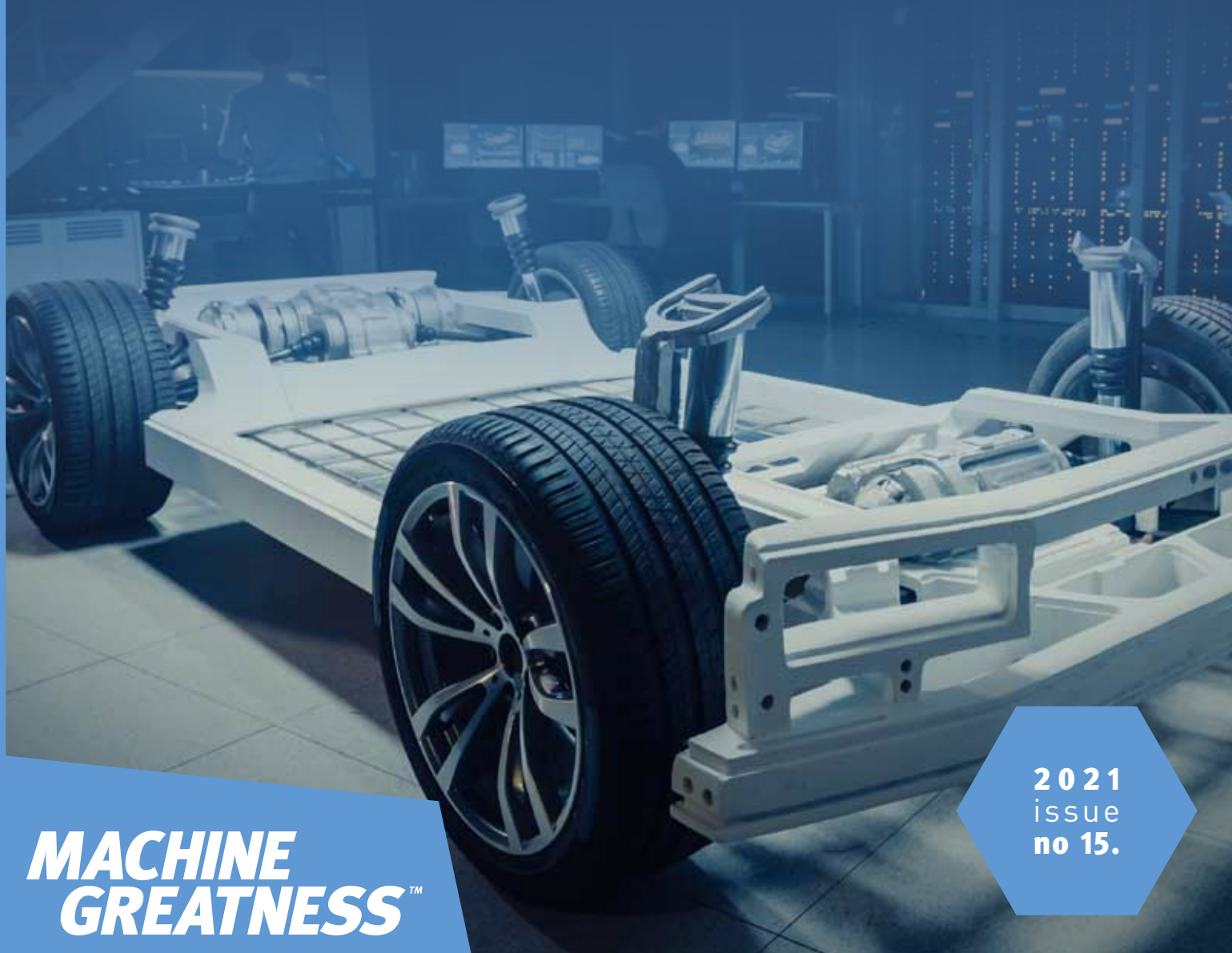




NEWSLETTER FOR DOOSAN MACHINE TOOLS VIP CUSTOMERS

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 to machine and supply large, and lightweight, complex parts

The key lies in acquiring multi-axis machines and using the advanced technologies available machine aluminum parts.

