



Doosan Machine Tools VIP Newsletter

# OPTIMAL SOLUTION

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- CNC, Localization and Competitiveness in the Machine Tools Industry

## ZOOM IN

- DOOSAN D300 CNC, the Fruit of 30 Years of Research and Development

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**MACHINE  
GREATNESS™**

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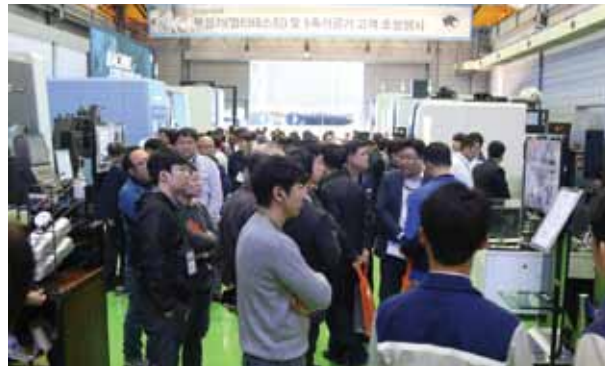
### EMO REVIEW

Presentation of Diverse Solutions under the banner of MACHINE GREATNESS at the EMO 2019



### MACHINE GREATNESS 2019 REVIEW

Customer Event Featuring 5-Axis/Multi-tasking/Automation Solutions



### Doosan Machine Tools Launches Responsive Website





## Doosan Machine Tools Presents Diverse Solutions at the EMO2019 under its New Corporate Slogan of “MACHINE GREATNESS”

Doosan Machine Tools took part in the EMO 2019 held in Hanover, Germany for six days from September 16 to 21, 2019, where it introduced twenty high-end multi-tasking and axis machine tools, including twelve new products, and cutting-edge automation solutions. Under the three main themes of automation, multi-tasking cutting and smart technology, the company set up its booth to showcase its multi-tasking cutting technologies and unrivaled automation solutions, attracting keen attention from the manufacturing sector. To meet the high expectations of visitors to the vent, Doosan Machine Tools unveiled a diverse product lineup ranging from its global bestsellers to its high-end five-axis, multi-tasking, and horizontal machining centers.

Most notably, the company featured its 5-axis machining centers including the DVF 5000, DVF 6500 and DVF 8000T simultaneously in a bid to promote its unrivaled advantage in the area of multi-tasking cutting solutions. Doosan Infracore also introduced its own open CNC platform, CUFOS, for the first time in the European market, emphasizing its upgraded automation features as well as its potential for cutting quality improvements. Furthermore, the company introduced its latest ‘IDOO CONTROL’ solutions as an optimized means of carrying out real-time monitoring, realizing cost reductions and increasing the efficiency of production lines. All of these products attest to the unrivaled competitiveness of the company’s machine tools in coping with changes in manufacturing environments and the challenges posed by future technologies.



## DMT Hosts Machine Greatness 2019 Customer Event on October 23

In the face of the Fourth Industrial Revolution, this year’s customer event introduced Doosan Machine Tools’ latest products and solutions under the theme of “5-axis machining, multi-tasking cutting, and process automation designed to bring excellence to customer performance”.

Among the eighteen products featured at the Machine Greatness 2019 Customer Event were the PUMA SMX3100ST, which boasts enhanced multitasking capacity; the PUMA SMX2600ST, which is equipped with CUFOS, a user-tailored operation system; the 2 Y-axis PUMA TT1300SYY/2100SYY, which realizes higher productivity thanks to its adoption of a twin spindle and a twin turret; and the DVF 5000, 6500 and 8000T, the latest new concept of 5-axis machining center. Notably, the lineup included four autonomous products that use a variety of pallets, a feature instrumental in boosting productivity.

To help customers cut the most complex shapes and produce high-precision high-quality components, the event was centered on demonstrations of the virtually unlimited capabilities of Doosan Machine Tools’ 5-axis and multi-tasking tools, such as its new 5-axis series comprising the DVF 5000, 6500 and 8000T, and its new expanded lineup consisting of the PUMA SMX2600, 3100 and 5100, through seminar sessions and exhibitions, as well as introducing automated production lines using diverse types of pallets.



## DMT Overhauls Website for User Convenience and Effective Communication with Customers

DMT recently upgraded its website with the focus on demonstrating Doosan Machine Tools’ status by reflecting the latest trends, such as full-screen visual images, infographics and diverse interactions. The new website design emphasizes the company’s core values for its products and customers as well as reflecting the company’s unique brand identity throughout the website.

Most notably, the product search feature has been enhanced to boost user convenience when searching the numerous products of Doosan Machine Tools. Furthermore, the product page now includes all the relevant information, such as overview, multimedia data, characteristics, major specifications and customer success stories, thereby allowing customers to check the general information on a product on a single page. The page can now be linked directly to the relevant sales channel, too.

To highlight Doosan Machine Tools’ new values and maximize user convenience, the website renewal project concentrated on the presentation of product information and info on services and sales in a consistent and convenient way from the customer’s perspective. The new website offers new contents and services and incorporates new features that will be instrumental in keeping the website up-to-date.

