

# Insight

Latest news and developments from Mills CNC, the exclusive distributor of Doosan CNC Machine Tools in the UK and Ireland.

Edition No. 11

Special 10 page feature on

## **Collaborative Robots**

### **Doosan machines in action:**

Aerospace, Oil and Gas, Automotive  
& Advanced Tooling case studies



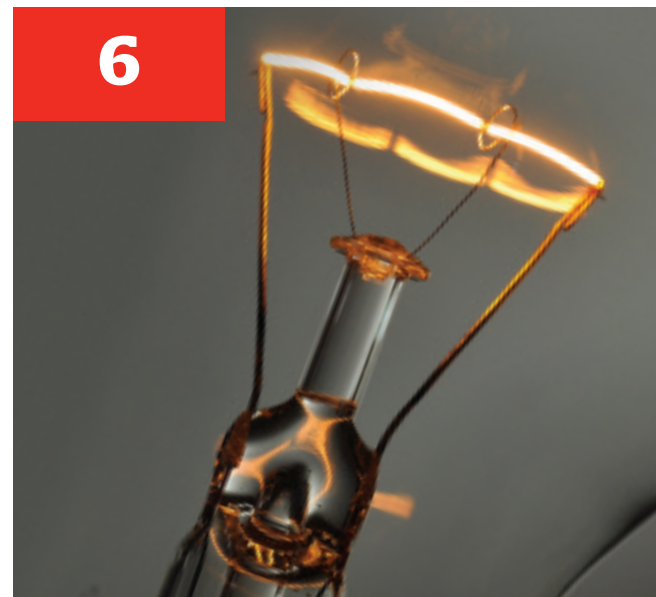
## **Automation - Mills style**

Introducing Mills CNC Automation



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# Automation -

# Mills style.

"Welcome to this Spring edition of Insight, our twice-yearly published customer magazine.

"Since the last edition hit the streets back in July 2018, there have been some significant developments here at Mills CNC.

"But, before we get into that, I wanted to do a quick review on our performance last year which was one of the best in the company's history and saw us take orders for 440 new Doosan machines during 2018, and deliver 431 new machines in the same period.

"This was a tremendous result. And a big 'Thank You' goes out to all of our customers for their continued support.

## New Doosan machines

"We're now well into 2019 and, as always, there's lots of information to share with you about new Doosan machines that have been (or are about to be) introduced into the market.

"Last year we launched the Doosan DVF 5000, Doosan Machine Tools' latest simultaneous 5-axis machine, at MACH.

"The machine has proved extremely popular with precision component manufacturers, especially those operating in the aerospace and medical device supply chains. The appeal of the DVF 5000 will, I am confident, be increased with the option to increase its productivity still further via the integration of a high-performance automatic work-piece pallet changer (8 pallets).

"Other new Doosan machine tool technology updates concern new machines we will be launching into the market over the next few weeks and months.

collaborative robot systems and solutions. (For those of you not yet up-to-speed, in January 2019, Mills CNC Automation became the agent for Doosan Robotics and, as such, is now supplying its range of advanced, high-performance collaborative robots to UK and Irish manufacturers).

"You can find out more about the range of Cobots now available from Mills CNC Automation in a special 10-page feature in this edition of Insight.

"For more in-depth information you can also visit our website - [www.millscnc.co.uk](http://www.millscnc.co.uk) - and click on 'Automation' in the menu bar to access, amongst other things, product specifications and videos of our cobots in action.

"Automation is the buzz word in manufacturing. And, whether its industrial or collaborative robot systems you're looking for - Mills CNC Automation has the solution.

**"...our performance last year was one of the best in the company's history and saw us take orders for 440 new Doosan machines during 2018, and deliver 431 new machines in the same period."**

**Kevin Gilbert, Mills CNC.**

## Doosan machines in action

"In addition to profiling these new Automation developments, this edition of Insight also features a number of recent customer case studies.

"Articles on Doosan machine installations for customers operating in the aerospace, automotive, oil and gas and specialist tooling sectors are included and are supported with short profiles on the Doosan machine tools acquired by these customers.

"The case studies demonstrate the productivity and performance gains customers are experiencing from their investments in our machines.

"I hope you enjoy this latest edition of Insight. Clearly the magazine is only able to provide a snapshot of the latest news and developments from Mills.

"To make sure you don't miss out on everything that's happening at Mills, in real time, remember to visit our website and to check-out our social media channels."

**Kevin Gilbert,**

**Managing Director, Mills CNC.**

"These include two new TT (Twin-spindle/Twin-turret) models - the TT 1300SYY and the TT 2100SYY and the new large-capacity DNM 6700XL - a versatile vertical machining centre with an impressive 2.1metre X-axis. You will find more information on the new machines in this edition of Insight.

## More groundbreaking news

"At the tail end of last year we created a new division within the company called Mills CNC Automation.

"The Division provides the focus for our automation business and is responsible for driving sales of our industrial and





# Exhibitions and Open Houses



## Dates for your diary.

Mills CNC and Mills CNC Automation are attending numerous regional and sector-specific exhibitions and events during 2019.

Mills CNC is also holding an Open House at its Technology Campus facility in Leamington in October where it will showcase its latest advanced Doosan machine tools to attendees.

The event also provides the ideal venue for Mills CNC Automation to exhibit its high-productivity Industrial Robot Solutions and its high-performance Collaborative Robot range from Doosan Robotics.

To find out where we are exhibiting - check-out the information below and visit our website [www.millscnc.co.uk](http://www.millscnc.co.uk) for more details.

### EVENTS AND EXHIBITIONS:

**June 2019: Mills CNC Automation at Automechanika (Collaborative Robots):** 4th - 6th June 2019, NEC, Birmingham

**September 2019: Mills CNC at SPE Off-shore Europe:** 3rd - 6th September 2019, Aberdeen

**October 2019: Mills CNC Automation at Robotics and Automation:** 29th & 30th October 2019, Ricoh Arena, Coventry

### OPEN HOUSE:

**October 2019: Mills CNC and Mills CNC Automation at Mills CNC's Open House:** 9th & 10th October 2019, Technology Campus, Leamington

# Innovation.

Update on the latest innovative machine tools and ancillary equipment from Doosan.

Every year Doosan launches a number of new high-performance machine tools and productivity-enhancing ancillary equipment into the market.

This year is no exception.

From the introduction of a new automatic workpiece pallet changer for the Doosan DVF 5000 simultaneous 5-axis machine through to the launch of the new large-capacity DNM 6700XL vertical machining centre, and the arrival of two new Twin-turret, Twin-spindle multi-tasking turning centres - Doosan is raising the bar for productivity, machining flexibility, precision and process reliability with yet more innovative technology solutions.

The new machine tools and the automatic workpiece pallet changer are all available from Mills CNC.

For more information turn overleaf and/or visit our website [www.millscnc.co.uk](http://www.millscnc.co.uk)



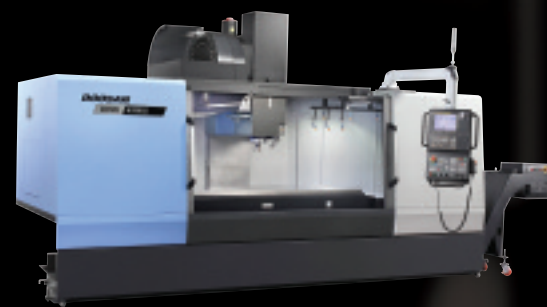
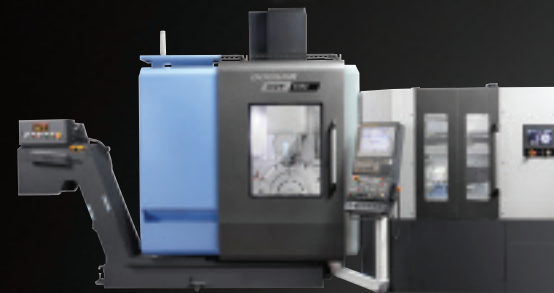


# Doosan machine tool technologies - always the bright choice!

## **DVF 5000 now available with an integrated Automatic Workpiece Changer (AWC).**

To increase the productivity and performance of the Doosan DVF 5000 simultaneous 5-axis machining centre, customers can now acquire the machine with an integrated Automatic Workpiece Changer as an option - making it ideal for unattended machining.