CASE (Connectivity, Automation, Sharing and Electrification) and digital transformation trends have already brought about great change, not only to the automobile sector, but also in the automobile components industry. Changes include the increase in demand for parts made from new materials and with different geometries and shapes, as well as a growing need for lightweight and highly-rigid components and parts. With internal combustion engine vehicles still occupying 80% of the total vehicle market, but with demand for environmentally-friendly vehicles growing exponentially, the automotive components industry is in transition and in a period of flux. Machine tools are expected to play an important part in securing sustainable competitiveness for the automotive parts machining industry. But in what ways?



Challenges in the industry

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

The demand for new electric vehicle components, and the machining of them, is on the rise.

Switching from vehicles with internal combustion engines to environmentally-friendly electric or hydrogen-fuelled vehicles is likely to cause the disappearance of more than 60% of the parts used in internal combustion engines (approx. 10,000). Whereas, the number of new automotive components created by switching to electric vehicles, i.e., mostly parts relating to motors, batteries 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 automotive components of conventional internal combustion engine vehicles also play a part. For electric vehicles, parts for engines are no longer required, and the need for gear and transmission-type components are reduced. A total of 15 components previously installed on the power train such as the cylinder block, cylinder head, bedplate, transmission housing, shaft, gear, turbocharger and oil pump have been replaced by a housing and cover encasing the motor, and an 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 automotive components involved.” Kang added, “Those in the machine manufacturing or machining industry should keep an eye on the trickle-down effect within the entire electric car industry as demand for electric vehicle component machining, as well as demand for machines to produce new components or machine new materials, are increasing in demand.”

Solutions for consumers

Successfully tackling the problems of machining components with complex shapes as well as machining parts from lightweight materials; capable of satisfying the needs for machining long and large electric vehicle components with 5-axis or multi-tasking machines

In addition to the increased demand for machines, switching to electric vehicles is also giving rise to a change in the automotive component machining process and includes the emergence of new components, components with complex shapes made from lightweight materials. When viewed in terms of the number of reduced components required, top of the list is steel components which will reduce by about 75%, followed by aluminum and cast-iron components which are expected to reduce by about 27% and 14% respectively. Particularly noteworthy is the lightweighting phenomenon that sees steel or cast iron quickly being replaced by aluminum or aluminum alloys.

Huh Young-rok, Doosan Machine Tools’ Manager of Application Engineering Team, added, “Those component manufacturers with 5-axis or multi-tasking machines can be competitive as the growing market for electric vehicles is dependent on the efficient and productive machining of high quality large and long battery and motor components used in vehicle bodies and chassis’.

Future market outlook

Countries with major global electric vehicle manufacturers are expected to expand their electric vehicle production. These countries have announced plans to stop or limit internal combustion engine vehicle production, replacing it with the electric vehicle production.

Electric vehicles are expected to be in demand for years to come due to carbon emission regulations and controls, and the trend across all countries for environmentally friendly vehicles. In fact, with Europe taking the lead, countries around the world have announced plans to stop the production of internal combustion engine vehicles in favour of electric vehicles - replacing the former over the period 2025 to 2040. In Norway, steps will be taken to stop internal combustion engine vehicle production by 2025. In Germany and Japan, by 2030 and in the 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 and sell them on the global market.

“Electrification trends are likely to cause change across all means of transport using the internal combustion engine.

Therefore, it may be wise for us to broaden our horizons by paying attention to other industries, customers, and regions and avoiding limiting our focus to just electric vehicles.”



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

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Achieved a ‘superb’ level of automation

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Capable of providing complex shape machining as well as universal machining

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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 focused on improving the competitiveness of the electric vehicle components industry

Improving their machine line-up by upgrading the performance of existing models and by designing and developing new, 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. Only ten years ago the electric car was shunned by most people because of its perceived 'poor mileage', a lack of charging infrastructure, and the lengthy charging times involved. However, the electric vehicle market has begun to grow rapidly in recent times thanks to environmental consciousness, environmentally friendly vehicles, an improvement across relevant technologies and infrastructure, and an extended product lineup. Under these circumstances, demand from the electric vehicle component industry is also growing fast.

