less frequently utilizing 50-seat aircraft, but moving towards 70-seat aircraft to fill the role of the current 50-seat aircraft, 100-seat aircraft to fill the role of the existing of 70-seat aircraft, and so on.

At airports with airline service, one of the largest impacts of this trend is at the terminal building. As aircraft increase in length and width, parking positions outside the terminal require reconfigurations. This can result in the loss of use of one or more gates while larger aircraft are present. A second impact is on internal terminal capacity. As the number of passengers per aircraft increases, peak hour passenger flows inside the terminal also increase. This can result in necessary terminal expansions or remodels. At smaller-sized airports, the existing airfield geometry (taxiway fillets and apron areas) may not be able to accommodate larger aircraft. Another consideration for smaller-sized airports is insufficient passenger demand to make service profitable with larger planes, which could result in a loss of service.

The general aviation community can also expect changes in aircraft utilization in the near future. The current fleet of general aviation aircraft is aging. On one hand, it is becoming more and more difficult to purchase replacement components for older aircraft. On the other hand, the cost of new aircraft are at an all-time high. It should be noted that pilots new to the industry are entering into a much safer and reliable system, and new planes are often equipped with many cutting edge technologies. New aircraft are allowing businesses to fly further without refueling and increasing safety to the GA industry. Although new business aircraft are being manufactured, the size of these aircraft are not necessarily increasing, but some do require longer runways, resulting in necessary infrastructure improvements.

ALTERNATIVE FUELS

Two of the distinct industry goals of the FAAC report from April 2010 directly related to aircraft fuels. First, the FAAC called for carbon-neutral growth by 2020, and second, a 50 percent reduction in CO2 emissions (relative to 2005) by 2050. Thus it is clear that the aviation industry is working to find greener, less-expensive and more secure (i.e., locally-produced) supplies of fuel. The range of possibilities includes biofuels and potentially even synthetic fuels.

Today, the majority of aircraft are fueled by either Avgas or Jet Fuel. Avgas contains lead, which increases the performance of aircraft engines, but also threatens the environment and is costly to produce and distribute. Consequently, there is a desire to find a replacement fuel that is environmentally-friendly, sustainable, and inexpensive that works with the aircraft of today and existing engine technology. Finding a suitable replacement is not only challenging on a technical level, but new fuels face economic and regulatory challenges as well. This is because new supply and distribution chains must be established along with the development and authorization of new specifications and certifications standards. The reasons for replacing jet fuels are similar, and the higher costs associated with jet fuel makes the search more imperative. As a result, the industry and the FAA are working cooperatively in the search to develop new fuels that are cheaper, sustainable, and environmentally friendly.

To date, there are some new alternative jet fuels already in use. An algae-based biomass fuel was blended with jet fuel and first used on a U.S. commercial passenger flight in December, 2011. Alaska Airlines has also used recycled cooking oil blended with jet fuel. The goal is to find a fuel which helps the aviation industry be more sustainable, but yet is cost competitive for consumers.

NEW AIRFRAME AND ENGINE TECHNOLOGIES

The FAA has predicted that the demand for passenger air travel will nearly double over the next twenty years. Not only will industry partnerships involve fuel source development, partnerships will be inextricably linked to emerging aircraft airframe and engine technologies. Two trends which are emerging in the industry are larger wingspans and higher performance engines.

Aircraft of all sizes are increasingly being built with larger wingspans as they are more efficient, save on fuel and emission costs. These larger-sized airplanes will carry more passengers, and larger and more efficient wings will be needed to offset the fuel and emission costs from the increases in loads.

New engine technology will be needed to bring more power with less fuel and fewer emissions, all while producing less noise than ever before. Emerging engine power technology will be coupled closely with advances in new alternative fuels. The engine technologies and new airframe design will be linked as emission standards are continuously being tightened.

NextGen

NextGen is an initiative of the FAA to upgrade the national aviation transportation system through new technologies and new operational rules. This initiative, launched in 2004, aims to increase the economic impact, safety, sustainability, and flexibility of the U.S. National Airspace System (NAS). NextGen focuses on three major components of the NAS for improvements: communication, navigation, and surveillance.

