

Hanwha Newsletter

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A Collaborative Robot for a Collaborative Workplace



Say hello to HCR-5, Hanwha's collaborative robot, or Cobot, The best work buddy you'll ever have.

HCR-5 is ready to give you a helping hand around the workplace and autonomously handle all sorts of tedious tasks.

You can also teach HCR-5 new things it can learn to work more efficiently with you through its learning capabilities.

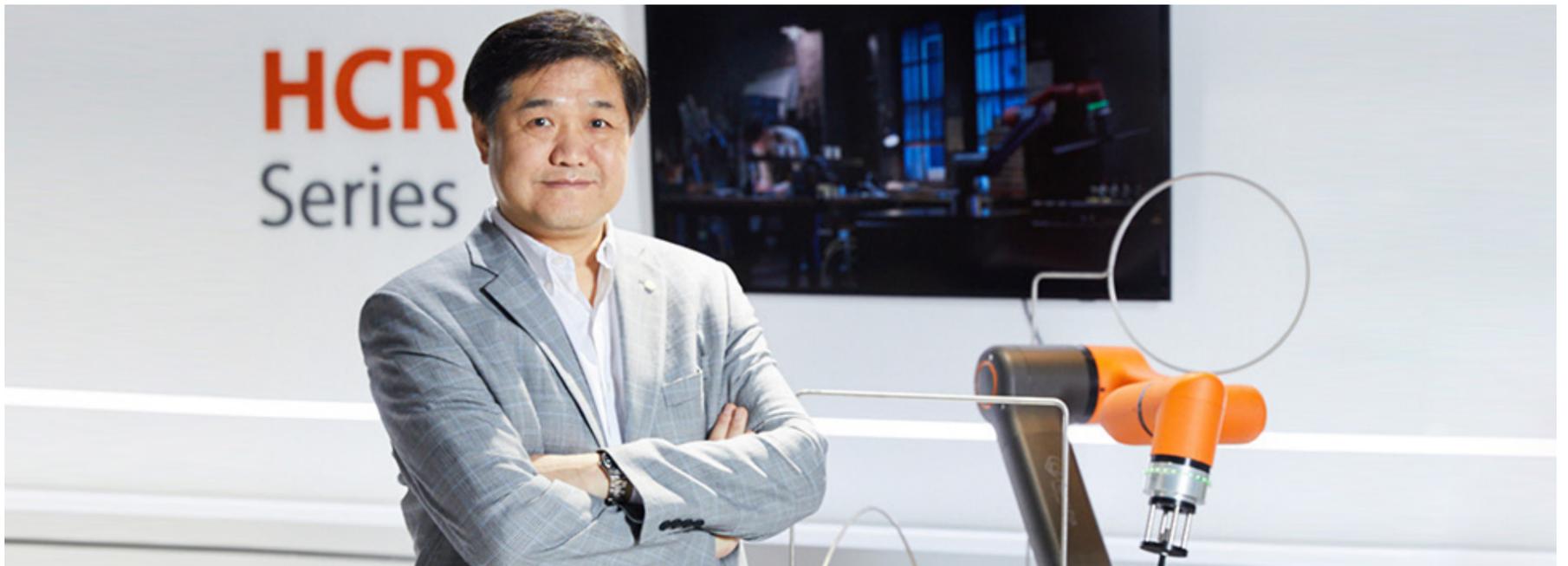
HCR-5 will be the first Cobot ever to be built in Singapore to supply South East Asian manufacturers.

HCR-5 will also be sold to European manufacturing companies through local distributors.

HCR-5 represents a new wave in robotics, where Cobots can work side-by-side with humans and make the workplace safer, and start a revolution for a collaborative future together.

To watch the video, please go to : <https://www.hanwha.com/en/cobot> ■

Hanwha Cobots Reach Out to Shake Up Robotics



Woo Sok Chang, Executive Vice President of Hanwha Precision Machinery, proudly stands next to a HCR-3 collaborative robot as it performs a precision tracking demonstration.

Hanwha Precision Machinery's HCR series of collaborative robots, or Cobots, only entered the market in 2017 but they quickly earned numerous plaudits and gained market share in a record amount of time. Their elegantly graceful design and versatility has attracted the attention of distributors and customers all around the world.

