

Hanwha Newsletter

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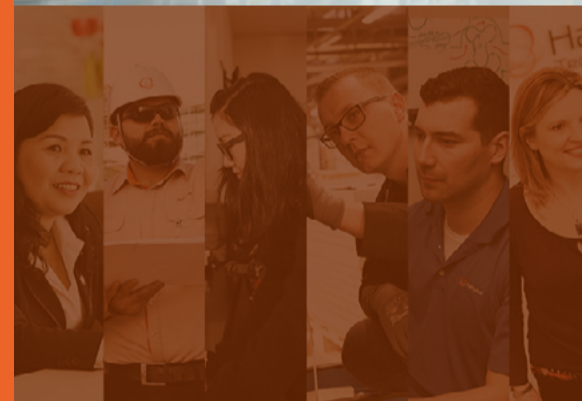
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Meet the team

Hanwha Aerospace KSLV- II Engineers

Wednesday, November 28th, 2018, was a historic day. On this day, the KSLV-II space rocket – a test launch vehicle built with Hanwha’s cutting-edge technology and materials – took its first flight into space. And now, South Korea is tantalizingly close to achieving its goal to send a fully indigenous rocket into orbit by 2021.

At Hanwha Aerospace’s flagship plant in Changwon, Korea, 11 engineers and 11 manufacturing specialists are going all out to boost Korea’s space program.



KSLV-II (a.k.a. Nuri), South Korea’s first fully indigenous carrier rocket, successfully completed its historic test flight on November 28, 2018. A maiden flight 15 years in the making. Meet the team working on the heart of the KSLV-II rocket.



The Test Launch Vehicle assembly for quality certification

Just as the human heart is the driving force behind the blood that courses through our body, the engine is the power behind the rocket that is launched into space. In essence, the engine is the heart of a rocket.

Hanwha Aerospace KSLV-II Team

- **Jonghan Kim** / Senior Manager :
Manufacturing Engineering Team / Propulsion Unit Manufacturing Department
- **Sungmoon Lim** / Supervisor :
Propulsion Unit Manufacturing Team / Propulsion Unit Manufacturing Department
- **Younghun Lim** / Manager :
Manufacturing Engineering Team/Propulsion Unit Manufacturing Department

Sungmoon Lim

Hello! I’m Sungmoon Lim and I lead the KSLV-II team here at Hanwha Aerospace.
(*KSLV: Korea Space Launch Vehicle)

Jonghan Kim

I’m Jonghan Kim and I lead the Propulsion Unit Manufacturing Department at Hanwha Aerospace.

Younghun Lim

I’m Younghun Lim and I’m a member of the Propulsion Unit Manufacturing Department.

Q. How did you become a part of the KSLV project?

Jonghan Kim

Back in 2011, while I was working on the KSR-series science rocket program, I was recruited by the department head to join the KSLV project. I joined the program because I was attracted to the very different development requirements with rockets and their ability to take a satellite payload into orbit.

Sungmoon Lim

Back then, no one in Korea dared to even think of building a space launch vehicle but the moment I first joined the project, my job was to develop the turbo pumps for the rocket. Many people would doubtfully ask me questions like “Are you sure you can build this?” or “Can we really pull this off?” I believed it was possible and that it was a project worth completing. My belief has helped me to keep going and come as far as I have.

Q. What were the challenges encountered during the development of the KSLV-II space launch vehicle?

Younghun Lim

I remember it being difficult because there were a lot of design changes in the beginning of the development process. If the engines didn’t perform as intended during the combustion tests, there would be many redesigns. We’d also have to make repairs or even disassemble the engines and fabricate new parts all the time.



The Test Launch Vehicle being transported for launch

Q. What does it mean for the launch to have been done with “fully indigenous technology”?

Jonghan Kim

Being able to locally develop satellites, rockets, and launch facilities means that our nation can be part of the “space club” – an unofficial club consisting of a select group of nations with advanced space programs. And being part of this elite club can lead to more opportunities to systematically develop the skills, technology and the environment that will allow younger generations of Korea to be inspired and not only be able to admire the space programs of other nations but also be proud of their own.

Younghun Lim

In the past, I’ve often felt blocked and unable to continue because there was no roadmap to follow. Now I feel our work is meaningful and my direction clear because the work we do now will serve as the benchmark for the Korean space launch industry. And knowing that we are paving the way for younger generations to follow, is driving us to focus and create more detailed and practical documentation for them.

