TRANSOFT SOLUTIONS

CASE STUDY

Managing Jet Blast Risk

RS&H for San Antonio International Airport

Abstract

Commercial service airports all face a common challenge when it comes to managing jet blast produced by passenger and cargo jet aircraft. In an apron environment, the high risk of equipment damage and human injury from jet blast makes it crucial for airports to consider its potential impact and take preventative measures.

This case study outlines these details and examines how AviPLAN can help overcome these challenges to facilitate safer designs and operating environments at airports.

Project Details

Client Name: RS&H for San Antonio International Airport
Date started: March 2021
Duration: 6 Months
Date Completed: August 2021

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Background & Challenge

There is a saying in aviation that “if you’ve seen one airport, you’ve seen one airport.” While this is very true for multitudes of factors, one factor that is universal amongst commercial service airports is the need to manage jet blast produced by passenger and cargo jet aircraft. The apron environment specifically, where large jets and ground personnel interface on a daily basis, is an area where the impacts of jet blast must be considered.

A passenger jet, especially one with a narrow body and larger jet engines, can create enough concentrated wind behind its engines to knock down air stairs, roll over tugs, flip small aircraft, and most concerning, injure people on the ground. Thus, the effects of jet blast are extremely important to consider. Airline pilots and ground crews are trained to minimize and avoid jet blast impacts. Those operators are well-aware of jet blast and its power as they work in the terminal environment where they feel and hear planes moving every day. Designers, on the other hand, are looking into the terminal environment through their computer monitors, making jet blast easy to miss and/or forget to consider because it is invisible. Jet blast doesn’t stand out in drawings the way structures, vehicles, and aircraft do. Its impact and reach are not readily known unless intentionally analyzed.

Aircraft manufacturers provide jet blast charts depicting the velocity of windspeed behind aircraft engines based on different power settings. However, these charts are static and cannot be easily modeled. A designer would need to draw the blast contours themselves to be able to see the jet blast in their drawings, and in many cases the information itself can be difficult to obtain.

In contrast, AviPLAN, Transoft Solutions’ airside planning, design and operations software, provides the ability to model and see jet blast for an aircraft, or fleet of aircraft. This is a significant advantage for designers as modeling brings the realities of the terminal environment to life. AviPLAN can also simulate jet blast impacts of a moving aircraft making a turn, which is perhaps the most difficult to anticipate impacts from. The result is an ability to visualize jet blast and the sweep of wind that a turning maneuver produces.

Terminal Project Outline

Any time a new design drawn changes the existing operations of aircraft, new jet blast impacts can be introduced. This was the case during a terminal project at San Antonio International Airport on Concourse B. A new gate was being added by converting a remain-over-night (RON) pad into a parking position and adding a bump out holdroom on the concourse.

Since the new parking position was built for RON, blast fencing already existed to protect vehicles and people outside the airport operating area. However, by changing the use of the RON pad to a parking position for the new gate, people and equipment would have been present in that area during regular operations. Thus, an examination of jet blast impacts for aircraft departing under power after pushback was needed.

The green aircraft in Figure 1 is shown parked at the new gate position. That position and the four other gates on the north side of the concourse were designed to fit up to the Boeing 737 MAX 10, so that aircraft was used to set spacing requirements for all the parking positions. The next largest aircraft planned on those gates was the Boeing 737-900SSW.

The Boeing 737 MAX 10 was also initially used for modeling of push-back and departure operations. As shown in Figure 1, the MAX 10 could be pushed back from the new position or Gate 1 and depart under power with no jet blast impact to the new gate. The figure shows breakaway thrust levels through the turnout to the north.

