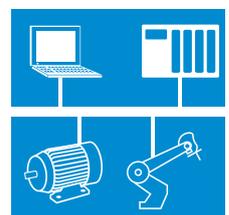


CIM – Computer Integrated Manufacturing



Automated Machining Technology

Tried and true machining technology ...

Machining technology is a fundamental aspect of many industrial sectors. In order to keep manufacturing cost-efficient it has been necessary to automate manufacturing processes. We provide this solution.



... in combination with robotics

Today, in the industrial serial production of mass volumes of goods, the use of one or more robots is a must to ensure that the manufacturing processes are working at maximum efficiency. In our training system a robot operates in combination with CNC machines.



Integration into automation engineering

CNC programming and machine tooling is an important task in many metal working factories and puts huge demands on student and trainee alike. In keeping with and complimentary to our IMS® program, Lucas Nülle is offering CNC training solutions. The CIM training system is a teaching program that lives up to the demands of modern training and advanced education in the area of metal working. Workpieces can be manufactured for further use in IMS® applications during project work.



Your benefits

- High-quality machines
- Professional software with simulation of machining operations
- Construction and quality correspond to current industrial standards
- Long working life and consistent manufacture of high-precision components
- Functionality comparable to modern industrial machinery
- All machines set up to cover all of the subjects contained in the training schedule

Optional automation accessories permit integration of IMS® stations, e.g. for the coupling of the CNC machine to the IMS® robot station, which then performs the loading and unloading of the CNC machine.

Lathe Machine

CIM 1

The compact **lathe** is perfectly suited for training applications and corresponds to industrial standards both in terms of design as well as function. Using this device all of the processes essential to modern manufacturing techniques can be illustrated and realistically demonstrated. Sensible simplification, elegant machine configuration and easy operability guarantee rapid learning success.



ILA course: Ranging from the basic principles of lathe operations to the manufacture of a workpiece

