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Why Automation Projects Fail at the Wheel Level

One-page quick reference · Full engineering guide + live tools at the QR codes below

Quick answer. Most warehouse automation projects fail at the wheel, not the software. Wheel-level problems, shimmy, flat-spotting, tread debris, and offset drift, are the top cause of AMR and AGV fleet downtime in the first 12 months, and shimmy-induced vibration gets misdiagnosed as sensor or vision error. Spec wheels for payload, speed, and floor condition during design, not after deployment.

Top 5 Wheel-Level Failure Modes in Automation

Failure Mode	Root Cause	Typical Cost
Shimmy at speed	Undersized offset, worn bearing	\$2-10k/week downtime
Flat-spotting	Soft compound under extended dwell	\$800-2k per wheel set
Tread debris	Wrong compound for floor	\$20-100k floor recoating
Bearing failure	Under-rated or wrong seal	\$1-5k repair + downtime
Offset drift	Mounting plate yield	Re-engineer cart frame
Tread tearing	Chemical attack on compound	Full wheel replacement

How to Design Wheels Into the Automation Project

Application	Typical Right Spec	Typical Wrong Spec
AMR on concrete warehouse	Hard poly, precision bearing	Solid rubber, plain bearing
AGV on coated epoxy	Medium-hard poly, sealed bearing	Soft rubber, open bearing
Tugger on mixed floor	Forged steel or hard poly	Cast iron, under-rated
Cold-storage AMR	Low-temp poly, lubricated bearing	Standard poly, dry bearing
Food-grade AGV	FDA-grade poly, sealed bearing	Generic rubber, open bearing



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