

Standard automation

Flexible manufacturing cells

Production lines

Engineering

Software

DMG MORI LifeCycle Services

### DMG MORI Systems



#### DMG MORI Systems

Standard automation

Flexible manufacturing cells

Production lines

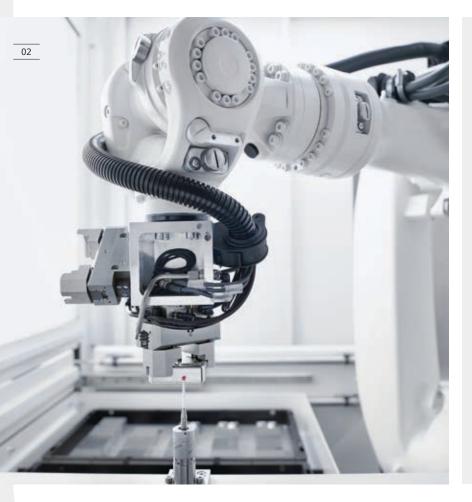
Engineering

Software

Why automate?

## Trends and possibilities – your opportunities, your profit.

Automated processes now offer the highest potentials for increase of productivity. At the same time, consistent production quality is achieved. This leads to economic success and the growing pressure of rising costs is countered efficiently. Many companies see additional value in automated processes: Highly qualified employees are relieved through automated processes, which means less shortage of specialists and saves the company costs. DMG MORI Systems supports you with many years of experience and a broad know-how base in all areas of possible automation potentials.



#### Potentials for your performance

- + Increased competitiveness and profit / returns
- + Increase of productive time (for instance bridging breaks or reduction of non-productive times)
- + Reduced labour costs and staff requirements
- + Advantages of mass production, even from small lot sizes
- + Manual operation is still possible
- + Optimal utilisation of the production capacities
- + Consistent high quality
- + Standardisation of operations
- + Efficient space utilisation
- + Increased flexibility

DMG MORI Systems

## Experience and know-how – more than 3,000 implemented projects.

Multiply your performance – with automation solutions by DMG MORI Systems. Perfect workflows and highest efficiency for your production are our trademark. DMG MORI offers you the know-how and the technology for the lowest workpiece costs at highest quality. Our standards experience spans from simple automation already integrated in the machine to planning and implementing of complex manufacturing cells or production lines.







Assembly hall of DMG MORI Systems in Hüfingen

04

DMG MORI Systems
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All-inclusive package

DMG MORI Systems

## Our 360° solution competence – analysis, consultation, implementation.

DMG MORI Systems opens all doors for you to achieve top performance. For this purpose we combine our core business, machine tools, with the leading engineering know-how in the field of automation of machine tools. Our customers benefit from automation solutions, which are tailored exactly to their requirements. Whether you want to automate a machine or a complete production line or want a cell with multiple machining steps. DMG MORI Systems will develop and implement the perfect solution for you.

#### Production planning

- + Process analysis
- + Technology planning
- + Machine design
- + Cycle calculation
- + Simulation

#### Production logistics

- + Automation planning
- + Material flow analysis
- + Layout planning

#### Start-up support

- + Training
- + Process visualisation
- + Back-up strategy
- + Remote diagnostics



#### **DMG MORI Systems**

- + 5 sites in Europe, Japan and the USA
- + Worldwide more than 3,000 implemented solutions
- + Complete added value: analysis, consultation and implementation
- + Largest and most innovative machine portfolio worldwide





#### Machine-integrated automation

#### Rotary and linear storage

As an option for the machine, DMG MORI factories have a selection of automation options, which can already be integrated in the machine.

Possible number of machines: 1

#### Standard automation

#### Workpiece or pallet handling

Efficient robots or portal solutions with additional modules (cleaning, measuring, brushing, etc.) as plug and play or available as customised versions.

Possible number of machines: 1 – 2





#### Flexible manufacturing cells

#### Linking of multiple process sequences

Portal solutions, fixed or mobile robots and additional modules for multi-machine loading with integration of additional operations.

Possible number of machines: 3 – 10

#### **Production lines**

#### Overall solutions in line production

Planning and implementation of pallets, portal and robot handling as production line.

