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Our goal. Our challenge to you.

MACHINE GREATNESS™

2017 issue no 8.
NEWS & EVENTS

DIMF REVIEW

DIMF 2017 introduces the new value and new future of Doosan Machine Tools to over 6,200 customers and dealers worldwide

INSIDE

Customer Success Stories
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EMO PREVIEW

Doosan Machine Tools Targets the European Market with High-performance Machine Tools and Solutions that Meet the Latest Manufacturing Trends while Enhancing Customer Competitiveness
Doosan Machine Tools held the "Doosan International Machine Tools Fair (DIMF) 2017" over four days from May 17 to 20 at its Seongju and Namsan plants. DIMF 2017 featured eighty types of machine tools including next-generation turning machines, machining centers, multitasking machines, 5-axis machines, Swiss Turns and double-column machining centers. A total of 6,250 customers and dealers, including over 650 overseas visitors from Europe, China and the Americas, participated in DIMF 2017.

DIMF 2017, the 11th biennial exhibition hosted by Doosan Machine Tools, was crucial in the sense that it proved that Doosan Machine Tools, which is celebrating its 20th anniversary in 2017, is a reliable partner and "solutions provider" for many diverse industries. Doosan Machine Tools set up five distinct customer industry zones, namely, Automotive, Die & Mold, Aerospace, IT, and Medical, and focused on the introduction of equipment optimized for each of the industries with the aim of growing together and sharing a common vision with its customers. Most notably, twenty-one of the eighty machine tools displayed were new models that were unveiled at DIMF 2017 for the very first time, which helped dispel any domestic and international concern about the Company’s future, and raised expectations about the Company’s customer and solution-centered paradigm shift.

It is also notable that DIMF 2017 featured a variety of solutions designed to respond to the Fourth Industrial Revolution, including ‘aI doo control’, which is Doosan Machine Tools highly evolved smart factory solution, gantry loaders, pallet systems and robotic automation solutions. DIMF 2017 was also very highly regarded by its visitors for the diverse opportunities it offered participants to exchange information amongst themselves, such as the Seongju and Namsan Plant Tour Program, seminars on ‘Customer Industry Solutions’, a smart factory demonstration and a hard-to-cut material machining demonstration, all of which helped them to acquire not only the latest information on machine tools but also to figure out changes in manufacturing technology trends and prepare themselves for the future.

Doosan Machine Tools is set to exhibit 22 machine tool models at EMO 2017, including the new DVF 5000 and various automation solutions

Doosan Machine Tools is ready to target the European market with its high-performance, high-reliability machine tools, together with smart production and manufacturing solutions. Doosan Machine Tools will exhibit twenty-two high-performance machine tools and automation solutions including the DVF 5000 and SMX3100ST at EMO 2017 to be held in Hanover Messe, Germany from September 18 to 23, and will actively promote its diverse lineups equipped with advanced technology matching the most advanced machine tool manufacturers in the world.

Doosan Machine Tools has decided to present twenty-two models from its machine tool lineup at the exhibition, including five types of simultaneous 5-axis machining centers and multi-tasking machines such as the DVF 5000 and the PUMA SMX3100ST; ix varieties of large turning centers and horizontal machining centers that have raised their overall reliability and performance using many improved features; five types of best-selling high-performance machine tools such as Lynx and DNM; and five types of turning centers and machining centers equipped with various automation solutions including robots, gantry, LPS (multi pallet), and die & mold

In addition, Doosan Machine Tools will give presentations on ‘aI doo control,’ its own smart factory solution, at its booth throughout the exhibition period and introduce diverse production and manufacturing solutions designed to enable customers to maximize their production efficiency, achieve greater manufacturing flexibility, and become more profitable.
'Machine Greatness' To Be Experienced by Customers: Doosan Machine Tools Presents its New Slogan for Entry into 'Global Top 3'

Doosan Machine Tools has launched its new slogan ‘Machine Greatness!’ with the aim of delivering ‘greatness beyond goodness’ in all its products and services. Under the concept of ‘Machine Greatness,’ the company aspires to help all its customers realize their dreams by producing and delivering top-notch machine tools that will enable them to cope with the rapidly changing business environment and achieve business success.

Doosan Machine Tools will promote the new slogan at the EMO 2017 held in Hanover, Germany from September 18-23, 2017.

