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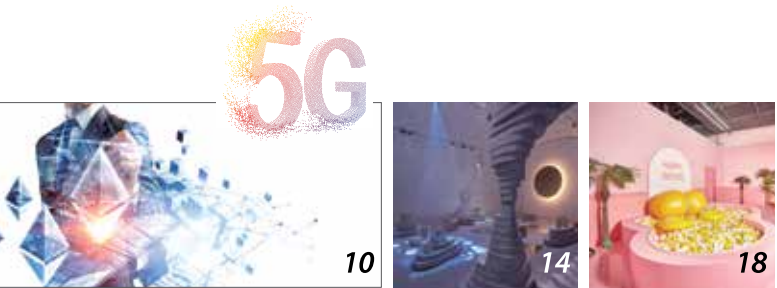


## 5G & Digital Transformation

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### 5G and the Digital Transformation

Last April 3rd, with three mobile carriers opening commercial 5G service, South Korea became the first country in the world to have commercial 5G networks. On Facebook, President Moon Jae-in stated “As the highway system became the aorta of our economy during the age of industrialization, 5G mobile communications will provide new opportunities for our economy and domestic industries in the age of the Fourth Industrialization.” The President also announced that “we will improve productivity in our major manufacturing industries by supporting the establishment of 5G factories.” The digital transformation and smart factory systems are gaining a lot of attention in the field and, in order to merge unto the 5G communications highway, they are being adopted faster and faster.

### 5G与数字化转型

4月3日, 三大运营商正式开始推行5G商用化服务, 这标志着韩国成为全球首个成功实现5G商用化的国家。文在寅总统通过Facebook表示, “就像在工业化时代高速公路成为了韩国经济的大动脉一样, 在第四次工业革命时代, 5G移动通信将为韩国工业与经济创造新机遇”, 他还宣布称, “政府将支持建设5G工厂, 实现中坚制造产业的生产效率革新”。随着5G浪潮的到来, 业界对数字化转型与智能工厂的关注度日渐提高, 纷纷加快引进速度。



## Changes to Be Caused by the Age of 5G

Lee Mi-yeong, an office worker who commutes from Mapo-gu, Seoul, to Jincheon-gun, Chungcheongbuk-do, has been enjoying her commute more ever since she bought an autonomous car. She has a bite for breakfast and puts on her make-up while in the car. Driving is completely up to the autonomous car. Yesterday, it took her less than a second to download a movie while she was in the car. She also used her smartphone to adjust the indoor temperature and air condition of her house in advance, so that she could pleasantly rest as soon as she gets home. Next week, her mother, who lives in Sacheon-si, Gyeongsangnam-do, is going to undergo a surgical operation through remote a medical service performed by a joint specialist working in Seoul. Her mother told her, “The hospital in Seoul was too far for me to visit. Now it is great that I can undergo surgery without meeting a doctor face-to-face. Unfamiliar, yet amazing.”

By\_Kim Cheong-yeon

## 5G时代带来的变化

家住首尔市麻浦区去, 在忠清北道镇川郡上班的李美英自从几个月前购买了无人驾驶汽车, 上下班的路途变得轻松了许多。她可以坐在车里简单地吃个早饭、化个妆, 把驾驶的事儿全都交给汽车来做。昨天下班路上, 她在车里仅用1秒钟就下载了一部电影。她可以用智能手机提前调整家里的室内温度与空气状态, 一进家门就舒舒服服地休息。美英的妈妈住在庆尚南道泗川市, 她计划下周通过远程诊疗找首尔的关节病专家进行手术治疗。母亲给美英打电话时说, “因为距离太远, 原本想都不敢想, 但现在不用见到医生的面也能接受手术了, 真是太好了。感觉既陌生又很神奇”。

文\_金青瑛

### 5G OF HIGH SPEED, ULTRA LOW LATENCY, AND HYPER CONNECTIVITY

This “unfamiliar, yet amazing” story of Mi-yeong is the daily life scenario of the upcoming future. Many people say 5G, which was recently commercialized, will become the accelerator to make this come true. What is 5G and how will it change our day-to-day life?

Last April 5, the three mobile carriers in South Korea released the world's first 5G smartphones. 5G is an abbreviation of “(the standard for) 5th generation mobile communications.” According to ITU guidelines, 5G network speeds should have a peak data rate of 20Gbps and a minimum download speed of 100Mbps. Compared to the LTE or 4G technologies that are currently in use, 5G is 20 times faster in speed and 100 times larger in processing capacity.

The characteristics of 5G can be summarized as “high speed, ultra low latency, and hyper connectivity.” While the processing speed of LTE is 1Gbps, that of 5G is as high as 20Gbps. Downloading a movie through 5G takes only one second on average. The latency time for the data sent out from a smartphone to reach the base station, switch room, and server and come back to the smartphone is also very short. This is why 5G is characterized by “ultra low latency.” With the latency time shortened from dozens of milliseconds into 1 millisecond, the possibility of providing a real-time service, which was impossible in the past, becomes a reality. 5G allows over 10 times the number of devices to be connected to the network, compared to LTE. Thus, a large number of devices and sensors can be utilized to present various services. This is why 5G is related to “hyper connectivity.”

When explaining the “ultra low latency” so characteristic of 5G technology, “the autonomous car” is frequently given as an example. Last March 12, A1, the autonomous car co-developed by LG Uplus and Hanyang University, crisscrossed downtown Seoul and arrived

### 超高速、超低延迟、超连接的5G

“既陌生又很神奇的”美英的日常就是即将到来的未来人们的生活方式。很多人都在说, 不久前开始商用化服务的“5G”将成为实现这种日常生活的催化剂。什么是5G, 它会以何种方式改变我们的日常生活呢?

4月5日, 韩国三大运营商率先于全世界开通了面向普通人的5G智能手机。5G是“5th Generation mobile Communications”的缩写, 指的是第五代移动通信(标准)。根据国际电信联盟(ITU)的定义, 5G指的是最高下载速度为20Gbps、最低下载速度为100Mbps的移动通信技术。与目前我们正在使用的4G移动通信技术LTE(Long-Term Evolution)相比, 5G的速度大约快20倍、处理容量大100倍。

5G的特点大体可以概括为“超高速、超低延迟、超连接”。LTE的处理速度是1Gbps, 5G的最大速度则可达20Gbps。在5G环境中下载一部电影平均用时不超过1秒。智能手机发送的数据经过基站、交换室、服务器等再次返回终端的延迟时间也非常短, 所以说5G的一大特点是“超低延迟”。现在几十毫秒(ms, 1ms=1/1000秒)的延迟时间缩短到1ms水平后, 使得过去无法实现的“实时”服务成为了可能。5G可以连接的最大设备数也比LTE多10倍以上。得益于此, 可以利用大量设备与传感器推出多种服务。所以叫“超连接”。

关于5G技术的“超低延迟”性, 经常会提到的案例是“无人驾驶汽车”。3月12日, LG Uplus与汉阳大学共同开发的5G无人驾

驶汽车“A1”在首尔市内各处穿行后顺利抵达首尔林停车场。A1在道路上遵守限速, 在拥堵路段与前车很好地保持了车距。当然了, 坐在驾驶座上的人并没有握住方向盘。A1之所以能够如此安全地行驶, 多亏了5G网络。假设在高速公路上以100km的时速快速行驶的无人驾驶汽车前面出现了障碍物, 需要紧急刹车时, 4G环境中车辆需要移动0.81~1.35m后才能停止, 而在5G环境中, 这个距离将会缩短到2.7cm。当然了, 各种各样的变数依然存在, 但仍旧可以大幅缩短发现→识别→反应所需的时间。也就是说, 事故发生概率会降低。

Let's say that an obstacle suddenly appears in front of an autonomous car that is running at 100 km/h on the highway and the stop signal is on. The car would stop after moving 0.81-1.35 m on the 4G network but the distance is shortened to 2.7cm on the 5G network. There must be diverse variables, indeed, but the time it takes to discover, recognize, and react to the situation can be greatly decreased. This means that the accident rate would drop as well. In the 5G environment, patients who find it difficult to come to the doctor's office to receive treatment or undergo surgery, like Mi-yeong's mother, can get treatment for disease prevention, diagnosis, and follow-up care without visiting the hospital, through the loHT (Internet of Health Things) services. While the presently available telemedicine is limited to short-distance cases due to technological restrictions, 5G with ultra low latency will facilitate telemedicine and teleoperation by getting rid of the communication delay. When telemedicine meets VR/AR video services, a more accurate and correct diagnosis will become available. Surgical areas that are invisible to the naked eye can be precisely operated on with the help of VR/AR video services.

### INDUSTRIES AND JOBS TO BE CHANGED DUE TO 5G

For their part, manufacturing businesses are keenly interested in smart factories that take advantage of 5G technology. A smart factory is a factory where the existing manufacturing facilities are combined with ICT. While the machines of existing automatic systems operate as they are programmed to do, the machines of a 5G smart factory are designed to collect data and determine the order of the tasks by themselves. This technology also makes it possible to collect real-time information on the status of machines and the progress rate through IoT devices established throughout the factory.

The short latency time of 5G helps robots react quickly to unexpected situations, lowers the failure rate and produces customized products. According to the Ministry of SMEs and Startups, companies that have introduced the smart factory concept to their processes have achieved an increase in productivity of 30 percent while decreasing failure rate by 43.5 percent and prime cost by 15.9 percent during the last three years.

In the age of 5G, realistic video contents will also be developed. High-quality VR video broadcasting will allow viewers to enjoy sports games like soccer and baseball as if they were in the stadium, or maybe closer than that. This is because they can view the game from any point and angle they want. The applications are not limited to sports. When travelling, users can look around a hotel room through realistic video as if they were actually in the room; using T-Commerce (binary data home shopping), buyers can check out how they look in a dress before deciding to purchase it.

There are also things to be concerned as enter go into the age of 5G. For instance, we should decide who should be held accountable for accidents cause by autonomous cars, which are expected to be commercialized around 2022, and how responsibility should be taken.

Every one of us should pay constant attention to the changes that will take place in all industries and jobs because of 5G. Looking at the changes in our daily lives brought about by 5G technology, such as autonomous cars, smart factories, and telemedicine, one might think that human labor will face the ultimate crisis. This is not exactly true. Even in the age where the “superpower” of 5G is prevalent, there are things that can only be done by human beings. For example, making the robots that will utilize this superpower is a task that will continue to be done exclusively by humans.