Newly created demand for machining electric vehicle components and production equipment

When considering the number of components required when switching from internal combustion engine vehicles to electric vehicles, it is clear that fewer components are needed. However, completely new sets, families and series of parts ARE required. Unlike internal combustion engine vehicles, electric vehicles do not use an engine or transmission system. This eliminates the need for metal cutting, which was essentially the production of these parts. Instead, there are new demands for the manufacture of electric vehicle motor housing and core parts, as well as for battery housings and cases. As a consequence, new opportunities are emerging for the machine tool industry as the manufacturers require new machines to produce the components and accurately machine the materials used in new electric vehicles.

A key factor for Doosan Machine Tools is acquiring and developing machine-tool-based engineering technology so that quick delivery, productivity improvement, and satisfying customer requirements can be achieved. Most global machine tool manufacturers provide a full line-up of products because they need to respond quickly and effectively to the different size, shape and precision requirements of various industries. Machine tool manufacturers' engineering technologies can play a key role in delivering the accuracies required and ensuring that customers' needs are met.

Doosan's First Solution

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

Being already well positioned in the automobile, mold tool and aviation parts markets, Doosan Machine Tools has carried out a two-pronged core strategy to simultaneously strengthen the usability and appeal of its existing models and develop speciality machines suitable to meet the growing demand for the machining of electric vehicle components. Existing machines, including the VCF

series of multi-tasking machines (3-to 5-axis models), are being used to machine small-sized parts and motor-related components. At the same time, core equipment and machining solutions that enable the machining of new materials such as aluminum and aluminum alloy are being designed and developed to machine the different materials used for electric vehicle components.

Doosan's Second Solution

Expanding the machine line-up optimized for light-duty cutting

Materials enabling lightweighting such as aluminum, aluminum alloy, CFRP and magnesium are increasingly in high 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 a workpiece, for example, it now takes only 10 seconds to do the same thing because it is sheets of aluminum or aluminum alloy that are now being machined. Because of this change, machines suitable for the electric vehicle component market are those that get down to business fast and deliver fast acceleration/deceleration rates. The machines should have a large capacity and yet, at the same time, be lightweight and inexpensive.

Focusing on such trends, Doosan Machine Tools launched the T 4000HS tapping center and the 'swift' SVM 41000 vertical machining center designed exclusively for machining aluminum workpieces; a horizontal machining center with 400mm sized pallet capacity is scheduled to be launched later in 2021, and a 5-axis machine for machining large-volumes or long electric vehicle components such as battery housings and main body chassis, will also be introduced.