Meanwhile, Doosan Machine Tools communicates with its customers via diverse social media channels including Facebook, YouTube, Instagram and LinkedIn.

## Focus

CNC Localization and  
Competitiveness in the  
Machine Tools Industry

# CNC, the Brain of a Machine Tool; Localization of CNC Technologies!

The Japanese government's decision to remove the Republic of Korea from its so-called 'white list' (a list of preferred trading partners for security reasons) went into effect on August 28, 2019. Many in and outside the machine tools industry in Korea have expressed concerns that the industry will sustain serious damage due to its heavy dependence on Japan for core components. However, some experts recommend using the crisis as an opportunity to localize CNC and to expand the application of developed CNCs, with the government implementing the relevant support programs.

**DOOSAN CNC D300**



“The government is speeding up CNC localization and local CNC distribution through strategic approaches.”



➤ Lynx 210A/B, Lynx 220G super



➤ T3600D / 4000L



➤ PUMA GT2600(L) / 2600M(LM)

### Korea Dependent on Japan for Over 90% of CNC Imports

Korea’s dependence on Japan for CNC (computer numerical control), which serves as the brain of diverse machine tools, currently stands at 91.3%. The global CNC market is dominated by FANUC, Japan and SIEMENS, Germany, while more than 90% of Korea’s CNC market is controlled solely by FANUC. Therefore there is no question that the domestic machine tools industry will be negatively affected by Japan’s removal of Korea from its white list. Alongside SIEMENS’ CNC, locally developed CNCs are also available, and yet domestic machine tools manufacturers with sufficient technological capability have so far been unable to install their CNCs in their machine tools because their customers favor Japanese CNCs, as is the case in other Asian countries.

### Local Industry Still Unaware of Seriousness of Situation

Although more than a month has passed since the Japanese government began to enforce export restrictions on Korea, local industry has not seen as many problems as it originally feared. The reason is that local machine tool manufacturers have secured sufficient stock of CNCs to last for up to ‘six months’ ever since Japan started moving in the direction of export restrictions on Korea. In addition, Korea FANUC supplied the Japanese products even after the Japanese government imposed the restriction. Nevertheless, that should be considered nothing more than a temporary relief. The localization of Korean CNCs must proceed in order to minimize the impact of our country’s external risks, including the Japanese export restrictions, in the short term and to improve the competitiveness of local machine tools and core components from the mid- to long-term perspective.

### CNC Technology Independence Critical for Enhanced Machine Tool Competitiveness

As mentioned above, Doosan Machine Tools and other major local manufacturers of machine tools have already developed their own CNCs, which have been evaluated as matching the technological level of Japanese products. The problem is that domestic CNCs have yet to secure technological credibility and operational convenience from local consumers of machine tools. The Korean government has set up strategies to promote CNC localization, such as expanding the distribution of local CNCs, and has begun to accelerate the implementation of these strategies. The measures taken by the government to counter Japan’s export restrictions include the ‘Local Machine Tools CNC System Development Task as part of the Machine Industry’s Core Technological Development Project (Manufacturing Machines Field Tests)’ and the ‘Smart Control Device Technological Development Project for Manufacturing Machinery Systems.’

The government is also planning to conduct a series of field tests and credibility assessments by June 2020 so that the machine tools produced by domestic companies like Doosan Machine Tools and equipped with local CNC technologies can be widely used at the country’s manufacturing sites. In the medium term, the government plans to support the development of next-generation CNCs equipped with cutting-edge technologies, including 5-axis cutting and ICT application technologies, for which the country still depends on overseas sources, with the goal of developing an open-type CNC system by 2024.

According to machine tools experts, “Korea needs to expand its CNC distribution in order for the country to lay the groundwork for CNC technological independence,” emphasizing, “CNC localization will accelerate when the government creates an environment in which domestic SMEs in particular can purchase machine tools equipped with local CNCs, and which assists field CNC operators’ retraining to promote the use of local CNCs.”

Lee Seong-suk, a freelance reporter in the field of production & manufacturing



Product details can also be checked on Doosan Machine Tools’ website.

[www.doosanmachinetools.com](http://www.doosanmachinetools.com)

## ZOOM IN

Doosan Machine Tools' CNC, the Fruit of 30 Years of Research and Development

# Doosan Machine Tools' 30-Year-Long R&D Efforts Have Contributed to Local 'CNC' Technological Independence

As the Japanese government has removed Korea from its white list, the Korean government and local industries are stressing the importance of localizing CNCs, for which there is still a high degree of dependence on Japan. The reality, however, is that Korea began its effort to localize CNCs more than thirty years ago, and consequently has now secured world-class CNC technologies. "Customers select CNCs entirely on the basis of their preference," said General Manager Jang Tae-seong of Control Technology Team 3. "The shortcut to boosting the competitiveness of local CNCs consists not in pursuing further technological development but rather in expanding the distribution of already developed CNCs, and in enhancing the domestic CNC lineup, so that more machine tools can adopt local CNCs."



