COMPANY UPDATE

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EV/Mobility Team

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Samhyun (437730)

The bigger picture coming into focus

- Samhyun in October issued KRW48.5b in convertible bonds to fund construction of a plant for defense and robot actuator production. The KRW32,672 conversion price represents a 10% premium to the weighted average of the stock's closing price over the past month, week, and most recent day.
- The company has been diversifying into robotics, defense, and urban air mobility, leveraging actuator technologies proven in autos. Its order backlog is expected to expand to KRW1.5t by end-2025.
- With mass-production of humanoid robots expected to begin in 2026, the firm should be able to add more clients, using its first contract (likely to be signed before end-2025) as a key reference.

WHAT'S THE STORY?

CB issuance: Samhyun has issued convertible bonds (CBs) to support capacity expansion and M&A activity.

- **Raises KRW48.5b:** Full conversion would increase the share count to 1,484,000, implying dilution of 4.51%.
- **Conversion price and period:** The KRW32,672 conversion price represents a 10% premium to the weighted average of the stock's closing price over the past month, week, and most recent day. The conversion period runs from Oct 29, 2026 to Sep 29, 2030.
- **Purpose:** Samhyun plans to use the proceeds to expand production capacity (KRW38.5b) to meet growing demand for robot and defense actuators, and to acquire a robot control company (KRW10b).

(Continued on the next page)

SUMMARY FINANCIAL DATA

(KRWb)	2021	2022	2023	2024
Revenue	59	69	100	100
Operating profit	4	3	10	6
Net profit (adj)	4	3	9	8
EPS (adj) (KRW)	152	130	369	278
EPS (adj) growth (% y-y)	22.8	(14.8)	184.4	(24.7)
EBITDA margin (%)	10.7	8.1	12.8	9.2
ROE (%)	11.7	8.8	21.4	10.3
P/E (adj) (x)	0.0	0.0	0.0	33.2
P/B (x)	0.0	0.0	0.0	2.5
EV/EBITDA (x)	0.8	0.0	(0.5)	24.8
Dividend yield (%)	n/a	n/a	n/a	0.5

Source: Company data, Samsung Securities estimates

AT A GLANCE

Not rated

Target price	n/a
Current price	KRW25,450
Market cap	KRW807b / USD553.5m
Shares (float)	31,707,567 (29.9%)
52-week high/low	KRW32,950/KRW5,960
Avg daily trading value (60-day)	"KRW51.9b/ USD35.6m"

ONE-YEAR PERFORMANCE

	1M	6M	12M
Samhyun (%)	-12.5	68.1	257.4
Vs Kosdaq (%pts)	-16.7	35.0	171.4

SAMSUNG vs THE STREET

No of estimates	n/a
Average target price (KRW)	n/a
Average rating	n/a

※ Rating: 4 < → BUY, 3 = HOLD, 2 > → SELL

- **Financial structure:** As of 1H25, the firm' debt ratio was 23%, and it held KRW500m in net cash.

Signs MOU in October to develop auxiliary power units

- **APUs:** An auxiliary power unit provides energy for vehicle functions other than propulsion. It is commonly used in combat vehicles, aircraft, large trucks, and submarines, and is designed to supply power in silent, power-saving mode. It consists of a small diesel engine, a generator, an inverter/converter, and a battery control module.
- Samhyun signed a strategic MOU with Suter, a Swiss developer of compact, high-power diesel engines that supplies global defense companies. Joint APU development should: 1) enable Samhyun to enter the domestic defense market in 2026; and 2) allow Suter to tap overseas markets. Historically, Samhyun's defense offerings focused on individual components (such as motors, controllers, heat exchangers), but the APU project should help it expand into system-level products.

Growing fast—From auto actuators to defense and robot actuators

- **Rising orders and plant construction:** The firm's order backlog should rise from KRW1.3t at end-1H25 to KRW1.5t at end-2H25. It raised KRW60b via its Apr 2024 IPO. A second plant is under construction in Changwon and should come online at year-end. Using proceeds from the recent CB issuance, the company also plans to build an additional plant.
- **Rising sales and mix shift:** Sales should grow from KRW100b in 2024 to KRW300b in 2028, supported by a strong client base and rising orders. The 2028 sales mix should be mobility (55%), defense (25%), and robot/UAM (20%), compared with mobility (70%), defense (15%), and others (5%) in 2024.

Defense products: Samhyun should begin receiving orders for modules rather than individual components, as its client is increasingly outsourcing production amid surging overseas demand.