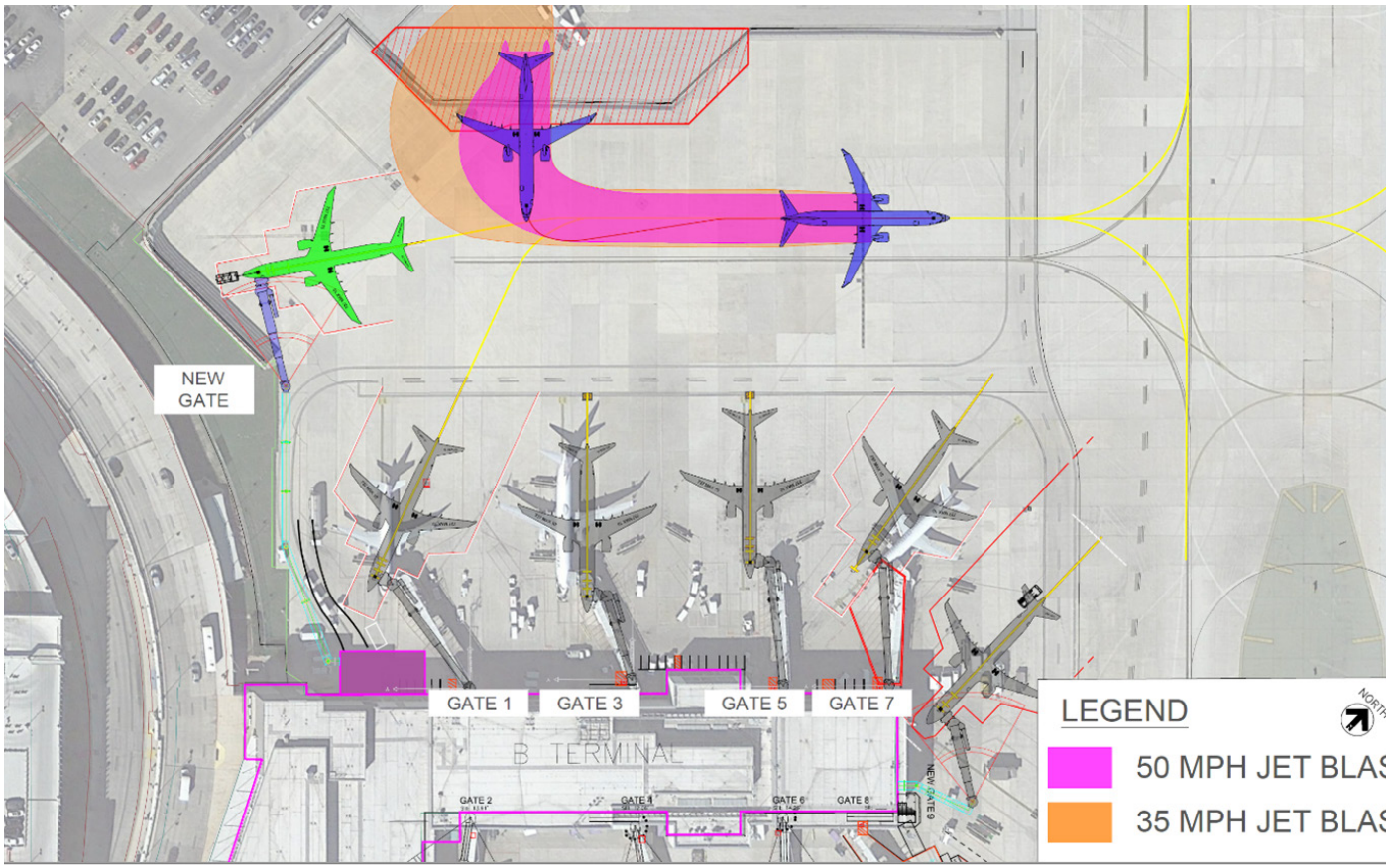

Figure 1

The MAX 10 uses LEAP engines, which have a lower jet blast profile than its predecessor variants. When modeling other aircraft that would be served on the gates, including the Boeing 737-900SSW and Airbus A320, a much different jet blast impact scenario was quickly found, as can be seen in Figure 2. Using the features in AviPLAN, it was determined that the greatest jet blast profile was created by the 737-900SSW. On power out, that aircraft would impact portions of the new parking position.

The result of the analysis led to discussions with the airline and airport to develop operational procedures so as to minimize blast impacts to the new gate.

