



Unlimited Flexibility in Production – Technology – Automation

DVS ModuLine platform:
The innovative production concept of the latest generation.

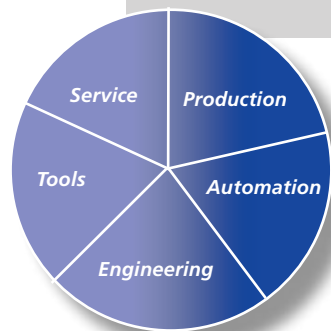




DVS is our philosophy.

The letters D, V and S stand for the technologies of "Drehen", "Verzahnen" and "Schleifen" – turning, gear cutting and grinding. These are complemented by other machining processes such as impact gear cutting, skiving, sharpening, chamfering, milling, drilling, etc.

The focus of the DVS Group lies in mastering these technologies, in order to optimise the efficiency and quality of processes in our customers' series production.



Modern series production in the throes of change.

In modern series production, our customers find themselves confronted with a range of challenges. With our new DVS ModuLine production concept, our customers are ideally equipped to meet these challenges, today and tomorrow. Modern series production is characterised in particular by the following developments:

- Increasing cost pressure
- Very short realisation times
- Limited planning resources
- Frequent model changes due to shorter product lifecycles
- Smaller production batches

The consistent further development of a proven system.

We always keep in close contact with our customers. The innovative ModuLine platform has been developed on the basis of this exchange of experience: the consistent further development of the proven DVS N1 machine basis. Like its predecessors, it combines the comprehensive technological know-how of the DVS companies – **Buderus, Diskus Werke, Pittler, Präwema and WMZ**. In combination with the latest automation facilities, ModuLine opens up new dimensions in terms of quality and efficiency, with an almost limitlessly flexible and sustainable production structure.







ModuLine ... convincing arguments

Technological productivity leadership

- Unit cost reduction by complete and simultaneous machining
- Cycle time reduction by 50% shorter travel movements
- Interruption-free production with reduced personnel due to continual parts supply
- Parallel machining and feeding by ModuLine SCARA robots
- Bypass shuttle

Flexibility & investment security

- Reduced adaptation investments and lifecycle costs even for the latest technology and process innovations
- Modular DVS system platform for high machine and system flexibility

Availability

- Decouplable production for high machine and system availability with the ModuLine bypass function

Time-to-production

- Fast production start due to standardised modules
- Rapid adaptation in case of new production requirements
- Problem-free integration into existing structures due to the low space requirement

And all with the acknowledged top production quality and technological expertise of the DVS Group!!

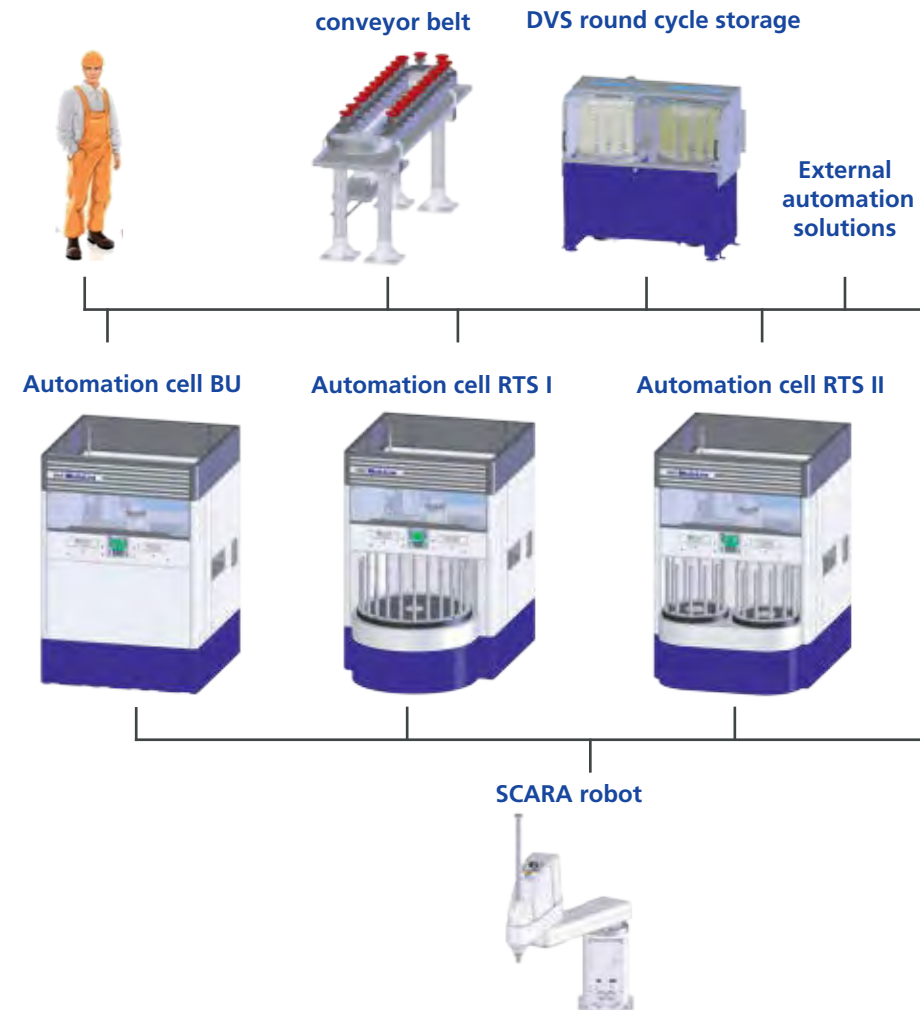
Production planning with the module component.

