Shift Scheduling and Automation System – Testing Document

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Testing Document

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1. Testing Strategy Overview

Given the operational complexity and real-time constraints of this system, my testing strategy focused on validating the software across multiple levels:

- **Unit testing** for isolated backend logic (e.g. break assignment rules, shift time parsing).

- **Integration testing** to verify that components (React frontend, Django backend, and OpenAI's API) function correctly together.

- **System testing** using Selenium to simulate real user behavior in the browser.

- **Ad hoc/manual testing** throughout development to quickly identify bugs.

- **User feedback** from airport staff to validate the system's logic and usability (included in a later section).

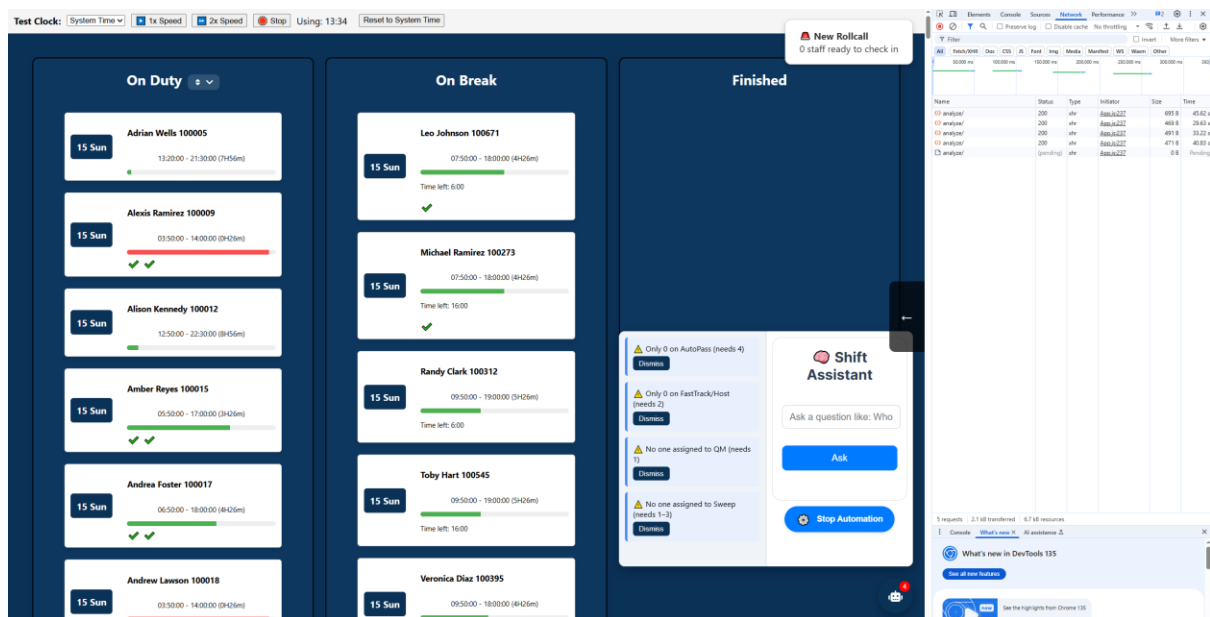|			
		Automation Testing	
		Open the popout tab and click Rollcall	Given I open the application When I click on the popout tab And I click on the Rollcall menu item Then the Rollcall page should be displayed
		Open the popout tab and click Staff(SED)	Given I open the application When I click on the popout tab And I click on the StaffSED menu item Then the StaffSED information should be displayed
		Open the popout tab and click VIP	Given I open the application When I click on the popout tab And I click on the VIP menu item Then the VIP information should be displayed
		Open the popout tab and click Auto Pass	Given I open the application When I click on the popout tab And I click on the Autopass menu item Then the Autopass information should be displayed And I click on the Autopass menu item again
		Open the popout tab and click Fast Track	Given I open the application When I click on the popout tab And I click on the Fast Track menu item Then the Fast Track information should be displayed And I click on the Fast Track menu item again
		Open the popout tab and click QM	Given I open the application When I click on the popout tab And I click on the QM menu item Then the QM information should be displayed And I click on the QM menu item again
		Open the popout tab and click Sweep	Given I open the application When I click on the popout tab And I click on the Sweep menu item Then the Sweep information should be displayed And I click on the Sweep menu item again
		Staff Ready to Check In Notification Appears	Given I open the application When I set the test clock to the specific time for Rollcall notifications Then I should see the staff ready to check in notification
		Staff RollCall is populated	Given I open the application When I set the test clock to the specific time for Rollcall notifications When I click on the popout tab And I click on the Rollcall menu item Then the Rollcall page should be displayed Then I should see the Rollcall list populated
		Add staff item from Rollcall to On Duty	Given I open the application When I set the test clock to the specific time for Rollcall notifications When I click on the popout tab And I click on the Rollcall menu item Then the Rollcall page should be displayed Then I should see the Rollcall list populated When I click on the first Rollcall item And I click on the Close button Then I should see the item moved to On Duty
		Staff item is moved to On Break after checking in	Given I open the application When I set the test clock to the specific time for Rollcall notifications When I click on the popout tab And I click on the Rollcall menu item And I click on the first available Rollcall item And I click on the Close button And I drag the item to the On Break section Then the item should appear in the On Break section
		Check Break Popup UI Appears	Given I open the application When I set the test clock to the specific time for Rollcall notifications When I click on the popout tab And I click on the Rollcall menu item And I click on the first available Rollcall item And I click on the Close button And I drag the item to the On Break section Then the item should appear in the On Break section Then I should see the break popup UI
		Confirm break and check timer appears	Given I open the application When I set the test clock to the specific time for Rollcall notifications When I click on the popout tab And I click on the Rollcall menu item And I click on the first available Rollcall item And I click on the Close button And I drag the item to the On Break section And I click the Confirm button on the break popup Then I should see the break timer appear