Hear from Hanwha Precision Machinery Executive Vice President Woo Sok Chang, who leads the company's robotics division, about the work he and his division is doing.

Could you please briefly elaborate on the concept of collaborative robots?

Cobots are designed to give people a helping hand in industrial settings. They're meant to handle repetitive tasks that also require precision and consistency. What this does is free up people so that they can handle jobs that require more human intuition and flexibility.

At Hanwha Precision Machinery, we currently have three types of HCR Cobots that can handle three, five, and 12 kilograms of weight, respectively. They're compact, easy to move, and able to handle a wide variety of tasks, making them ideal for small- to medium-sized manufacturers who need a versatile resource in their workplace.

How did Hanwha enter the robotics market?

Hanwha Group began pursuing robotics when the company was discussing how to best address the Fourth Industrial Revolution. We decided to put particular focus on collaborative robots and released the HCR series last year as the first ever Cobots made in Korea.

Hanwha Group has a diverse collection of business interests that includes the energy, industrial equipment, and CCTV camera sectors. As a market leader in these fields, Hanwha already had extensive expertise in areas such as precision machinery, motion control technology, image recognition software, and autonomous navigation.

This is all central to robotics.

We brought together this unique collection of knowledge, experience, and technology to develop our robotics division and bring products like the HCR series to market. We found success quickly because we were able to draw upon people with incredible expertise in robotics and software development to drive Cobot R&D.



In 2018, the HCR-5 became the first robot to be locally built in Singapore through a joint venture between Hanwha and PBA Group

What are the advantages of having Cobots in the manufacturing industry?

A traditional industrial robot is very limited in what it can do. Do you want it to move an object? You'll have to write a computer program so it can do that one task. Do you want it to do something else, like screw in a bolt? You'll have to write another program so the robot can do that. Do you want to move it somewhere else? You'll need to shut down the assembly line and bring in heavy equipment.

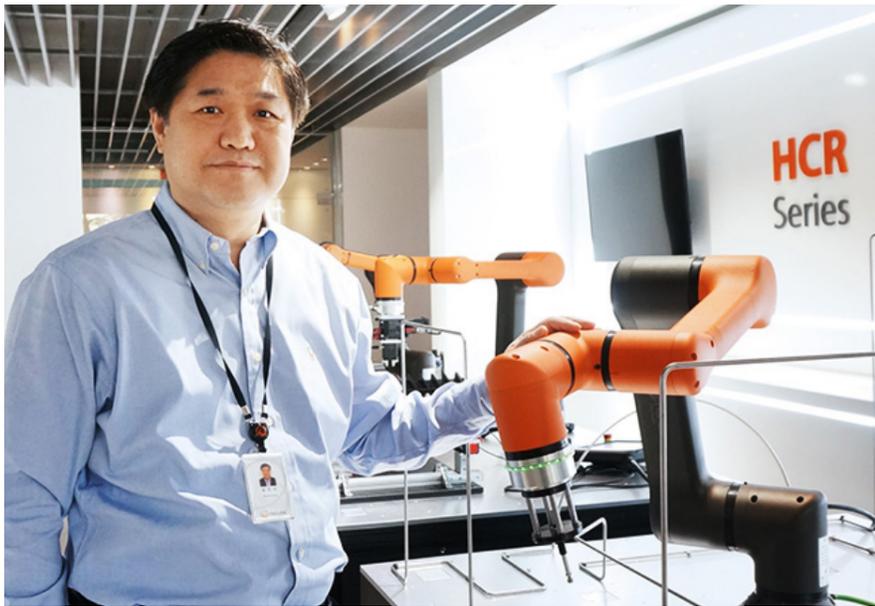
This all takes a lot of time and money.

HCR series collaborative robots take away almost all of this hassle. It will take less than a day for someone to master operating HCR Cobots due to friendly user interface to do a wide variety of tasks. Setting up or changing its workflow is as simple as clicking icons into the order you need.

What do your customers say?

Our customers are overwhelmingly positive about the HCR series. What really sets our HCR series apart from other Cobots on the market is that you can run two HCR Cobots off of a single control unit. They can save up to 10% in operating costs compared to using two Cobots from a competitor. This, combined with how easy it is to use the HCR series, allows our customers to increase their productivity.

