

# The KATSYS8010 CNC

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**K**ATSYS8010 is the second in the series of high-performance CNC controllers from KAT GmbH, Bremen, Germany. The first product, KATSYS8000, was designed in 1993. KATSYS8000 was a multiprocessor solution, integrated into an industrial PC. The CNC machine can be controlled via either digital drives, interfaced over the **S**erial **R**ealtime **C**ommunication **S**ystem (SERCOS), or via analog drives.

KATSYS8010, a compact version with a Pentium 200 MHz processor, is a PC plug-in CNC controller. KATSYS8010 is also configurable, providing either four axes of analog control or digital control via SERCOS standards. The CNC programs and data are downloaded from the PC, which is stored in

battery backed memory. The CNC control software that comes with KATSYS8010 also has a programmable mask generator for user configuration. The performance of the 200 MHz Pentium is about two and a half times that of KATSYS8000.

While KATSYS8000 can interface only to incremental encoders, KATSYS8010 can interface to either incremental or absolute encoders. This was possible due to the design of the XC5210-based **D**ual **I**ncremental encoder and **S**ynchronous **S**erial **I**nterface **C**ontroller (DISSIC, *see page 11*).

## Why CPLDs were Chosen

KATSYS8000 was designed with more than 40 PALs. It was very tedious to program, label, and insert these into sockets. So, the first design goal for KATSYS8010 was to remove this problem. Accordingly, the complete logic was split into four different blocks and each of these were initially

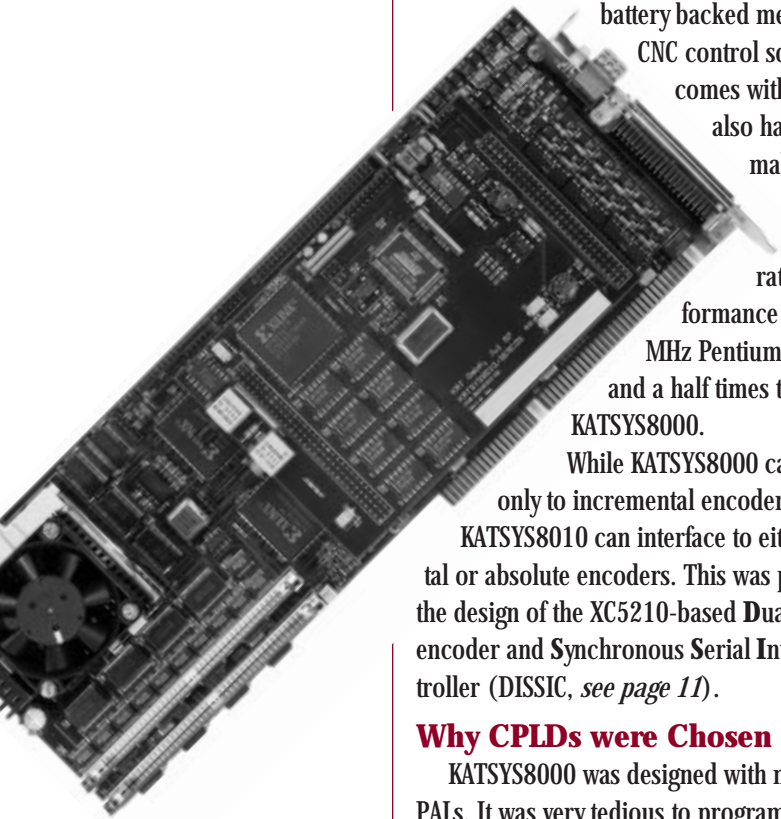
targeted for XC3100A series FPGAs, mainly due to the need for 50 MHz bus speeds. Soon, it was discovered that pin-locking was becoming a major issue. CG-CoreEI, of Pune, India, then recommended the use of CPLDs. The designs were then redesigned and targeted to XC9572 CPLDs which have excellent pin-locking capability.

The CPLDs provided In-System Programmability, no loss of components due to design revisions, and greatly reduced manufacturing times. All the design work was carried out in India with the support of CG-CoreEI, Pune, India, the local representatives. Now, KAT GmbH uses Xilinx CPLDs in all current and future designs.

## The KATSYS8010 Design

Though there are four CPLDs in any particular configuration, five CPLDs were actually designed. The functions of these CPLDs are as follows:

- **PC Interface CPLD:** All the necessary interface circuitry for accessing the memory- and PC-related I/O from the ISA bus.
- **RAM Control CPLD:** The battery-backed RAM is dual-ported to both PC and Pentium. Address decoding, arbitration, command, and bus-multiplexer control signals were implemented in this CPLD.
- **I/O Control CPLD:** All the I/O devices like interrupt controllers, timers, 24V I/Os, serial communication ports, watchdog timers, and system ID are controlled by this CPLD.
- **Axes Control CPLD:** All the timing and control needed for interfacing to analog devices such as ADCs, DACs, DISSIC, watch dog timer, module ID, are generated by this CPLD.
- **SERCOS Control CPLD:** All the timing and control needed for interfacing to SERCOS controller, auxiliary ADC, 64-bit to 16-bit data bus steering, are generated by this CPLD.



# Controller *from KAT GmbH*

“The XC9500 CPLDs pack in so much logic, that it has eliminated a lot of PALs and GALs and greatly reduced the power consumption. The Xilinx software is very reliable - all the five designs worked right the first time. And, four of the five CPLDs were running with a 50 MHz clock. Thanks to the accurate simulation results of the Xilinx software” said TSN Murthy, principal design engineer.

“The Xilinx FastFlash CPLD technology is so

elegant, that we want to use only Xilinx CPLDs for all our future logic designs” said Ulrich Schulz, project leader.

## **End Use**

KATSYS8010 can be used in all types of CNC machines. In order to apply KATSYS8010 in diverse machines, KAT supplies user-configurable software to suit the machine and its configuration. ◆