- **Defense sales expanding:** With rising volumes, some orders are shifting to system-unit outsourcing. The company should evolve from supplying components to delivering integrated system solutions. To support this, a second plant is being built in Changwon (scheduled to come online in 4Q25). Margins in the firm's defense business are around 15-20%.
- **Smart defense products:** Samhyun supplies propulsion motors and controllers for a range of advanced defense systems, addressing the military's increasing electrification needs. Key products include propulsion motors for medium- and long-range anti-aircraft missile horizontal jack systems; Azimuth firing motors for electro-optical targeting systems (EOTS); components for infrared search and track (IRST) systems; radar drive motors for K-SAM Pegasus systems; optical heat exchangers; and propulsion motors and controllers for unmanned transport vehicles, multipurpose unmanned vehicles, and unmanned submarines.
- **Developing unmanned vehicle platform Hoplon:** Recently, Samhyun developed Hoplon, an unmanned vehicle platform that integrates its 3-in-1 e-powertrain, a battery-exchange system, and advanced remote-driving capabilities. The firm is now receiving orders for this platform from defense customers.

Robot actuator technology: The firm combines brushless alternating current (BLAC) motors with cycloidal gear reducers in its robot actuators, making them suitable for robot legs and waist, where high power and durability are essential.

- **BLAC and cycloidal gear reducers:** High-precision, high-torque actuators that integrate BLAC motors and cycloidal reducers are widely used in humanoid robots. They offer greater durability than harmonic reducers typically used in collaborative robots.
- **Price competitiveness and compact design:** By internalizing both hardware and software capabilities, the firm can produce integrated actuator modules that combine the motor, reducer, and controller in a single unit. This yields compact, cost-competitive products.
- **Humanoid robot actuator order expected by end-2025:** We expect Samhyun to secure an actuator order from an overseas humanoid robot company in 4Q25. This should: 1) provide a key reference to support future orders; and 2) help the firm command a valuation premium relative to peers.

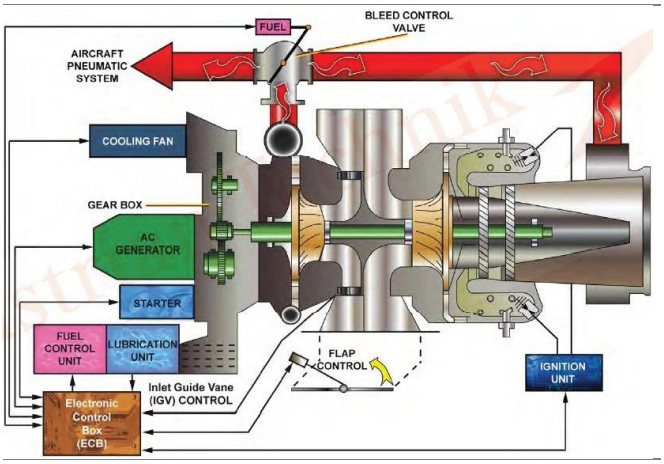
Robot actuator market poised to be 100x the size of vehicle control system market: Robotics should become one of the largest markets in modern industrial history.

- **High rare earth content:** Robot actuators use significant amounts of rare earth magnets (0.9-4 kg per humanoid robot, roughly twice the volume used in EVs), as they are essential for precise torque and speed control. Given the high cost of rare earths, actuator ASPs have limited downside.
- **Humanoid robots require 20-30 actuators per unit:** Humanoid robot actuators (with their ASP of around USD19,000, assuming annual output reaches 1m units) account for 60-70% of total manufacturing cost. By comparison, the ASP of vehicle control systems (braking, steering, suspension) is roughly USD2,000, representing 5-6% of vehicle manufacturing cost.
- **Robot actuator market potential:** We believe the robot actuator market could grow to roughly 10 times the size of the automotive actuator market.

APU for small aircraft/helicopters

Source: Google image

APU structure



Source: Google image

Samhyun: Competitive edge in drive actuators (in-wheel motors) and joint module actuators

	Samhyun	H company (Korea)	Z company (China)	Note
Type	BLAC	BLDC (Servo motor)	BLAC	
Resolution	16bit	10bit	10bit	Competitor stability & precision control issue
Electric brake	내재화	구매	내재화	
Global certification (Reliability)	CLASSIFIED UL	-	-	컴팩트화율
Cost Design	100	개발중	100	
Cost Domestic Import	100		110	
AS	Seperate A/S for Tire, Motor and Electric brake		Whole product replacement	

