



Doosan Machine Tools' VIP Customer Newsletter

# OPTIMAL SOLUTION

## FOCUS

- Automation Trends in the Machine Tool Industry

## ZOOM IN

- Automation Solutions of Doosan Machine Tools

## INSIDE

- Customer Stories
  - Barron Engineering (The Netherlands)
  - Dongfeng Honda Automobile (China)
  - INT (Korea)



2018  
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**MACHINE  
GREATNESS™**

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## NEWS & EVENTS

### IMTS PREVIEW

**Doosan Machine Tools Introduces It's High-End Technologies for the US Market at the IMTS 2018 Trade Show.**



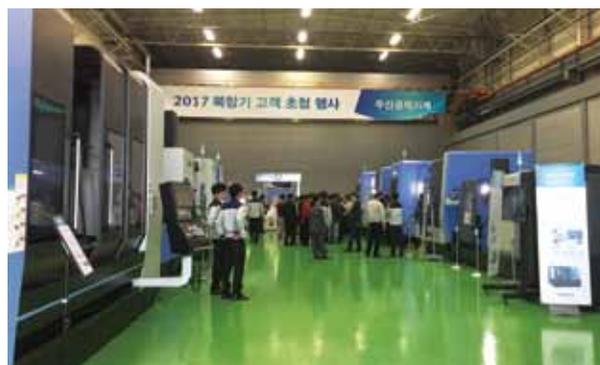
### AMB REVIEW

**Doosan Machine Tools Introduces ITs High-end Technologies for the European Market at the AMB 2018 Expo.**



### Upcoming Events

**Invitational Event for Multitasking and 5-axis Machining Centers**





## IMTS is the world's largest Machine Tools Trade Show in 2018 DMT Introduced 17 Machine Tools including Customized Automation Systems and DVF 8000.

The International Manufacturing Technology Show (IMTS) 2018, one of the world's largest machine tools trade shows along with the EMO, JIMTOF and CIMT, was held from September 10-15 in Chicago, USA. The IMTS 2018 showcased a great variety of metal-cutting technologies and products including machine tools. Doosan Machine Tools introduced seventeen types of machine tools, including the DVF 8000, a premium-class 5-axis machining center, and the PUMA SMA 2600ST, a multitasking turning center, as well as a range of automation solutions optimized for the Aerospace, Medical and Automotive industries among others, attracting an enthusiastic response from visitors to the expo.

- Date: September 10-15, 2018
- Venue: McCormick Place, Chicago, IL, USA
- Display: 17 Types of Machine Tools



## AMB Held in Stuttgart, Germany Showcases European Metal-Working Technologies. DMT Unveiled 8 Machine Tools, including the DVF 5000 for Unmanned Machining.

The AMB (International Exhibition for Metal Working) 2018 was held in Messe, Stuttgart, Germany from September 18-22 with the participation of more than 1,500 companies from over 30 countries. Doosan Machine Tools presented 8 machine tools at the expo, including the NHP 4000, a high-speed heavy-duty horizontal machining center. The DVF 5000 received a particularly favorable response from visitors as a next-generation 5-axis compact machining center capable of realizing unmanned machining operations based on automation and specifications 'customized' to meet the customers' specific requirements and choices.

- Date: September 18-22, 2018
- Venue: Messe, Stuttgart
- Display: 8 Types of Machine Tools

# MACHINE GREATNESS™

## We invite you to visit our Namsan plant in Changwon, Korea on October 24, 2018 for a very special story – an invitational event for prospective buyers of our multitasking and 5-axis machine tools.

Please come to our Namsan plant for a first-hand experience of our optimized cutting technology solutions and an unmissable opportunity to explore new possibilities and competitiveness for your company through demonstrations of our unrivaled machine tools, including next-generation multitasking turning centers, horizontal turning centers, Swiss turns, and 5-axis machine tools.