Possible number of machines: > 10

Flexible manufacturing cells

Production lines

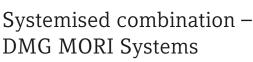
Engineering

Software

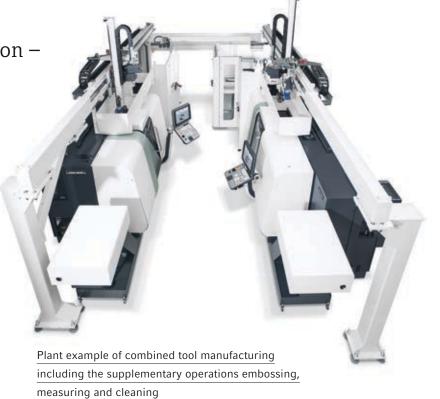
Modular systems

### Broad band of competence – individual solutions.

Whether you choose / decide for a standard automation or a production cell, we will set up your perfect automation solution according to a simple and highly efficient principle. That is just a short excerpt of our possibilities.



- + Portals, robots
- + Conveyor installations
- + Gripper attachments
- + Control systems
- + Supplementary stations
- + Workpiece holders





\* also available as telescopic axis

# Robot systems, possible load capacities: 3 to 250 kg



6-axis robot







Robot on 7th axis

Drawers



7-axis robot

Paternoster



Cage stack cell



Buffer conveyor

#### **Gripper attachments**



Double gripper



Gripper on C1-axis



Gripper on B1- and B2-axis

#### Combination options



Robot attached to the 7<sup>th</sup> axis

#### Additional stations



Measuring device drawer



Deburring station



Oil centrifuge



Vent box



Measuring

#### Standard automation

Workpiece handling

Flexible manufacturing cells

Production lines

Engineering

Software

Standard automation / Workpiece handling WH 2

## Compact handling for small workpieces.

The WH 2 is perfectly suited for the loading of turning machines with small chucks. The system operates consistently with a 6-axis industrial robot from the workpiece storage, optimal for small series, compact and with exceptional accessibility. Robot and workpiece storage are adaptable as stand alone solutions. The integrated workpiece storage allows the storage of parts up to 20 kg each per drawer.









1: Retrieval from the workpiece storage and transfer to the machine working space 2 + 3: Workpiece examples









1: Workpiece retrieval from the working space 2 + 3: Workpiece examples

Standard automation / Workpiece handling

### WH 2 and WH 3 for MILLTAP 700.

The workpiece handling WH 2 and WH 3 is perfectly suited for the loading and unloading of MILLTAP 700 with workpieces. The system operates consistently with a 6-axis industrial robot from the workpiece storage, optimal for small and medium series, compact and with exceptional accessibility. The robot and workpiece storage are completely integrated in the safety enclosure. The integrated workpiece storage allows the storage of parts up to 20 kg per drawer with a storage capacity of 15 tool holders in the circulation system.



#### Turnkey projects MILLTAP 700

- + Technology design
- + Design of the clamping equipment
- + Application technology
- + Automation based on requirements

#### Your benefits - system highlights

- + High degree of autonomy (up to 2 hours decoupling of workers)
- + Automation solution extremely flexibly adapted to MILLTAP 700
- + 6-axis industrial robot, loading capacity optional up to 7 kg
- + 15-fold tool holder circulating system for very high storage capacity

#### Standard automation

Workpiece handling

Flexible manufacturing cells

Production lines

Engineering

Software

Standard automation / Workpiece handling WH 3

## Universal with maximum storage capacity.

The WH 3 solution is extremely flexible, easily accessible, can be used universally and optimal for the equipment of diverse turning and milling machines as well as for other machine types like eroding machines or LASERTEC machines.

#### Also available as retrofit solution

#### Your benefits - system highlights

- + High autonomy and can be used flexibly
- + Extremely flexible automation solutions for turning and milling machines
- + 6-axis industrial robot, loading capacity 5 kg (optional up to 7 kg)
- + **15-fold workpiece holder circulating system** for particularly high storage capacity
- + Safety enclosure with integrated operating panel

Free access to machine set-up

+ **Optional:** Lateral displacement for optimal machine accessibility, extension to 30-fold workpiece holder





1 + 2: Workpiece examples

Standard automation / Workpiece handling WH 10

### Top performance for heavy weights.

The workpiece handling solutions WH 10 and 25 are optimal for the loading of turning and milling machines with parts up to 10 kg or 25 kg. Equipped with an industrial robot and a 2-fold (optional 4-fold) pallet change system, these standardised automation solutions are conceptualised in the familiar compact form.