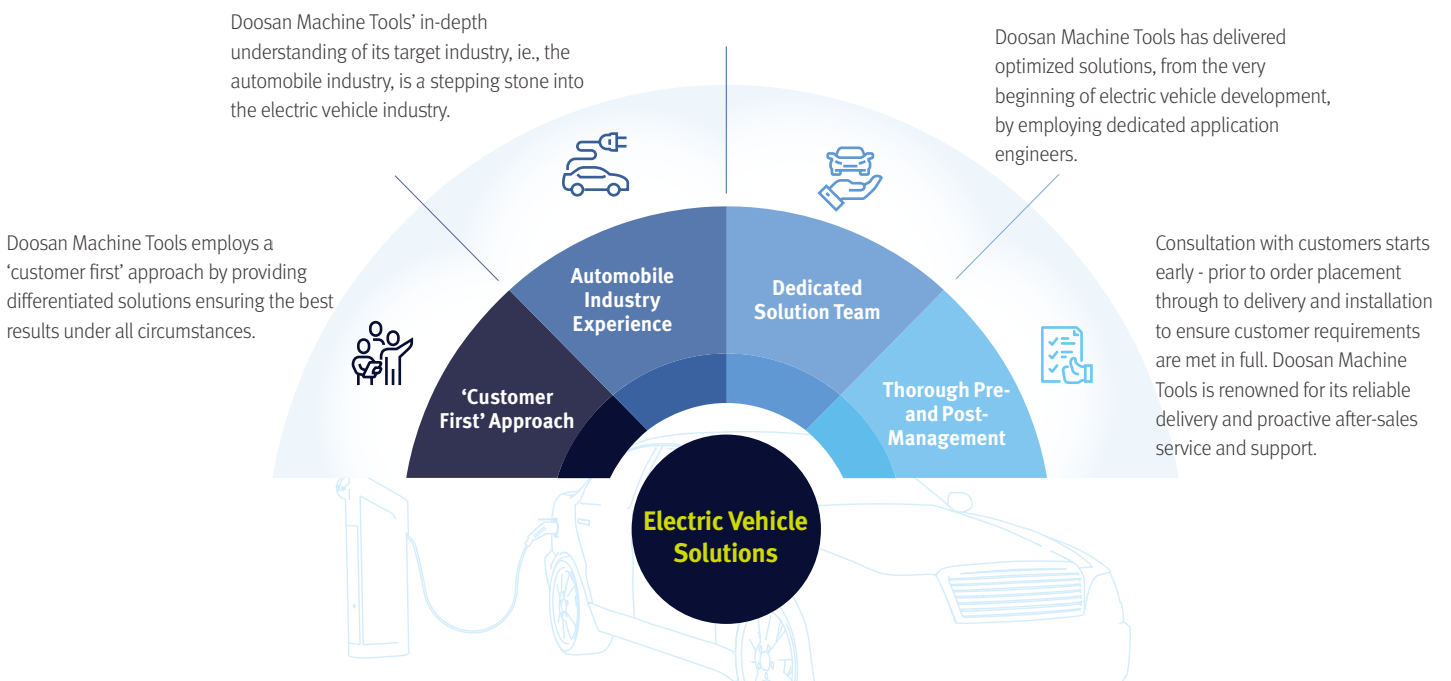
Once the machine line-up for machining electric vehicle components is completed, Doosan Machine Tools will be able to quickly respond to needs ranging from the machining of small and compact precision

components, through to processing polygonal and/or large components.

Deputy Manager Kang Hyun-jung, Marketing Team of Doosan Machine Tools, commented, "When engine manufacturing technology was the core technology for the automobile industry, Korean machine tool manufacturers found it hard to secure significant market share. However, if/when the engine market is replaced by a new and emerging electric market, it will present a good opportunity for domestic machine tool manufacturers to gain substantial market share." Kang added, "Electrification trends are likely to cause change with almost all means of transport that previously was reliant on internal combustion engines. Therefore, it may be wise for us to broaden our horizons by paying attention to these various industries, customers and regions whilst, at the same time, not just limiting our attention to the electric vehicle market."



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

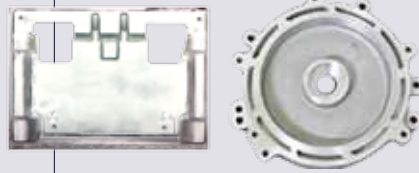
New

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.

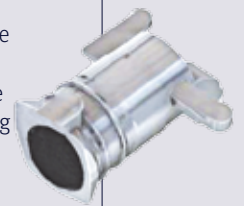
- T 4000HS: Full 24000 r/min, optimized for long-time continuous machining
- T 4000HP: Optimal acceleration, reduced non-cutting time



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.

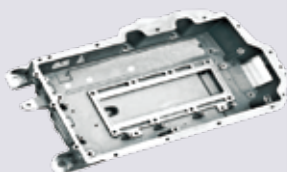
- Providing spindle cooling and sensor-type thermal displacement compensation ensures high precision performance
- Applying X/Y/Z linear scale as standard



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.