### Machine Tools on Display



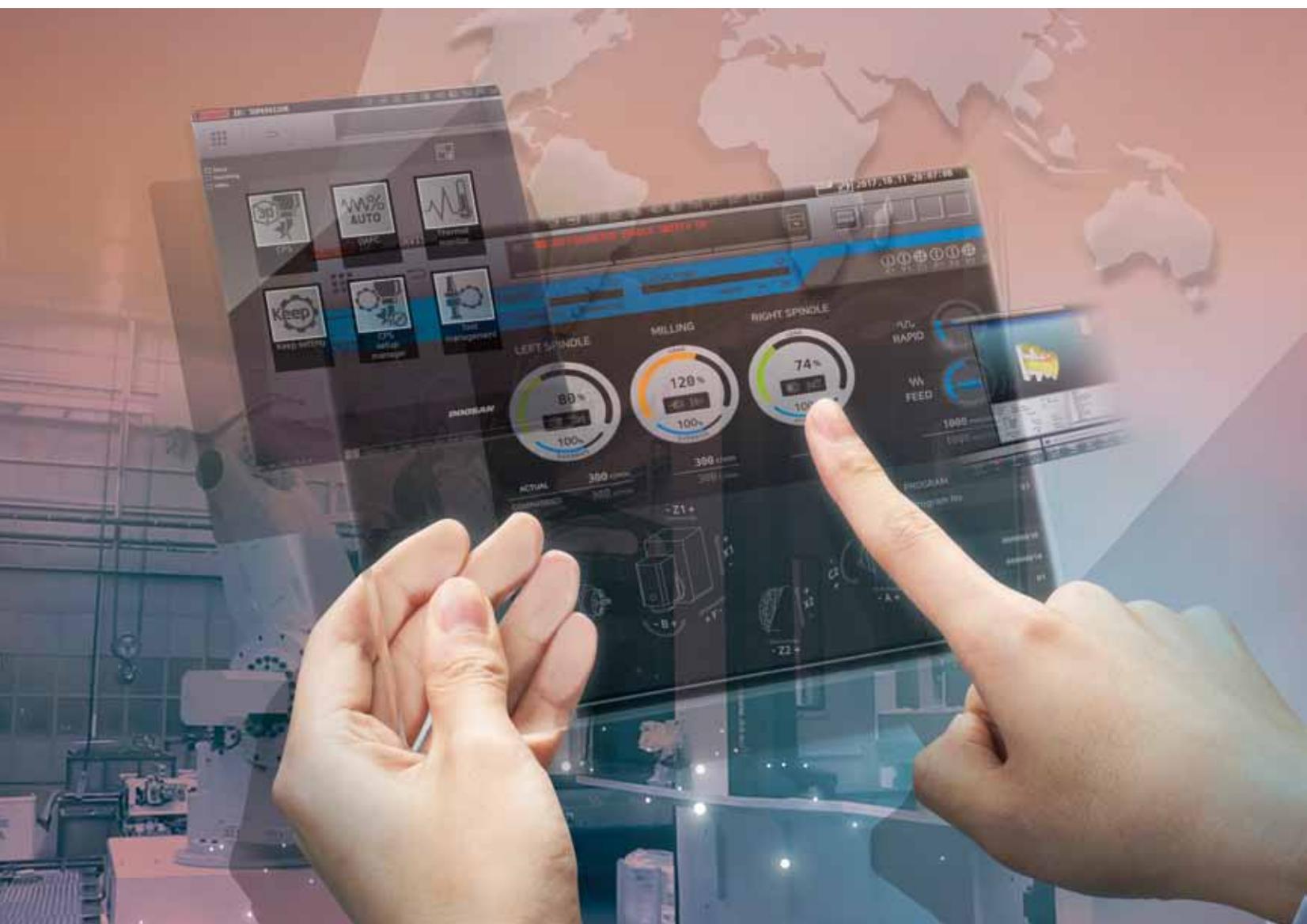
PUMA SMX2600ST / PUMA SMX3100ST / PUMA 2600SY II / PUMA TT1300SYY / PUMA TT2100SYY / PUMA ST20GS/38GS



DVF 5000 / DVF 6500 / 8000 / DHF 8000 / VCF 850LSR

# Automation of Machine Tools and Cutting Processes Realized Through Smart Machine Tools and Open Interfaces

As a result of improvements in the performance of their core components and devices, increasingly smart machine tools are equipped with the intellectual capacity to minimize operators' involvement while carrying out diverse tasks by themselves, ranging from the input of workpiece design files and cutting operations, through tool changing and part load/unload, to completed workpiece. On top of that, the development of DNC (distributed numerical control) has enabled a single controller to control multiple machine tools, which in turn has motivated even small manufacturers to commit themselves to building machine tool-related automation solutions that not only bring about improvements in quality and productivity but also address and resolve such pressing issues as rising wages and recruitment difficulties.





**Automation Realized Through the Connection of Open Interfaces**

In line with the broad convergence currently taking place between higher performance machine tools and automation peripherals and devices, high performance automated models showing price competitiveness. Notably, the development of Cobot, which can cooperate with operators (humans) through interaction, along with the enhanced operational ease of cutting tools and automation peripherals, has heightened the interface accessibility of machine tool users, thereby allowing companies to freely realize optimal automation solutions customized to their own production environments.

With changes being made to cope with the introduction of the Fourth Industrial Revolution (Industry 4.0), even small and medium size parts manufacturers are showing keen interest in automation systems. When asked about their expected difficulties due to the limited working week (which took effect in July 2018), many SMEs referred to ‘production disruption and delivery difficulties because of the lower-capacity operating rates’ (31.2%). As potential countermeasures, they mentioned ‘investment in process automation and production facilities’ (16.9%) and ‘efforts to improve the existing employees’ productivity’ (13.8%), which indicates that 30.7% of the respondents are considering making improvements in their manufacturing environments through automation.

**Machine Tools Playing Central Role in Automation Efforts**

The automation of machine tools can be largely divided into automation of the machine tool functions themselves, and automation achieved via interface with peripheral devices. The internal automation of machine tool functions has continued to make swift progress through improvements in the quality and performance of key elements of the machine

In addition, a leading factor in the automation of the entire production line is the combination of machine tools with various cutting-edge peripherals and devices, such as high performance barfeeders designed to maximize efficiency of machine tool utilization by automated material supply; overhead gantry loader systems providing load/unload of material and finished parts; the compact automation solution (AWC) which contributes to improving productivity through extended operating hours; and the unmanned machining system (LPS) and the automatic tool exchange system (ATS) whereby multiple pallets can exchange workpieces and work on them automatically.

Sometimes standard automation solutions cannot satisfy customers’ demands due to variation from company to company in terms of workpiece characteristics, work environment and process requirements. For this reason, solution engineering has gained importance for its utilization of robot automation, gantry loader systems and machine

tools to develop suitable automation systems optimized for the diverse production environments of customers.