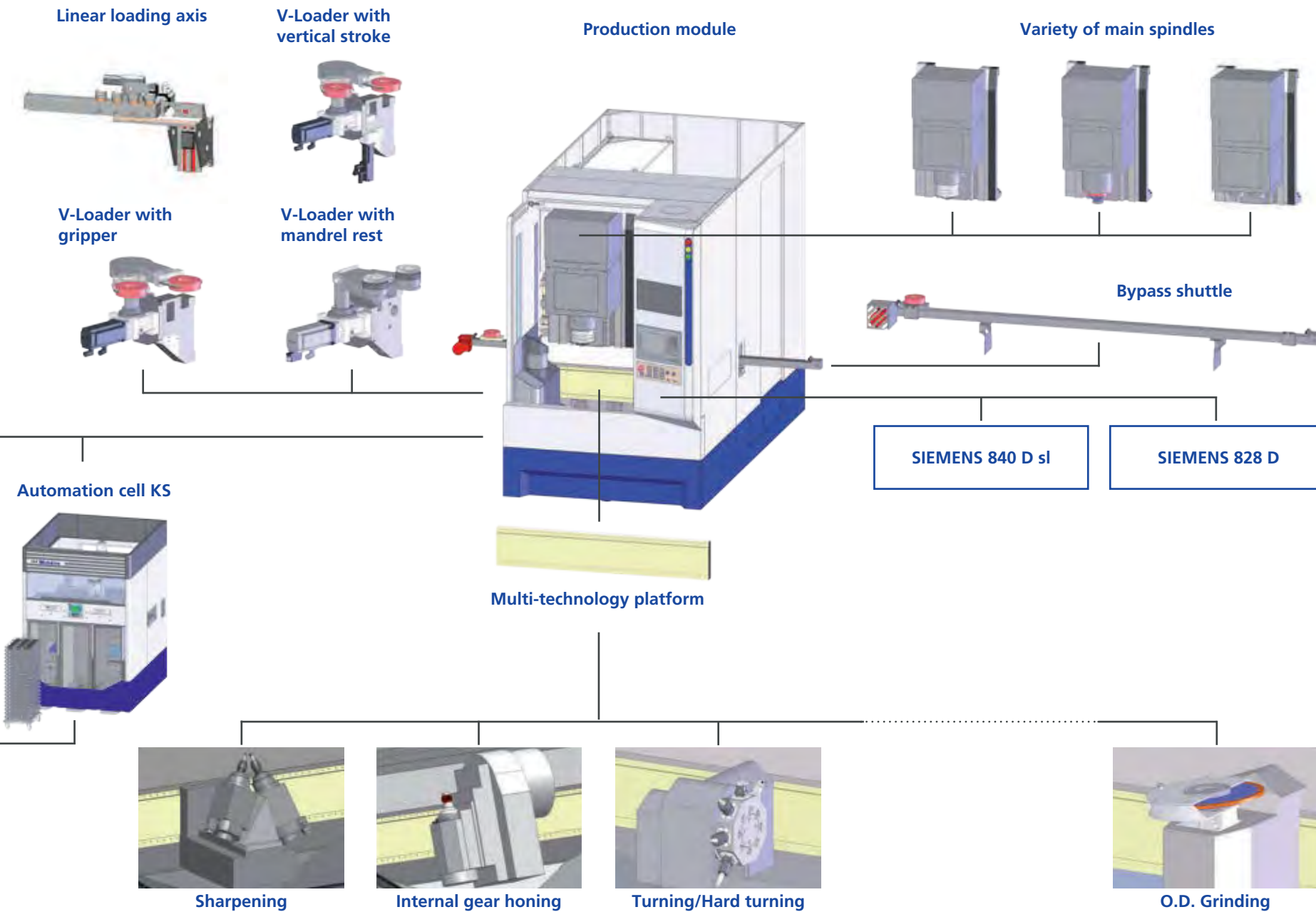


The DVS standardisation of functional units and interfaces ensures high compatibility and configurability of the ModuLine components and other external components.

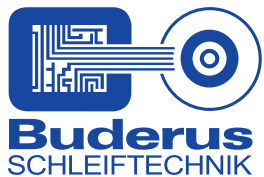
The best tool is flexibility.

The flexible ModuLine production concept adapts itself rapidly to new conditions and order situations. The individual DVS modules, whether production cells, technologies, automation or parts storage facilities can be combined individually into the optimum production solution. The great advantage is that in an existing ModuLine production structure, available modules can be easily replaced with new modules. New production solutions can be created by the regrouping, addition or reduction of modules. The latest DVS technology and process innovations can be upgraded and thereby integrated seamlessly into existing structures.





The technological expertise of the DVS Group.



Hard turning

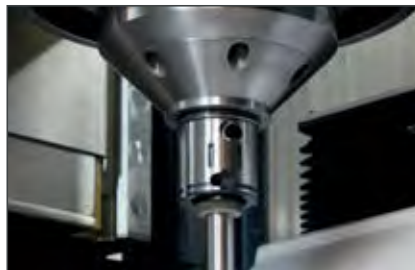
Use of all DVS technologies on one platform ... Expertise complete from a single source.



Slot milling



O.D. Grinding



Internal thread grinding



Turning



Drilling



Thread whirling



I.D. Grinding



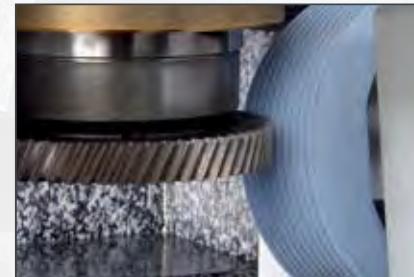