	Samhyun	R company (Korea)	T company (Germany)	Note
Type	BLAC	DC/BLAC	BLAC	DC Reliability issues
Resolution	16bit (Incremental type)	16bit (Optical type)	16bit (Incremental type)	Optical type has higher unit cost
Reducer	Robox (new tech)	Cycloid	Cycloid	
Global certification (reliability)	CLASSIFIED UL	CLASSIFIED UL	CLASSIFIED UL	
Compactness (Parts/weight)	100/100	130/100	130/100	
Cost Actuator	100	100	140	
Cost Motor	100	80	200	
Delivery	2 months	2 months	10 months	

Source: Company data

Humanoid robot gear reducers: Comparison

	Cycloid	Harmonic	Quasi direct drive (QDD)
Principle	Eccentric rotation creates a cycloidal trajectory on the disk	Elastic deformation of the flexspline creates a wave-like contact	Low gear ratio (3-10:1) + high-torque motor direct control
Mechanical Structure	Eccentric cam + cycloidal disk + output pin	Wave generator + flexspline + circular spline	Low gear ratio + BLAC (PMSM) motor
Torque Transmission	Multi-point contact → shock absorption	Elastic deformation → precise but weak	Low gear ratio + high current control for direct torque
Gear Ratio	30-150:1	50-160:1	3-10:1
Precision	High (almost no backlash)	Very high (no backlash)	High (achieved through control compensation)
Durability / Shock Resistance	Very high	Low (elastic fatigue accumulation)	Medium (compensated by electronic control)
Efficiency	85-93%	70-85%	90-95%
Weight / Size	Large	Small	Very small
Response Speed	Medium	Slow	Fast
Maintenance	Good	Replacement required	Almost unnecessary

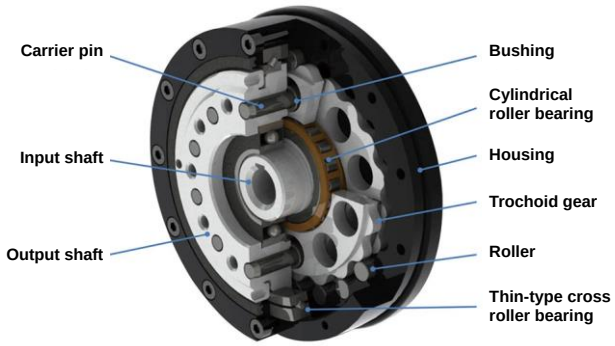
Source: Chat-GPT, Samsung Securities

Gear reducer application, by robot joint

Robot joint	Required characteristics	Recommended gear reducer
Leg (hip, knee)	High torque, shock resistance, load-bearing strength	QDD-type cycloidal reducer
Waist/Pelvis	Torque, balance control, load-bearing strength	QDD-type cycloidal reducer
Arm/Shoulder	Fast response, medium torque	Quasi direct drive (QDD)
Wrist/Fingers	Ultra-precision, low torque	Harmonic drive
Neck/Head rotation	Speed	Direct drive (DD) or QD

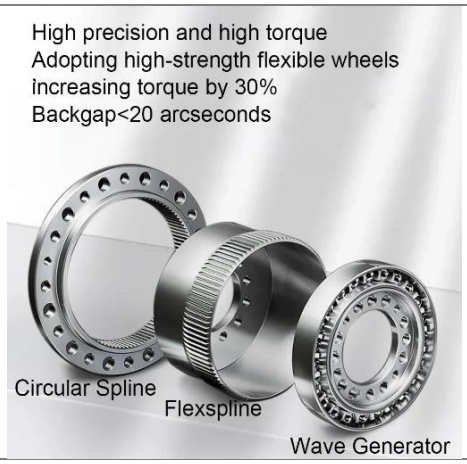
Source: Chat-GPT, Samsung Securities

Cycloid reducer



Source: Google Image

Harmonic drive



Source: Google Image

Rare-earth magnet usage: EVs vs. Humanoid robots

	Rare-earth magnet usage (kg/unit)	Notes
EVs	0.5-2.0	Depends on motor specification, number of motors, trim level BYD uses ~1.5kg.
Humanoid robots	0.9-4.0	Varies by actuator count and design. Optimus (Tesla): Estimated 3.4-3.5kg.