With the products and solutions provided by Doosan Machine Tools, our customers can equip themselves with the vision required to preemptively respond to the rapidly changing industrial environment (‘Initiative’ ‘Optimal Solutions’), produce any product they desire with any materials they choose (‘Infinity’), and boost the satisfaction of everyone concerned (‘Reliability’).

Our customers will be able to achieve both maximum output and maximum sales through the Greatness they achieve with Doosan machine tools, ultimately leading to their greatest experience ever (‘Maximization’).
The ‘Machine Greatness’ of Doosan Machine Tools!

Doosan Machine Tools is committed to providing products and solutions of superior quality and flexibility that enable its customers to respond effectively to the Fourth Industrial Revolution. To this end, Doosan Machine Tools aims to achieve customer satisfaction with the following five unrivaled competitive edges: (1) a ‘product lineup’ of more than 360 products that can be delivered anytime anywhere; (2) ‘diversity and customization’ that enables the company to meet all of its customers’ needs in terms of materials, processes and machine tools; (3) ‘market responsiveness and future technological competence’ that enables the Company to provide optimized solutions to the rapidly changing manufacturing and business environment; (4) ‘expertise’ proven by the Company’s 40-year corporate history, R&D technological competence, and customer trust; and (5) ‘solutions’ customized for the establishment of smart factories and automation systems, and the optimization of production and manufacturing capacity in each customer industry.

Greatness to be experienced by the customers

The greatness of Doosan Machine Tools’ products is the cornerstone of our customers’ greatness. Our customers are able to establish their own ‘greatness’ by using the products of Doosan Machine Tools.

With the products and solutions provided by Doosan Machine Tools, our customers can equip themselves with the vision required to preemptively respond to the rapidly changing industrial environment (‘Initiative’ ‘Optimal Solutions’), produce any product they desire with any materials they choose (‘Infinity’), and boost the satisfaction of everyone concerned (‘Reliability’).

Our customers will be able to achieve both maximum output and maximum sales through the Greatness they achieve with Doosan machine tools, ultimately leading to their greatest experience ever (‘Maximization’).
The NHP 4000 & 5000, high-productivity horizontal machining centers, offer unrivaled performance in machining a variety of materials, in particular automobile parts made of aluminum. These new models provide markedly improved cutting precision by adopting a range of Doosan technology features, including those customized to minimize overheating and thermal deformation of the machine tool.
Doosan Machine Greatness - an evolutionary advance realized by the Company's passion for much more than simply meeting set goals

The NHP 4000 & 5000 machine tools have been evaluated as having realized higher productivity and even greater precision, as well as offering a variety of high technology functions, thus matching the world’s most advanced machine tool builders. By minimizing non-cutting time, realizing a stabilized structure, and applying a thermal compensation function which monitors ten machine elements thorough quality control and performance verification, Doosan have created a truly world class machine tool.

Concentrated application of technologies designed to shorten installation time and improve productivity through a 3-point support bed structure

The NHP 4000 & 5000 machine tools feature a three-point support bed structure boasting the most outstanding stability in its class. This enables users to achieve the ideal rigidity and performance without having to fix the machine into a deep, specially-constructed foundation. Thus, the installation time can be much reduced compared with many competitor’s horizontal machining centers.

In addition, these two new machine tools offer a shorter non-cutting time by reducing the ATC tool change time to be 0.9 seconds and increased the table rotation speed from 25 to 40rpm. Furthermore, the tool magazine has been changed to a disk type, and the tool selection to a random method, making it possible to search for tools even faster. Most notably, the NHP 4000 features a rate of 1G for the acceleration/deceleration of feed axes to shorten the cycle time.

Proven reliability and differentiated technologies to achieve greater reliability and Doosan Machine Greatness!

The NHP 4000 & 5000 machine tools come fitted with ball screw shaft and bearing cooling systems as a standard feature, designed to reduce the heat generated by rapid feedrates, and maintain accuracy. In addition, the spindle bearings and motor are cooled. All areas of the machine bed structure are covered to prevent the thermal effects of coolant splash.

