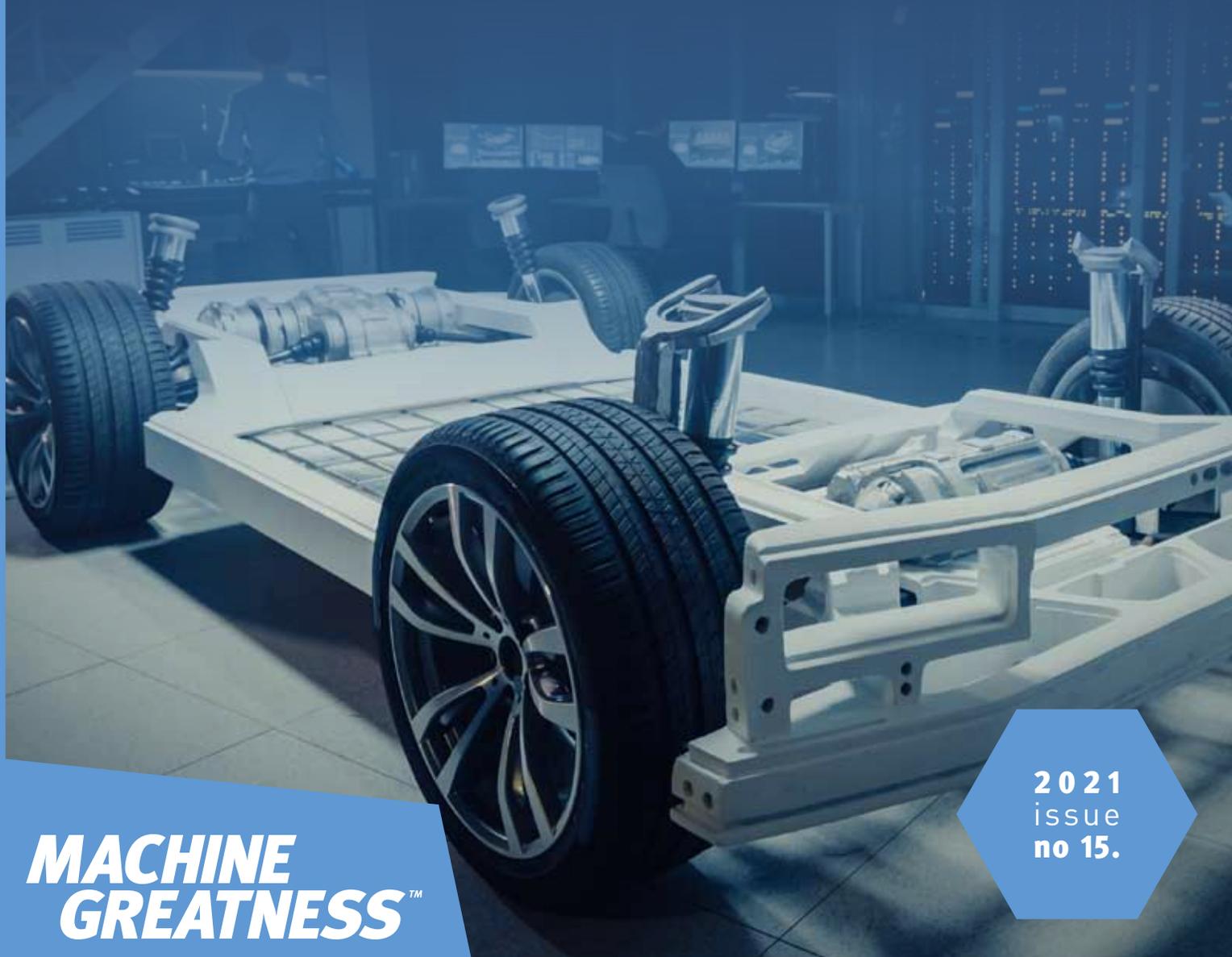




NEWSLETTER FOR DOOSAN MACHINE TOOLS VIP CUSTOMERS

OPTIMAL SOLUTION

MACHINE TOOLS THAT RESPOND TO THE
ELECTRIC VEHICLE INDUSTRY'S GROWTH



**MACHINE
GREATNESS™**

2021
issue
no 15.

Focus

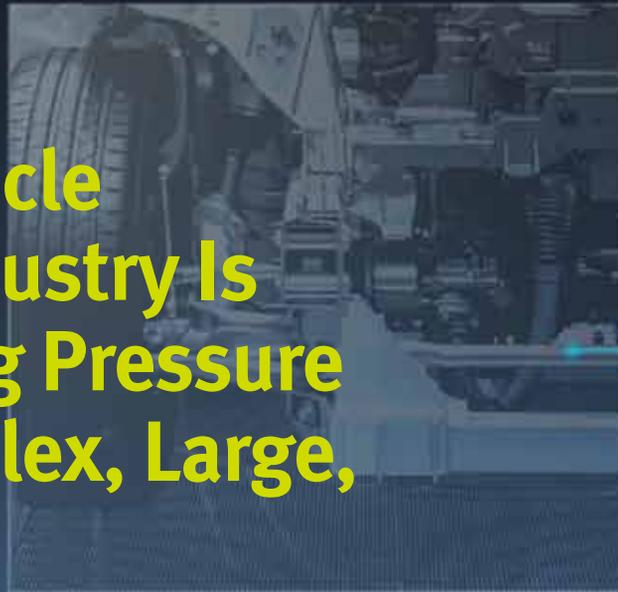
Electric Vehicle Market
Growth and the
Changing Automobile
Components Industry

The Electric Vehicle Components Industry Is Under Increasing Pressure Related to Complex, Large, and Light Parts

The key lies in procuring multi-axis cutting machines and the availability of matching technology for aluminum parts.

