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A Case Study of Chinese Smart-Logistics
Equipment Firms (3): BlueSword Intelligent
---- How a Shandong University Spin-off
Became a Pioneer in China's Private-Sector
Material-Handling Industry

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A Case Study of Chinese Smart-Logistics Equipment Firms (3): BlueSword Intelligent ---- How a Shandong University Spin-off Became a Pioneer in China's Private-Sector Material-Handling Industry

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1. A Pioneer Among Private Smart Logistics Equipment Enterprises in China

Company Overview and Strategic Positioning in China's Logistics Equipment Industry

BlueSword Intelligent Technology Co., Ltd. (hereinafter referred to as BlueSword) is a smart logistics equipment enterprise established in Jinan, Shandong Province, in 1993. Today, the company is widely recognized as a comprehensive logistics system integrator (SIer), delivering an extensive portfolio of material handling equipment and integrated information systems centered on logistics robots, automated storage and retrieval systems (AS/RS), miniload AS/RS, warehouse management systems (WMS), and warehouse execution systems (WES).

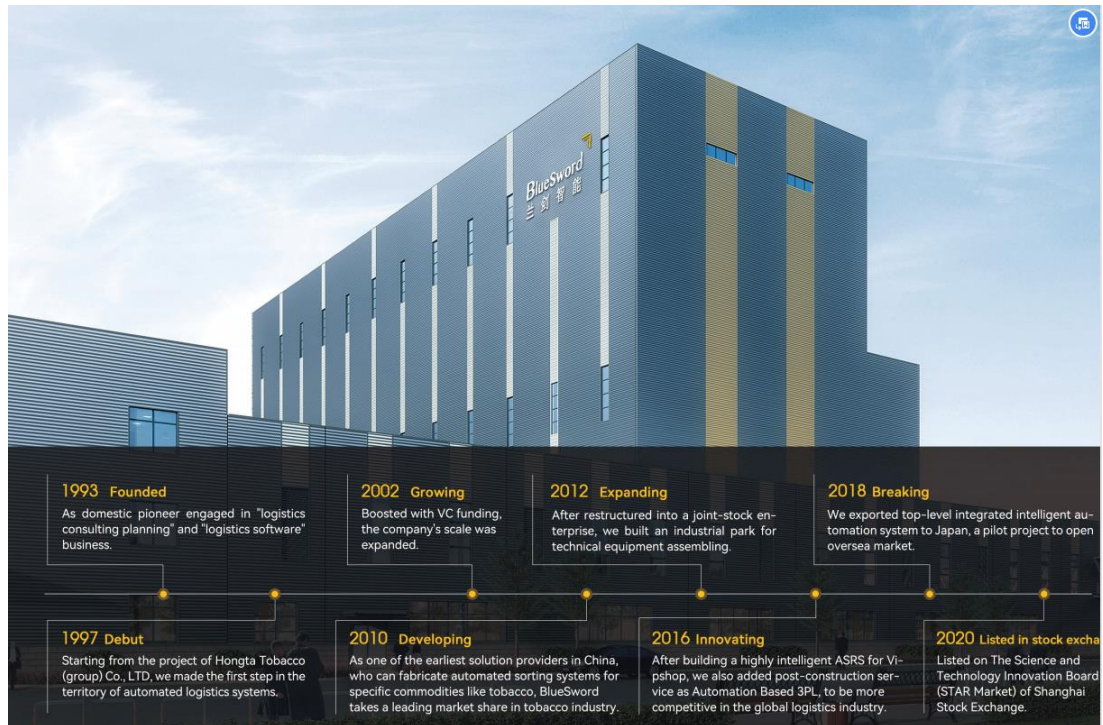
Having grown into one of the earliest pioneers among private material handling enterprises in China, BlueSword was listed on the Science and Technology Innovation Board (STAR Market) of the Shanghai Stock Exchange in 2020. In 2022, the "BlueSword Technology Park"—a core R&D and manufacturing base covering approximately 200,000 m²—became fully operational. With annual revenue reaching 1.502 billion RMB in fiscal year 2025, the company has solidified its position in the top tier of China's logistics equipment industry.

The trajectory of BlueSword provides an insightful case study for examining how a Chinese university spin-off built a robust competitive advantage by integrating hardware, software, and services upon a foundation of dedicated research and development.