驶汽车“A1”在首尔市内各处穿行后顺利抵达首尔林停车场。A1在道路上遵守限速, 在拥堵路段与前车很好地保持了车距。当然了, 坐在驾驶座上的人并没有握住方向盘。A1之所以能够如此安全地行驶, 多亏了5G网络。假设在高速公路上以100km的时速快速行驶的无人驾驶汽车前面出现了障碍物, 需要紧急刹车时, 4G环境中车辆需要移动0.81~1.35m后才能停止, 而在5G环境中, 这个距离将会缩短到2.7cm。当然了, 各种各样的变数依然存在, 但仍旧可以大幅缩短发现→识别→反应所需的时间。也就是说, 事故发生概率会降低。

5G环境中, 像美英母亲那样因为种种原因无法直接接受医生诊疗或手术的患者, 即使不直接去医院, 也可以通过loHT (Internet of Health Thing)服务接受疾病预防与诊断、事后管理等。虽然现在也并非没有远程诊疗的案例, 但由于技术局限, 当前的远程诊疗也仅限于近距离, 然而在以超低延迟为特点的5G环境中, 通信中断现象将消失, 远程诊疗与手术将变得更加顺畅。远程诊疗与VR(Virtual Reality, 虚拟现实)/AR(Augmented Reality, 增强现实)影像服务结合后, 将有望实现更加准确细致的诊断, 因为肉眼很难确认的手术部位可以利用VR/AR影像技术实现精准主刀。

### 因5G而改变的产业与职业

与此同时, 制造业对利用5G技术的“智能工厂”的关注度也很高。智能工厂指的是在现有制造设施中结合信息通信技术(ICT)的工厂。与现有自动化系统的机械只能按照编程好的程序运转不同, 基于5G的智能工厂中的机械采用的是可以自行收集数据并下达作业命令的设计, 还可以通过安装在工厂各处的物联网(IoT)实时收集机械状态与工序进展率等信息。

5G的短延迟时间可以帮助机器人快速应对生产过程中的突发状况, 降低不良率, 实现定制型生产。中小风险投资企业部的数据显示, 引进智能工厂的企业过去3年的生产效率提高了30%、不良率降低了43.5%、成本降低了15.9%, 取得了非常显著的效果。

5G时代, 实感型影像内容也将进一步发展。高清VR影像传播将使观众在观看足球、棒球等体育比赛时犹如亲临赛场般真实, 甚至比亲临赛场时还要更加清晰、真实, 因为可以利用VR在想要的位置与角度观看比赛场面。不光是体育赛事, 旅行时预订酒店时可以如亲临现场般通过实感影像查看房间, 亦可通过T-Commerce(双向数据电视购物)看到自己穿上衣服后的样子并决定是否购买。

随着5G时代的到来, 也有很多我们不得不思考的问题。例如, 计划于2022年左右实现商用化的无人驾驶汽车肇事时由谁负责、该如何追究事故责任等, 这些问题都必须解决。

我们每个个体都不应该放弃对因5G而改变的产业与职业格局变化的关注。看着无人驾驶汽车、智能工厂、远程诊疗等5G技术带来的日常变化, 人们也会不由自主地想人类的劳动似乎真的正面临着危机。其实也不尽然, 即便说5G是发挥“超能力”的时代, 也依然存在只有人类才能做的工作, 例如生产发挥超能力的机器人的工作仍然是人类的事不是吗?





## 5G, Altering the Future of Manufacturing with the Smart Factory

Lee Tae-jin, Managing Director of Metanet Global and Member of KOSMIA

Last March, the South Korean government announced its budget guidelines for the fiscal year of 2020, listing four economic platforms, hydrogen economy, data, AI, and 5G, and the eight leading industries, including future vehicles, UAV, and the smart factory. Thanks to 5G and the smart factory, the innovation within the manufacturing field that began in 2014 is starting to accelerate. Now that everything is being digitalized, why is the light being shed on the manufacturing field? What are the methods and direction of change? In order to get some answers, we met with Lee Tae-jin, the managing director of Metanet Global who performs governmental tasks and plays the role of a policy adviser for matters related to the smart factory, as a member of the KOSF and KOSMIA.

### 通过5G与智能工厂改变制造业的未来

智能制造产业协会活动Metanet Global专务李泰珍

3月, 政府发布了2020年预算案制定指南, 明确提出了氢能经济、数据、AI、5G四大经济平台与未来汽车、无人机、智能工厂等八大领军项目。2014年开始的制造业创新在5G与智能工厂的推动下, 正在进一步加快速度。用数字化改变一切的当下, 重新审视制造业的理由是什么? 变化的方法与方向是什么? 对此, 我们采访了Metanet Global的李泰珍专务。李专务在民官联合智能工厂推进团与韩国智能制造产业协会担任着智能工厂政府课题的执行与政策顾问的职务。

#### Q. LET'S TALK ABOUT THE DEFINITION OF A "SMART FACTORY." WHAT IS THE SMART FACTORY AND WHAT DIFFERENTIATES IT FROM THE EXISTING FACTORY?

**A.** The existing factory does predetermined tasks according to the computer and IT technology, but this is not a "smart factory." When mobile communication technologies like IoT and 5G are applied to enable the facilities of the factory to sense, control, and actuate a situation, that is when the factory becomes a "smart factory." The commonly used terms in various definitions of the smart factory are, "Intelligent," "IoT," and "Connected." We can also talk about industrialization by associating it with communication. The first wave of industrialization came with the advent of the steam engine, the second wave of industrialization came with the system of mass production, the third wave of industrialization came with the advent of the computer, and the fourth wave of industrialization came with CPS(cyber physical system). Communication has changed, and will change, according to each wave of industrialization, or each wave prompts change. The First Industrial Revolution is characterized by the stamp, the Second by the telephone, the Third by the Internet, and the Fourth by the unification of things and communication(IoT). In the end, the gist of the "smart factory" is can be summed up as communication among men, machines, and products in a factory that leads to the most efficient production of products for customers.

#### Q. AMONGST ALL OF THE CHANGES BROUGHT BY THE FOURTH INDUSTRIAL REVOLUTION, THE GOVERNMENT IS FOCUSING ON THE MANUFACTURING FIELD AND THE SMART FACTORY BY ORGANIZING A KOSF AND PRESENTING A VARIETY OF SUPPORT MEASURES. WHAT COULD BE THE REASON FOR THIS?

**A.** First, let's take a look at our daily lives. The manufacturing industry constructs our lives much more than any other industry. The manufacturing industry was the source of economic growth for advanced and developing countries in the past and it will never disappear in the future. Manufacturing isn't just linked to production, but also to design, materials, shipping, re-use, and disuse. Second, IoT can be most effective in the manufacturing industry, among other fields. There is a report that the industry amounting to two-thirds of the world's production will benefit from industrial IoT while research performed by Cisco in 2013 proved that manufacturing would be the industry that would generate the most value after combining with digital technology. Take Komatsu, the excavation equipment manufacturer, for example. Komatsu applies digital technology to the excavation equipment so that the state and lifespan of the running equipment in the field can be checked and reflected in its production plans. The practical running data of its customers are applied to the development of the products and the operation of the factory. Like this, the smart products, smart production, and smart service form the company's whole value chain via the smart factory. Additionally, South Korea started the Manufacturing Industry Innovation 3.0 initiative in 2014, when the Fourth Industrial Revolution was not yet a largely discussed issue, in order to boost economic growth by connecting manufacturing to ICT(information and communications technologies). At that point, Industry 4.0 came onto the scene in Germany, making the smart factory a significant agenda.

#### Q. WHAT ABOUT THE NEEDS OF THE INDUSTRIAL FIELDS? AS ORDINARY PEOPLE DO NOT YET FEEL THE NEED TO BUY 5G SMARTPHONES, THE SPEED OF TECHNOLOGICAL DEVELOPMENT AND THE REACTION SPEED IN THE FIELD MAY BE DIFFERENT FROM THOSE OF THE SMART FACTORY.

**A.** The smart factory was an unfamiliar concept only until 2016. Now, as it has often appeared in media together with discussions about the Fourth Industrial Revolution, the understanding of the smart factory is beginning to spread and the interest surrounding the field has grown greatly. The question they are asking has changed from, "What is the smart factory?" to "What should we do?" and they are practicing what should be done. In fact, many factories are asking how they can enhance efficiency with the data they have already accumulated. There are more cases in which the digital sensors and data analyses are utilized in the overall operation of the factories. The changes in the fields are already reality. Currently, engineers are making the system by coding the points of expertise into an algorithm. As time passes, all the points of expertise will be absorbed by the machine's learning capabilities, which will fulfill the effects in earnest.

#### Q. 首先,我想先从智能工厂的定义说起。什么是智能工厂,它与现有工厂最大的差别是什么?

**A.** 现有工厂也利用电脑与IT技术执行事先安排好的工作,但它并不能称为智能工厂。采用IoT、即物联网与5G等无线通信技术,工厂设备本身能够自行识别(Sensing)情况、作出判断(Control)并执行(Actuate)的工厂就叫智能工厂。在对智能工厂的各种定义中,可以看到同一个词,那就是"Intelligent, IoT, Connected"。工业革命也可以与通信联系起来,第一次工业革命的标志是蒸汽机的出现,第二次工业革命的标志是量产系统的出现,第三次工业革命的标志是计算机的出现,第四次工业革命的标志是CPS(Cyber Physical System)的出现,通信手段也随之变化或引发诸多变化。第一次工业革命中是邮票,第二次工业革命中是电话,第三次工业革命中是互联网,第四次工业革命中是事物与通信的同步,即以所有事物自行通信的功能为特征。归根结底,智能工厂的核心是工厂中的人与机器、产品(Man, Machine, Product)彼此通信,并以最有效的方式生产出客户想要的各种产品。

#### Q. 政府打造民官联合智能工厂推进团并推出多种支援政策,在第四次工业革命的变化中给制造业与智能工厂画上了着重号。其原因是什

**A.** 大家可以观察一下我们的日常生活。制造业在我们的生活中占据的比重比任何产业都要大。就传统而言,制造业也是发达国家与发展中国家的经济增长源泉,未来也绝不会消失。首要原因是生产并不单纯地停留于制造,还连接着设计乃至材料、配送、再利用与报废。第二个原因是,制造业是可以最大发挥IoT效果的领域。研究显示,相当于全球产量三分之二的产业都能通过工业用物联网获利,同时思科(Cisco)在2013年的研究结果也表示制造业是结合数字技术时产生最大价值的产业。我们以日本的挖掘机企业小松集团为例来看一下,小松集团在挖掘机中结合数字技术,检查现场产品的状态与寿命,并将其体现在生产计划中。同时还将客户的实际使用数据应用在产品开发与工厂经营中。建设智能工厂的同时搭建了智能产品、智能生产、智能服务的整个价值链。再有一点就是,韩国早在2014年,即第四次工业革命成为热议话题前就已经提出了制造创新3.0倡议,即必须在制造业中结合ICT(Information and Communications Technologies)、实现新增长。当时,德国也开始出现工业4.0,智能工厂成了重要的议程。



+ INTERVIEW



Q. WHAT IS THE ULTIMATE GOAL OF THE SMART FACTORY? IS IT POSSIBLE TO NOT ONLY REPLACE THE EXISTING MANUFACTURING PROCESS, BUT TO ALSO CREATE A NEW FLOW OF PROFIT?