The AWC's capacity can be configured to suit an individual customer's requirements in terms of the number of pallets available (i.e. 4, 6, 8, 10, 12, 24), and the size of each pallet (i.e. 150mm x 150mm to 500mm x 500mm). The AWC is supplied with SCHUNK clamping systems (NSE) and gripping systems (NSR).



## **New large-capacity DNM 6700XL equipped with a 2.1 metre X-axis.**

The DNM 6700XL is the latest addition to Doosan's highly-popular DNM range of 3-axis vertical machining centres.

The machine has a 2,100mm X-axis that makes it ideal for machining longer and larger components. As with other DNM models - the DNM 6700XL features a

direct-coupled spindle (18.5kW/15,000rpm) that reduces noise and vibration, a fast servo-driven ATC, a sophisticated thermal compensation system that ensures high precision and process reliability, and roller LM guideways for rigidity and accuracy.

## **New twin-spindle twin-turret multi-tasking turning centres with Y-axis capability on their upper and lower turrets.**

The new Puma TT 1300SYY (42/51mm bar diameter) and the new Puma TT 2100SYY (65/81mm bar diameter) twin-spindle, twin-turret turning centres have Y-axis capabilities on both their upper and lower turrets.

This dual Y-axis facility makes the machines more versatile and productive:

- The twin turrets allow simultaneous OD and ID cutting on a part in the main spindle.

- Simultaneous milling and turning of components in the machine's main and sub-spindle enables multiple finished parts to be completed in one cycle.
- Operations can be combined by machining one side of a part in the main spindle and finishing it in the sub-spindle.





# Latest machine tool investments match ambitions.

Leading aerospace precision subcontract specialist invests in new high-performance Doosan CNC machine tools.

We have recently supplied leading, Coventry-based aerospace precision subcontract specialist - Arrowsmith Engineering Ltd., with five new Doosan machines.

The machines - four Lynx 2100 series lathes and a DNM 4500 vertical machining centre - were installed at Arrowsmith's 20,000 square foot facility in the latter half of 2018, between August and December, and are being used to machine a range of complex, high-precision parts for the aerospace sector - specifically aero-engine and aircraft braking system components.

These components, made from a variety of materials that include titanium, nimonic, nickel-based alloys, magnesium etc., are machined to exacting accuracies and surface finishes.

## Going for growth

The significant machine tool investment was made following the completion of an extensive internal and external research programme, undertaken by Arrowsmith in partnership with a NCML (National

Manufacturing Competitiveness Levels) Assessor, and separately with Cambridge Judge Business School, to review current performance and help direct future business growth.

Arrowsmith Engineering was established in 1967 and is a major player in the aerospace supply chain providing best-in-class CNC turning, milling and grinding machining services to its customers.

The company is successful and ambitious, and experienced impressive 46% growth last year which included a dramatic growth in export sales. Arrowsmith regularly invests in advanced, state-of-the-art machine tools and ancillary technologies.

Explains Jason Aldridge, Managing Director at Arrowsmith Engineering:

"If you're not investing in the future - you are moving backwards.

"We are part of the global aerospace supply chain and, as such, are competing every day with the very best manufacturing companies in the world. Everything we do is built around supplying our customers with high-quality machined parts...delivered on

## Doosan DNM 4500 vertical machining centre.



**"Having seen the machines and talked to Mills' sales and applications engineers about our requirements we decided to place the five machine tool order."**

Jason Aldridge,  
Arrowsmith Engineering Ltd.

time and in budget.

"We assess and review our performance continually. If and where improvements can be made - we make them."

This commitment to continuous improvement has seen the company make significant improvements and modifications to its facility, and achieve a range of certifications and accreditations i.e. AS 9001 rev D: 2015; ISO 14001; SC 21 (Silver 3) and NADCAP, as well as numerous OEM and Tier 1 approvals from major aerospace manufacturers.

## NCML Assessment

As part of its improvement programme Arrowsmith, in 2018, was selected to pilot the NCML programme and worked with a NCML assessor.

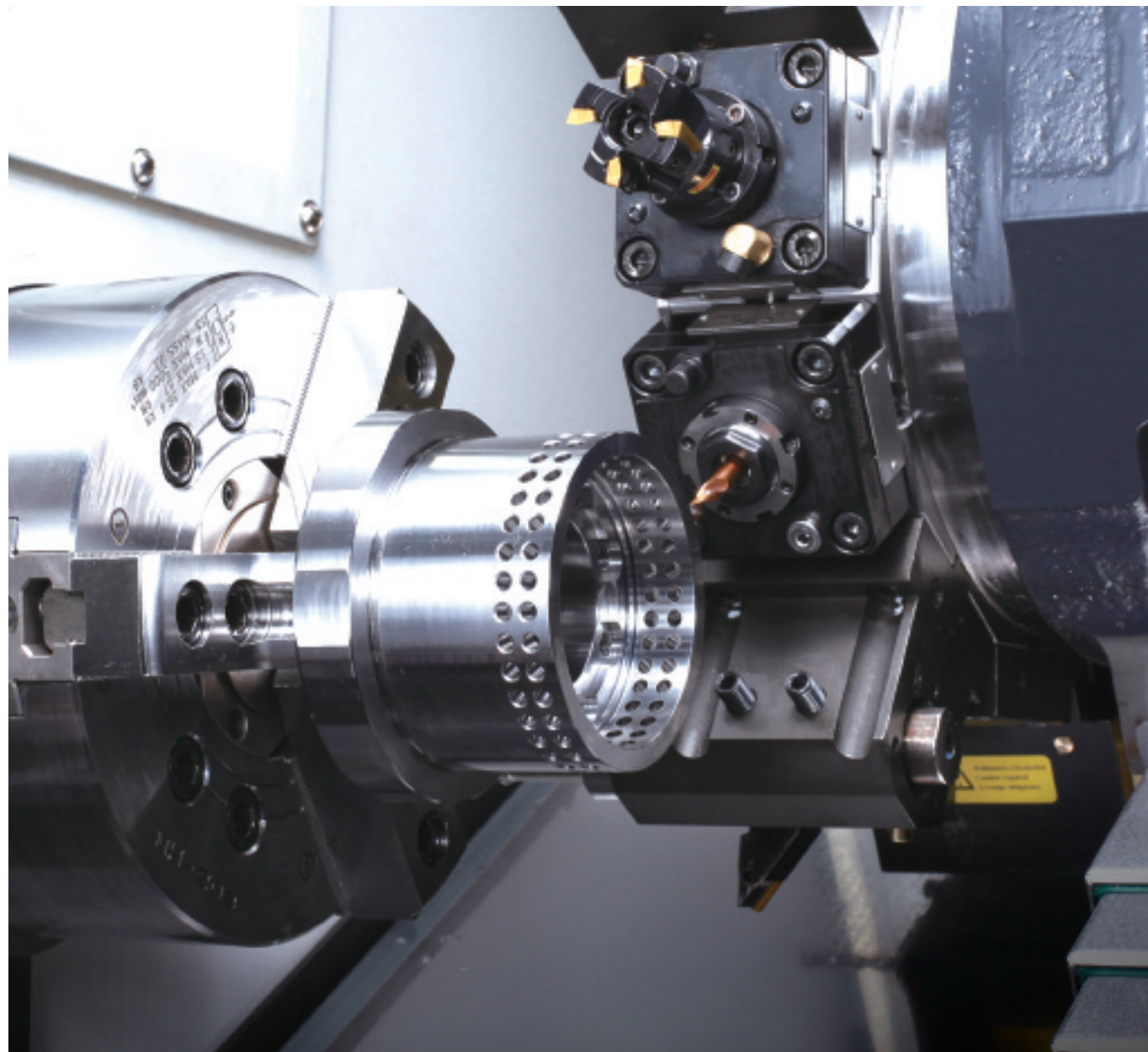
Says Jason Aldridge:

"We worked with NCML to help improve our competitiveness and customer satisfaction levels.