Our customers also love how the HCR Cobots look - they are ergonomically designed and beautiful to see. Industrial machines usually have parts that stick out that can snag or bump into other things. The HCR series takes away that danger. We designed the HCR to have smooth lines and curves.



HCR Cobots won the Design Award from IF WORLD DESIGN in 2017 for their product design

Industrial design isn't just about physical safety. People have to also feel comfortable to work next to Cobots, so our HCR Cobots are designed to look friendly and non-threatening. When people look at one, they feel safe.

And they are right to feel safe. HCR Cobots' automated collision detection function will immediately freeze them in place if they detect a bump. This is especially important for the majority of our customers, who are small to medium-sized manufacturing operators with relatively small facilities.

How does the future look for Cobots?

We're working on finding ways to integrate AI, Big Data, and IoT into our products, and how these updated products can then be used in the real world. One amazing thing about being part of Hanwha Group is that we have sister companies that specialize in a wide variety of fields.

We're talking to all of them to learn about how Cobots can be applied to their work and making a list of all their feedback and needs. Our Cobots can be used in Hanwha's machine tool factories and chemical plants, allowing them to adopt distributed manufacturing techniques or even continuous manufacturing. They will provide real-world case studies and show just what the HCR series is capable of and attract more customers.

How will the technology develop?

The ultimate goal is to develop AI to the point where machines can become almost fully autonomous. We are working to make Cobots as easy as possible to operate in any setting and situation.

Industrial robots have existed for more than 60 years, but their application was very limited because of the reasons I stated earlier. It was only in the past two and a half years that AI and deep learning technology could be integrated into the robots' operating systems.

Because of this, we are going to be seeing some fundamental changes in the robotics industry very soon. I used to think in five-year or ten-year cycles, but that's really too slow now. Developments that were previously thought to be several years down the road are happening right now.

How is the market demand for Cobots at the moment?

We're going to see a major paradigm shift in robotics in the next few years. Think of it like the shift from feature phones to smartphones. We're going from devices that are meant to do a few things to devices that will do almost everything.

Cobots are still in a very early stage, and the market is very niche, but there is potential for huge opportunities in the future. Right now, we're seeing lots of interest and growth opportunities in Europe and Southeast Asia.

In the short term, our robotics division aims to double its market share every year. In the middle term, our goal is to become the world leader in Cobot development. With the Fourth Industrial Revolution, we're going to see technological trends leading to more automation and smart factories.

Hanwha plans on going from leading the Korean market to leading the global market for robotics. ■

Hanwha Tricircle Photo Contest : Winner Announcement

Find Your Young Hanwha Spirit

Hanwha Tricircle Photo Contest Winner Announcement



An incredibly diverse group of people from all over **Hanwha** Group showed off their Young **Hanwha** Spirit through their amazing submissions.

A great many thanks to all those who took the time to send in an entry.

Now, here are the contest winners!



GRAND PRIZE WINNER



Crazy Engineer

The picture reflect our dynamic, our fun at work, our will to create something innovative, our collaboration and global partnership.

Three circles new interpretation: Three columns of success (Research and Development, Production, Sales) also for the Global activities (Asia – Europe – America).

- Name : Michael Mette
- Affiliate : Hanwha Q CELLS GmbH (Germany)

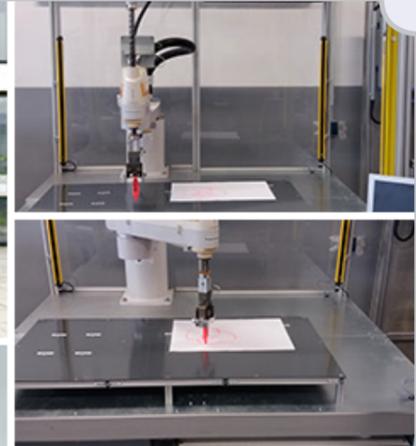


SECOND PRIZE



*“With our young and enthusiastic spirit,
Hanwha Life Vietnam is
ready to face every challenge.”*