#### Your benefits - system highlights

- + Complete machining through additional operations
- + **Finished system** with the maximum storage capacity
- + **6-axis industrial robot,** loading capacity up to 10 or 25 kg
- + 2- or 4-fold drawer models with a maximal load capacity of 300 kg per drawer for main time parallel loading
- + **Optional:** Lateral displacement design for optimal machine accessibility





DMG MORI Systems

Standard automation

• Workpiece handling

Flexible manufacturing cells

Production lines

Engineering

Software





1 + 2: Workpiece examples

Standard automation / Workpiece handling WH 10 top

### Space-saving automation.

Perfectly compatible with DMG MORI turning machines, this solution is equipped with a workpiece storage intended for workpiece handling of 1 to 25 kg. Loading the machine from the top, saves valuable floor space. Good accessibility of the machine working space for set-up procedures is guaranteed by the optimal arrangement of the industrial robot.



#### Your benefits – system highlights

- + Complete machining through additional operations
- + **Plug and play** with the maximum storage capacity
- + **6-axis industrial robot,**loading capacity up to 35 kg







1 + 2: Workpiece examples

WH top linear

### Simple and efficient.

The workpiece magazine with its re-stacking function ensures the smooth provision of blanks and the discharge of finished parts with the transport trolley. Arbitrary supplementary stations can be integrated between the workpiece magazine and the machine tool, like for instance measuring, cleaning or brushing.







#### Highlights

- + Loading capacity under the vertical axis: 60 / 120 / 250 kg
- + Repetition precision ± 0.1 mm
- + Scalable stacking cell
- + Adapted to the portal unit
- + High degree of autonomy
- + Low space requirement

3: Re-stacking cell PS 4 4: Gripping out of wire basket

Standard automation

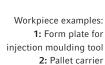
Pallet handling

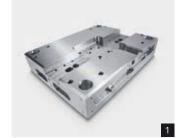
Flexible manufacturing cells

Production lines

Engineering

Software







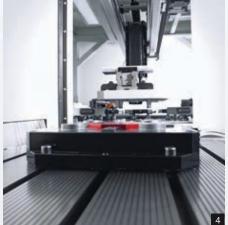
Standard automation // Pallet handling / Linear

## Optimise item costs thanks to pallet handling.

Our linear handling systems are easy to operate, flexible and highly efficient. Our standard product PH 150 | 8 with a large selection of possibilities for workpieces up to 250 kg on a varying number of pallet storage points is a perfect supplement for almost any milling machine.















Workpiece examples: 1: Latching device 2: Knee joint

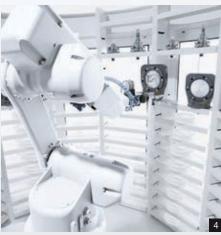
Standard automation // Pallet handling / Robot

### Exploit all possible potentials.

With the pallet handling systems of DMG MORI Systems you are always one step ahead. High storage capacities as well as a load capacity of up to 250 kg per pallet offer a high degree of autonomy for your production. The optimal automation solution with the best possible degree of operating comfort can be offered due to the multitude of options and modular system components.









3: PH 50120, machine set-up 4: PH 31100, placing a completely machined workpiece in the pallet storage system 5: PH 50120, loading of the pallets

DMG MORI Systems

Standard automation

Pallet handling

Flexible manufacturing cells

Production lines

Engineering

Software



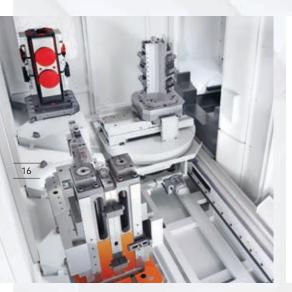


1+2: Workpiece examples

Standard automation // Pallet handling / CPP

### Perfect for small to medium lot sizes.

This very robust and stable pallet system is suitable if you want to take your production from small and medium lot sizes to a new productivity level. The modular system of standardised, pre-defined components allows you to expand from one to four machines and to use up to 2 set-up points.