An official of the AE Technology Development Team of Doosan Machine Tools said, “Automation solutions have been developed so that machine tools can easily interface with automation systems like robots and peripheral devices, carry out systematic mutual data checking, and reduce the time required for setting and loading, thereby reducing cycle times significantly. Therefore, automation is likely to be adopted in a variety of industries.” He went on to say, “Given the situation, Doosan Machine Tools has reformed its automation solution organization while focusing on the development of new models and the design of customized automation solutions.”

Most notably, Doosan Machine Tools will prioritize the development of machine tools and automation solution models that even small companies can effectively install and operate, with the specific goal of helping small businesses to resolve the issue of higher wages following hiring difficulties combined with the introduction of 52-hour maximum working week and, consequently, to improve their productivity.

**Characteristics and Advantages of Doosan Machine Tools’ Automation Solutions**

| Automation Solutions         | Advantages   |
|------------------------------|--|
| Bar Feeder System            | Assures the highest level of productivity for turning centers and the automation of the manufacturing process.   |
| Gantry Loader System         | Ease of installation and operation, quick turnkey system, quick loading, diverse workpiece loading, flexibility, and high productivity for flange and shaft work.  |
| Robot System                 | Allows highly productive automation of parts machining in traditional manufacturing processes for which automated production lines are hard to establish; and automation within a single turning/machining center, between multiple turning/machining centers, or between turning centers and machining centers. |
| AWC (AUTO Workpiece changer) | An automation solution optimized for the handling of small workpieces within a confined space (workpiece, workpiece + fixture, workpiece + zero clamping).   |
| RPS (Rotary Pallet Systems)  | Basic automation for improving the productivity of machining centers, minimizing of floorspace requirements, storage of multiple pallets, optimizing flexibility.  |
| LPS (Linear Pallet System)   | Secures high-efficiency for the small-quantity production of multiple types of products, as well as mass-production, module expandability and compatibility between HMC/VMC, a maximum of 7 machine tools, 72 pallets and 4 setup stations.  |
| Full-Customized Automation   | Doosan Machine Tools offers optimized automation solutions for each of its customers.  |

**Results of the ‘Survey on the Opinions of 500 SMEs about the Reduced Work Week’**

**Difficulties**

|  |              |
|--|--------------|
| Production and delivery disruptions due to reduced operating rates.                                | <b>31.2%</b> |
| Manpower shortages due to hiring difficulties.   | <b>19.0%</b> |
| Increase in labor costs due to the need to employ additional workers.                              | <b>15.8%</b> |
| Increase in labor costs due to the obligation to provide wage compensation for existing employees. | <b>11.2%</b> |
| Concerns about the possibility of deteriorating labor relations.                                   | <b>5.4%</b>  |

**Countermeasures**

|  |              |
|--|--------------|
| Investment in facilities and manufacturing infrastructure.           | <b>30.7%</b> |
| Hiring of new personnel.   | <b>25.3%</b> |
| Acceptance of smaller production quantities.                         | <b>20.9%</b> |
| Outsourcing of work.   | <b>10.2%</b> |
| Additional delay of enforcement of the regulation through split-ups. | <b>8.4%</b>  |

\* Source: Results of the ‘Survey on the Opinions of 500 SMEs about the Reduced Work Week’ conducted by the Korea Federation of SMEs.

ZOOM  
IN

Doosan Machine Tools'  
Automation Solutions

# As a Solutions Provider, Doosan Machine Tools Offers Customers Intelligent Machines, Automation, and New Values

Many manufacturers are actively investing in automation facilities to cope with shorter production and design cycles, the need to produce multiple types of products in small or large quantities, the growing demand for multitasking technologies, and the latest modular design trends. Notably, the smart factory is the biggest issue within the manufacturing industry at present. For SMEs, building a smart factory is not an easy task given the heavy burden of initial investment, the standardization of production lines, and the higher proportion of OEM production compared to their own brand production. That's why small-scale manufacturers and factories with fewer than ten employees are striving to meet the new trend towards flexible production and manufacturing by introducing automated intelligent machine tools.

“In line with newly emerging market needs, we are developing various unmanned machining solutions whose development we were unable to embark upon in the past due to their low profitability.”

## ‘Specialization’ Built with Passion and Effort over 30 Years

Gradual technological developments have facilitated automation across all industries while contributing to improving the performance of machine tools and peripheral equipment and devices. Doosan Machine Tools began to focus on research aimed at enhancing performance and the automation of machine tools back in the second half of the 1980s, which has led the company to emerge as a highly reliable ‘Solutions Provider’ beyond the level of a mere machine tools manufacturer.

Baek Woo-hyun, manager of AE Team 1 of Doosan Machine Tools, said, ““In keeping with new market needs, we are developing various unmanned machining solutions whose development we were unable to embark upon in the past due to their low profitability.” He went on to say, “Machine tools, in their capacity as ‘specialized machine tools’, are now required to be highly flexible in their production machining operations instead of being somewhat limited in their functions. It is for this reason that Doosan Machine Tools launched the AE Team in 2016 to take charge of the company’s development and establishment of automation solutions.

