

Entivity VLC Achieves Factory-Floor Stability With INtime Real-Time Operating System

Convincing manufacturing managers to convert to PCs for industrial control has meant proving that Windows-based platforms can be both robust and reliable. Entivity, Inc., has met that challenge, becoming the world's leading supplier of PC-based industrial-control software. To achieve the necessary critical level of platform stability, Entivity selected INtime[®] from TenAsys Corporation, as the real-time operating system for its own VLC[®] solution.

Entivity, Inc. is the world's leading supplier of PC-based industrial-control software. Unlike traditional suppliers, Entivity, from its inception, has focused on intuitive, open architectures that integrate hardware and software from all suppliers. Its products provide an intuitive flowchart-based environment for developing control logic, PID control, serial communications and motion control, based on Windows[®] NT, 2000, XP and Microsoft embedded platforms.

Based in Ann Arbor, Michigan, Entivity was formed in 2001 by the merger of two leading automation software companies — Think & Do[®] and Steeplechase[®] — with the mission



- *DaimlerChrysler's transmission assembly plant in Kokomo, Indiana, credits Entivity VLC with major reductions in design time, installation time and floor space. VLC uses INtime as its real-time operating system.*

to dramatically improve productivity in the development, deployment and operation of automated material handling and manufacturing systems.

Today the Steeplechase Visual Logic Controller, or VLC[®], is regarded as the

fastest control software in the manufacturing market, achieving logic scan times as short as 200 microseconds. Operating in an environment where reliability is critical, VLC incorporates INtime[®] software from TenAsys

tured 100 percent priority. Our number one task was to run that machine. Everything else was secondary.”

Durand says the strength of INtime software is its fundamental design and the way Entivity engineers have integrated it into VLC. “The way the TenAsys product does a lock-out on memory and other things is very attractive to those customers who were concerned about crashing,” he says.

The INtime kernel uses iRMX, originally developed by Intel®, to provide key functions. Unlike real-time drivers that reside within the Windows kernel, the INtime solution creates two virtual machines on a single CPU. This avoids “blue screen” crashes that occur when the kernel stops functioning along with any applications and device drivers.

Dividing the hardware into separate virtual machines enables real-time applications to take advantage of the address isolation features of the CPU itself. The real-time kernel uses these features to isolate each real-time process from all other real-time processes and from the Windows system. If a thread attempts to access an address outside of its virtual address space, INtime generates a fault that is handled without affecting other processes.

“The TenAsys product is extremely efficient because it does take number-one priorities very, very fast,” Durand adds. “A lot of that has to do with the way VLC was written — itself a very fast product — and the TenAsys product allows us to take advantage of that speed.”

“*When we came along and put PCs into the factory-floor environment, what we heard was: ‘PCs aren’t reliable – how are you going to prove that they are?’ The TenAsys product did just that: it gave us credibility in terms of reliability and performance.*”

— Peter Durand, Marketing Manager, Entivity, Inc.

Achieving long-term satisfaction

Entivity’s VLC customers uniformly require high speeds and other key efficiencies in addition to reliability.

“Our VLC product can accomplish almost all of our applications, but the real benefit is that about 40 percent of our customers require a very high speed, closed loop and some sort of motion-control solution,” explains Jeff Fisher, Entivity’s vice president of sales. “If somebody says, ‘Look, I’ve got to run thousands of packages a minute through this thing, or I’ve got these four motion products I’ve got to interface with and I’ve got to control them at this rate, and — above all — I’ve got to make sure this thing doesn’t crash,’ then we have VLC that satisfies all of those things.”

A brief sampling of Entivity customers shows that VLC with the INtime real-time extension is meeting these various requirements and creating high levels of customer satisfaction in the process.

Engineered Products & Systems, Inc. (EPSI) of Bogart, Georgia, designs and manufactures liquid-filling systems and is known for building semi-custom machines to meet

the specific needs of each customer, material and bottle configuration. EPSI uses Entivity VLC for controlling the filling process and machine turns. VLC communicates with high-speed data acquisition cards to monitor filling volumes and valves, achieving an output rate of 1,000 bottles a minute. EPSI credits VLC with significantly improved test and debug times as well as robustness.

DaimlerChrysler’s transmission assembly plant in Kokomo, Indiana, produces 2.6 million transmissions a year. It installed Entivity VLC on a new transmission line with the goal to reduce floor space, but in the process achieved the fastest-ever launch of a new assembly line at Chrysler. Today, Chrysler’s Kokomo plant manager credits VLC with reducing floor space requirements on the new transmission line by 40 percent, cutting design and installation time by 12 weeks and reaching full-production status in just one-tenth the normal time.