### Improved Productivity

The optimal control system for Doosan machine tools comes equipped with high-speed cutting pre-reading blocks as a standard feature.

IT & Auto Parts Productivity  
Measurement Cycle Time

Reduced by  
**12%**



### Enhanced User Convenience

- Convenient peripherals
- Operation-friendly features
- Graphic screen enhancement
- High-quality cutting code as a standard feature



### Strengthened Maintenance Features

- Screen-based maintenance requests
- Screen-based alarm guidance
- Other convenient maintenance features
- Smart factory support Optional

**IDOO CONTROL**





“Check your machine tool operations anytime anywhere on a smartphone.”



### Doosan Machine Tools' CNC Development History

Doosan Machine Tools' CNC development history goes back some thirty years to the era of Daewoo Heavy Industries, which promoted the localization of CNCs at the beginning of the 1990s under a technological alliance with foreign companies and succeeded in developing the PC-based V380 model of CNC for high-precision cutting in 1995 for the first time in Korea. “Daewoo had most local machine tools equipped with the V380 CNC as a result of its efforts to distribute local CNCs,” said GM Jang Tae-seong of Control Technology Team 3. “Unfortunately, following FANUC's launch of the so-called low-priced ‘Zero Model’ targeting the V380, the latter began to lose its competitiveness.”

However, that did not discourage Doosan Machine Tools from working tirelessly to secure local CNC technologies. Following the launch of its first-generation CNC models, such as the V380 and the V640i, Doosan Machine Tools introduced its second-generation CNC models, including the V380i and the V640i+, thus enhancing CNC performance and the precise diagnosis feature in the mid-2000s. Most notably, its third-generation CNC D300, which was developed in 2005 and only launched after being subjected to rigorous reliability tests to verify its technological perfection, is recognized as a model that has significantly improved not only reliability and productivity but also operational convenience.

### Next-Generation CNC D300 and CNC Solutions

The D300, a new model of CNC launched as an upgraded version of the Vision series, has made improvements in all the advantages offered by previous models in the series. Installed in the company's T4000, Lynx, PUMA GT, and M models, the D300 contributes significantly to enhancing machine tools' productivity as it is equipped with

an optimized control system and high-speed cutting pre-reading blocks as standard features. In addition, operational convenience has been boosted by the adoption of greatly enhanced graphic screen features, and maintenance convenience has also been improved by the inclusion of screen-based maintenance assistance and screen-based alarm guidance features, among others, thus accelerating the realization of digital cutting by machine tools.

In addition to enhancing its technological capabilities through CNC localization, Doosan Machine Tools has developed an integrated operating system named CUFOS (Customized User-friendly Flexible Operation Solutions) which it intends to apply to its high-end machine tools as part of its efforts to lead new trends in the metal processing industry. CUFOS is a process solution based on an integrated PC-based controller required for all of the setting, cutting, and maintenance processes. As an open CNC platform, CUFOS minimizes the waste of resources during the operation process and thus contributes to the overall productivity improvement. While machine tools manufacturers in advanced markets such as the United States and Europe are struggling to secure CNC solutions as part of their endeavors to meet the new challenges of the Fourth Industrial Revolution, Doosan Machine Tools is striving to develop a variety of new systems and solutions capable of meeting the changing trends in the industries in which its customers are engaged,” said GM Jang Tae-seong, pointing out that CUFOS was a part of the company's efforts in this direction.

### Strategic Distribution of Local CNCs and Expansion of Lineup

Since beginning its development of the D300, Doosan Machine Tools has adopted the ‘LADDER’ PLC used by global CNC machine manufacturers for the user interface in an effort to eliminate the operational

inconvenience that can result from differences in operations. It has been some time since local CNCs reached the world-class level of technology, although they have yet to be widely accepted by the domestic market. As regards the reasons for this, GM Jang Tae-seong said, “The purchase of a CNC is entirely a matter of customer preference,” adding, “Because most operators prefer to use CNCs they are familiar with, they hesitate to choose a local one out of fear of operational mistakes, even if local CNCs run in exactly the same way as their existing CNCs do.”

GM Jang went on to stress that “CNC localization is not just a technical issue: It is a serious matter that determines a country's competitiveness in the entire manufacturing sector based on machine tools.” He added, “All global machine tools manufacturers have secured their own CNC technologies. From lenses to weapons requiring extremely high-precision cutting, CNC 5-axis cutting is now widely needed in an advanced economy. Should Korea lack the necessary domestic technological capabilities in the area, it will only be a matter of time before it is devastated by an external risk, posing a severe threat to the entire national economy.”

GM Jang further emphasized, “To expand the market share of local CNCs, they should be distributed to educational institutions, including technical high schools and colleges, in an effort to secure future users, while practical assistance should be offered by the government to the buyers of local CNCs. In fact, the best way to promote the further development of local CNCs would be to create a virtuous cycle between the application of more local CNCs to machine tools and the expansion of the local CNC production lineup.”