Mon Dae-won, manager of the AE Technology Development Team, said, “When a cutting process is followed by a thermo treatment process, different cutting processes and automation technologies must be applied. A designer who is unaware of such characteristics will never be able to come up with an optimized solution. Therefore, we have no choice but to customize our automation solutions to handle each customer’s specific cutting items.” Doosan Machine Tools intends to continue broadening its

specialization and heightening its competitiveness in a bid to provide solutions to its customers’ needs from their perspective based on the know-how it has accumulated over the years, primarily by designing machine tools and providing automation solutions for each machining item.

## ‘Optimization’ Aimed at Improving Machine Tool Performance and Creating a Customized Machining Environment

An automated machine tool needs anywhere from 20,000 to 30,000 parts, while an airplane is made of 200,000 to 300,000 parts. To cut so many kinds of parts efficiently, diverse automation solutions are required as well as sophisticated cutting technologies, tools and software. Kim Sang-seok, manager of AE Team 2, said, “There can be no such thing as the “same automation solutions” given manufacturers’ different manufacturing environments, cutting machine tools, and operators qualifications.” Kim went on to say, “Doosan Machine Tools places top priority on the development of optimized automation solution models that can maximize its customers’ usability according to their specific needs and production environments.”

Given its inherent characteristics, the optimization of an automaton solution continues long after it has been delivered to the customer. In fact, it is gradually developed into an ever more efficient model in the process of finding the best solutions to the issues that may arise at the customer’s worksites. Manager Baek Woo-hyun said, “A solution undergoes a kind of evolutionary process as various improvements are made to it over time.” He went on to emphasize, “Therefore, the provider and the user of any given solution must establish a close relationship so that



➤ Namsan Plant in Changwon, Korea



➤ Mgr Kim Sang-seok of AE Team 2 / Mgr Moon Dae-won of the AE Technology Development Team / Mgr Baek Woo-hyun of AE Team 1 (from left to right)



new models can be developed by the provider and better solutions can be offered to the user on the basis of experience.”

**‘Diversity’ in Model Designs Customized for Workpieces and Corporate Environment**

Doosan Machine Tools has secured such automation solutions as the bar feeder, gantry, and robot that realize convergence-based automation between machine tools and peripheral devices, and pallet-based automation solutions (such as AWC, RPS and LPS) that realize the automation of core parts. On top of that, Doosan Machine Tools provides ‘customized automation solutions’ on a turnkey basis whereby the customer receives not only workpiece and pallet automation but software solutions as well. The CEO of a DMT customer that manufactures parts said, “We carefully reviewed Doosan Machine Tools’ automation machine tools and systems and asked the company to design and optimize its machine tools and automation solutions for our company’s

workpieces. We are deeply satisfied with the level of productivity we have achieved as a result.”

**Achieving ‘Differentiation’ by Finding Partners with Innovative Technologies and Products**

“Machine tools alone cannot realize automation completely,” declared manager Moon Dae-won. “To overcome that limit, we must find many ‘small giants’ with outstanding technological competence and strive for win-win prosperity with them.” When asked to reduce the loading time for bearing automation from 4-5 seconds to less than 3 seconds, Doosan Machine Tools met the requirement by incorporating the idea of a specialized partner company into a CAM drive system. It is a typical example of Doosan Machine Tools’ efforts to achieve win-win growth with partners equipped with exceptional technological competence. The company will continue to focus on finding such partner companies.

“Our AE Team has created a system called NAD (New Application Development) and developed sophisticated applications to cope preemptively with changes in both our customers’ needs and the overall manufacturing environments,” said manager Kim Sang Hyuk of AE Team 2. “As a company at the forefront of changes in manufacturing trends, we will strive to enhance our machine tool and automation design capabilities so that we can present solutions customized for new concepts of machining item,” he added. With the AE Team leading the way, Doosan Machine Tools is planning to offer its customers the highest value with its new machine tool automation solutions from their perspective.

**Doosan Machine Tools’ Automation Solutions / Models**

| Classification                     |   |
|------------------------------------|---|
| Work-piece                         | Bar Feeder System : Lynx , GT/PUMA, TT, ST    |
|                                    | Gantry Loader System : TW-GL, Lynx -GL, TT-GL |
|                                    | Robot System : All+ Robot/Cobot               |
| Pallets                            | AWC (Automatic Workpiece Changer) : DVF       |
|                                    | RPS (Rotary Pallet Systems) : NHP, NHM, DVF   |
|                                    | LPS (Linear Pallet System) : NHP, NHM, DVF    |
| AE cases , bearing solutions, etc. |   |

**Bar Feeder System**



**AWC (Automatic Workpiece Changer)**



**LPS (Linear Pallet System)**



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**INSIDE**

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Barron Engineering  
(The Netherlands)



## **Barron Engineering Finds the Answers to the Challenges Posed by Rising Demand and the Need for Stable Production with Doosan Machine Tools' PUMA MX and PUMA SMX.**

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As a company based in the motorsport industry with its head office in Harderwijk, the Netherlands, Barron Engineering specializes in the manufacture and design of rally cars, indoor go-karts, and motocross bikes. Equipped with a production and facility infrastructure optimized for the production of prototypes and the mass production of core parts, Barron Engineering has found solutions to the rising demand for the machining of aluminum, steel and alloys in the PUMA MX and the PUMA SMX, two of DMT's multitasking machine tools.