Work balance enables operators to control the feed rate on their own, and a filtration system prevents chip clogging

The NHP 4000 & 5000 machine tools are equipped with a specialized work balance, one of the feed control functions that can modify the acceleration/deceleration time constant so that operators can more easily control the feed rate according to the weight of the workpieces and realize optimal high-speed, high-precision processing. The two new machine tools are also equipped with an oil skimmer applied to both the shaft grease lubrication and coolant tanks as a standard feature for environmentally-friendly operation. The adoption of a combined drum filter and chip conveyor as a standard feature has freed the machine tools from the risk of chip clogging. Most notably, the drum filter has a self-cleaning feature, which extends the period between cleaning cycles of the machines, making maintenance much easier.
The PUMA 3100Y, Doosan Machine Tools’s Multitasking Turning Center, Contributes to Stable Supply of Super-Precision Aerospace Parts

The UK’s aircraft and aerospace parts market is the second largest in the world after the United States. Demand for aircraft and aerospace components has increased in recent years both domestically and internationally, said HEC Precision, a company specializing in aerospace parts processing and multi-axis processing in the UK. Since purchasing and installing Doosan Machine Tools’ multitasking turning centers at its production sites, HEC Precision has not only improved its productivity but has also actively responded to diverse customer needs including super-precision machining and complex shape machining.
We can operate the machine tools at night with a smart machining system, thereby improving our productivity, enhancing the utility of our machine tools, and reducing our costs.

**Challenge**

“We had to choose excellent equipment for super-precision aerospace parts processing!”

According to a report released by the Korea Trade-Investment Promotion Agency (KOTRA) in 2016, the global aircraft market will grow to US$ 5.6 trillion, with demand for an additional 38,050 aircraft, by 2034. Recently, the demand for low-cost aircraft has surged in emerging economies, particularly China and India, enabling the UK’s aviation industry, which ranks second in the global aircraft and aerospace parts market, to grow steadily.

“With the recent expansion of the low-cost aircraft market as well as the large-sized aircraft market, the demand for small aircraft is expanding rapidly,” said Kevin Manhood, managing director of HEC Precision. “In line with the increasing demand for aerospace parts in connection with the A350 project, our company has carried out facility investments with the aim of supplying high-quality super-precision parts to our customers in a more stable manner.”

Predicting that demand for aircraft will expand in emerging countries such as China and India, in particular, as well as in the UK, HEC Precision decided to purchase machine tools that would deliver high-precision, high-quality, high-productivity work performance as part of its plan to respond rapidly to changing markets without incurring an excessive financial burden.

Having used Doosan machine tools for eight years and experienced their excellence as well as Doosan’s responsiveness to any management or service requirements, HEC chose DMT’s PUMA 3100Y, a multitasking turning center, without hesitation and installed it in its Southall plant in August 2015.

**Solution**

Ultra-Precision High-Speed Machine Tools to Cope with Expanding Demand for Aerospace Parts

HEC Precision is currently using the PUMA 3100Y to process aluminum aerospace parts that require ultra-precision machining. Notably, the machine tool can carry out flexible machining using 50mm, 80mm, and 100mm diameter bars, but it is also ideal for multi-axis-based multitasking. Moreover, it minimizes the need for operator intervention and can be operated at night with a smart machining system, thereby improving productivity, enhancing the utility of the equipment, and reducing costs. In addition, the machine tool offers superior structural rigidity of the box guideways, ensuring stable performance under any processing conditions, minimizing thermal displacement, and guaranteeing excellent accuracy during long-time machining operations.

In addition, the three available spindles - including a spindle of 30 kW / 3000 r / min - deliver the best performance under diverse processing conditions, and as such are capable of processing diverse parts with the materials that customers want, including stainless steel, titanium and Inconel. HEC is highly satisfied with the PUMA 3100Y.

"Since 2015 we have seen increasing demand for a variety of aircraft components in connection with the A350 aircraft project," said Kevin Manhood, managing director of HEC Precision. "We established a facility investment plan to meet our customers’ increasing needs and supply our products in a more stable manner." He made the following remarks about the background to the purchase of Doosan machine tools:
“No more lengthy turnaround time! I can now handle urgent orders immediately.”