These three components will utilize digital and spatial information systems to replace today's voice, ground-based navigational aids, and radar-based systems. NextGen will tap into the data-link communication system, satellite technology, and aircraft-based Global Positioning System (GPS) surveillance technology to aid in this effort.

NextGen will allow pilots and controllers to manage aircraft locations at a much higher level of precision than is possible today. Air Traffic Control (ATC) will have aircraft position updates every second, rather than the every five to twelve seconds provided by current radar systems. This will allow aircraft to be spaced closer together, resulting in greater capacity.

Automated tools for air traffic management will also help optimize spacing and sequencing as well as allowing for landing and departure procedures that minimizes noise exposure, fuel consumption, and greenhouse gas emissions.

NextGen also offers several benefits for GA airports. Perhaps the most immediate benefit for Minnesota's GA airports is the FAA's rapid production of GPS instrument approach procedures. GPS procedures offer pilots navigation services that are nearly equivalent to instrument landing systems (ILS) but without the considerable cost for equipment on the airport. This means good navigation is available to more airports, especially in inclement weather. As a result, both general aviation and commercial aviation are increasingly equipping their aircraft with GPS navigation avionics in order gain access to those airports that do not have an ILS.

The following sections further discuss the three components of NextGen.

IMPROVED COMMUNICATION

Pilots utilizing today's technologies communicate with a series of different controllers on a series of different radio frequencies. As pilots reach the edge of a controller's area, they are directed to the next frequency/controller that will monitor their aircraft's position. The focus of NextGen related communication improvements is to replace the system of independent controllers and networks and create a cohesive system which communicates necessary data continuously. NextGen has established two programs which will aid in creating this cohesive network of communication.

The first, System Wide Information Management (SWIM), is designed to address the lack of connectivity between the interdependent information systems of the current network. SWIM aims to provide streamlined information sharing for core services in order to provide better collaborative decision-making and improved air traffic flow management. SWIM will be a secure, single point of access which will rapidly collect and transmit all of the data produced by the National Airspace System (NAS). By collecting and distributing this data, SWIM allows pilots and controllers to access data from across the system rather than just in a specific area.

Controller-Pilot Data-Link Communication (CPDLC) is NextGen's solution for the currently-congested, voice-to-voice communication system. Today, air traffic controllers link with pilots using voice radio communications. In heavy use airspace, voice-to-voice communication from a few controllers to multiple aircraft results in rapid, succinct, and sometimes overlapping phraseology. This places a heavy mental load on controllers and pilots, one which leaves little margin for error. Through CPDLC a vast amount of the data now communicated verbally will be delivered electronically. For instance, rather than detailing a pilot's clearance into an airport via voice and mandating the pilot repeat what they heard back, pilots receive electronic instructions for their clearance into an airport.

Over the next six years the FAA will construct a ground-based network of digital transceivers that will enable both voice and data streams to and from the ground to cockpit. Data-link automated programs will help get airplanes to the right place at the right time, which will eliminate unnecessary holding and unnecessary fuel burn. Additionally, with CPDLC there will be automated arrival management, automated spacing, and automated advisories for speeds, headings, and altitudes, all of which allow controllers to monitor the airspace with more cognitive lead time to spot potential conflicts.

IMPROVED NAVIGATION

Improved navigation aims to establish more precise aircraft paths to increase capacity by putting more aircraft safely in a given area of airspace, minimize noise pollution around airports, reduce aircraft fuel consumption, and reduce aircraft travel times. The two key navigation components of NextGen are Area Navigation (RNAV) GPS procedures and wide area augmentation system (WAAS). Through these two components, the FAA will continue to establish additional RNAV Required Navigation Performance (RNP) procedures which optimize navigation requirements and performance-based approach minimums.

WAAS is used in many of the FAA's new GPS-based approach procedures; one of the most notable already enacted benefits of NextGen. These approach procedures use the WAAS system to link satellites with ground stations to provide precise positioning of aircraft. This improved position accuracy makes it possible for GPS equipped planes to fly instrument approaches into airports that cannot afford to install and maintain expensive equipment used by a traditional instrument-based approach (i.e. ILS).

