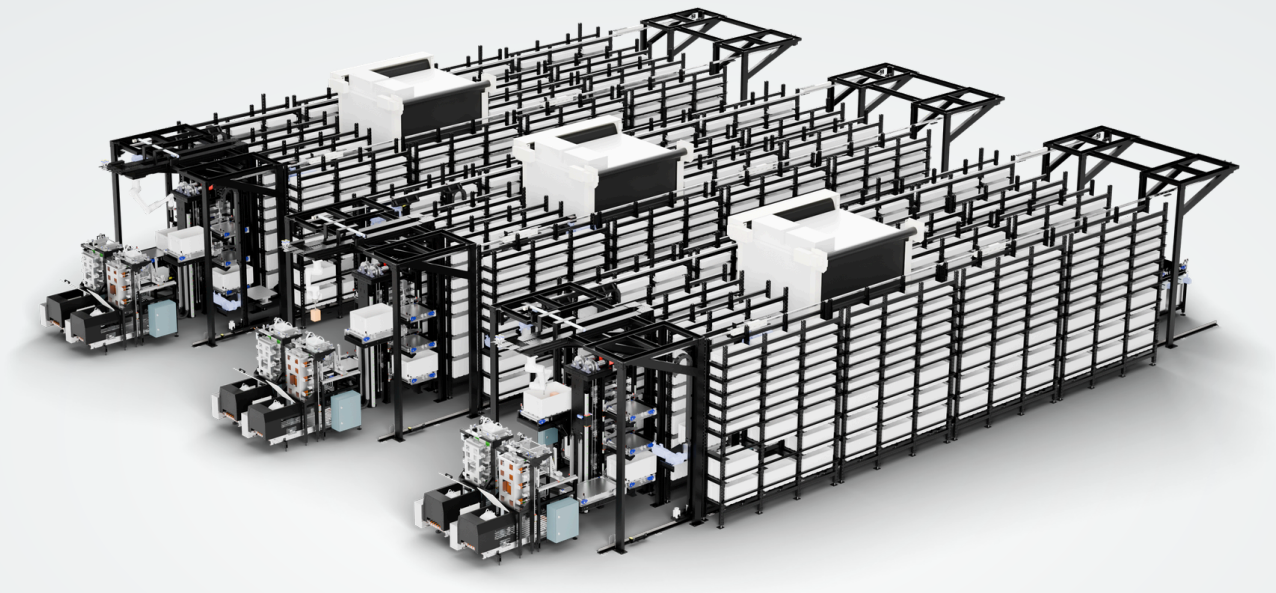
totssy

WHITE PAPER · OCTOBER 2026

Making Urban Fulfilment Profitable.

Why the first wave of retail automation stalled in the city, what retailers now require, and how automating the pick, not just the storage, changes the economics of fulfilling from existing urban sites.

Totssy Robotics · totssy.com/solutions/urban-fulfilment



IN THIS PAPER

01 Executive summary
02 Definitions
03 Demand is moving into the city
04 The urban profitability trap
05 Lessons from the first wave
06 Eight requirements
07 Why the pick can now be automated
08 The Totssy platform
09 How benefit figures are produced
10 Worked example
11 Proven in operation
12 Closing statement
13 Sources

01 Executive summary

Online retail now takes more than a quarter of UK retail spend and over a fifth of retail sales globally, and customers expect delivery in hours rather than days. That demand can only be met from inventory held inside cities, where space is scarce, rent is high and almost every order is still picked by hand. The result is a profitability trap: fulfilment cost rises as fast as online revenue, and growth eats margin.

The first wave of retail automation did not solve this. Kroger, Walmart and Takeoff Technologies show a consistent pattern: systems designed for warehouse scale did not fit existing sites, did not flex with demand and did not pay back within the two-to-three-year window buyers expect. The common engineering cause is rarely discussed: those systems automated storage and retrieval and left the most expensive step, the item-level pick, to people.

This paper derives eight requirements from documented retailer experience, explains why item-level robotic picking is now feasible, and describes Totssy's platform — highly modular hardware run by intelligent software — with a worked example of labour, space and payback for one urban site.

> **Urban fulfilment pays back only when automation is built for the site you already have and automates the pick, not just the storage.**

02 Definitions: what urban fulfilment is

URBAN FULFILMENT

The storage, picking, packing and hand-over of online orders from sites located inside the city they serve: back-of-store areas, dark stores and consumer-facing automated units. Such sites are typically under 300 m², below 3 m ceiling height and subject to urban rent. Urban fulfilment is defined by location and constraint, not by technology, operator type or vertical.