Popout Menu	Functionality	Cancel break and check item returns to On Duty	Given I open the application When I set the test clock to the specific time for Rollcall notifications When I click on the popout tab And I click on the Rollcall menu item And I click on the first available Rollcall item And I click on the Close button And I drag the item to the On Break section And I click the Cancel button on the break popup Then I should see the item back in the On Duty section
		Confirm break, move to Finished, and verify On Duty with checkmark	Given I open the application When I set the test clock to the specific time for Rollcall notifications When I click on the popout tab And I click on the Rollcall menu item And I click on the first available Rollcall item And I click on the Close button And I drag the item to the On Break section And I click the Confirm button on the break popup When I click on the popout tab And I drag the item to the Finished section Then the item should reappear in On Duty with a checkmark
		Confirm break, move to Finished, and verify On Duty with checkmark repeat again two checkmarks	Given I open the application When I set the test clock to the specific time for Rollcall notifications When I click on the popout tab And I click on the Rollcall menu item And I click on the first available Rollcall item And I click on the Close button And I drag the item to the On Break section And I click the Confirm button on the break popup When I click on the popout tab And I drag the item to the Finished section Then the item should reappear in On Duty with a checkmark And I drag the item to the On Break section And I click the Confirm button on the break popup And I drag the item to the Finished section Then I should see two checkmarks on the item
		Confirm break, move to Finished, and verify then go home	Given I open the application When I set the test clock to the specific time for Rollcall notifications When I click on the popout tab And I click on the Rollcall menu item And I click on the first available Rollcall item And I click on the Close button And I drag the item to the On Break section And I click the Confirm button on the break popup When I click on the popout tab And I drag the item to the Finished section And I drag the item to the On Break section And I click the Confirm button on the break popup And I drag the item to the Finished section And I drag the item to the On Break section And I click the Confirm button on the break popup finish Then the item should not appear in the On Break section
		Check to see if PiChart updating	Given I open the application When I set the test clock to the specific time for Rollcall notifications When I click on the popout tab And I click on the Rollcall menu item Then the Rollcall page should be displayed Then I should see the Rollcall list populated When I click on the first Rollcall item And I click on the Close button Then I should see the On Duty pie chart segment
		Verify all landing page features are present	Given I open the application Then I should see all landing page features present
		Test sorting functionality on the On Duty section	Given I open the application When I set the test clock to the specific time for Rollcall notifications When I click on the popout tab And I click on the Rollcall menu item Then the Rollcall page should be displayed Then I should see the Rollcall list populated When I click on the first Rollcall item And I click on the Close button And I click on the Sort Toggle button And I select "Shift Start Time" from the Sort dropdown And I select "First Shift Time select" from the Time dropdown And I select "Shift End Time" from the Sort dropdown And I select "First End Time select" from the Time dropdown And I click on the Sort Toggle button again
		Test AI Assistant section functionality	Given I open the application When I set the test clock to the specific time for Rollcall notifications When I click on the popout tab And I click on the Rollcall menu item Then the Rollcall page should be displayed Then I should see the Rollcall list populated When I click on the first Rollcall item And I click on the Close button When I click on the popout tab When I click the AI Copilot button Then I should see the Copilot alerts Then I should see the AI Assistant UI

2. Integration Testing

Integration testing focused on verifying communication between the Django backend, the React frontend, and the GPT-4 scheduling engine.