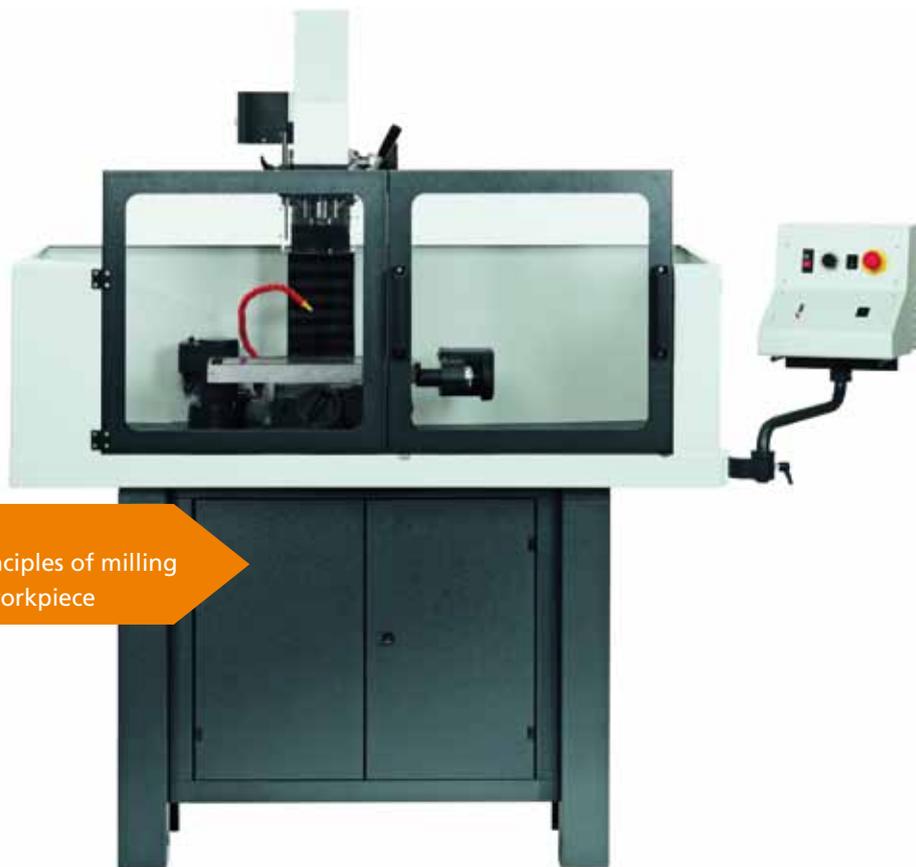
Your benefits

- Compact CNC lathe
- Industry-standard, hardened V-shaped cast iron bed
- Direct control either using included programming software or by means of conventional manual operation
- Safety machining cabinet
- Spindle features clockwise and anticlockwise rotation
- Continuously controllable main drive
- Automatic 8-fold tool changer
- Entire manufacturing process can be automated thanks to robot integration
- IMS® integration possible
- Manufacturing the bolts for IMS®
- **ILA course:**
 - Material properties
 - Geometrical and technological fundamentals
 - Project-related workpiece manufacture

Milling Machine

CIM 2

The compact **milling machine** is perfectly suited for training applications and corresponds to industrial standards both in terms of design as well as function. Using this device all of processes essential to modern manufacturing techniques can be illustrated and realistically demonstrated. Sensible simplification, elegant machine configuration and easy operability lead to rapid learning success.



ILA course:

Ranges from the basic principles of milling to the manufacture of a workpiece

Your benefits

- Compact 3-axis CNC milling machine
- Direct control either using the programming software included or by conventional manual operation
- Safety machining cabinet
- Spindle features clockwise and anticlockwise rotation
- Continuously controllable main drive
- Automatic 8-fold tool changer
- Entire manufacturing process can be automated through robot integration
- IMS® integration possible
- Manufacture of an upper and lower workpiece section for IMS®
- **ILA course:**
 - Material properties
 - Geometrical and technological fundamentals
 - Project-related workpiece manufacture

Total Automation and IMS® Integration

CIM 11/12 – Lathe and milling machine fully integrated into IMS®

Subjecting the individual station to full automation is the first step towards total integration in a production line. This is achieved with the aid of a robot that functions as a link between the machining equipment and the IMS® station. The robot undertakes the steady loading of the workpiece blanks and subsequently the unloading of the machined (lathed and cut) workpieces. The finished workpieces are then safely loaded into the magazine of the corresponding IMS® station.



Safe is safer

In all of the CIM systems numbering 11-23, the working ranges of the robot are safeguarded by safety packages designed specifically for this application. As soon as the infrared beams of the light curtain are interrupted, the robot is disabled. The robot also immediately stops its work when the front flap of the lathe or milling machine is opened, thus preventing injuries and material damage.



Total Automation and IMS[®] Integration

CIM 11 – Lathe production lines with 3 subsystems

IMS[®] 5 – Processing, IMS[®] 11.2 – Robot, CIM 1 – Lathe

IMS[®] 5 – Processing

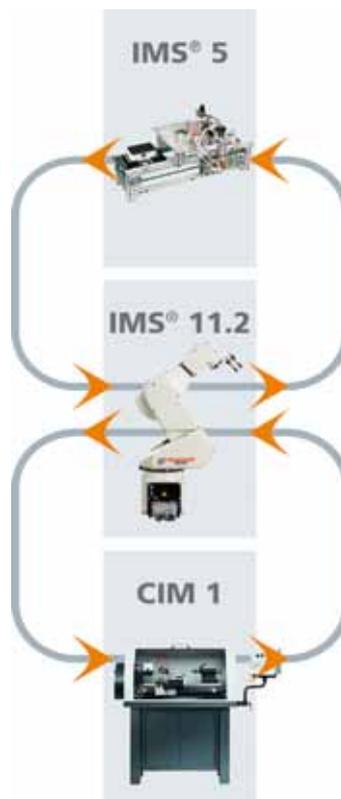
The processing station is filled with bolts by the robot. A workpiece carrier loaded with a workpiece is positioned under the station. A bolt from the gravity feed magazine is inserted into the bore hole of the workpiece.