A. Yes. In the case of Michelin, they equipped tires with a sensor to check the attrition rate, expanding the equipment's service and leading to a check-up and repair. Furthermore, it provides customers with information for saving fuel. While digitalizing its products, Michelin created new profits by creating a new market called "Customer's Experience Service." The most important goals of the smart factory are mass customization, in which the various customized demands are fulfilled with products of low production cost, and the enhancement of productivity. To match the spending pattern that is becoming extremely personalized due to the development of the digital sector, companies should efficiently produce customized products, as an artisan produces clothes and shoes. This type of customization requires a smart factory.

Q. WILL IT BE ADVANTAGEOUS TO THE WORKERS? WILL THE NUMBER OF JOBS DECREASE?

A. Rather than the number of jobs decreasing, the same number of workers will produce a greater number of products. The number of commonly discussed "3D jobs" will decrease, which is preferable. Instead, the number of jobs related to the smart factory will increase. Accordingly, proper education should be offered in schools and companies. Smart workers will be able to perform their tasks more conveniently and safely using smart devices. For example, customers will call for on-site help due to a failure in the facility, but

Q. 工业现场的需求是什么?就像普通人如今尚未深切感受到5G智能手机的必要性一样,智能工厂的技术发展速度与现场反应速度似乎也不尽相同。

A. 直到2016年,智能工厂还是一个陌生的概念,但对它的理解正在逐渐拓宽。随着这一概念经常与第四次工业革命一同在媒体中出现,现场的关注度也日渐提高。以前人们会问“什么是智能工厂?”,现在则会问“那我们该怎样做呢?”,人们的意识逐渐转到了实行阶段。事实上,有很多工厂都在问,如何才能利用过去积累的数据提高效率。在工厂运营中运用数字传感器与数据分析的案例也在逐渐增加,现场的变化已经成为现实。可以说,现在正处于将技术人员的经验诀窍编码成算法并搭建系统的过程,随着时间推移,一旦机器能够学会所有经验诀窍,效果将全面体现。

Q 智能工厂的终极目标是什么?不单单是取代现有制造业,也可以创造出新的收益潮流吗?

A. 是的。以米其林为例,在轮胎上安装传感器,扩大到了掌握磨损程度、延伸至检查与修理的设备服务项目,甚至还向客户提供节约燃料的信息服务。成功开创了从普通产品到数字产品、以及客户体验服务的新市场,创造了新收益。

此外,智能工厂的最大目标是Mass Customization,即满足个别客户多样化需求的同时,保持低成本的产品个性化等定制型批量生产与提高生产效率。随着数字技术的发展,消费模式逐渐变得极度个性化,为满足这一特点,企业必须像量身定制一样,高效地生产适合个体的产品。为此,必然会需要智能工厂。

Q 对劳动者来说也有利吗?是否存在工作岗位减少的问题呢?

A. 与其看成是工作岗位减少,不如从相同数量的人员可以生产更多产量的“生产效率”方向去看。但是,我们常说的3D行业的工作岗位肯定会减少,事实上也是如此。虽然工作岗位减少了,但与智能工厂有关的工作岗位却会增加。为此,学校与企业必须配备相应的培训。

与此同时,劳动者作为使用智能设备的智能工人,可以更安全、便捷地工作。例如,出差的相当一部分原因是现场设备故障,但到了现场才发现没什么问题,这种

in many cases, the engineer will go to the site and find that the problem was nothing special. If the worker could use a smart device to check the situation in real-time, the problem would be able to be solved without sending an agent to the site. Although the birth of the smart factory starts with machines, a factory is a place where not just machines work. It is a space where human and machines co-exist and collaborate, a space where both complement each other based on the system to maximize the synergy effect.

Q. IS THERE A TYPE OF COMPANY THAT IS WELL-SUITED FOR THE SMART FACTORY, AND THUS SHOULD START UTILIZING THIS TYPE OF FACILITY SOONER? IS THERE FIELD IN WHICH THE SMART FACTORY IS NOT NEEDED?

A. There is no right answer to these questions. However, it is important that a company correctly recognizes its reality and level, imagines the most ideal smart factory, and judges a scope that is realistically possible. Technically speaking, companies that are more focused on machines and facilities are leading the smart factory, but even in contrary cases, the smart factory is rapidly being introduced. Not long ago, in fields in which both technology and manpower were important, such as at the shipyard, they said "A smart factory? Nonsense!" But now they are changing, as the concept of smart workers is being introduced.

Q. AS A SPECIALIST WHO PREPARED THESE CHANGES, YOU MIGHT HAVE YOUR OWN SENTIMENTS WATCHING THE DEVELOPING SPEED OF THE SMART FACTORY. IS THERE ANYTHING YOU EXPECT FROM THE SMART FACTORY INDUSTRY?

A. The most important thing for a company is investment. Foreign companies that have built abilities into hardware or OT(operation technology), such as ABB and Siemens, have constructed the smart factory by fusing their own points of expertise with software technology. The level of technology of each company in South Korea doesn't quite compare to that of a foreign company, but the grouping is weak. If the hardware companies join hands with the software companies and the large firms collaborate with small businesses, South Korea can also be competitive enough. The Smart Manufacturing Innovation Center that is founded and run by the government should visualize the future and expand the opportunities of education by expanding model factories into diverse industries, such as the chemistry and electronic parts fields. It has been 30 years since I wrote my master's dissertation on production plans and control using AI. I am thrilled when I see the theory from my dissertation being widely actualized in the production field. The speed at which imagination becomes reality gets faster and faster. What innovations will 5G bring about in the manufacturing field? Enormous changes will soon occur.

情况比比皆是。这时,如果使用实时收发现场情况的智能设备,则不需要出差就能解决问题。虽然智能工厂的诞生始于机械,但工厂却并非只有机械在工作,工厂必须是机械与人类共存并合作的空间,是互相完善、最大限度实现协同效应的系统。

Q 那些企业适合引进智能工厂?或者说有不需要智能工厂的领域吗?

A. 关于这个问题,其实并没有正确答案。重要的是企业准确认识工厂的现实与水平,从现实角度判断引进智能工厂的可行性。虽然现在在很多工厂中,机械或设备的作用已经远大于操作者,但也有很多与之相反的企业也在加快引进智能工厂。像造船厂这种以劳动者的技术实力与劳动能力为核心的企业,不久前还在问“智能工厂有必要吗”,如今也逐渐发生改变,纷纷引进智能工人的概念。

Q 对于这些变化,作为专家,您看待智能工厂发展速度的感触似乎与众不同。您对未来智能工厂产业有哪些期待呢?

A. 对企业而言,最重要的是投资。在硬件或OT(Operation Technology)领域长时间积淀实力的ABB、西门子等外资企业,他们在公司的经验基础上搭载软件技术并建成了智能工厂。虽然韩国的个别技术水平与外国没有太大差别,但彼此的组合性较差。倘若拥有硬件的企业与软件企业合作、大企业与小企业合作的话,韩国也能充分确保竞争力。由政府成立、经营的智能制造创新中心未来必须增加化学工业、电子配件工业等多个产业群的模范工厂,使未来面貌变得可视化,拓展培训机会。

30年前,我以使用AI的生产计划与控制为主题写了硕士论文。看着论文中的理论在生产现场广泛应用,我感到非常激动。想象变成现实的速度正在逐渐加快。5G将以何种形式融入制造现场并引发新的创新呢,可以肯定的一点是,必将出现非常巨大的变化。

Lee Tae-jin(李泰珍)

The managing director of Metanet Global (formerly Accenture Korea), Lee Tae-jin, is in charge of the digital transformation projects of manufacturing, such as task innovation through IT, the smart factory, mobile, and big data. Recently, he has been working as an opinion leader as he fulfills government tasks and gives advice on the policies related to the smart factory.

Metanet Global(原Accenture Korea)专务,负责执行利用IT的业务创新、智能工厂、手机、大数据等制造业的数字化转型项目。最近担任着智能工厂相关政府课题执行与政策顾问的职务,同时也为企业提供咨询服务。





## DIGITAL TRANSFORMATION, THE INDUSTRIAL MAP OF THE FOURTH INDUSTRIAL REVOLUTION

What is a digital transformation? Another term has appeared while the meaning of the Fourth Industrial Revolution remains vague. It is as if another wave has rushed in before a massive wave has washed away. Let's look into the term's definitions before navigating the volatile ocean of the Fourth Industrial Revolution. There are various definitions of digital transformation(DX). At the Davos Forum, it was defined as transforming an organization using a business model that can enhance digital technology and performance. Microsoft says DX is about accepting a new way of bringing people, data, and processes together, and designing new business models through an intelligent system to create value for customers. IBM's definition revolves around a company shifting its business model and settling into a new orientation within the industry by integrating the digital and physical elements.\*

If the Fourth Industrial Revolution includes the comprehensive changes of individuals, companies, governments, societies, and cultures following the change of technology, DX explains particularly the management strategies of companies, the processes of organizations, new business models, and communication with customers. That is, DX shows us the industrial map of the Fourth Industrial Revolution.