Standardised technology modules guarantee interchangeability and therefore process efficiency to the very latest standard.



Skiving



Chamfering



Gear grinding



Measuring



Sharpening



Gear hobbing

Up to 4 technology modules used in combination open up new perspectives in simultaneous and complete machining.



Impact gear cutting



Deburring



SCHLEIFTECHNIK GMBH



Face grinding

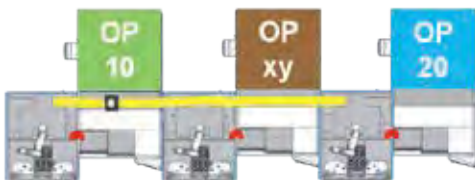
The multi-functional production module PR

More than enough room for efficiency and precision

The production module PR enables the integration of all DVS technologies for the machining of workpieces up to Ø 220 mm on an area of only 8 m². This is due to the DVS multi-technology platform, which enables rapid tooling and refitting. The heart of the production module PR is the transfer unit – the ModuLine V-Loader, the DVS interface for the automation. This now enables the parallel feed of workpieces in under 1 second. In the twin-spindle version, the V-loader is replaced by a linear loader for the efficient simultaneous machining of two workpieces. Due to the feeding of workpieces on one side only, this results in a reduction of travel movements in the working area of up to 50%. The bypass shuttle is available as an optional upgrade, which offers numerous advantages:



ModuLine bypass: the revolution in line production.