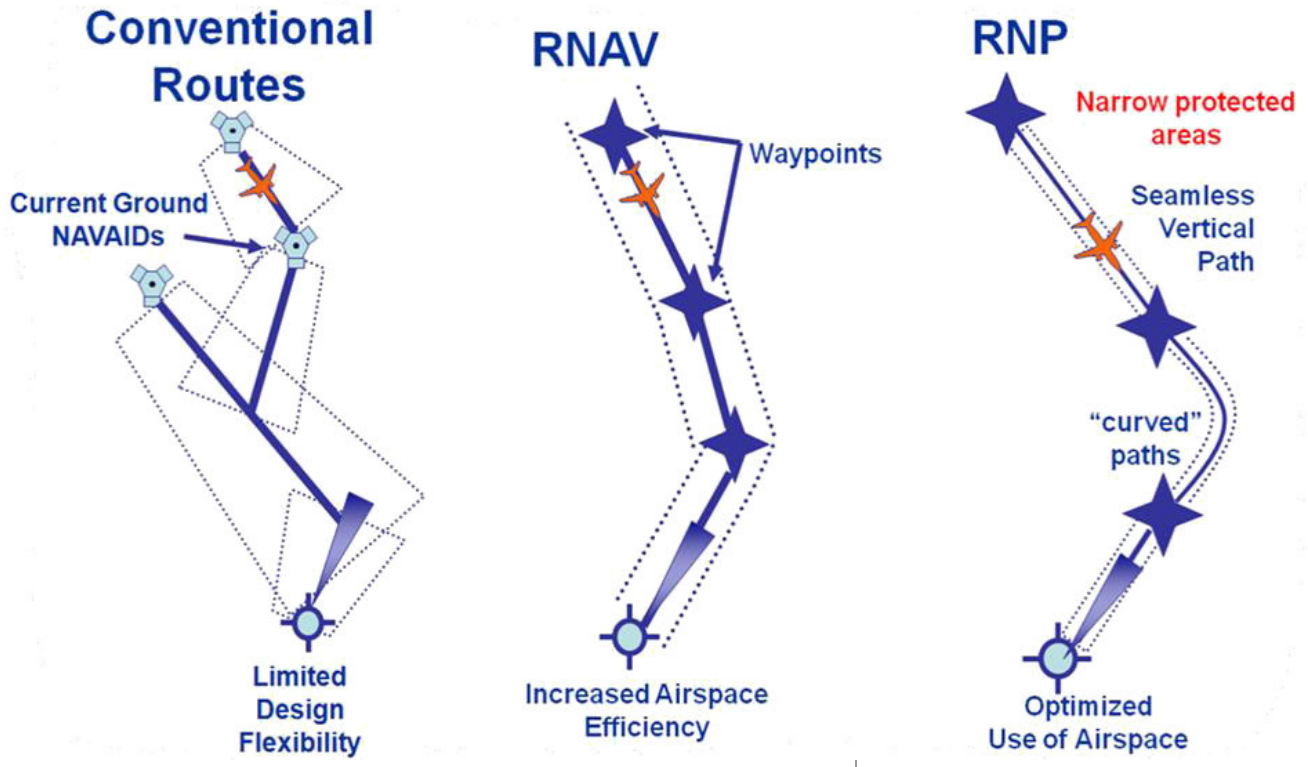
As of March 2012 there are more than 2,780 published LPV approaches in the U.S. Of these, 76 are at Minnesota airports. This ranks 15th among the contiguous United States.

One type of WAAS procedure is known as Localizer Performance with Vertical guidance (LPV), which provides both horizontal and vertical guidance to a runway with a precision that matches those with traditional ILS, but at a significantly lower cost. Of the 2,780 LPV approaches, over 1,160 are published at airports that do not have an ILS available. This is beneficial for the 53,000 general aviation aircraft currently equipped to utilize LPV approaches.[35] Minnesota is ranked 15th in the U.S. for working with the FAA in developing and publishing these procedures for both airports with ILSs and those that do not currently have precision instrument runway approaches.

[35] "NextGEN Implementation Plan", Federal Aviation Administration. March, 2012. http://www.faa.gov/nextgen/slides/?slide=3. Accessed May, 2012.