Q. What does “precision technology” mean with regard to engine production?

Jonghan Kim

Quite literally, precision technology is complex technology that requires an extremely high level of skill and knowledge. Liquid-propellant rockets and space launch vehicles require an even higher level of precision technology. This means that you need layers of inspection and verification processes to make absolutely sure that everything is precisely manufactured and assembled.



The Propulsion Unit Manufacturing Department team at Korea Aerospace Research Institute (KARI) after successfully installing the 75-ton class first-stage engine

Q. How are you currently preparing for the orbital launch of KSLV-II in 2021?

Jonghan Kim

We are currently assembling the prototype (qualification model) of the 75 ton-class engine that will be used in a three-stage launch vehicle test flight. Once that testing is complete and approved, we will begin building the prototype, the flight engine that will be used in the actual orbital flight scheduled for 2021.

Everyone on the team is keeping a cautious eye on each step to make sure that the assembly process we’ve built is applied more systematically in the actual build of the flight model.

Q. What is the driving force behind your work?

Sungmoon Lim

The confidence in knowing that I’m doing something that very few people can do.

Jonghan Kim

For me, it’s all the experience I’ve gained while working on many different projects over the years since joining Hanwha.

Younghun Lim

I think it’s the professional responsibility. I feel that I am passionate about what I do because I feel responsible for delivering the best work that I’ve been entrusted to do.

Way to go, Hanwha Aerospace!

Find out more about Hanwha’s aerospace business here >

www.hanwha.com/en/aerospace&mechatronics ■

Hanwha Goes Up Among the Stars

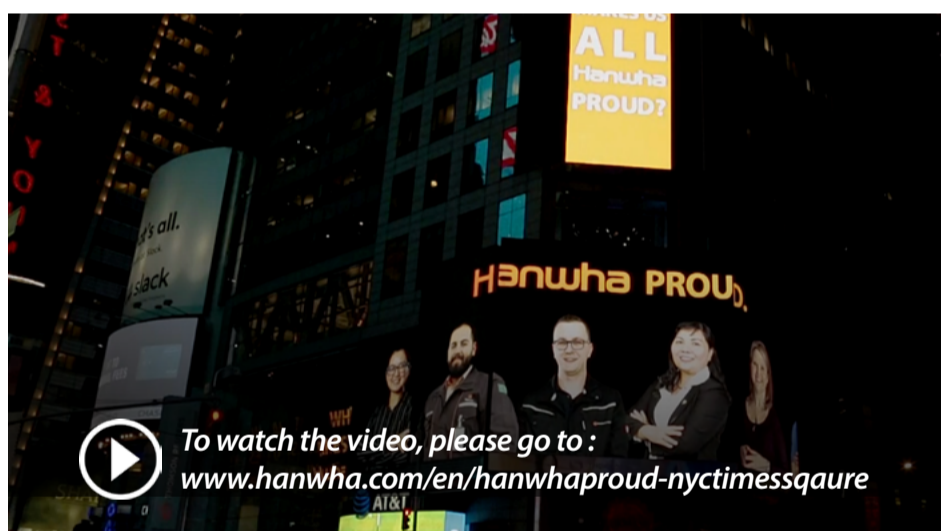


Last year, we inundated with hundreds of submissions for the Hanwha PROUD. campaign.

Held in celebration of our 66th anniversary, the campaign was an opportunity for anyone and everyone to share what made each of us feel proud to be a part of the Hanwha family and help foster closer ties between our business units around the world.

In order to show the world the overwhelming pride that we all share, the submissions were whipped up into a short film AND broadcasted at **Times Square in New York!**

Hanwha brand ambassadors Tang Hoang Quoc Thai from Hanwha Life Vietnam and Andrew Anderson from Hanwha Azdel visited New York to watch the video for themselves and documented their experience to share with you all:



So wonderful to hear from you!

It was immensely gratifying to hear all your stories. Hanwha wouldn't be what it is today if it wasn't for your contributions.

We put the six individuals who best encapsulated the spirit of the campaign under the spotlight through a series of interview videos. Take a moment to visit the link below and learn more about their unique stories.