High line availability:

Decouplable production for production changes and maintenance/servicing work.



Line cycle time optimisation:

Parallel use of identical machining operations – bottleneck effects are reduced to a minimum.



V-Loader: workpiece feeding



SCARA Robot, V-Loader, Bypass



Linear loader: workpiece feeding



4 axis machining



Internal thread machining



Synchronous O.D. grinding

ModuLine Automation – No Limits

Automation variants
■ Manual feed
■ Conveyor belt
■ DVS round cycle storage
■ DVS automation cell
■ Automation of other units

The new standard: The multi-talent in standby time

Maximum productivity also with automation

The logistics hub of the ModuLine is the high-productivity automation cell, which is charged with workpieces up to Ø 150 mm via the V-loader of the production modules, and linked by means of the bypass shuttle. It also ensures quality – in parallel time – via measuring stations and SPC & NiO rejection, and detects and positions workpieces. It also carries out ancillary production machining (blowing, deburring, signing etc.) without affecting the cycle time, something which is indispensable for series production; batch assignment is ensured at all times.

Loading and unloading, linking, quality management, ancillary production machining and batch control and storage on an area of approx. 3 m² - the new standard in line production.



Base unit – Round cycle storage I + II – Basket stack storage

Multi-functional ModuLine SCARA robot

The heart of the automation cell is the ModuLine SCARA robot – a true workaholic, which has proven itself in industrial series production. Lightning fast (11 m/s), it carries out the handling of the widest range of workpieces in 4 axes.

ModuLine makes the parts “flow”

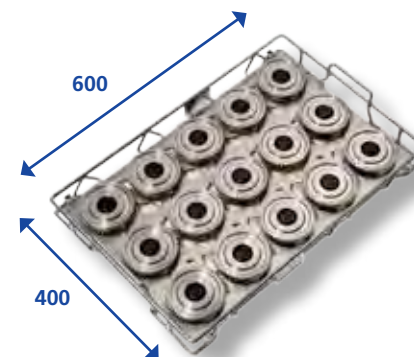
The parts storage facilities – mono-round cycle storage, duo-round cycle storage and basket stack storage – ensure interruption-free loading and unloading of the production cell with reduced personnel requirements via the automation cell. Rough parts and finished parts storage facilities are kept separate at all times. Traceability is ensured by consistent batch management.