#### Your benefits - system highlights

- + Simple installation with workpiece storage systems
- + Automated workpiece transfer for machine tools to reach a higher level of productivity
- + Ideal for small to medium lot sizes
- + Simple integration in every production due to simple, efficient construction and pre-defined modules
- + You can match the automation exactly to your requirements by selecting from 8 different options.
- + User-friendly, software-based system control MCC-LPS III in three configurations: BASIC, STANDARD and ADVANCED



Standard automation // Pallet handling PH 50 | 20

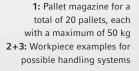
### Power and precision up to 50 kg.

The PH 50120 offers space for 20 pallets with a load capacity of 50 kg – optimal for the highest productivity in mould making and tool making. The high storage capacity allows highly autonomous operational performance and besides this it can be expanded flexibly. All orders are controlled in an operator-friendly way via the Automation Job Manager, which is accessed from a control panel.

#### Your benefits - system highlights

- + High level of automation with the Automation Job Manager
- + **6-axis industrial robot,** for handling weights up to 50 kg
- + Integrated pallet magazine with 20 unloading points and integrated set-up area for main time parallel loading
- + **Optionally** expandable with additional shelf unloading points











#### Standard-Automation

· Additional operations / Individual solutions

Flexible manufacturing cells

Production lines

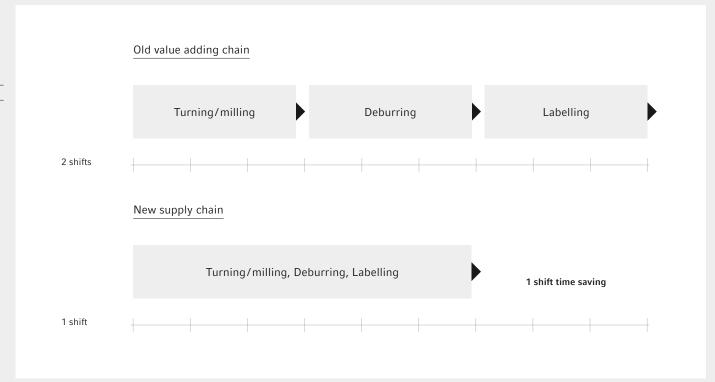
Engineering

Software

Standard automation

### Additional operations increase added value and productivity.

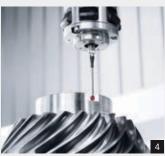
All automation solutions of DMG MORI Systems with 6-axis industrial robots or with a portal can be equipped with additional operations, which are carried out in parallel to the machining process by the automation system. Through the reduction of manual activities and simultaneous increase of added value, the economic efficiency of production can be increased significantly.











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Standard automation

## Individual solution for your special requirements.

Do you have special requirements and conditions in your production? Whether it is individual work piece specific feeding systems, process optimisation through linking of machine tools or the integration of additional operations, like for instance optical image processing, position recognition or loading of multiple machine tools. We will modify your solution for you with the aid of our modular building block system (see p. 6).











Automation solution for a DMU 80 P duoBLOCK® with integrated pallet (1) and workpiece handling (2). Gripper change from pallet handling to workpiece handling is done fully automatic in the robot cell (3). Workpieces can be turned around at the re-grip station (4). The system can be expanded with a second milling machine.

DMG MORI Systems

Standard automation

Layout plans

Flexible manufacturing cells

Production lines

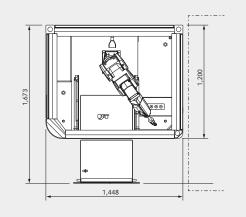
Engineering

Software

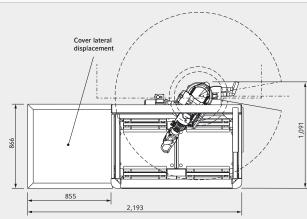
Workpiece handling / Pallet handling

### Layout plans

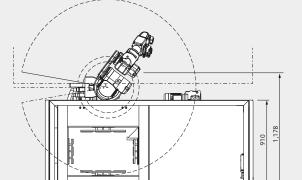
WH 2



WH 3

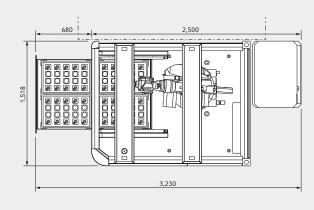


WH 3 U

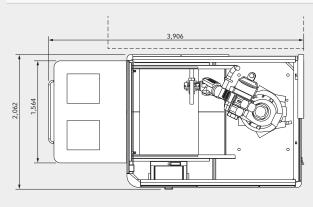


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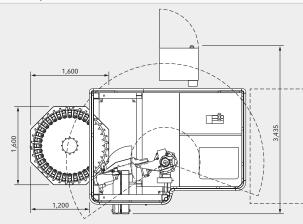
WH 10