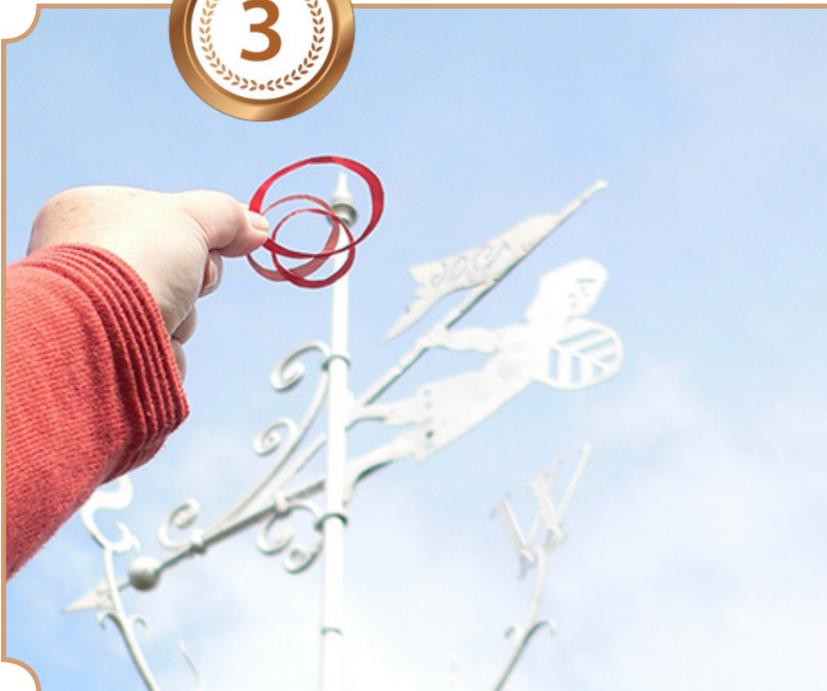
- NAME : Vũ Hoàng Hiệp
- AFFILIATE : Hanwha Life Insurance Vietnam Ltd.



For the business division with the most entries
Hanwha Q CELLS GmbH, Germany



THIRD PRIZE



“ The wind symbolizes the economy which is in constant change and the weather vane indicates the change which symbolizes Hanwha as a leading company. Therefore Hanwha and its people challenge the ever changing economy like the vane on top which seems to challenge the wind. ”

- NAME : Christin Osterloh
- AFFILIATE : Hanwha Europe GmbH (Germany)



“ Across the border between Korea and Japan, we are **young Hanwha**. Ocean Palace's Tricircle is made by golf club, management team, and support team. ”

- NAME : Lee Sookyeong
- AFFILIATE : Acropark Golf Corp. (Japan)



“Pre-graduation photo of
Mikayla Gardner.”

- NAME : Barbara Gardner
- AFFILIATE : Universal Bearings (US)



Grand Prize

Includes

- ONE Hanwha Tricircle Gold Medal
- A crystal trophy, with your winning photo etched onto the surface



Second Prize

Includes

- "Young Hanwha" Commemorative Boxes



Third Prize

Includes

- 2018 PyeongChang Winter Olympic Games
Hanwha Commemorative Torch Pen

Thank you to all those who participated in the
Hanwha Tricircle Photo Contest.

You brought the Young Hanwha Spirit to life.

Hanwha Q CELLS Showcases End-to-End Solar Solutions at Intersolar Europe

- Innovative solar energy solutions, including Q.FLAT-G5 and Q.MOUNT, demonstrate Hanwha Q CELLS' commitment to supporting the entire solar energy value chain
- Q.PEAK DUO-G5 half-cell module shortlisted for the Intersolar AWARD 2018



Hanwha Q CELLS proudly exhibited its comprehensive product portfolio and capabilities in the European solar energy market at Intersolar Europe

Hanwha Q CELLS Co., Ltd.(NASDAQ: HQCL), the world's leading solar cell and module manufacturer, presented a broad range of solar energy solutions at the recent Intersolar Europe exhibition in Munich, Germany. With the rapidly growing European solar energy market forecasted to grow 35% year-on-year in 2018 (according to GTM research), Hanwha Q CELLS is poised to meet the continent's needs with its catalog of solar energy products for the residential, and commercial and industrial (C&I) segments.

