

VECTOR™

One machine, infinite applications.



Curtis Machine Tools

www.curtisgrinding.com

THE COMPANY



Grind in a Box patented technology has proved to be a worldwide success.

Based on this concept, Curtis Machine Tools ('CMT') launched the **VECTOR** family of grinding machines and has been enjoying worldwide success for decades. The Engineering team at CMT are constantly developing new machining methods and applications that are precisely tailored to the needs of customers and market conditions. In order to maximise the efficiency of the production process, the integration of additional processes such as:

- + Vision systems
- + Automation
- + Workpiece inspection
- + Deburr, wash and dry
- + Laser marking, packaging and much more

are designed, developed and integrated into the **VECTOR** to give a complete turn-key process. CMT offers limitless possibilities to engineer and implement the user-specific requirements. With hundreds of machines ranging from a standalone solution to the fully automated production line, CMT is one of the market leaders in this field and your partner when it comes to process oriented solutions.

The **VECTOR** machines have been designed to give maximum productivity and precision with a very small footprint.



VECTOR™

ONE MACHINE WITH INFINITE APPLICATIONS

VECTOR machines have been designed to give maximum productivity and precision with a very small footprint.

- ✓ Integrated loading system
- ✓ Angular or straight approach operation
- ✓ Ideal for mid to mass production
- ✓ Pre-, In- and Post Process component measurement
- ✓ Automation
- ✓ Siemens control and drives
- ✓ Fast and easy setup
- ✓ Twin worked for reduced cycle times
- ✓ From a single machine to fully linked production line
- ✓ Part identification system
- ✓ Ancillary process integration



VECTOR™

BASICS



VECTOR™

THE FAMILY

Eccentric shafts and diesel injection nozzles



- ✓ The **VECTOR** is the basis for all machines in the product family. As a production grinding machine with an integrated loading system, it is suitable for the production of larger components and more complex clamping operations.
- ✓ The **VECTOR TWIN**. With the same advantages of the **VECTOR** machine, a double workpiece spindle is now integrated. This additional spindle allows loading and unloading to take place whilst grinding is in progress on the other spindle, giving a spark to spark time approaching zero. Ideal for cycle time optimised production.

VECTOR™

THE FAMILY

Turbocharger vanes and shafts



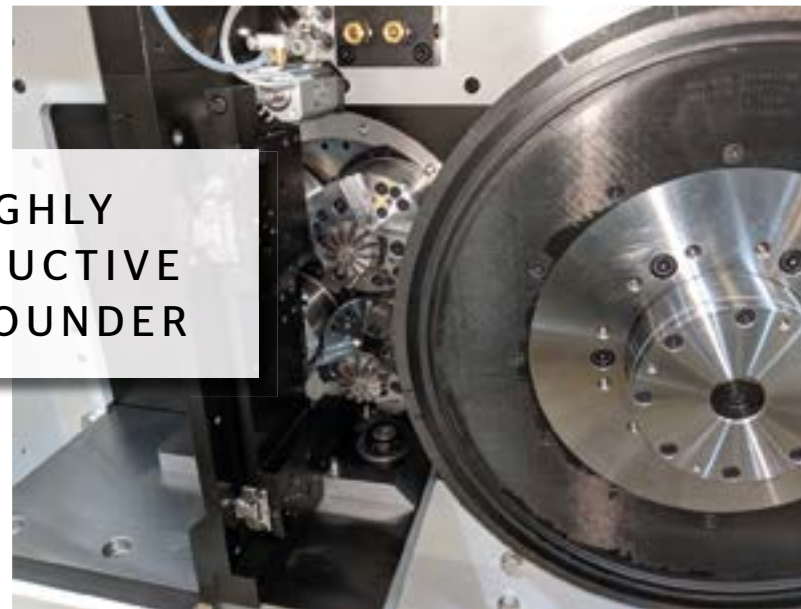
- ✓ The **VECTOR CONCENTRIC**. A not so well-known type of grinding is concentric grinding. Here, the workpiece is rotated between rollers and a fixed stop allowing the grinding of slender shafts to be carried out with maximum support and giving excellent concentricity, it's equally suited for grinding both sides of a gear shaft.
- ✓ The **VECTOR GFS**. (GRIND FROM SOLID) With Similar to a bar feed lathe, this machine makes small parts cost-effectively directly from the bar. The part is ground in multiple operations straight from standard or hardened bar, the workpiece is then cut off in turn using a separate spindle. This machine eliminates the turning / hardening operations and produces the parts directly from raw material fed by the integral bar loading system.
- ✓ The **VECTOR ROTARY**. In this machine, the workpiece spindle head is mounted on a pivoting axis. Thus, you get a universal machine that can be used for either straight or angle approach grinding with the additional ability to produce more complex spherical blended profiles, allowing complex workpieces to be ground fully automatically in one clamping.

