Passenger Luggage Reclaim Capacity & Wait Time Analysis

Capacity Assessment for Edinburgh Airport
August 2025
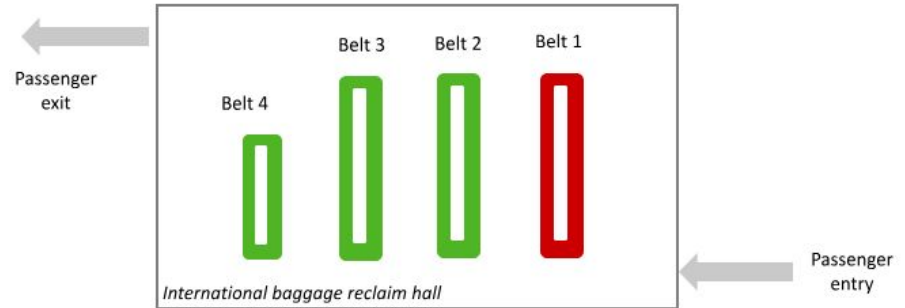
Tadea Veng
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Key findings

2.9% of passengers wait 15 minutes or more, with longest wait time being 21.5 minutes.

At peak occupancy, 402 passengers are waiting for their baggage.

Out of four belts, three have sufficient capacity, with Belt 1 at maximum capacity 9% of the time.

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Data & Methodology

Data:

3D simulation of peak day at the baggage reclaim hall.

Two resulting data sets, Bags & Passengers.

Spanning one day from midnight to just after midnight next day.

Methodology:

Analysis performed in Python (Google Colab) using Pandas, Numpy, and Matplotlib

Bags data variables	Processor Unique belt ID	Time HH:MM:SS format	Bags Number of bags at given time
Passengers data variables	Passenger # Passenger ID	Entry time When the passenger starts waiting. HH:MM:SS format	Exit time When the passenger stops waiting. HH:MM:SS format

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Q1. Do Luggage Belts Provide Sufficient Capacity?