—

CASE (Connectivity, Automation, Sharing and Electrification) and digital transformation trends have already brought about great change not only to the automobile industry but also to the automobile components industry. Changes include the emergence of demand for parts made of new materials and shapes as well as growing needs for the parts quality, i.e. lightweighting and high rigidity. With internal combustion engine vehicles still occupying 80% of the total vehicle production and the environmentally friendly vehicles showing the possibility of steady growth, auto components industry is being forcefully pushed into a transitional stage in which change of dominion in the industry is likely to occur. Machine tools are expected to play an important part in securing sustainable competitiveness for the auto parts machining industry. But in what way?



Challenges in the industry

“60% of the parts for the internal combustion engine vehicles will disappear.”

A noteworthy increase in demand: demand for the new electric vehicle components/workpiece machining and machines is on the rise.

Switching from internal combustion engine vehicles to environmentally friendly vehicles such as electric or hydrogen-fueled vehicles is likely to cause the disappearance of more than 60% of the parts for the internal combustion engine vehicle, numbering about 10,000. On the other hand, the number of new auto components created by switching to electric vehicles, mostly parts relating to motor, battery and sensors, is expected to be no more than 2,000. Expansion in environmentally friendly vehicle production is not the only cause of such a phenomenon; electrification of the auto components of the conventional internal combustion engine vehicles also plays a part. For electric vehicles, parts for engines are no longer needed, and components relating to the running and transmitting gears are reduced. A total of 15 components previously installed on the power train such as cylinder block, cylinder head, bedplate, transmission housing, shaft, gear, turbocharger and oil pump have been replaced by the housing and cover enveloping the motor and the electrical/electronic component housing and cover.

Deputy Manager Kang Hyun-jung, Market Intelligence, Marketing Team of Doosan Machine Tools, emphasized, “It’s not appropriate to view switching from internal combustion engine vehicles to electric vehicles in terms of only the change in the number of the auto components involved.” Kang added, “Those in the machine manufacturing or machining industry should keep an eye on the trickle-down effect of the entire electric car industry as electric vehicle components machining as well as the machines for producing new components or machining new material is in increasing demand.”

Solutions for consumers

Successfully tackled the problems of machining components of complex shapes as well as the tasks of lightweighting using the lightweight material; capable of satisfying the needs for machining the long and large electric vehicle components by securing 5-axis or multi-task machines

Apart from the machines in increasing demand, switching to electric vehicles is giving rise to a change in the auto component machining process that includes the emergence of new components, components of complex shapes, and the choice of lightweight material. When viewed in terms of the reduced number of components, a matter of our primary concern, top of the list is steel components reduced by about 75%, followed by aluminum and cast-iron components reduced by about 27% and 14% respectively. Particularly noteworthy is the phenomenon in which steel or cast iron is quickly being replaced by aluminum or aluminum alloy for lightweighting.

Huh Young-rok, Doosan Machine Tools’ Manager of Application Engineering Team, added, “Those component machining companies operating 5-axis or multi-tasking machines can be competitive as the growing market for electric vehicles will necessitate machining the components relating to the battery and motor or the components of the body and chassis, which are usually large and long.”

Future market outlook

Countries housing world major electric vehicle manufacturers are expected to steadily expand their electric vehicle production. These countries have announced a plan to stop or reduce the internal combustion engine vehicle production, replacing it with the electric vehicle.

Electric vehicles are expected to be in demand continuously due to reinforced carbon emission control and the major countries’ policy in support of environmentally friendly vehicles. In fact, with Europe taking the lead, major countries around the world have announced plans to stop the production of internal combustion engine vehicles in order to start producing electric vehicles replacing them for a period between 2025 and 2040. In Norway, steps will be taken to stop internal combustion engine vehicle production by 2025. In Germany and Japan, by 2030 and In U.K. by 2040. In line with such trends, Hyundai is planning to launch 560,000 electric vehicles by 2025 while Kia is planning to launch 500,000 electric vehicles by 2026 to sell them on the global market.

“ Electrification trends are likely to cause change in almost all means of transport using internal combustion engines. Therefore, it may be wise for us to broaden our horizons by paying attention to various other industries, customers, and regions and avoiding limiting our attention to the electric vehicle alone.”



Deputy Manager Kang Hyun-jung, Marketing Team of Doosan Machine Tools

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ZOOM IN

—
Doosan Machine
Tools is able to
respond to the needs
of the electric vehicle
industry

Doosan Machine Tools is focusing on enhancing the competitiveness of the electric vehicle components industry

Reinforcing their machine lineup by improving the performance of existing models and by developing dedicated machines

—
Ten years have passed since Hyundai Motors unveiled 'BlueOn', its first mass-produced model for a high-speed electric car, raising the curtain on the domestic electric vehicle market. Just 10 years ago the electric car was shunned by most people because of the poor mileage it gets, lack of charging infrastructure, and the charging time, which is often too long. However, the electric vehicle market has begun to grow rapidly in recent times thanks to environmentally friendly vehicle trends, improvement of relevant technology and infrastructure and the extended lineup. Under these circumstances, responses from the electric vehicle component industry are also getting faster than ever.

Newly created demand for machining electric vehicle components and production equipment

When considering the number of components alone, switching from internal combustion engine vehicles to electric vehicles will reduce the machining market size. However, there must be newly created demand amid such changes. Unlike internal combustion engine vehicles, electric vehicles do not use an engine or transmission, eliminating the need for metal cutting, which is essential to producing such products. Instead, new demand is expected to be created for producing the electric vehicle motor housing and core parts as well as for the battery housing and the case. Also, a new target market is emerging for the machine tool industry as the manufacturers require a new machine to produce the components and work material for electric vehicles.