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Figure1. BlueSword Technology Park and BlueSword's Major Events



Origins as a University Spin-Off and the DNA of "Systems Thinking"

To understand the essence of BlueSword's competitive advantage, one must trace its corporate origins. While conventional logistics equipment manufacturers typically begin with machinery fabrication and mechanical assembly, BlueSword's origins lie in academic research on intelligent warehousing, logistics simulation, and control systems conducted over many years by its founder, Professor Wu Yaohua of Shandong University.

From its inception, the company's foundational approach was not rooted in standalone machine manufacturing, but rather in a systems-engineering perspective: visualizing, controlling, and optimizing the entire logistics flow through software and system technologies. Even after founding the company, Professor Wu continued his academic and research activities, leading approximately 40 graduate students to drive R&D and the commercialization of logistics software and system technologies.

During this developmental phase of China's material handling industry, when most private firms relied on imitation and low-cost production, it was exceedingly rare for a private company to emerge directly from a university laboratory and translate high-level academic research into commercial enterprise.

BlueSword established a distinct technological philosophy—centered on how to design, simulate, and optimize entire logistics systems—and embarked on its journey as an R&D-driven pioneer.

Commercialization of Academic Research and Interdisciplinary Technology Integration

The company's origins and character as a university spin-off exerted a definitive influence on its subsequent business expansion and technological foundation. Rather than limiting itself to logistics hardware manufacturing, BlueSword consistently prioritized the development of underlying technologies that make end-to-end systems functional:

Core Technological Capabilities: 3D logistics simulation, AGV dispatch and control technologies, dynamic location management, computer vision/image recognition, and advanced optimization algorithms.

Interdisciplinary Talent and Technology Integration: Maintaining close partnerships with academic and research institutions, notably Shandong University, the company recruited and integrated multidisciplinary talent spanning hardware domains (mechanical design, electrical engineering, PLC control, circuit design) and software domains (AI, big data analytics, business intelligence).

Leveraging its strengths as an academic spin-off to integrate expertise across disparate technical fields into a unified organization serves as the core wellspring enabling BlueSword to continuously generate comprehensive system-level innovations that transcend piecemeal, single-product modifications.

2. Diverse Product Lineup and Evolution Toward Integrated Solutions

BlueSword's core competitive strength is most visibly demonstrated by its extensive product portfolio. The company manufactures and integrates a wide array of logistics machinery, including warehousing robots, shuttle robots, automated guided vehicles (AGVs/AMRs), overhead hoist transport (OHT) systems, picking robots, palletizing/depalletizing robots, automatic loading/unloading robots, high-speed vertical lifters, and diversified automated sorting systems.

Warehousing Robots: Alongside flagship product lines such as the "Unit Load-Qomolangma," "Unit Load-Taishan," "Unit Load-Tianping," "Mini Load-Zhuifeng," and "Mini Load-Shandian" series, the company offers Jaguar all-servo stacker cranes, carton/case stacker cranes, ultra-high pallet stacker cranes, cold-chain stacker cranes, and high-speed stacker cranes. Integrating dual closed-loop control

and S-curve acceleration/deceleration algorithms, these systems achieve high-speed travel and precise positioning while maintaining robust reliability under challenging operating environments, including low-temperature, fireproof, and explosion-proof conditions.

Shuttle Robots: The shuttle portfolio encompasses carton shuttles, four-way carton shuttles, four-way pallet shuttles, linear rail-guided vehicles (RGVs), and loop-type RGVs. By combining in-house developed electrical control systems, motion controllers, supercapacitor fast-charging technology, and compact servo drives, BlueSword delivers high-speed, high-precision transport capabilities.

Material Transport Robots (AGVs/AMRs): The transport robot lineup features low-profile under-ride units, high-lift stacking models, towing types, counterbalance forklifts, reach-type forklifts, transfer-transport robots, and rackless container-stacking robots, engineered to satisfy diverse on-site material handling specifications.

Overhead Hoist Transport (OHT) Systems: Integrating intelligent fleet dispatch systems, enclosed track systems, power supply systems, industrial communication architectures, and rail-guided carriers, BlueSword's OHT series optimizes spatial efficiency for automated inter-bay material handling across automotive, tire, and electronics manufacturing lines.

Picking and Depalletizing/Palletizing Robotics: This domain includes specialized book-picking robots, 6-axis articulation depalletizing/palletizing robotic arms, collaborative piece-picking robots, and a variety of automated sorting systems.