IMS[®] 11.2 – Robot

The robot supplies blanks to the lathe. After the manufacturing process has been completed the robot extracts the finished bolt from the lathe and places it into the magazine of the processing station.

CIM 1 – Lathe machine

The lathe comes with an automation installation kit included. Thanks to the pneumatically controllable slide door on the rear wall, the robot is able to remove the workpiece or insert it into the collet's pneumatically controlled quick-action chuck. The solenoid valve permits PLC control of the lathe.



CIM 12 – Milling machine production line with 3 subsystems

IMS® 3 – Sorting, IMS® 11.2 – Robot, CIM 2 – Milling machine

IMS® 3 – Sorting

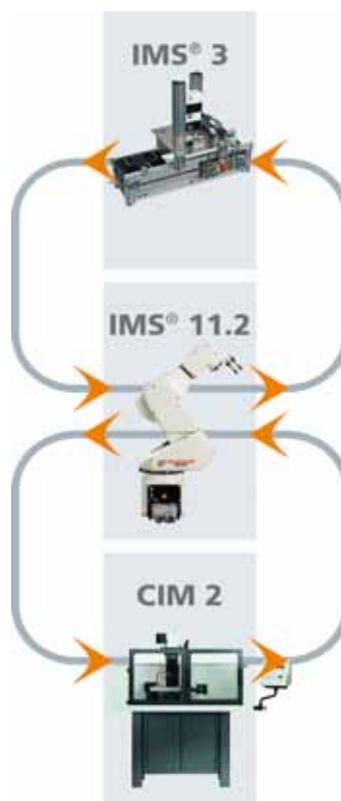
The sorting station is filled with workpiece subsections by the robot. A workpiece carrier is positioned under the station. A workpiece subsection is deposited on the carrier from the gravity magazine.

IMS® 11.2 – Robot

The robot supplies blanks to the milling machine. After the manufacturing process is complete the robot removes the finished subsection from the milling machine and places this into the magazine of the sorting station.

CIM 2 – Milling machine

The milling machine is equipped with a pneumatic-hydraulic machining vice. The solenoid valve permits PLC control of the milling machine.



From the CIM Station to IMS[®]-equipped Production Plants

CIM 21-23 – Realistic modelling of an integrated production processes

When CIM machines are integrated into the production plant, the system covers everything from workpiece production to end product assembly and includes warehousing and disassembly into individual parts. The production lines CIM 21 to CIM 23 contain nine to twelve subsystems for the realisation of one's own production plant. The production lines offer the choice of manufacturing all workpiece parts completely or partial manufacture, whereby the missing parts for the end product are included in the delivery.



CIM 21 – Production plant with 9 subsystems

IMS® 3 – Sorting, IMS® 4 – Assembly, IMS® 5 – Processing, IMS® 6 – Testing, IMS® 8 – Storage, 2 x IMS® 11.2 – Robot, CIM 1 – Lathe, CIM 2 – Milling Machine

Same as IMS® 25, but also includes:

2 x IMS® 11.2 – Robot

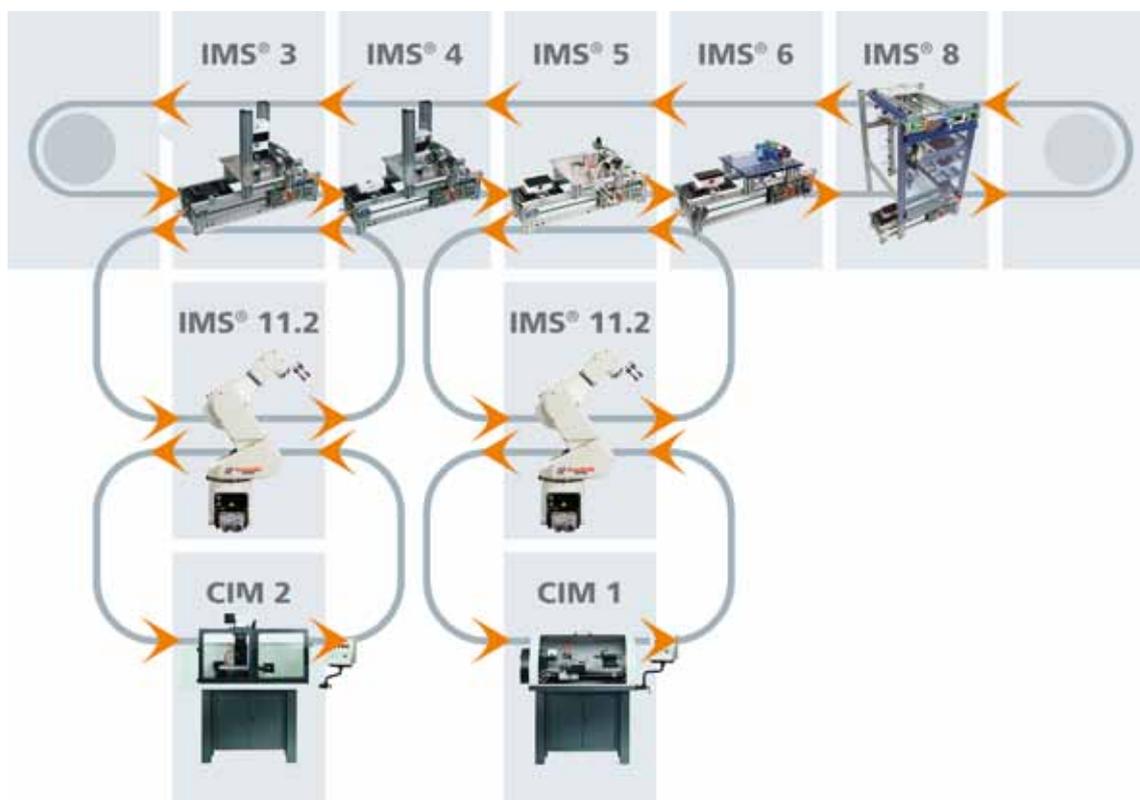
Two robots are used to place blanks into the machining tools which then upon completion of the manufacturing process load the finished workpieces from the lathe or milling machine into the magazine of the sorting or processing station.

CIM 1 – Lathe machine

The lathe is equipped with an automation retro kit. Thanks to the pneumatically controllable sliding door on the rear wall, the robot is able to remove the workpiece or insert it into the collet's pneumatically controlled quick-action chuck. The solenoid valve permits PLC control of the lathe.

CIM 2 – Milling machine

The milling machine is equipped with a pneumatic-hydraulic machining vice. The solenoid valve permits PLC control of the milling machine.