"Part of the process involved the NCML Assessor talking directly with our customers."

At the time the company was primarily involved in developing secure processes for machining standard





**“Doosan machine tools have a reputation in the market for their high-performance, reliability and affordability - and Mills CNC is respected and well regarded for its proactive and well-resourced after-sales service and support operations.”**

Jason Aldridge, Arrowsmith Engineering Ltd.

aero-engine parts (M: Issue), but wanted to secure production contracts (F: Issue) to machine production parts.

Continues Jason Aldridge:

“The NCML process was invaluable and identified a number of areas where improvements could be made.”

An important area highlighted concerned the machine tool technologies used by the company - some of which were considered ‘not to be leading edge’.

Says Jason Aldridge:

“These discussions with customers

highlighted the type of machine tool technologies (including their manufacturer) that were favoured and endorsed. Doosan machine tools were mentioned (positively) a number of times.”

Armed with this knowledge, engineers from Arrowsmith began researching the machine tool market and, as part of the process, attended the MACH 2018 event in April where they visited Mills CNC’s stand and saw Lynx 2100 series lathes and the DNM 4500 vertical in action.

Comments Jason Aldridge:

“Doosan machine tools have a reputation in the market for their high-performance, reliability and affordability - and Mills CNC is respected and well regarded for its proactive and well-resourced after-sales service and support operations.

“Having seen the machines and talked to Mills’ sales and applications engineers about our requirements we decided to place the five machine tool order.

“We are now better prepared and resourced to handle much more production as well as development work from our existing (and new) aerospace customers.”

#### The Future

In addition to continuing its investment in advanced machine tool technologies Arrowsmith, as a route to further improve its productivity and operational efficiencies, is investigating how and where automation can be incorporated and integrated into its production processes.

The company, following discussions with Mills CNC Automation, has just placed an order for its first Doosan Robotics’ collaborative robot (cobot). The automation system, destined for the company’s milling production area, will be delivered and installed in April 2019.

#### Doosan Machine Tools



#### ADVANCED TECHNOLOGIES

## Doosan Lynx 2100 series lathes

Lynx 2100 series lathes are productive, flexible and reliable - and are the number one choice for component manufacturers looking for a compact, fast and high-accuracy turning technology solution.

The range comprises 11 different models including machines with long beds, sub-spindles, C-axes and driven tools.

- Chuck size: 6”/8”/10”
- Bar capacity: 51mm/65mm/81mm
- Maximum swing and turning diameter: 600mm/350mm
- Spindle: 18.5kW/6,000rpm
- Control: Doosan Fanuc i/Siemens 828D



**For more information about this machine visit [www.millscnc.co.uk](http://www.millscnc.co.uk). To arrange to see our machines in action at our Technology Campus, call 01926 736736.**



# BIG machines for big aerospace aspirations.

Large-capacity Doosan vertical turning lathes occupy centre stage at new Hanwha Aerospace's aero-engine parts production facility in Vietnam.

South Korean-based Hanwha Aerospace, part of the Hanwha Group - a FORTUNE Global 500 company - has announced that it plans to significantly ramp up production and supply of civil aircraft aero-engine parts (fans and compressors) to the global aerospace market through the creation of a new manufacturing facility in Vietnam, are nearing completion.

The new factory, located near Hanoi, is substantial and, at 60,000m<sup>2</sup>, is approximately eight times the size of a football pitch. Building works, which began in 2017 were completed at the end of 2018.

Once fully operational it is anticipated that Hanwha Aerospace will be able to increase sales turnover to 1 Trillion Won (USD 879 Million) and lead the aero engine production industry by 2025.

To help the company achieve its ambitions it has invested heavily in a number of large-capacity Doosan vertical ram-type lathes (VTRs). By the end of January 2019 it is expected that 30 Doosan VTRs will have been installed at the new Vietnam factory - rising to 120 machines by 2024.

The Doosan machines supplied to Hanwha Techwin comprise VTR 1012F and VTR 1216F models.

Doosan's F-designated VTR machines have a fixed cross

beam design, as opposed to a travelling cross beam design - and, as such, are particularly suited to the machining of smaller, shorter components such as aero-engine rings.

In addition both VTR models also have a wide column and box guideway design, and are equipped with powerful ram-type spindles (up to 45kW/400rpm) and large diameter cross taper roller bearings for heavy-duty machining operations.

The machines also feature servo-driven tool changers for fast and accurate tool change, high-efficiency swarf evacuation and management systems for increased productivity and trouble-free machining, and have a maximum turning diameter up to 1,600mm (VTR 1216F).

Says Tony Dale, Technical Director at Mills CNC, the exclusive distributor of Doosan machine tools in the UK and Ireland:

"Across the world Doosan machine tools are used extensively and are specified by global aerospace OEMs and by leading manufacturers in the aerospace supply chain.

"Hanwha Aerospace supplies aero-engine parts to GE, Pratt & Whitney and Rolls-Royce (to name but a few), and the sheer scale of this investment (120 machines in 5 years) is truly remarkable and demonstrates Doosan's prowess in the aerospace sector."





# Braking news!

A turnkey solution, developed by Mills CNC, helps deliver up to a 40% reduction in brake disc machining cycle times for leading brake and clutch systems specialist.



In June 2018 we supplied leading brake and clutch system specialist - Alcon Components Ltd., - with three new Doosan high-performance vertical turning lathes.

The three Doosan V8300 vertical turning lathes were installed at Alcon's Tamworth facility as part of a process improvement solution, designed by Mills CNC in partnership with Alcon production engineers, to manufacture the company's range of high-performance brake discs.

Alcon Components' advanced braking systems are used in the motorsport, automotive and defence sectors. The company supplies its systems and solutions direct to motorsport teams (F1, Formula E, World Rally Cross); to automotive OEMs (for use in their high-performance cars) and to defence contractors (armoured and military vehicles). It also manufactures braking systems to service a large, internationally-based, after-market.

Some 70% of the company's braking systems are manufactured for export.

Prior to the acquisition of the new Doosan lathes, and the implementation of the new manufacturing process, Alcon machined its brake discs on three horizontal fixed head lathes.

These 'legacy' machines, whilst still performing satisfactorily, were relatively old having been purchased in 1983 when Alcon Components was first established. As a consequence, the machines were slow and were increasingly prone to breakdown.

Explains Brian Cutler, Alcon Component's Production Engineering Manager:

"Our business is growing and demand for our braking systems is at an all time high.

"This increase in demand was beginning to put pressure on our existing machine tools, machining methods and manufacturing processes."



An internal review undertaken by Alcon identified that its brake disc manufacturing operation was a specific 'pinch point' that was affecting the company's overall productivity and operational efficiency.

Continues Brian Cutler:

"It was clear that we needed to invest in, and significantly upgrade, our brake disc manufacturing cell.

"We made the decision with the new cell to move away from horizontal lathes in favour of vertical turning lathes - and drew up a list of machine tool

manufacturers who could not only supply the new machines but who could also develop a robust, flexible and repeatable machining process."

## The vertical turning lathe imperative

Vertical turning lathes are best suited for machining wheel-, plate- and disc-shaped components which are characterised by their relatively large diameters and short (workpiece) lengths.