Tests included:

- Verifying that /analyze/ correctly processes POST data containing shift and passenger information, then returns a usable JSON response in the format {ID: [FirstBreak, SecondBreak]}.

- Confirming that /assistant-query/ processes natural language queries and returns appropriate responses based on the system state (e.g., "Who can I finish early?").

- Ensuring that state transitions (e.g., Rollcall → On Duty → On Break → Finished) behave correctly based on test clock time and AI responses.

These tests helped validate that the system could consistently handle realistic data volumes, including batches of 100–300+ staff records.
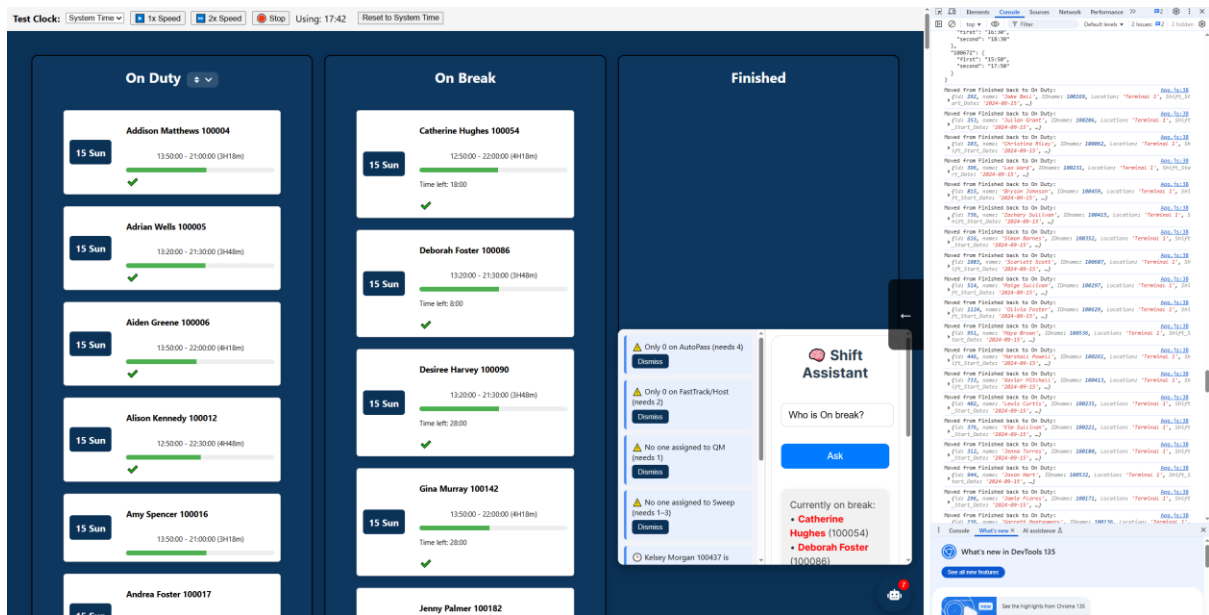
On Duty ⇕ ▾

Addison Matthews 100004
15 Sun
13:50:00 - 21:00:00 (6H55m)

Adrian Wells 100005
15 Sun
13:20:00 - 21:30:00 (7H25m)

Aiden Greene 100006
15 Sun
13:50:00 - 22:00:00 (7H55m)

Alison Kennedy 100012
15 Sun
12:50:00 - 22:30:00 (8H25m)

Amber Reyes 100015
15 Sun
05:50:00 - 17:00:00 (2H35m)
✓✓

Amy Spencer 100016
15 Sun
13:50:00 - 21:00:00 (6H55m)