03 Demand is moving into the city

E-commerce has settled at a structurally higher share of retail than before 2020, and growth is now in speed rather than reach. UK online share was 27.3% in August 2026 against 19.1% in February 2020; in the Gulf, quick commerce is growing at about 22% a year.

27.3%

UK online share of retail sales, August 2026 (19.1% in February 2020)

ONS, series J4MC, all retailing incl. fuel [1]

~21%

E-commerce share of global retail sales, 2026 forecast

eMarketer, Feb 2025 [2]

53%

Last-mile share of total shipping cost, 2023 (41% in 2018)

Capgemini Research Institute via Statista [3]

~22%

GCC quick-commerce CAGR to 2031 ($3.8bn in 2025 to $12.4bn)

Mordor Intelligence [4]

Speed is bought with proximity: the last mile already accounts for more than half of shipping cost. In November 2025 Kroger closed three of its eight large Ocado-automated fulfilment centres, taking an impairment of about $2.6 billion after sites with lower order density underperformed, and now leans on its 2,700-plus stores for rapid delivery [5]. Automation did not fail — distance from the customer did.

04 The urban profitability trap

Many retailers already hold ideally located sites in cities. Those sites were built for walk-in shoppers, not for e-commerce, and they carry four hard constraints.

01

Space is scarce and expensive.

UK retail-park vacancy is at a record low of around 4–5% [6]. Every square metre used for picking is a square metre not selling.

02

Labour is the largest cost, and it is rising.

Picking and storage activities are more than half of warehouse operating cost [8]; the UK National Living Wage rose 6.7% in April 2025 [9].

03

Manual picking does not scale.

McKinsey estimates manual store picking adds about $8 per $100 basket, turning a typical $4 in-store profit into a loss for online orders [10].

04

Service hours are capped

by opening hours and labour availability, when demand peaks.

05 Lessons from the first wave of retail automation

Retailers do not doubt that fulfilment must be automated; what holds them back is experience. Much of the first wave was built around scale and struggled once it met real stores, real demand and real balance sheets.

CASE	WHAT HAPPENED	LESSON FOR URBAN FULFILMENT
Kroger US grocer	Closed three of its eight Ocado-automated fulfilment centres in Nov. 2025 with an impairment of about $2.6bn; CEO linked underperformance to low order density [5].	**Proximity matters more than scale.**
Walmart US retailer	Bought Alert Innovation for about $400m in 2022; in January 2025 transferred it to Symbotic for $200m up front plus contingent payments [12].	**Retailers should not have to own bespoke automation hardware IP.**
Takeoff Technologies MFC vendor	In-store micro-fulfilment pioneer for Albertsons and others; filed for Chapter 11 in May 2024 [13]. Albertsons later took a $39.8m impairment closing its MFCs [14].	**High fixed cost could not flex when volumes changed.**
Getir / Gorillas quick-commerce operators	Exited the UK, Germany, the Netherlands and the US in 2024 and closed Gorillas [15].	**Labour-heavy dark stores do not survive thin margins.**

The engineering pattern behind these cases is consistent. In one documented micro-fulfilment site the automation was rated at 600 picks per hour, but the system as a whole delivered 250, because the manual steps around the automation became the bottleneck [16].

> “The experience at the last mile was not what we wanted it to be. It also was not as cost-effective as we had hoped.”
>
> Tim Wentworth, CEO, Walgreens Boots Alliance, on pausing its micro-fulfilment rollout, January 2025 [18]

Automation rarely failed in urban retail because robots do not work. It failed when systems built for scale did not fit the site, did not flex with demand and did not pay back in time, and when the pick itself was left to people.

06 Eight requirements, scored by automation class

From these cases eight requirements emerge: fit existing sites, start small, pay back quickly, adapt, cover the full flow, deploy fast, run 24/7 and repeat across the network. The table scores classes of automation, not brands; Totssy's own assessment is in section 8.

REQUIREMENT	MANUAL DARK STORE	CUBE / SHUTTLE ASRS (TOTE-TO-PERSON)	COMPACT TOTE-TO-PERSON UNIT	COMPACT GOODS-TO-BAG UNIT
01 Fits existing urban sites	●	○ does not fit	●	●
02 Starts small	●	○ minimum viable grid	●	●
03 Short payback at urban volumes	○	○ at low volume	◐ pick still manual	● depends on coverage
04 Adaptable, multi-temperature	●	◐	◐	●
05 Covers the full flow	○	○ human picks	○ human picks	◐ replenishment and hand-over manual
06 Fast, low-risk deployment	●	◐ months	●	● days to weeks
07 Reliable 24/7	○ labour-bound	●	●	●
08 Repeatable across network	◐	●	●	●

Table 2. ● meets ◐ partial ○ does not. Scores are the authors' assessment of the class, not of any named product; a specific system may score differently.