www.hanwha.com/en/lifeathanwha



Vũ Ngọc Duyên
Hanwha Life
Insurance Vietnam



Hussein Haythem Abdulreda
Hanwha Engineering
& Construction Iraq



Jin Haihua
Hanwha Chemical
Ningbo



Christoph Lenz
Hanwha Q CELLS
GmbH



Andrew Anderson
Hanwha Azdel



Kirsty van den Bulk
Hanwha Techwin
Europe

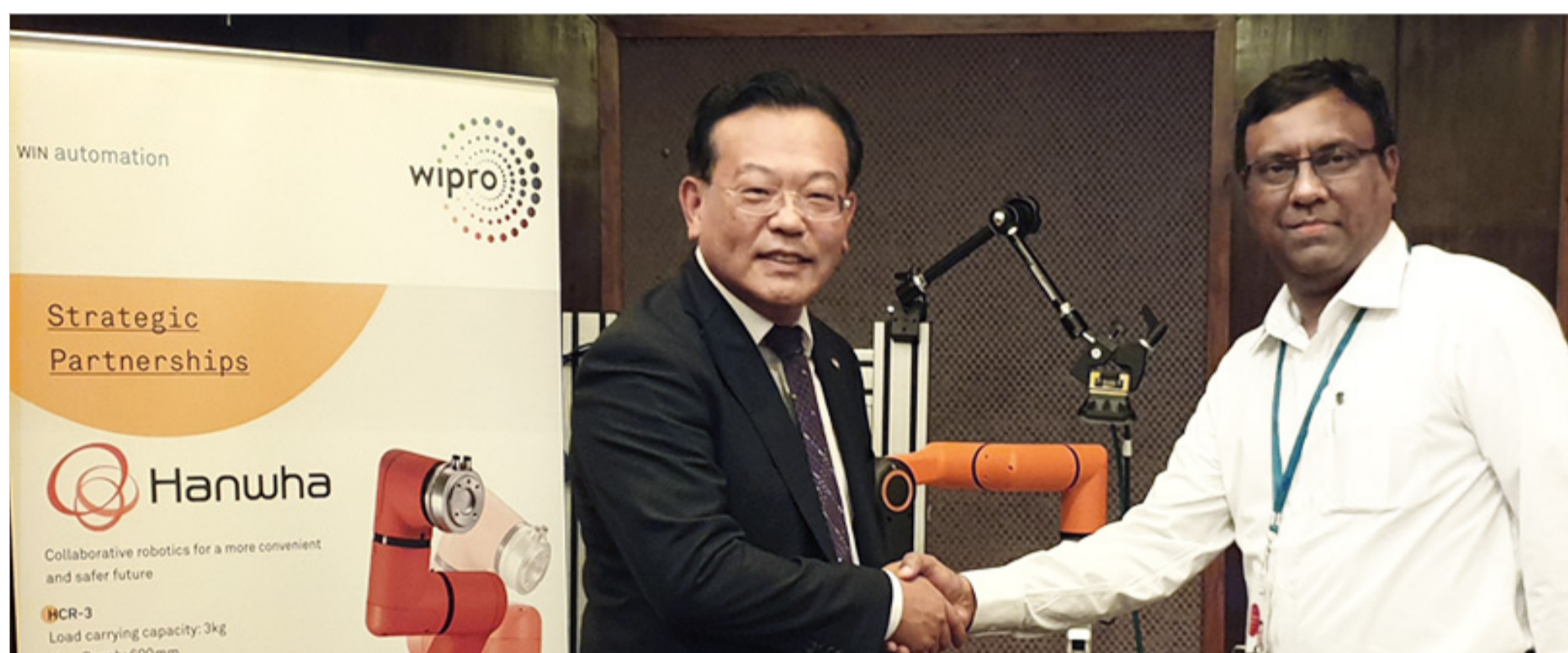
Ready for another round?

Due in no small part to everyone's awesome participation, the Hanwha PROUD. campaign was awarded Bronze for Internal Communications at the 2019 PR Awards Asia.

It gives us immense pleasure to announce that due to the overwhelming success of last year's campaign, we'll be bringing it back with an upgrade this year. Stay tuned to learn more about how you'll be able to participate in Hanwha PROUD. Season 2. ■

Hanwha Robotics and Wipro Team Up to Explore Cobot Market in India

- Hanwha Robotics and Wipro Infrastructure Engineering signs an MOU to set up a base of operations in India
- Hanwha Robotics is the first Korean collaborative cobot manufacturer to enter India
- Hanwha Robotics adds India to its existing sales network that expands from Europe and Asia to the Americas, making a leap to become a global cobot specialist company



Vice President & Head of Hanwha Robotics Chongsung Ra (left) and, Senior Vice President of Wipro Infrastructure Engineering G. Sundararaman (right)

On July 2, 2019, at a ceremony held at Wipro Enterprises' headquarter in Bangalore, Hanwha Precision Machinery's Robot Business Division (Hanwha Robotics) signed a memorandum of understanding (MOU) with Wipro Infrastructure Engineering (WIN) to establish a local sales and operations office in India. The event was attended by the Vice President & Head of Hanwha Robotics Chongsung Ra and the CEO of WIN Pratik Kumar, among other executives.

