

From Small Giants to Global Champions: Korean Suppliers in Ideal Position to Benefit from Supply Chain Realignment

30%

South Korea accounts for approx. 30% of global LiB Patent Asset Index (2023)

24%

South Korea represents 24.4% of the global semiconductor production market (2022)

6th

in IMD's 2023 World Digital Competitiveness Ranking

To many, the global supply chain has entered a new era. Not so long ago, manufacturing groups designed their production networks by prioritizing price efficiency, leading to supply chains that expanded across countries and continents. In recent years, however, a combination of supply-side disruptions, geopolitical tensions and advanced technological breakthroughs have forced companies and governments to rethink the architecture of global trade.

While America's landmark policies, such as the Inflation Reduction Act (IRA) and the CHIPS Act, have grabbed headlines, most major economies passed similar policies, with common objectives like bringing strategic industries onshore and prioritizing suppliers from "friendly countries."

The current period of transition will bring about both winners and losers. Amid this period of transition, one country's suppliers find themselves in an ideal situation: South Korea.

Having established a robust track record over the past decade by supplying domestic multinationals, Korean firms are positioning themselves as alternatives of choice to replace traditional suppliers for the creation of supply chains compliant with each country's policies.

Furthermore, Korean suppliers have historically competed on three core advantages: flexibility, fast delivery and the adoption of disruptive technologies. In an era where technological advancements converge with supply chain realignment, agility and speed have never been more in demand, leading the country's suppliers to expand across industries.

Secondary Batteries

The battery sector, essential to a growing number of applications from EVs (electric vehicles) to renewable energy, is first on the list. The aforementioned IRA, in particular, has spurred Korean investments in the battery sector and presented companies with opportunities. Lim Jonghyun, president of A-PRO, a leader in battery activation equipment, argues: "North America is poised to heavily invest in EVs. Thanks to the IRA, we've managed to sidestep direct competition with Chinese counterparts."

Korean groups like LG Energy Solution and Samsung SDI are pivotal in this evolving landscape as they look for domestic suppliers to enhance cost-efficiency and meet regulatory requirements. "We've been actively engaged in pilot services for Hyundai Motors and are collaborating on solid-state battery development," explains Mr. Lim. This collaboration underscores the synergy between major Korean conglomerates and sup-

pliers, enabling the latter to build a track record with major groups before expanding globally.

James Choi, president of KEMCO, a subsidiary of Korea Zinc Group, sees opportunities in the production of nickel sulfate and precursor cathode active materials (pCAM), which are vital for battery manufacturing. Despite South Korea's strengths, it heavily relies on Chinese producers for these materials. Mr. Choi states: "Our primary mission is to address this gap... Once we fulfill this mission by around 2028-29, we will pivot towards international expansion."

Investors were quick to take notice of this positive situation, sending Korean stocks soaring throughout 2023, with cathode producer Ecopro recording a +500% return. Although 2024 saw a downturn due to slower EV sales, the long-term prospects for Korean battery companies remain promising. South Korea is poised to lead in R&D, with patent analysis from IAM media indicating that South Korean firms will soon outpace Chinese, Japanese and U.S. companies in both the quantity and quality of lithium-ion battery (LiB) patents.

Semiconductors

The semiconductor industry is another area where Korean suppliers face major opportunities. The CHIPS Act aims to bolster domestic semiconductor production in the United States, creating new dynamics in the global supply chain.

A case in point is NextIn Solutions. Having successfully localized various wafer inspection technologies, the company is now set to break the monopoly that KLA, a global leader in yield management systems, enjoys in the dark field inspection market, a technology utilized for the defect inspection of a large number of wafers. "Our growth strategy revolves around acquiring a substantial share of KLA's market," explains Chris Park, CEO of NextIn. "We are aiming for a share of 30 percent."

Here again, the collaboration with Korea's leading semiconductor conglomerates has provided suppliers with a decisive advantage. Kang Doo-Hong, president of ASFLOW, which provides high-purity components such as valves, pipes and fittings to major foundries, emphasizes that working with those conglomerates has allowed the company to achieve reliable delivery and competitive pricing. "Chipmakers are fostering competition with overseas suppliers to drive down overall costs," says Mr. Kang. "This competition elevates the technological proficiency of domestic suppliers, enabling them to meet global standards and expand their market presence."



Lee Dong-cheol, CEO, Hana Micron

To successfully expand, Mr. Kang notes the importance of local partnerships: "Securing reliable local partners is paramount. While localization aids in market penetration, listening to partners' needs and ensuring prudent investment in shared ventures are essential to sustain long-term partnerships."

Lee Dong-cheol, CEO of Hana Micron, South Korea's largest outsourced semiconductor assembly and test (OSAT) enterprise, also echoes this opinion: "As Samsung and SK Hynix expand into Western markets, they seek to bring their OSAT partners along." In turn, this situation has provided the company with a local footprint to reach local partners. "Hanamicon is expanding its portfolio by engaging with U.S.-based fabless companies such as NXP or Microchip Technology."

Leveraging Digital Transformation

To further expand across industries, Korean firms can count on a hidden ace: the country's advanced IT environment. In IMD's 2023 World Digital Competitiveness Ranking, South Korea ranked sixth globally, its best position to date.