**Barron Engineering**

“Behind our stable production of wheel hubs is the crucial role played by the PUMA MX and SMX multitasking machine tools. As such, we would actively recommend Doosan Machine Tools’ products to anyone.”



Erwin Saverangs, CEO of Barron Engineering



Realization of Multitasking Machining with the PUMA MX and SMX Multitasking Machine Tools

## The Challenge Faced by ‘Barron Engineering’

### Improve Productivity while Assuring Quality

Barron Engineering began to produce wheel hubs that meet the quality standards of Haan Wheels, a renowned motocross company specializing in the production of customized wheels for the world’s best motocross athletes, some twenty-two years ago and now supplies about 6,000 high-quality wheel hubs to the company every year. In the beginning, Barron Engineering manually produced machine parts with lathes and milling machines. After earning recognition for the quality of its products, however, the company soon faced the challenge of meeting a sharp increase in the quantity of orders.

CEO Erwin Saverangs of Barron Engineering said, “We were tasked with increasing our production volume in a stable manner to meet the increased demand while maintaining the highest quality.” To meet the challenge, the company asked Dormac CNC Solution, Doosan Machine Tools’ sales subsidiary in the Netherlands, for help. After Dormac recommended using the PUMA 230M, Barron Engineering purchased the model in 2004. With the PUMA 230M, Barron was able to increase its annual wheel production volume to 1,000 units, but the company’s orders kept increasing.

Barron then started to perform turning work with a turning machine, following the milling process, in addition to implementing a two- and three-shift plan, but it still couldn’t meet the ever increasing production requirements. Most notably, the machine tool setting values and cutting environments had to be readjusted for each process, and between ten and twelve workers had to work until late at night every day in what was an extremely labor-intensive practice by Dutch standards. Barron Engineering needed to find the key that would allow it to meet the increasing production volume while securing labor flexibility.

## The Solution is a ‘Multitasking Machine.’

### Integrate All Processes into One with the PUMA MX and SMX Multitasking Machine Tools.

The ideal solution consisted in finishing the milling and turning processes with a single machine tool. At the time there were few multitasking machine tool manufacturers apart from Doosan Machine Tools, whose PUMA MX 2000 series was receiving widespread recognition in the market for its heavy and interrupted cutting functions, high precision and consistency, and optimal surface conditions. Satisfied with the service provided by Dormac CNC Solutions, Doosan Machine Tools’ sales subsidiary in the Netherlands, Barron Engineering decided to purchase one of Doosan Machine Tools’ machine tools without hesitation.

Dormac CNC Solutions installed Doosan Machine Tools’ 9-axis PUMA MX2100ST multitasking machine tool and two independently operating robot arms at the Barron Engineering worksite. With this combination, Barron Engineering was equipped with production facilities capable of functioning 24-7 for the first time in its corporate history, and this heightened production capacity led the company to accept more new product orders. To cope with this increase in product orders, the company purchased the PUMA SMX2600S model and two additional robot arms in 2016. “Because of the difference in wheel size, we produced front wheel hubs with the PUMA MX and rear wheel hubs with the PUMA SMX,” said CEO Erwin Saverangs. “Doosan Machine Tool’s multitasking machine tools are very versatile. But depending on our needs, we can produce both front and rear wheels with either the PUMA MX2100ST or the PUMA SMX2600S.”

CEO Erwin Saverangs added that the introduction of Doosan Machine Tools’ machines at its worksites has not only improved quality and productivity in a stable manner but also reduced the machine setting and production lead times, thus enabling our workers to avoid working hastily without sufficient rest. He went

on to say, “With our previous machine tools, we had to reinstall them more than five times according to changes in the machining environments. Now, we can conveniently carry out various processes with a single operation.” Thanks to this change for the better, Barron Engineering can now produce ninety wheel hubs a day with the PUMA MX and the PUMA SMX. Furthermore, if the company runs the PUMA 230M lathe and the 5-axis VC 630 milling machine, it will be able to sharply increase its daily production total of wheel hubs to 120.

Barron Engineering has also expressed satisfaction with the fact that, with the utilization of the PUMA SMX, it has not just increased its productivity but also made its working environment cleaner, which in turn has improved its work efficiency. The company used to have difficulty disposing of chips when it was producing a large quantity of aluminum parts overnight. The introduction of the PUMA SMX has solved the problem. Doosan Machine Tools’ PUMA SMX has a sturdy, vertical structure so chips fall easily on to the conveyor belts beneath and are removed completely. CEO Saverangs said, “After operating the PUMA SMX overnight, we found no chips at all in the morning,” adding, “Total chip disposal is a tremendous gain for us.”

CEO Erwin Saverangs concluded by saying, “Behind the market recognition of our outstanding quality is the huge role played by the multitasking machine tools PUMA MX and PUMA SMX. To anyone that is thinking of buying these machine tools, I would actively recommend them for their high productivity, precision machining, and outstanding quality compared to their prices,” sparing no words in expressing his trust in the products of Doosan Machine Tools.