The machining process on a vertical turning lathe is inherently stable - workpieces stand upright and need less

**"Doosan machines deliver excellent performance and they are competitively priced. The machines are also backed up by Mills' technical and after-sales services which are also first-class."**

Brian Cutler, Alcon Components Ltd.



clamping force (due to the effects of gravity) than when horizontal lathes are used. They also enable higher cutting forces to be applied which improves removal rates and reduces cycle times.

#### Selecting Mills CNC

Alcon already had a pre-existing relationship with Mills CNC and, in the last seven years, had invested in a number of Doosan machine tools. These included horizontal and vertical machining centres, and multi-tasking lathes.

Comments Brian Cutler:

"We have a good relationship with Mills CNC.

"Doosan machines deliver excellent performance and they are competitively priced. The machines are also backed up by Mills' technical and after-sales services which are also first-class."

#### The new vertical turning lathe cell

The new flexible manufacturing cell at Alcon comprises three new Doosan 15" chuck V8300 vertical turning lathes with Fanuc controls.

The machines have an integral box guideway design that helps reduce vibration and facilitates heavy-duty and high-precision machining. All three machines are equipped with powerful, high-torque spindles and fast servo-driven turrets for rapid indexing and accurate positioning.

The machines have large axis travels - 495mm (X-axis) and 780mm (Z-axis), a maximum turning diameter of 830mm and a 750mm maximum turning height. The machines are fast with 20m/min rapid rates on their X- and Z-axes.

The V8300 lathes at Alcon are positioned in close proximity to each

other enabling rapid part transfer between them, and are being used to machine a range of different sized brake discs.

The discs are made from cast iron (castings) and are machined to tight tolerances and high surface finishes in low volumes. Alcon currently machines approximately 500-600 discs per week in the new cell.

Explains Brian Cutler:

"All our brake discs are produced in three operations using the three machines - so in effect that's one operation per machine.

"Having three machines at our disposal means that production is not affected or interrupted if one machine goes down.

"The machining process, developed in collaboration with Mills and using the

three V8300 vertical lathes, has enabled us to ramp up production and to reduce part cycle times by up to 40%."

**"Having three machines at our disposal means that production is not affected or interrupted if one machine goes down."**

Brian Cutler, Alcon Components Ltd.



#### Doosan Machine Tools



#### ADVANCED TECHNOLOGIES

## Doosan V8300

Doosan V8300 vertical turning lathes are designed to deliver long-term accuracy and are ideal for heavy-duty cutting operations.

They have a rigid box guide-way design and build, and are equipped with gearbox driven technology for fast and responsive machining.

The range also includes V8300M models, which have driven tooling capability (23kW/4,000rpm), and twin spindle (SP) models.

- Chuck sizes: 15" to 24"
- Maximum turning length and diameter: 750mm/830mm
- Rapid rates: 20m/min
- Spindle: 37kW/2,000rpm
- Turret: 12-position
- ATC: 12-position (Capto C6) option
- Control: Fanuc or Siemens



**For more information about this machine visit [www.millscnc.co.uk](http://www.millscnc.co.uk). To arrange to see our machines in action at our Technology Campus, call 01926 736736.**





Doosan Robotics

Doosan Robotics' Collaborative Robots from Mills CNC Automation.

# Say 'Hello' to the Cobots of the Future.

- **Innovative**
- **Safe**
- **Versatile**
- **Competitively-priced**





Mills CNC launches new

# Automation Division.

Mills CNC has created a new division to provide a focal point for sales of its industrial and collaborative robot business.

The new division, called Mills CNC Automation, was created in late 2018 and is located at Mills CNC's Technology Campus facility in Leamington.

At the beginning of this year (2019), Mills CNC Automation, agreed a deal with Doosan Robotics (based in South Korea and part of the Doosan Group), to become its UK agent and supply its advanced, high-performance collaborative robot (cobot) systems and solutions to UK and Irish manufacturers.

Says Tony Dale, Mills CNC's Technical Director:

"This is a new and exciting venture for us.

"The new Mills CNC Automation division will be responsible for driving and accelerating sales of our industrial and collaborative robots."

Mills CNC Automation is currently developing a range of industrial robot solutions for turning and milling applications. These solutions called Mills CNC AutoTurn and Mills CNC AutoMill respectively, represent high-value (and often complex) work-piece loading and unloading automation systems and will be turnkey in nature.

## Collaborative Robots

The agreement with Doosan Robotics will see Mills CNC Automation supplying a range of technically-excellent cobots into the UK and Irish markets.

The range comprises 4 different models - the M0609, M1509, M1013 and M0617.

The M0609 is a compact cobot that has a 6kg payload capacity, a 0.9m reach radius and has been designed for performing quick, routine and repetitive tasks.

The M1509 cobot has the market's largest payload available

(15kg) and a 0.9m reach radius. It has been designed to handle heavier objects that could pose a potential health and safety risk to humans.

The M1013 is a versatile cobot with a 10kg payload capacity, a 1.3m reach radius and is suitable for a wide range of tasks.

The M0617 cobot has the largest reach radius on the market (1.7m), and a 6kg payload capacity. It has been designed to perform tasks that require a longer reach.

In addition to their impressive payload and reach radius capabilities, plus their sleek and stylish design, all cobots feature 6 torque sensors on their articulated (6-axis) arms and provide +/- 0.1mm repeatability and a TCP (Transmission Control Protocol) speed of 1m/s.

As well as cobot arms, every model is also supplied with a control unit (490 x 290 x 287mm) and a robust and lightweight (0.8kg) teaching pendant with a 10.1" capacitive touch screen.

All cobots can be supplied with a range of different end effectors depending on their intended use and application.

Says Tony Dale:

"The cobots are easy to use and simple to install.

"The torque sensors on the cobot arms detect the slightest impact. In layman's terms they stop immediately before any type of collision occurs. This technology makes the cobots inherently safe and means that they do not need to be fenced in or caged off."

In the first instance, Mills CNC Automation will promote its cobot range to CNC machine tool users (for machine tending operations) but will, in the future, market the range to specific sectors i.e. automotive, electronic, food and drink etc.

## Cobot of the Future - No.1



### M0609

**The M0609 is a compact cobot that has a 6kg payload capacity, a 0.9m reach radius and is designed for performing quick, routine and repetitive tasks.**

- 6kg payload
- 0.9m reach
- 6 Torque Sensors on all axis
- Repeatability: 0.1 mm
- TCP Speed: 1 m/s



## Cobot of the Future - No. 2



### M1013

The M1013 is a versatile cobot with a 10kg payload capacity, a 1.3m reach radius and is suitable for a wide range of tasks.

- 10kg payload
- 1.3m reach
- 6 Torque Sensors on all axis
- Repeatability: 0.1 mm
- TCP Speed: 1 m/s

## Demand for cobots set to rocket!

Global Cobot market predicted to be worth \$4.28 billion by 2023.

According to Markets and Markets' recent research report "Collaborative Robots Market by Payload Capacity, Industry, Application, and Geography – Global Forecast to 2023," the cobot market is expected to be worth \$4.28 billion by 2023, growing at a compound annual growth rate (CAGR) of 56.94% between 2017 and 2023.

This growth, in part, is attributed to the demonstrable high return on investment rates (ROI) and the relatively low price of cobot technology that is driving demand amongst small-to-medium sized enterprises (SMEs).

The market for cobots with a payload of 10kg and over is expected to grow the fastest between 2018 and 2023, due mainly to the expected demand for relatively high payload capacity cobots in the automotive, electronic, machining sectors.

The manufacturers of cobots with such a high payload capacity is evolving and is occupied by only a few companies.

A relatively new entrant to the market is Doosan Robotics, part of the Doosan Group, who have recently appointed Leamington-based, Mills CNC, as its UK and Irish distributor.