Having access to this advanced digital ecosystem has enabled enterprises not just to compete, but to disrupt traditional sectors. Notable examples are found in the automotive field, where Charles Bang, president of Dongseo Machine & Tools, a leader in aluminum die casting that counts Hyundai among its clients, has made the adoption of AI-based quality control a key factor in its development of giga casting technologies. "While our core expertise remains rooted in precision machining and casting processing, what sets us apart today is our commitment to infusing intelligence into these processes," he explains. "Our focus has evolved to encompass the integration of smart technologies within our operations, thereby enhancing efficiency and productivity."

In turn, the growing adoption of digital technologies across industries is creating opportu-

nities for components and material suppliers. Such has been the experience of Novatech, which produces industrial magnets key to the creation of AI-enabling hardware. "As we transition to the era of autonomous vehicles equipped with advanced AI functions, the importance of controllers, sensors, motors and other mechanical and electric parts will increase," explains Oh Choon Teak, Novatech's CEO. "With the shift to motor-powered vehicles, the demand for magnets, which we produce, is steadily rising."

While manufacturing firms are often criticized by industry experts for their limited utilization of digital tools, many Korean suppliers have made the adoption of smart technologies a cornerstone of their R&D strategies. A case in point is KORLOY, one of Korea's leading cutting tool specialists, which created a pilot line to freely experiment with novel processes. "Unlike the manufacturing section, where implementing new IoT equipment could disrupt production cycles, the pilot line operates independently, granting us the freedom to explore different digital solutions," explains President Junghyun Yim. "This experimentation paves the way for insights that can potentially minimize future failures when integrating such technologies into the manufacturing domain."

Despite having limited resources relative to larger firms, advanced automation systems have allowed Korean SMEs to extend their product portfolios. DaeHan Precision Industry, an SME specialized in hydraulic hose fittings for the construction machinery sector, offers a striking case study. "Our competitiveness rests on three key factors," explains President Kim Oh Gon. "First is productivity and automation. We're pioneers in adopting robots in our assembly lines and plan to introduce 39 robot lines by 2027. Second is material development... Third is high-mix, low-volume production, allowing us to manufacture multiple products in low volumes from our smart factories." Despite its small size, the company offers over 3,500 products, enabling it to tailor their offering to each client's needs.

Korean suppliers' eagerness to adopt digital tools has also created a fertile environment for start-ups and innovative ventures, which can swiftly find practical applications for frontier technologies. Choi Chi Won, president of P&C Solution, a leading developer of XR simulations for the defense, medical and education fields, sees potential in the manufacturing sector. "Developers in smart factories can input information on error resolution using AR or VR into the system. This allows individuals to undergo pre-emptive training through shadowing. Subsequently, when faced with a real issue on-site, workers can apply the learned solutions from AR or VR," he explains.

As the industrial world embraces a new era of technological innovation and supply chain shifts, the demand for flexibility, speed and disruptive technologies has never been higher. Fortunately for Korean suppliers, these strengths have defined their success over the past decades, leading us to ask the question: are Korean suppliers on the verge of transforming from small giants into global champions?

Shaping the Digital World Through Tech Innovation



Metalense 2 (XR glasses)

A Korean company founded in 2015, the smart glasses manufacturer P&C Solution has ambitious plans for growth in the AR/XR sector.

A Korean manufacturer that specializes in augmented reality (AR) and extended reality (XR) technology, P&C Solution is a small to medium-sized enterprise with a clear mission statement.

"At P&C Solution, 'P&C' stands for 'Positive' and 'Creative,'" President Choi Chi Won explains. "We want this name to be a reflection of our company: a gathering of positive and creative individuals who are actively shaping the digital world through technological innovation."

P&C Solution's flagship product is its Metalense smart glasses, which draw on optical technology developed by the company to offer the brightest and clearest display among AR/XR glasses worldwide.

Metalense's opening model won an Innovation Award at the prestigious Consumer Electronics Show (CES) in 2023—and has now been followed by a new iteration. Unveiled this year, Metalense 2 offers improvements such as enhanced outdoor visibility, extended battery life and greater comfort for the wearer.

P&C Solution's glasses have applications in a wide range of industries. "In the medical field, for example, they're used for dental implant surgery," Mr. Choi says. "They can calculate the 3D space or gap between the drill tip and dental nerves. This aids dentists in performing safer surgeries."

The firm also boasts a growing portfolio of defense clients. "Following our recognition at CES, a U.S.-based company reached out to us, expressing the need for our glasses in repairing U.S. Air Force aircraft," Mr. Choi reveals. "For instance, an individual wearing the glasses can identify a bolt that isn't securely fastened in an aircraft."

Along with Europe, North America is a major focus of P&C Solution's efforts to strengthen its global presence. As part of this drive, the manufacturer has partnered with the U.S. tech



"We aim to create smart glasses that are compact, lightweight and powerful, capable of enhancing people's capabilities while ensuring comfortable wear."

Choi Chi Won, President,
P&C Solution Co., Ltd.



www.pncsolution.co.kr

giant Qualcomm, which provides the central processing unit (CPU) in Metalense glasses.