Automatic Truck Loading and Unloading Robotics: The company has engineered systems such as the "Asian Elephant" autonomous loading/unloading robot and continuous pallet handling systems, bridging the critical interface between transport vehicles and warehouse docking bays to automate previously labor-intensive dock operations.

Crucially, BlueSword's competitive advantage does not stem merely from a vast catalog of individual machines. Rather, its core strength lies in its ability to synthesize these distinct hardware units into a unified, integrated system encompassing storage, transport, sorting, loading/unloading, real-time control, and supervisory monitoring. BlueSword has evolved far beyond a standalone equipment manufacturer, establishing itself as an enterprise capable of engineering end-to-end logistics workflows for distribution centers and manufacturing plants while delivering optimized system configurations tailored to project-specific requirements.

Figure . BlueSword’s Major Product Lineup



Table 1: Major Product Lineup and Target Industries of BlueSword Intelligent

Product Category	Major Product Examples	Key Functions & Applications	Target Industries	Distinctive Corporate Features
Warehousing Robots	Unit Load (Qomolangma, Taishan, Tianping), Mini Load (Zhuifeng, Shandian), Various Stacker Cranes	High-density storage, automated storage/retrieval, high-speed & high-precision positioning, harsh environment compatibility	E-commerce, FMCG, Pharmaceuticals, New Energy, Cold Chain	Engineered for diverse conditions, including low-temperature, fireproof, and explosion-proof environments
Shuttle Robots	Carton Shuttles, 4-Way Carton Shuttles, 4-Way Pallet Shuttles, RGVs	High-speed transport and intra-warehouse movement in multi-tier, high-density storage	E-commerce, 3C Electronics, FMCG, General Manufacturing	Combines proprietary control architectures and fast-charging technology for high-throughput transport
Material Transport Robots (AGVs/AMRs)	Under-ride, High-lift Stacking, Towing types, Various Forklift	Autonomous transport in plants/warehouses, inter-line material	New Energy, Automotive, General Manufacturing,	Utilizes hybrid navigation and high-precision positioning to

	AGVs, Transfer-transport robots	feed, flexible handling adapted to payload geometry	Warehousing	navigate complex traffic layouts
Overhead Hoist Transport (OHT)	Monorail Suspended Transport Systems, Rail-guided Transport Carriers	Space-saving overhead material transfer, production line delivery automation	Automotive, Tire Manufacturing, Electronics	Eliminates floor-level footprint constraints; optimizes line-side parts feeding via intelligent fleet dispatching
Picking & Sorting Robots	Book-picking Robots, Collaborative Piece-picking Robots, Automated Sorting Systems	Case-level and piece-level order picking, automated sorting	E-commerce, Publishing/Books, 3C Electronics, Pharmaceuticals, Daily Necessities	Integrates AI vision recognition and advanced motion control for high-accuracy handling
Depalletizing & Palletizing Robots	Articulated Robotic Arms, Layer-type Systems, Empty Pallet Destackers	Package recognition, mixed-case handling, automated stacking and destacking	Food, Beverage, Daily Necessities, General Manufacturing	Adapts to diverse packaging formats; seamlessly synchronizes with upstream and downstream material flows
Automatic Loading & Unloading Robots	Asian Elephant, Continuous Pallet Handling Systems, Individual Pallet Handling Vehicles	Automated loading and unloading operations between truck trailers and dock bays	Logistics Centers, Manufacturing, 3PL	Automates labor-intensive, bottlenecked dock and yard operations
High-Speed Lifters & Conveying Systems	Inter-floor Lifters, Container Lifters, Various Conveyors and Transfer Devices	Vertical inter-floor transport, inter-process connection, system-wide throughput optimization	Multi-story Warehouses, Distribution Centers, Manufacturing Plants	Serves as critical infrastructure maximizing overall system throughput rather than standalone units

Software & Digital Twin Platforms	WMS, WCS, AGV Scheduling, 3D-SCADA, TPM, VIT Dashboard	System design, real-time monitoring, preventive maintenance, end-to-end visualization, algorithmic optimization, operational support	Cross-industry versatility (Highly versatile across all sectors)	Seamlessly integrates hardware and software, enabling continuous operational optimization pre- and post-implementation
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3. Building an Agile Supply Chain Through Manufacturing Internalization and Localization of Component Sourcing

