

CNC SOLUTIONS

IDEALLY MATCHED HARDWARE AND **SOFTWARE COMPONENTS**
EN

CNC SOLUTIONS



CNC KERNEL

Scalable entry-level or high-end CNC solution



COMBIVIS studio 6

Automation tool for CNC, PLC, safety and drives



COMBIVIS studio HMI

CNC visualization



COMBIVIS CLOUD

Ready for IoT



COMBIVIS CONNECT

Remote maintenance



SEAMLESS INTEGRATION

In order to create a complete CNC solution, a consistent concept of coordinated hardware and software components is required. This starts with IPC-based control technology and fitting visualization, extends to drive controllers with integrated safety up to motors and gears. System solutions from a single source simplify implementation.

SCALABLE SOLUTIONS

Entry-level solution

KEB offers an economical basic solution for selected applications with integrated KEB CNC kernel. The user has at his disposal a library according to IEC standard, which can be extended easily by machine-specific functions and special features. At the same time, the software package offers the possibility of using a dedicated visualization with a user-friendly HMI.

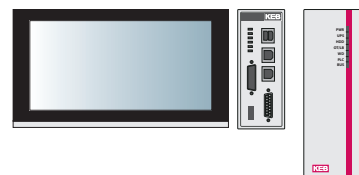
High-end solution

For demanding requirements, the high-end solution for CNC automation can be selected. This solution integrates ISG's CNC kernel with various features for CNC, robotics and motion control. It is characterized by excellent path and speed planning as well as the underlying architectural model of the software. This allows the user to make individual adjustments and add extensions.



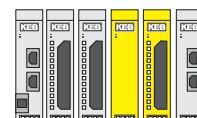
EMBEDDED CONTROLS IPC CONTROLS

Scalable real time control solutions



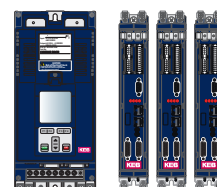
REMOTE I/O SAFETY PLC

EtherCAT® based I/O system,
Safety over EtherCAT®



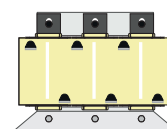
DRIVE UNITS

Modular drive systems



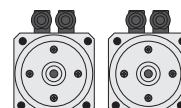
FILTER

Flexible mains and
motor filters



MOTORS

Extensive range of
motors



HIGHLIGHTS

- Ideally matched hardware and software solutions
- CNC kernels with extensive function packages
- Extension of machine functions via IEC 61131
- User-friendly HMI
- Scalable controls, drives and motor solutions
- Open tools for automation with COMBIVIS studio 6
- Safety
- Remote maintenance integrated

HMI



CNC VISUALIZATION

The CNC solutions contain the complete CNC visualization in a user-friendly interface. The HMI interface is designed for intuitive operation with multi-touch and offers convenient features for the operation of CNC applications. The associated commissioning wizard guides the user from the reference point run to the determination of the up to 100 zero points of the workpiece and, if necessary, machine coordinate systems to the parameterization of the CNC program and all necessary machine settings.

This enables even users with less experience to start a machine program without any problems. In addition to operation via the capacitive touch screen, classic operation via mouse and keyboard is also possible.

MACHINE FUNCTIONS

- G-Code Editor
- Tool hopper handling
- Tool types management
- Machine and workpiece coordinate system management
- Path setup
- Spindle management

SETUP WIZARD

- Parameterisation of the CNC process
- All necessary machine settings

ENTRY-LEVEL SOLUTION

CNC SOLUTION WITH KEB KERNEL

The flexible and scalable system solution with integrated KEB CNC kernel consists of control, visualization, safety technology, drives and motors. It enables various applications in the field of CNC.

- Up to eleven interpolating axes in the Cartesian coordinate system
- No limit for non-interpolating axes in the bus network for all scaling in the CNC program
- Scalability of CNC controllers
 - Embedded controls as an economical solution
 - IPC technology for higher demands on cycle time
- Orientation at the Tool Center Point (TCP) as standard
- IEC 61131 programming environment for implementation of machine-specific functions
- Large number of interfaces for access to all information and customer-specific operation of the machine

The time-optimized commissioning of the CNC kernel takes place in four simple steps:

- Definition of kinematics used
- Parameterisation of CNC settings
- Registration of axes
- Creation of variables for exchange in G-code (optional)

These settings and extensions are based on standards according to IEC 61131-3 and DIN 66025. In addition, further G-code commands can be integrated and edited as well as subprograms retrieved in the G-code. Furthermore, the CNC kernel supports mathematical and logical expressions as well as string operators.