Says Tony Dale, Technical Director at Mills CNC:

"Cobot technology is developing at a rapid pace. Improvements in human:machine interfaces (HMIs) on the latest cobots make them easier to use - and the use of sophisticated sensor technology means that they are inherently safe."

Assembly and pick and place applications accounted for the largest and second largest markets for cobots in 2016. This is expected to continue in the future owing to the inherent flexibility of cobots and their ability to perform a range of different operations and tasks via easy re-programming and the quick change of end effectors.

The automotive industry held the largest share of the global cobot market

in 2016, with cobots mainly used to perform assembly operations as well as production line 'pick and place', quality inspection, packaging, palletisation, machine tending and other material handling tasks.

Europe accounted for the largest share of the market in 2016 followed by APAC and North America. European market growth was driven by strong government support promoting automation and Industry 4.0 solutions in manufacturing.

Concludes Tony Dale:

"We are ideally positioned to capitalise on the demand for higher payload capacity cobots. The Doosan Robotics' range currently comprises four different cobot models.

"These cobot systems with their good reach capabilities and high-torque sensors deliver high productivity and inherent safety - all at a cost-competitive price."



# The future is Collaborative Robots!

Dirty, tedious and repetitive jobs soon lose their lustre - if they even had any in the first place. They can often wear down workers and prevent them from completing higher value and more profitable jobs.

These 'menial' types of jobs are often highlighted as being 'ripe' for automation. But installing an industrial robot to handle grimy or monotonous work may not always be the answer.

That's because not all robots are equal.

Firstly, industrial robots can be complex, especially for small and medium-sized businesses.

Secondly, not every manufacturer has the staff (or budget to hire an integrator) to program (and reprogram) a robot.

Thirdly, industrial robots require the robot's working area to be safeguarded to prevent potential injury to humans.

Depending on the application, the above challenges can be addressed by investing in a special type of industrial robot - a collaborative robot - or cobot.

Cobots are relatively lightweight and are designed to operate safely in close proximity to people. The use of sensors or force-limiting technology (with the correct application and risk assessment)

eliminate the need (and cost) of cages and fencing.

Furthermore cobots are also easily programmed through hand guiding, which allows a worker to move the cobot's arm to each point in a job - instead of typing commands into a pendant.

People with only a passing knowledge of cobots often refer to them as "fenceless robots" - a phrase that implies their safety.

However, if you're manufacturing knives with a fenceless robot, it doesn't necessarily follow that a worker nearby is safe because the robot is moving slowly.

Clearly whatever the application - proper evaluation needs to occur.

Before investing in a cobot, it is essential that a thorough risk assessment is conducted.

Collaborative robots can work alongside humans and are easily configured. If a cobot comes in contact with a worker, it immediately stops to minimise or eliminate injury.

Manufacturers that decide to reconfigure their production line to handle a new product can easily re-program a cobot in a relatively short space of time. This compares favourably with the lost production time experienced with re-programming an industrial robot to handle a new product line!

In fact, investing in collaborative robots is a good way to future proof manufacturing. Because, if and when new product lines are added or existing lines are modified, cobots (due to their versatility and adaptability) are able to handle these changes with minimal disruption or difficulty.

Collaborative robots have many advantages in terms of safety, cost, quality and ROI.

This is what makes the technology so attractive to manufacturing supply chain companies - irrespective of their size or the industries and sectors they serve.

## Cobot of the Future - No. 3



### M0617

**The M0617 has the largest reach radius on the market at 1.7m, a 6kg payload capacity and is designed to perform tasks that require a longer reach.**

- 6kg payload
- 1.7m reach
- 6 Torque Sensors on all axis
- Repeatability: 0.1 mm
- TCP Speed: 1 m/s



## Cobot of the Future - No. 4



### M1509

**The M1509 offers the market's largest payload available at 15kg, a 0.9m reach radius and is designed to handle heavier objects that could pose a potential health and safety risk to humans.**

- 15kg payload
- 0.9m reach
- 6 Torque Sensors on all axis
- Repeatability: 0.1 mm
- TCP Speed: 1 m/s

# Look before you leap!

Four issues manufacturers should consider before investing in cobot technology.

Collaborative robots, or cobots, are providing manufacturers of all sizes with the capability to automate some of their processes. But, with so many different types of cobot on the market - each one seemingly having different capabilities, features and, of course, price tags - it's important that manufacturers do their homework before making any investment.

From our knowledge and experience we have identified four key issues that manufacturers need to consider, at the outset, before making any decisions.

#### Identify and prioritise the right tasks in advance

Cobots present manufacturers with automation opportunities for a variety of applications. Tasks that are mundane, repetitive, ergonomically challenging or high risk are all potentially appropriate for cobot deployment.

Operations that include packaging, metal stamping, testing and quality inspection, CNC machine tending and assembly are all areas where a cobot can help streamline operations, and free humans to focus on higher value tasks.

Identifying these specific tasks and understanding how, where and when cobot deployment can deliver real business benefits, including a more than satisfactory return on investment, are vital first steps in the decision making process.

#### Educate and reassure the workforce

Employees might be initially sceptical about robots joining the team.

Traditionally industrial robots have worked separately and away from humans - often being installed behind safety caging. Cobots, by contrast, are designed to be collaborative and work alongside humans.

This can often result in questions being asked about the safety of cobots in such working environments. (Cobots from Doosan Robotics, for example, have high-resolution force sensors on all of their arm joints which cause the cobot to stop if and when it comes into contact with an object).

Employees may also be concerned about job security and

wonder whether cobots could put them out of work.

As a consequence, it is important to communicate with employees and stress that cobots will not replacing them but, instead, are designed to handle the more monotonous and error-prone processes - allowing them to focus on tasks that require more thought, problem-solving and dexterity.

The more that employees know about cobots the more likely companies will benefit from this type of automation.

#### Think 24/7: 365

Cobots don't sleep, or take lunch breaks and holidays.

Productivity, in the context of a cobot is different from workforce productivity - so it's important to rethink and reconfigure production schedules. Cobots can operate (safely) overnight and unattended, and provide manufacturers with additional production hours and capacity. They can also be used to create autonomous and flexible manufacturing cells which deliver continuous production.

#### Work with your cobot supplier

Your cobot supplier knows and understands cobot use and best-practice - i.e. what tasks and operations are suitable for their cobots, which end effectors to use for specific applications, how and where to deploy cobots in specific work environments etc.

Mills CNC Automation, the supplier of Doosan Robotics' collaborative robots in the UK and Ireland, is a valuable resource and provides manufacturers with in-depth knowledge and expertise.

#### Summary

Cobots are extremely versatile and adaptable. They are already deployed in a growing number of industries and sectors performing a wide range of tasks.

Cobots are designed to work alongside people - and are part of the team. Such proximity inspires employees to find new ways to work with cobots and identify different processes (and areas of work) where they can be deployed.



# Well prepared to meet demand!

Leading specialist fastener and hot forged bolt manufacturer invests in three new Doosan machines to meet the growing demand for its products and solutions from offshore and subsea drilling, production and processing equipment customers.

We have recently supplied three new Doosan machines to Mellish Engineering Services - a private, family-owned specialist precision manufacturer of performance-critical, high-integrity and fully-traceable fasteners and hot forged bolting used extensively in the oil and gas sector.

The machines - a Mynx 6500/50 large-capacity vertical machining centre, a Puma 2600SY Mk II multi-tasking lathe and a compact, high-performance DNM 4000 vertical machining centre were installed at the company's 26,000 square foot facility in Aldridge during August and September 2018. They are being used to machine a range of high-precision, performance-critical standard and non-standard fastener components that include bolts, pins, clamps, studs, nuts, washers etc.

These components are all made from hard and difficult-to-machine materials (i.e. Duplex and Super Duplex stainless steels, carbon steel, titanium, Inconel, Monel etc.) and are machined to tight dimensional tolerances and high-quality surface finishes.