**INSIDE**

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Dongfeng Honda  
Automobile  
(China)



## ‘Dongfeng Honda,’ China’s Second Largest Automaker Achieves High Productivity and High Quality with Doosan Machine Tool Products

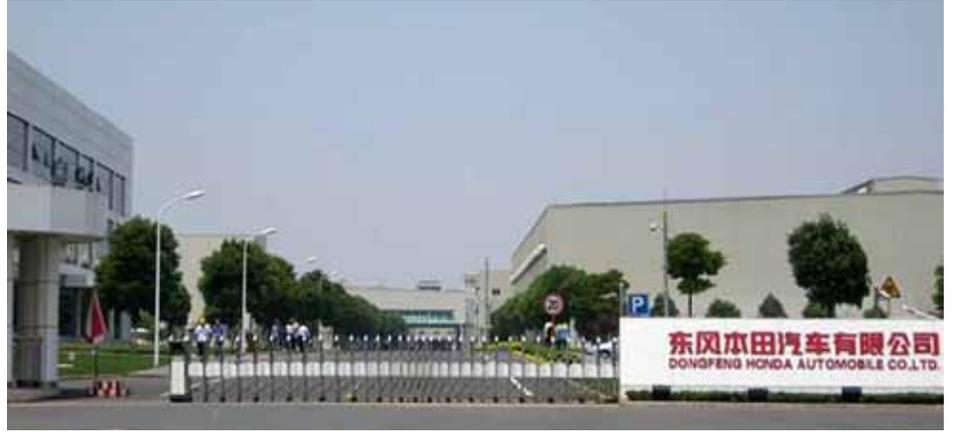
—  
Dongfeng Honda Automobile has actively responded to the rising domestic demand for automobiles in China by securing the advanced machine tools and production infrastructure required for various processes such as stamping, welding, PVC, painting, engine casting, machining, engine assembling and automobile assembling on top of its outstanding R&D competencies. In line with the sales increase, the company took active measures to increase its automobile production capabilities, including the purchase of fifty-seven Doosan Machine Tool products such as the DNM 650/50 and the NHP 5500S, for two years before and after the completion of its third manufacturing plant in December 2016.



**Dongfeng Honda Automobile**



Assistant manager Zhuchang, Cylinder Header Production Team 3, Machining Dept., Power Manufacturing Plant



The manufacturing plant of Dongfeng Honda Automobile manufactures automobiles with Doosan Machine Tools' machining centers.

## The Challenge Facing Dongfeng Honda Automobile

### To deal with a 25% production increase over the previous year'

Dongfeng Honda Automobile, the second biggest automaker in China, was founded in 2003 with a joint investment by Dongfeng Motor Group, Honda Motor Company, and Honda Motor Co., Ltd. China. The company provides quality products and services to Chinese customers, selling a total of 3,720,500 cars - including the CR-V, CIVIC, SPIRIOR, CIIMO, ELYSION, INSIGHT, JADE, XR-V, GREIZ, and GIENIA - between 2004 and 2017.

Starting with the purchase of Doosan Machine Tools' DNM 650/50 machining center in April 2016, the company bought fifty-six machine tools from Doosan Machine Tools, including twelve DNM 500HS models, as well as the Lynx 300 and the NHP 5500S between May and December of 2017. In a bid to respond to a sharp increase in demand, we had to expand our production capacity," said Zhuchang, assistant manager of Cylinder Header Production Team 3, Machining Dept., Power Manufacturing Plant. "We launched a project to deal with the increased burden on the 1.5L/1.0T production line and decided to purchase Doosan Machine Tools' products because of our satisfaction with the performance of the DNM 650/50 we purchased in 2016," he added.

At present, Dongfeng Honda carries out 1.5T block machining with Doosan Machine Tools' DNM 650/50 model and the NHP 5500S, as well as cylinder liner machining through the cylinder head machining of 1.5T, 1.5L and 1.0T with the DNM 500HS. In 2017 alone, the company sold 714,300 automobiles, representing an increase of 25% over the previous year.

## The Solution is a 'High-Performance Machining Center'

### Improve Productivity and Quality with the NHP and DNM

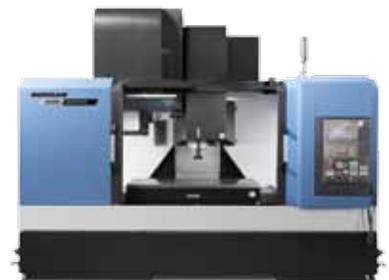
Through the use of Doosan Machine Tools' products, Dongfeng Honda has made remarkable progress, improving not only its productivity but its product quality as well. "Following the utilization of Doosan Machine Tools' products, we have been able to solve a lot of difficult machining-related problems," said assistant manager Jucahng. "With our previous machine tools, our work quality deteriorated because of the heavy vibration involved in the machining of wider boring holes. We were able to solve this problem by using Doosan Machine Tools' NHP 5500S model," citing a representative case of improvements.

"The latest trends in automobile and auto part manufacturing include demands for a shorter design cycle compared with before and demands for the production of multiple types of products in small quantities or the mass production of multiple kinds of goods, which requires us to produce 100% satisfactory products in terms of quality with a minimum investment within a short period of time," said Zhuchang. "Most notably, core auto parts are directly related to human life and safety, so only machine tools equipped with cutting-edge machining technologies and high-quality performance features will survive in the market."

Equipped with a strict quality assurance system in keeping with the global automobile industry's trends, Dongfeng Honda strives to satisfy its customers with high-performance products offered at reasonable prices. "When we purchase additional machine tools in the future, we will present not only the operational stability of machine tools but also their productivity and quality features suitable for automation and mass-production systems as our basic requirements," said assistant manager Zhuchang. "User convenience must be considered for machine tools as well as automobiles. User needs based on the latest

consumption trends must be reflected in both the design and the manufacture of goods. Differentiation of the exterior design is also important.

