

## **The First to 1 GHz**

In early 2000, Intel and AMD were locked into a battle to see who would first mass-produce a 1 GHz processor. Intel was building their Pentium II while AMD was developing their Athlon K7 processor. AMD beat Intel to the deadline while using KCC Software to help them achieve this amazing feat.

This generation of processor was a complex device. Instead of all circuits residing on one silicon chip, the Pentium II and K7 were small circuit boards with separate processors and memory all enclosed in large plastic housings. The production and assembly were complex processes. The K7 was built on two 300' production lines including more than \$16,000,000 in automated equipment.

AMD turned to KCC Software to integrate all of these expensive machines that could not previously "talk" with each other. To build the lines quickly, pieces of the assembly lines were purchased without regard to communications or compatibility. It was the responsibility of KCC Software to "fill the holes" allowing all machines to communicate with its neighbors by whatever means available to achieve smooth transfers up and down these long assembly lines.

These lines were collectively producing a new CPU every 4.5 seconds. To support the work, KCC Software programmed 6 PCs and 9 PLCs both using a distributed Ethernet I/O network. In addition to smooth transitions, the manufacturing execution system (MES) was required to track individual components throughout the production process, to manage the automated functional tests, to support critical vision systems and in-circuit test systems, to interface with the manufacturer's inventory and production systems, and to generate and enforce the algorithm for serial number creations.

The system was developing using a combination of Think & Do Live (for most of the production control) and Wonderware InTouch (for most user interfaces and all Allen Bradley drivers). The automated testers were each controlled using a serial communication port. Seeing that there were four testers each with 16 test stations, this one PC was 64 virtual comm. ports. Additional capabilities were added to the system after several weeks of production supporting the repair and rework stations.

The entire system was developed in under three months allowing over \$9,000,000 worth of finished goods to be produced each day. The collection of automated stations that were united into a functioning production line came from more than 30 different manufacturers. There were also five different software systems (e.g., inventory, lot tracking) and even more databases that required connection with this MES system.

The Ethernet I/O system used to support these long assembly lines was the E2-EBC-based modules provided by AutomationDirect. Enclosures were placed strategically up and down the assembly lines. The PCs and PLCs controlling the different aspects to the lines could gather information from these Ethernet I/O racks. The combination of

strategically placed I/O, a supporting Ethernet infrastructure, and scaled PCs and PLCs with distributed functionality allowed KCC Software to develop the many requirements of this system and do so in a very short time.

The entire production system could be managed from a single PC. The nature of the system, however, was that continual supervision was not necessary. So, not only did the MES supplied by KCC Software help AMD and the manufacturer produce the first 1 GHz processor, it also allowed them to do so with minimal staff, no production losses due to technology failures, and the ability to use whatever production pieces they could gather quickly in order to ramp up rapidly. Rapid responses and thorough designs are KCC Software trademarks. AMD depended on these capabilities in order to beat Intel to the goal. They were not disappointed.

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