Production and Testing Infrastructure Supporting Industrialization: The Dezhou Manufacturing Base and the "Super Future Factory"

In BlueSword's transformation from an R&D-oriented startup into a full-scale industrial enterprise, the expansion of its manufacturing and testing infrastructure played a pivotal role. The manufacturing and testing operations for the company's logistics robots are concentrated at its Dezhou manufacturing base in Shandong Province (covering an area of approximately 200,000 m²), located about an hour's drive from its Jinan headquarters. This base serves as the core hub supporting both mass-production capacity and advanced experimental validation capabilities.

Practicing Smart Manufacturing (The "Super Future Factory"): At the heart of this base lies the "Super Future Factory," which integrates logistics centers, machining workshops, and logistics robot assembly plants. It conducts integrated manufacturing for a comprehensive portfolio of material handling products across the entire logistics workflow—including storage, picking, sorting, production-line feeding, and packaging. The facility incorporates automated welding lines, CNC machining, automated assembly lines, ultra-high-density parts storage systems, flexible scheduling, and intelligent integrated management systems, thereby functioning as an advanced operational showcase for smart manufacturing and smart logistics.

Dedicated Prototyping and Validation Facility (Pilot Plant): The site features an on-premise, 4,353 m² dedicated R&D pilot testing plant, where stability and performance evaluations of new products, as well as pre-market prototype fabrication and testing, are systematically conducted.

Building System Implementation Capabilities Through Vertical Integration: By establishing this

integrated architecture uniting research, design, prototyping, testing, and volume manufacturing, BlueSword has drastically enhanced its capability to translate cutting-edge technologies into commercial products and implement them as stably operating systems at customer sites. The company represents a pioneering case among Chinese private material handling enterprises in pursuing early-stage business integration and vertical integration.

Figure . BlueSword's Dezhou manufacturing base



High In-House Production Ratio and Strategic Sourcing Shift to Domestic Components

Backed by the expansion of its manufacturing base, BlueSword has established itself as a "manufacturer-type Sler": a system integrator equipped with robust in-house production capabilities. Its in-house manufacturing ratio for flagship products reaches approximately 80%, underpinned by a hybrid production structure that relies primarily on internal manufacturing while complementarily leveraging the production capacities of external partners.

Until about a decade ago, core components such as speed reducers, laser sensors, and servo systems were heavily dependent on foreign suppliers, creating operational bottlenecks due to prolonged lead times and elevated procurement costs. However, as the performance and quality of Chinese domestic components advanced, the company systematically localized its key component sourcing. Compared to overseas vendors, the domestic supplier base provides rapid responsiveness, shorter lead times, and superior cost-control capabilities, alongside high flexibility in collaborative product co-development. This shift serves as a primary driver of BlueSword's supply chain resilience and cost competitiveness.

Agile Procurement Network Leveraging the Pearl River Delta Industrial Cluster

BlueSword's component suppliers are predominantly concentrated in the Pearl River Delta, a dense industrial cluster for equipment manufacturing. Due to the historical concentration of its early core customer base in Guangdong and surrounding areas, the company's South China branch has consistently spearheaded supplier development, selection, evaluation, and management.

In the Chinese logistics system equipment market, where extremely tight project deadlines and rapid on-site commissioning are standard requirements, supply chains must maintain superior on-demand delivery capabilities. The deep division of labor within the Pearl River Delta cluster provides access to a dense network of diverse component suppliers. This enables rapid parts replenishment, immediate component replacements, and high adaptability to sudden demand fluctuations, serving as a reliable foundation that underpins smooth project execution.

Mass Customization Through Modular Design and Differentiated Inventory Management

While fundamentally operating on an Engineer-to-Order (ETO) and Make-to-Order (MTO) basis, the company implements a differentiated inventory strategy calibrated to the degree of product standardization:

Standardized Products (High-frequency, general-purpose components): The company systematically maintains an optimal buffer stock of parts to fulfill rapid delivery requirements.

Customized Products (Low-frequency, specialized components): With the exception of highly interchangeable common parts, the company holds virtually zero dedicated component inventory, instead relying on the agility and responsiveness of its end-to-end supply chain.