\* Digital Retail Consulting Group ([digitalretail.co.kr](http://digitalretail.co.kr))

### 第四次工业革命的产业地图, 数字化转型

什么是数字化转型?第四次工业革命的概念尚且很模糊,又出现了一个新的术语。可谓是一波未平,一波又起。为在变化无常的第四次工业革命海洋中航行,我们先来整理一下术语。对数字化转型(Digital Transformation,下称DX)的定义多种多样。达沃斯论坛上将数字化转型定义为“利用能够提高数字技术与成果的商业模式改变组织的过程”,微软将其解释为“为客户创造新价值,通过智能系统重新构思现有商业模式,接纳结合人、数据及流程之新方案的过程”,IBM则称之为“企业整合数字与物理要素,改变商业模式并确立产业新方向的过程”。\*

如果说第四次工业革命综合了技术变化带来的个人、企业、政府、社会、文化等的总体变化,那DX则在其中说明企业经营战略与组织流程、新商业模式、与客户间的沟通等。换言之,展示第四次工业革命产业格局的是DX。

\* 数字零售咨询集团([digitalretail.co.kr](http://digitalretail.co.kr))

## Digital Transformation for Everyone

Jeffrey Immelt, the CEO of GE, posed the question, “Why not us?” during his keynote speech at the Minds+Machines 2016. It means, “Why are we not growing, when the Silicon Valley companies like Google, Facebook, and Apple are rapidly growing even in the midst of a global depression?” The answer is “Digital Transformation.” GE, which asked itself early on and quickly found the answer, turned into a digital manufacturing company, succeeding in the digital transformation. There are countless companies to which the question above can be posed.

## 一切的转变数字化转型

“为什么不是我们呢?”, GE的CEO杰夫·伊梅尔特在2016年“Minds+Machines”的主题演讲中提出了这个问题。他的意思是“谷歌、Facebook、苹果等硅谷企业在全球经济不景气的情况下也能快速增长,为什么我们不行呢?”。答案就在“数字化转型”中。早早地自问并自行寻找答案的GE快速转变成了数字制造企业,成功实现了数字化转型。然而,依然有大量企业存在以上问题。



## + INFORMATION

### DIGITIZATION, DIGITALIZATION, AND DIGITAL TRANSFORMATION

In order to understand DX correctly, one should compare it with other similar terms that were in use. First, digitization means to turn an analog record into a digitized one, like turning a cassette tape into a CD or a comic book into a computer file with a scanner. An example of digitalization, on the other hand, is to move these digital contents onto the internet. Through digitalization, one can listen to music through MP3 players and on iTunes, instead of using CD players. Thanks to DX, various information about the user is analyzed and customized services are provided. Not only the music that was chosen by the user, but also the music the user might like is recommended and different types of music are played according to the time of the day. The voice of the user produces a reaction, sometimes, other than music. Smart speakers such as Giga Genie, NUGU, and Alexa are considered concrete examples. For DX, not only the original digital contents, but also the big data of users and consumers, as well as communication technology, are required. As it newly broadens the user's experience, DX is clearly differentiated from digitization or digitalization.

### 数码化、数字化及数字化转型

为准确理解DX,我们先来看一下先前使用过的术语。首先是数码化(Digitization),指的是像将唱片或磁带中录制的音乐转移到CD中或扫描漫画书将其制成文件那样将模拟记录转化成数字形式的过程(Digitized)。最典型的例子是将这些数字内容上传到网上。通过数字化,人们便能利用MP3播放器或iTunes代替CD播放器听音乐了。而DX则会进一步分析用户的各种信息,并提供个性化服务。不仅播放用户选出的音乐,还为用户推荐可能会喜欢的音乐,在不同的时间段给用户播放不同的音乐,对用户的声音作出反应或作出音乐以外的回应。GiGA Genie、NUGU、Alexa等智能音箱都有具体的体现。为实现DX,不仅需要固有的数字内容,还需要用户与所有消费者的大数据与通信技术。在新拓展用户经历方面,DX与数码化或数字化有着明显的区别。



### FROM THE BOOKSTORE TO THE CLOUD, FROM READY-MADE GOODS TO MADE-TO-ORDER GOODS

Let's think about the companies that have succeeded in DX or are practicing DX. The first company that comes to mind might be Amazon. Starting as an online bookstore, Amazon expanded its scale as an online retail company and has now become the world's largest cloud computing company that provides AWS, and also created Alexa, the AI platform.

Let's take a look at GE, run by Jeffrey Immelt who asked "Why not us?" meaning "We can also do it!" GE announced that it would be "ranked one of top ten software companies in the whole world by 2020," and has thus transformed into an IT company offering an industrial internet operation platform and data analyzing service. The Digital Twin technology of GE collects information through the sensor attached to the physical products to maintain its optimization. The Digital Twin was actually applied to GE90, the world's largest jet engine, to enhance the utilization rate of the aircraft and reduce the cost of unnecessary service check-ups. DX, in the manufacturing process, can be illustrated in the smart factory. Adidas established a Speed Factory where customized sneakers are designed based on the individual's body information and are produced through 3D printing. The automatic process performed by robots realizes a service that allows the customer bring their own, customized shoes home just five hours after placing the order.

The scale of the economic and social added value generated by DX at Davos Forum will globally amount to USD 100 trillion by 2025. According to a study by the Harvard Business School, the top 25 percent of leading companies that pursued DX earned a 55 percent higher gross profit on average on a three-year average basis than the bottom 25 percent stragglers.\*\* Companies are facing the turning points of DX and the smart factory in manufacturing. If you cannot avoid it, you should take the lead.

\*\* *The Advent of the Age of 5G, the Technology to Buy the Future*, ETRI 5G Business Strategy Bureau, Contents Hada

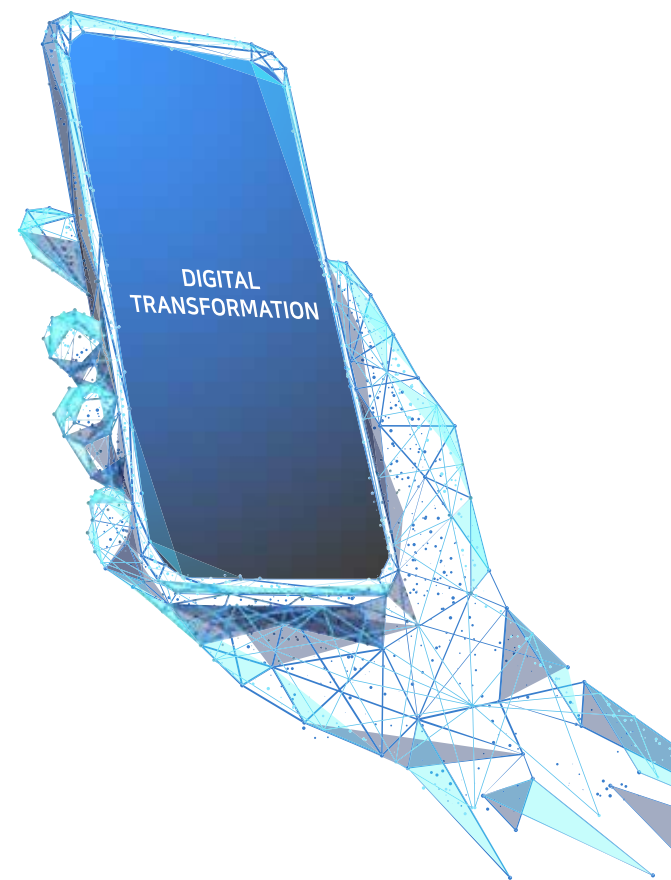
### 从书店到网盘,从制成品到订制品

说起成功实现或正在进行数字化转型的企业,最先想到的便是亚马逊。最早以网上书店起步的亚马逊逐渐壮大规模,发展成了网上零售流通企业,如今已经是提供亚马逊网络服务(AWS)的全球最大云计算公司,甚至还成功打造了人工智能平台“Alexa”。

“为什么不是我们呢?”这不是提问而是公开宣布“我们也行动起来吧!”。杰夫·伊梅尔特所在的GE又如何呢?早在2015年就已经宣布“将于2020年跃居为全球十大软件企业”,如今变成了提供工业用网络运营平台、分析数据的IT企业。GE的数字孪生技术利用物理产品上安装的传感器收集信息并帮助实现产品的最优化。在全球最大的喷气式发动机GE90中实际应用的数字孪生技术提高了飞机运行率,节约了不必要的服务检查费用。制造工序中的DX以智能工厂的形式体现。阿迪达斯分析个人的身体信息,设计定制款运动鞋,建成通过3D打印与机器人的自动化工序完成生产的速度工厂,实现了订货后仅5个小时就能带走“私人定制鞋”服务。

达沃斯论坛分析称,截至2025年,全球范围内通过数字化转型创造的经济社会附加值规模将达到100兆美元。哈佛商学院的调查研究显示,以3年的平均数值为准,推进数字化转型的前25%的领军企业的总利润比后25%的企业总利润要高出55%。\*\*如今,企业正处于数字化转型与生产智能工厂这个转折点。若无法避免,则必须抢占先机。

\*\* 《掌控未来的技术,5G时代来临》,ETRI 5G事业战略室著,Contentshada





MILAN DESIGN WEEK 2019



**NOROO’s ESSENCE: Facing the World**

NOROO Group participated in Milan Design Week 2019 held from April 9th to the 14th. Milan Design Week is the world’s largest design exhibition and festival where companies specialized in various fields, not only in design, but in fashion, interior design, automobiles, electronics, and IT boast their design sensibilities. NOROO Group, the first paint manufacturer from Korea to take part in the event, had an exhibit which attracted local attention and was selected as the top exhibition at Milan.

**NOROO的ESSENCE, 面向世界**

4月9日至14日, NOROO集团参加了在意大利米兰举行的“2019米兰设计周 (Milan Design Week 2019)”活动。米兰设计周被誉为全球最大规模设计展会与盛典, 也是产品设计、时装、室内装饰、汽车、电子与IT等众多领域的企业展示创新设计理念的盛会。作为业内首个参加该活动的企业, NOROO集团的展览入选了“米兰TOP展览”等, 在当地引发了高度关注。

**NATURE, THE SOURCE OF BEAUTY**

Tony Chambers, the creative director of *Wallpaper*, an English design magazine, explains Milan Design Week as, in his words, “[more than just being exciting and glamorous] the Milan Design Week has an edge, because it combines all forms of creativity.” Indeed, Milan Design Week combines design with technology, fashion, and art to offer a whole new experience.

<TIDES>, NOROO’s exhibition, earned enthusiastic responses from the audience as it provided a painted space that embraced art. At the exhibition hall, audience members got the peculiar impression that they had entered into a landscape. The landscape was like something never before experienced but which was simultaneously familiar and cozy. In the huge cavernous space, a dark round moon in the distance has forms silver lining like a lunar eclipse. Beneath it, a puddle of sea water, left behind from ebbing tides, reflects the moonlight. Massive pillars expose strata, making viewers imagine a landform, once submerged in the ocean, and stools placed around here and there show the changing of the moon. The gradually changing color of the lights shift from yellow to violet, orange, pink, and blue, generating a dream-like atmosphere. All these things were installed over the paint of NOROO Paint & Coatings Co., Ltd.