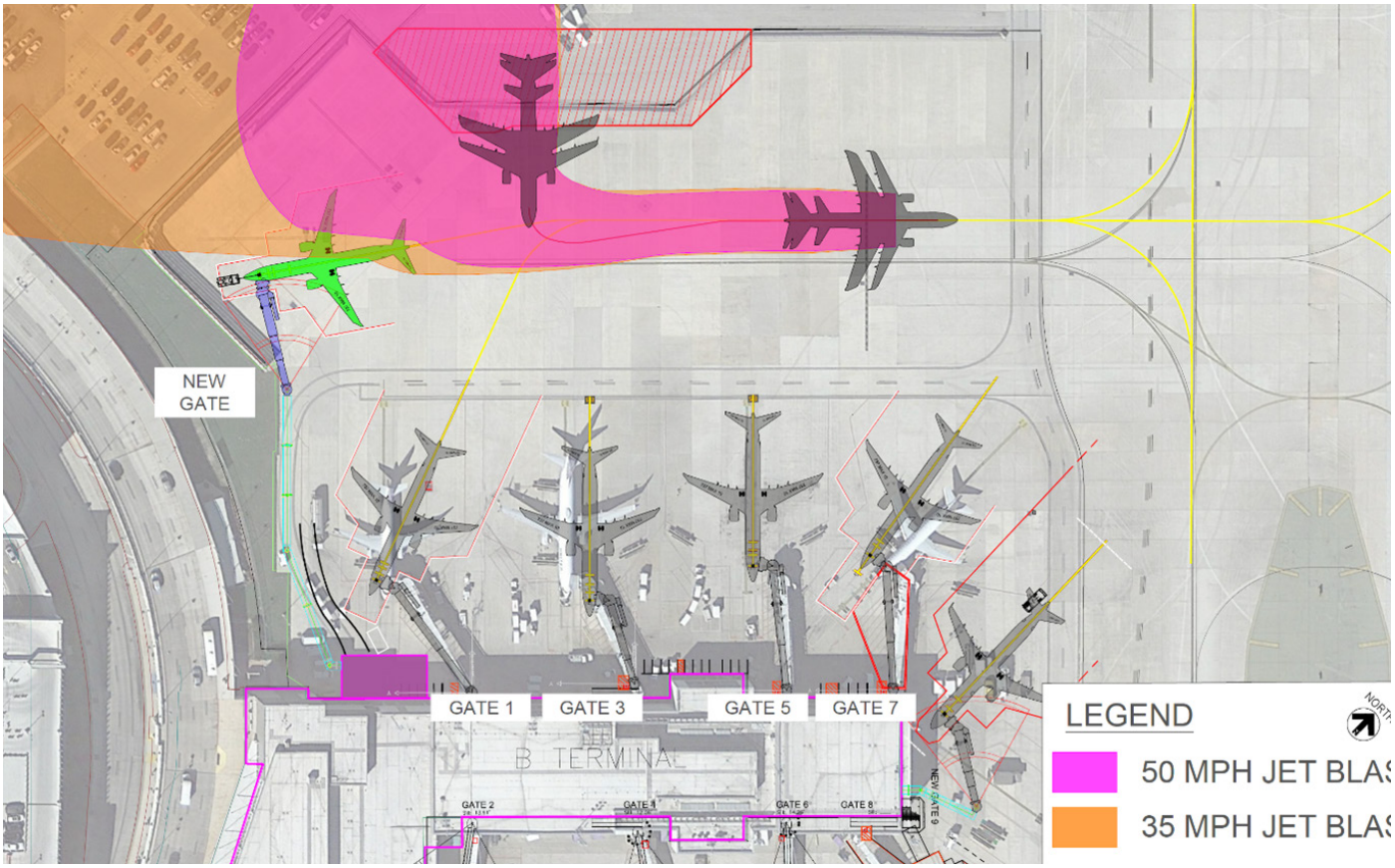

Figure 2

Summary

The ability to model jet blast and allow stakeholders to see the extent of its impacts is valuable in every scenario. With a single exhibit using the modeling capabilities of AviPLAN, stakeholders and designers can see if jet blast is an issue that must be mitigated, or if it is inconsequential. Unlike manually drawing blast profiles or guessing, AviPLAN provides a quick and easy tool for designers to model jet blast and obtain a thorough understanding of the potential impacts. It helps take something invisible and turn it into something designers and stakeholders can see and mitigate if necessary. The result – safer designs and safer operating environments at airports.