Ideal rooftop solar energy solutions

The wide variety of products displayed at the exhibition exemplify how Hanwha Q CELLS is applying its expertise and exacting standards across all areas of the solar energy value chain.

The products showcased at Hanwha Q CELLS' booths at Intersolar Europe included the Q.PEAK DUO-G5 and Q.PEAK DUO BLK-G5 high-performance solar modules. Both monocrystalline solar modules, which are ideal for rooftop mounting, feature 120 half-cut solar cells and Q.ANTUM DUO technology. They also incorporate six bus bars and round wires to deliver superior energy yields. The Q.PEAK DUO BLK-G5 is unrivalled in its aesthetics, making it ideal for installation on residential rooftops.

Hanwha Q CELLS received the Intersolar AWARD 2018 in the Photovoltaics category for the Q.PEAK DUO-G5 solar module. It was one of ten modules, shortlisted out of 53 entries, which were evaluated by an independent jury.

Also on display at Intersolar Europe was the Q.FLAT-G5, a solar module mounting system designed for flat rooftops, such as the ones commonly seen on C&I structures across Europe. Hanwha Q CELLS also had the Q.MOUNT on show, a universal mounting system for sloping rooftops to facilitate quick and easy solar module installation.

Providing flexibility and control

Aside from its diverse range of solar modules, Hanwha Q CELLS also presented customers with an array of energy storage systems that allow users to take full



Hanwha Q CELLS' award-winning Q.PEAK DUO-G5 solar module

advantage of the electricity produced by their solar modules.

For residential solar solutions, customers can choose among three sizes of the all-in-one Q.HOME+ ESS-G1 storage solution. For customers who require more control and flexibility in managing their solar energy consumption, the Q.HOME+ ESS HYB-G2 is a modular storage solution that can be scaled in five different sizes so that system owners can expand their storage capacities to suit their specific needs.

Visitors to Hanwha Q CELLS' booths at Intersolar Europe also got a glimpse of the company's upcoming Q.HOME CLOUD platform, a smart software

solution designed to give homeowners complete autonomy of their home solar energy systems.

Hanwha Q CELLS also promoted its Q.PARTNER Program while at Intersolar Europe. This partnership program provides solar module retailers and installers the opportunity to work closely with Hanwha Q CELLS to further their exposure and success in their home markets.

"Today, we see a great appetite for solar energy solutions in Europe, particularly in the residential and C&I space in Germany and Benelux," says Hanwha Q CELLS EU Sales Head Maengyoong Kim. "Hanwha Q CELLS' broad portfolio of industry-leading and market-ready products at Intersolar Europe demonstrates that we are ready to immediately meet Europe's solar energy needs." ■

Explore This Month's News of Hanwha and Its Affiliates, Taking the Initiative in All Corners of the World



China



Hanwha Hotels & Resorts

Foodist Food Culture(Shanghai) Co., Ltd

Foodist Food Culture Celebrates Dragon Boat Festival with Clients

Foodist Food Culture organized a special event in Shanghai with its valued clients to commemorate the Dragon Boat Festival on June 18. Participants enjoyed getting to make their own zongzi, lotus-wrapped glutinous rice balls that are traditionally eaten during the festival.



The Dragon Boat Festival, also known as the Duanwu Festival, is a traditional Chinese holiday held on the fifth day of the fifth month of the Lunar Calendar. It commemorates the death of Qu Yuan, a celebrated poet and government official in Ancient China. Dragon boat races are held during the festival and people mark the occasion by consuming zongzi and xiong huang jiu, a type of Chinese wine.



Hanwha Techwin

Hanwha Techwin (Tianjin) Co., Ltd

Hanwha Techwin Tianjin Takes to the Field for President's Athletics Competition 2018

The 2018 edition of the annual President's Athletics Competition was another successful team building event that brought employees of Hanwha Techwin Tianjin closer together. This year's iteration, with the theme of "Aiming Higher, For Health and For Fun", included track and field events and mixed relay races for the first time.



The more athletic employees had a chance to show off their physical prowess on

the field, in the spirit of a little friendly competition. Everyone in attendance had a great time that day, giving their all in various events. As the event ended, the employees were reinvigorated, and ready to return to the office to take on the next challenge at work.