"Collaborating with renowned international brands allows us to prove ourselves, gain validation and raise our brand awareness," Mr. Choi says. "Despite being a small company, we have immense potential to produce outstanding products. Through collaborative efforts with the U.S., I'm confident we can unleash our full potential."

For Mr. Choi, the goal is international market domination: "My hope is that in five years' time, we'll have developed top-tier glasses surpassing the standards set by Meta and Apple. I aspire for P&C Solution to emerge as the global leader."

Semiconductor Sector's Perfect Partner

A Korean company that has enjoyed impressive growth—and has ambitious plans for continued expansion—NextIn supplies top-quality defect detection equipment to semiconductor manufacturers.

Founded in 2010, the Korean company NextIn Solutions provides high-quality defect detection and metrology technology to semiconductor manufacturers at home and abroad. Based in Hwaseong, the firm supplies dependable systems that cover bright-field and dark-field wafer inspection, and offer solutions for 2D and 3D semiconductor manufacturers. NextIn's technology guarantees a high defect capture rate and works quickly—helping its customers to carry out efficient, effective production processes that result in excellent semiconductor yields.

A company that has worked hand in hand with major names in the tech industry—such as Intel, Samsung and SK Hynix—NextIn has enjoyed impressive sales growth in recent years. Indeed, the firm's revenue rose by 103 percent between 2021 and 2022. This increase is thanks, in no small part, to a versatile product range that is helping to fill a void that appeared in the marketplace just under 15 years ago.

"An interesting shift occurred in 2010, when the wafer inspection systems company AMAT exited the dark-field industry," NextIn CEO Chris Park recalls. "This left another company, KLA, with a complete monopoly. However, device makers prefer a competitive market, avoiding dependence on a sole vendor. Recognizing the need to break this

monopoly, NextIn has ventured into the dark-field equipment market, aiming to compete with KLA."

Among NextIn's flagship defect detection technology is the AEGIS Series—innovative, cost-effective 2D imaging equipment that uses both bright-field and dark-field illumination. "AEGIS wafer inspection systems can detect not only pattern defects like bridges, thinning, protrusion and footing, but also scratches and particles in film, pattern-generation, planarization, ion implantation and cleaning processes across all semiconductor manufacturing sequences, resulting in a superior return on investment for its customers," the company says.

In the area of 3D wafer manufacturing, meanwhile, NextIn has developed the IRIS inspection system. Using the firm's patented Multiple Off-focus Image Process Technology, IRIS detects defects in 3D manufacturing environments such as high aspect ratio (HAR) wafer production and through silicon via (TSV) processing.

"Our growth strategy revolves around acquiring a substantial share of 30 percent in the dark field inspection industry."

Chris Park,
CEO, NextIn Solutions

What's more, NextIn's customers can now complement both AEGIS and IRIS by equipping them with an integration module known as KROKY (formerly TWINS)—a newly developed device which oversees edge trimming, identifying cracks and chips.

As part of its continuous efforts to bring through state-of-the-art defect detection technology, NextIn is also working on charge removal equipment that can eliminate harmful static electricity from chip production systems that use extreme ultraviolet (EUV)

light. Given the important role that EUV lithography has to play in the future of the semiconductor industry, this is a project of no little significance.

A next-generation production method, the EUV process will allow manufacturers to continue to deliver chips of unprecedented power and energy efficiency, in turn enabling the cutting-edge technology that we use in our daily lives, such as smart cars, phones, watches and homes.

On top of the versatility of its technology, NextIn's rising revenue has come down to the company's steadfast commitment to strengthening its presence outside of South Korea. "From 2020 to 2023, our growth was significantly driven by the Chinese market," Mr. Park explains. "And now, beyond 2023, we are strategically working towards expansion in the U.S. and Japanese markets."

In Japan, NextIn's plans for international advancement have come up against a clash in business cultures—but are now steadily progressing, despite being interrupted by the pandemic. "The Japanese market tends to be conservative," Mr. Park says. "While Korea is often associated with the tagline 'dynamic Korea' upon arrival at Incheon Airport, signifying its readiness to explore and adopt new equipment, Japanese clients exhibit a more cautious approach. De-

spite establishing positive business relations with Japanese companies pre-COVID-19, the pandemic severed these ties. However, Toshiba recently reinitiated contact, and we are currently engaged in discussions."

As he looks to the future, Mr. Park backs NextIn to enjoy continued growth, as long as it remains a firm that loves the work it does—and crafts products that inspire the same emotion in its customers. "At NextIn, we have a slogan that encapsulates our vision: to be a company where employees arrive at work with a smile, and where children take pride in their parents working for us," the CEO declares.

"I consistently convey to my team that while NextIn may not be the largest company globally, we can strive to be the best. Achieving this goal would bring me immense joy. What I mean by this

is, while we may not produce products on the scale of BMW or Ferrari, we can aspire to create something akin to the beloved Beetle.

Many people experienced genuine happiness driving a Beetle. I aspire to build a company that brings such joy to people's lives."



