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Humanoid Robot and Physical AI

Tesla Optimus 3 read-throughs – deployment progress, technical bottlenecks, and stock implications

Tesla (covered by Rajat Gupta, N rating) held its 3Q 2026 earnings briefing this morning. While the market was watching a range of topics including FSD, capex, and core auto margins, our focus was on the latest updates for the Optimus humanoid robot. Elon Musk provided several important messages for the sector. He confirmed that Optimus production has started at Fremont, and signaled that Tesla could be ready to start shipping Optimus robots to other companies by the end of next year. While this is a more confident timeline than some had expected, Musk was clear that the ramp will be gradual, with volume guidance of 10k–20k units before launching external sales—below the most bullish market hopes. He described the manufacturing process as an S-curve, emphasizing that "10,000 things" need to work correctly and that the slowest component or process will set the pace for the entire ramp. Musk highlighted the robot's hand as the main hardware bottleneck, and achieving human-like dexterity, reliability, and onboard intelligence remains a challenge. Tesla's immediate focus is on deploying Optimus internally in its own factories for dangerous or repetitive tasks, with external commercial shipments targeted for late 2027. Consumer applications are further out. Musk also noted that a video demonstration of Optimus performing non-pre-scripted tasks is expected within the next one to two months, and that the integration of the next-generation AI5 chip in 2027 should provide a significant boost in compute power and enable more complex behaviors.

Our CIIF tour takeaways (see *Humanoid Robot & Physical AI: Robotics tour takeaways: CIIF 2026—Ecosystem demand, workflow integration, and what's next for the sector*) also support this more selective stance. The most tangible demand we observed was not at the robot OEM level, but among suppliers of sensors, 3D vision, data-collection devices, reducers, and dexterous hands. Leader Drive's management was notably concrete about Physical AI already contributing over 35% of its business, and it is planning multi-year capacity expansion. Orbbec highlighted a sharp ramp in robotics-related orders, especially for data-collection hardware and 3D vision modules. However, the demand is still "ecosystem demand"—R&D, pilots, and data collection—rather than mass end-user deployment. The gap between humanoid robot demos and industrial-grade automation remains wide, and the real bottlenecks are now around perception consistency, manipulation reliability, and the ability to deliver repeatable ROI in real-world workflows.

Our stock views: Against this backdrop, we have become more selective on the broader humanoid robot supply chain as expectations realign. The recent rally in Chinese robotics OEMs—led by Unitree and UBTech—has been sentiment-driven, and we remain cautious on these names in the near term as the market digests Tesla's more gradual production outlook. We see a risk of disappointment over the next 1–3 months as expectations reset and operational progress is reassessed, particularly for Unitree, Estun, and UBTech. At the same time, we continue to see Hengli Hydraulic and Sanhua Intelligent as the best-positioned Tesla bot supply chain plays, both confirmed suppliers that

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See page 5 for analyst certification and important disclosures, including non-US analyst disc

have not priced in much of the Tesla bot optimism and now trade at attractive P/E-based valuations after giving back most of their gains since 1H25. Both companies have solid underlying businesses and valuations near or below historical mid-cycle mean. Leader Drive remains our top pick among component names, given its proven moat, scalability, and more concrete Physical AI contribution, as reinforced by our CIIF meetings. Orbbec follows, with strong technology positioning in 3D vision and data-collection tooling, though we remain mindful of the near-term earnings risk. Our pecking order remains: Hengli Hydraulic = Sanhua Intelligent (both OW) > Leader Drive (OW) > Orbbec (OW) > Inovance (N) > UBTech (N) > Estun = Unitree (both UW).

