Embodied AI: The Screw War

2026 is destined to be a critical turning point for the embodied intelligence industry, moving from "spectacular showmanship" toward "practical utility."

Just this month, Unitree's STAR Market IPO registration was approved, driving a collective surge in the humanoid robotics sector. Market data confirms this momentum: in the first half of 2026 alone, domestic embodied intelligence financing exceeded RMB 90 billion, with the full-year market size projected to reach RMB 1.09 trillion. While the spotlight shines on robots' dazzling running and dexterous fingers, true industry veterans have fixed their gaze on seemingly inconspicuous corners—the screws in joints, the inserts in skeletons, the washers on drive shafts.

Because these "tiny parts" determine just how fast and how far this trillion-dollar embodied intelligence track can go.

The Invisible Cost Killer: The "15-85 Law" Hidden Beneath the Surface

The industry reference manual Embodied Intelligence – One-Stop Fastening Connection Solutions reveals a harsh "15-85 Law": companies tend to overfocus on visible procurement costs while neglecting the 85% that is hidden costs. In design, material selection, assembly, and after-sales, a loose screw jamming a joint, a stripped thread causing a full rework, or galvanic corrosion triggering warranty claims—these latent downstream costs are often severely underestimated during the project's early stages.

Even more critical is the "project lifecycle cost impact model": the upfront decision-making window is extremely short, yet it locks in the majority of costs; later stages, despite massive investment, incur prohibitively high correction costs. This demands that embodied intelligence companies make precise judgments at the earliest possible stage—not just choosing the right motors and computing chips, but also selecting every fastening connection solution correctly.

Industrial Scenario Deployment: The Ultimate Test from "Showcase" to "Productivity"

Embodied intelligence is rapidly moving from laboratories to real-world battlefields. Xiaomi's robot has officially entered automotive factories, using five-fingered dexterous hands to install self-tapping nuts in die-casting workshops, achieving bilateral installation at a 76-second cycle time with over 90% success rate. Industrial manufacturing is widely considered the clearest commercialization direction for embodied intelligence.

However, the demanding nature of industrial scenarios places extremely high requirements on robotic hardware. On real production lines, robot failures often stem from basic component malfunctions. Industry data shows that "screw loosening and jamming" has become a prominent shortfall limiting the reliability of high-dynamic robots. In high-vibration, high-impact scenarios such as combat or industrial inspection, any minor loosening can lead to loss of balance or even accidents.

Toprecision's Hard-Core Solution: Turning "Small Connections" into "Big Achievements"

As a one-stop fastening connection solution expert, Toprecision offers not just a standard parts catalog, but a comprehensive total cost optimization framework

spanning the entire embodied intelligence lifecycle.

Targeting the core pain points of humanoid robots, Toprecision delivers precise "targeted remedies":

1. Resolving the "lightweight vs. strength" dilemma

Using 10.9/12.9-grade titanium alloy and 6.8-grade high-strength aluminum alloy screws, these fasteners achieve lightweighting while eliminating galvanic corrosion issues in magnesium alloy connections. These high-strength anti-loosening screws are applied not only in full-body joints but also in precision areas like finger joints and fingertip actuators.

2. Conquering the "high precision & long life" challenge

Shoulder screws serve as critical base components in joint and motion structures, shouldering the triple functions of "connection, positioning, and rotational support." Rod-end spherical bearings are core articulating joints for bionic motion, enabling flexible swinging in knee and ankle joints. Threaded inserts penetrate deep into torso frames, resolving "thread stripping" pain points in lightweight structural components and extending the lifespan of primary load-bearing structures.

3. Coping with "high-frequency vibration" threats

Anti-loosening washers—made from carbon steel, stainless steel, and advanced alloy steels—are deployed in core joints such as hips, knees, and shoulders, effectively resisting loosening risks from high-frequency robot movements and ensuring stability for sensor modules.

Conclusion: The "Fundamental Skills" Contest in the Mass-Production Year

Industry forecasts indicate that 2026 is the mass-production launch year for embodied intelligence, with a scale inflection point potentially arriving in 2027 or 2028. As the track enters the second half—competing in "data, scenarios, and supply chains"—the contest is no longer about flashy individual technical metrics, but about overall reliability, cost control, and delivery capability.

On this track, Toprecision stands as a "hidden champion," using solid engineering expertise to tighten every screw for embodied intelligence's "critical leap." After all, only when robots truly break free from the "prototype dilemma" and can operate stably 24/7 does the trillion-dollar market blueprint become more than just a castle in the air.