AEGIS



IRIS

NextIn
<https://nextinsol.com/en>



"Our primary goal is for ASFLOW to emerge as a globally recognized top-tier company."

Kang Doo-Hong,
President, ASFLOW

ASFLOW: Driving Semiconductor Innovation

ASFLOW, a Korean company specializing in Ultra High Purity technology, leverages decades-long partnerships and strategic expansions to navigate global challenges and opportunities in the semiconductor industry.

The success of Korean conglomerates has had a positive trickle-down effect on domestic suppliers, providing them with growth momentum and core capabilities. However, in recent times, an increasingly saturated and competitive domestic landscape has necessitated a global outlook for continued growth. ASFLOW, a Korean company specializing in Ultra High Purity (UHP) technology, is navigating this complex landscape with remarkable dexterity.

Founded in the early 2000s, ASFLOW was the first company in South Korea to localize tubes, pipes and fittings for the semiconductor industry. Over the years, the company has expanded its product line to include valves and filters, thereby providing comprehensive process gas supply solutions for major players like Samsung and SK Hynix. ASFLOW's holistic approach, which spans from basic components to advanced modularized systems, positions it as a crucial player in the global semiconductor supply chain.

Kang Doo-Hong, president of ASFLOW, emphasizes the company's commitment to quality and innovation. "Our collaboration with Samsung over two decades has endowed us with expertise and experience, facilitating our penetration into the challenging process equipment sector," says Mr. Kang. This long-standing partnership has not only fortified ASFLOW's market position but also underscored its potential to engage with global giants like Applied Materials, Lam Research and TEL.

In 2018, ASFLOW achieved registered partnership status with Applied Materials, followed by Lam Research in 2022. These milestones highlight ASFLOW's growing influence in the semiconductor sector. "Anticipated encounters with Texas Instruments, Intel and TSMC, as they onshore their plants, are on the horizon," notes Mr. Kang, reflecting on the future opportunities for ASFLOW in the global market.

Despite the promising outlook, ASFLOW faces significant chal-

lenges, particularly from Taiwanese and Japanese competitors. Mr. Kang points out: "Japanese companies often favor domestic suppliers, while Taiwanese counterparts may lean towards Japanese contenders, perceiving Korean suppliers as direct competitors." To navigate these challenges, ASFLOW has engaged in original equipment manufacturer (OEM) businesses with both Taiwanese and Japanese entities, delivering to TEL and TSMC plants through intermediaries.

U.S. governmental policies such as the IRA and CHIPS Act also influence the landscape in which ASFLOW operates. While these policies may not directly impact smaller companies like ASFLOW, they signify a broader realignment of the supply chain, benefiting conglomerates and mid-sized enterprises. Mr. Kang remains optimistic about the future, noting the potential benefits from such policies for the broader industry ecosystem.

ASFLOW's specialization in UHP technology extends its solutions be-

yond the semiconductor industry, encompassing applications in OLED, biotech and aerospace sectors. However, the current focus remains on the semiconductor industry, with a strategic shift towards the tools and module markets. Mr. Kang elaborates: "Our comprehensive product lineup, spanning from tubes to filters, enables us to offer fully modularized solutions, presenting a distinct advantage over competitors."

The semiconductor industry's evolution presents both challenges and opportunities for ASFLOW. The company's robust manufacturing capabilities, combined with ongoing investments in R&D, position it favorably for future growth. As Mr. Kang envisions: "Our primary goal is for ASFLOW to emerge as a globally recognized top-tier company, renowned for its excellence worldwide."

By establishing global production hubs in the U.S. and China, ASFLOW aims to enhance its market presence and operational efficiency. This strategic expansion, coupled with a commitment to innovation and quality, sets the stage for ASFLOW to play a pivotal role in the future of semiconductor manufacturing.



Tubes and pipes



Diffusers



Fittings

ASFLOW
AEROSPACE & SEMICONDUCTOR FLOW CO., LTD.

<https://asflow.com>

KEMCO Targeting the Global Nickel Market

Part of the Korea Zinc Group, KEMCO has become a major player in nickel sulfate production for EV batteries. The South Korean company now plans to boost production to meet growing global demand.



"Drawing from our extensive industry experience and past endeavors, I'm confident in our ability to produce nickel products with a cost-competitive edge."

James Choi,
President, KEMCO Co., Ltd.

KEMCO was established in 2017 in line with the increasing demand for the secondary battery utilized by the EV (electric vehicle) and ESS (energy storage system) industries and has stayed firmly put for nearly a decade. The Korean company specializes in the production and supply of nickel sulfate—one of the core materials in the manufacturing of secondary batteries for EVs—currently producing 80,000 tons annually, with plans to increase the volume to meet the growing demand in the EV industry.