VECTOR™

QUAD



HIGHLY
PRODUCTIVE
ALLROUNDER



- ✓ The **VECTOR QUAD**, revolutionises production grinding. Two workpieces are ground simultaneously with the four spindle workhead and in parallel the parts will be loaded and unloaded. This machine concept effectively increases your productivity by 100%.
- ✓ Quad workhead for grinding two pieces simultaneously.
- ✓ Small footprint.
- ✓ Simultaneous grinding of workpieces by conventional plunge grinding or peeling grinding with a straight angle of attack.
- ✓ Optional integration of ancillary processes.
- ✓ One machine - infinite applications.



VECTOR™

PENDULUM



ONE MACHINE -
TWO WORKHEADS



- ✓ The **VECTOR PENDULUM** concept was developed to fill a gap in the grinding market and give the technology output of two machines in one, quickly and with the smallest possible foot print.
- ✓ With two workpiece spindles on either side of the main grinding wheel, this machines combines two processes in one machine. With the workheads being adjustable for either straight/angle approach or a combination of both. Chuck, collet and tailstock options are also easily configured into this innovative solution. The machine loading and unloading takes place whilst the part in the opposite workhead is being ground, this ensures almost zero impact on cycle time.
- ✓ The centrally located dressing unit also saves time- consuming dressing cycles, which are performed whilst the grinding wheel is moving from station 1 to station 2, giving the possibility for conventional abrasives to be used and thus reducing consumable costs.
- ✓ Workhead Station 1
- ✓ Dressing system with automatic indeed.
- ✓ Workhead Station 2
- ✓ Direct driven wheel spindle.





DRESSING OPTIONS

The **VECTOR** can be equipped with several dressing options. The programming is based on an ISO code program and gives the possibility to dress almost every contour. The external profile dressing software WinWOP calculates the profiles based on CAD drawings and processes this into optimised dressing algorithms.



Dressing system for diamond wheels









Rotary dressing systems for diamond disc



Rotary dressing system for profile rolls

VECTOR WORKHEADS

The **VECTOR** machine is available in various versions. It has a modular application adaption by the possibility to use different workheads:

-  **VECTOR (with one work spindle)**
-  **VECTOR TWIN (with two work spindles)**
-  **Eccentric workhead**
-  **Workhead with automatic 2/3 jaw chuck**
-  **Workhead with face driver system**
-  **Workhead with collet chucking**



ENGINEERED SOLUTIONS

The **engineering team**, designs and develops solutions that are precisely tailored to maximise the production output of the system and satisfy the customers ancillary requirements. At the concept stage everything is considered to give a truly Turn-Key process, from pre-process inspection to the final packaging. The Vector is much more than just a machine - it's the foundation for the complete solution.