> "In the last month of the year we became profitable, even though only 30% of the volume was robotized at that time."
>
> Michiel Muller, co-founder and CEO, Picnic, Supply Chain Movement, September 2024 [20]

07 Why the pick can now be automated

First-wave micro-fulfilment systems automated storage and retrieval but left the item-level pick and bagging to people, capping labour savings while fixed cost stayed. Since about 2023, 3D vision, grasp policies trained in simulation, tool-changing industrial arms and edge GPUs have made robotic picking of a mixed retail assortment practical. Once the pick is automated, the dominant labour line becomes a function of coverage and the site can pick overnight.

The first wave automated the storage. The pick is where the cost is. Automation that does not pick cannot change the unit economics of an urban order.

08 The Totssy platform

Urban fulfilment has until now been run almost entirely by hand, because conventional automation was derived from the central warehouse. Totssy was designed the other way round, from the constraints of existing urban sites. Its advantage rests on two things working together: highly modular hardware and intelligent software.

Highly modular hardware. Every system is built from standard, pre-assembled modules joined by standard interfaces: ambient, chilled and frozen storage, retrieval bots, a robotic picking cell on an ABB six-axis arm with automatic tool-changer, automated bagging and consolidation, and a replenishment station. The same modules make a 4 m by 4 m entry unit or a full dark store, are arranged to fit low ceilings, pillars and uneven floors, and are added one at a time as volume grows.

Intelligent software. The Totssy Brain runs each site autonomously, sequencing bots, picks and bags in real time and keeping orders flowing through a connectivity loss. Its AI picking stack, built on NVIDIA GPUs, uses 3D vision and grasp policies trained in simulation to pick items it has not seen before. Before any hardware ships, a digital twin of the site is run on the retailer's own order data to choose the module mix and operating mode. Totssy Connect links units, stores and order systems into one network.

PRODUCT FAMILY	USE	ECONOMICS IT IS SOLD ON
Urban Fulfilment Unit	Back-of-store and dark-store order fulfilment for pharmacy, health and beauty, convenience, grocery, quick commerce and 3PL urban nodes	Labour removed, space released, throughput ceiling lifted
Automated Retail Unit	Consumer-facing unattended store: high-density storage behind a counter or kiosk, presentation to the shopper, regulated-category controls	Revenue per square metre, trading hours, footfall
Hybrid	One inventory serving both walk-in shoppers and online orders from the same unit	Both of the above from one footprint

Table 3. Totssy product families.