The most important thing to Doosan Machine Tools is procuring machine-tool-based engineering technology so that quick delivery, productivity improvement, and satisfying customer requirements can be properly achieved. Most of the global machine tool manufacturers provide a full lineup of products because they need to be prepared for actively responding to the size, shape, precision and parts required by various industries. Machine tool manufacturers' engineering technologies can play a key role in providing the desired level of accuracy and satisfying the needs of the customers in a timely manner, thus playing a major role in raising competitiveness.

Doosan's 1st Solution

Utilizing multi-purpose machining tools ranging from 3-axis to 5-axis machines

Having higher competitiveness in the markets for automobiles, molds and aviation parts, Doosan Machine Tools has carried out a two-pronged core strategy to simultaneously strengthen the usability of the existing models and develop specialty machines that are especially suitable for electric vehicle component machining as electric vehicle components were expected to be in

increasing demand in line with the expansion in electric vehicle production that began in 2018. For now, existing models including the VCF series of multi-task machines ranging from 3-axis to 5-axis machines are being utilized to respond to the needs pertaining to small-sized parts and motor-related components in an attempt to reinforce electric vehicle component machining capabilities. At the same time, core equipment and machining solutions that enable the machining of new materials such as aluminum and aluminum alloy are being adopted to properly respond to changes in materials.

Doosan's 2nd Solution

Expanding the machine lineup optimized for light-duty cutting

Materials enabling lightweighting such as aluminum, aluminum alloy, CFRP and magnesium are in increasingly high demand, leading to an increase in demand throughout the entire automobile industry. Huh Young-rok, Manager of Doosan Machine Tools' Application Engineering Team said, "If it previously took one minute for a single tool to cut the workpiece, for example, it takes now only 10 seconds to do the same thing because it's the sheets of aluminum or aluminum alloy that are machined. Because of this change, machines suitable for the electric vehicle component market are those with easy machinability and capable of providing quick acceleration/deceleration. The size of these machines should be large and yet lightweight and inexpensive. These machines are in increasingly high demand."

Focusing on such trends, Doosan Machine Tools launched the tapping center T 4000HS and the vertical machining center SVM 4100 to be exclusively used for aluminum workpieces, and the horizontal machining center with the 400mm pallet is scheduled to be launched sometime in 2021. Also, development of a 5-axis machine is underway for exclusive use in machining large-volume or long electric vehicle

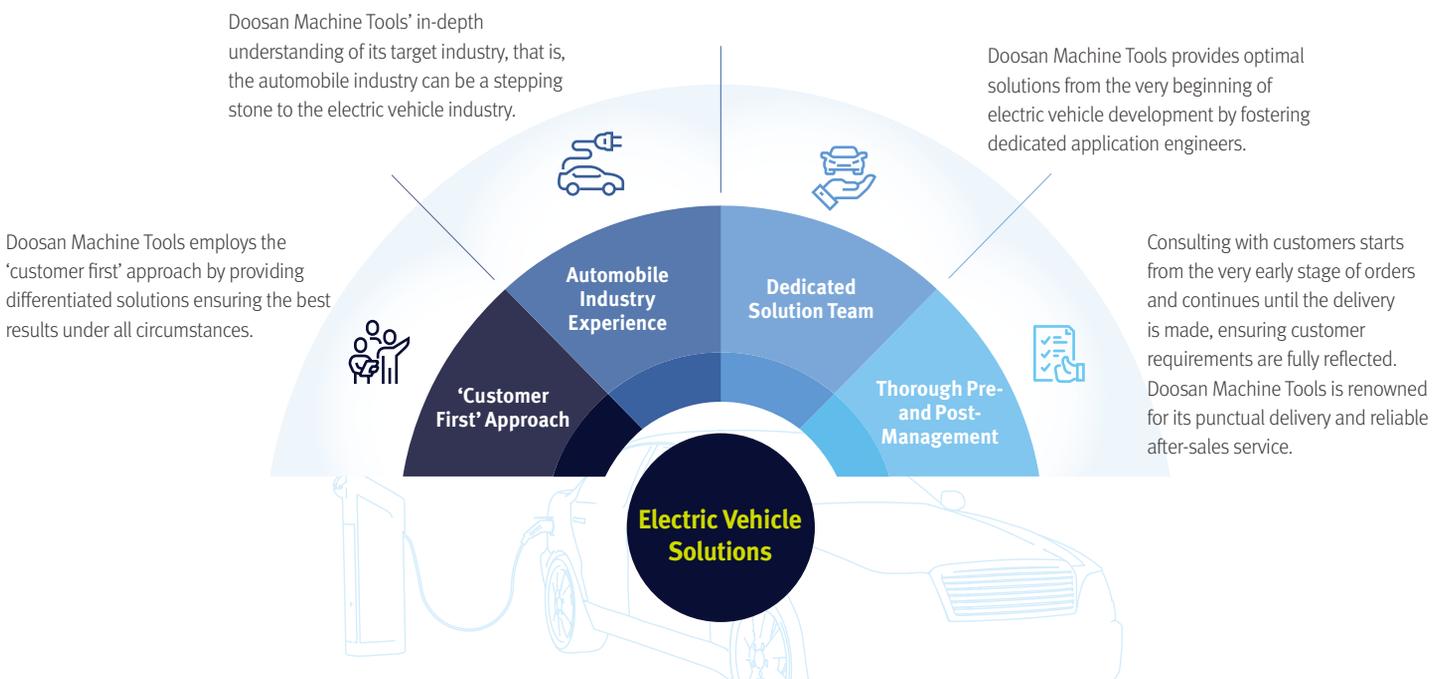
components such as battery housing and main body chassis.