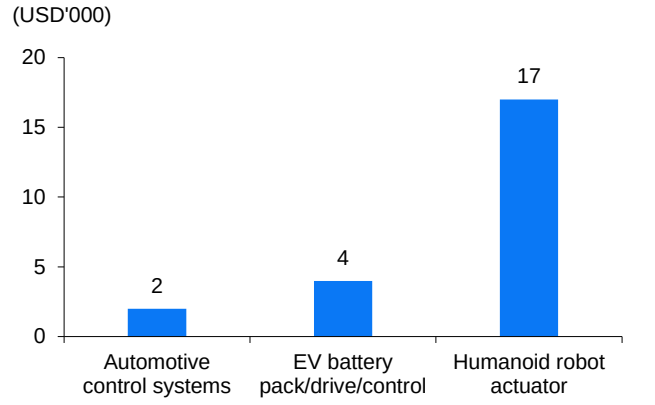
Source: Thunder Said Energy, High Magnets, Samsung Securities

Total number of motors in humanoid robots vs. in their hands alone

	Total	Per Hand	
Optimus	28	6~10	PMSM-based, underactuated linkage
Figure 02	30	10	Hybrid (direct drive and cable actuation)
Apptronik Apollo	25	6	Series-elastic actuator (SEA)+linkage
Agility	20	6	Simple structure; hands do not support fine manipulation
E-Atlas	20	6	Simple structure; 7-DoF hands

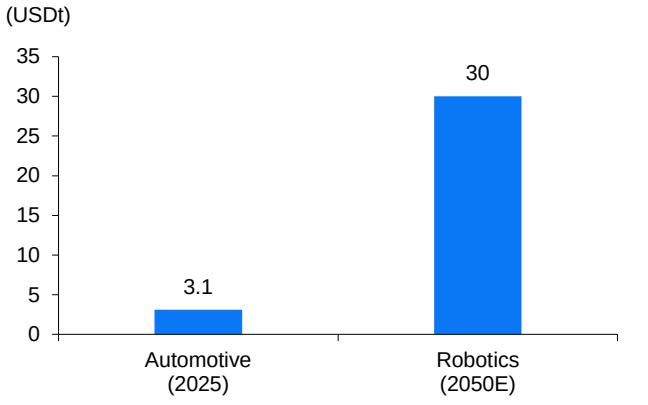
Source: Company data, Samsung Securities

Hyundai Mobis Core parts business ASP



Source: Company data, Samsung Securities

Market size: Automotive vs. robotics



Source: Samsung Securities

Samhyun: Peer valuations

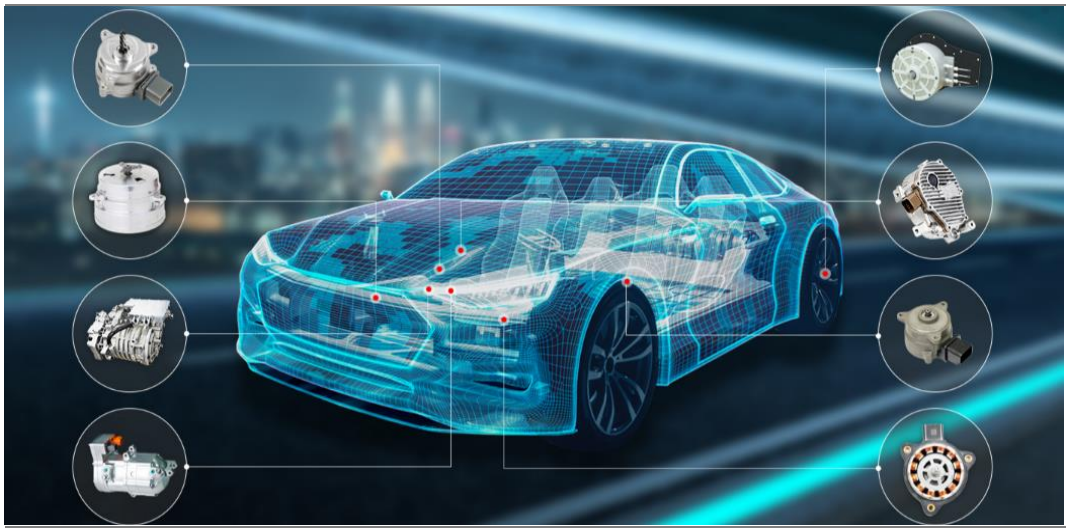
Company		Samhyun	Higen RNM	Robotis
Market cap (KRWb)		1,042	1,798	2,730
Stock price (KRW)		32,850	58,200	206,500
Stock performance (%)	1M	43.5	34.6	32.3
	3M	169.9	83.9	161.8
	6M	143.2	80.8	510.2
Revenue (KRWm)	2023	99,849	77,247	29,128
	2024	100,448	75,886	30,038
	2025E	115,200	n/a	43,039
Operating profit (KRWm)	2023	9,796	4,337	-5,299
	2024	5,517	-369	-2,974
	2025E	6,700	n/a	1,943
Operating margin (%)	2023	9.8	5.6	(18.2)
	2024	5.7	(0.5)	(9.9)
	2025E	5.8	n/a	4.5
Net profit (KRWm)	2023	9,450	2,647	-1,300
	2024	8,314	-1,093	-3,039
	2025E	8,900	n/a	1,921
P/S (x)	2023	n/a	n/a	12.9
	2024	2.8	4.6	10.0
	2025E	9.2	n/a	70.2
P/B (x)	2023	n/a	n/a	4.1
	2024	2.5	5.5	3.2
	2025E	n/a	n/a	32.2
P/E (x)	2023	n/a	n/a	n/a
	2024	33.2	n/a	n/a
	2025E	119.5	n/a	963.8
EV/EBITDA (x)	2023	n/a	n/a	n/a
	2024	24.8	231.2	n/a
	2025E	n/a	n/a	821.3
ROE (%)	2023	21.4	6.0	(1.5)
	2024	10.3	(1.9)	(3.3)
	2025E	n/a	n/a	1.3