From the CIM Station to IMS[®]-equipped Production Plants

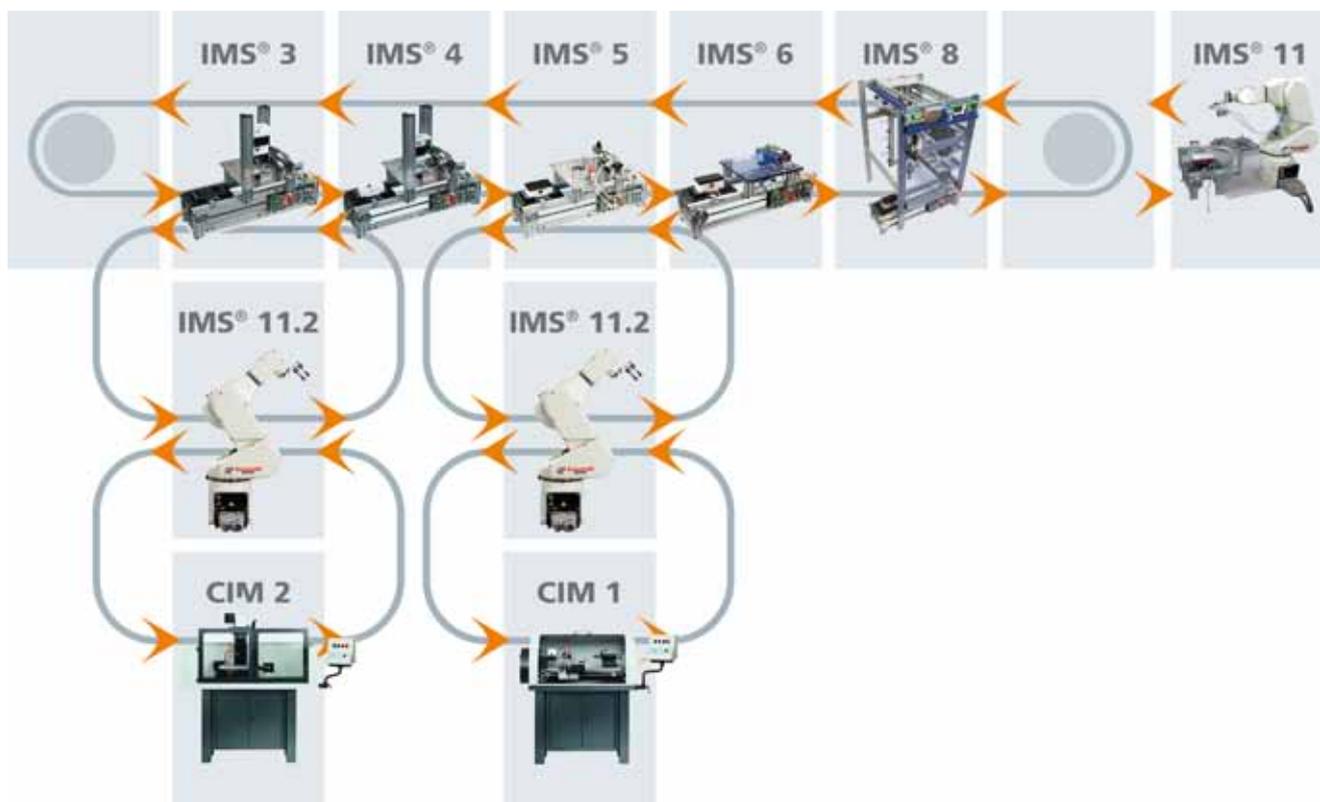
CIM 22 – Production lines with 10 subsystems

IMS[®] 3 – Sorting, IMS[®] 4 – Assembly, IMS[®] 5 – Processing, IMS[®] 6 – Testing, IMS[®] 8 – Storage, IMS[®] 11 – Disassembly, 2 x IMS[®] 11.2 – Robot, CIM 1 – Lathe, CIM 2 – Milling machine

Same as CIM 21, but also includes:

IMS[®] 11 – Disassembly

The robot extracts the workpiece from the conveyor belt and places it in the disassembly station. There it dismantles the workpiece into its component parts. When this has been completed, the robot sorts the components into the appropriate storage destinations.



CIM 23 – Production lines with 12 subsystems

IMS® 3 – Sorting, IMS® 4 – Assembly, IMS® 5 – Processing, IMS® 6 – Testing, IMS® 8 – Storage, IMS® 9 – Routing, IMS® 10 – Buffering, IMS® 11 – Disassembly, 2 x IMS® 11.2 – Robot, CIM 1 – Lathe Machine, CIM 2 – Milling Machine