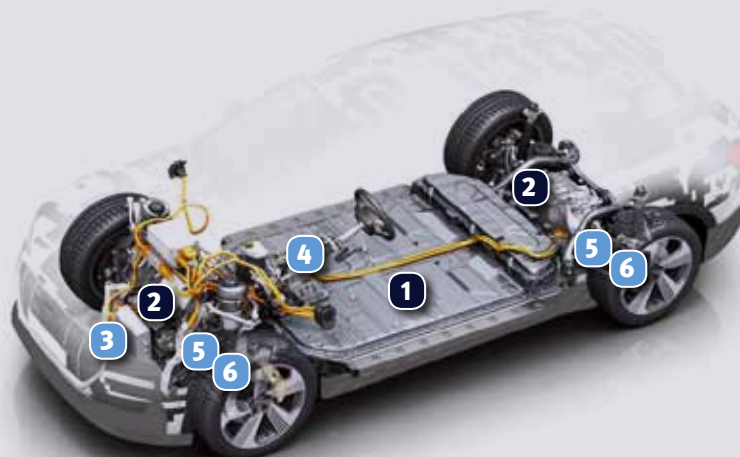
- Max. spindle speed: 12000 r/min
- Rapid feed rate: 36 m/min
- Tool change time: 1.2 seconds



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

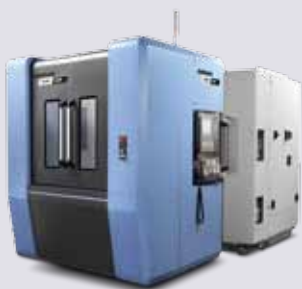
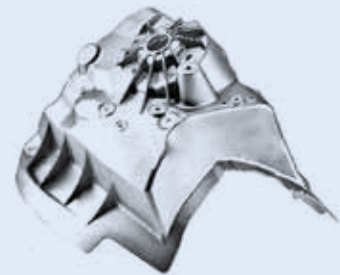
Doosan Machine Tools' powerful and versatile electric vehicle component solution lineup provides customers with various solutions, equipping them with the renewed capability to produce components new to them.

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

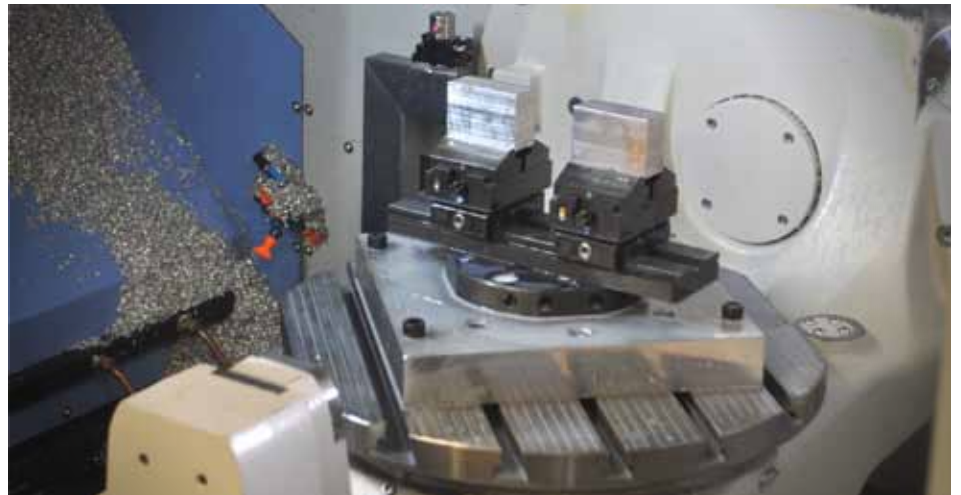
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Cambridge Precision Ltd ("CPL"), a precision engineering specialist, recently created a manufacturing environment enabling 24-hour continuous machining of aluminum enclosures using the vertical machining center linked to the Cobot. Doosan Machine Tools 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



➤ The compact and rigidly-designed and built DVF 5000 delivers unsurpassed productivity.