Belt 1 is at maximum capacity 8.7% of the time. Longest time at full capacity is 61 minutes.
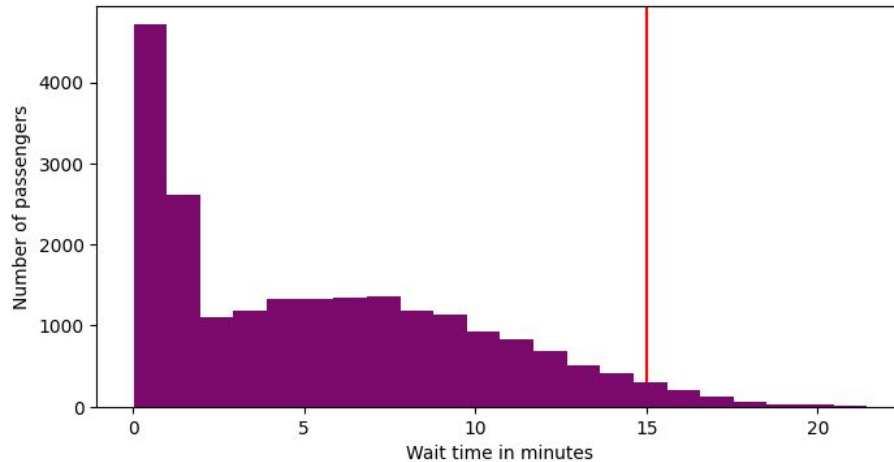
Belts 2, 3, and 4 are seen to have sufficient capacity, being at maximum capacity <3% of the time.
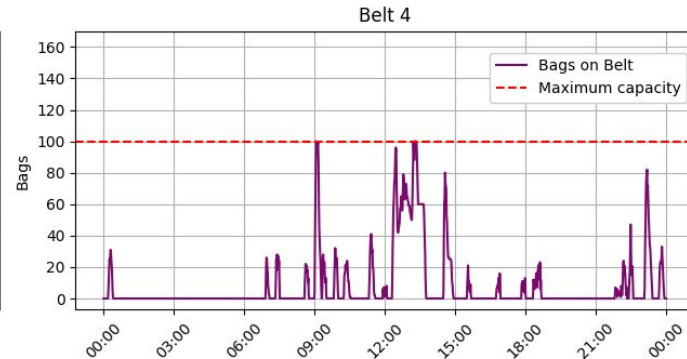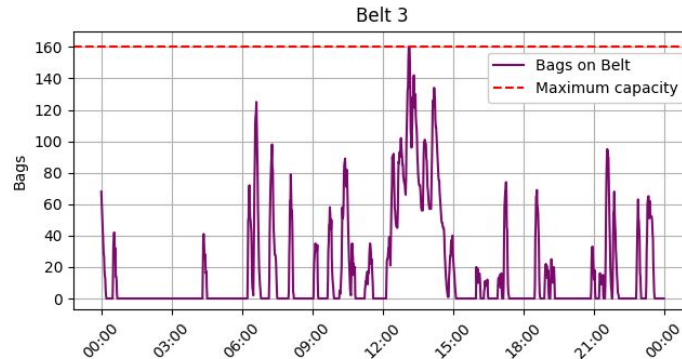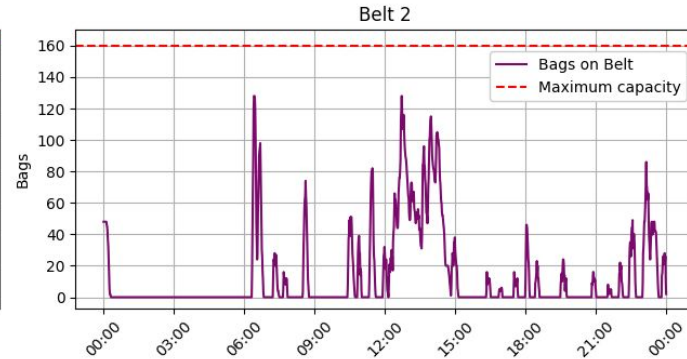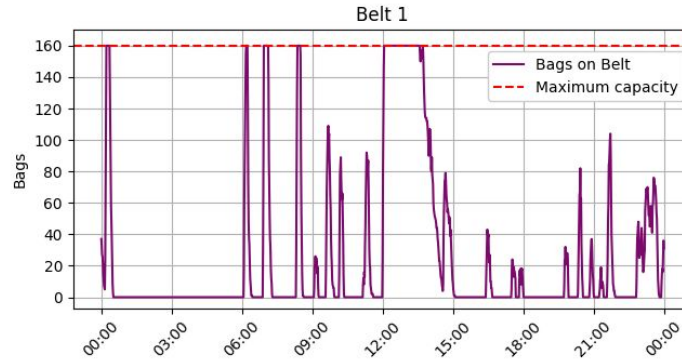
Q2. Passenger Wait Times

Out of 21359 passengers:

- 616 waited 15 minutes or more. That's 2.88%.
- 18 waited 20 minutes or more. That's 0.08%.

	Wait time
Mean	5 minutes 27 seconds
Median	4 minutes 43 seconds
Max	21 minutes 26 seconds
25th percentile	1 minute 6 seconds
75th percentile	8 minutes 42 seconds

Q3. Expected Maximum Occupancy

Maximum occupancy is at 12.03 PM, with 402 passengers.