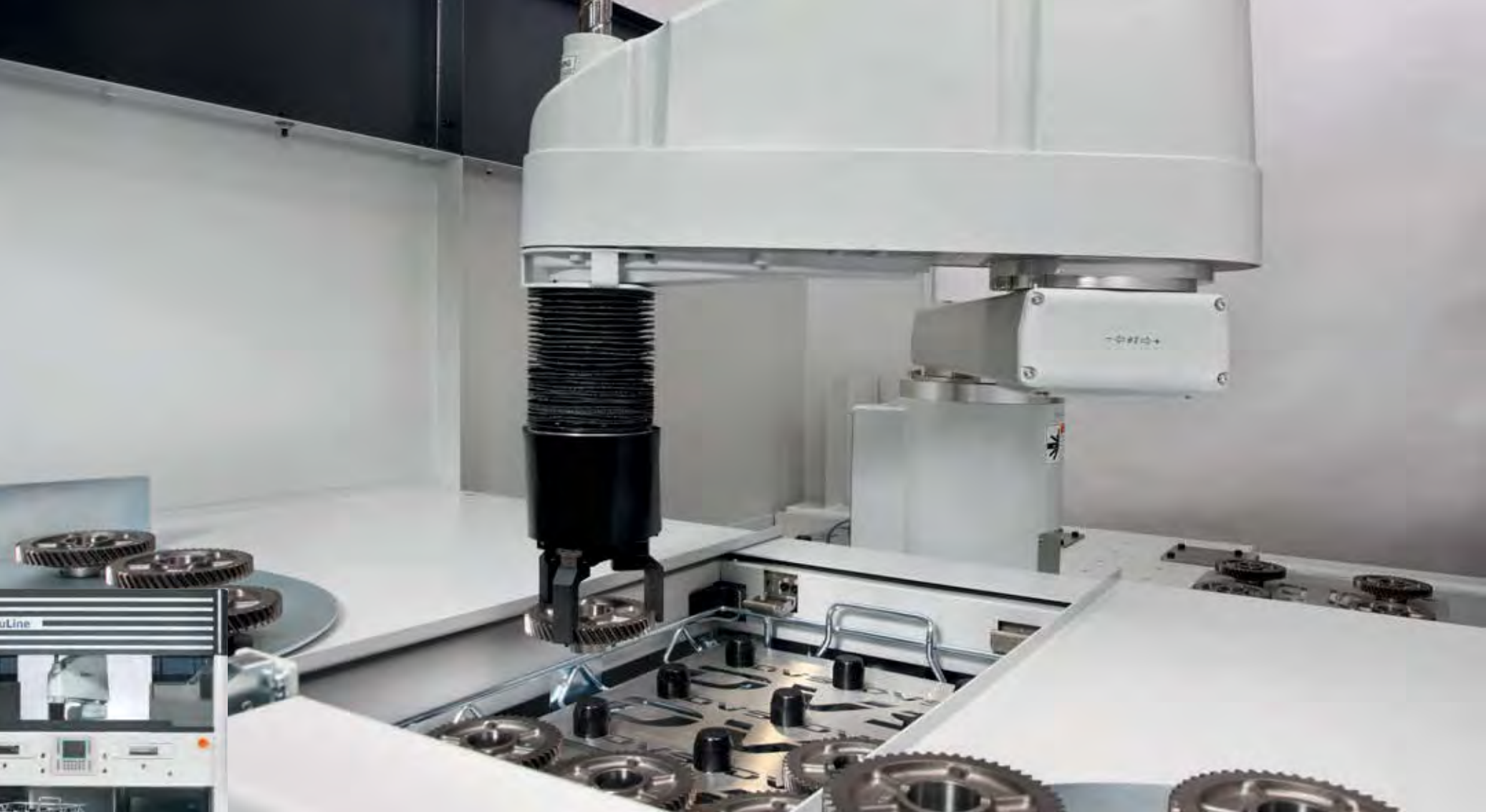
The DVS round cycle storage

The economic and space-saving DVS round cycle storage unit – with one or two stacking magazines – has established itself convincingly in series production. With a capacity of up to 1,000 workpieces, it enables long and interruption-free production.

ModuLine supports the logistics standard

The “Basket stack” transport and storage unit used in the KS automation cell is compatible with the magazine systems commonly used in series production in accordance with DIN 24602.





Round cycle storage



Lifting unit



SPC- & NOK-rejection

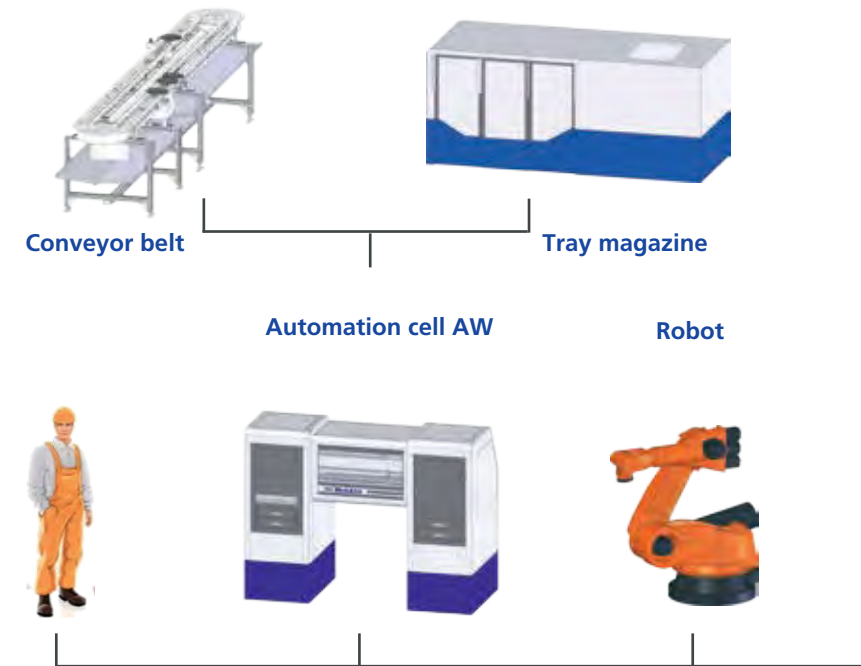
It's the combination – Production with the module component

