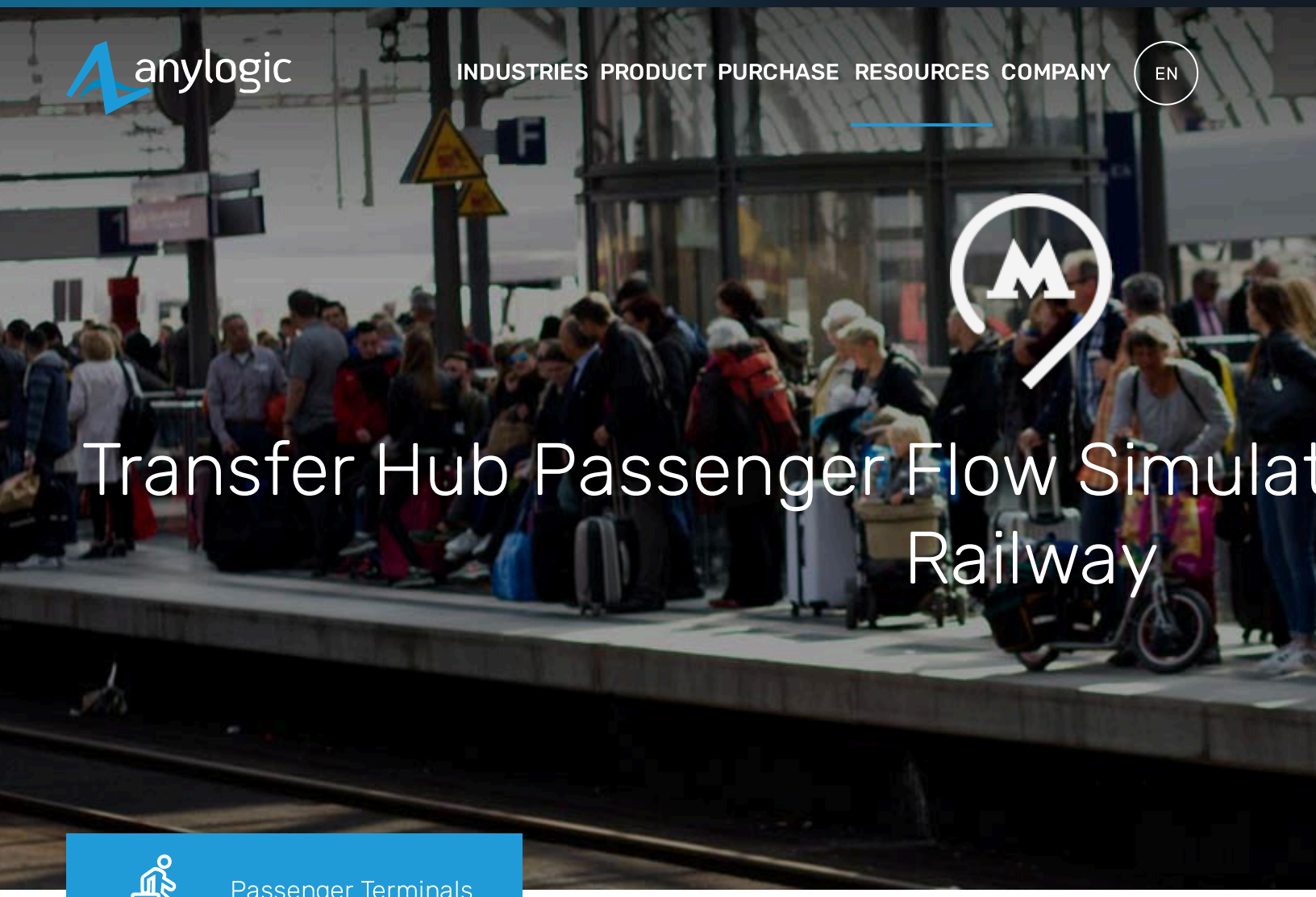


Transfer Hub Passenger Flow Simulat Railway

Passenger Terminals

Problem

Moscow Ring Railway, built in 1908, crosses city outskirts, residential districts, and industrial areas. It is currently being used for freight traffic only. The launch of passenger trains on this railway is planned for 2016, and is expected to drastically improve the road traffic situation and congestion on public transportation. Many of the newly built stations will be connected to

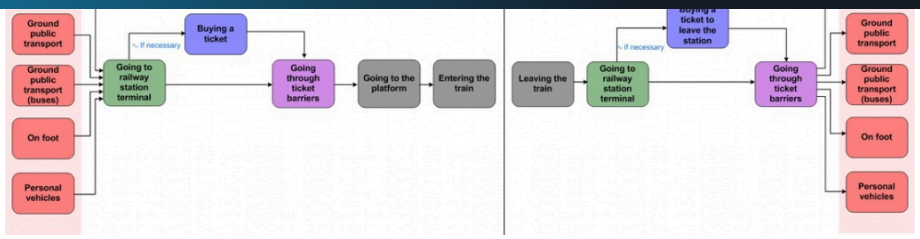
passenger load times in order to discover the construction elements limiting the capacity of the hub (corridors, stairs, escalators, ticket barriers, ticket windows, fare boxes, etc.). Hub performance was considered acceptable if passengers didn't experience difficulties in moving along the hub and buying tickets during the peak hour of 8:00 to 9:00 in the morning.

Solution

The Cherkizovo hub model used both the Pedestrian and Rail Yard libraries of AnyLogic. 3D animation capabilities of the software were used for system visualization. The model integrated the projected railway station and the existing subway station and featured the following elements:

- Northern and southern railway station terminals.
- Northern and southern subway station halls.
- Northern and southern crosswalks between railway and subway stations.
- Subway and railway station platforms.

Passengers could arrive at the terminal by foot, or



Entrance and exit algorithms.

To reflect the system correctly, the modelers had to take into account the following peculiarities:

- Nonuniform distribution of passengers between station terminals.
- Train arrival timetable.
- Nonuniform distribution of passengers in trains (coaches closer to exits carry more passengers).
- Percentage of passengers with or without tickets.
- Percentage of passengers buying tickets at ticket windows and fare boxes.
- Consideration of people eligible for buying reduced fare tickets (available only at ticket windows).

The input data used in simulation included:

- Characteristics of trains, coaches, escalators, platforms, and ticket barriers.
- Passenger flow distribution in entrances, exits, ticket windows, fare boxes, and distribution of passengers in trains and at platforms.
- Service time of one passenger at ticket window and fare box, ticket barrier usage time, train stop time.
- Passenger speed and speed of train moving along the platform.

passengers increased, bottlenecks were expected to appear close to ticket windows because the ticket windows were situated along the main route of passengers on their way to ticket barriers.

To optimize the ticket windows' load, and decrease passenger service time, the client was advised to encourage passengers to buy tickets at fare boxes or use other methods to purchase tickets. It was also recommended that the client decrease the number of fare boxes, as some of them would not be used even if some passengers switched to them from ticket windows.

The Cherkizovo model will be employed by JSC Moscow Ring Railway for finding optimal parameters of other transport hubs. The model will also be used for researching passenger behavior in emergencies and during evacuations.

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