Note: As of Oct 29, 2025 close / Source: FnGuide, Bloomberg, Samsung Securities

Samhyun: Second plant under construction in Changwon (Korea)

Source: Company data

Samhyun business areas: Mobility—Electrification smart actuators



Source: Company data

CVVD actuator

Source: Company data

DCT clutch actuator (CA) motor

Source: Company data

SBW actuator

Source: Company data

Samhyun business areas: Defense industry—High-precision control technology smart actuators, electric propulsion systems

Source: Company data

EOTS internal elevation/azimuth gimbal motor

Source: Company data

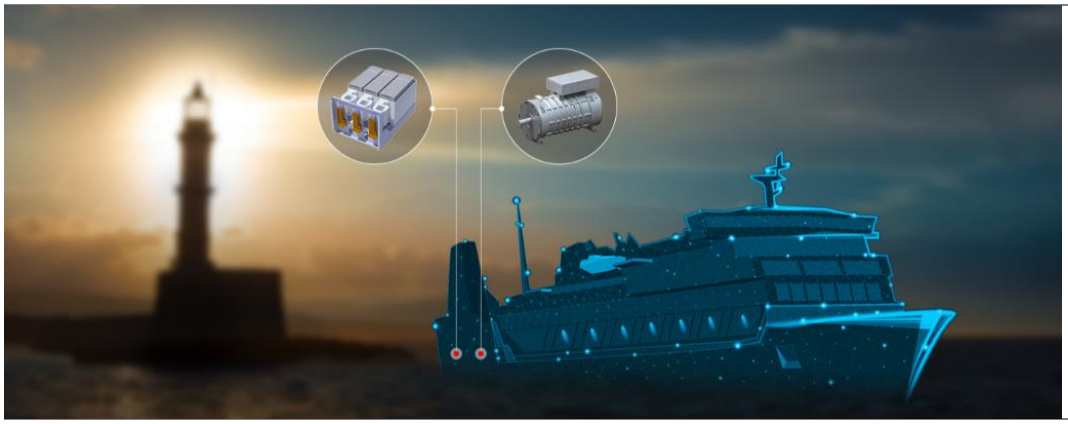
Remote controlled weapon system (RCWS) drive module