By adopting modular architecture, BlueSword configures customized systems to individual client specifications rapidly through the flexible combination of standardized functional modules. This approach organically reconciles scale and production efficiency via standardization with agile responsiveness to bespoke customer needs (customization), thereby minimizing inventory holding costs.

Compressing Project Lead Times: The 7×7 Project Schedule Management Model and Front-Loading

To match the market's demand for speed, the company continuously refines its project management

methodologies. The centerpiece of these efforts is the "7×7 Project Schedule Management Model."

This model breaks down the entire project lifecycle into seven major phases, strictly managing progress to target completion of each phase within approximately seven days, thereby substantially compressing overall project lead times and boosting on-time delivery rates:

The Seven Core Phases: (1) Design & Engineering, (2) Module Fabrication, (3) Assembly & In-House Testing, (4) Transportation, (5) On-Site Installation, (6) Commissioning & Tuning, and (7) On-Site Acceptance Testing.

The ultimate objective of this model is to streamline and simplify on-site testing, encapsulated in the concept of "One-Button Startup and Instant Testing" (kaiji yijian ceshi). By completing system validation during the engineering design phase and enforcing modular manufacturing, the company front-loads adjustment and testing tasks—traditionally executed at the customer site—into upstream stages. Furthermore, by combining digital twin-driven virtual commissioning with pre-installation simulations, BlueSword drastically reduces on-site installation and tuning man-hours, achieving both high project execution efficiency and superior delivery quality.

4. Cross-Industry Expansion and Business Model Evolution: Industry-Specific Solutions and RaaS Deployment

Adapting to Diverse User Industries Leveraged by a Common Technological Platform

While many players in the logistics equipment industry specialize in narrow vertical markets, a defining characteristic of BlueSword is its horizontal deployment of solutions across highly varied user industries with distinct logistics characteristics and performance requirements. The company maintains a robust capability to flexibly reconfigure its systems to meet industry-specific operational demands while preserving a standardized core modular and technological platform:

E-Commerce: Addressing large-scale, high-efficiency, and high-accuracy piece-picking demands, BlueSword provides integrated 3D honeycomb storage and sorting solutions. Successful implementations for major e-commerce platforms—such as Vipshop, Kaola, and SHEIN—demonstrate the competitive edge of its systems in high-throughput, high-frequency logistics environments.

3C (Computers, Communications, and Consumer Electronics): Operating under stringent

requirements for high-mix, low-volume, short-lead-time fulfillment with zero tolerance for production line stoppages, BlueSword enables full-process unmanned and labor-saving operations spanning inbound receiving, storage, picking, transport, sorting, and outbound shipping. Real-time monitoring and simulation models optimize logistics operations directly linked to manufacturing assembly lines.

Pharmaceuticals and Healthcare: Meeting rigorous standards for quality assurance, picking accuracy, and end-to-end traceability, the company delivers high-reliability solutions combining Goods-to-Person (GTP) picking, digital twin monitoring, and 3D vision position correction across pharmaceutical manufacturers, distributors, healthcare institutions, and pharmacies.

New Energy: To satisfy high-precision transfer and stable line-side replenishment between cathode and anode manufacturing processes, BlueSword integrates proprietary AGV systems, high-precision positioning, hybrid navigation, and digital twin monitoring to achieve stable inter-process transport.

Cold Chain: Mitigating operational strain in low-temperature environments, frost/condensation risks, and cleanroom constraints, the company decouples operational areas from storage zones while integrating 3D vision, real-time telemetry, and predictive maintenance to ensure product integrity alongside operator safety.

Home Furnishings and Interior Goods: To handle bulky, heavy, irregularly shaped, and materially diverse goods, BlueSword deploys integrated high-bay storage, reach-type high-lift AGVs, and advanced vision-guided transport systems to automate non-standard cargo handling.

Fast-Moving Consumer Goods (FMCG): Catering to high-frequency, high-mix, low-volume, and large-scale shipping profiles, the company integrates stacker crane AS/RS with multi-tier shuttle systems to enable ultra-high-speed, high-precision order picking.

As emphasized by Vice General Manager Zou in an interview with the author, the richness of BlueSword's product lineup does not merely reflect a broad catalog. Its true essence lies in the company's "flexible architectural adaptability"—the capability to rapidly customize and reconfigure systems around a shared core technology platform to resolve idiosyncratic operational bottlenecks across diverse sectors.

