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Airport Operations Delays and Possible Mitigation Through Electric Taxi Systems

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Overview

- Each year, airline daily departures increase.
 - With more aircraft at terminals, ground delays, based on current airport design, will continue to increase.
- Systems that allow for reduced aircraft time on the ground will improve airport operations, in addition, will reduce airline delays both for departure and arrival at the gate.





Background

- Time for a tug (external vehicle designed to move aircraft) to push back, park, set, and disengage from an aircraft averages 5 minutes.
- A sample of 6,723 aircraft pushbacks showed the time increased to 11 minutes to capture 95% of all pushbacks, based on distance to the pushback spot, assuming no problems are encountered.
- An internal electric system could allow an aircraft to push back on its own and taxi within as little as 45 seconds.





Purpose

The purpose of this qualitative research study was to explore the efficacy, from ramp controllers' perspectives, of equipping airliners with an electric taxi system.





Method

- A case study method was selected, using 19 ramp controllers from four major airports (Chicago, Denver, Houston, and Los Angeles) were selected.
- These airports are representative of major airports with a high number of ramp operations.





Research Questions

- **RQ1:** How do ramp controllers perceive potential benefits of electric taxi systems at major airports?
- **RQ2:** How do ramp controllers perceive potential problems of electric taxi systems at major airports?
- **RQ3:** How do ramp controllers perceive the implementation of electric taxi systems?





Sample

- Four major airports in the US.
- The 19 purposely-selected participants were airline representatives from Chicago (7), Denver (3), Houston (4), and Los Angeles (5).
- This allowed for a perspectives from a cross section of major airports that experience a significant number of ground delays on a regular frequency.
- A written transcription was developed for each participant.
- The MAXQDA qualitative data analysis software was accessed to summarize these transcripts.



Results

- **RQ1:** How do ramp controllers perceive potential benefits of electric taxi systems at major airports?
 - Can save fuel, environmental considerations...
- **RQ2:** How do ramp controllers perceive potential problems of electric taxi systems at major airports?
 - If it breaks, what is the alternate plan?
- **RQ3:** How do ramp controllers perceive the implementation of electric taxi systems?
 - Not very helpful at all. This was a surprise!



Unanticipated Findings

- Although they understood the potential economic and environmental impact of an electric taxi system, they felt it would be of minimal impact to aircraft movement and delays in the ramp area.
- For the most part, the controllers did not see a time-saving benefit, because of the ramp entry/exit problems.

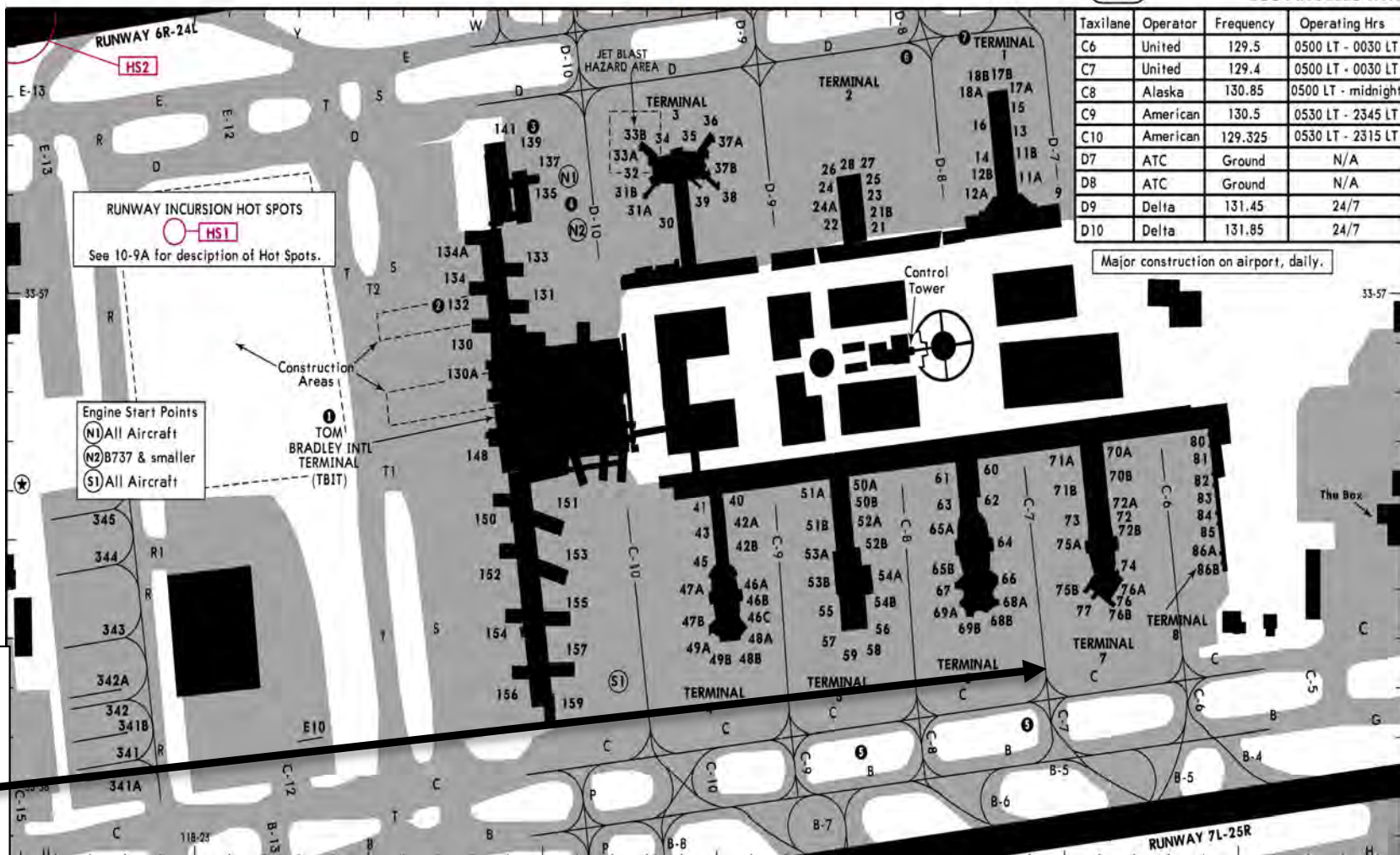


An Example - LAX

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Conclusions

- From ramp controller's perspectives, the economic benefits of accessing the electric taxi system, at least initially, were positive.
- The airport design and lack of ability to quickly allow entrance and exit from the ramp areas were a far greatest concern.



Recommendations

- The first recommendation-airport officials must work with ramp controllers to find specific holding areas, outside of the ramp areas, where aircraft can park, to keep the entry and exit paths to the ramp area clear.
 - Creating these designated areas for both arriving and departing aircraft would increase the ramp efficiency by allowing unencumbered movement to and from the gates.
- The second recommendation-create a quantitative analysis of potential costs and costs savings of implementing electric taxi systems, without consideration of the ramp delays.



Questions