Table 1: Key subsystems and development status of Tesla Optimus

Subsystem/Capability	Tesla Optimus (3Q 2026 update)	Status/Commentary	Bottleneck/Next Milestone
Hand (Dexterous hand)	Main hardware bottleneck	Musk highlighted the hand as the most difficult part, with human-like dexterity and reliability still a challenge	Improving hand design, durability, and tactile sensing; key gating item for industrial/consumer use
Eye (Vision/Perception)	Not specifically detailed	No explicit update on vision system, camera, or LiDAR; robust perception implied as necessary for non-pre-scripted tasks	Consistent, reliable perception for unstructured tasks; integration with "brain" and model
Chip (AI5)	AI5 chip integration targeted for April 2027	AI5 to provide c.10x compute vs. AI4; expected to enable more complex, generalizable behaviors	Hardware integration, software stack migration, and validation in real-world tasks
GPU/Compute	Not detailed	No explicit mention of GPU or compute bottlenecks, but AI5 is expected to be a major step up	Sufficient compute for real-time, non-pre-scripted task execution
Brain (Onboard intelligence)	Still in development	Musk emphasized need for further improvements in onboard intelligence and software to manage many degrees of freedom	Video demo of non-pre-scripted tasks expected in 1–2 months; ongoing closed-loop learning
Model (AI/Software)	Ongoing iteration	Focus on enabling Optimus to perform tasks that are not pre-programmed; software and model still evolving	Demonstration of generalizable, non-scripted behaviors; integration with new chip
Production plan	Gradual ramp, S-curve	Production started at Fremont; the initial output of 10k–20k units will be for Tesla Academy; slowest process/component sets the pace	Internal deployment in Tesla factories; external shipments targeted for end-2027
Supply chain	Reducing China reliance	Musk noted deliberate effort to localize and diversify supply chain, adding complexity to ramp	Localized sourcing, scaling non-China suppliers, and managing global logistics
Battery/Power	Not detailed	No direct update on battery tech, runtime, or energy density	Long-duration reliability and safe operation for industrial tasks
Factory deployment	Initial customers	Optimus to be used in industrial applications at first, such as dangerous repetitive tasks	Would be extended to household products as Tesla scales up

Source: Tesla 3Q26 briefing and public disclosures.

Read-throughs from Tesla 3Q26 briefing and Optimus update

- **Elon Musk's latest commentary on Optimus signals a more measured ramp-up, with the initial volume ramp-up guidance of 10k–20k units coming in below market expectations.** During Tesla's 3Q 2026 earnings call, Musk stated that while production has begun at Fremont, the company is taking a cautious approach to scaling. He guided to 10k–20k units within a 12-month timeframe, below prior market hopes, and described the manufacturing process as an S-curve, with "10,000 things" that need to work

correctly. The slowest component or process will set the pace for the entire ramp. Musk was explicit that the desire to reduce reliance on the Chinese supply chain is adding to the complexity.

- **Tesla's internal deployment strategy for Optimus is focused on self-play and training data generation, with external commercial shipments still at least a year away.** Musk explained that Tesla's immediate priority is to deploy Optimus robots for practical tasks, and Tesla is building an Optimus Academy where Optimus can do self-play and generate training data. As for the profile of initial customers, Tesla is considering industrial applications notably dangerous, repetitive, or ergonomically difficult tasks 24/7. This internal-first approach allows Tesla to collect proprietary real-world data, validate reliability, and iterate on both hardware and software before offering the robots to external customers. Musk stated that commercial shipments to outside companies are roughly a year away, and that broader consumer applications will follow only after reliability and cost targets are met.

- **Tesla's 3Q 2026 update highlighted the hand, onboard intelligence, and compute roadmap, while providing limited detail on reducers, vision, or battery.** Musk was explicit that the hand remains the main hardware bottleneck for Optimus, citing the challenge of achieving human-like dexterity, reliability, and long-duration operation. On the "brain" and software side, Musk emphasized the need for further improvements in onboard intelligence and the ability to manage the robot's many degrees of freedom, with the next major milestone being a video demonstration of Optimus performing non-pre-scripted tasks within the next one to two months. Tesla confirmed plans to integrate its next-generation AI5 chip into Optimus around April 2027, which management described as providing roughly an order of magnitude more compute than the current AI4 and enabling more complex, generalizable behaviors. However, there was no specific mention of vision systems, cameras, or battery technology, while Optimus Engineering Lead highlighted their relatively high confidence in body electrotechnical system. Musk did reiterate that the production ramp will be gradual, with the slowest component or process setting the pace, and that the company is deliberately reducing reliance on the Chinese supply chain, which adds to the complexity of scaling.

- **Musk's commentary reinforced that the path to mass adoption will be gradual, with initial customers likely to be industrial rather than residential.** Musk reiterated that the first external use cases for Optimus will be in industrial settings, where the robot can take on tasks that are dangerous or highly repetitive. He was clear that consumer applications are still further out, as the company needs to prove reliability, safety, and cost-effectiveness in more controlled environments first. Tesla's own regulatory filings also acknowledged that the company has not yet commercialized Bots and cannot predict demand from commercial or consumer applications, underscoring the early stage of the industry.