Source: Company data

Unmanned transport platform: Hoplon

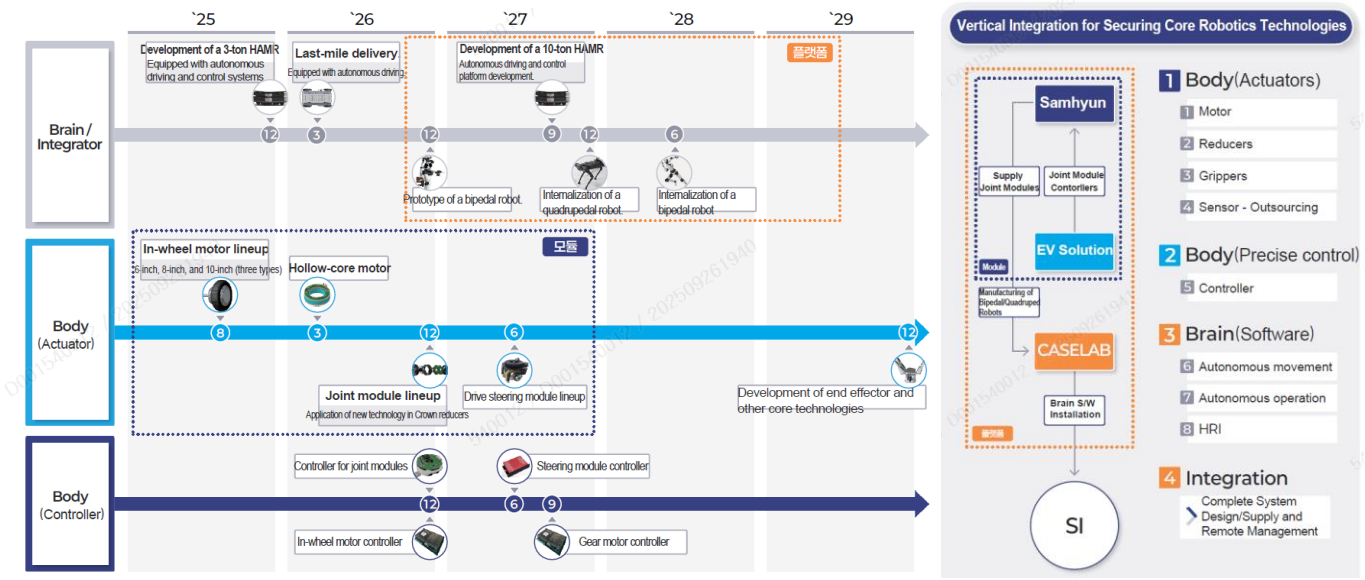
Source: Company data

Samhyun business areas: Shipbuilding—Eco-friendly electric/hybrid electric propulsion systems for ships



Source: Company data

Samhyun business areas: Robotics—Building full line-up of joint modules and drive modules to create robotics platform by end-2027

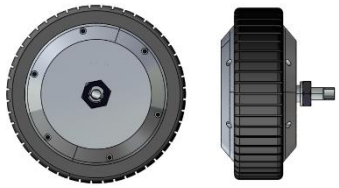


Source: Company data

Joint drive motor for collaborative robots

Source: Company data

In-wheel motor

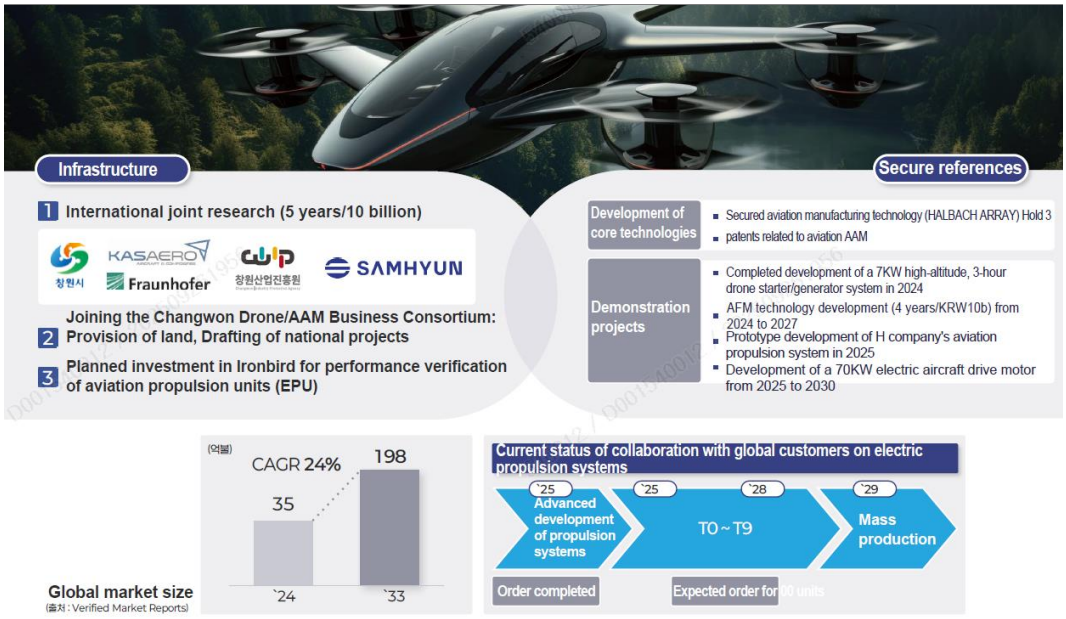


Source: Company data

Key components of collaborative robot joint modules

Source: Company data

Samhyun business areas: Aerospace industry—Core components for AAM and hybrid drones