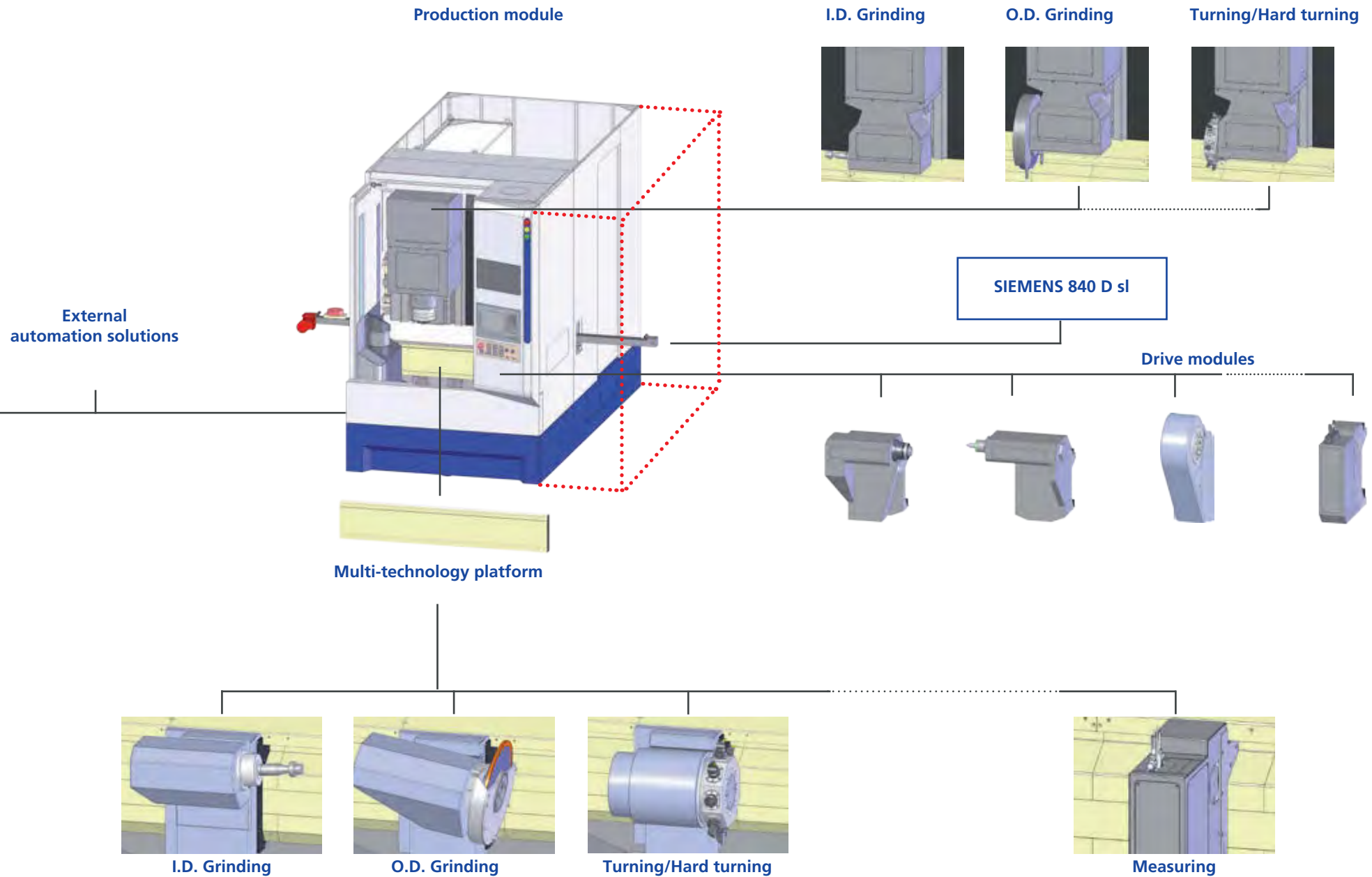


A ModuLine concept with corresponding DVS standardisation has also been developed for the machining of shaft-type workpieces. Standardised modules ensure the high flexibility of production.