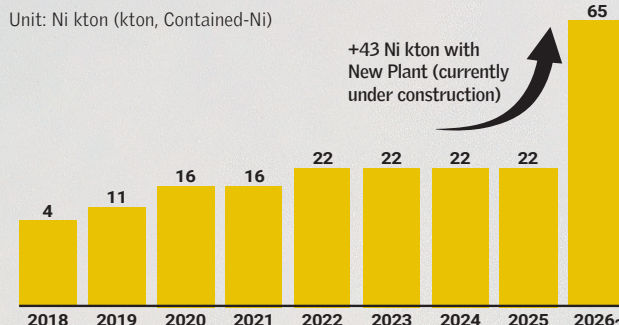
Despite being a relatively young company, KEMCO has achieved substantial revenue growth within a short period. The company has been working

hard to increase its business opportunities in the Japanese market, with 70 percent of its products being sold to Japan. Company president James Choi points out, however, that such growth has not come without its challenges.

South Korea currently relies heavily on Chinese nickel sulfate and pCAM (precursor cathode active material) producers. pCAM is a core substance used to manufacture the lithium-ion batteries found in EVs. However, Mr. Choi highlights that "our foremost objective is to bridge this gap in nickel sulfate and pCAM production. This endeavor is crucial not only from an economic standpoint but also for national security and ecosystem sustainability within the battery industry." KEMCO has begun bridging this gap through its collaboration with LG Chem—known as Korea Precursor Company—to increase its pCAM production efforts by implementing cutting-edge technologies to create the world's largest reactor. By decreasing its reliance on Chinese production, the company plans to start channeling a substantial portion of its nickel sulfate production into its in-house pCAM production, serving as a critical link in the supply chain which could extend potentially to the U.S. market.

Along with reducing reliance on Chinese production, being able to produce nickel sulfate and pCAM in the same geographical area is important to avoid logistical con-

Production will increase rapidly, from 22 to 65 Ni kton, after the construction of KEMCO's new refinery in year-end 2025, helping to support customers' potential requirements



straints. This logistical constraint is one of the hurdles the company faces to break into the U.S. and European markets. However, it is a hurdle the president is confident they can address, stating: "By the end of the 2020s, we aim to offer a complete package from nickel smelting and refining to pCAM production. This integrated solution will be deployed globally based on market demand." Offering a competitive edge such as this over Chinese companies will stand KEMCO in good stead given the ongoing worldwide realignment of supply chains which has seen Korean companies become trusted allies in both the U.S. and European markets.

Mr. Choi explains that the price volatility of various feed materials like nickel has posed an additional hurdle for the company, necessitating flexibility to adapt to market fluctuations—something that demands substantial investment. To address this, KEMCO has embarked on the construction of an all-in-one nickel refinery, commencing this year with an anticipated completion by the end of 2025. He points out that "this refinery will enhance our flexibility in handling various feed materials (MHP, matte, black mass) and therefore mitigate the risks associated with price volatility."

The future trajectory of KEMCO looks clear, with the implementation of its new nickel refinery, pCAM production through its joint venture, Korea Precursor Company, and defined destinations for its products. When asked about his personal ambition for KEMCO, the president highlights that whilst the company currently has a plan to build the largest nickel refinery in South Korea, he hopes to provide a one-stop solution, from nickel refining to pCAM production, thereby contributing to the EV industry.

KEMCO
Korea Energy Materials Company
www.koreaenergymaterials.com



A-PRO: Pioneering Innovations in the EV Battery Supply Chain

A-PRO, a key player in the EV battery supply chain, focuses on customization, technological innovation and strategic R&D, driving efficiency and sustainability in the industry.



"Our strength lies in technological innovation, with over 50-60 percent of our workforce dedicated to R&D."

Lim Jonghyun,
President, A-PRO

The proliferation of electric vehicles (EVs) is a notable phenomenon not just in the West, but also in China, and recently, the United States has implemented policies to incentivize domestic production. LG has established operations in the U.S. to offer battery solutions, and A-PRO has followed suit, providing equipment and after-sales service. In this evolving landscape, A-PRO stands out as a key player in the global EV supply chain, particularly concerning secondary batteries.

"North America is poised to heavily invest in the EV sector," says Lim Jonghyun, president of A-PRO. "Thanks to the Inflation Reduction Act (IRA), we've managed to sidestep direct competi-

tion with Chinese counterparts. Despite the current stagnation in the EV market, I firmly believe that EVs represent the future trajectory for us."

A-PRO's journey began in 2000 as a power components manufacturer. Over time, the company evolved to focus on rechargeable battery manufacturing equipment, initiating partnerships with industry giants like LG Energy Solutions. Today, A-PRO boasts a comprehensive portfolio, emerging as a total solution provider for power conversion-related devices and systems.

"Our current identity is rooted in our journey as a total solution provider, leveraging our foundational technologies such as AC/DC and DC/AC converters," Mr. Lim explains. "These technologies served as the cornerstone for our entry into battery activation."

A-PRO's engagement in the secondary battery market started in 2014, driven by orders from Samsung SDI. The company supplies all activation processing equipment and devices to the secondary battery market, meeting the demand for bi-directional converters. This technological

advancement allows for both discharging and charging within the same circuit, a significant innovation in the field.

Customization and flexibility are key aspects of A-PRO's operations. "Customization is paramount in the secondary battery field due to varying requirements among companies," Mr. Lim notes. "For instance, we supply Samsung SDI with prismatic types, while LG Energy Solution and SK receive pouch types."