Standard modules, configured to the site

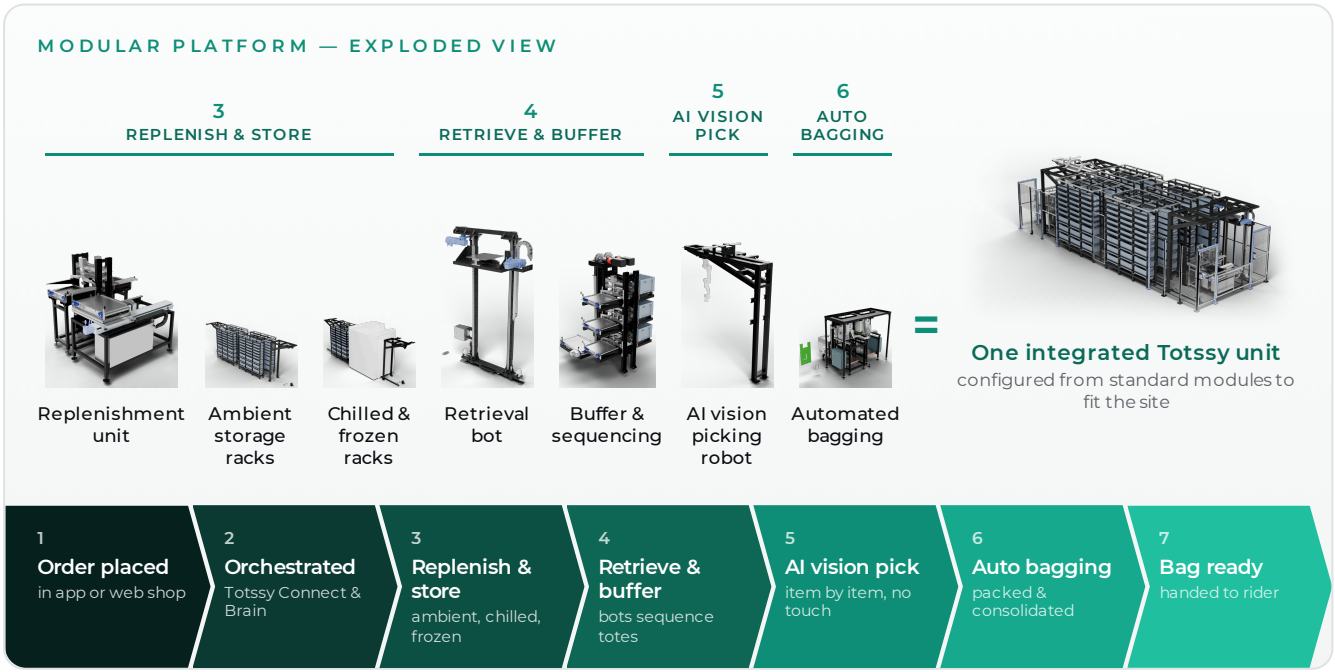


Figure 1. The modular platform. Standard modules combine into one integrated unit covering the flow from order to consolidated bag. Replenishment and rider hand-over are operator tasks.

Self-assessment against the eight requirements

#	REQUIREMENT	SCORE	HOW TOTSSY MEETS IT, AND WHERE IT DOES NOT YET
01	**Fits existing urban sites**	●	Configured around each site's constraints; reference system about 80 m², under 3 m high.
02	**Starts small, scales in steps**	●	Start with one storage module and one pick station (4 m × 4 m); add storage, bots and arms as volume grows.
03	**Short payback**	●	Sized to today's volume; effects begin with the first module. Computed per site (section 10).
04	**Adaptable**	●	A digital twin of the retailer's order data sets and re-tunes the module mix; ambient, chilled and frozen in one unit.
05	**Covers the full flow**	◐	Storage, pick, bagging and consolidation automated; replenishment and rider hand-over by one operator per shift.
06	**Fast, low-risk deployment**	●	Pre-assembled modules commissioned in days; orders via a public API, ERP integration when the retailer is ready.
07	**Reliable around the clock**	●	On-site Brain keeps running through connectivity loss; 24/7 operation; every item logged with batch and expiry.
08	**Repeatable across the network**	●	Designed as one configuration replicated site by site; Totssy Connect consolidates inventory and orders across the network.

Table 4. Seven requirements met, one partial. ● meets ◐ partial.

Technology partners

Robotics

Totssy's picking cells are built on ABB robots — the GoFa collaborative family and IRB industrial six-axis arms — chosen for industrial reliability, global service coverage and proven 24/7 performance. Retailers get standard, serviceable motion hardware rather than bespoke mechanics, with access to ABB's channel, support and lifecycle services worldwide.

NVIDIA Inception Program

Totssy is a member of NVIDIA Inception. Its perception and picking stack runs on NVIDIA GPUs: vision and grasp models are trained on synthetic data and validated in a simulated digital twin of each site, so a configuration is sized, tested and commissioned against the retailer's real order data before hardware ships.



Figure 2. Totssy picking cell on an ABB collaborative arm with NVIDIA-based vision, during factory testing.

09 How benefit figures are produced

Labour saving, assortment coverage and storage density are points on one curve, set per site by how much of the assortment the unit stores, what share of order lines it covers and how high storage can go. Across Totssy configurations modelled and measured to date, the labour effect ranges from roughly a third of picking hours to more than 90%.

This paper therefore quotes no single headline percentage; section 10 works one configuration end to end.

10 Worked example: a back-of-store node

Illustrative health-and-beauty node, UK cost assumptions: 600 orders a day of six lines, manual rate 60 lines per labour hour at £16 per hour [9], 75% of lines covered by one arm at 6 picks per minute, one operator per shift on two shifts, and 80 m² of back room released at £300 per m² a year. Replace any input with site data.

LINE	MANUAL OPERATION	WITH THE AUTOMATED UNIT	EFFECT
Picking labour hours per day	60	15 (the 25% of lines picked manually) + 16 (operators) = 31	**− 29 hours per day**
Labour cost per year	≈ £350,000	≈ £181,000	**≈ £169,000 saved (≈ 48%)**
Space cost (£300 per m² a year)	160 m²	80 m² released	**≈ £24,000 saved or re-let to sales**
Annual operating effect			**≈ £193,000 per year**

Table 5. Illustrative result. A 48% labour effect is one point on the curve described in section 9; higher coverage removes more, a smaller entry configuration less.