Korea



Hanwha Advanced Materials

Hanwha Advanced Materials Non-Tenured Faculty Awards 2018 Selects its Winners

On June 11, Hanwha Advanced Materials held its fourth annual Hanwha Advanced Materials Non-Tenured Faculty Awards at its headquarters in Sejong, South Korea. The recipients of the awards were recognized as Young Leaders among Korean academics currently working in the United States, and received personalized trophies and research grants.

This year's recipients were Lee Chi Hwan of Purdue University and Cha Jeeyoung



of Yale University. They were lauded for their work in nanotechnology and wearable devices, respectively. Lee Sun Suk, CEO & President of Hanwha Advanced Materials, was on hand to personally present them with their awards.

The two award recipients also held a seminar to speak about their research as well as current research trends.

The Hanwha Advanced Materials Non-Tenured Faculty Awards were created in order for Hanwha Advanced Materials to build an R&D network, and for the company to expand its scope of research areas. Candidates for the awards must be Korean academics with less than seven years' experience, and who are

conducting research in the United States. Every year, an advisory board picks two individuals to be recognized based on a comprehensive list of criteria.

"These awards have given us the opportunity to meet with amazing researchers and learn about exciting new technologies," says CEO Lee. "I look forward to seeing how our relationship with the award recipients will open new opportunities for Hanwha Advanced Materials."

Hanwha TOTAL Petrochemical

Hanwha Total Petrochemical Commits to a Safer Workplace with Korea Gas Safety Corporation

On May 29, Hanwha Total Petrochemical and the Korea Gas Safety Corporation held a signing ceremony at Hanwha Total Petrochemical's Daesan plant to mark the beginning of a technical support agreement between the two organizations. The agreement was signed by Yoon Young In, Hanwha Total Petrochemical Daesan Complex General Manager, and Kim Jungryul, Chungnam District Head for the Korea Gas Safety Corporation.

This technical support agreement comes as Hanwha Total Petrochemical construction gets underway on a new NCC side cracker at its Daesan Plant.



During the cracker's construction, Hanwha Total Petrochemical and the Korea Gas Safety Corporation plan on conducting safety training and accident prevention campaigns.

Saipan

Hanwha Hotels & Resorts

Saipan World Resort

Hanwha Saipan World Resort Wows Visitors at 2018 HANA Tour International Travel Show

Hanwha Saipan World Resort (SWR) participated in the recent 2018 HANA Tour International Travel Show in Ilsan, South Korea from June 8 to 10, where the resort's facilities and services were on show to delegates from around the world. Hanwha SWR attracted significant attention for its travel packages, which are designed to appeal to traveling families.

Hanwha SWR is a dominant player in Saipan's highly competitive hotel and resort industry, with about 30% market share. The resort stands out from the competition by offering guests unique holiday experiences, such as Saipan's



biggest waterpark. At the beginning of June, Hanwha SWR introduced the Sunset Garden, a brand new dining experience that offers guests a special barbecue menu.

"We are proud to offer Saipan's best holiday experience for all travelers," says Tony Kim, a member of Hanwha SWR's Sales and Marketing team. "Our guests get to enjoy world class facilities and services while taking in Saipan's amazing natural beauty."

Mexico

Hanwha Advanced Materials

Hanwha Advanced Materials Mexico S. De R.L. De C.V.

Hanwha Advanced Materials Mexico Updates Its Quality Management Standards

Hanwha Advanced Materials Mexico (HAMX) recently set up an internal task force to bring the company in compliance with the International Automotive Task Force's IATF 16949 standards. The company will reorganize its work processes

and procedures from June to July this year, and undergo an audit from August to September in order to be IATF 16949-certified by the end of October.

IATF 16949 standards, which govern automotive sector quality management systems, will supersede the IOS/TS 16949 standards HAMX currently adheres to. The main sections of the IATF 16949 standards are based on a Plan-Do-Check-Act cycle and cover the following: context of the organization, leadership, planning, support, operation, performance evaluation, and improvement.

"IATF 16949 will comprehensively change our work processes," says Jang Sungbae, HAMX Quality Team Manager. "We are using this transition as an opportunity to recalibrate everyone's responsibilities and to encourage better communication between each department." ■