They are machined in small batches (i.e. one-offs) right through to larger volumes to suit individual customer requirements.

## A growth in demand

The machines were acquired by Mellish as a direct result of the company achieving API (American Petroleum Institute) certification in 2017.

Explains Mark Rattenberry, Mellish's Managing Director

"We took a long-term, strategic view, following the rapid fall in oil prices in 2014, to increase our share in a relatively static or, some may even say, a declining market.

"Achieving API certification, we believed, would not only differentiate us from our competitors but would also position us as an approved quality

**Doosan Puma 2600SY Mk II multi-tasking lathe.**



fastener supplier in what is a highly-regulated sector where environmental and health and safety (EHS) concerns are of paramount importance."

In 2017 Mellish achieved its ambitions gaining API Q1, API 20E and API 20F certification and has, since then, experienced a marked increase in the number of companies, from around the world, making contact...enquiring about the company's solutions...and, ultimately, placing orders.

## Meeting the demand

To meet the growing demand for its fastener systems and solutions Mellish, as part of its commitment to continuous improvement, makes regular investment in its people, plant, equipment,

processes and systems.

The recent acquisition of the three new Doosan machines is evidence of this commitment.

## The Doosan machines: Mynx 6500/50

The Mynx 6500/50 was purchased following the completion of a successful cutting trial undertaken at Mills CNC's Technology Campus facility. The trial was intended to demonstrate the Mynx 6500/50's cutting capabilities and its ability to reduce part cycle times when machining titanium tie-rod components.

Says Mark Rattenberry:

"The Mynx 6500/50 is a rigidly-built and constructed machine that is ideal for heavy-duty machining operations, and

**"The Mynx 6500/50 is a rigidly-built and constructed machine that is ideal for heavy-duty machining operations, and for machining the hard materials we use to manufacture our fasteners."**

Mark Rattenberry, Mellish Engineering Services.



**“We are focused on maintaining our market-leader status in the oil and gas industry and capital investments, such as those made in Doosan machine tools from Mills CNC, will enable us to do this.”**

Mark Rattenberry, Mellish Engineering Services.

for machining the hard materials we use to manufacture our fasteners.

“In the machining trial (and the subsequent machining process developed by Mills), the part cycle times for machining each titanium component was reduced by 15 minutes.”

Since being installed Mellish has focused its efforts on refining and optimising the machining process further, and has invested in a state-of-the-art manual twin workpiece pallet

change system that is positioned in front of the machine enabling virtually continuous production with minimal operator intervention.

#### Puma 2600SY Mk II

The Puma 2600SY Mk II enables Mellish to machine small turned parts, like studs and nuts, to completion in a single set-up. The machine was supplied with a bar feeder to ensure continuous production.

Says Mark Rattenberry:

“The Puma 2600SY Mk II is a high-productivity lathe that has helped us reduce part cycle times, improve part accuracies (as components no longer need to be transferred between machines), and avoid production bottlenecks.”

#### DNM 4000

The DNM 4000 is a compact, high-performance and fast vertical machining centre equipped with a direct-drive spindle and a 20-position ATC. The machine was supplied with a 4th-axis unit to increase its flexibility and productivity potential.

The machine is being used to machine a ‘family’ of small fastener parts.

Says Mark Rattenberry:

“The DNM 4000 certainly packs a punch and we have been impressed with its cutting capabilities and performance. To improve the productivity of the machine we have designed special

#### Doosan DNM 4000 vertical machining centre.



purpose fixturing to enable multiple parts to be machined in a single set-up.”

Productivity and operational efficiency are critical to Mellish’s future growth and prosperity.

The investment in leading edge Doosan machine tools from Mills CNC combined with the company’s determination to ‘sweat its assets’ and continuously look at ways to optimise its machining processes means that Mellish is able to meet the surge in demand for its fastener products and solutions.

Doosan Machine Tools



## ADVANCED TECHNOLOGIES

# Doosan Mynx 6500/50

The Mynx 6500/50 is a large-capacity, rigidly-built vertical machining centre designed for heavy-duty machining operations, and for machining hard and tough materials.

The machine has a box-guide-way design and features a powerful (BT 50) spindle, a large working envelope and generous-size tool changer.

- Travels: 1,270mm x 670mm x 625mm
- Table size: 1,400mm x 670mm
- Spindle: 15kw/6,000rpm - 26kW/12,000rpm
- ATC: 24/30/40 position
- Control: Fanuc, Siemens or Heidenhain

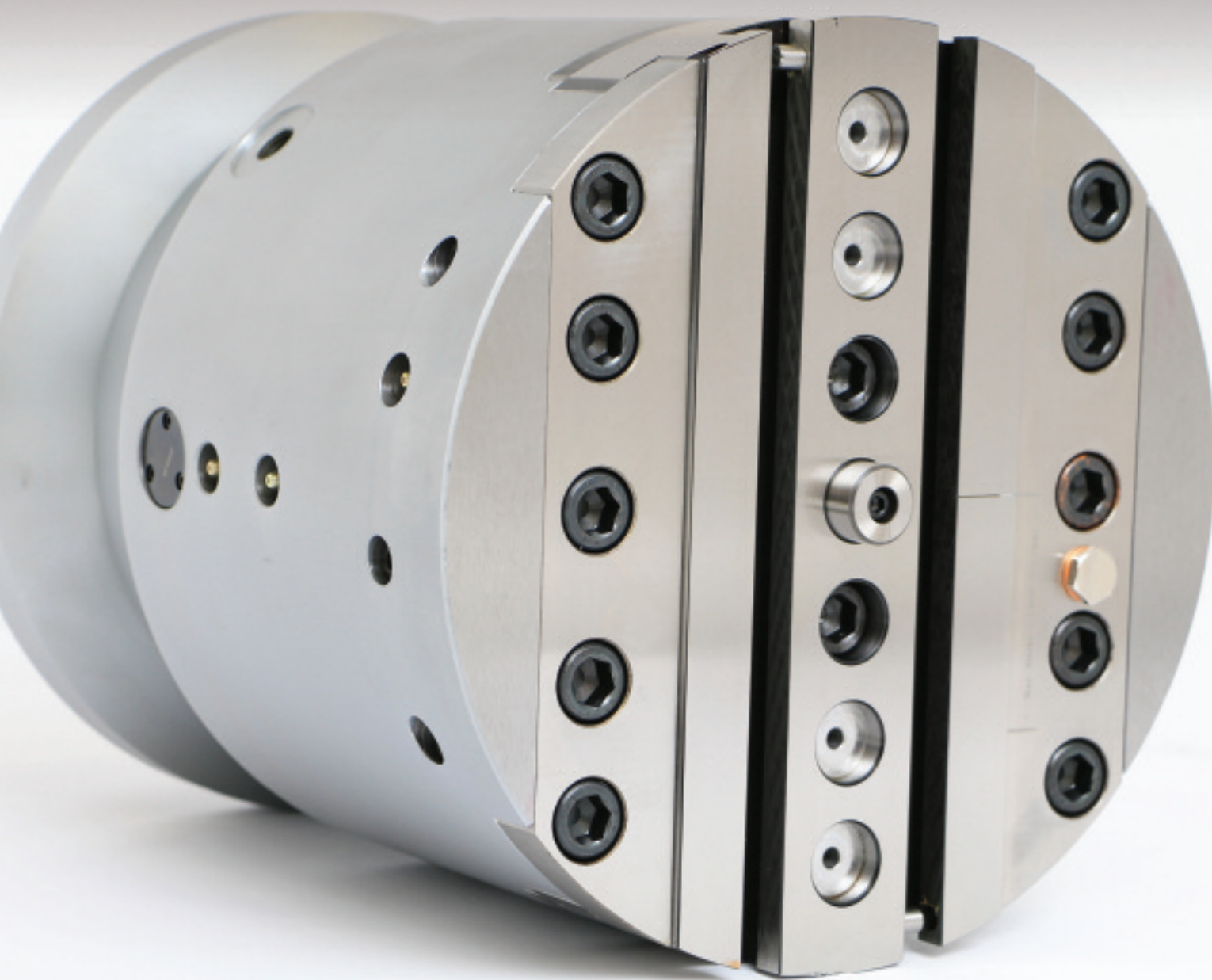


**For more information about this machine visit [www.millscnc.co.uk](http://www.millscnc.co.uk). To arrange to see our machines in action at our Technology Campus, call 01926 736736.**



# Leaving NOTHING to chance.

Specialist precision tooling solutions provider selects Doosan vertical machining centre for its capacity, machining capabilities, immediate availability and cost-competitiveness.