Upon completing the machine lineup for machining electric vehicle components, Doosan Machine Tools will be able to adequately respond to the needs ranging from machining compact precision components to polygonal or large components.

Deputy Manager Kang Hyun-jung, Marketing Team of Doosan Machine Tools, commented, "While engine manufacturing technology remains to be the core technology for the automobile industry, Korean machine tool manufacturers found it hard to secure a significant market share. However, if the engine market occupied by market leaders possessing high-precision technology is replaced by a new kind of emerging market, it will present a good opportunity for the domestic machine tool manufacturers to gain market share any significantly." Kang added, "Electrification trends are likely to cause change in almost all means of transport using internal combustion engines. Therefore, it may be wise for us to broaden our horizons by paying attention to the various industries, customers and regions while avoiding limiting our attention to the electric vehicle alone".



Huh Young-rok, Manager of Doosan Machine Tools' Application Engineering Team
Inquiry: youngrok.heo@doosanmt.com



ZOOM IN

The full lineup in anticipation of machining the electric vehicle components

Solutions in anticipation of all possibilities

New

T series

Doosan's T-Series is a high-speed tapping center that provides high productivity and superb quality.

To machine each component accurately and highly productively in accordance with its unique characteristics, different spindle lineups are provided along with a wide machining area.

- T 4000HS: Full 24000 r/min, optimized for long-time continuous machining
- T 4000HP: Optimal acceleration, reduced non-cutting time



XC 4000-2SP

The XC 4000-2SP series features vertical machining centers with Y-axis 400mm grade 2 spindles. Equipped with 12000 r/min high-speed direct coupled 2 spindles, these machining centers are capable of performing excellent high-speed machining and built with the mineral casting bed to provide stable performance and accuracy.

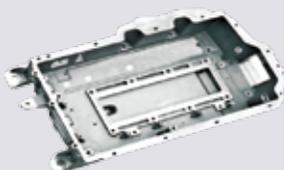
- Providing spindle cooling and sensor-type thermal displacement compensation ensures high precision performance
- Applying X/Y/Z linear scale as standard



SVM 4100

SVM 4100 is a specialty vertical machining center that is especially suitable for high-productivity light-duty cutting. It provides the highest productivity when performing light-duty cutting in a business environment where die casting machining is on the increase with the chip disposal amount kept to a minimum and components inducing fuel efficiency are also on the increase.

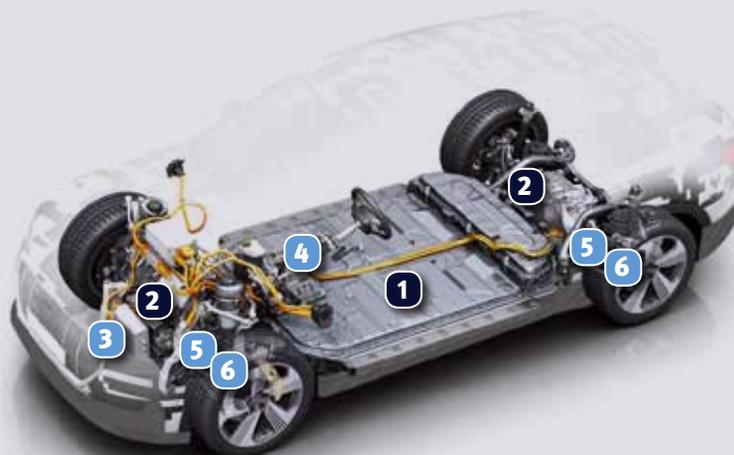
- Max. spindle speed: 12000 r/min
- Rapid feed rate: 36 m/min
- Tool change time: 1.2 seconds



DNM series

Doosan Machine Tools' typical best-selling model DNM series offers a wide lineup from 400 to 6700mm in the Y axis and from 800 to 2100mm in the X axis, enabling the user to handle a wider range of workpieces in various work spaces.

- DNM 4500L / 5700L / 6700XL



New

- 1 Battery
- 2 PE System

Retained

- 3 Thermal System
- 4 Steering
- 5 Axle & Drive
- 6 Suspension/Brakes

Doosan Machine Tools' powerful and versatile electric vehicle component solution lineup provides customers with various solutions, equipping them with the renewed capability to produce components new to them.

Retained

VC 630/5AX

The VC630/5AX machining center provides full 5-axis simultaneous machining. Its highly rigid integral rotary/tilt table and high precision built in spindle provide the solution for both high-speed and heavy-duty machining of complex parts in one setting.

- 12000 r/min { 2000/3000 r/min **Option** }
- Max. spindle torque: 204 N.m
- No. of tools held: 40 tools {60/81/101/121 **Option** }



NHP 4000/5000 series

Equipped with such features as the ability to keep non-cutting time to a minimum, a stable structure, and a thermal error compensation function, the NHP 4000/5000 series provides high productivity and high precision. It is a compact high-productivity horizontal machining center best suited for machining small, medium and large workpieces.

- Feed axis acceleration and deceleration: 1g
- High speed built-in spindle: 15000/2000 r/min
- Pallet size: Ø400 / Ø500 mm



VCF 5500 series

Equipped with a table that is 5600mm long when extended, VCF 5500L/UL is a universal column moving vertical machining center with a flexible operating system that can be equipped with various applications.

This column moving machine can provide work convenience and enhanced productivity using the center partition option.