WH 25

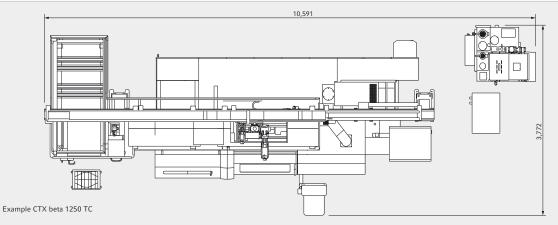


WH 10 top

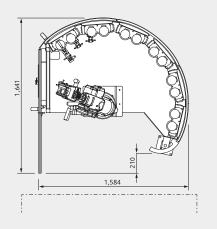


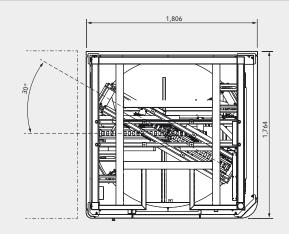
20

#### WH top linear

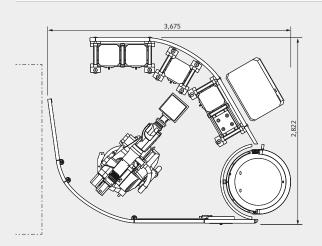


PH 3|100 PH 150|8



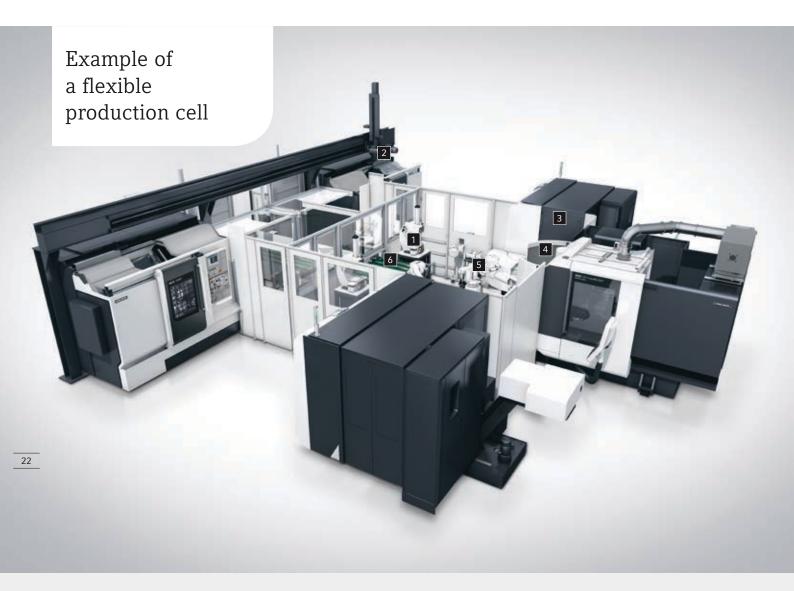


#### PH 50 | 20 / 200 | 20



DMG MORI Systems
Standard automation
Flexible manufacturing cells
Production lines

Engineering Software



#### Additional devices

Measuring, cleaning, embossing device

- + SPC drawer
- + NIO drawer

#### 2-axis portal

for two NZX2500 production turning machines

- + SPC conveyor for static process control
- + double gripper for fast part changing (8-10 seconds)
- + pneumatic loading hatch for de-selecting individual machines from the process

#### CTV 250 with rotary cycle storage and

#### integrated centring equipment

- + Rotary table as intermediate decoupling
- + Rotary table for decoupling automation / machine
- + When a machine is de-selected, it is possible to machine manually via the rotary table (individual parts / re-work)

#### DMC 55 H duoBLOCK® with pallet storage

Transfer of finished parts from the DMC 55 H to an available CTV 250  $\,$ 

#### Two 6-axis robots

with 20 kg loading capacity each

#### Cycle conveyor

for loading and unloading of the complete system

- + Conveyor also serves as intermediate buffer
- + Fast lane for SPC parts

  If requested, a component can overtake the parts in the buffer

# From the blank to the finished workpiece – complete machining according to your requirements.

In this segment we project the entire material flow for your workpiece. Together we will establish the linking of different machine tools. Of course we will incorporate the necessary additional tasks, like for instance deburring, cleaning or assembling, into the optimal workflow. As a result you get an automation cell with maximal productivity.