The DNM 750 II Improves Productivity and Enhances Quality

In keeping with the ongoing trend for personalized manufacturing, the trend for custom-made manufacturing of automobile and motorcycle wheels is on the rise. The US company Renegade Wheels produces small custom-made wheels with a DNM 750 II from Doosan Machine Tools. “By machining our wheels on a Doosan machine tool, we have reduced our typical machining time from ten days to just a few hours, achieving remarkable improvements in both productivity and cost effectiveness,” declared company president Chuck Frederick. “Above all else, we are very highly regarded by our customers for the excellence of our machining quality.”
The Best Choice for Reducing Time and Recovering Profits Wasted on Outsourcing!

Great business ideas sometimes come from the most surprising places. When Chuck Frederick, who lives in Orange County, CA, bought a Harley Davidson Fatboy back in 2003, he designed a pair of custom wheels for his new ride and had them manufactured at a friend’s shop.

The ‘new’ wheels were so cool that people began stopping him in the street to ask him where they came from. Chuck soon got the hint. Before long, Renegade Wheels was up and running, and began to manufacture custom-made wheels.

At first, all of the fledgling company’s machining operations were outsourced to local job shops since all Chuck had back then was design ability. He recollects, “For the first nine years we were turning out products in an assembly plant, and we saw our outsourced machine shops growing and buying equipment while we were faced with even greater problems due to increasing quantities and quality inconsistency.” Chuck realized something had to change.

After careful consideration, Renegade Wheels decided to purchase its own machining equipment and quickly learned how to make hub and brake rotors with a small grinder. Then, in 2016, the company installed the DMN 750 II, a vertical machining center of Doosan Machine Tools, in its workshop. “I looked at many other machining centers,” Chuck said, “but none of them could match the reliability, performance, and service quality of Doosan Machine Tools.”

Solution is DMN 750 II

Production Revs Up with Doosan Machine Tools

The DMN 750 II purchased by Renegade Wheels is a high-productivity, mid-to-large-scale vertical machining center featuring a 30” x 64” table, which is sufficiently large to accommodate wheel forgings up to 30” in diameter. The model is equipped with a 50-taper high-rigidity high-output spindle that ensures powerful cutting performance and outstanding precision, and features a vastly improved surface finish.

“Job shops used to charge me higher rates for better surface finishes,” said Chuck. “But now I can set up the DMN 750 II to machine an incredibly smooth surface, which reduces the time and cost spent on polishing each wheel.”

Chuck says that he is extremely satisfied with the DMN 750, particularly because he can shorten the polishing process through the simple set-up of the machine tool to obtain the smoothest surface.

“Today, we have control of the entire process, and that speeds up the delivery time, so I don’t have blanks waiting ten days to be machined. If I get a hot order, I can slot it in to run tonight,” said Chuck. “The whole experience has led me to recognize how important it is to choose the right machine tools supplier.”

Chuck refers to his custom-made wheels as “jewelry for men.” Wheels not only reflect a rider’s character but also affect performance. And, as they are closely related to safety, all wheel machining operations require a very high level of technological competence and quality assurance. He also knows that presentation has just as much of an impact on the client as the product itself. That’s why Renegade adds that extra touch of care to shipping and packaging to make sure the customer procures a Christmas-like joy out of opening the box. Renegade Wheels aims to present each of its products as if it were ‘a Christmas gift’ for the customer because it is so confident about the quality and performance of its products.

According to Chuck, “Doosan has made a complete and massive difference to our company. We’re turning out higher-quality products faster and spending less money on each piece.” In fact, he has already made plans to diversify his custom wheel production by purchasing another Doosan VMC so that smaller wheels don’t have to wait to be run on the big machine.
Currently, many SMEs place considerable emphasis on ‘product flexibility’ which means to expand the market by processing various kinds of parts using just one machine tool. Hwayoung Autotech, as a company devoted to the production of only ‘wheel hub bearing parts’, has taken a different path to that of other SMEs. Equipped with the expertise and confidence it has accumulated through ‘selection and specialisation’ and the ability to read the paradigm shift of automotive trends, Hwayoung Autotech, named a hidden champion by the Korean government, has collaborated with Doosan Machine Tools to develop the technology and know-how required for the manufacture of wheel hub bearing parts for more than twenty years. The company has also continued to work tirelessly for a better corporate future ever since its inception.
Focus on Specialization and Insight into the Future

Established in Busan in 1993, Hwayoung Autotech (hereafter “Hwayoung”) started out by processing auto parts for engines, transmissions, and chassis. After well over twenty years, Hwayoung became specialized in the production of wheel hubs and wheel hub bearing parts to support the inside and outside of wheel bearings - power transmission components that connect the steering wheel with the wheel axle. With production facilities in Gyeongsan and Jecheon, Hwayoung is a so-called “hidden champion” that generates annual revenues of more than KRW 200 billion and has about 120 employees.