KEB_CncKernel	
InverterEnable	InitDone
ManualInterfaceIn	Progress
Reset	ProcessTime
AutoPause	ActGcodeFile
StepPause	ActGcodeLine
StartAutomatic	DistanceToGo
StopAutomatic	TargetDistance
ResetAutomatic	ActVelocity
ResetToolChange	RetractState
SetCncMode	AxisPowered
SetCoordinateSystem	AxisInMotion
GCodeFile	AxisHomingDone
SearchSetup	SpindleState
FeedOverride	ManualInterfaceOut
SpindleOverride	ActCncMode
StoreSettings	ActCoordinateSystem
CncSettings	RequestedTool
CoordinateSystemList	ActTool
Tools	ActToolCorrection
ToolCorrection	ToolChangeActive
	Error
	ErrorID
	ErrorStr
	ToolErrorID
	ActPosAcs
	ActPosMcs
	ActPosWcs

CORE FUNCTIONS OF THE CNC SOLUTION

- Manual/automatic mode
- Macros (WCS calibration function)
- M/T/S command functions

The type and scope of the CNC kernel can be adjusted according to the required kinematics. It works by default with the orientation at the tool center point (TCP). In the CNC kernel up to eleven interpolating axes in the Cartesian coordinate system can be worked with. Depending on the selected kinematics, several axes are connected in a group.



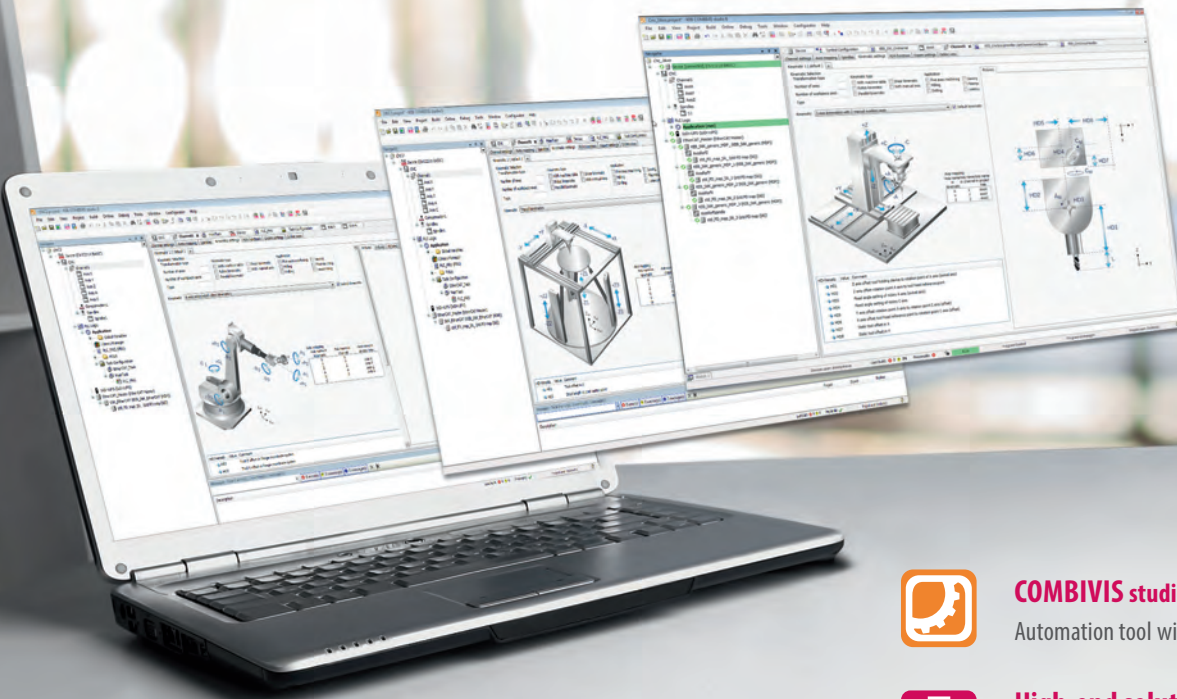
HIGHLIGHTS

- Integrated KEB CNC kernel
- Simple and flexible configuration
- User-friendly HMI
- Easy machine software realization
- Extension of machine functions via IEC 61131
- Time- and cost-optimized
- Safety

Examples of applications

- Milling
- Grinding
- Cutting

HIGH-END SOLUTION



COMBIVIS studio 6

Automation tool with object-oriented design



High-end solution

KEB extension package

FAST AND PRECISE PATH PLANNING

For complex requirements, the high-end solution with the integrated ISG CNC kernel offers extensive features for CNC, robotics and motion control. Systems with up to 64 axes are possible for the realization of a CNC application. Depending on the requirements, the number of axes or channels can be increased. Extensive function packages are available for this purpose. The user has the possibility to access on a database with various transformations.