Shaft production with the ModuLine

The module set consists of various modules from the areas of technology, workpiece drive, automation and parts storage. The capability of fitting technology modules both to the lower bed and the upper bed results in numerous arrangement possibilities. The range is further extended by centre drive spindles. The individual modules can be flexibly combined to produce optimum production solutions. Due to its standardisation, the integration of technology or process innovations also poses no problems for the ModuLine concept. A machine bed extended by 600 mm is available for larger shaft-type workpieces, or for the integration of further technology modules.

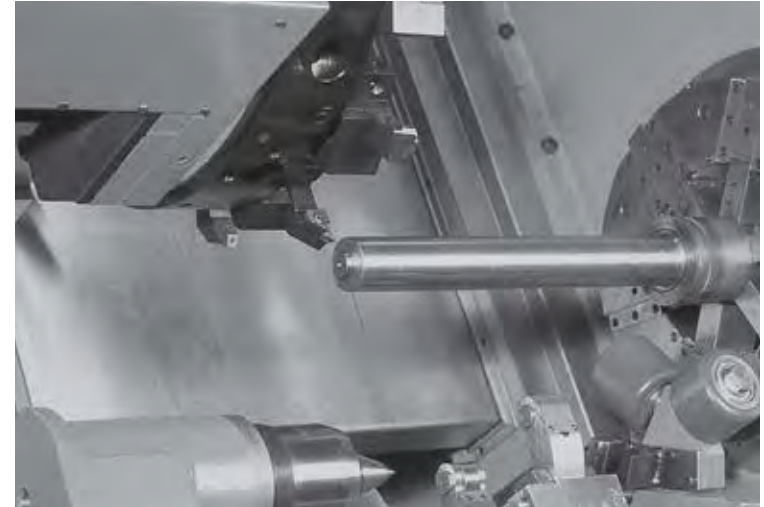
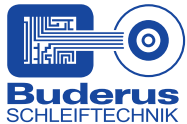




Makes independent – Flexibility in shaft machining



The technology competence of the DVS Group combined into one production concept – DVS ModuLine. All DVS technologies can be combined on one platform. The use of up to 2+2 technology modules (upper and lower bed) enables the efficient complete and simultaneous machining. A variety of technology solutions can be realised. For example the simultaneous face machining by using centre drive spindles. The stability of the workpieces is ensured by the use of steady rests during machining. Saving potentials are exploited through the use of a mobile drive for two-sided grinding processes. Also standardised interfaces enable the use of the latest developments.



Technologien	
■ O.D. Grinding	■ Skiving
■ I.D. Grinding	■ Milling
■ Thread grinding	■ Drilling
■ Turning	■ Deburring
■ Hard Turning	■ Measuring