The Challenge for CPL

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

Last February, three Doosan machining centers—the simultaneous 5-axis vertical machining center DVF 5000, the vertical machining center DNM 6700, and a DNM 4500—were installed in CPL's manufacturing facility (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 machining the aluminum enclosures. We then decided to purchase a vertical machining center integrated with a Cobot in a package deal to achieve 24-hour continuous production."

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 and productivity of the DVF 5000, which has a compact and rigid structure." 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 because of its size, rigidity and ability to machine high-rigidity, high-precision larger component to high accuracies. When purchasing the machines, we had to think about how we would automate production to achieve 24/7 operation. That's how and why we chose the Doosan Cobot H2017."

The Solution Is

The DVF 5000, DNM 6700 integrated with Doosan Cobot H2017, and DNM 4500 help reduce cycle times, enhance production efficiencies, and achieve high productivity.

CPL decided to install the DVF 5000 in the unit enclosure machining line to reduce cycle times (to approximately two hours) and increase productivity. A Nikken rotary tilting table (5 axes) was also added.

Though capable of machining workpieces or components weighing as much as 20kg, CPL purchased Doosan Robotics' Cobot H2017, which provides a reach radius of 1.7 m and precision repeatability, and integrate it with the DNM 6700 for high productivity workpiece load/unload operations. Nick Raven said, "Workpieces to be machined (24 workpieces at a time) are placed on the table, and the machining time ranges from five to 60 minutes."

Andrew Barnard, CPL's process supervisor, commented, "In addition to this latest investment we actually invested in our first Cobot back in July 2019 - since then we have become firm cobot advocates. We now have two Cobots at our disposal and this improves efficiencies and allows team members to focus on other manufacturing or assembling tasks." CPL included in the investment a 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 finishing operations.

The plan - to keep investing and moving forwards.

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 at its height. Large orders were canceled, threatening the existence of the company. However, we participated in the Ventilator Challenge, which enabled us to move into medical device manufacturing. It was a good proving ground and we knew that once things settled down we would invest in new technology to take advantage of any upturn. It was only last fall that we began receiving an increasing number of orders. Ever since September 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, our technical excellence and our robust in-house systems and processes, we were able to take advantage of the situation. 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

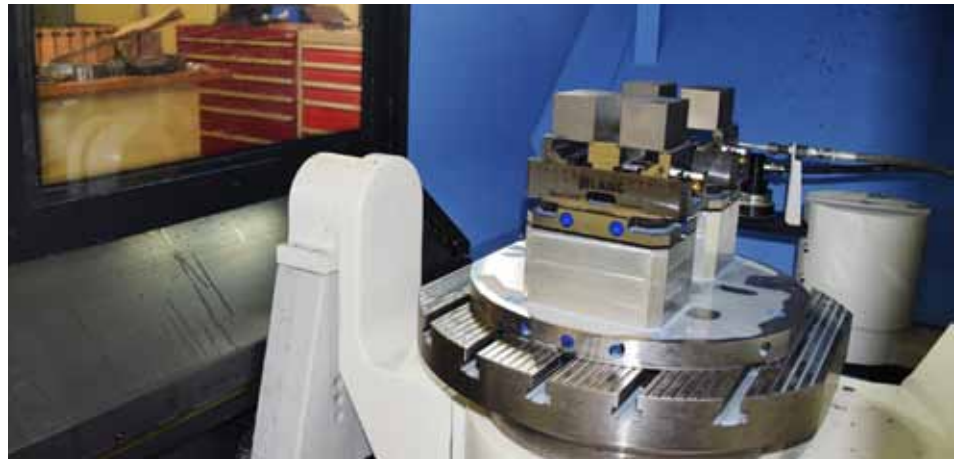


Raussendorf GmbH

“Doosan machine tools are capable of clamping four components at the same time and are able to complete machining operations in just 12 minutes (a 300% reduction in cycle time) compared to conventional machines.”