INSIDE

SHINHWA HI-TEC



📍 - CEO Song Seong-soo reiterating the importance of CNCs which operators can easily operate and maintain when producing small quantities of diverse items.

## The Ideal CNC – the DOOSAN D300 with a User-Friendly Control System and Outstanding Graphic Features

The evolution of CNC features has more than doubled the performance of machine tools and empowered field operators to serve as veteran technicians (engineers).

CEO Song Seong-soo, who has used Doosan's first-generation CNC V380i, another company's CNC, and Doosan Machine Tools' latest ambitious next-generation CNC D300, said, "The D300 is a perfect CNC as it not only improves productivity but is also easy to operate and maintain."



SHINHWA HI-TEC





SHINHWA HI-TEC produces metal pipe fittings and supplies them to Korea and Japan under the SHT brand.



Do Jeong-hwan, a field operator, praises Doosan's CNC D300 for the ease of its operations, ranging from cutting process management to graphic features to button touch.

## Challenge of SHINHWA HI-TEC

### SHINHWA HI-TEC Produces Metal Fittings and Pipe Parts

Located in Busan, SHINHWA HI-TEC specializes in the production of plumbing products, such as tube fittings and pipe fittings, used in a range of industrial sectors including the energy, plant, and automotive industries. Launched as SAEHAN HI-TEC 15 years ago in 2004, SHINHWA HI-TEC rolls out 3,600 different types of fittings and other related parts of various sizes for the Korean and Japanese markets.

Having purchased four compact Doosan turning centers in January, SHINHWA now uses eleven Doosan machine tools at its production site, and has installed the D300 model in two lathes. "It's easy for me to compare the performance of different CNCs as I have used the V380i, another company's CNC, and the D300 for the same process, for cutting the same parts," said CEO Song Seong-soo. "Our company has used the D300 for six months. Despite this relatively short period of time, it has improved our overall productivity by around 3%, due to the faster return and cycle time, as opposed to another company's CNC."

CEO Song emphasized, "Our machining time starts three seconds earlier on average, as our machine tools equipped with the D300 start cutting right after the turret starts rotating."

"The D300's operations are similar to those of other companies' CNCs, so both seasoned and novice operators can operate it easily. The unrivalled durability of its tools is another advantage."

## Solution Offers 'Operational Ease' and 'Easy Maintenance'

### The D300 Excels in terms of 'Operational Ease' and 'Easy Maintenance'

"The D300 model tops the V380i and another supplier's CNC not only in terms of its superior external screen but in many aspects of the program involved as well," said CEO Song Seong-soo. Most notably, to prevent an operator from setting the model incorrectly by entering the wrong cutting conditions and data, the D300 displays the previous cutting conditions on the initial screen page and asks, "Do you want to set up?" after entering new data values in an effort to minimize the risk of input errors, which is quite reassuring." Such a feature is not available in either the V380i or the other manufacturer's CNC.

A D300 operator working at the SHINHWA HI-TEC plant said, "For the V380i and another supplier's CNC, I had to enter the program numbers. By contrast, I can easily retrieve programs on a screen when operating the D300." He went on to say, "In terms of the graphics, the other company's CNC only supports processing graphics, whereas the D300 enables me to check the graphics simply and quickly and to find out how long processing will take."

He also expressed satisfaction with Doosan Machine Tools' attention to detail, saying, "Not only are the D300's operations similar to those of another company's CNC, which has enabled both our seasoned and novice operators to easily operate the D300, but the D300's touch buttons are also designed to avoid errors when pressing them."

As for the other advantages offered by the D300, SHINHWA HI-TEC pointed out that a tool counter is available as the model features an image-based sensor input/output monitoring screen, while easy maintenance and repairs are possible through the NC/PLC alarm guidance feature, and that the tool lifecycle has been extended compared to another company's CNC thanks to cutting feature improvements."

### Developing into the Best Provider of Plumbing Parts through Constant R&D

For its own accuracy control and quality improvement, SHINHWA HI-TEC reviews its clients' drawings and almost always proposes improvements to them no matter how long the process takes, until it can greenlight their final orders.

CEO Song Seong-soo said, "Such efforts have improved our quality management capabilities while enabling us to earn our clients' trust," adding, "We take pride in our clients' product quality." He stressed that he could not compromise on quality under any circumstances.

Of the more than 3,600 kinds of products that SHINHWA HI-TEC rolls out, 70 percent are standard products ready for batch production, while the remaining 30 percent are products that the company has localized using its own technological capabilities. "When the economy slows down, competition intensifies all the more among SMEs," said CEO Song. "We must take advantage of such an occasion to work even harder to enhance our technological competence and competitiveness. We will increase the proportion of our own development in our product portfolio so that we can grow into the best provider of plumbing parts and supply the very best goods to the domestic market."