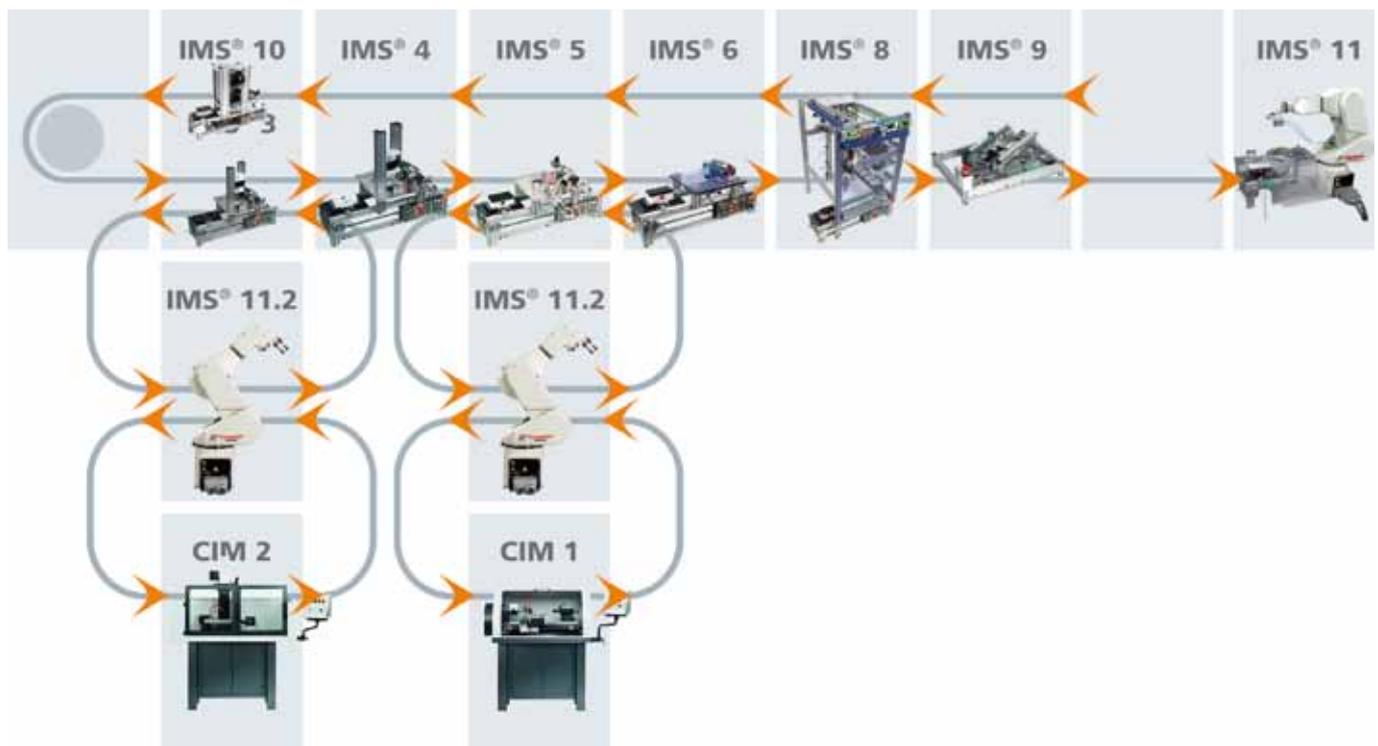
Same as CIM 22, but also includes:

IMS® 9 – Routing

The routing unit can route the workpiece to a different subsystem or reverse its direction of motion.