Performance-based navigation RNAV (RNP) improves on RNAV (GPS) with WAAS augmentation by developing airport approaches that provide pilots with a continuous 3-D navigation course that is calculated solely upon GPS. RNP courses are typically more precise procedures which allow for curved segments to reduce flight distance, reduce fuel burn and emissions, or avoid obstacles that might otherwise not be possible with conventional routes. The largest barriers of implementing RNP procedures are that aircraft must be equipped with special avionics to allow the pilot to fly the route and the pilot also needs special training. **Figure 8-3** below provides an illustration of how these two types of navigation systems compare to the conventional routes used in today's air transportation system.

Figure 8-3: Navigation Systems



This RNP system allows for simpler, more direct routes to the runway and also allows planes to travel in closer proximity to one another. This can substantially increase capacity at airports. Environmental benefits include reduced fuel use and emissions as well as reduced noise exposure for surrounding communities. More efficient flight paths will also mean that planes will be in the air for shorter periods of time, a benefit for the movement of passengers and goods.

As of March 2012 there were 565 RNP runway approaches published nationwide, only two of which are published in Minnesota. Both of these are for Runway 35 at MSP. Operators are beginning to realize the benefits of performance-based navigation and currently 92 percent of air carriers are equipped for some level of RNAV.[36] However, not all air carriers have invested in the equipment and training required to fully utilize these runway approaches, and as of today, there are no requirements or timeframes for airlines to do so.

IMPROVED SURVEILLANCE

The focus of creating better surveillance is to equip aircraft with the necessary technology to provide accurate locational data to both ground surveillance and other aircraft. Currently, the resolution of radar systems as well as voice communication between pilots and controllers requires the establishment of a minimum safe distance between aircraft. Better surveillance will allow for a reduction in the minimum separation between aircraft, allowing flights to fly with a higher level of safety from destination to destination and controllers to monitor the skies with greater confidence.

Automatic Dependent Surveillance-Broadcast (ADS-B) is the primary method of creating a system with better surveillance. ADS-B has two functional types, "ADS-B Out" and "ADS-B In". ADS-B Out capable aircraft are those which can transmit their GPS positions out into the airspace network. The FAA is currently mandating that by 2020 all aircraft are to be equipped with ADS-B Out capability if intending to fly in the most heavily used controlled airspace. This is generally all airspace above 10,000 feet and around all major metropolitan areas. Effectively, by 2020, all aircraft in busy airspace will be transmitting their GPS positions to ATC and other aircraft via the ground transceiver station network. This provides ATC a complete picture of aircraft activity in the sky without the use of ground-based radar stations and at a much more accurate level than RADAR can provide.

[36] "NextGEN Implementation Plan", Federal Aviation Administration. March, 2012. http://www.faa.gov/nextgen/slides/?slide=3. Accessed May, 2012.

ADS-B In capable aircraft are those which will be able to receive the data transmitted by ADS-B Out capable aircraft and ATC. As ATC is receiving aircraft information, it is simultaneously sending a complete picture of air traffic via the same network of transceivers. It also sends out information on weather data. As of today, ADS-B In concepts and technologies are still in development with estimates of realization near 2030. Additionally, many airlines have yet to make a business case for acquiring the technology, considering that FAA estimates of fuel cost savings and emissions reductions are overstated.

Regardless, the recently passed FAA Reauthorization Bill (signed into law February 14, 2012) also mandates that by 2020 all aircraft are to have ADS-B In capability so that all pilots have the same picture of aircraft activity in the sky that air traffic controllers will. It is uncertain the extent to which this provision will be implemented.

Summary

The aviation industry is on the cusp of an unprecedented change in the way it operates. In the next 50 years, airports will see changes not only in the way aircraft fly into and out of an airport, but also in the direction of the aviation industry's future. Safety will always remain the top priority of the aviation industry, but new attention will be brought to ideas of how aviation can complement other modes of transportation and how airports can sustain their own needs. Through focusing on these concepts, the Minnesota aviation system will continue to promote safe travel while increasing accessibility and mobility.

Without a doubt, the aviation system in Minnesota plays an important role in the state's transportation network. While challenges do exist for the system, MnDOT will proactively and creatively work towards the best solution with the support of the FAA, airport leaders, aviation businesses, local communities, legislatures, and other key stakeholders. In doing so the Minnesota aviation system will be the nation's safest and most effective for the next 50 years and beyond.

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