INSIDE

—  
Dream Mecatec  
Co., Ltd



◀ Director Yeom Seong-min (right) and Jeong In-cheol, who are in charge of technical sales and production technologies, respectively

## Dream Mecatec Cuts Semiconductor and Display Manufacturing Equipment Parts DCM Excels in Rigidity, Precision and Stability

A high degree of repeat accuracy is required to secure stable cutting quality. A vacuum chamber, for instance, used for semiconductor and display manufacturing equipment requires not just strong, heavy cutting but a high degree of accuracy as well. Therefore, the relevant machine tools must be able to meet the requirements, too. “DCM works better than foreign machine tools in terms of accuracy and stability. It has made great contributions to improving the quality of our products,” said an executive of Dream Mecatec. “The most outstanding advantages of Doosan’s machine tools are their high rigidity, operator-friendly control features, and fast customer service.”



Dream Mecatec Co., Ltd



⊕ GM Jeong In-cheol says, "Compared to foreign machine tools, the DCM excels in rigidity, accuracy, and stability."



⊕ Dream Mecatec uses the DCM series in its chamber-machining of semiconductor manufacturing equipment requiring heavy cutting and a high degree of accuracy.

## The Challenge of Dream Mecatec Co., Ltd

### Expanding Machining Capabilities from Semiconductor and Display Manufacturing Equipment to Automation, Defense Industry and Aircraft Parts

Dream Mecatec specializes in cutting parts used in semiconductor and display manufacturing equipment, automation equipment, and PV cells. Founded in 2007, Dream Mecatec has accumulated technological competence in these areas over the past twelve years and, having secured optimized process technologies and quality assurance expertise, is now highly recognized by renowned suppliers of Korean semiconductor and display manufacturing equipment.

Dream Mecatec is now striving for diversification, marking a departure from its former concentration on parts processing for semiconductor and display manufacturing equipment. "The manufacturing sector in the country has slowed down. Many machining companies in the area are suffering. Still, our company earned KRW 25 billion in 2018, and we expect to earn just as much in 2019 as well," said director Yeom Seong-min. "However, we have felt the need for market diversification due to declining prices, market maturation, and growing competition in the semiconductor sector. We are expanding our business into the automation, defense, and aerospace parts industries." The reasons why Drama Mecatec can actively seek market diversification include not only its accumulated machining technologies but its lineup of machine tools. "Through constant investments, we now have more than forty machine tools including compact machining centers, mid- to large-sized machining centers, and general cutting equipment," said director Yeom. "Hence we can realize optimal machining regardless of the material, shape or size of each workpiece."

## Solution is Doosan Machine Tools' 5-Face Double-Column Machining Center DCM Series

### Primary Contributor to Dream Mecatec's Strong Competitiveness in Precision and Quality

Dream Mecatec runs eight machining centers supplied by Doosan Machine Tools, including five models from the DCM series, which it uses to cut the vacuum chambers used in semiconductor manufacturing equipment. An executive has stated that it can now cut multiple faces with a single setting, dramatically boosting productivity and cutting stability. GM Jeong In-cheol expressed his satisfaction, saying, "Chamber cutting requires angle partition. Previously, we depended on simple division, but with the introduction of the DCM we can now undertake precise partition machining, which enables us to finish difficult processes at the same time and shorten the processes, too."

"The selection of proper machine tools is crucial to cut diverse types of workpieces according to our clients' requests, guarantee machining stability, and maintain high precision during long-running operations," said GM Jeong In-cheol. "Most notably, to produce various kinds of products and fulfill our clients' needs, one has to secure a machine tools lineup that can optimize each one of the processes involved. Thanks to the fact that we are equipped with outstanding machine tools, we have been able to expand into parts cutting for the aviation and defense industries," adding "We are planning to advance into new markets with optimized process management systems in terms of machine tools, cutting technologies and tools."

### 2020 Will Be the First Year of Expansion into New Markets including Aviation and Defense

"Throughout 2019 we have been preparing to make a giant leap forward in 2020," said director Yeom Seong-min. "This year, we are making every effort possible to empower our employees through education and training and to optimize our worksite equipment and facility management so that we can expand our investments in new machine tools and production facilities in 2020, in order to make inroads into new industries and markets." He concluded by saying that it is Dream Mecatec's vision and goal to move beyond its status as a company specializing in cutting operations and to emerge as a firm that can assemble parts and produce machine tools."

With the introduction of the DCM, we can now undertake precise division machining, which enables us to finish difficult processes at the same time and shorten the processes, too."



INSIDE

Hongsan Co., Ltd.



CEO Roh Gyu-seon of Hongsan says, "Doosan Machine Tools' NHM and NHP have bolstered our machining precision and boosted customer satisfaction."

## Recognizing the Important Roles of Machine Tools, Hongsan Achieves Automation and Competitiveness via NHM, NHP and LPS

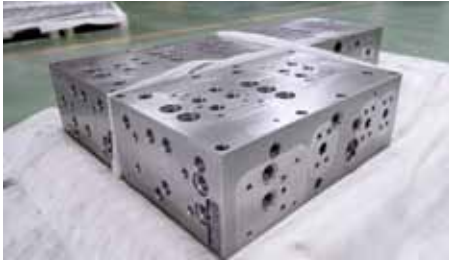
Hongsan, a parts manufacturer, has boldly replaced its machine tools in a bid to secure 'high precision and productivity' to keep accelerating delivery through outstanding cutting tolerance and process automation, having a positive impact on its clients as well as its suppliers. Fully aware of the influence of 'machine tools' on machining quality, Hongsan has used Doosan Machine Tools' NHM series since 2014 so satisfactorily that it has also advised its suppliers to use Doosan machine tools. CEO Roh Gyu-seon said, "We have striven to satisfy our clients' needs 100% by acquiring new machining know-how and by optimizing our manufacturing processes." He added that "since the installation of Doosan machine tools, not only have we been able to secure high product quality but we have also improved 'employee welfare' through process automation."