Leading specialist tooling solutions supplier, Cogsdill-Nuneaton Ltd, has recently invested in a new high-performance Doosan vertical machining centre.

The machine, a DNM 6700, was installed at the company's 27,000 square foot facility in May 2018 where it is being used to machine precision components for Cogsdill's range of ZX facing and contouring head tooling systems. These components include different sized front-mounted cross slides, with slide ranges from 200mm to 900mm, which are machined from nitrided and carbon steel.

The decision to invest in the new Doosan DNM 6700 machine followed an internal review undertaken by Cogsdill into its existing CNC machine tool capabilities and, in particular, whether its current milling machining capabilities were adequate to meet the growing demand from customers worldwide for its large-capacity tooling solutions.

Says Lee Donaldson, Executive Director, Cogsdill UK:

"We invest regularly in advanced CNC machine tool technologies and the audit and review highlighted a potential improvement opportunity to optimise our existing CNC milling capabilities."

With global demand for its larger tooling solutions on the increase it became clear to management and production staff at Cogsdill that an investment in a new, reliable and large-capacity vertical machining centre was required.

Explains Lee Donaldson:

"To ensure we acquired a vertical machining centre that matched our needs and expectations we did our homework and created a 'key criteria' checklist before investigating the market."

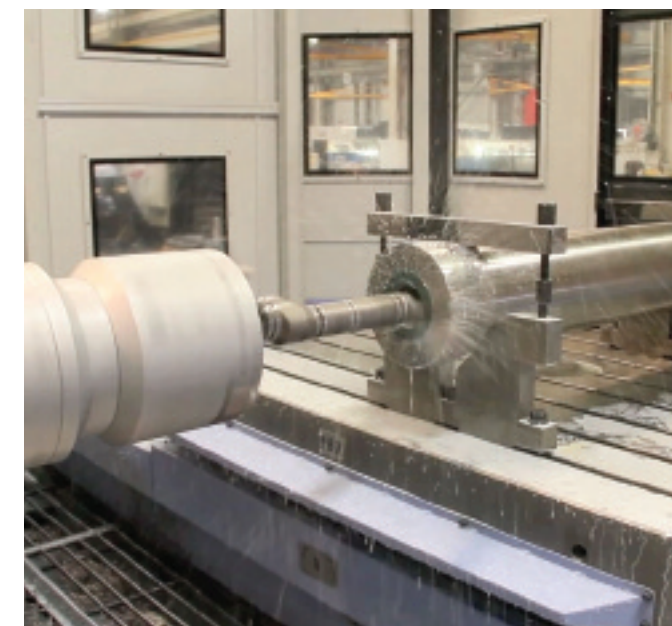
In addition to the working capacity of the new machine other requirements included the machine's cutting performance, its availability and price as well as the scope and scale of the technical back-up and after-sales support services provided by the machine tool supplier.

Continues Lee Donaldson:

"Although we hadn't invested in a Doosan machine tool previously we knew that Doosan machine tools have a good

**"Just knowing that you have Mills' technical, applications and service back-up at your disposal inspires confidence."**

Lee Donaldson, Cogsdill-Nuneaton Ltd.



reputation in the market, and that Mills CNC, the exclusive distributor of Doosan machines in the UK and Ireland, is a successful company with a significant market presence."

Cogsdill also had direct experience of working in collaboration with both Doosan and Mills CNC as a Technical Partner - supplying advanced tooling solutions to both.

Following its extensive search into the market Cogsdill ultimately decided on investing in a new DNM 6700 vertical machining centre.

## DNM 6700: Capacity and capability

The DNM 6700 is a large-capacity vertical machining centre equipped with a generous sized work table and impressive axis travels.

The machine also features a powerful, high-torque direct-drive spindle.

Says Lee Donaldson:

"The working envelope of the machine was of critical importance. The DNM 6700's large-capacity working envelope enables us to machine big components (as well as smaller ones) in a single set-up. This means faster production and reduced part cycle times.

"Similarly the cutting performance of the machine was important and the DNM 6700, with its powerful and direct-drive spindle technology, gives us the ability to achieve high-volumetric removal rates when required as well as good surface finishes. It is a very versatile machine."

To increase the machine's flexibility still further Cogsdill, as part of its investment, also ordered a 4th/5th axis unit to be supplied with the machine.



**“The cutting performance of the machine was important and the DNM 6700’s powerful, direct-drive spindle technology gives us the ability to achieve high-volumetric removal rates when required as well as good surface finishes. It is a very versatile machine.”**

Lee Donaldson, Cogsdill-Nuneaton Ltd.

#### DNM 6700: Availability

Mills CNC has at least 70 new Doosan machines, at any given time, in stock at its Technology Campus facility in Leamington. A significant proportion of

these machines include its best-selling DNM vertical machining centres.

Comments Lee Donaldson:

“The quick availability of the new machine was important. We attended

MACH 2018 where we visited Mills CNC’s stand and supplied them with a ‘letter of intent’ to purchase a DNM 6700. Just a few weeks after the event, once we had acquired external grant-based funding, the machine was delivered, installed and commissioned.”

#### DNM 6700: Price

DNM 6700 machines are competitively priced and this, in conjunction with their high-performance and reliability, explains their popularity.

Says Lee Donaldson:

“I have to say that we were pleasantly surprised with the machine’s price. There is a lot of technology and functionality packed into the DNM 6700 and, whilst price isn’t everything, it

clearly is an important factor when making any capital investment.”

#### DNM 6700: After-sales support

All Doosan machines supplied by Mills CNC are backed by the company’s impressive after-sales service and support.

Concludes Lee Donaldson:

“Mills CNC’s reputation in the market for its after-sales support is second to none and we have direct experience of this having worked in partnership with Mills delivering a number of turnkey and process improvement projects for customers.

“Just knowing that you have Mills’ technical, applications and service back-up at your disposal inspires confidence.”