➤ Raussendorf's indexing pin machined by DVF 5000



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

The Challenge for Raussendorf

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

With more than 150 years' history, Raussendorf Maschinen-und Geratebau GmbH (“Raussendorf”) provides contract manufacturing services for a range of industries and sectors (i.e. plant engineering, agricultural machinery etc.), and is renowned for its excellent quality and technology. Focused on satisfying the needs of customers as a top priority, this company is broaden the scope of its manufacturing operations to deliver a more comprehensive service and machine a wider and more diverse range of parts in order to grow the 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 competency in recent years.

The first solution is flexible production and the capacity to machine a wide range of workpieces/materials

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

Using a DVF 5000, Raussendorf machines workpieces of different materials ranging from soft materials such as aluminum and plastic to hard materials like brass, castings, steel, stainless-steel, and Hardox. Robert Lehmann said, “Components used in various industries are as varied as their shapes, and so are the workpiece materials used. In this respect, the high level of complex machining capability and versatility provided by Doosan machine tools are obviously advantageous to us. Not only us 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 the DVF 5000.”

The second solution is tool positioning, different 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 rotary tilting table, the DVF 5-axis vertical machining center can deliver huge savings on machining times and part cycle time. Our company makes the most of the large rotary tilting table during machining, and 4 workpieces can be clamped and then simultaneously machined in a single setup, reducing not only the machining time but also contributing greatly to increased productivity.” Raussendorf manufacturers brackets for aligner gauges, and once these brackets are machined, they are delivered to a 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, has a tool magazine that holds 40 tools along with tool load monitoring software to help reduce cycle times and improve process reliability. The machine is best suited for machining complex components and component features.”

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



The third solution is the perfect deburring of four components

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

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

Raussendorf is planning to expand the machining scope of DVF 5000 to manufacture not only the brackets for the aligner gauge but also the indexing pin, cams (prototype) for auto industry and a coupling carrier. He added, “With the DVF machine, you can manufacture a variety of components flexibly and very efficiently without any additional set ups, 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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니플에 질식유가 나오고 다시 니플을 잠그면 에어 제거 작업은 마무리가 됩니다.



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

Responding with the highest level of service can be the most important corporate value for businesses that offer products or technology. For businesses offering a total solution based on advanced machine tools like Doosan Machine Tools, servicing is more than simply solving customer problems; it is also fundamental and 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 to customer needs.

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 accessible and relevant. One day, a customer called him to enquire about a training program on the machines. Considering the circumstances restricting face-to-face meeting due to the COVID-19, Doosan and its suppliers decided to use video technology instead of visiting the customer. 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 inconvenience

Determined to produce service tip videos, Kang Ho analyzed customer FAQs and VOCs received from the call center, related departments, and customers themselves before creating any content. 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, ad libs and colloquial language where feasible, rather than formal technical terms. We wanted it to be natural, relaxed and engaging - professional but without using a TV producer.

Establishing a rapport with customers, not just delivering a message through our video content

Kang Ho was quoted as saying, "Participating in the video production as a Doosan member of staff 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 an additional 85 service tip videos within the year. Kang is planning to expand the video topics to cover not only CNC control operation and programming tips but also diversified topics such as the machining best practice tips, replacement of consumables and elementary/intensified courses. As for the machines themselves, many other models will be included beginning with entry products (i.e.,GT/DNM) and expanding into HMC and 5-axis machine series.

When an alarm is triggered during operation, resetting the alarm seems to pose a big problem for many customers. In many cases, customers are unable to determine what triggered the alarm and this is frustrating because they need to use the machine. They don't know what to do because they are unable to find the cause, even though it can often be a simple problem. These issues are more frustrating at night when the call center is closed. Kang said, "I hope the service tip video will show that we are being responsive and doing our best for customers. Our goal, with the video, is to help the customer address and trouble shoot the problem, keep machine downtime to a minimum, determine the cause of the alarm, fixing any issues quickly and reset the alarm."

Meanwhile, Kang expects the service tip videos to be more useful for virtual learning. He said, "Subscribers are mostly those customers using Doosan machines. 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 sessions due to COVID-19 pandemic. Videos for intensive courses are now being produced in response to customer requests.

"We decided to use field terms rather than formal, technical terms 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 the 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 mist motor 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 Yantai, 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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