Driving Servitization: Business Model Extension Through Robot as a Service (RaaS)

Transcending traditional one-off equipment sales models, BlueSword is expanding its scope into Robot as a Service (RaaS) operational outsourcing. Under this model, BlueSword undertakes capital

investment, design, engineering, on-site operation, and lifecycle maintenance of smart warehousing and automated systems. This enables clients to access state-of-the-art logistics infrastructure on a subscription or pay-per-use basis while minimizing upfront capital expenditures (CAPEX).

This servitization strategy shifts BlueSword's positioning from a conventional equipment vendor to an operational partner supporting the customer's core business workflows:

- **Client-Side Strategic Benefits:** Eliminating substantial initial investment hurdles lowers the barrier to automation adoption and grants enterprises the flexibility to scale logistics capacity in tandem with market volatility.
- **Strategic Value for BlueSword:**
 - ✓ **Establishing Recurring Revenue Streams:** Complements traditional transaction-based revenues with stable, predictable, long-term recurring revenue.
 - ✓ **Operational Data Feedback Loop:** Deep operational immersion at client sites allows BlueSword to harvest real-world operating data and domain know-how, creating a virtuous cycle that informs next-generation product design, engineering enhancements, and follow-on contract opportunities.

Strategic Implications and Organizational Challenges of Multi-Industry Integration and RaaS

While the convergence of multi-industry adaptability and the RaaS model reinforce BlueSword's competitive moat, it simultaneously demands advanced organizational capabilities.

Unlike traditional project delivery that concludes upon site acceptance, scaling RaaS requires the firm to internalize long-term responsibilities: continuous on-site operational performance, maintenance management, dedicated personnel governance, and asset/balance-sheet risk management. Sustaining long-term growth hinges on the company's ability to maintain uniform service level agreements (SLAs) while mitigating disparate operational risks across vastly different industry settings.

Consequently, RaaS is not merely an auxiliary financial or maintenance scheme for BlueSword; it represents a strategic business model transformation aimed at monetizing multi-industry domain expertise and evolving from an equipment manufacturer into an integrated logistics service provider.

5. Competitive Advantage Driven by Research and Development

R&D-Oriented Philosophy and Sustained High-Level Investment

Over the past three decades, BlueSword has adhered to the guiding philosophy of "Innovation as the Sole Path to Development" (Wei You Chuang Xin), consistently positioning innovation at the core of its corporate strategy. In the fiercely competitive logistics automation market, the company emphasizes novelty, high-frequency iteration, and scale of investment, adopting an agile development strategy to continuously reinforce its product competitiveness and technological edge.

The foundational engine of this core capability is its sustained, high-level R&D expenditure maintained since its public listing. BlueSword's R&D expenditure as a percentage of operating revenue has consistently ranked first among the 13 listed logistics equipment enterprises in mainland China. In fiscal year 2025, R&D investment reached approximately 145 million RMB, accounting for 9.63% of operating revenue. Driven by this continuous commitment, the company held over 40 core proprietary technologies and accumulated 522 intellectual property rights by 2025.

Advancement of Hardware Technologies and Evolution into a Solutions Enterprise

BlueSword's R&D initiatives span an extensive range of domains: lightweight mechanical design, advanced velocity control, dynamic AGV dispatching, automated depalletizing, seismic structural engineering, dynamic container location management, pre-sorting mechanisms, flexible container handling, inbound scheduling, and 3D physics-based simulation. These constitute an integrated technology stack engineered to elevate efficiency, safety, flexibility, and stability across logistics workflows.

This demonstrates the true strength of BlueSword's academic spin-off roots. The company established a self-reinforcing virtuous cycle: translating fundamental and applied research into commercialized solutions, and reinvesting the resulting capital and operational insights back into upstream R&D. This cyclical mechanism underpins its pioneering role as a private material handling enterprise, enabling its strategic evolution beyond an equipment fabricator into a comprehensive solution provider.