This coincides with Belt 1 being at maximum capacity for 61 mins
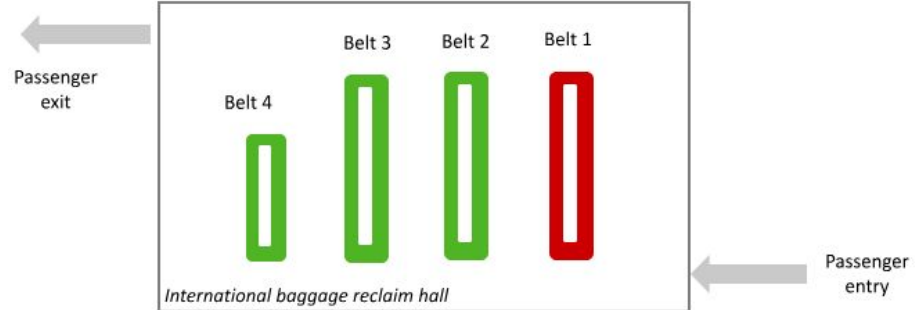

Occupancy Over Time
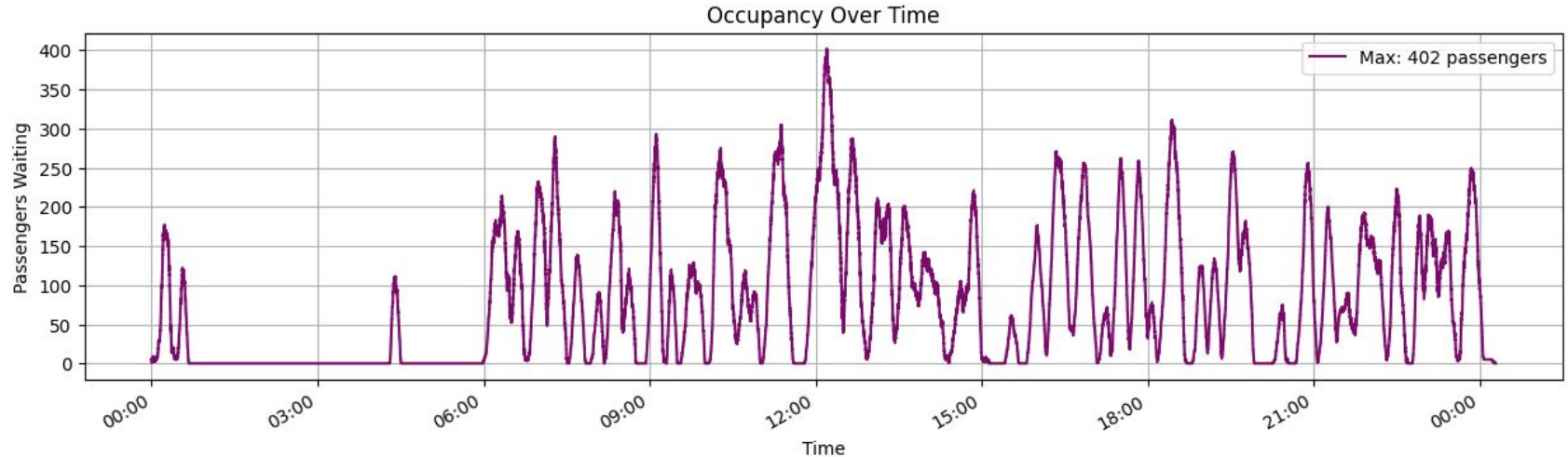
Next steps

Use the 3D simulation to simulate wait times with other belt layouts to compare multiple design options for the baggage reclaim hall.

Include flight details in data sets to analyse options for redistributing bags to other belts for optimal belt utilisation.

Analyse layout options, to avoid congestion at passenger entry point.

Belt 3   Belt 2   Belt 1

Passenger exit

Belt 4

International baggage reclaim hall

Passenger entry

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Resources

For more information of this analysis, consult the [Google Colab Notebook](https://colab.research.google.com/drive/1k1nblOsWbvfddCkmNIszKjiaNhm3mmi8?usp=sharing) or contact the author, Tadea Veng, at TadeaVeng@gmail.com.

https://colab.research.google.com/drive/1k1nblOsWbvfddCkmNIszKjiaNhm3mmi8?usp=sharing

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