Note: EPU; Electric Propulsion Unit, AFM; Axial Flux Motor
Source: Company data

Income statement

Year-end Dec 31 (KRWb)	2020	2021	2022	2023	2024
Sales	**49**	**59**	**69**	**100**	**100**
Cost of goods sold	43	52	61	84	87
Gross profit	**6**	**7**	**7**	**16**	**14**
Gross margin (%)	12.1	12.5	10.5	15.7	13.5
SG&A expenses	3	4	4	6	8
Operating profit	**3**	**4**	**3**	**10**	**6**
Operating margin (%)	6.0	6.4	4.0	9.8	5.7
Non-operating gains (losses)	**0**	**(0)**	**0**	**(0)**	**2**
Financial profit	0	0	0	1	2
Financial costs	0	0	0	1	1
Equity-method gains (losses)	0	0	0	0	0
Other	1	0	0	(0)	0
Pre-tax profit	**3**	**4**	**3**	**10**	**8**
Taxes	0	(0)	(0)	0	(1)
Effective tax rate (%)	2.9	(1.3)	(9.1)	3.3	(12.1)
Profit from continuing operations	3	4	3	9	8
Profit from discontinued operations	0	(1)	0	0	0
Net profit	**3**	**4**	**3**	**9**	**8**
Net margin (%)	6.4	6.4	4.8	9.5	8.5
Net profit (controlling interests)	3	4	3	9	8
Net profit (non-controlling interests)	0	0	0	0	0
EBITDA	5	6	6	13	9
EBITDA margin (%)	10.1	10.7	8.1	12.8	9.2
EPS (parent-based) (KRW)	124	152	130	369	278
EPS (consolidated) (KRW)	124	152	130	369	278
Adjusted EPS (KRW)*	124	152	130	369	278

Balance sheet

Year-end Dec 31 (KRWb)	2020	2021	2022	2023	2024
Current assets	**22**	**34**	**40**	**55**	**94**
Cash & equivalents	2	3	8	6	10
Accounts receivable	8	9	9	16	14
Inventories	6	4	4	7	6
Other current assets	5	18	19	27	64
Fixed assets	**42**	**41**	**41**	**40**	**46**
Investment assets	0	0	0	1	1
Tangible assets	42	32	31	37	40
Intangible assets	0	0	0	0	0
Other long-term assets	0	9	9	2	5
Total assets	**64**	**75**	**80**	**95**	**140**
Current liabilities	**15**	**26**	**38**	**44**	**21**
Accounts payable	7	8	10	17	11
Short-term debt	1	2	2	2	2
Other current liabilities	7	16	26	25	8
Long-term liabilities	**21**	**13**	**3**	**2**	**4**
Bonds & long-term debt	20	12	2	2	3
Other long-term liabilities	0	1	1	1	1
Total liabilities	**36**	**39**	**41**	**46**	**25**
Owners of parent equity	**29**	**36**	**40**	**49**	**115**
Capital stock	1	1	4	4	16
Capital surplus	0	4	0	0	47
Retained earnings	21	33	36	44	53
Other	7	(1)	(0)	(0)	(0)
Non-controlling interests' equity	**0**	**0**	**0**	**0**	**0**
Total equity	**29**	**36**	**40**	**49**	**115**
Net debt	14	5	0	(7)	(63)

Cash flow statement

Year-end Dec 31 (KRWb)	2020	2021	2022	2023	2024
Cash flow from operations	**10**	**5**	**7**	**12**	**7**
Net profit	3	4	3	9	8
Non-cash profit and expenses	2	3	3	4	2
Depreciation	2	3	3	3	4
Amortization	0	0	0	0	0
Other	(0)	0	0	1	(2)
Changes in A/L from operating activities	5	(1)	2	(2)	(4)
Cash flow from investments	**(15)**	**(10)**	**(2)**	**(9)**	**(45)**
Change in tangible assets	(10)	3	(2)	(4)	(6)
Change in financial assets	(5)	(13)	(1)	(5)	(37)
Other	1	(0)	(0)	(0)	(2)
Cash flow from financing	**3**	**7**	**0**	**(5)**	**42**
Change in debt	3	4	1	(4)	(16)
Change in equity	0	4	(0)	0	58
Dividends	0	0	0	0	0
Other	(0)	(0)	(0)	(0)	(1)
Change in cash	(2)	1	5	(2)	4
Cash at beginning of year	4	2	3	8	6
Cash at end of year	2	3	8	6	10
Gross cash flow	**5**	**7**	**6**	**14**	**10**
Free cash flow	**(4)**	**0**	**5**	**7**	**0**