Sophistication of Software, AI, and Digital Twin Technologies

BlueSword's underlying competitiveness relies on far more than hardware manufacturing. Having originated with the development of 3D logistics simulation software in 1993, the firm has maintained software and proprietary algorithms as core strategic differentiators:

- **Development and Deployment of AI and Advanced Algorithms:** The company develops proprietary algorithms spanning laser-SLAM hybrid navigation, integrated AGV monitoring and simulation, 3D simulation platforms based on Discrete Event Simulation (DES), robotic arm computer vision, higher-order S-curve motion profiles, pallet pose/geometry estimation, dynamic flexible storage allocation, order assignment, and vehicle routing optimization. BlueSword seamlessly integrates these high-level algorithmic assets into system architecture design, field deployment, and continuous operational optimization.
- **Unified Digital Twin Platform:** BlueSword has constructed an enterprise platform integrating dynamic modeling, virtual simulation, offline debugging, 3D SCADA monitoring, asset maintenance, AGV dispatching, WMS/WCS synchronization, and end-to-end telemetry visualization:
 - ✓ **Offline Debugging:** Enables pre-commissioning testing and early risk mitigation prior to on-site physical hardware delivery.
 - ✓ **3D Monitoring & Asset Management:** Provides intuitive, real-time spatial oversight of facility operations while enabling predictive maintenance protocols.
 - ✓ **AR Remote Maintenance & Telemetry Dashboards:** Integrates augmented reality (AR) field-service capabilities alongside unified dashboards visualizing operational KPIs across the entire supply chain facility.

BlueSword conceptualizes logistics automation as an end-to-end digital system encompassing design, control, visualization, analytics, and continuous refinement. This technological posture reflects its academic heritage, cementing its unique market position as a high-tech logistics systems integrator.

Project-Oriented R&D Organizational Structure and Stratified Human Resource Allocation

Because the majority of customer orders require bespoke customization, BlueSword deploys an agile organizational structure capable of assembling project-specific engineering teams. R&D divisions are organized along product lines and technical disciplines, combining multidisciplinary engineering talent to address distinct technical specifications.

Currently, R&D personnel number 525, representing approximately 30% of the company's total workforce. Structurally, 201 researchers at the corporate R&D center focus on fundamental logistics robotics research, while the remaining 324 engineers are embedded across specialized business units dedicated to applied product development.

The academic profile of the R&D workforce spans doctoral, master's, bachelor's, and

polytechnic/associate degrees. The company implements a stratified division of labor: core technical responsibilities—including conceptual R&D design, AI architectures, and algorithm development—are led primarily by doctoral and master's graduates. Conversely, operational and field tasks, such as parameter calibration, hardware tuning, and site testing, are handled by bachelor's and polytechnic graduates. This tiered talent governance optimizes both R&D output velocity and human capital productivity.

Next-Generation Innovation: The "Blue Brain" Embodied AI Platform

In June 2026, BlueSword officially launched "BlueBrain," a proprietary embodied AI platform engineered for logistics machinery. This next-generation architecture interfaces with diverse hardware classes, including AGVs, AMRs, stacker cranes, and shuttle robots. It marks a decisive transition of embodied AI from proof-of-concept (PoC) validation to full-scale commercialization, serving as a critical strategic milestone in BlueSword's transformation from a conventional automation equipment manufacturer into an embodied robotic systems solution provider.

- **Autonomous Perception and Real-Time Optimization:** By integrating computer vision, environmental semantic sensing, and intelligent decision-making architectures, BlueBrain endows logistics equipment with autonomous "Perceive-Decide-Act" agency. Machines dynamically calibrate their operational states in response to environmental volatility, optimizing operational throughput while guaranteeing operational safety.
- **Data-Driven Continuous Learning Infrastructure:** Leveraging the massive operational datasets accumulated across decades of customer deployments, BlueBrain conducts autonomous learning and model optimization. This continuous learning loop progressively refines environmental adaptability, algorithmic decision precision, and overall autonomy, forming the foundational core driving the next generation of smart logistics systems.

6. Global Expansion Strategy, Future Prospects, and Strategic Challenges

Executing the "Piggyback" Expansion Strategy via Global Customer Networks

As its initial internationalization approach, BlueSword pursued a "piggyback" strategy—termed domestically as Da Chuan Chu Hai ("boarding large enterprises' ships to venture overseas")—by following and embedding itself within the global expansion trajectories of its core multinational clients. Today, overseas revenue accounts for approximately 10% to 20% of the company's total operating revenue, serving as a high-growth engine driving international corporate expansion.