The partnership combines the core competencies between the two companies: Hanwha's cobot manufacturing and development capabilities and WIN's Automation Solutions business and broad sales network in India. Through this partnership, Hanwha Robotics will be able to sell its factory automation cobots to WIN's extensive customer base through its sales network.

WIN is one of two main businesses of Wipro Enterprises (P) Limited, which posts a total revenue of USD 8.47 billion with a net income of USD 1.3 billion in annual sales, and a market capitalization of USD 11.6 billion. WIN was established over 40 years ago in hydraulics and has since then expanded into Aerospace, Additive Manufacturing, Automotive Solutions, and Water Treatment. Wipro's IT outsourcing service business is one of the world's Top 3 in IT outsourcing with more than 170,000 employees worldwide.

"I believe that cobots are the ideal solution for manufacturing automation in the Fourth Industrial Revolution," said WIN CEO Pratik Kumar during the MOU signing ceremony. "We chose to work with Hanwha because it leads the cobot industry with its technological prowess and manufacturing edge."

The MOU between Hanwha Robotics and WIN marks the first time a Korean cobot company has partnered with an Indian company to form a mutually beneficial partnership where both parties work together to create new markets and opportunities.

"I'm proud that with this agreement, Hanwha's cobot will be able to enter the Indian market," said Vice President & Head of Hanwha Robotics Chongsung Ra. "We will continue investing in robotics while building a sales network across Europe, the Americas, and Asia to become a truly global cobot company."

In March of 2017, Hanwha Robotics launched Korea's first cobot: the HCR-5. Soon after, the HCR-3 and HCR-12 were added to extend the product line of cobots. Hanwha Robotics is now expanding across China, Southeast Asia, Europe, the Americas, and India. ■

Hanwha Q CELLS Earns Top Performer Recognition in 2019 PV Module Reliability Scorecard Published by PVEL and DNV GL

Hanwha Q CELLS' Q.PEAK DUO high performance module series was selected as a Top Performer by PVEL and DNV GL, marking the fourth year in a row in which Hanwha Q CELLS has attained Top Performer status



PVEL presents Hanwha Q CELLS with its fourth consecutive award for being a Top Performer in the solar industry

Hanwha Q CELLS, one of the largest solar cell and module manufacturers in the world, has been recognized as a Top Performer in the 2019 PV Module Reliability Scorecard, published by PV Evolution Labs (PVEL) in partnership with DNV GL. This is the fourth year in a row that Hanwha Q CELLS has been selected for this accolade.

PVEL is one of the world's leading reliability and performance testing laboratories in the solar industry. As an independent laboratory, PVEL tests PV modules from leading solar manufacturers annually, and publishes the PV Module Reliability Scorecard based on these test results every year. The PV Module Reliability Scorecard is recognized as one of the most comprehensive publicly available PV module reliability test results comparisons. The title of Top Performer, which is granted to high-ranked companies, is accepted throughout the industry as a reliable mark of high product quality and reliability.

This year, Hanwha Q CELLS earned the Top Performer recognition with its Q.PEAK DUO series of high-performance monocrystalline half-cell modules. The Q.PEAK

DUO series of modules are manufactured using the Company's patent-protected, unique passivation technology, which is a key ingredient in Q.ANTUM Technology. For better product quality and reliability, Q.ANTUM Technology includes additional cutting-edge technological and security features like excellent Anti-LID (light induced degradation) and Anti-PID (potential induced degradation) performance, as well as Hot-Spot Protect and traceable quality with Tra.Q™, which is Hanwha Q CELLS' unique laser identification to protect against counterfeiting.

Hee Cheul (Charles) Kim, CEO of Hanwha Q CELLS, said: "We are pleased to announce that we have once again been recognized as a Top Performer by the leading testing lab PVEL. The very DNA of Hanwha Q CELLS is rooted in German R&D excellence and a desire to consistently deliver top-quality renewable energy products and services. To contribute to the higher customer value and the growth of the global solar industry, Hanwha Q CELLS will continue to strive towards even greater excellence in product quality and reliability with all our might." ■

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Indonesia



PT. Hanwha Life Insurance Indonesia

PT. Hanwha Life Insurance Indonesia Advocates for Road Safety and Insurance Protection During Eid al-Fitr

PT. Hanwha Life Insurance Indonesia handed out 10,000 free 14-day personal accident insurance policies as part of its "Teman Mudik Hanwha" or "Hanwha, Your Safe Travel Buddy" CSR campaign. Coinciding with Eid al-Fitr, a holiday commemorating the end of Ramadan and one of Indonesia's busiest travel seasons, this campaign aimed to educate Indonesians the importance of being protected.