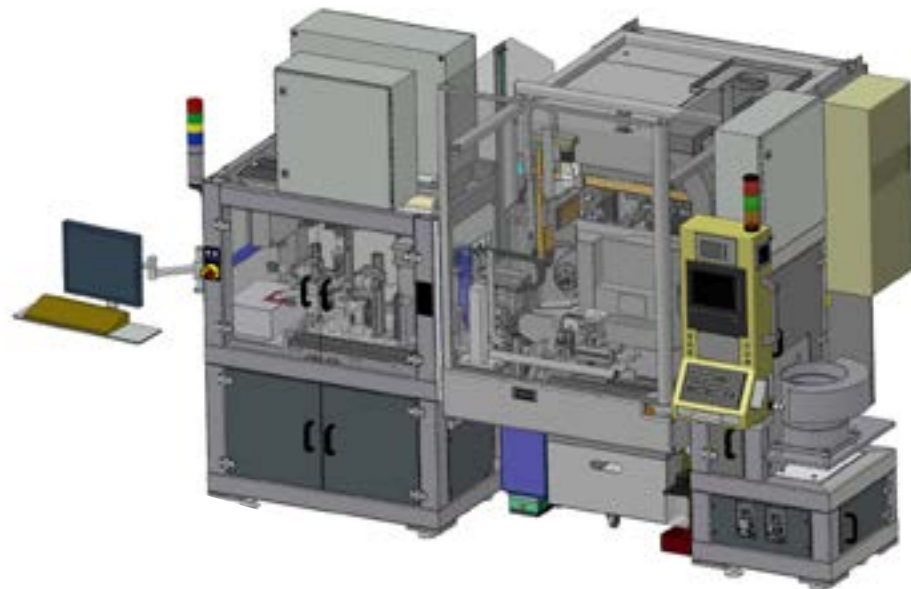
-  **Pre and post process measuring**
-  **Single part washing systems**
-  **Deburring**
-  **Laser making**
-  **Demagnetisation**
-  **Integration of other processes**



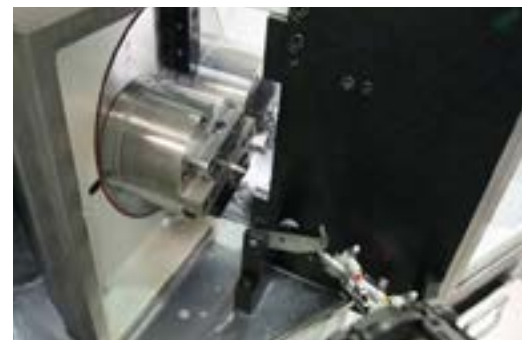
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RANGE OF APPLICATIONS

The application spectrum of the **VECTOR** is infinite thanks to its modular design and can be combined with a wide variety of loading systems. Whether it is a single machine with loading drawer, or multiple linked machines, with stacking system for automatic pallet change or, a Twin machine for workpieces that have to be ground in different fixtures or as a complete production line - anything is possible.



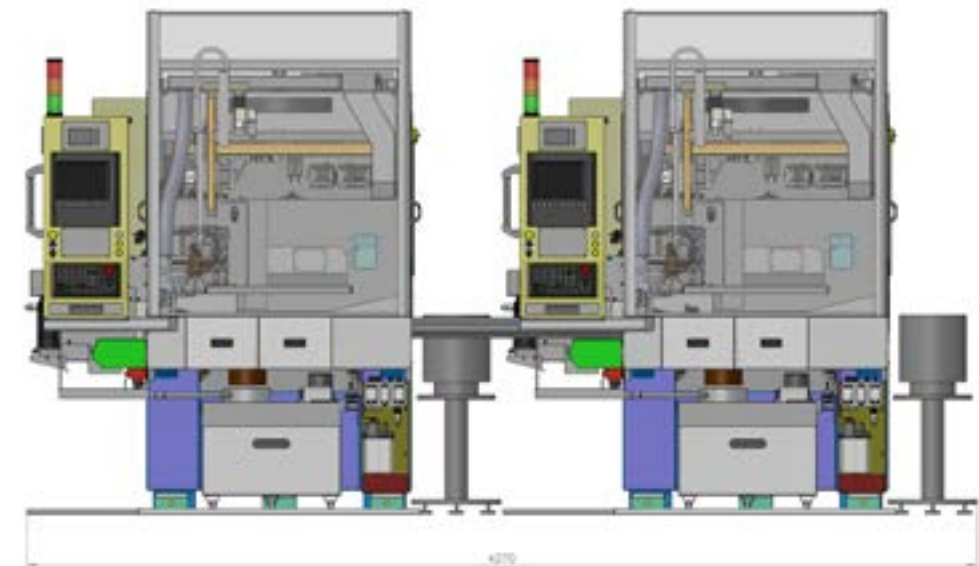
*The picture shows a stand-alone machine for grinding guide vanes for turbochargers, the diameter of the shaft as well as the blade top contour are ground.
An automatic gauge system (left) checks the parts using tactile measurement and high-resolution camera system.*