Lee Kwang-ho, who also collaborated with NOROO in NCTS(NOROO International Color Trend Show), and Wang & Söderström, the promising Norwegian artists’ team, worked together to create <TIDES>, an exhibition representing tides, helping the audience grasp the birth of nature and the sources of beauty. Visited by over 10,000 people, the exhibition was selected as the year’s top exhibition at Milan by *Frame*, a famous Dutch architecture magazine, and one of 15 must-see exhibitions by *D CASA*, a famous Italian interior design magazine. *Design Press*, the Korean design channel, suggested that <TIDES> was the most outstanding exhibition among all that were displayed in the Ventura Centrale.



**美丽的根源, 自然**

英国设计杂志《Wallpaper》的创意总监东尼·钱伯斯(Tony Chambers)对米兰设计周给出了自己的理解,“米兰设计周有着超乎兴趣与魅力的某种东西,因为它可以结合所有形式的创作活动”。就像他说的那样,在米兰设计周上,技术、时装及艺术所有一切都能与设计结合,为观众提供别样的体验。

NOROO的展览作品“潮流(TIDES)”也是用涂料表现的充满艺术气息的空间,赢得了观众的热烈反响。展览现场给观众留下了犹如走进风景中般的奇妙印象,分明是未曾见过的风景,但却似曾相识、给人舒服的感觉。在犹如巨型洞窟的空间尽头好似月食般的照明,地上满是退潮时留下的水洼,水洼在月光的映照下发出微光。一旁的巨型柱子让人不由得联想到海底的地貌,随处可见的凳子反复展示着月亮的变化。黄色与紫色、橘黄与粉红、蓝色轻轻摇曳,变化的灯光演绎出梦幻的氛围。这所有的色彩都源于NOROO涂料股份有限公司涂料的完美呈现。

曾参与“NOROO INTERNATIONAL COLOR TREND SHOW(NCTS)”活动的韩国设计师李光镐与极具发展潜力的北欧团队“Wang & Söderström”联手打造的作品“潮流(TIDES)”通过潮水的再现,帮助观众理解自然的诞生与美丽的根源。该作品吸引了万余名参观者,入选了荷兰著名建筑杂志《Frame》评选的本年度“米兰TOP10展示,并被意大利著名装饰设计杂志《D CASA》评选为“不可错过的15个展示作品”之一,同时还被韩国设计专门频道“Design Press”称赞为“在Ventura Centrale举办的最抢眼的展览”。





# TIDES

by Kwangho Lee x  
Wang & Söderström



## NOROO, LIFE & SCIENCE COMPANY

Tides are the last theme to wrap up the “ESSENCE” series that NOROO has been conducting since the 2019 NCTS. It makes us consider the origin of colors and design. The artificial structures in the exhibition hall naturally reveal the correlation between the sunshine that enables colors, the moon that reflects the light, and the human observer that sublimates nature into art. The exhibition was also a place where the capacity of the design and cultural marketing of the NOROO Group, which has been consistently striving to illustrate the changes of life through beautiful colors, was highlighted.

As the first in the industry, the NOROO Group pioneered in the field of color design and generated new visions and values. It established the NPCI(NOROO Pantone Color Institute), an organization specializing in colors, and developed color content, including the trend book Cover All to communicate with consumers and enlarge the market. It collaborated with POW!WOW!, the world-famous street art group, to make the case for urban restoration through culture. It also received the Red Dot Design Award, the first for a paint company, thanks to an innovative paint container that no one had ever considered before. Han Won-seok, the managing director of NOROO Group, stated that “The NOROO Group, which has professionally manufactured and sold paints, is now aiming to be recognized as a Life & Science Company that works to enhance people’s quality of life through its products and services.” NOROO Group will continue off of its success at the 2019 Milan Design Week in NCTS 2020 in order to promote artistic and cultural inspiration in the lives of its customers.

## 生活&科学企业NOROO

潮流(Tide)作为NOROO 2019 NCTS进行的“ESSENCE”系列的最后一个主题作品,让人联想起色彩与设计的起源。展览现场的人工结构物很自然地表现了制造色彩的太阳,反射阳光的月亮,以及将自然升华为艺术的人际关系。通过本次作品, NOROO一如既往地大众传递了美丽色彩与生活的变化,用设计&文化营销展现自身优势。

NOROO集团率先于行业内开拓了色彩设计领域,构筑新蓝图与企业价值,通过建立色彩专门组织NPCI(NOROO PANTONE COLOR INSTITUTE)、举办国际流行色彩发布会(NCTS)、发售色彩潮流杂志《COVER ALL》,与消费者沟通并实现了市场增长。NOROO还通过与世界著名涂鸦艺术团体POW!WOW!合作,开展城市再生项目,同时NOROO的涂料容器还一举摘得了业内首个红点设计奖。NOROO集团的韩元硕专务表示,“专门制造、生产涂料的NOROO集团如今想要转变为通过产品与服务提高生活质量的‘生活&科学企业’”。

NOROO集团计划在即将到来的NCTS 2020上延续在2019米兰设计周上取得的成功,不断向大众传播艺术、文化灵感。





## Feelings Are Colorful

### NOROO × HAPPY INSIDE

NOROO Paint & Coatings Co., Ltd. collaborated with Hi-Island, an exhibition planning agency, to open an extraordinary cultural space through the exhibit entitled “Happy Inside,” at The War Memorial of Korea. The exhibition is comprised of various visual objects and emoticons will provide visitors with a colorful experience that will make them feel happy and sad, embarrassed and joyful, and much more, through the use of colors. So why not go and discover the color that makes you happy by browsing the colorful feelings in this exhibit, open until October 27?

### 情感是彩色的

NOROO涂料股份有限公司与展览企划公司Hi-Island联手开展色彩合作, 在龙山战争纪念馆举办了特色文化空间展览“HAPPY INSIDE”。展览由多种视觉雕塑与表情符号构成, 为观众呈现了通过色彩确认幸福与悲伤、混乱与高兴等情感的别样体验。本次展览将持续到10月27日, 何不试试在彩色情感中寻找自己的专属幸福色彩呢?



### PINK FOR HEALING, YELLOW FOR HAPPINESS

At the entrance, you can see the word “happiness” filling the room and the yellow emoticon grins a welcome to visitors. You may go straight in and find happiness right away. Children who enter the exhibit hall holding their mother’s hand exclaim “Wow!” and run into the mouth of the smiling emoti-con. Their instinct is to react to happiness without hesitation. The next space on the inside of a train filled with the sweetness of PANTONE Candy Pink paint. This train doesn’t seem to deliver passengers, but rather their dreams. The subway lines forming the phrase “HAPPY INSIDE” indicate stations like “SAD Town,” “SOSO Av,” and “RESET Station.” What will be the next stop? Each space, divided with curtains and corridors, piques the curiosity. When you pass through the pink corridor and pull the curtain aside, yellow shines out like sunlight. Push one of the emoticons on the wall and you will see messages of happiness. Children look for the happy messages hidden in the wall as if they are on a treasure hunt and well-dressed young visitors take pictures against the greenish blue windowsill surrounded by pink and yellow. In moments like these, the meaning of the sign reading “Everyday Happiness” can be clearly felt.



### 治愈的粉色, 幸福的黄色

在被“HAPPY”字样包围的粉红色入口, 黄色的表情符号带着开朗的笑颜迎接着观览者, 让人有种走在通往幸福的直通道路中的感觉。牵着妈妈的手走进展览现场的孩子们不停地发出“哇啊~”的感叹, 边感叹边扑进了开怀大笑的表情符号口中。孩子们对幸福的直觉快速而本能。相连的空间是用潘通涂料涂刷的糖果粉色甜蜜电车, 这辆电车仿佛正搭载着梦想疾驰。在由“HAPPY INSIDE”几个字组成的路线图上, 站名写的是SAD Town、SOSO Av、RESET Station。.....下一站究竟是哪呢? 每个空间用帘幕与过道分开, 勾起观众的无限遐想与好奇心。穿过粉红过道、掀开帘幕, 映入眼帘的黄色犹如阳光般明媚。轻轻按下黄色墙壁上贴着的表情符号, 就会有蕴含日常生活幸福的语句展现在眼前。孩子们犹如寻宝般四处寻找隐藏在墙壁中的幸福讯息, 时尚的年轻人则忙着在一旁拍照留念。“生活中的小幸福”指示牌让大家真切地感受到了此刻的幸福。