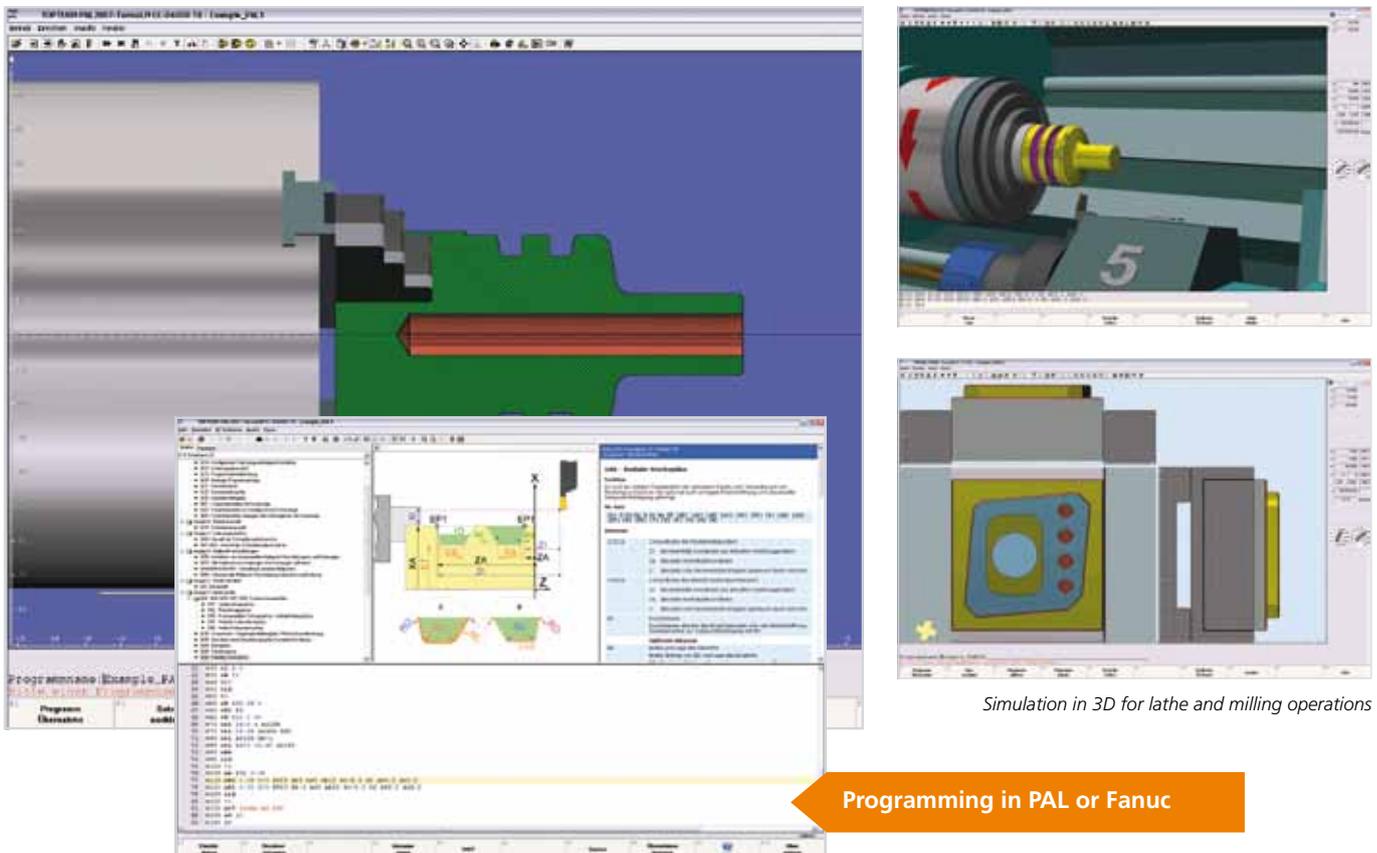
IMS® 10 – Buffering

If more than one workpiece carrier is located on the conveyor belt, the buffering subsystem controls the flow of materials. The workpiece carrier is raised by means of a lifting device. If needed the workpiece carrier can be returned to the conveyor belt.



Professional 3D programming software

Direct programming of CNC machines is possible using the professional 3D programming software. These programs can be created in PAL or Fanuc and simulated in 3D, tested and converted into machine G-code using a post-processor especially adapted for CIM 1/2 machines. The professional 3D software is available in the lathe and milling machine version. Automated manufacture feature is also possible. This is achieved by deploying a tool changer, a thread cutter in CNC operation, an electronic handwheel as well as the use of higher processing speeds.



Simulation in 3D for lathe and milling operations

Programming in PAL or Fanuc

Scope of functions

- Program input according to DIN 66025 with G and M functions, as well as PAL programming
- 3D or 2D simulation of the machining process with machine and tool depicted
- Data transfer from PAL or Fanuc source code and conversion into a working G program code
- Input of technology values
- Machine-independent programming
- Cutting radius compensation

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