Eid al-Fitr is an incredibly busy time in Indonesia as Muslims across the country travel home to celebrate with their families. With many more cars and buses on the road than usual, accident rates normally spike during this holiday period.

Throughout the Teman Mudik Hanwha campaign, PT. Hanwha Life Insurance Indonesia conducted various activities to remind motorists to stay safe on the road, and the benefits of having insurance protection as well. A pop-up booth was even



set up at a rest area on one of the busiest highways going in and out of Jakarta to increase the campaign's visibility.

The Teman Mudik Hanwha campaign proved to be very popular, with the free personal accident insurance policies all quickly snapped up by the public. PT. Hanwha Life Insurance Indonesia hopes that the roads of Indonesia will become safer, and that Indonesians are more aware on the importance of being properly insured.

Germany



Hanwha Q CELLS GmbH

Energy-Independent Home Powered by Hanwha Q CELLS GmbH Receives Prestigious Award from German Federal Ministry of Economics and Technology

The Hörmann family home in Zusmarshausen, Germany is entirely independent of the local power grid. It relies on a Hanwha Q CELLS GmbH solar power system working in tandem with a fuel cell for all its energy needs, from electricity and heating to even charging the family car. Hailed for demonstrating that it is possible for a house to be CO2-neutral and not rely on external power sources, the German Federal Ministry of Economics and Technology awarded the Hörmann family home, the Federal Prize for Outstanding Innovative Achievements.

The Hörmann family was well-prepared for building an energy-independent home. As owners and operators of Hörmann Solartechnik, a Zusmarshausen-based solar installation firm, they are well aware of the pros and cons of the many solar energy systems available on the market. As participants in Hanwha Q



CELLS GmbH's Q.PARTNER Program, there was no question as to which brand the Hörmanns would select for their own home.

"It was clear to us, right from the start, that we would implement our own solar system with Hanwha Q CELLS GmbH's modules," said Rita Hörmann, Managing Director of Hörmann Solartechnik. "As solar installers, we've had plenty of positive experiences with the extremely high performance and durability, as well as the beautiful design, of the Q CELLS' modules."

Hanwha Q CELLS GmbH is incredibly proud to play such an important role in a

structure as forward-thinking as the Hörmann family home and hope that the house will serve as an example for other German homeowners.

“It is very important for us to increase homeowners’ acceptance of solar power and we are pleased to be doing this with one of our Q.PARTNERS,” said

Maengyoon Kim, Hanwha Q CELLS GmbH’s Head of EU Sales. “All of us here at Hanwha Q CELLS GmbH salute the Hörmann family and Hörmann Solartechnik on their energy self-sufficient home.”



Hanwha E&C Iraq Representative Office

Hanwha E&C Iraq Representative Office Livens Up Korean Culture Festival in Baghdad

Hanwha E&C Iraq Representative Office was proud to participate in a Korean culture festival organized by the Embassy of the Republic of Korea in Baghdad, Iraq from June 20 to 21. Hundreds of people flocked to the event to learn about Korea and participate in many different fun activities.

The event was held to celebrate the 30th anniversary of the establishment of diplomatic relations between Korea and Iraq and to reinforce the two countries’ desire to form a closer bond on the world stage. Many influential people were in attendance, including Kyung Wook Jang, Korea’s ambassador to Iraq, as well as members of Iraq’s major political parties and diplomatic delegations from other Middle Eastern countries.

Hanwha E&C Iraq Representative Office’s booth was a popular attraction during the festival. Visitors got to learn more about Bismayah New City, a major urban development project spearheaded by Hanwha E&C Iraq Representative Office to provide affordable homes to hundreds of thousands of people.

All the VIPs who came to the festival expressed their amazement and pleasure at how quickly Hanwha E&C Iraq Representative Office was able to accomplish such a huge project. They also noted that the project’s completion will mark a major



step forward for Iraq and that it will give the nation hope for an optimistic future.

“Korea is an advanced nation with many impressive accomplishments in industry, technology, and other sectors,” said Maison Al-Damalju, spokesperson for Iraq’s Al-Wataneya coalition. “Iraq can learn much from its example.”

The festival also featured many different games and competitions that visitors could participate in, including singing and dancing contests set to the latest K-Pop hits. Winners got to go home with amazing prizes donated by Hanwha E&C Iraq Representative Office.

“Our diplomatic relationship with Iraq is strong and we’re here today to enhance it even further,” said Ambassador Jang. “This festival is a good opportunity to find new ways for our countries to work together.” ■