Adding that China is also witnessing the acceleration of smart manufacturing and intelligent factories, assistant manager Zhuchang concluded with the following advice: "To further improve its competitiveness in the Chinese market, Doosan Machine Tools should strive to improve its efficiency in building intelligent production management systems and collecting machining data to actively cope with the needs of smart and intelligent parts machining in China."



DNM 650/50



NHP 5500S

INSIDE

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INT



## INT Opens the Way for the Machining of Functional Parts from Cutting to Coating to Polishing

I met Kim Sun-hoon, CEO of INT, at the end of August when the rainy season had not quite finished, while he was busy talking to his staff on the factory floor about a prototype. “We are extremely busy trying to deliver higher order quantities on time,” said CEO Kim who, having started cutting parts with a machining center just five years ago, has already acquired unparalleled expertise and know-how in the area. In fact, CEO Kim, having opened the way for the machining of functional parts beyond the level of ordinary component machining, says that if he had not met Doosan Machine Tools’ DNM 4500, there would be no INT as we know it today.



INT

“Doosan Machine Tools’ DNM 4500m provides INT with the ultimate in precision, convenience and efficiency,” says CEO Kim Soon-hoon.



➤ CEO Kim Soon-hoon operating the Mynx 5400



➤ Having started with the Mynx 7500 and 4500, INT now operates more than ten Doosan machine tools.

## The Challenges Faced by ‘INT’

### An Enterprise with a Challenging Spirit and Relentless Passion

“I started a computer-related business, which is far removed from the machining business, in 2005,” said INT CEO Kim Soon-hoon. “But most of my clients were engaged in the machining business, and I quite naturally developed a keen interest in the industry.” On an acquaintance’s recommendation, he took up the challenge of machining a cell phone part. With little professional knowledge about machining, CEO Kim had a ton of things to learn and practice, including the basic principles of cutting tools, the machinability and machining time of each type of major workpiece, and the efficiency and stability of the relevant machine tools. He virtually lived in his factory for the first six months, studying and accumulating INT’s unique machining know-how before starting to look for customers in the machining industry. His extraordinary commitment and hard work began to earn high recognition in the market when INT received a surprising offer.

In 2016, AP Systems, a semi-conductor equipment manufacturer, offered INT a contract to produce the small grippers used to remove protective film and feed glass in the manufacturing process of mobile phone LCDs. “It requires precision machining technologies and even in-depth know-how about coating to machine a gripper, which is a functional part. It took me three months to check all the papers related to the sticking and coating technologies and conduct in-depth research on key materials like polyurethane and silicone and the relevant machining technologies,” recalls CEO Kim. Despite failures, he kept on trying out new approaches and ended up producing high-quality grippers that amazed the client, AP Systems.

Soon, INT began to produce small grippers for AP Systems in full swing, which soon led the company to produce other functional parts required by AP Systems. Most notably, CEO Kim has competed with a Japanese company armed with decades of experience in the area in the domestic market with the aim of ‘localizing’ parts production. The growth of his company is the result, says CEO Kim.

## The Solution is a Fourth ‘Doosan Machine Tools’ Machining Center

### The Key to Success in the Machining of High-Quality Functional Parts is ‘Machine Tools.’

INT produces various kinds of small grippers in different shapes and sizes. Except for plating, INT carries out all the required processes internally, including cutting, manufacturing molds for special coating, coating processed parts, re-processing coated parts, polishing, and binding with resins such as poly-urethane and silicon. To that end, INT initially purchased Doosan Machine Tools’ Mynx 7500 and Mynx 4500, and the company now uses more than ten Doosan machine tools for various processes including metal cutting, the re-processing of coated parts, and polishing.

The metal cutting allowance for grippers is  $\pm 0.1\text{mm}$  while the requirement for urethane surface resistance is as high as  $10^6\text{-}9$ . Thus, INT is equipped with coating and polishing technologies of unrivaled competitiveness. Most notably, INT uses large amounts of electric conductive rubber. “Urethane turns into conductive rubber when it is well mixed with conductive liquid and coated on to products,” says CEO Kim. “With patents for the joining of different materials and coating, INT has striven to secure differentiated competitiveness in the field of functional parts machining.

“Re-cutting following the coating of metal materials requires cutting technologies of a very high standard,” says CEO Kim. “The principal contributor to our company’s stable production is machine tools.” He recalls, “When we began manufacturing grippers, we used a tapping machine which could not be used for other purposes. So we looked for a multitasking machine tool, and Doosan Machine Tools recommended using the DNM 4500.” He adds, “Molding is absolutely necessary for the coating of small grippers due to their small coating areas. We could not outsource the coating process for fear of quality issues in addition to concerns about higher costs. That’s why we make the molds ourselves in order to fulfill our customers’ needs in terms of process tolerance, surface resistance, and precision.”