To address these diverse needs, A-PRO allocates over 50-60 percent of its workforce to R&D, comprising electronic software and hardware engineers. This focus on R&D enables the company to provide tailored solutions that enhance battery performance and client satisfaction.

Working with Korean MNCs, known for their exacting standards, has further honed A-PRO's competitiveness in the international market.

"Our strength lies in technological innovation," the A-PRO president emphasizes.

"We actively propose solutions that align with our clients' needs. Through our long-term partnerships, we've developed an intuitive understanding of our clients' preferences, which helps us secure more orders."

A-PRO's innovations extend to enhancing battery performance and safety. The company focuses on assessing battery performance to ensure maximum capacity while identifying any defects. This involves continuous testing and measuring of various battery properties, including internal resistance and Electrochemical Impedance Spectroscopy (EIS).

"We have developed a deep learning system that can assess the state of health (SOH)



A-PRO Global Center Headquarters

of batteries within just 10 minutes," Mr. Lim shares. "This system rapidly analyzes the SOH curve within three minutes and makes a decision within 10 minutes."

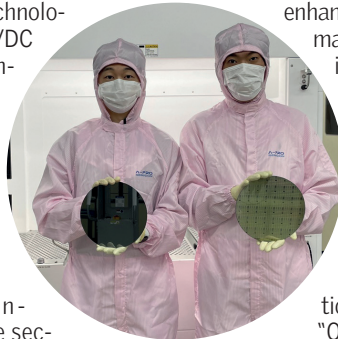
A-PRO's strategic integration of GaN semiconductors has also been pivotal in driving efficiency and miniaturization. This synergy between A-PRO's equipment competitiveness and A-PRO Semicon's innovative GaN transistor technology has significantly enhanced the company's offerings.

"Our primary focus remains closely aligned with LG Energy Solution," the president explains. "While we actively engage with new battery cell makers in the EU in terms of R&D, we refrain from direct overseas marketing initiatives at present."

Looking ahead, A-PRO is poised to leverage its core capabilities to explore new business opportunities and integrate new technologies into the fast-charging process. The company is also working on methods to detect and assess used batteries, contributing to a more sustainable approach to battery disposal.

A-PRO

<https://en.aproee.com>



200mm GaN on Si
Epi and Device wafer



Silver Tower Order of Industrial Service Merit 2023

KORLOY: Revolutionizing Manufacturing Through Happiness Management

Through DX-driven system competitiveness, strong brand value and exceptional product quality, KORLOY prioritizes innovation, global expansion and employee satisfaction.



"Our overarching goal is fostering a culture where everyone finds fulfillment in their work."

Junghyun Yim,
President, KORLOY

KORLOY, a prominent player in the metal cutting tool industry, stands out for its unique approach to business, combining innovation with a strong emphasis on employee happiness and digital transformation. Led by President Junghyun Yim, the company has carved a niche for itself both domestically and internationally, driven by a philosophy that intertwines advanced technology with a nurturing corporate culture.

At the heart of KORLOY's success is a commitment to happiness management. Mr. Yim emphasizes: "Ensuring employees feel fulfilled and content in their roles is paramount. If work is a source of misery, it taints half of one's waking hours, profoundly impacting overall well-being." This philosophy is not just about providing adequate compensation but fostering a positive work environment where employees can thrive. He believes that nurturing positive workplace relationships is integral to job satisfaction and, consequently, to the company's success.

System Competitiveness Through Digital Transformation

KORLOY has been at the forefront of digital transformation since 2019, incorporating IoT (internet of things) and digital technologies to enhance its manufacturing processes. "We utilize data analysis to optimize our processes and find the best solutions, feeding this information back into our research and development sector for deeper analysis," the president explains. This digital shift has not

only improved efficiency but also enabled the company to respond swiftly to market changes and customer needs.

A key innovation is the establishment of a pilot line within the R&D department, allowing rapid customization and prototype development. "This enables us to provide customers with samples promptly, aligning with their delivery requirements without fail," he says. The approach has significantly reduced lead times for prototype production, enhancing KORLOY's ability to meet customer demands quickly.

Brand Value

KORLOY's brand value is rooted in its ability to innovate and maintain close relationships with customers. Despite intense competition from global giants like Sandvik, Iscar and Kennametal, KORLOY has carved out a significant market share by consistently introducing new products aligned with market trends. "Our strategy hinges on nurturing deep relationships with our customers, ensuring that we not only deliver exceptional products but also provide comprehensive support services," Mr. Yim notes.

The company's commitment to globalization has also bolstered its brand value. KORLOY has effectively expanded its international footprint with branches in key markets like Turkey, Russia and Germany in Europe, the United States and Brazil in the Americas, and China and India in Asia. "Glo-

balization remains a cornerstone of our strategy," he asserts, highlighting the importance of establishing local branches staffed by experts who understand regional market dynamics.

Product Quality

Product quality remains a cornerstone of KORLOY's reputation. The company offers a range of high-performance tools, such as the Super Endmill and a high-pressure coolant tool, tailored for difficult-to-cut materials in industries like automotive, aerospace and medi-

cal devices. Mr. Yim emphasizes the importance of innovation in product development, particularly in response to the evolving needs of sectors like renewable energy and medical devices.