## COLORFUL DELIGHTS IN DAILY LIFE

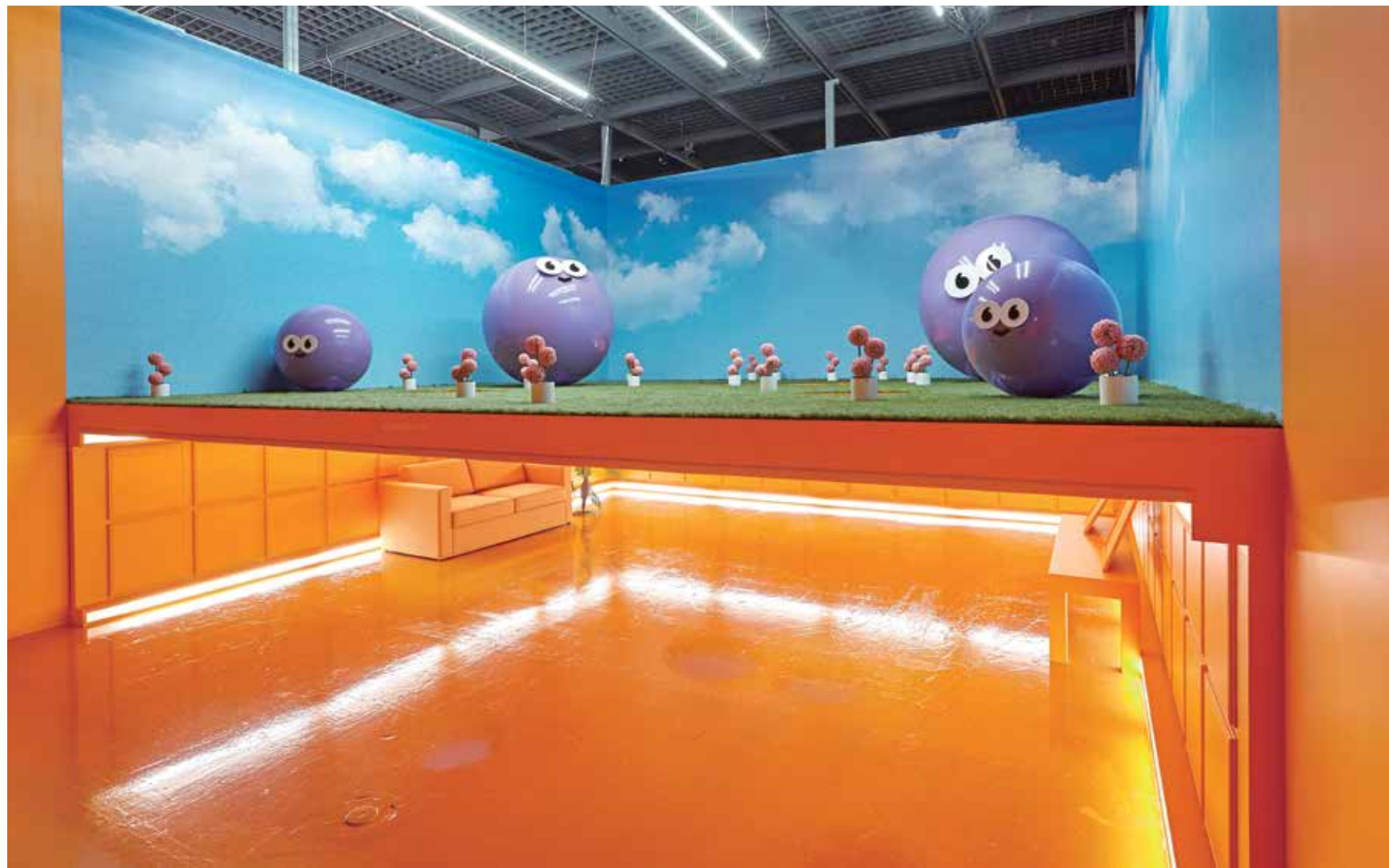
The exhibition continues with the room Happiness in Darkness, where there is an emoticon that appears to be shedding tears, a media art piece that uses lasers, performance art where visitors can hear strangers' monologues through phones in a snow-white room, and the spaces called Unexpected Happiness, Exciting Happiness, and Lovely Happiness.

Visitors will be too busy to take pictures because they will be looking through a hole and giggling at the cartoons that reflect people's simple hopes and imaginations, drawn by Keykney, an illustrator with 200,000 followers on social media; riding a bicycle to power the light bulbs around it; dancing with inflatable puppets; jumping into a ball pool; and becoming a dwarf and throwing themselves into the arms of a huge emoticon doll, all in order to indulge in the various feelings of life. In the background of all the different faces captured in pictures is the clear colors of PANTONE Paints.

## 从日常生活到喜悦全都是彩色的

在漆黑的黑暗中表情符号流着眼泪, 穿过“黑暗中的幸福”就是用激光表现的媒体艺术; 纯白色的房间中, 透过听筒聆听陌生人独白的表演艺术, 感受“意外的幸福”、“快乐的幸福”以及“爱的幸福”。

观众可以透过小孔欣赏拥有20万SNS粉丝的插画家Keykney以愉快手法描绘人们的小希望与想象的漫画, 笑着转动自行车车轮, 制造闪耀的光芒, 与飘扬的气球玩偶一起跳舞, 噗通一下跳入球池, 化身为侏儒矮人, 投入巨型表情符号玩偶的怀抱, 充分感受各种情感, 拍下无数趣味照片。在照片中成为所有不同面孔背景的是潘通涂料的鲜明色彩。



## PANTONE PAINTS EXPAND YOUR SENSES AND YOUR HEART

The themed booths titled “Daily Life, Chaos, Escape, Happiness, and Joy” have become animated and they are the perfect photo zone thanks to the crisp colors of PANTONE Paints: the pink of Almond Blossom 13-2006 delivers warmth as if it is tenderly embracing the viewer, the vivid orange of Carrot Curl 15-1262 is like a mixture of the sun and the soil, the light violet of Lilac Chiffon 15-2913 contains the fragrance of flowers, and more. NOROO Paint & Coatings Co., Ltd.'s Cleanpoxy 3100 was used to create a safe and tidy floor. Each color was planned in a collaboration of NOROO Paint & Coatings Co., Ltd., the director Park Seo-young from the Art of Seoyoung, and the Hi-Island team, based on the PANTONE's 2019 Color Trends. The promotion zone depicting nature by using Living Coral 16-1546, PANTONE's 2019 color of the year, will make you realize again the power of NOROO's color sense.

The organizer of the event stated, “NOROO Paint & Coatings Co., Ltd.'s collaboration with PANTONE Paints, the company specializing in color, will lead to greater success in this exhibition.” In fact, the exhibition is drawing so much attention, to the extent that early bird tickets sold out and a second round was opened, with the amount of photo evidence on social media continuing to grow. This is thanks to the beauty of PANTONE Paints that express quotidian emotions through vibrant colors and the excellence of the exhibition that asks visitors look reflect on their daily lives with open eyes and open hearts. Come, discover the color that will claim your heart at <Happy Inside> .

## 开启感性与心扉的潘通涂料

犹如轻轻拥抱般传递体温的杏花 (Almond Blossom 13-2006) 与让人沐浴春风温柔的樱花 (Cherry Blossom 13-3207) 的粉色, 太阳与土壤相遇后形成的胡萝卜卷 (Carrot Curl 15-1262) 的鲜明橙色, 洋溢着花香的丁香雪纺 (Lilac Chiffon 15-2913) 的淡紫色等, 潘通涂料的高彩度颜色为“日常-混乱-逃脱-高兴-喜悦”这5种主题注入了生命力, 构成了最适合拍照的空间。NOROO涂料股份有限公司的Clean Poxxy 3100打造了整洁安全的地板。各颜色以潘通公司2019年流行色为基础, 通过NOROO涂料股份有限公司与“Art Of Seo Yeong”的总监朴瑞英、Hi-Island组的合作企划, 使用“潘通年度流行色”珊瑚橙演绎的自然宣传区再次让观众认识到了NOROO涂料股份有限公司的色彩感。

本次活动的主办方表示, “与色彩专业企业NOROO开展合作, 将为本次展览锦上添花”。目前, 展览的早鸟票已2次售罄, SNS上的照片也在快速增加等, 活动受到了大量关注。这或许正是色彩与涂料的魅力吧。快来“HAPPY INSIDE”中确认自己心中的颜色吧~~







JIN MYUNG-HO, CEO OF NOROO PAINT & COATINGS,  
RECEIVES GRAND PRIZE IN GLOBAL QUALITY MANAGEMENT



NOROO PAINT & COATINGS CO., LTD. SIGNED MOU WITH THE CITY OF BUSAN  
FOR "WHITE ROOF INSTALLATION PROJECT"

## NOROO Paint & Coatings Co., Ltd.

NOROO涂料股份有限公司

### JIN MYUNG-HO, CEO OF NOROO PAINT & COATINGS, RECEIVES GRAND PRIZE IN GLOBAL QUALITY MANAGEMENT

Mr. Jin Myung-ho, CEO of NOROO Paint & Coatings, received the "grand prize at Global Excellence Award in Quality Management" during the <2019 Korean Society for Quality Management fall conference> held in The K Hotel on May 31.

Awarded to managers and executives who've made significant contributions to the development of domestic industries, quality management and social responsibilities of companies, "Global Quality Manager Awards" perform a review in accordance with the process of screening conducted by the award committee that the President of Korean Society for Quality Management appoints, and select winners through an approval of the board of directors. Jin received the grand prize for his company's contributions to reinforced corporate competitiveness and national industrial growth through leading quality management activities. At the Quality Talk Show that followed the award ceremony, Jin emphasized that "the three factors – strengthened quality competitiveness through win-win cooperation of both consumer and company, vitalization of investments and complete overhauling due to global competition, and reinforced corporate brand through smart factory and quality innovation – are critical for Korean companies to continuously solidify their quality management activities. He also added, "I wish to thank all of our employees who are striving for quality competitiveness with a unified mindset and attitude...I will continue to do my best for customer satisfaction and realization of our social responsibilities through the quality improvement of products and services."

#### NOROO涂料代表陈明浩, 荣获全球品质经营者大奖

NOROO涂料股份有限公司的法人代表陈明浩社长在5月31日首尔The-K酒店举办

的“2019年韩国品质经营学会春季学术大会”上获得了“2019全球品质经营者大奖”。“全球品质经营者大奖”是向为韩国产业发展与品质经营作出贡献, 并对企业社会责任作出重大贡献的经营者颁发的奖项, 按照韩国品质经营学会会长委托的褒奖委员会审议流程进行审议、经理事会批准后选出。NOROO涂料股份有限公司的法人代表陈明浩社长通过领先的品质经营活动为加强企业竞争力与推动国家产业发展作出了贡献并因此获得了大奖。在当天的颁奖典礼后进行的品质访谈节目中, 陈明浩代表强调说, 韩国企业在加强品质经营活动方面, 最重要的三个因素是“通过消费者与企业共生共赢加强品质能力, 在全球竞争中激活投资并全面改善企业结构, 通过智能工厂与品质创新加强企业品牌”。陈明浩代表在获奖感言中表示, “感谢为加强品质竞争力团结一致、共同努力的全体员工”, “未来公司也将通过提高产品与服务品质竭尽所能地实现客户感动与企业社会责任”。

### SIGNED MOU WITH THE CITY OF BUSAN FOR "WHITE ROOF INSTALLATION PROJECT"

On May 13th, the city of Busan signed an MOU with NOROO Paint & Coatings and Busan Institute of Registered Architects (BIRA) for promotion of the "White Roof Installation", a charity project.

"White Roof Installation Project" is a public-private cooperation project that aims to alleviate the urban heat island phenomenon and realize low-carbon green architecture by painting the roofs of existing residential buildings in white and, subsequently, reducing greenhouse gas emitted from them. It is known that use of a bright-colored (white or similar) paint, which has a significant effect of reflecting sunlight and solar heat, the accumulation of heat on the roofs is reduced, which leads to a decrease in indoor temperature by 4 to 5 degrees. If the interior temperature goes down, the energy needed for air conditioning during summer is also conserved.