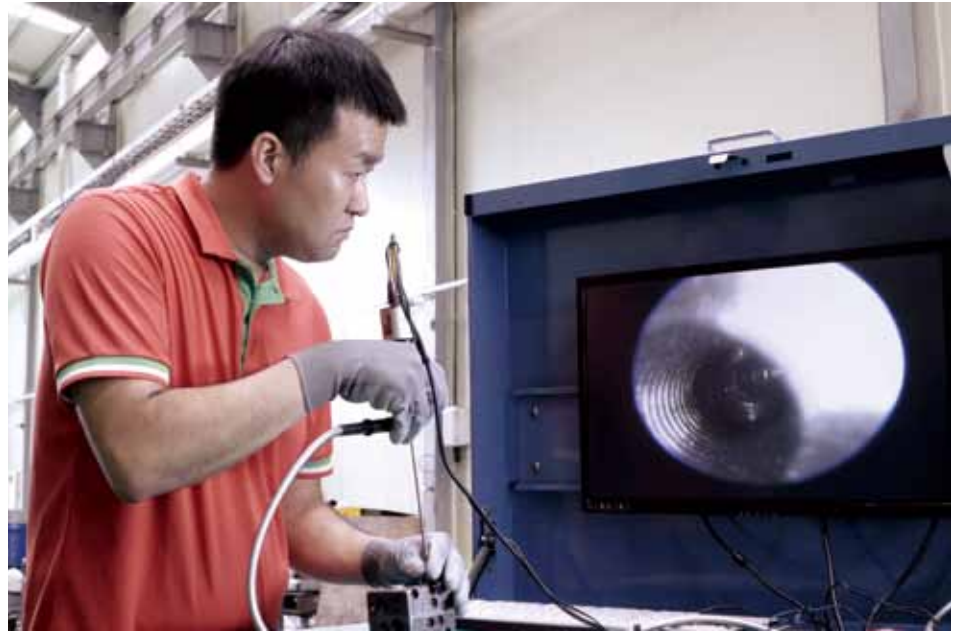
Hongsan Co., Ltd.



CEO Roh Gyu-seon said, "We now carry out unmanned machining for heavy industry parts at night using a single setting. Not only can we meet any delivery request, but we have also improved our employees' welfare because they no longer have to work at night."



Hongsan produces and cuts a variety of precision parts ranging from mechanical components to EV housing and central axis parts.



Hongsan pays keen attention not only to machine tools but also to measurement-based surface roughness management to minimize its machining tolerance.

## The Challenge Facing Hongsan

### Enhancing Machining Know-how and Process Optimization to Improve Customer Satisfaction

As a company that produces and cuts parts used in machine tools, industrial machinery and hydraulic machines, Hongsan places particular focus on the production of hydraulic piston motors for industrial machinery and eco-friendly auto parts for electric and hydrogen-powered cars. In order to cut the 'manifold' used to steer large vessels, five years ago the company bought Doosan Machine Tools' NHM series of horizontal machining center for its outstanding rigidity and machining speed among other factors, following its extensive survey of various domestic and foreign machining center brands.

"The NHM that we bought in 2014 still performs as precisely as ever," said CEO Roh. "The NHM has enabled us to cut highly rigid workpieces precisely with a zero defect rate, greatly contributing to cost reduction." Such a high degree of satisfaction has led the company to purchase another NHM. Following its purchase of a second NHM in 2016 in relation to its production of hydraulic piston motors, Hongsan procured a third NHM and a horizontal machining center, the NHP6300, which is equipped with an LPS, in 2018.

## Solution Is Doosan Machine Tools' Horizontal Machining Center & LPS

### Securing Fast Delivery, Productivity and Precision through Zero Defect Autonomous Production

With its third NHM and its first NHP, Hongsan produces piston motors and piston pumps, and cuts vessel regulators and excavator actuators and motors. "We purchased the first and second NHMs to address our immediate needs, whereas we invested in the third NHM and the first NHP to improve our product quality and expand our market in the long term," said CEO Roh. "We no longer work at night these days. Without the machine tools, however, we had to work overnight to meet the delivery schedule for large-sized workpieces for the heavy equipment industry." Having found the answer in LPS, Hongsan has connected twenty LPS to two machine tools that run overnight on their own.