- Direct coupled spindle: 12000 r/min
- Y-axis travel 550 mm
- Tool magazine with a steady structure
- Bed flushing coolant available as standard



VCF850II series

VCF 850II series features universal column moving vertical machining centers with flexible operating systems that can be equipped with various applications. Equipped with the high rigidity B-axis swivel head and the axis feed extending to 3m for X axis, this machine is capable of boosting work convenience and efficiency and developing higher value-added business, using a variety of options including a rotary table and center partition.

- Built-in spindle: 12000 r/min {18000 r/min}
- Milling using the B axis, which is capable of rotating by 220 degrees
- Pick-up magazine available as an option for large diameter or long tools



INSIDE

—
Cambridge Precision
Ltd
(U.K.)



➤ Cobot 'H2017' of Doosan Robotics equipped with vertical machining center DNM 6700 and Nikken's rotary tilting table (5 axes)

Cambridge Precision of the U.K. achieves a superb level of automation

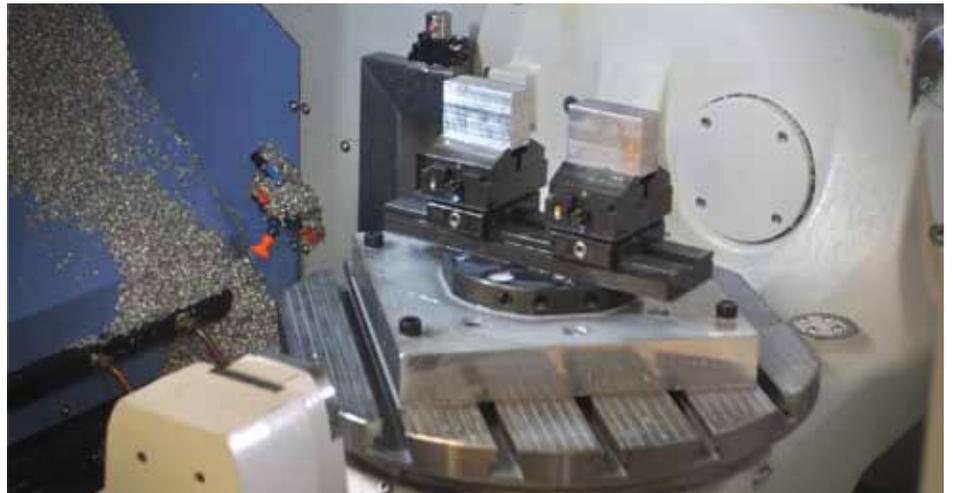
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Cambridge Precision Ltd ("CPL"), a precision engineering specialist, recently created a manufacturing environment enabling 24-hour continuous machining of aluminum enclosures using the vertical machining center linked to the Cobot. Doosan Machine Tools supplied the 5-axis vertical machining center 'DVF 5000' and such vertical machining centers linked to the Cobot as DNM 6700 and DNM 4500 through a package deal to help CPL achieve a superb level of automation.



Cambridge Precision Ltd

* Source: Mills CNC, Doosan Machine Tools' U.K. dealer



➤ DVF 5000 compact and yet of steady structure provides powerful productivity

The Challenge of CPL

Invested in Doosan Machine Tools' new machining center and the Cobot.

Last February, 3 units of Doosan Machine Tools' machining centers—the simultaneous 5-axis vertical machining center DVF 5000, the vertical machining center DNM 6700, and DNM 4500—were installed in the manufacturing factory of CPL (24,000 ft²). Nick Raven, General Manager of CPL said, "Considering the amount of work, machining work, preparation of parts and operation time required, we thoroughly reviewed the project and came to the conclusion that a high-performance 5-axis machining center would be best suited for a machining aluminum enclosure. We then decided to purchase a vertical machining center linked with a Cobot in a package deal with 24-hour continuous machining in mind."

Explaining how they came to purchase the DVF5000, Nick Raven added, "We are an old customer of Doosan Machine Tools and are well aware of the performance of DVF 5000, which is compact and yet of steady structure while providing powerful productivity, and this allowed us to make our purchase without hesitation." Additionally, CPL purchased the 3-axis vertical machining center DNM 6700 as well. Commenting on the DNM 6700, Nick Raven said, "I've been interested in the DNM 6700 among the DNM series models because of its capability to machine high-rigidity, high-precision components. When purchasing the machines, we had to think about how we would raise the level of automation. We then chose the Doosan Cobot H2017 to link it with the DNM 6700."

Solution is

The DVF 5000, DNM 6700 linked with Doosan Cobot H2017, and DNM 4500 turn out to be the key to reducing cycle time, enhancing production efficiency, and achieving high productivity.

CPL decided to install the DVF 5000 in the unit enclosure machining line to reduce cycle time and increase productivity, hoping that the cycle time would be reduced to about 2 hours. The Nikken rotary tilting table (5 axes) was also added. They were planning to utilize it in machining enclosure cover components.

Though capable of machining the workpiece or components weighing as much as 20kg, CPL purchased Doosan Robotics' Cobot H2017, which provides an operating radius of 1.7 m and precision repeatability, to link it with DNM 6700 for maximum efficiency in loading/unloading the workpiece and moving it to the next process and the like. Nick Raven said, "Workpieces to be machined (24 workpieces at a time) are placed on the table, and the machining time ranges from 5 minutes to 60 minutes."

Andrew Barnard, CPL's process supervisor, commented, "Apart from the Cobot recently purchased, it was first introduced to us in July 2019, and the use of Cobots has been favored here ever since. Now we have two Cobots, and team members working in the factory can concentrate on other manufacturing or assembling work and make plans for the operation time accurately thanks to these Cobots." CPL included in the investment compact 3-axis vertical machining center DNM 4500 as well. This machine is to be placed close to DNM 6700 and H2017 so that it alone can perform the finishing process.

The plan is to adequately respond to new production in demand

Investment in more advanced machine tools will continue!