For this project, NOROO Paint & Coatings will provide special heat-reflective paints and other materials needed for construction, whereas BIRA will be responsible for the overall construction. The city of Busan has selected 22 buildings vulnerable to intense heat in two district's (Jung-gu, Saha-gu) for this project, and plans to begin construction in May and complete before the hot summer arrives. A representative of Busan stated, "This MOU is significant

since public and private agencies communicate and collaborate with each other through active financial and talent support by NOROO Paint & Coatings and BIRA in order to take a leading role in establishing green buildings...We will further vitalize the White Roof Installation Project and spread greater awareness in green buildings, striving to reduce the temperature of Busan."

#### 与釜山市签订“白色屋顶建设支援项目”业务合作协议

5月13日, 釜山市与NOROO涂料、釜山广域市建筑师会签订了业务合作协议(MOU), 决定全面推进捐助项目“白色屋顶建设支援项目”。

“白色屋顶建设支援项目”指的是将现有住宅建筑的屋顶刷成白色, 以达到为建筑节能、缓解城市热岛现象、实现低碳绿色建筑的项目。建筑屋顶刷上亮色(白色系)涂料后, 可有效反射太阳光从而减少屋顶上热气的堆积, 使室内温度降低4~5度, 从而节约夏季冷气能源。此项目由NOROO涂料负责提供隔热特殊涂料等施工材料, 由釜山市建筑师会负责施工。釜山市选择了2个区(中区、沙下区)内抗热性较差的22栋住宅为对象, 自5月起施工, 计划在夏季酷暑来临前完工。釜山市相关人士表示, “得益于NOROO涂料与釜山市建筑师会在财力与人力方面的积极资助, 该项目成功实现了民官沟通与合作, 走在了建设绿色建筑的前列, 就这点而言, 本次合作的意义重大”, “未来釜山市将努力开展白色屋顶支援项目, 传播对绿色建筑的认识, 努力降低釜山的温度”。

### CPTED ACTIVITIES ON A VILLAGE MURAL STREET IN DONGDAEMUN-GU

On April 20, NOROO Paint & Coatings, in cooperation with Ministry of Justice's Seoul Legal Obedience Support Center, held "Small CPTED in Our Village - Mural Painting Project" on retaining walls located in front of Yeonyukgyo Bridge by Baebongsan Mountain in Dongdaemun-gu. An acronym of 'Crime Prevention Through Environmental Design', CPTED helps to prevent crime and reduces residents' concerns by changing the environment. This project, which seeks to paint murals on desolate retaining walls for crime prevention and creation of a bright atmosphere, has been planned and overseen by the Seoul Legal Obedience Support Center and sponsored by the Korean Federation of Volunteering, NOROO Paint & Coatings and Neoman



CPTED ACTIVITIES ON A VILLAGE MURAL STREET IN DONGDAEMUN-GU

Wall Painting Group, a non-profit volunteer organization, while relevant agencies such as Hwiggyeong 2-dong Community Center collaborated. Designs of the murals originated from twelve attractions of Dongdaemun-gu such as King Sejong Memorial Hall and Jungnangcheon cherry blossom path, and as many as 120 people including teenage volunteers from local schools, Hwiggyeong 2-dong community committee members and residents, Dongdaemun-gu district councilmen, and advisors from Seoul Legal Obedience Support Center took part in the mural painting. Through this project, the gray cement walls on the path leading to Baebongsan and Jungnangcheon cherry blossom path were decorated by pink paint and reborn in a beautiful and fresh look, further adding a charming appeal to the nearby trail.

#### 通过东大门区村路壁画开展CPTED活动

NOROO涂料于4月20日与法务部首尔守法支援中心一同在东大门区拜峰山连陆桥前的护墙上开展了“我们社区的CPTED-壁画绘制项目”。CPTED是通过环境设计预防犯罪(crime prevention through environmental design)的缩写, 意思是改善环境, 防止犯罪、增加居民的安全感。

本项目通过在荒凉的护墙上绘制壁画、营造明快的氛围, 达到预防犯罪的效果, 由首尔守法支援中心企划并主办, 由社团法人全国志愿服务联盟与NOROO涂料、非营利性志愿组织Neoman壁画事业团赞助, 由徽庆二洞居民中心等相关机构合作开展。壁画的图案以世宗大王纪念馆、中浪川樱花路等东大门区的12个景点为主题构成, 辖区内外的高中高中生志愿者及徽庆二洞居民自治委员等地区居民、东大门区议员、首尔守法支援中心守法支援咨询委员及职员等共计120余人直接参与了壁画的绘制工作。本次绘制将连接拜峰山与中浪川樱花路的胡同两侧的灰色水泥墙涂成立粉红色, 使整个胡同变得清爽、明亮, 为附近的步道增添了情致。

### NOROO PAINT & COATINGS RELEASES 2 FUNCTIONAL PAINTS FOR ENHANCING INDOOR ENVIRONMENTS

NOROO Paint & Coatings (CEO: Jin Myung-ho) has released Soon&Soo Water Guard, a new paint concept capable of usage even in humid conditions and equipped with antibacterial, anti-fungal features, and Soon&Soo Radon Guard, which reduces the introduction of radon gas. Coupled with PANTONE





NOROO PAINT & COATINGS RELEASES 2 FUNCTIONAL PAINTS FOR ENHANCING INDOOR ENVIRONMENTS

Air Fresh, NOROO aims to aggressively engage the interior water paint market with its three functional products for enhancement of interior environments. The already released PANTONE Air Fresh showed a rate of adhesion of formaldehyde in the air more than 11 times greater than typical water paint according to the results of tests conducted by Korea Conformity Laboratories, proving its impact on improving indoor air quality. A type of paint that has received the eco-friendly certification mark and antibacterial mark, PANTONE Air Fresh has also acquired the performance assessment standard for sorptive building materials, one of the criteria for health-friendly housing construction recommended by Ministry of Land, Infrastructure and Transport. While PANTONE Air Fresh adsorbs and removes harmful substances already floating in the air, the recently released Soon&Soo Water Guard and Soon&Soo Radon Guard serve to prevent discharge of such toxic substances. Most of the other types of paint can only be painted on perfectly dry surfaces without any moisture but Soon&Soo Water Guard is a new paint concept capable of being painted even on moist surfaces thanks to its ability to dry quickly, and is also a functional water paint that prevents moisture coming out of concrete or infiltrating from the outside to protect the walls and, thanks to its antibacterial and antifungal features, eliminates any worries of humidity or fungus inside the home. In addition, Soon&Soo Radon Guard blocks any discharge of radon, which is often called a “silent killer”. A natural background radiation substance with no color, odor or taste, radon is widely known as a group 1 carcinogen that can potentially lead to lung cancer if inhaled for an extended period of time. It can be found everywhere in our living environment such as construction materials and even mattresses and marbles, as discovered in recent years, and therefore, efforts to reduce it is required in any way possible. In particular, radon gas may flow into a building through cracks on construction materials like concrete and cement mortar but, because of its high elasticity, Soon&Soo Radon Guard is resistant to cracks, which not only helps reduce the amount of radon gas discharged but also shows good elongation (flexibility) even at low temperatures, thus making it tough for it to crack easily during wintertime. A representative of NOROO Paint & Coatings said, “The three products, which

have been released not just for mere pollution prevention or eco-friendliness but to actively improve our environment, were all developed through monitoring of consumer feedback. These functional paints will form various interior shields and, thus, serve a significant role in generating a healthy and pleasant indoor environment.”

**NOROO涂料, 推出两款室内环境改善用功能性涂料**  
NOROO涂料(法人代表陈明浩)推出了在潮湿环境中也能涂刷、具有抗菌及抗霉菌功能的新概念涂料“纯&秀”防水卫士、减少氡气释放的“纯&秀”防氡卫士, 以及潘通空气清新涂料三款室内环境改善用功能性产品, 开始全面攻克韩国水性涂料市场。  
韩国建设生活环境试验研究院的试验结果显示, 与普通水性涂料相比, 此前推出的潘通空气清新涂料对空气中甲醛吸附率达到11倍以上, 室内空气质量改善效果得到了验证。潘通空气清新涂料不仅取得了环保认证标志与抗菌标志认证, 同时还通过了国土交通部辖下的健康友好型住宅建设建议标准之一的吸附建筑材料性能评估标准。  
如果说潘通空气清新涂料是吸附并消除已经漂浮在空气中的有害物质, 那这次推出的“纯&秀”防水卫士与防氡卫士则具有阻止有害物质释放的功能。一般来说, 大部分的涂料都只能在没有湿气的完全干燥表面涂刷, 但“纯&秀”防水卫士涂料却不同, 它能凭借快干性能在潮湿环境中涂刷, 作为一款新概念的功能性水性涂料, 它可以防御混凝土中释放的湿气或外部渗入的湿气, 保护墙面, 兼具抗菌与抗霉菌功能, 可消除家中的湿气或霉菌困扰。  
与此同时, “纯&秀”防氡卫士可以阻断被称为沉默杀手的氡的释放。众所周知, 氡是一种无色、无臭、无味的自然放射性物质, 长时间吸入时会引发肺癌, 属于一级致癌物质。最近建筑材料及床垫、大理石等中都检出了氡, 生活环境各处都能发现氡的存在, 因此必须要减少它的释放量。特别值得一提的是, 氡气可以通过混凝土、水泥灰浆等建筑材料的裂缝流入室内, 但“纯&秀”防氡卫士具有很高的弹性, 可有效抵抗裂缝, 减少氡气的释放量, 且低温条件下也有很好的柔韧性, 冬季也不容易开裂。  
NOROO涂料相关人士表示, “超越单纯地防止公害或环保层面、站在积极改善环境的角度推出的这三款产品, 全都是在采集消费者意见后才开发而成的。这些功能性涂料将形成各种室内防护膜, 为营造健康、舒适的室内环境发挥巨大作用”。



EVENT HELD TO CELEBRATE THE 1ST ANNIVERSARY OF THE FOUNDATION OF NOROO COIL COATINGS LABOR UNION

NOROO Coil Coatings Co., Ltd.  
NOROO 卷钢涂料有限公司

**EVENT HELD TO CELEBRATE THE 1ST ANNIVERSARY OF THE FOUNDATION OF NOROO COIL COATINGS LABOR UNION**  
On May 9, NOROO Coil Coatings hosted an event to celebrate the 1st anniversary of the foundation of its labor union (May 14) at Pohang Plant. Park Min-rae, the head of NOROO Coil Coatings labor union, said during the commemorative address, “Our labor union has gone through significant changes and achieved great growth in just the short amount of time of one year... We will continue to maintain a union that develops ceaselessly and grows through the spirit of a win-win attitude and harmony.”  
The opening address by the head of the union was followed by an award ceremony for the model union members, speeches of encouragement from the heads of labor unions at NOROO Chemicals, NOROO BEE Chemical, and NOROO Automotive Coatings, followed by a congratulatory message by Lee Han-bok, CEO of NOROO Coil Coatings. The celebration of the union’s 1st anniversary offered an opportunity to validate the status of the union and unity between the members.