"Our tools initially may have lagged behind competitors in overall quality, but our emphasis on customization fostered loyalty among customers," he recalls. This customer-centric approach has been integral to KORLOY's growth, allowing it to compete effectively on the global stage.

KORLOY's journey, marked by a strong emphasis on employee happiness, digital transformation and relentless innovation, offers a blueprint for modern manufacturing success. By prioritizing the well-being of its employees and leveraging cutting-edge technology, KORLOY not only enhances its competitiveness but also ensures sustained growth in a rapidly evolving market. Moreover, as a leading cutting tool manufacturer, KORLOY is committed to fulfilling its role in the industry and establishing itself as a company that grows alongside its customers.





Everyday we pursue

"Another Originality"

for the future



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Korean Leader in Magnet Technology Commits to Expanding Existing Portfolio

Novatech has witnessed rapid revenue growth, surpassing USD 100 million in 2022, driven by the swift diversification of neodymium-based magnet applications. These applications span tablets, home appliances and autonomous vehicles. Now, the Samsung supplier is prioritizing R&D efforts to introduce new technologies to the market.

Established in 2007, Novatech specializes in neodymium magnet technology, with a portfolio covering magnets, shield magnets and core materials for laptops, wireless charging pads and smartphone devices, as well as new opportunities in automotive sensors.

Company President Oh Choon Teak explains how the firm is structured: "Our headquarters, equipped with production facilities, houses both marketing and research and development teams. The Korean Institute of Magnetic Technology, which is dedicated to innovative technology development, focuses intensively on researching materials, techniques and applications related to magnets. It collaborates with various OEMs [original equipment manufacturers] and automotive component manufacturers, particularly for field components such as automotive sensors."

The firm, he continues, has a factory equipped for magnet equipment production in Hwaseong, as well as overseas subsidiaries in China and Vietnam, with plans underway to establish a new branch in Laos.

A one-stop shop for magnet technology, Novatech is obliged to compete against established companies such as Hitachi Metals, Shin-Etsu and Arnold Magnetic in the U.S. Mr. Oh, however, is confident that his firm retains a significant competitive advantage in the field.

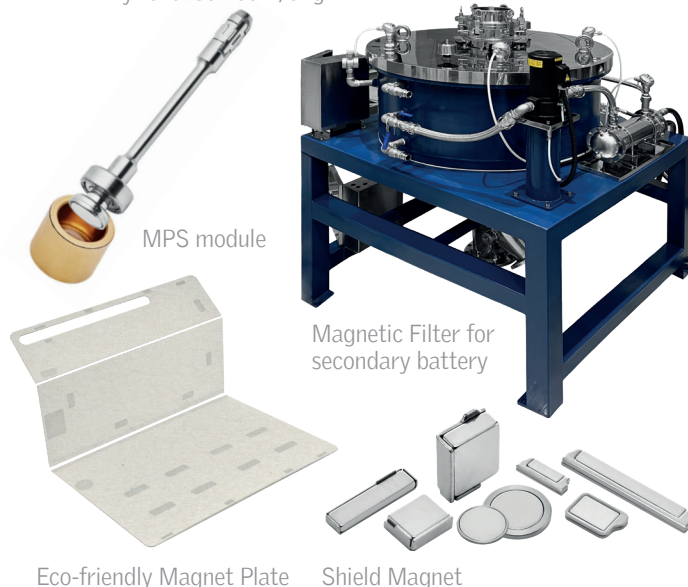
"Our competitive edge lies in our expertise in magnet application," he says. "We meticulously analyze magnet properties and incorporate them into our products. But our real advantage comes from our commitment to R&D. For example, Apple's iPad and Samsung's tablet PC used to have 125 magnets per device. Through continuous research and development, we have managed to reduce the number of magnets in Samsung tablet PCs from 125 to 27, a remarkable achievement."

Elsewhere, the firm's prioritization of innovative R&D practices



"I see Novatech becoming a global entity with a strong international presence."

Oh Choon Teak, CEO, Novatech Co., Ltd.
www.mynovatech.com/eng



has borne fruit in the development of its pioneering Motor Position Sensor (MPS) technology, which utilizes magnets to provide an accurate measurement of the steering wheel shaft. "Currently," Mr. Oh confirms, "we're on track for mass production, and our next step involves proposing our technology and solutions to global OEMs."

Looking to the future, Mr. Oh is expecting the automotive industry to be a major growth driver for

main growth driver, there are nevertheless other opportunities for expansion on the horizon. One such opportunity is in the field of home appliances, where AI and virtual reality are beginning to be used more widely to realize advanced functions, meaning growth in the demand for sensors and actuators. To this end, Novatech is already developing magnets or miniaturized motors for use in such components, with market roll-out just around the corner.

"Our long-term strategy," Mr. Oh states, "is focused on prioritizing innovation in both cost and quality to attract a larger customer base. As part of this initiative, we have launched a rare earth mine development project in Laos to develop neodymium in a country other than China, which we hope will address the unique costs and risks associated with the extraction of rare earth minerals."