Having started producing wheel hub parts in 1998, Hwayoung rapidly accumulated expertise and technical competence in this area and emerged as a first-mover beyond the level of a fast follower in the industry. So what has enabled Hwayoung to achieve this remarkable progress? “We decided to focus on the machining field in order to produce superior products,” said Bokhee Jeong, vice president of Hwayoung. “We chose the production of wheel hub parts as our main line of expertise, which has enabled us to maintain our marketability despite the reduced production of internal combustion engine vehicles and the dawning of the era of the electric vehicle.”

Wheel hub bearing parts must be precise and display minimum dimensional variation. They also require a smooth surface finish for outstanding durability. “The most important technology in wheel hub bearing parts processing is autosizing,” said VP Bokhee Jeong. “It is a key processing technology for determining the optimal size so that the ball and its peripheral parts can be assembled precisely.” Hwayoung has secured high-precision machining technology suitable for autosizing and, by supplying high-quality parts to its customers, has been able to build trust and credibility with its domestic and overseas customers.

“In precision parts processing, the final quality depends on the know-how of operators who fine-tune their processing equipment according to the physical properties and processing dimensions of workpieces,” said VP Jeong. “To improve their work environment so that they can focus entirely on the quality of their work, two years ago we carefully analyzed the level of our operators’ fatigue and realigned our manufacturing processes while introducing automatic inspection machines which integrated the inspection process into the machining process, thereby creating smart processing lines in our production facilities. In 1998, one operator was responsible for two machine tools: Now one operator runs twelve machine tools. This is largely because our production lines have become automated and smart.”

An Encounter with Machine Tools that Determines 80% of Processing Quality Competitiveness

In order to ensure quality uniformity, precision, and cost competitiveness, Hwayoung carries out all wheel hub parts machining processes by itself, including CNC lathe machining of forged products, hole machining, high-frequency heat treatment, broaching, polishing and bolt tightening. Hwayoung carries out the lathe turning and hole machining operations using Doosan machine tools.

Hwayoung has been using Doosan machine tools since 1998. VP Jeong said, “There are many factors that affect product quality, including machining equipment, fixtures, tools, manufacturing methods and materials, but it is the metalcutting machine tools that affect product quality most decisively.” She added that machine tools determine at least 80% of processing quality, and that for this reason, many companies place top priority on cutting capability and machine tool rigidity when purchasing machine tools, followed by the price and the after-sales service.

An Encounter with Machine Tools that Determines 80% of Processing Quality Competitiveness

In addition to the PUMA QL30H and the PUMA QL300H, Hwayoung has recently installed CNC lathes including the PUMA TW2600 and the PUMA GT3100 for the turning processes of hubs and outer rings. It also uses the T3600D tapping center, to process holes for hubs and outer rings. VP Jeong praised Doosan machine tools highly, saying, “Doosan machine tools have the lowest failure rate during operation while demonstrating 3-5% superiority in productivity compared with other companies’ machine tools.” She went on to say, “Most notably, having had the experience of using the company’s machine tools on the ground, we have found out that the machine tools are superior not only in price competitiveness but also in speed, rigidity and after-sales service.”

To cope with the latest trends in automotive parts manufacturing, such as lightness, improved durability and higher precision, Hwayoung has developed technologies for the production of 3rd- and 4th-generation bearings for machining all-in-one components that incorporate wheel hub bearing balls, as part of its continuous efforts to preemptively meet its customers’ needs.

“I hope that Doosan Machine Tools will pay even more attention to the dynamics and rigidity of its machine tools so that manufacturing companies can achieve global competitiveness in a rapidly changing environment,” said Jeong. “Especially in the era of the coming "Fourth Industrial Revolution," it is our sincere hope that Doosan Machine Tools will take the lead in the development of smart equipment, and optimize the automation and intelligence of its machine tools, so that SMEs can proactively respond to changing environments.”