On Break

Candice Webb 100046
15 Sun
11:50:00 - 21:00:00 (6H55m)
Time left: 15:00

Edith Knight 100104
15 Sun
11:50:00 - 21:00:00 (6H55m)
Time left: 25:00

Kaitlyn Carter 100208
15 Sun
10:50:00 - 19:00:00 (4H55m)
Time left: 13:00

Sierra Turner 100447
15 Sun
10:50:00 - 19:00:00 (4H55m)
Time left: 13:00

Vanessa Turner 100451
15 Sun
10:50:00 - 19:00:00 (4H55m)
Time left: 13:00

Finished

⚠ Only 0 on AutoPass (needs 4)
Dismiss

⚠ Only 0 on FastTrack/Host (needs 2)
Dismiss

⚠ No one assigned to QM (needs 1)
Dismiss

⚠ No one assigned to Sweep (needs 1–3)
Dismiss

🧠 **Shift Assistant**

Ask a question like: Who

Ask

Stop Automation

On Duty ⇕ ▾

Addison Matthews 100004
15 Sun
13:50:00 - 21:00:00 (3H18m)
✓

Adrian Wells 100005
15 Sun
13:20:00 - 21:30:00 (3H48m)
✓

Aiden Greene 100006
15 Sun
13:50:00 - 22:00:00 (4H18m)
✓

Alison Kennedy 100012
15 Sun
12:50:00 - 22:30:00 (4H48m)
✓

Amy Spencer 100016
15 Sun
13:50:00 - 21:00:00 (3H18m)

Andrea Foster 100017
15 Sun
06:50:00 - 19:00:00 (4H18m)

On Break

Catherine Hughes 100054
15 Sun
12:50:00 - 22:00:00 (4H18m)
Time left: 18:00
✓

Deborah Foster 100086
15 Sun
13:20:00 - 21:30:00 (3H48m)
Time left: 8:00
✓

Desiree Harvey 100090
15 Sun
13:20:00 - 21:30:00 (3H48m)
Time left: 28:00
✓

Gina Murray 100142
15 Sun
13:50:00 - 22:00:00 (4H18m)
Time left: 28:00
✓

Jenny Palmer 100182

Finished

⚠ Only 0 on AutoPass (needs 4)
Dismiss

⚠ Only 0 on FastTrack/Host (needs 2)
Dismiss

⚠ No one assigned to QM (needs 1)
Dismiss

⚠ No one assigned to Sweep (needs 1–3)
Dismiss

⚠ Kelsey Morgan 100437 is

🧠 **Shift Assistant**

Who is On break?

Ask

Start Automation

3. System Testing (Selenium)

To validate end-to-end functionality from the user's perspective, I implemented automated system tests using **Selenium WebDriver** with Java.

Key features tested include:

- Confirming break popups trigger correctly and respond to "Confirm" and "Cancel" actions.

- Verifying that timers start when breaks are assigned.

- Ensuring UI elements update correctly in response to user actions and AI decisions.

- Revalidating that staff members return to the correct section (e.g., "On Duty") after break popups are dismissed.

Test Structure:

- Tests are defined using Cucumber-style .feature files (e.g. RollcallAddItem.feature, BreakConfirmChecker.feature)

- Step definitions are implemented in Java (e.g. PopoutMenuSteps.java)

- Tests are run using the built-in test runner in IntelliJ

Results:

21 system tests passed
Total test execution time: ~2 minutes
Verified that user interactions correctly update the system state across the UI
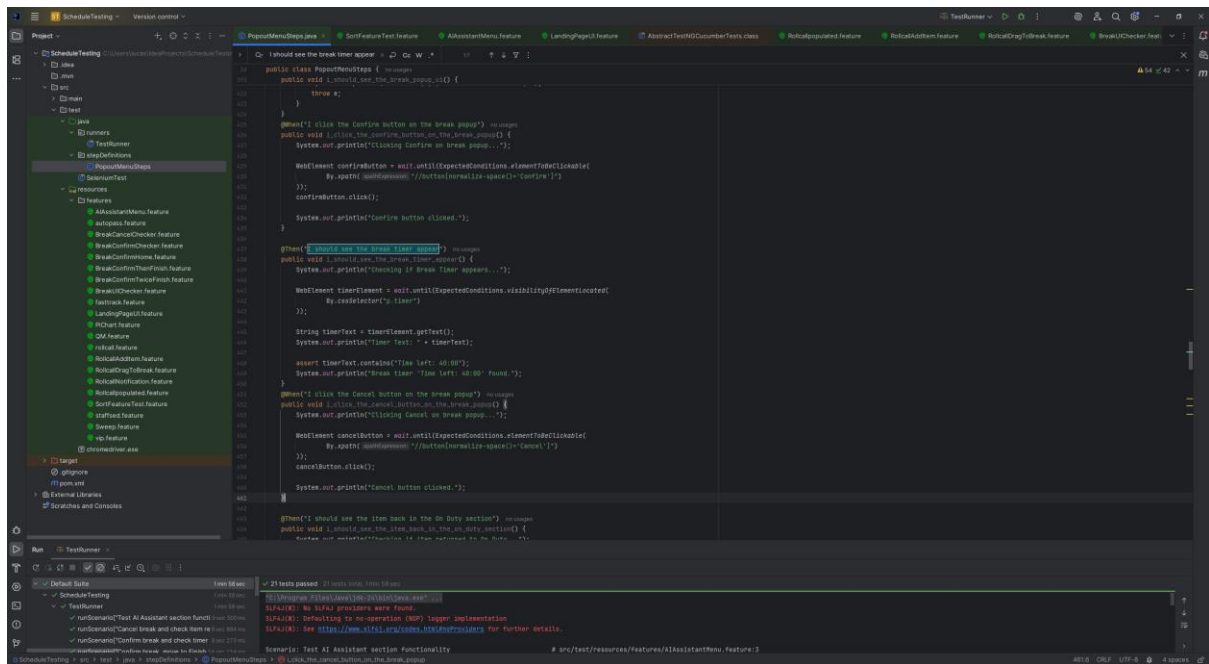
4. Ad Hoc Testing

In addition to automated tests, I regularly used ad hoc/manual testing throughout development. This included:

- Checking UI responsiveness to time changes using the custom test clock

- Verifying break reminders triggered at the correct moment (4h15min after shift start)

- Manually simulating shifts with early finishes and reassignments

- Testing edge cases like overlapping breaks, staff with only one break, or shifts ending before 8 hours

This approach allowed me to rapidly test new logic and catch issues before writing formal tests.