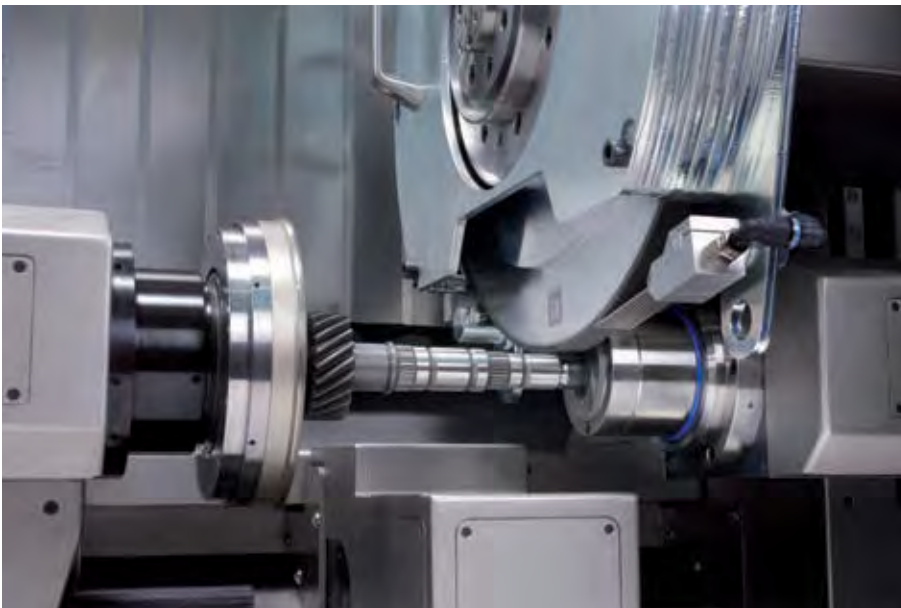


Saves time and money - The multi-functional production module



Large shafts in the smallest possible space

The integration of all DVS shaft technologies can be achieved with the production module PW for the machining of workpieces up to 500 mm in length and 150 mm in diameter on an area of only 8 m². The upper and lower DVS multi-technology platform enables the rapid upgrading and conversion of the machining modules. Complete and simultaneous machining is made possible by the integration of up to 3 technology modules, or up to 4 technology modules in the extended production module. The workpiece and centre drive spindles, mounted on the standardised interface, are interchangeable.



Technology layouts



Drive layouts



Version example





ModuLine Automation – New ways

Automation variants

- Manual feed
- 6-axis robot
- DVS automation module AW with
 - Belt solution
 - Tray magazine
- Automation of other units

The portal solution which isn't one.

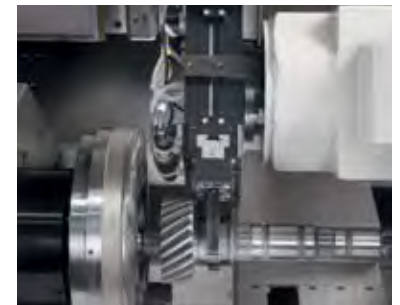
The ModuLine automation module AW ensures the efficient and time-effective workpiece feed even of shaft-type parts. The compact and independent module also offers more flexibility in production, and avoids complex portal assemblies. By means of a linear axis with swivel unit, the workpiece changing of shafts with a length of up to 500 mm and a diameter up to 150 mm can be carried out within 7 sec. Ancillary work (e.g. measurement, storage or cleaning) and quality assurance processes via SPC/NOK feed and removal can of course be carried out in parallel with the main process.

Maintenance work is greatly facilitated thanks to the compact and low design.

The automation module AW offers the following advantages:

- Compact, independent module
- Cost-effective and easily-integrated automation solution without complex portal connection requiring continual adjustment
- Easy change of use to different production processes
- Integrated ancillary functions
- Fast loading times

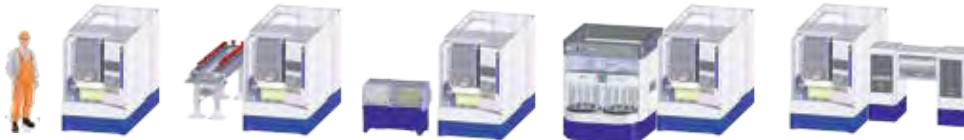




The module components



Stand-alone production



Production island



Production line



Decouplable module combination

Conveyor linking

Practice example: Soft & Hard turning





Production planning with the ModuLine module

The optimum solution for every type of production – not only for today ... but also for tomorrow

The ModuLine component rings in a new age of production planning. Due to the high configurability of this innovative concept, it is now possible to define the optimum solution for every production process, a concept which is variable and configurable to the maximum degree, and therefore absolutely reliable and viable for the future.

Configuration of the ModuLine production module

Due to the generous multi-technology platform, up to 4 technology modules can be integrated at the same time for efficient simultaneous and complete machining. A wide selection of high-performance pick-up spindles are also available, depending on the intended machining process.

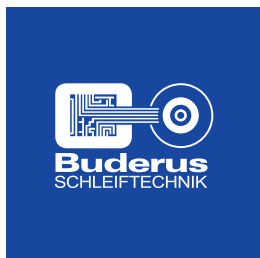
ModuLine automation configuration

The ModuLine automation cell can be adapted to every aspect of production. Feed, linking, transport, parallel post-process activities and parts storage can be combined in the smallest possible area, depending on workpieces and the installed logistics. This represents an alternative to bulky, rigid belt linkages and inaccessible gantries.

High space efficiency



The DVS technology partners



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