The interpolation can be linear, helical or spline interpolation. The aim is to achieve a stimulation-free and jerk limited motion control. In addition, KEB's CNC solution supports the possibility of volumetric compensation according to ISO 230. The system achieves its high precision by various compensation possibilities of mechanical and thermal influences.

OPEN TOOLS

KEB enables CNC machine manufacturers to automate their machine technologies with open automation tools based on standards (IEC 61131) without limiting the CNC functionality. This allows machine manufacturers to create their individual solution on demand. The system is set up using the COMBIVIS studio 6 automation tool – flexible and user-friendly. The object-oriented design of the tool supports the user in configuring the axes and channels.

CNC SOLUTION WITH ISG KERNEL

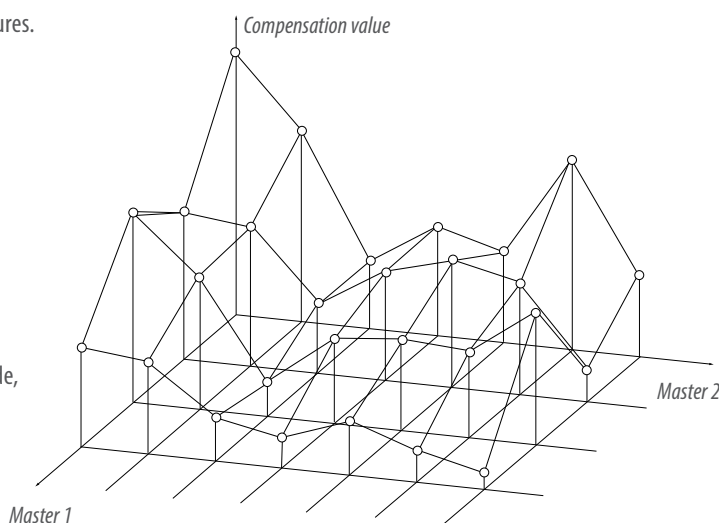
For the implementation of high-end applications, the ISG CNC kernel was implemented on real-time IPC controllers. The flexible and scalable system solution, consisting of control, visualization, safety technology, drives and motors, enables various applications in the field of CNC.

The functional scope offers solutions for machine tools as well as the movement of complex kinematics. The functions are used, for example, in applications such as milling, drilling, cutting, grinding, bending and associated handling systems.

BASIC PACKAGE

The basic package of the high-end solution offers essential CNC features. These are among others:

- Speed and acceleration pre-control, jerk limitation
- Powerful, clock-synchronous CNC-PLC interface
- Coupling functions, gantry axis functions, measuring functions
- Look-ahead function
- Linear, circular, spiral interpolation
- DIN 66025 program syntax with high-level language extension
- Subprogram technology, macro definitions, coordinate systems, spindle and additional functions
- Operation with automatic mode, manual mode, single block mode, referencing, block advance, handwheel operation mode
- Tool management



EXTENSIVE FUNCTION PACKAGES

Building on this, extensive function packages are available for the implementation of various applications. The packages can be selected according to the requirements and the software can be extended by the necessary functions:

- **CNC Channels:** Up to 12 channels expandable, channel synchronization, axis exchange between the channels
- **Transformation:** Expansion of all CNC channels through kinematic transformation
- **High-Speed Cutting (HSC):** Faster processing time, higher accuracy, better surface quality
- **Spline:** Use of gearing (AKIMA, B-Spline) for geometry optimization
- **Cutting:** CNC technology extension for cutting (e.g. laser, plasma, oxyfuel, water jet)
- **Volumetric compensation:** Effective way to increase machine accuracy



HIGHLIGHTS

- Integrated ISG CNC kernel
- Simple and flexible set up with object-oriented design in COMBIVIS studio 6
- Extension of machine functions via IEC 61131 without limiting CNC functionality
- Extensive function packages
- Safety
- Advanced features for CNC and robotics
 - Compensation axis / temperature
 - High speed cutting
 - Look-ahead function
- Multi-Core management



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