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Table 2: Global Humanoid Robot Comp

	BBG Ticker	JPM rating	Last Price LC	JPM PT LC	Upside/ Downside	Mkt Cap US$Mn	aily turnov US$Mn	YTD stock perf.	P/E (x) FY26E	P/E (x) FY27E	EPS Growth FY26E	EPS Growth FY27E	ROE (%) FY26E	ROE (%) FY27E	P/S (x) FY26E	P/S (x) FY27E	Revenue growth Y/Y FY26E	Revenue growth Y/Y FY27E
China																		
Unitree	688836 CH	UW	515	300	-42%	31,200	405.1	NA	345.4	236.7	121%	46%	8.4	9.3	73.9	51.6	66%	43%
Leader Drive	688017 CH	OW	258	358	39%	7,076	345.2	34%	255.1	130.1	36%	96%	5.1	9.6	52.5	28.1	58%	87%
Estun	002747 CH	UW	26	21	-19%	3,556	236.7	10%	92.8	68.2	462%	36%	9.7	9.4	5.1	4.5	8%	7%
Sanhua Intelligent-A	002050 CH	OW	33	51	55%	19,771	277.2	-40%	29.1	24.9	17%	17%	12.8	14.6	3.9	3.5	9%	13%
Sanhua Intelligent-H	2050 HK	OW	23	38	69%	19,771	20.4	-41%	16.9	14.5	17%	17%	12.8	14.6	NA	NA	9%	13%
Ningbo Tuopu	601689 CH	UW	42	48	13%	11,031	164.0	-45%	26.5	23.2	-1%	14%	11.1	11.7	2.2	1.9	16%	13%
Minth	425 HK	OW	22	54	145%	3,285	11.8	-31%	7.2	6.1	7%	18%	12.3	13.2	0.8	0.7	9%	14%
Zhongda Leader	002896 CH	NC	55	NA	NA	1,629	89.2	-38%	97.1	81.4	23%	19%	8.7	9.7	8.4	6.7	25%	25%
Shuanhuan	002472 CH	NC	39	NA	NA	4,930	122.8	-16%	23.4	19.9	13%	18%	13.0	13.7	3.2	2.8	8%	14%
Ningbo Joyson	600699 CH	N	21	20	-5%	4,582	123.6	-33%	18.5	15.3	16%	21%	8.8	9.9	0.5	0.5	2%	4%
Hengli Hydrulic	601100 CH	OW	83	126	52%	16,662	104.6	-26%	35.2	26.6	8%	32%	17.3	20.2	8.3	6.8	26%	22%
Robosense	2498 HK	OW	15	45	203%	892	9.3	-59%	NM	24.3	-26%	NM	-4.7	4.5	2.1	1.3	45%	57%
Johnson Electric	179 HK	N	14	18	33%	1,611	10.4	-54%	7.8	11.5	NA	-32%	7.4	5.9	0.4	0.4	NA	1%
Wolong Electric	600580 CH	N	24	31	27%	5,700	178.3	-50%	46.8	29.7	-37%	58%	7.3	10.7	2.5	2.2	-4%	12%
Orbbec	688322 CH	OW	93	110	19%	5,738	137.3	3%	142.8	64.4	NA	122%	7.5	13.1	28.4	15.3	NA	86%
Horizon Robotics	9660 HK	OW	4	9	135%	7,737	73.3	-56%	NM	NM	156%	-44%	-38.9	-23.4	9.8	6.3	61%	55%
UBTech robotics	9880 HK	N	67	74	10%	4,367	49.8	-47%	NM	139.8	-62%	-151%	-5.7	3.0	7.3	4.6	99%	59%
Shenzhen Dobot	2432 HK	NC	17	NA	NA	859	6.9	-55%	NM	NM	84%	-56%	-4.0	-1.6	7.4	5.2	54%	41%
Zhaowei Machinery	003021 CH	NC	76	NA	NA	2,827	38.0	-39%	82.6	61.0	-16%	35%	5.0	5.8	10.2	8.9	-1%	14%
Laifual Drive	3952 HK	NC	29	NA	NA	388	1.0	NA	NM	59.2	NA	-156%	-29.0	3.2	6.3	3.6	NA	74%
Geekplus	2590 HK	NC	6	NA	NA	1,059	9.0	-70%	131.2	21.5	-47%	NM	2.0	3.6	1.7	1.3	30%	32%