"When we considered using LPS for our overnight operations, we had serious concerns about productivity and potential defects, which have proved to be totally unfounded," said CEO Roh. "Our clients are highly satisfied with our performance in quality and delivery, so we expect to receive more job orders from them." He added that Hongsan's autonomous operations are widely known, and his acquaintances are considering adopting the same system for their own plant operations.

To move closer toward complete automation, Hongsan is planning to acquire 'robots' in place of 'humans' to complete the LPS workpiece setting. "Automation based on 'LPS + Robots' is one way of coping with the challenges of the Fourth Industrial Revolution in the manufacturing sector," said CEO Roh. "We are planning to expand our automation system based

on LPS + Robots, although the characteristics of workpieces must be taken into account too."

### Hongsan Expands EV Core Parts Production & Cutting and Plans to Promote 'Welfare for Us' Companywide

To develop an EV prototype, Hongsan is working to make improvements in its machining tolerance for housing and motor central axis parts together with the manufacturer's research center. "Given that mass production can increase the machining tolerance demonstrated during the research process, the minimization of machining tolerance is required in the development process," said CEO Roh. "We are able to meet this requirement by using Doosan machine tools." In addition, the company has purchased a German measuring instrument that it requires for high-precision machining in a bid to secure a minimum level of machining tolerance.

Meanwhile, CEO Roh said, "We are planning to focus on the development of reducers and jigs along with the relevant cutting technologies to cope with the challenges of the Fourth Industrial Revolution," adding, "We would like to contribute to the revitalization of the Korean manufacturing sector and the country's economic development as a proud Korean precision machining company." In addition to continued technological development, CEO Roh stressed that he will personally make every effort possible to build Hongsan into a company where everyone is happy according to the principle of "Welfare for All."

**INSIDE**

—  
Rasi Maskinfabrik  
A/S



CEO Lars Jacobsen stresses the importance of the stability of machine tools themselves and the machining know-how required to prevent workpiece deformation when cutting aluminum parts.

## Rasi's Ultimate Choice of the DVF 500 for the Precision Cutting of Aluminum Parts of Complex Shapes

Rasi Maskinfabrik A/S, a Danish prototype and sample machining company, has operated a variety of German and Japanese machine tools to meet its customer's diverse needs and quality requirements. "Recently we decided to purchase the DVF 5000 model from Doosan Machine Tools in order to cut various aluminum parts," said CEO Lars Jacobsen. "We are highly satisfied with the DVF 5000 as we can secure a high degree of reliability and productivity and cut workpieces of complex shapes most efficiently with this excellent machine tool."



Denmark



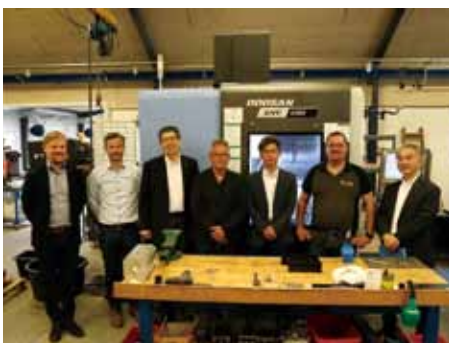
➤ Rasi Maskinfabrik A/S cuts aluminum parts on Doosan Machine Tools' DVF 5000

### The Challenge of Rasi Maskinfabrik A/S

#### Securing Expertise by Machining Workpieces of Diverse Materials and Shapes

Rasi Maskinfabrik A/S is a seasoned Danish metal processing company. Lars Jacobsen, who founded Rasi in 2006 with one machine tool to produce prototypes and machining samples, said, "We now cut parts with a total of nine top-of-the-line CNC machine tools manufactured in Germany, Japan and Korea."

Lars Jacobsen is an expert in the high-quality high-precision machining of diverse materials and shapes, and boasts a wealth of experience in the area. Recently he decided to purchase Doosan Machine Tools' 5-axis vertical machining center, the DVF 5000, to cut aluminum parts in particular.



### The Solution is 'Machine Tools Optimized to Cut Aluminum Parts'

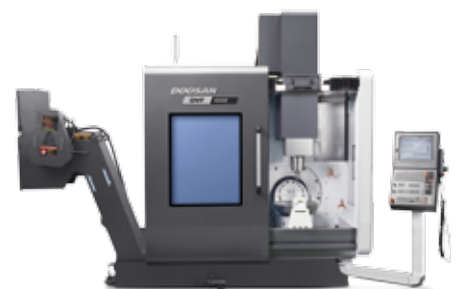
#### Finding the Most Appropriate Machine Tool to Cut Aluminum Parts

The main reason why Rasi has successfully grown into a firm specializing in the machining of prototypes and samples is that it has worked hard to secure cutting-edge engineering technologies and machining know-how for an array of materials including not only metals such as steel, aluminum and brass, but also non-ferrous metals and even plastics.

"Our company has recently started cutting aluminum parts," said CEO Jacobsen. "To cut aluminum parts with a high thermal expansion coefficient, the stability of the machine tools themselves is critical, as is their response to internal and external environments in terms of internal stress, cutting force and cutting heat, in order to prevent the deformation of workpieces." He expressed his satisfaction with the performance of

the DVF 5000, saying, "In that context, the DVF 5000 meets our company's machining and quality criteria, demonstrating outstanding performance in the cutting of workpieces of complex shapes."