Nick Raven said, "We were having a hard time last March and April when the COVID 19 pandemic was declared. Large orders were canceled, threatening the existence of the company. However, we participated in the Ventilator Challenge, which enabled us to find a new way of doing business via manufacturing components relating to medical devices. Having overcome difficulties with these efforts so far, we all knew that we would be able to take a great leap forward if an opportune moment came for investment.

It was only last fall that CPL began receiving an increasing number of orders after things became more stable. Ever since September of that year, we've been quite busy. Beginning in the fall of that year, we reconfigured the manufacturing hub and expanded the Cobot center. Just like the overall situation of the U.K. economy, we too had a sharp rebound, and thanks to the high-performance multi-axis type multi-tasking machines and technological competitiveness we secured and our own innovative system and processes, we were able to make the CPL's future very bright. We will continue to strive to strengthen corporate competitiveness by adopting a proactive approach."

INSIDE

Raussendorf
(Germany)



➤ Raussendorf GmbH building located in Obergurig, Germany

Raussendorf in Germany becomes capable of providing complex shape machining as well as universal machining. It was Doosan Machine Tools' 5-axis vertical machining center that made this happen.

“Among our own 17 machine tools, DVF 5000 is the machine that satisfies us most. We marveled at its machinability,” Robert Redman, Production Management Manager of Raussendorf Maschinen-und Gerätebau GmbH, explained. The company purchased Doosan Machine Tools DVF 5000 in 2019. In the field report of this company, they evaluated DVF 5000 as the machine capable of providing technical advantages such as increased efficiency, perfect deburring, flexible production of various workpieces, and optimized service.

* Source: Wappler, Doosan Machine Tools' dealer in Germany

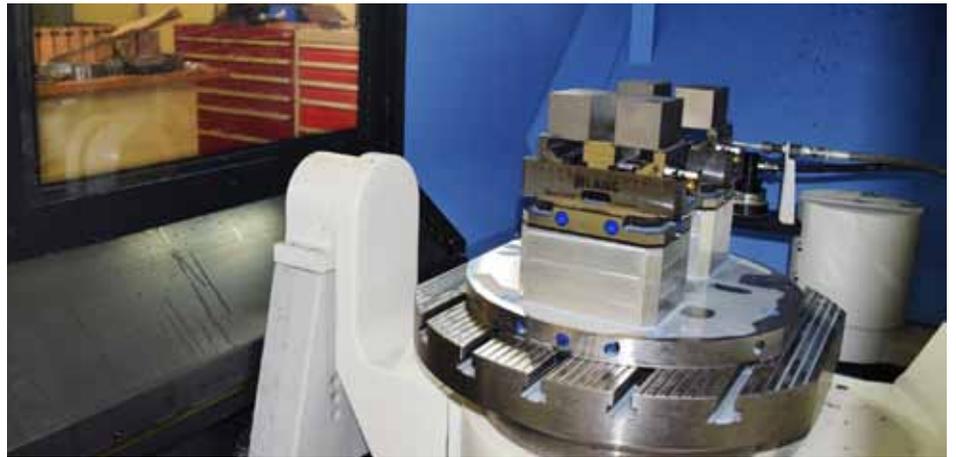


Raussendorf GmbH

“Doosan machine tools are capable of clamping 4 components at the same time and able to complete machining in just 12 minutes, reducing the cycle time by 300% compared to conventional models.”



➤ Raussendorf's indexing pin machined by DVF 5000



➤ 4 workpieces clamped in DVF 5000 to be machined in a single setup.

The Challenge of Raussendorf

Expand the scope of machining and manufacturing activities in various industries!

With more than 150 years of history, Raussendorf Maschinen-und Gerätebau GmbH (“Raussendorf”) provides contract manufacturing services for machinery, plant engineering, and agricultural machinery and has credibility from customers for its excellent quality and technology. Focused on satisfying the needs of customers as a top priority task, this company is expanding the scope of its manufacturing activities in various industries with an aim to adequately respond to the machining environment of the machine components and to securely run their business. In particular, Mr. Hannes Stefan Hanneheim, CEO of the company, has established a core strategy of securing manufacturing technology based on machine tools as part of an effort to accomplish this goal and has been strengthening R&D competence in the field for years.

The first solution is flexible production and the capacity to respond to a wide range of workpiece/material

Manufacturing small batches of a variety of products/mass production of limited kinds of products

Using DVF 5000, Raussendorf machines workpieces of different materials ranging from soft materials such as aluminum and plastic to hard material such as brass, castings, steel, stainless-steel, and Hardox. Robert Lehmann said, “Components used in various industries are as varied as their diverse shapes, and so are the workpiece materials. In this respect, the high level of complex machining capability and versatility provided by Doosan machine tools are obviously advantageous to all. Not only our company but also other customers testify from their own experience that you can machine a myriad of workpieces in small or large quantities with a single machine, and that machine is DVF 5000.”

The second solution is tool position, clamping options, and the speed of the machine.

Efficiency increased by 300% by carrying out tasks based on process focus, benefiting customers

Robert Redman said, “Equipped with a swivel rotary table, the DVF 5-axis vertical machining center can provide huge savings on the machining time and cycle time. Our company makes the most of the large swivel rotary table during machining, and 4 workpieces can be simultaneously machined in a single setup, reducing not only the machining time but also contributing greatly to productivity improvement.” Raussendorf manufacturers brackets for aligner gauges, and once these brackets are machined, they are to be delivered to the renowned manufacturer of laser cutting devices for incorporation.