#### Doosan Machine Tools



#### ADVANCED TECHNOLOGIES

# Doosan DNM 6700

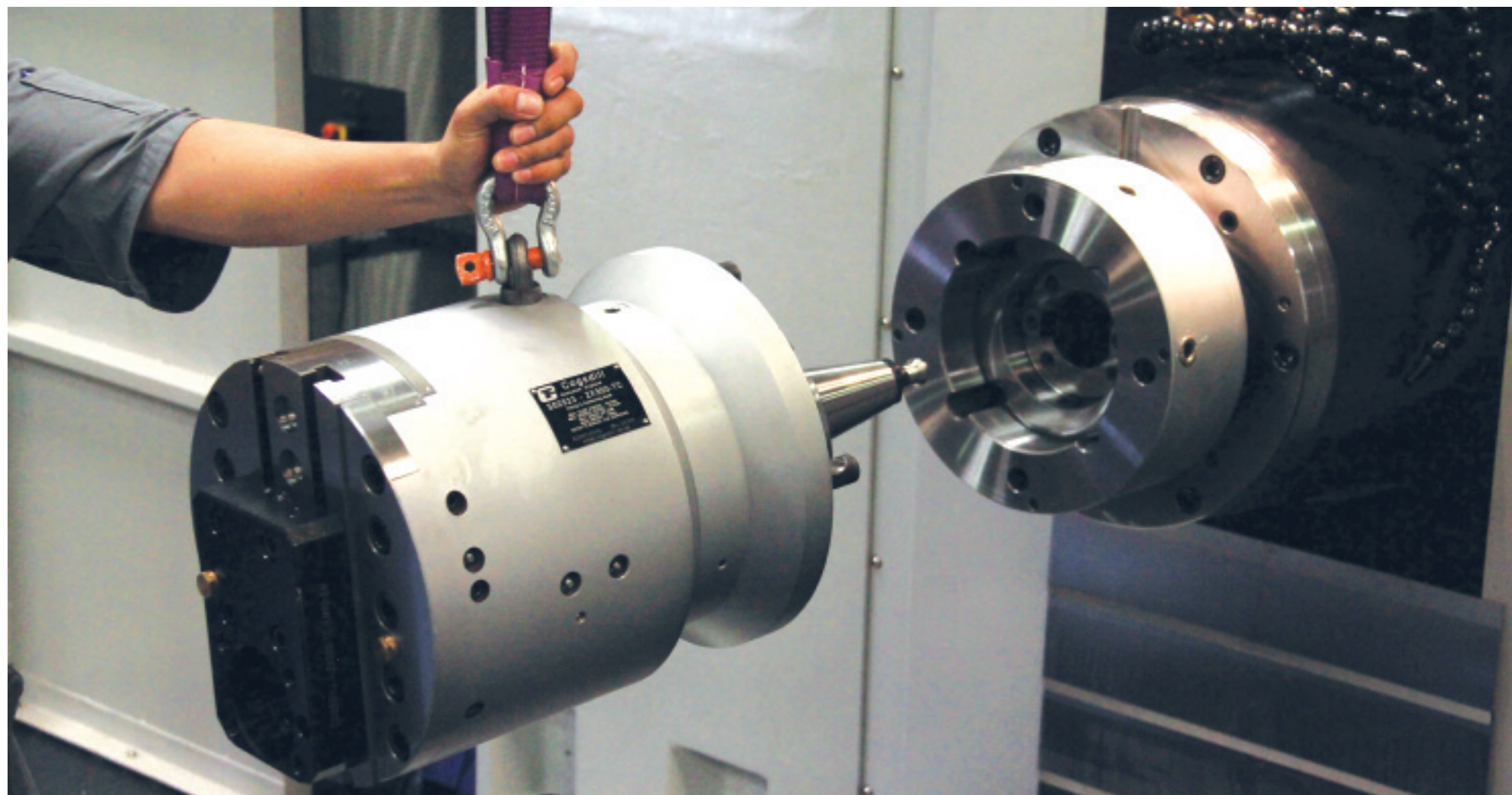
The DNM 6700 is reliable and accurate, and provides component manufacturers with flexibility and improved performance.

The machine is equipped with a direct-drive spindle, a large working envelope, roller LM guideways with greased lubrication, a quick change ATC and integrated thermal compensation systems for increased productivity, part accuracies and process reliability.

- Travel: 1,300mm x 670mm x 625mm
- Table: 1,500mm x 670mm
- Spindle: 18.5kW/12,000rpm
- Tool changer: 30/40 position
- Control: Fanuc, Heidenhain or Siemens



**For more information about this machine visit [www.millscnc.co.uk](http://www.millscnc.co.uk). To arrange to see our machines in action at our Technology Campus, call 01926 736736.**





# A good impression!

Visitors were more than impressed by the Doosan 5-axis machine tool and Doosan Robotics' collaborative robot showcased at the Southern Manufacturing Show 2019.

We attended the Southern Manufacturing Show for the first time in the company's history back in February 2019 - and used the event to showcase our latest high-performance

simultaneous 5-axis machining centre to show attendees.

The Doosan DVF 5000, first launched at MACH 2018 has, ever since its introduction, proved popular with

**Out in force at Southern Manufacturing 2019. Pictured (L to R) are Steve Brown, Steve Nash, Liam Wellings and Karen Earley alongside the Doosan Robotics' collaborative robot (cobot) demonstration.**



aerospace and medical component manufacturers.

The machine delivers high precision, speed, flexibility and process reliability. It is equipped with a direct-drive spindle, a generous-sized servo-driven tool changer and the latest control technology from Fanuc, Heidenhain or Siemens.

Other standard features include linear guides, a sophisticated thermal compensation system that mitigates against the effects of thermal drift and ultra-fast rapid rates (40m/min) on the machine's axes.

The machine's productivity can be further increased via an optional (8-pallet) automatic workpiece changer.

Says Tony Dale, Mills CNC's Technical Director:

"The DVF 5000 is the latest addition to Doosan's impressive 5-axis machine tool portfolio.

"Precision, speed, process reliability and flexibility accurately sum up the credentials of the new machine and explain why it proved so attractive to visitors."

## Collaborative robots

Southern Manufacturing 2019 was also an ideal venue for Mills to showcase a Doosan Robotics' collaborative robot (cobot) to visitors.

Says Tony Dale:

"At the end of last year we signed an agency agreement with Doosan Robotics, part of the Doosan Group, to supply its range of advanced collaborative robot systems and solutions to UK and Irish manufacturers."

There are four different collaborative robots in the Doosan Robotics' range and, at Southern Manufacturing 2019, a M0609, the smallest cobot in the range, was showcased performing different pick and place tasks.

All four cobots in the range are incredibly safe and feature 6-axis articulated arms with highly-sensitive torque sensors that are able to detect changes in force and/or any impact which causes them to stop.

As well as different capacity arms all cobots are supplied with a state-of-the-art controller, a sophisticated Teaching Pendant as well as a number of options that include a dress pack, a water jacket and a mobile base unit.

Concludes Tony Dale:

"Visitor traffic to the Mills stand was steady over the three days.

"This was the first time we have attended the Southern Manufacturing Show - it will not be the last."

**"Doosan Robotics' cobots are versatile, easy to install and use, incredibly safe and competitively-priced."**

Tony Dale, Mills CNC.

## Doosan Machine Tools



## ADVANCED TECHNOLOGIES

# Doosan DVF 5000

The DVF 5000 is a high-performance simultaneous 5-axis machine that delivers unrivalled speed, precision, flexibility and process reliability.

- Travels X/Y/Z: 625mm x 450mm x 400mm
- Rotary tilting table (B- and C-axes): -30/+110 degrees/360 degrees
- Table: 500mm x 400mm
- Rapid rates: 40m/min
- Spindle: up to 22kW/18,000rpm
- ATC: up to 120 tools
- Control: Fanuc, Heidenhain or Siemens



**For more information about this machine visit [www.millscnc.co.uk](http://www.millscnc.co.uk). To arrange to see our machines in action at our Technology Campus, call 01926 736736.**



The Doosan DVF 5000 simultaneous 5-axis machine.

# It would still be a great machine with just half the features!



Component manufacturers don't think twice when it comes to investing in 5-axis machines that deliver unrivalled speed, precision, flexibility and process reliability.

That helps explain why demand for our Doosan DVF 5000 machines remains so high.

Equipped with 17kW/12,000rpm direct-drive spindles (22kW/18,000rpm option); 40m/min rapids; generous sized tool changers (up to 120 tools); integrated thermal compensation systems; the latest controls and an 8 pallet automatic workpiece changer option - DVF 5000 machines are helping component manufacturers improve their productivity, performance...and profitability.

They could definitely do the same for you.

**To find out more visit [www.millscnc.co.uk](http://www.millscnc.co.uk) or call 01926 736736.**

**Mills CNC: Like No-one Else!**