Mech Mind	9615 HK	NC	87	NA	NA	1,384	4.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Xpeng	9868 HK	N	37	45	22%	9,043	62.7	-53%	NM	NM	119%	-27%	-13.4	-10.9	0.7	0.6	11%	22%
Xpeng	XPEV US	N	10	12	16%	9,508	77.3	-51%	NM	NM	119%	-27%	-13.4	-10.9	0.8	0.6	11%	22%
Average									67.5	45.7	47%	1%	1.4	5.9	7.7	5.0	25%	31%
Asia (ex-China)																		
Hiwin	2049 TT	UW	308.00	160	-48%	3,360	46.1	59%	56.4	48.0	37%	18%	5.2	6.0	4.1	3.8	9%	8%
Bizlink	3665 TT	OW	1950.00	3,100	59%	12,002	236.5	28%	28.7	16.2	46%	77%	25.4	33.8	3.7	2.5	48%	50%
Sinbon	3023 TT	N	308.00	235	-24%	2,280	10.5	60%	23.3	19.6	5%	19%	19.3	21.6	2.2	2.1	6%	9%
TM Robot	4585 TT	NC	276.50	NA	NA	892	2.1	-15%	60.6	36.7	NA	65%	NA	NA	13.4	10.1	NA	32%
HDS	6324 JP	NC	5390.00	NA	NA	3,283	46.3	43%	78.1	53.9	NM	45%	7.9	10.5	6.8	5.9	30%	16%
Nidec	6594 JP	UW	1762.00	1,500	-15%	13,287	122.1	-17%	14.9	12.5	8%	19%	15.7	16.0	0.7	0.7	6%	5%
Yaskawa	6506 JP	NC	4204.00	NA	NA	7,089	138.7	-12%	24.1	18.9	23%	28%	9.1	11.0	1.9	1.7	12%	9%
Fanuc	6954 JP	NC	5823.00	NA	NA	36,167	220.7	-4%	26.4	24.6	28%	7%	10.8	11.4	5.9	5.5	15%	7%
Minebea Mitsumi	6479 JP	OW	3284.00	5,100	55%	8,868	64.3	5%	13.9	12.1	38%	15%	9.5	9.9	0.8	0.7	11%	6%
Hyundai Mobis	012330 ks	OW	346000.00	620,000	79%	23,473	142.5	-7%	6.5	5.9	17%	12%	8.8	9.0	0.5	0.5	3%	3%
HL Mando	204320 ks	N	38950.00	49,000	26%	1,381	13.8	-34%	9.8	8.7	6%	12%	6.4	6.8	0.2	0.2	5%	4%
Hyundai motor	005380 KS	OW	309500.00	440,000	42%	47,563	283.1	4%	9.8	8.9	-21%	11%	6.9	7.3	0.3	0.3	1%	4%
Average									29.4	22.2	19%	27%	11.4	13.0	3.4	2.8	13%	13%
Ex-Asia																		
NVIDIA	NVDA US	OW	216.47	320	48%	5,216,927	25,424.8	16%	46.3	23.4	60%	97%	104.2	99.8	24.4	12.8	66%	91%
Tesla	TSLA US	N	373.71	415	11%	1,477,175	13,071.3	-17%	261.3	257.7	-11%	1%	5.9	5.6	13.7	11.9	14%	15%
Siemens	SIE GR	OW	263.05	345	31%	230,822	302.9	10%	21.6	18.4	6%	17%	13.8	15.2	2.5	2.3	5%	8%
Schaeffler	SHA0 GR	N	5.86	9	45%	6,213	7.2	-30%	10.9	9.5	2%	15%	17.1	18.1	0.2	0.2	-2%	0%
Average									85.0	77.2	14%	33%	35.2	34.7	10.2	6.8	21%	28%
Global humanoid average									**55.0**	**41.1**	**34%**	**13%**	**8.0**	**11.1**	**6.6**	**4.5**	**21%**	**25%**

Source: Bloomberg Finance L.P., J.P. Morgan estimates. Estimates for Not Covered (NC) companies are based on Bloomberg consensus data. Japanese names have financial years ending March. As of 21 October 2026.