■  
 "Optimized for the cutting of aluminum parts, the DVF5000 contributes to boosting the quality competitiveness of our workpieces."  
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➤ DVF 5000

**NEW  
PRODUCT**

—  
Doosan Machine  
Tools' New Products

# Meet Doosan Machine Tools' Core Technologies in its New Products

## TURNING CENTER

Doosan's Large Turning Centers with 2-axis to Y-axis Machining Capability



### **PUMA 700LM / ATC**

The PUMA 700LM/ATC is a large horizontal turning center ideally designed for machining the types of pipes and flanges used in the oil and gas industry, hydraulic parts used in construction equipment, and complex parts used in the aircraft and shipbuilding industries. Its slant bed design allows easy chip disposal, while its maximum turning diameter and length of  $\varnothing 900\text{mm}$  and 5050mm.

Doosan's High Productivity Twin-Turret Vertical Turning Center for Disc Brake Machining



### **PUMA VD3600TT**

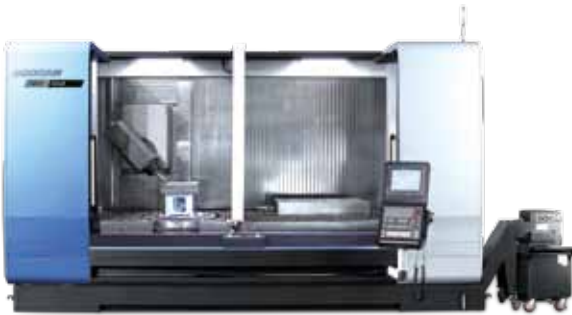
The PUMA VD 3600TT is a high productivity twin-turret vertical turning center for disc brake machining. Its bed structure and traverse system are optimized for easy chip disposal and powerful cutting performance. The spindle, equipped with high rigidity bearings, is optimized to prevent thermal displacement and deliver powerful cutting performance. It features a high-power motor and torque to maximize productivity. To further improve productivity, the model is designed with two turrets that can engage in cutting simultaneously, and it has an optimized machining space for disc brake machining. The model can also meet customers' needs for automation simply by adjusting the gantry loader and robot features.



Doosan Machine Tools' new machining centers are equipped with the company's core technologies, such as its high-speed spindle technology, high-rigidity guideway technology, thermal stability technology, easy operation technology, and smart monitoring technology.

## MACHINING CENTER

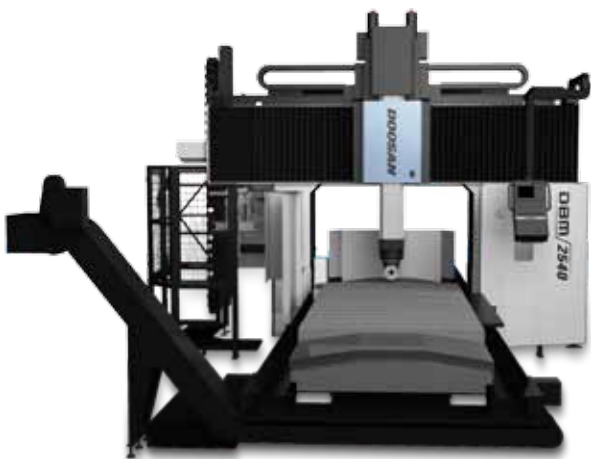
### Multi-Purpose Vertical Machining Center



### **VCF 850LSR II**

The VCF 850 II series of multi-purpose, vertical machining centers is suitable for a wide range of applications. The model is designed for 3-, 4- or 5-axis machining through a top-mounted or embedded rotary table. It is ideal for customers who need to cut diverse types of workpieces on a machine tool. It offers multiple advantages including its compact size compared to its machining scope thanks to its moving-column structure.

### Multi-Purpose Double-Column Machining Center



### **DBM 2540**

The DBM series is a multi-purpose double column machining center without a W-axis designed for such applications as the heavy duty machining of large parts and high-precision dies and molds. Boasting the highest specifications in its class, the DBM series provides a broad range of machining capabilities and optional equipment, together with many convenient functions for the operator. A variety of different ram spindle specifications and a wide range of auto-change attachments support many types of machining applications ranging from die and mold machining to heavy duty cutting. The DBM series provides a support system for the 5-face machining of large and heavy workpieces, easy pattern cycles, workload counter control, automatic feed control, and a process monitoring function.

Doosan Machine Tools



# T4000HP

## High-Speed, High-Productivity Tapping Center

- ▶ Greater productivity achieved due to the improved acceleration/ deceleration feature of the spindle and the travel system, in addition to a shorter non-cutting time.
- ▶ Greater reliability due to a more robust structural design and quality verification by various institutions.
- ▶ Greater operational ease due to the adoption of a compact installation area and the application of a 12.1-inch color LCD.

**DOOSAN CNC D300**



**MACHINE  
GREATNESS™**



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