Redman explained, “The machining performance of Doosan’s machine tools, as evidenced by the precision repeatability of 2/1000mm, exceeds the expectations of customers. DVF 5000, which is now being used by Raussendorf, provides a tool magazine that holds 40 tools along with tool load monitoring software to optimally reduce the cycle time, and the machine is best suited for machining components of complex shapes.”

➤ Simultaneous 5-axis machining center DVF 5000 performing thread cutting



The third solution is the machine ensuring perfect deburring for 4 components

Capable of completing 4-face cutting, thread cutting, and 4-component cutting in just 12 minutes

“No time is wasted—not even a single moment.” According to Robert Redman, the tool change speed of the tool magazine provided by DVF series is faster than any other machines owned by Raussendorf. Marveling at the capacity of supplying in just 15 seconds all the machining tools including the maximum size of 75×300mm weighing 8kg, Redman said, “The machine we used to operate took as much as 12 minutes to clamp and machine one piece. However, Doosan’s machine tool is capable of clamping 4 components at the same time and able to complete machining in just 12 minutes, thereby reducing the cycle time by 300% compared to the conventional model.”

Recently, Raussendorf is planning to expand the machining scope of DVF 5000 to manufacture not only the brackets for the aligner gauge but also indexing pin, cam (prototype) for auto industry and coupling carrier. He added, “With the DVF machine, you can manufacture a variety of components flexibly and very efficiently without any extra machine setup, and for this reason the machine will be used for a wider range of applications than ever.”

➤ DVF 5000



INSIDE

Interviews

Any problems? Check the video tips when operating the machine or troubleshooting!

Meet the man producing the service tips: Kang Ho, Section Chief of the Service Team

With COVID-19 still rampant and not disappearing, many customers are trying to get product information via non-contact means while solving simple problems by themselves. Doosan Machine Tools' service tip videos are gaining popularity as the non-contact service trends continue. Kang Ho, the man producing these service tip videos, said, "Doosan Machine Tools is making an effort to diversify its communication channels with enhanced convenience in mind from the perspective of the customers. We provide service tips videos as part of our efforts to reduce inconvenience and raise convenience and satisfaction on the part of customers."



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머신락 기능 (ON / M17) (OFF / M18)

Service tip videos contain the answers to the questions asked by customers most frequently

Responding with the highest level of service can be the most important corporate value to businesses that offer products or technology. To businesses offering a total solution based on a machine tool like Doosan Machine Tools, servicing is more than simply solving customer problems; it helps boost the brand image. With contact service activities restrained recently due to the COVID-19 pandemic and the management of technology becoming increasingly important, Doosan Machine Tools has made continuous efforts to respond quickly and with high-quality service.

Kang Ho, Section Chief of Doosan Machine Tools' Service Team, has been trying for some time to find ways of providing technical support and service that are easily comprehensible. One day, a certain customer called him to inquire about a training program on the machines. Considering the circumstances restricting the face-to-face meeting due to the COVID-19 pandemic, Doosan and its suppliers decided to use videos instead of visiting the customers. Videos were produced for training on machines and sent to the customers. Kang Ho recalled, "The reaction was good." From that moment on, Kang Ho took an interest in video content and began producing service tip videos.

Not only providing tips, but wishing to contribute to eliminating customer inconveniences

Determined to produce service tip videos, Kang Ho analyzed customer FAQs and VOCs received from the call center, related departments, and customers before producing videos that can deal with customer inconveniences proactively. He said, "In the beginning, service tip videos took the form of a manual. Once the manual was ready for use, I found it unnatural and not very friendly or relaxed, and concluded that it might be hard to establish a rapport with customers".

Therefore, Kang began consulting with the studio to find out ways of inducing customers to check the tip video and enjoy it. He said, "We decided to use field terms rather than formal technical terms with ad-libs independently of specific expression formats in order to deliver the message naturally. We may not look skillful, but we're well acquainted with the corporate news and aware of the inconvenience of the customer. For this reason, we were able to produce videos that appeal to the customer without using a professional TV producer."

Establishing a rapport with customers, not just delivering a message through videos

Kang Ho was quoted as saying, "Participating in the video production as a staff member of Doosan gave me an opportunity to establish a new communication channel with customers." In fact, he has already produced 39 tip videos focusing on simple operation methods, and is now planning to produce additional 85 service tip videos within the year. Kang is planning to expand the video topics to include not only the topics of controller operation and the program tips but also diversified topics such as the machining/replacement of consumables and elementary/intensified courses. As for the applicable models, many other models will be included beginning with base product (GT/DNM) and expanding into HMC series and 5-axis machine series.

When an alarm is triggered during operation, resetting the alarm seems to pose a big problem for the customers. In many cases, customers are unable to determine the cause when the alarm goes off while they are in urgent need of operating the machine. They don't know what to do because they are unable to find the cause, though it is a simple problem. Especially at night when call center service is not available, this simple problem can easily get worse. Kang said, "I hope the service tip video will contribute to the advancement of our responsiveness to the customer and the brand image. Our goal is to help the customer cope with the problem, keeping the machine downtime to a minimum, by determining the cause of the alarm going off and resetting it and by solving the small problems by themselves with the aid of the service tip video."

Meanwhile, Kang expects the service tip videos to be more useful for virtual learning as well. He said, "Presently, subscribers are mostly those customers using Doosan machines or those recognizing the Doosan machines because it began as a service tip video. However, with the service tips providing a variety of information, they can be useful for training purposes in general." As a matter of fact, Doosan Machine Tools has begun providing elementary courses on virtual learning to customers who could not participate in face-to-face due to COVID-19 pandemic, receiving a warm reception. Videos for an intensive course are now being produced in response to customer requests.

"We decided to use field terms rather than formal, technical terms with ad-libs independently in order to deliver the message naturally."