**NOROO 卷钢涂料举办工会创立一周年纪念活动**  
为庆祝工会成立一周年(5月14日), NOROO 卷钢涂料于5月9日在浦项工厂举行了纪念活动。NOROO 卷钢涂料工会委员长朴闵来在致辞中表示, “虽然只有短短的一年时间, 但NOROO 卷钢涂料还是取得了很多变化和发展。今后, NOROO 卷钢涂料也将本着相辅相成、和谐共处的精神, 建立更加发展壮大的工会。”  
活动包括表彰模范工会会员; NOROO 化学制品、NOROO 非化学制品、NOROO 汽车涂料委员长致辞; NOROO 卷钢涂料代表理事李汉馥致辞等。在一周年之际, 工会地位和工会成员凝聚力再次得到了确认。



THE KIBAN'S “BORAMCHAN HONEY ORIENTAL MELON” WON THE GRAND PRIZE AT THE ORIENTAL MELON CONTEST

Agricultural corporation, THE KIBAN Co., Ltd.  
农业公司法人(株)THE KIBAN

**THE KIBAN'S “BORAMCHAN HONEY ORIENTAL MELON” WON THE GRAND PRIZE AT THE ORIENTAL MELON CONTEST**  
At the 2019 Seongju Life Culture Festival and Seongju Oriental Melon Festival, held from May 16 to 19 in Seongju, Gyeongsangbuk-do and well-known for its oriental melons, Mr. Park Byeong-woo, a farmer, submitted the “Boramchan Honey Oriental Melon” of THE KIBAN and won the grand prize. One of the largest events hosted by Seongju-gun, Seongju Life Culture Festival and Seongju Oriental Melon Festival aim to promote and develop the region as a home of oriental melons, and host a variety of experiences and attractions. Among them, the oriental melon contest is the main event of the festival and appoints oriental melon experts as judges for fairness and objectivity to perform two rounds of thorough review and, ultimately, choose outstanding farms. For the first-round review, judges visit the farms to inspect, for example, the overall conditions for cultivation control while, in the second leg of the review, the commercial value of the oriental melons, which includes the shape, color and gloss, mouthfeel, taste and sweetness, is verified through a blind test. The contest aims to handpick oriental melon farms that will come to symbolize the pride and superiority of Seongju, the leader of Korean oriental melons, which is why the review process is carried out in an extremely meticulous fashion.  
Park stated, “Boramchan Honey Oriental Melons are easier to grow than other varieties thanks to a convenient cultivation control as well as superior color, texture, sweetness, continuous fruit-bearing and yield.”  
Meanwhile, Mr. Jung Shin-young, a farmer from Chojeon-myeon, received the silver prize for his Alchan Honey Oriental Melons while Mr. Jung Woo-cheol and Mr. Kim Hae-gyu from the same region as well as Mr. Jo Yang-sik of Yongam-myeon who cultivated Bareun, Horamchan and Alchan Honey Oriental Melons, respectively, received the bronze award. The contest produced



## KIBAN 기반테크

COMPANY HAS CHANGED ITS NAME FROM NOROO KIBAN TO KIBAN TECH

five winners who grew THE KIBAN oriental melons and, therefore, served as an opportunity to prove expertise of THE KIBAN in growing oriental melons. Mr. Choi Gyu-seoul, CEO of THE KIBAN, stated, “We will continue to develop and distribute outstanding new varieties to help the farms raise their incomes and, in the future, ensure that the reputation of Seongju Oriental Melons is continuously maintained and evolved.”

### THE KIBAN的“意义满满的蜜香瓜”，在香瓜品鉴会上摘得大奖

5月16日至19日, 在香瓜之乡庆尚北道星州举办的2019星州生命文化节与星州香瓜节上, 农民朴炳宇携 THE KIBAN的“意义满满的蜜香瓜”参展并摘得了大奖。星州生命文化节与星州香瓜节是在星州郡举办的最大规模的活动之一, 可为参与者提供丰富多样的体验与看点, 意在宣传并发展香瓜之乡星州。其中评选香瓜品鉴会是该庆典的主要活动, 为确保评审的公平性与客观性, 委托香瓜相关专业评审委员分别实施一次与二次的评审, 评审过程十分严格。一次评审中, 由评审委员直接访问农户, 检查整体的栽培管理状态等; 二次评审中, 对香瓜的形状、色泽、口感、味道、糖度等商品性进行盲测。因为该品鉴会将评选出韩国香瓜的代表——象征星州香瓜骄傲与优秀性的香瓜栽培农户, 所以评审过程非常严格。荣誉大奖的获得者是栽培THE KIBAN的“意义满满的蜜香瓜”的星州邑农民朴炳宇, 朴先生评价说, “‘意义满满的蜜香瓜’易于栽培管理, 果色与口感、糖度、连续坐果性、产量等优秀, 与其他品种相比, 栽培更轻松”。“意义满满的蜜香瓜”荣获大奖的同时, 草田面农民郑新英栽培的“实在蜜香瓜”获得了银奖, 栽培“纯正蜜香瓜”、“意义满满的蜜香瓜”、“实在蜜香瓜”的草田面农民郑宇哲、金海圭及龙岩面农民赵良植分别获得了铜奖, 共有5人凭借THE KIBAN的香瓜品种获奖, 本次品鉴会上, THE KIBAN在香瓜品种培育方面的专业性得到了认证。THE KIBAN的法人代表崔圭高社长表示, “为继续保持并发展星州香瓜的盛名, 未来公司也将继续培育并推广优秀新品种, 帮助农户增加收入”。

### KIBAN TECH,. Ltd.

(株)KIBAN TECH

### COMPANY HAS CHANGED ITS NAME FROM NOROO KIBAN TO KIBAN TECH

On April 15, NOROO Kiban officially changed its name to KIBAN TECH,. Ltd. based on a decision of the board of directors. The change stems from the company's desire to efficiently perform integrated management of its brands in the field of agro-bio and to improve the expandability of its businesses, and KIBAN TECH aims to treat this name change as a fresh turning point to consistently develop new technologies in the agro-bio high-tech industry and expand its areas of business for making a greater leap forward. Based on the name change, the address of the official company website has been changed to [www.kibantech.co.kr](http://www.kibantech.co.kr) while the address of business facilities and the business registration number are the same as before.

### 由NOROO KIBAN更名为KIBAN TECH

4月15日, NOROO KIBAN通过理事会将公司名称正式更改为(株)KIBAN TECH (KIBAN TECH Co.,Ltd.)。此举意在有效整合并管理农生命事业领域的品牌、提高事业扩张性。作为新的转折点, (株)KIBAN TECH将在农生命高科技事业领域不断开发新技术, 扩大事业领域, 努力实现更大的飞跃。公司更名后, 现有官网地址变成了[www.kibantech.co.kr](http://www.kibantech.co.kr), 公司地址与营业执照号等与之前相同。



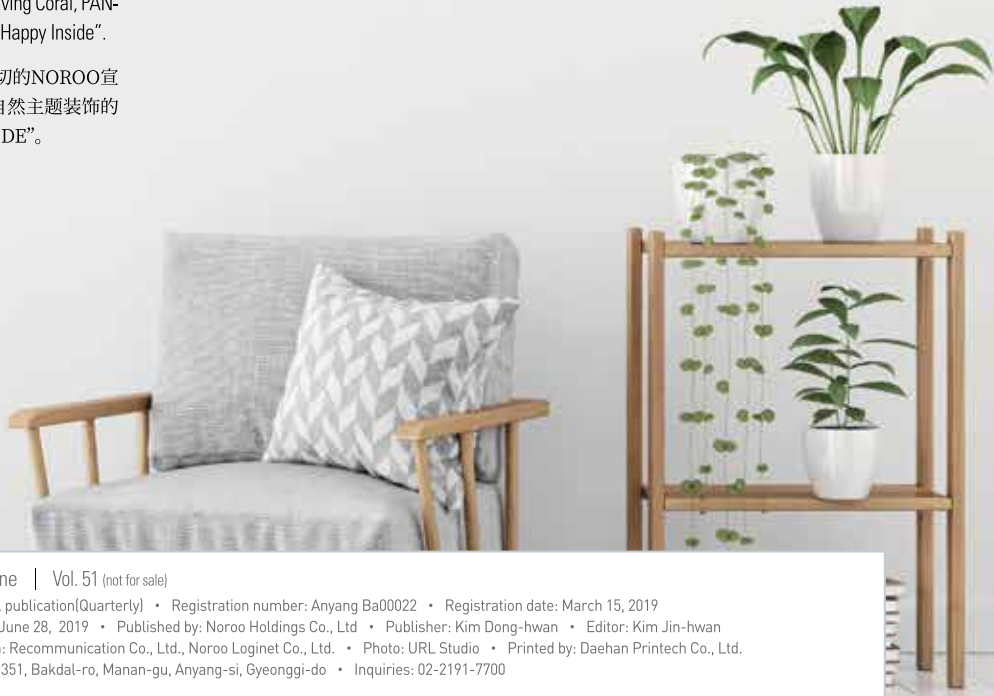
This is the PR zone of NOROO that you are welcome to discover at <Happy Inside> exhibition. The inside, which is decorated with the theme of nature and Living Coral, PANTONE Color of the Year 2019, is literally “Happy Inside”.

“HAPPY INSIDE”展览现场倍感亲切的NOROO宣传区, 利用潘通年度流行色珊瑚橙与自然主题装饰的展厅内部绝对是真正的“HAPPY INSIDE”。



Mr. Lee Tae-jin of Metanet Global who has given his knowledge and insight on smart factories through a special theme interview brightened even those around him with his radiant smile. Thanks for such a great photo.

通过特别主题采访阐明对智能工厂的认识与见解的Metanet Global李泰珍老师以明快的笑容照亮了四周。感谢他的帅气照片。



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