On the other hand, Hwayoung is interested in material technologies capable of processing parts made of nonferrous metals and composite materials, in addition to iron and steel, as part of its efforts to find new growth engines beyond the level of just meeting the customers’ current needs. Hwayoung’s strong commitment to innovation and its continuous efforts towards attaining its goals are what set it apart from its competitors as a highly recognized specialized manufacturer of wheel hub bearing parts at home and abroad, as well as being the motors that will continue to propel the company’s growth further down the road.

Challenges of Hwayoung Autotech

An Encounter with Machine Tools that Determines 80% of Processing Quality Competitiveness

The Solution: ‘Doosan Machine Tools’ CNC Lathe and Tapping Center

Wheel bearing
**Introduction of New Products**

**TURNING CENTER**

**10-inch Global Compact Turning Center**

**LYNX 2100LC series**

The Lynx 2100LC series is capable of machining a diverse range of components measuring up to 350mm in diameter and 550mm in length, including valves, shafts, gears, flanges, housings, and bolts. The high-power motor maximizes the machine's productivity, including external and internal diameter cutting, and U-drilling, while the low-vibration structural design of the spindle housing, ballscrew assemblies, and LMG type slideways offers high productivity even during prolonged operation. The machine comes fitted with a number of standard functions, including a one-button-press-activated CNC tailstock, and a tool monitoring function that can be used to prevent tool failure. When equipped with the optional tool setter, it is possible to reduce the set-up time by using automatic, one-touch setting of cutting tools in the turret.

**High-Productivity 8-inch, 10-inch Horizontal Turning Center**

**PUMA 2100Y/2600SY II**

The PUMA 2100 II and PUMA 2600 II Y-axis series are 8/10/12-inch CNC turning centers that are capable of machining precision parts in diverse industries such as Automobile, IT, Medical, Energy, and Aerospace. They are upgraded models of the PUMA 2100 and PUMA 2600 Y-axis series, two proven premium turning centers that have more than adequately demonstrated their high level of performance in the global market. These models are capable of precision machining complex metal parts with a maximum diameter of 376mm and a maximum length of 1280mm in a single set-up, including valves, shafts, gears, flanges, housings, and fittings. With the application of the high-rigidity box guideway to all X/Y/Z axes, the strong basic structure and the high-power spindle with a maximum power of 22kW offer strong and excellent machining capability. In addition, they are fitted with Doosan’s heat displacement compensation function to provide the ultimate level of precision.
All axes of the NHP 4000/5000 machines are equipped with ballscrew shaft and bearing cooling functions as a standard to ensure high-precision machining. The spindle, equipped with a thermal displacement compensation function, boasts up to 303 N·m torque, which is twice that of many competitors’ machines, thereby offering strong and accurate machining capability along with an optional maximum spindle speed of 20000 rpm for high productivity. The machine’s compact size and the 3-point support bed structure make installation and maintenance quick, easy and convenient. The center-through chip-handling system facilitates the discharging of chips to the rear of the machine. The improved design of these models offers an 18% increase in machining area than the previous model, and the NHP 5000 machine is capable of machining workpieces of up to 700kg.

The DNMs are the flagship machining centers of Doosan Machine Tools. They offer significant improvements in both productivity and convenience based on their high productivity, high precision, and highly efficient machining ability. The DNMs have improved on the advantages of the preceding DN series with the adoption of a spindle with a maximum rotation speed of 15,000 rpm and a feed axis with an acceleration/deceleration (X/Y/Z) speed of 42/42/36 m/min, thereby delivering even greater productivity. The series is optimized for high-speed cutting and much easier to operate, while its larger machining space and higher power and torque equips the customer with maximum machining capability. It is also eco-friendly as it features a grease lubrication system.

Fundamentally, Doosan machine tools are able to improve its customers’ productivity as its new products have incorporated the company’s core technologies such as high speed spindles, high rigidity guideways, thermal stability, easy operation and smart monitoring.
NHP 4000/5000

MACHINE GREATNESS™
high-productivity premium horizontal machining centers

High productivity
Equipped with high-speed built-in spindle and extremely fast 1G axes acceleration/deceleration

High precision
Shaft and bearing cooling system keeps fast moving axes at stable temperature

Convenience
The 3 point leveling design makes machine installation and maintenance much more convenient