#### Reference

Full machining of gear shafts

Maximal productivity thanks to optimal material flow. The system combines outside turning, gear cutting and inside turning in one continuous material flow. Control is accomplished with a process control computer including component tracking. Two decoupled lines allow the simultaneous production of different component versions.

#### Reference

Production of turning parts

This extremely compact cell serves the purpose of producing complex turning pieces. The system combines machining in a CTX alpha 500 with a linear portal with a subsequent machining step in CTX alpha 300, including the ancillary activities embossing, measuring and cleaning. Supply of blanks and discharge of finished products is done by pushing a transport trolley into a storage cell.

#### Your benefits

- + Tailored to individual requirements
  - \_ Requirements analysis
  - Planningvalue adding chain
  - \_ Communication with ERP systems
  - \_ Modular solution
- + Most efficient space utilisation
- + Large workpiece weights possible
- + Unmanned production
- + Just-in-time production
- + Turnkey projects
- + Medium and large lot sizes
  - Optimised machining steps in the machine
  - Optimised loading and unloading of machines
  - Automation of subsequent steps
- + Many workpiece options
  - Automated change of different workpiece types
  - \_ Machining of different workpieces as a mix

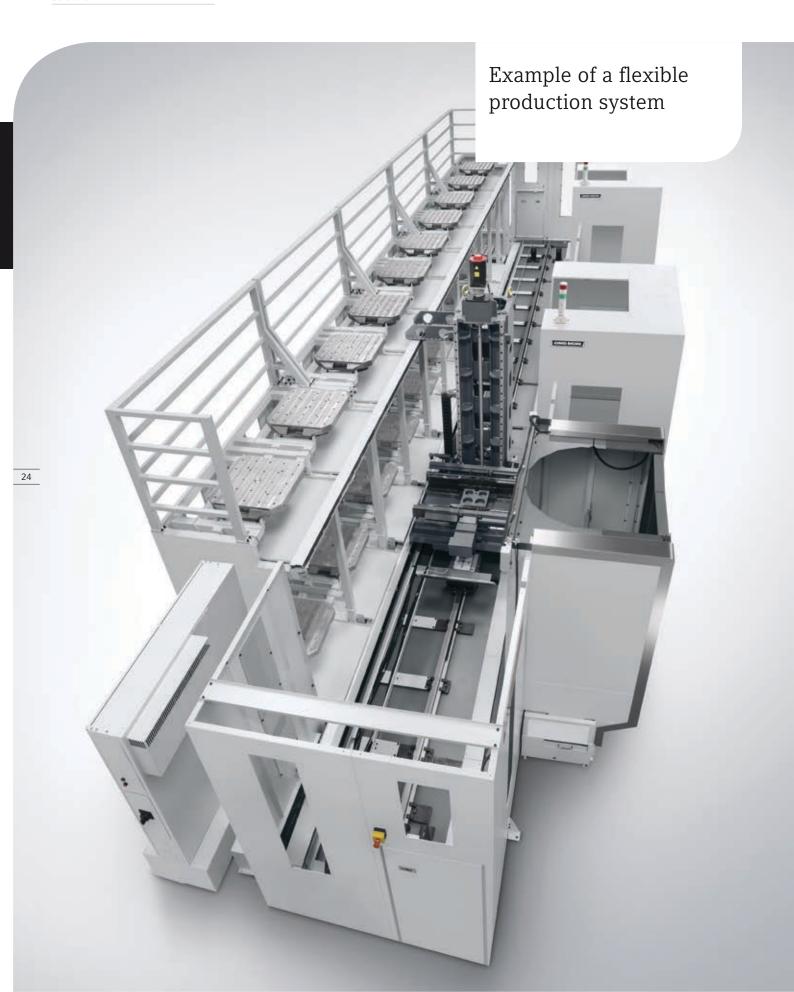
DMG MORI Systems
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Flexible manufacturing cells

**Production lines** 

Engineering

Software







1: Cylinder head 2: Universal joint assembly

**Production lines** 

## The future today – material flow in fully automatic production.

Large production systems, complex process chains or exceptionally specialised production. DMG MORI Systems offer you highly efficient solutions in every case to maximise the throughput of items. Make use of our competence in the fields of engineering and tech-nology – for fully automated production with the highest degree of economic efficiency. Welcome to the future – at DMG MORI Systems.