Service Tip Videos

Subscribe to Doosan Machine Tools' Channel and you will be able to enjoy a variety of the latest service tip videos.



Doosan Machine Tools Service Tip List

1. How to open the electric cabinet door without turning off the main power
2. How to replace the battery when the Fanuc battery alarm goes off
3. How to correct the keep relay
4. How to correct Vision 380 parameters
5. How to back up all data
6. How to set up the Fanuc data server
7. How to input/output Fanuc memory card
8. How to reset the motor overload alarm
9. How to reset the chip conveyor alarm
10. How to reset the ATC magazine synchro malfunction alarm
11. Fanuc Controller Program Copy/Paste
12. How to input/output the Fanuc controller USB
13. How to set controller built-in Ethernet
14. How to input/output RS232C data
15. How to reset the regular maintenance alarm
16. How to reset the 2210 Rigid tapping retraction mode alarm
17. How to reset the screw conveyor or oil mistmotor overload alarm

The launch of the e-catalog has enabled the sharing of various information and experiences concerning the products



Quickly responding to the marketing conditions that have developed since the COVID-10 pandemic, Doosan Machine Tools provides customer support service that conforms to the digital age. Last year, Doosan Machine Tools opened a 3D virtual exhibition, the first of its kind in the domestic industry, displaying new models to create a sensation in the market, and the company has recently launched 'e-catalog' for 20 models focusing on 5-axis machines/complex machines/large machines

This "e-catalog" provides images and website links and 3D virtual exhibitions rather than descriptions containing images and text, enabling users to share various information and experiences concerning the products so that time and space limits can be kept to a minimum while focusing on convenience on the part of the customer. In particular, a 360-degree VR Product View has been added to allow the users to view various aspects of the product using the digitalized technology in order to create an effect that makes the viewer feel as if they're seeing the actual product. Doosan Machine

Tools launched an e-catalog for 20 models first and then gradually extended the number of models to be included in the catalog.

As a market leader pursuing new digital marketing, Doosan Machine Tools promotes development of digital catalog/manuals, digital consulting, remote test cuts, non-contact witness testing, digital AS/training, and more, taking the lead in digital marketing.

In particular, while carrying out on/offline marketing activities to increase contact with customers, Doosan Machine Tools actively promotes digital marketing so that customers can easily experience Doosan machines.

You can find the new e-catalog on the product website.

 **See the DVF 5000 e-catalog**

<https://77250738.flowpaper.com/KORDVF5000/#page=1>



 **See a video introducing the e-catalog**

https://youtu.be/WC_XO19eMxM



INTERMOLD KOREA 2021 REVIEW

INTERMOLD 2021 Online Exhibition for Molds, 5-Axis Machines, and Automation Solution Themes



Communication and the rapport just like you had when participating in INTERMOLD KOREA 2021 Online Exhibition or from the offline exhibition booth for MACHINE GREATNESS 2021 Virtual Exhibition

During INTERMOLD KOREA 2021, (the 25th international mold and related devices online exhibition) which was held for 7 days from March 16 to March 22, Doosan Machine Tools introduced 8 units of machines including 2021 new models and the mold machining tools lineup in line with the themes of 'mold', '5 axes' and 'automation, and held a webinar concerning the sharing of machining solutions for each theme. In addition, it linked INTERMOLD KOREA 2021 with Doosan's homepage to encourage the entry of the visitors and carried out product marketing for the exhibited models for customers at home and abroad. In particular, using 360-degree VR technology, Doosan Machine Tools allowed visitors to view the machines exhibited at its INTERMOLD Virtual Exhibition website from various angles in order to overcome the limits of an online exhibition. As a result, visitors were able to click on a machine to easily get the information concerning various machines and machining solutions in the same way they would get information from an offline exhibition.

CIMT 2021 REVIEW

CMT 2021 to introduce machine greatness concepts and 5-axis/complex/automation solution



Doosan Machine Tools to participate in Beijing CIMT 2021 (17th China International Machine Tool Show)

Offering a 5-axis/complex/robot automation solution and exhibiting 6 models in total

During CIMT 2021, which was held in Beijing for 6 days from April 12 to April 17, Doosan Machine Tools presented global top-level machining solutions using the high-end 5-axis, complex, mold and automation themes under their slogan of "machine greatness." During the exhibition, a total of 6 models were displayed, including the Chinese market-specific robot automation solution and new models made in China. In particular, auto industry-specific machining items such as the 2-axis horizontal machining center Lynx 2105LY new model manufactured in Yentai, China and easy-to-operate Doosan Machine Tools' Cobot automation solution, which can be conveniently installed through DNM 5705 + PUMA V8305, were displayed in the exhibition. In line with the exhibition themes, smart machines and flexible, highly productive 5-axis/complex/robot automation solutions were also introduced to the satisfaction of visitors.

Upcoming Event

Participating in EMO MILANO 2021

Doosan Machine Tools to participate in EMO MILANO 2021

Both an offline exhibition and a virtual exhibition will be held simultaneously, displaying a total of 10 models



Doosan Machine Tools will participate in EMO MILANO 2021, which is to be held from October 4 until October 9 at Fieramilano-Rho in Italy. In this exhibition, Doosan Machine Tools will introduce a total of 10 new models, aiming to create brand awareness in the European market. Also, a virtual exhibition will be held during the exhibition period to seek communication with the customers all over the world who will not be able to visit the exhibition. We encourage you to participate in the virtual exhibition through Doosan Machine Tools' website.

Place: Fiera Milano, Milano, Italy **Booth No.:** Hall 5, E10

Exhibition opening hours: Mon - Fri 9 a.m. ~ 6 p.m. /Saturday 9 a.m. ~ 4 p.m.



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