Collaboration with P&G and First International Breakthrough: BlueSword's first overseas contract was an automated high-bay warehouse project for Procter & Gamble (P&G) Japan, completed in 2018 with a contract value exceeding US\$18 million, marking the first major milestone in its global market entry. Prior to this engagement, BlueSword had cultivated a long-standing partnership with P&G's Asia-Pacific headquarters. By delivering logistics system simulations, project consulting, and business process optimization for P&G's Chinese subsidiaries—alongside executing multiple automated warehouse projects across Jiangsu and Guangdong provinces—the company established a proven track record that served as a springboard into international markets.

Synchronization with BYD's Global Manufacturing Footprint: BlueSword is also a key logistics equipment supplier to BYD. In 2024, the company secured a landmark logistics automation contract covering 87 BYD manufacturing plants worldwide, delivering comprehensive intra-facility solutions including line-side intermediate buffer storage (online warehouses) and automated parts-receiving systems. By leveraging the global production and operational footprints of such multinational giants, BlueSword has accelerated the pace of its international expansion.

Penetration into Developed Markets and Localized After-Sales Service Infrastructure

Currently, BlueSword operates more than 10 overseas business locations, primarily across North America, Europe, and countries along the Belt and Road initiative. Its large-scale international projects are concentrated in advanced markets such as the United States and Germany, where it has steadily expanded its client base from overseas facilities of Chinese multinationals to established local domestic enterprises.

These international branches primarily oversee on-site project execution, commissioning, and after-sales support. BlueSword standardizes a service framework that deploys dedicated local engineering teams upon project completion to provide three years of warranty, maintenance, and technical support. Team sizing is optimized according to local project density and operational scope, balancing high service quality with operational efficiency.

Horizontal Technology Transfer: Venturing into Next-Generation Digital Vertical Farms

In recent years, BlueSword has leveraged the core technological capabilities developed in logistics automation—specifically its digital twin technologies and system integration know-how—to branch

into next-generation digital vertical farms. At its operational plant factory within the Dezhou Technology Park in Shandong Province, the company has deployed a suite of integrated smart systems:

- **Deployed Technologies and Systems:** Automated seeding, seedling transplanting, harvesting robotics, automated material flow control, precision spectrum LED lighting, environmental climate control, nutrient solution monitoring, and crop health diagnostic systems.
- **Technical Synergy with Logistics Capabilities:** Autonomous transport, computer vision, data analytics, and closed-loop control optimization.

This initiative serves as a clear proof point that BlueSword's core technological architecture possesses high versatility beyond traditional warehousing and logistics boundaries.

Organizational and Strategic Trade-Offs Accompanying Growth

As its business scope broadens and globalization deepens, BlueSword faces several structural trade-offs:

- **Strategic Positioning of Diversified Ventures:** Senior leadership faces a strategic decision regarding whether the vertical plant factory should remain a technology demonstrator/showcase for core automation capabilities or be aggressively capitalized as a standalone growth pillar. Under finite managerial and financial resources, the firm must clarify how tangible synergies with its core logistics business will be realized.
- **Organizational Complexity and Resource Dispersion Risks:** The concurrent expansion of product lines, target vertical industries, software engineering, RaaS offerings, and new business ventures has led to a rapid escalation in organizational complexity. Excessive dispersion across disparate R&D initiatives, while a source of differentiation, risks diluting strategic focus and spreading engineering resources thin.
- **Risks Inherent in Business Model Transformation:** While expanding RaaS establishes a stable, recurring revenue baseline, it introduces capital allocation trade-offs by shifting asset burdens onto the balance sheet and increasing long-term operational and credit risk exposure.

Evolution of an Academic Spin-Off and its Future Strategic Trajectory

The trajectory of BlueSword illustrates how a Chinese university spin-off, centered on rigorous R&D, evolved into a pioneer of the private material handling sector and transformed into an intelligent logistics systems enterprise integrating hardware, software, and services.

The company's core competitive advantages reside not merely in the performance of standalone equipment, but across five interconnected pillars: (1) holistic system architecture capabilities rooted in simulation; (2) continuous accumulation of advanced technology through university-industry collaboration; (3) flexible domain adaptability across diverse vertical industries; (4) end-to-end integration capabilities powered by digital twins and AI; and (5) versatile business model design, including RaaS.

How BlueSword will realign and leverage these multi-layered advantages in its next growth phase remains the central strategic question. As it completes its transition from an academic venture to a global player, the company stands at a pivotal juncture, requiring a clear redefinition of its long-term strategic focus.

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