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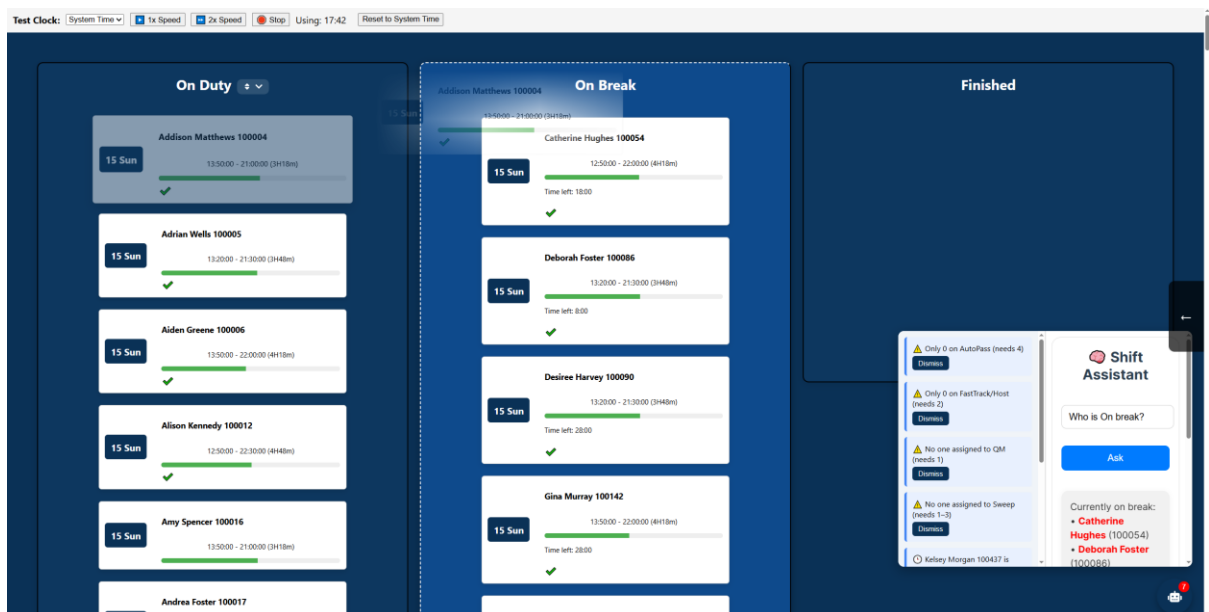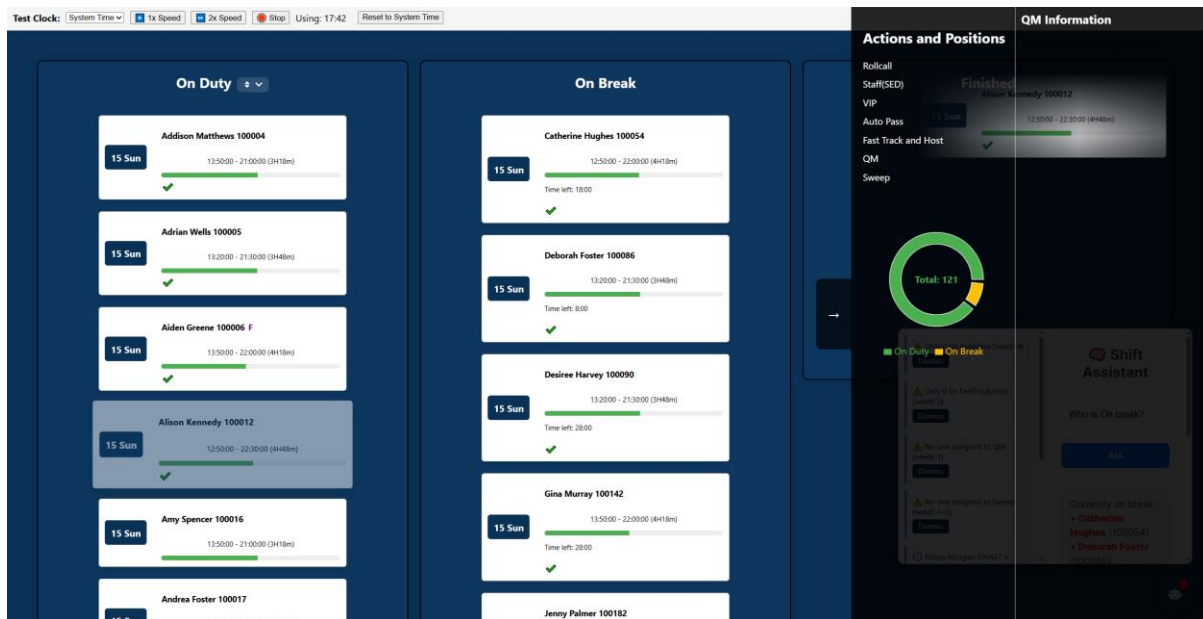
5. User Feedback Testing

To evaluate the real-world effectiveness of the system, I demonstrated it to several members of the Dublin Airport staff, including **coordinators**, **supervisors**, and **duty managers**. Each group was shown a live walkthrough of the interface, including:

- Shift transitions from Rollcall → On Duty → On Break → Finished

- Real-time AI-generated break planning

- The AI Co-Pilot popup alert system

- The test clock simulating full shift days

Their feedback was collected informally during testing sessions and is summarized below:

Coordinator Feedback

"The visual layout makes it much easier to see who's active and who's already had a break."

"The break reminders are really useful. Sometimes we don't realize someone's gone four hours without a break until it's too late. This actually catches it in time."

"I'd love to have this live during summer rush — it would save us from so many Excel errors."

Supervisor Feedback

"The AI assigning breaks in quiet periods is a great feature. It's thinking ahead and avoids those awkward moments when four people leave during a rush."

"This actually reflects the rules we follow — minimum numbers, role coverage, gender requirements. It's not guessing, it's calculated."

"If we had this running live, it would probably reduce the number of passengers waiting to go through security"

Duty Manager Feedback

"The way people automatically move to Finished after their second break — that's a small thing, but it keeps the floor list clean and avoids confusion."

"I'd be interested in seeing this work across Terminal 1 and 2 at the same time. If it scales, it could really change how we plan coverage."

"Compared to the current method, this feels like a more proactive system — it doesn't just log data, it thinks for you."

These insights helped confirm that the system was not only technically functional but also aligned with real operational workflows and staff needs. Further iterations were based off this feedback to improve usability, scale the logic, and deepen AI integration.