For his part, Mr. Oh remains cautiously optimistic about the future. While acknowledging that the global supply chain realignment poses as many potential risks as it does opportunities, the company is as focused as ever on expanding into the global market.

"The majority of inquiries we receive from overseas pertain to magnets and shield magnets," Mr. Oh explains. "For instance, Indian car manufacturers and IT device makers often ask about our magnet offerings. Our primary focus is on closely collaborating with our partners to optimize magnet applications through simulations, sample production and testing."

The future may be uncertain, but the stage is set for Korean small and medium-sized enterprises to storm the global stage. "I believe," Mr. Oh states, "that Korean engineers have unparalleled technological prowess. And my goal is for our company to be recognized as an industry leader, renowned for its technical capabilities and commitment to ESG (environmental, social and governance) management."

the company. "As we transition to the era of electric vehicles and autonomous vehicles equipped with advanced AI functions, the importance of controllers, sensors, motors and other mechanical and electrical parts used in these vehicles will only increase. With the shift to motor-powered vehicles, meanwhile, the demand for magnets is also increasing."

If the automotive industry looks set to be the company's

Korean Hydraulic Firm Targets U.S. Market

More than three decades on from its establishment, hydraulic hose fittings manufacturer DaeHan is looking to showcase its extensive portfolio of products by increasing its presence in both America and Europe.



"We believe in quality and cost-effectiveness, as well as client loyalty and meeting delivery deadlines."

Kim Oh Gon, President,
DaeHan Precision Industry

Initially founded in 1990 as an automobile components manufacturer, today DaeHan Precision Industry is an established international presence, renowned for its manufacture of high-quality, cost-effective hydraulic hose fittings.



DaeHan's representative product line-up

"Our business philosophy," company president Kim Oh Gon explains, "centers on earning our clients' trust. Much like popular restaurants thrive through word of mouth, our clients advocate for us based on our quality, performance and timely delivery."

Such qualities should stand the company in good stead in the face of changes that have seen the domestic landscape be-

come increasingly saturated and competitive. Globally, of course, things are changing too, with the economic conflict between the U.S. and China obliging major corporations to reorganize their supply chains. Far from being problematic, however, this shift provides Korean companies with a significant opportunity.

Mr. Kim takes up the thread: "Ongoing logistical challenges and supply-demand mismatches mean that the U.S. is now turning to its allies, including South Korea, Japan and Taiwan. From the U.S. perspective, while sourcing products from Mexico or Latin America may offer lower costs, political instability in those regions is a concern. Japanese products are costly, and European Union products lack the diversity to meet U.S. market needs adequately. Hence, the U.S. administration is increasingly focusing on the Korean logistics channel."

Meanwhile, having previously sourced raw materials from China, Vietnam and Indonesia, global conglomerates Hyundai, Samsung and LG are beginning to focus on producing finished goods in South Korea by procuring materials and components from Korean small and medium-sized enterprises (SMEs). One of the reasons for this shift, Mr. Kim states, is South Korea's "unrivalled quality and productivity," and DaeHan itself has been supplying products to the U.S. aviation market and companies such as Komatsu, Hitachi and Caterpillar.

The fact that global conglomerates are bolstering Korean SMEs by investing in smart factory technology and advanced automation provides ready-made incentives for the companies that benefit to remain as competitive as possible.

And for his part, Mr. Kim is in no doubt where DaeHan's

strengths lie: "Our competitiveness rests on three key factors. First is productivity and automation. We're pioneers in adopting robots in our assembly lines and plan to introduce 39 robot lines by 2027. Second is material development, where we're continuously experimenting with various materials to find the best fit. Third is HMLV [high-mix, low-volume] production, allowing us to manufacture multiple product types in low volumes from our smart factories."



DaeHan's machining process site

Looking to the future, Mr. Kim cites recent developments such as electric vehicles and electric excavators as factors that will ensure sustained company growth. Elsewhere, achieving miniaturization, lightweight construction and compactness in company products will represent key challenges in maintaining relevance in the rapidly-evolving hydraulic fitting industry.

"We are aiming," he says, "to capitalize on the trend of miniaturization in heavy-duty vehicles, which are becoming lighter all the time." It is worth noting here that the company is anticipating a significant increase in orders for heavy-duty vehicles once conflicts in

Ukraine and the Middle East are resolved.



DaeHan's first factory and headquarters

Another key focus will be the company's product line-up. With 3,500 items currently on offer, Mr. Kim is hopeful that figure can be increased by a further 1,000. "While many of our competitors are moving away from HMLV," he says, "we are embracing it even more."

Already an established international presence, exporting to more than 10 countries, the company is looking to expand further still. "Moving forward," Mr. Kim confirms, "our primary focus will be on the U.S. and European markets. As part of our efforts there, we attended the Hannover Messe exhibition last year, and we are pleased to announce that we will have a booth there in 2024."

With the company's competitive edge based on quality, cost-effectiveness and winning clients' trust, Mr. Kim is keen to emphasize that DaeHan's business management approach also includes knowledge management. He concludes: "DaeHan is actively supporting its employees in pursuing graduate education so they can better contribute to the company's growth. We believe that human resources will play a crucial role in our future endeavors."