#### Your benefits

- + System solution for large series production
   (3 10 or more machines)
  - \_ Optimised machining steps in the machine
  - Optimised loading and unloading of machines
  - Automation of subsequent machining steps (e.g. washing)
- + Integration of multiple machining centres
- + Fully automatic set-up points (robots or portal loading)
- + Control by LPS III software (details on page 29)
- + Automated functions: Loading and unloading, transport, measuring / testing

## Engineering and know-how – we plan and implement your success.

In the area of production cells and lines top engineering is needed. If you are looking for top quality engineering, DMG MORI Systems is your choice. DMG MORI has bundled its expert know-how in the field of production planning in this company. Our experts ensure an optimal workflow, taking into consideration all required technologies and work steps. It is always the objective to plan and implement the most efficient production of your workpieces.





- + Many years of international experience in the field of production planning
- + Expert knowledge and experience in machine tool construction
- + More than 3,000 projects in the field of machine tool automation completed successfully
- + Customer-oriented focus on economic solutions
- + Broad basis of solution competence for individual customer requirements
- + Successfull combination of modern production technologies and worldwide leading cutting competence





- 1: Planning, engineering
- 2: Simulation
- 3: Implementation

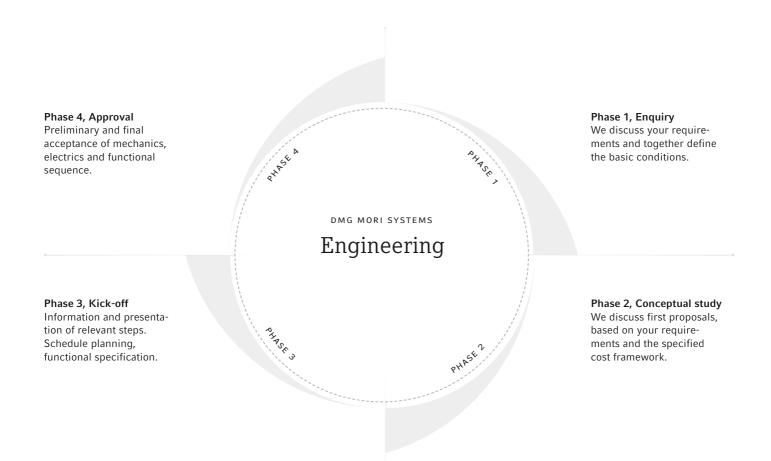


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DMG MORI Systems

## Every customer problem makes us grow. We are looking forward to your challenge.

Ground breaking solutions often result from quite individual technical challenges. Our top priority is to continiously increase our engineering competences. Therefore we have a weakness for small and big technical problems, which we strive to solve with all our strength. We are not bent on technical detail, but always see the bigger picture. Engineering, as we see it, binds us to the customer today, and offers mature solutions for the future tomorrow.



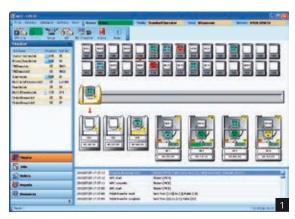
#### Software

## MCC-LPS III software – the highly developed cell control system.

Flexible an efficient of material flow for your workpieces. Select the ideal implementation of workpiece transfer, which best fits the workpieces and the production volume. The newly developed MCC-LPS III is completely flexible. Many functions open the way to maximum productivity and process safety – from task management and task sequences, machining programme management, material, equipment and tool management, system status monitoring up to diverse production reports. You can get this software in the versions BASIC, STANDARD or ADVANCED, depending on your requirements.

#### Highlights

- + Job-based planning and operation
- + Job / order grouping
- + Input and output of machining programme and workpiece correction
- + Workpiece attachment at different stations
- + System monitoring
- + Job set-up display
- + Access authentication control system
- + Adaptable reports
- + Diagnostic and restoration report





Visualisation overall system
 Production plan

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