

Supplementary Information: locked simulation design and reproducibility details

Supporting the manuscript: “Disruption-aware reserve-constrained dispatching of battery-electric AGVs for brownfield manufacturing intralogistics”

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Author: Muhammad Rafay Ikram

Affiliation: Independent Researcher, Harrisburg, Pennsylvania, USA

Correspondence: muhammadrafay.ikram1@gmail.com

S1. Locked coefficients and normalization

Feature	Coefficient	Scale	Interpretation
Empty distance	1.5625	10	Empty travel from vehicle to pickup
Route inflation	3.75	5	Effective route minus nominal route
Reserve penalty	3.125	20	Shortfall from 12-point soft headroom
Projected tardiness	1.5	50	Expected completion beyond due time
Priority credit	-0.6	2	Credit for priority levels 0–2

S2. Experiment manifest

Component	Seed block	Policies/variants	Profiles/configurations	Runs	Jobs
Main confirmation	1300–1359	4 policies	4 profiles	960	432,000
Capacity robustness	1400–1439	2 policies	3 capacities × 2 profiles	480	216,000
OAT sensitivity	1500–1519	11 RCRD variants	3 stress profiles	660	297,000
Sensitivity matched core	1500–1519	1 policy	3 stress profiles	60	27,000
Total	—	—	—	2,160	972,000

S3. Main algorithm

1. Advance to the next job-release, vehicle-completion, or charge-completion event.
2. Add released jobs and identify available vehicles.
3. Obtain current blocked-zone detours and construct the urgent candidate set.

4. Evaluate every available-vehicle/candidate-job pair.
5. Remove pairs that fail expected post-task charger reserve.
6. If no feasible pair remains, charge the vehicle with earliest achievable charge completion to 85% SOC.
7. Otherwise select the minimum RCRD score, execute the task, and update vehicle state.
8. Repeat until all jobs are completed.

S4. Randomness controls

Separate deterministic streams generate job arrivals and attributes, disruption schedules, and initial states of charge. Travel, handling, and energy multipliers are attached to jobs before policy execution. This avoids policy-dependent random-number consumption and preserves matched scenario comparisons.

S5. Additional outputs

Run-level files include mean and 95th-percentile tardiness, on-time rate, wait and cycle measures, empty and loaded distance, utilization, charge service, charger queueing, completion horizon, route-inflation exposure, decision counts, and dispatch-time summaries. Analysis scripts recreate all manuscript tables and inferential results.