VECTOR™

FLEXIBLE PRODUCTION CELLS

Two connected **VECTOR** machines for machining parts in two separate operations. The variation of work which can be catered with this system is almost limitless and the VECTOR system is unrivalled in floorspace and variations.



The flexible and characteristics of the VECTOR concept strengthens the calculation of return of investments when the application and type of work is changing, the machine and loading setup can be easily adapted to accommodate the change of workload, operation and part type.

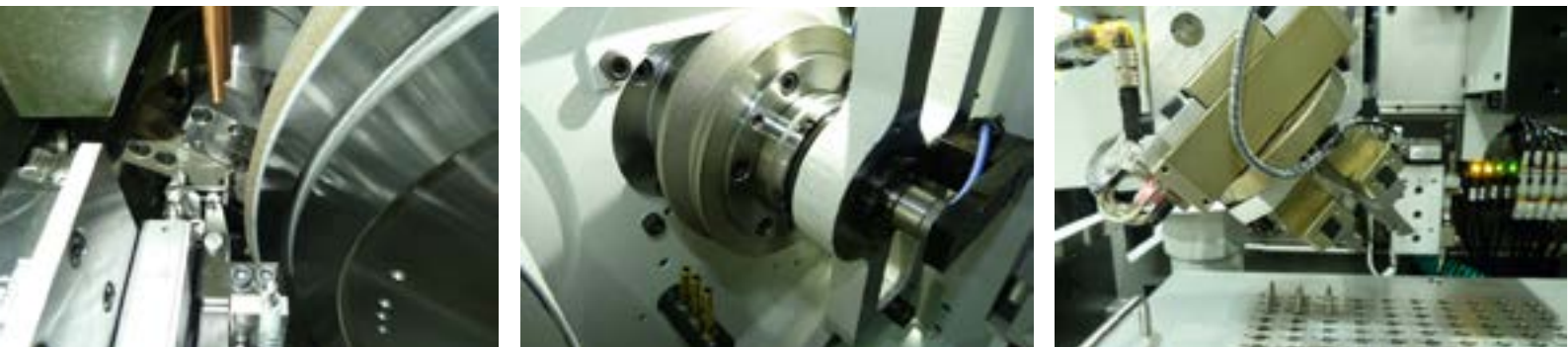


PRODUCTION LINES

The **VECTOR** concept is equally designed for high volume production lines. It can be setup as a turnkey solution together with other processes, such as lathes, super-finishing, brush deburr, wash, measurement, balancing etc. to build a modular, flexible production line with the smallest footprint.



The picture shown is a production line to grind the groove and profile from turbo charger shafts



MACHINE SPECIFICATION

Technical Data


| | |
|------------------------------|-------------------|
| Max. grinding wheel diameter | 457 mm |
| Max. wheel width | 50 mm |
| Wheel bore diameter | 152/203 mm |
| Grinding spindle power | 5 kw |
| Max. wheel speed | 5000 RPM |
| Travel „X“ direction | 190 mm |
| Travel „Z“ direction | 60 mm |
| Center height | 150 mm |
| Machine control system | Siemens 840D |
| Max. workpiece diameter | 110 mm |
| Max. workpiece length | 160 mm |
| Max. grinding length | 100 mm |
| Machine dimensions | 1200 mm x 1925 mm |



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