PAYBACK

2 to 3 years

Payback is the system price divided by this annual effect, net of software and service fees: at about £193,000 a year, a system priced in the low hundreds of thousands of pounds pays back within two to three years.

11 Proven in operation

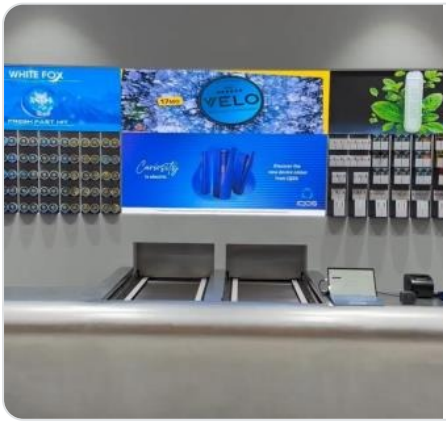


URBAN FULFILMENT · ENGINEERING PILOT

Robotic picking in a quick-commerce dark store

Four-month pilot, concluded in 2026, in a Gulf-region quick-commerce dark store where manual picking capped peak throughput: about 580 SKUs in 28 m² under 3.2 m, ambient, one picking arm and automated bagging. Orders completed without operator intervention rose from about 60% to 96%.

6	1.34 min	>97%	96%
picks / min per arm	order completion	pick accuracy	orders without intervention



AUTOMATED RETAIL · THE DUBAI MALL · LIVE

Automated retail unit in The Dubai Mall

Live since June 2026 in one of the world's most visited shopping destinations, in a regulated category with controlled sale and strict landlord requirements. A single-aisle unit holds about 1,200 SKUs and presents each item to the shopper at the counter.

16 s	~1,200	100%	24/7
request to presentation	SKUs	items logged to sale	system availability

12 Closing statement

Urban fulfilment is still done by hand because the automation on offer was designed for large warehouses, not for city stores. Totssy is built the other way round: it fits the urban sites retailers already have, automates the most expensive step — picking each item into the customer's bag — and starts with an investment sized to today's orders, adding modules as volume grows. The result is lower labour and space cost, more orders from the same site and a short payback: online growth that finally adds to profit.

13 Sources

[1] Office for National Statistics, Internet sales as a percentage of total retail sales, series J4MC, all retailing including automotive fuel, release 18 September 2026.

[2] eMarketer, Worldwide Retail Ecommerce Forecast, February 2025.

[3] Capgemini Research Institute, last-mile share of total shipping costs worldwide 2018 to 2023, via Statista (January 2024).

[4] Mordor Intelligence, GCC Quick Commerce Market, 2026.

[5] The Kroger Co., Form 8-K, 18 November 2025. Supply Chain Dive, 24 November 2025.

[6] Savills, UK retail warehouse vacancy, Q4 2025 (4.3%). Trevor Wood Associates, Q2 2026 record low.

[7] Tesco PLC, interim results 2021/22 analyst call transcript, 6 October 2021, p.33.

[8] STIQ Ltd, Goods-to-Person Storage & Retrieval Solutions, 2026 market insights.

[9] Carter Jonas, UK Logistics Outlook 2025.

[10] McKinsey & Company, Achieving profitable online grocery order fulfillment.

[11] Retail Technology Innovation Hub, FT Live Future of Retail 2025, 8 October 2025.

[12] Symbotic Inc., Form 8-K, 27 January 2025. Boston Globe, 21 January 2025; Interact Analysis, March 2025.

[13] Grocery Dive, Takeoff Technologies files for Chapter 11, 31 May 2024.

[14] Albertsons Companies, Form 10-K for fiscal 2024.

[15] Tech.eu, Getir is exiting Europe and closing Gorillas, 29 April 2024. tech.eu/2024/04/29/getir-is-exiting-europe-and-closing-gorillas-as-fast-food-delivery-feels-the-chill/

[16] Interact Analysis (Rowan Stott), The MFC market is dead. Long live the MFC market, July 2024.

[17] Automated Warehouse, MFC automation surge 2025 (Interact Analysis), 24 March 2025.

[18] Walgreens Boots Alliance, Q1 FY2025 earnings call, 10 January 2025.

[19] Grocery Dive, 17 August 2022.

[20] Supply Chain Movement, Online retailer Picnic is out of the red thanks to robotization, 20 September 2024.

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