Asked about the biggest advantage of Doosan Machine Tools’ products, CEO Kim refers to ‘their ease of operation and machining precision.’ He added, “The operational ease of machine tools is the most important factor for the production lines of SMEs. I am sure that very few machine tools are as good as Doosan machine tools in terms of operational ease, not to mention their machining precision.” “When purchasing machine tools, one must identify precisely what kind of machine tools one’s company needs,” emphasizes CEO Kim. “Salespeople tend to explain machine tool performance sufficiently, but many people do not really listen to them. They don’t choose all the necessary options, and tend to focus on buying machine tools at the lowest possible prices. Then, while actually using the machine tools, they compare their machines with other brands and become dissatisfied with their machine tools.” As for suggestions to Doosan Machine Tools, CEO Kim proposed that the company add a function for 300mm hole processing so that a machining center can carry out the gun-drilling process. INT is planning to buy an additional VM 6500 machining center prior to the completion of its factory expansion in March 2019.

### Competitiveness Never Stays Put

INT, having localized small grippers, has seen an almost 1,000% increase in its sales over the past two years. In fact, INT accounts for 80% of the domestic market share, which everyone seems to take for granted given that INT maximizes the usability of the machine tools that it purchases to produce products of the highest quality, in addition to the fact that it has secured unrivaled competitiveness in cutting, coating and polishing, thereby ensuring stable production and quality assurance. CEO Kim concludes by saying, “We will continue striving to develop INT into a leader in the research and manufacture of functional parts.”

## NEW PRODUCT

Introduction of  
Doosan Machine  
Tools' New Products

# Introduction of New Products Equipped with Doosan Machine Tools' Core Technologies

## TURNING CENTER

### High-Productivity Gang-type Global Compact Turning Center



### **LYNX 2100G**

Doosan Machine Tools has launched its newest model, The Lynx 2100G, a high productivity gantry-type turning center, which is an upgrade to the previous highly successful Lynx 220G. The Lynx 2100G is a 6 inch chuck size gang type turning center that capable of high speed precision machining for large volume parts such as valves, fittings and bearings. It has a capacity up to 170mm diameter and 322mm length. While maintaining the previous model's rigid construction, the new model boasts improved machining capability thanks to its powerful spindle motor with 18.5kW power and 118Nm torque output. It is also worth noting that the reduction of machine thermal displacement improves its machine stability and reliability over long production periods. In addition, the 2100G has a significantly reduced floor space requirement.

### High-Productivity Single Compact Turning Center



### **PUMA TS2600 series**

Equipped with a 10" chuck, the Puma TS2600 is part of the successful TW Series, and is characterized by its single spindle and turret. This compact model is most suitable for automation lines where a single machining operation is required. It boasts unrivalled productivity and reliability thanks to its world class gantry loader automation system.

### Large Ram Type Vertical Turning Center



### **PUMA VTR1012F/1216F series**

The Puma VTR1012F/1216F are large ram-type vertical turning centers with fixed cross beam.. These models are suitable for the machining of low height workpieces, such as flywheels, pulleys, gear blanks, and rings. They provide unrivalled cutting performance backed up by the highest spindle torque and tool clamping force in its class. Equipped with Doosan's unique quad tool system (90 deg index of ram head), these models guarantee high productivity and include a totally enclosed splash guard as a standard feature for operator convenience.

Doosan Machine Tools has recently launched products equipped with its cutting-edge core technologies, such as high-speed spindle technology, high-rigidity guideway technology, thermal stability technology, easy operation technology, and smart monitoring technology.

## MACHINING CENTER

### Multipurpose Vertical Machining Center Equipped with a 2.1m X-axis



### **DNM 6700XL**

The DNM 6700XL, the latest version of the global bestseller DNM series, is a highly productive vertical machining center equipped with a 2100mm X-axis optimized for the cutting of medium-to-large LED display parts and Aerospace parts. With a direct-coupled spindle (8000 r/min, 18.5 kW) adopted as a standard feature, the new machining center features significantly reduced spindle vibration and noise. The new model also minimizes non-cutting time with a faster tool changeover time (1.2 seconds) among other qualities. Equipped with Doosan Machine Tools' unique thermal error compensation feature, the machining center ensures stable machine operation as well. The DNM 6700XL has adopted a grease lubrication system for a cleaner work environment and a 60% reduction in annual maintenance costs compared to oil lubrication. With E.O.P (Easy Operation Package) provided as a standard feature, the model also offers enhanced operational convenience.

### Vertical Machining Center with 5m X-axis Feed Distance



### **VCF 5500UL**

The VCF 5500UL is a table-fixing, column-moving vertical machining center with a feed distance of 550 mm for the Y-axis and 5000mm for the X-axis, making it possible to machine long and narrow aluminum parts. The machining center offers further enhanced rigidity and precision through application of the roller LM guideway to all axes and adoption of the X-axis linear scale as a standard feature. Its direct-connection spindle, boasting a maximum speed of 12000 r/min, offers precision machining with 117.8 N-m torque and 18.5 kW power. The standard magazine, which can hold up to 35 tools, increases productivity, while the pickup magazine for extra length tools can be adopted feature enables an efficient response to diverse types of machining needs.

**Doosan Machine Tools**



# What We Make is Who We Are!

**Join Hands with Doosan Machine Tools to Achieve Great Things!**

You are remembered by what you make.  
Choose Doosan Machine Tools to achieve great things.

Doosan Machine Tools rolls out cutting-edge machine tools that will help you rise to the top of your business. The PUMA SMX2600ST is the latest addition to our product line.

Are you ready to rise with us?  
Doosan Machine Tools will always stand with you.



**MACHINE  
GREATNESS™**



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