Financial ratios

Year-end Dec 31	2020	2021	2022	2023	2024
Growth (%)					
Sales	(14.3)	21.5	16.1	45.5	0.3
Operating profit	(51.1)	28.6	(27.0)	255.8	(42.1)
Net profit	(46.2)	21.4	(12.4)	184.4	(10.4)
Adjusted EPS**	(46.2)	22.8	(14.8)	184.4	(24.7)
Per-share data (KRW)					
EPS (parent-based)	124	152	130	369	278
EPS (consolidated)	124	152	130	369	278
Adjusted EPS**	124	152	130	369	278
BVPS	1,133	1,415	1,548	1,897	3,630
DPS (common)	0	0	0	0	50
Valuations (x)					
P/E***	0.0	0.0	0.0	0.0	33.2
P/B***	0.0	0.0	0.0	0.0	2.5
EV/EBITDA	2.9	0.8	0.0	(0.5)	24.8
Ratios (%)					
ROE	11.6	11.7	8.8	21.4	10.3
ROA	5.2	5.4	4.3	10.8	7.2
ROIC	6.9	9.9	9.0	25.7	14.5
Payout ratio	0.0	0.0	0.0	0.0	18.7
Dividend yield (common)	n/a	n/a	n/a	n/a	0.5
Net debt to equity	50.2	13.5	0.4	(14.4)	(54.8)
Interest coverage (x)	8.3	9.2	7.0	12.3	11.1

Note: *Excluding one-off items;
**Fully diluted, excluding one-off items;
***From companies subject to equity-method valuation

Source: Company data, Samsung Securities estimates

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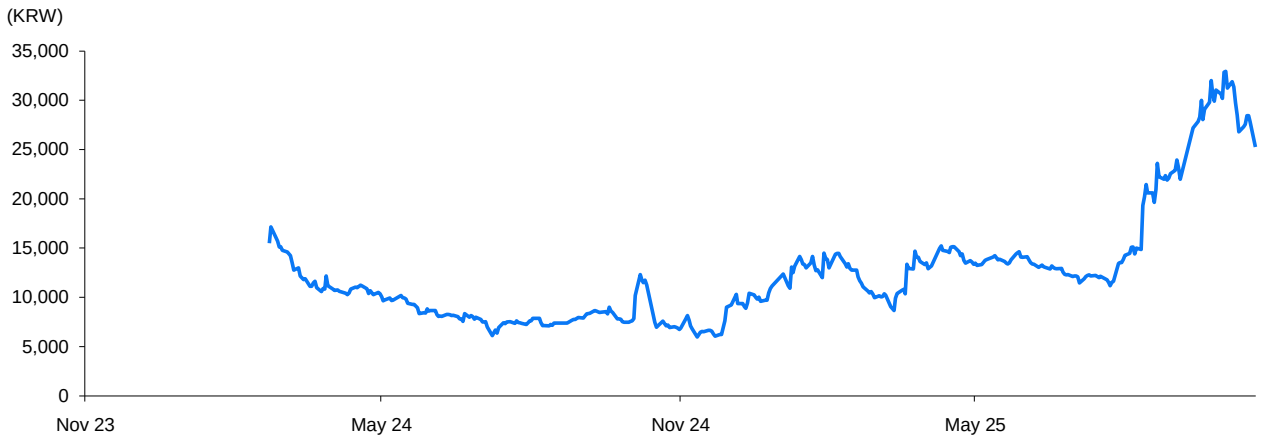
Target price changes in past two years



Rating changes over past two years (adjusted share prices)

Date	2025/11/17
Recommendation	Not Rated
Target price (KRW)	n/a
Gap* (average)	
(max or min)**	

Note: * [(average, maximum, or minimum share price over duration of target price minus target price) / target price] x 100%
** Maximum/minimum share price if new target is higher/lower than market close on the business day prior to target price change

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Company

BUY	Expected to increase in value by 15% or more within 12 months and is highly attractive within sector
HOLD	Expected to increase/decrease in value by less than 15% within 12 months
SELL	Expected to decrease in value by 15% or more within 12 months

Industry

OVERWEIGHT	Expected to outperform market by 5% or more within 12 months
NEUTRAL	Expected to outperform/underperform market by less than 5% within 12 months
UNDERWEIGHT	Expected to underperform market by 5% or more within 12 months

* Note: Effective Jul 27, 2023, BUY, HOLD, and SELL criteria are based on expectations of share-price moves of 15% or more within 12 months

Percentage of ratings in 12 months prior to 2025.09.30

BUY(83.5%)·HOLD(16.5%)·SELL(0%)

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