Alvey Systems, Inc., in St. Louis, produces turnkey material-handling systems for consumer goods operations. It standardized on Entivity VLC for hard real-time control of high-speed material handling. Alvey credits VLC with effi-

Corporation to combine deterministic, hard real-time control with the Windows operating system.

Taking advantage of Windows

In searching for the optimum real-time control solution, Entivity focused on three key product requirements. One was to replace conventional hardware-

to remain current with Windows developments. "The fact that the TenAsys product was a solid platform was very important," Durand recalls. "It had a history before we started looking at it. TenAsys was proven technology."

Proving the case for reliability

INtime's basic architecture provides unprecedented system stability and reliability, which has been a critical consideration on the factory floor, especially with the introduction of Windows-based PCs into that environment.

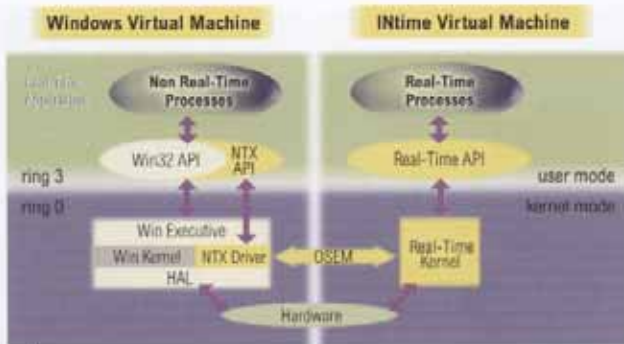
"When we first came to market with VLC in 1995, we were going up against products that had been used for 20 years — PLCs and 'custom code' — with their proprietary operating system and their own real-time kernel inside them," Durand says. "The PLCs don't do anything glamorous — they don't capture data, they don't have any Windows interfaces — but the folks on the factory floor depended them because they always worked."

"When we came along and put PCs into that environment, what we heard was: 'PCs aren't reliable — how are you going to prove that they are?'" he says. "The TenAsys product did just that: it gave us credibility in terms of reliability and performance."

"The whole point of VLC with the TenAsys product is that we kept all of the Windows operations — the mouse, the disks, the graphics, all those other drivers — separate from the actual logic execution of the control of the machine," Durand explains. "We cap-

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— Jeff Fisher, Vice President, Sales and Marketing, Entivity, Inc.



INtime creates two virtual machines on a single CPU, protecting the real-time system from Windows "blue screen" crashes.

based PLC with standard-grade PCs. Another was to rely on a real-time system that utilized the Windows operating system as the front end. The third was to develop a softPLC

application to move from ladder logic programming to the use of flowcharting.

"We definitely did not want to create a proprietary platform," recalls Entivity Marketing Manager Peter Durand. "Our goal from the very beginning was to use something off-the-shelf and open."

Entivity selected INtime as the real-time extension for VLC because of INtime's ability to take advantage of Windows features without compromising real-time control. Plus, TenAsys — as a Microsoft Windows Embedded Partner — has maintained a firm commitment

ciently integrating machine control, servo motion and HMI functions into a single-box system while reducing by 50 percent the panel space required for a typical system. Entire installation of the VLC system took only eight days.

Ingersoll-Rand uses Entivity VLC as part of its PC-based automotive transmission assembly and testing processes. According to Ingersoll-Rand, some key benefits of incorporating VLC include greatly reduced debugging time due to the VLC system's built-in diagnostics, reduced launch times due to reusable control programs, and reduced life-cycle costs because the systems are modular and easily reconfigurable.

Fisher also emphasizes that Entivity's relationship with TenAsys — and the strength of the TenAsys ties with the evolving Windows platform — has been a factor in Entivity achieving stronger relationships with its own key customers.

"Because TenAsys has continued to develop its product and progress with it on the Microsoft platform, we've recently been able to sign three-year extensions to some key customer agreements on service and licensing," he explains. "This means that Chrysler, American Axle, and Alvey — some of our largest customers, as examples — want to have long-term agreements with us because we have the technology they specified and that they never want to lose. This is taking reliability and turning it into real business."

Maintaining a responsive relationship

Entivity engineers praise the quality of support they receive from TenAsys, according to Fisher.

"TenAsys has been very good to work with," he says. "The key thing with software is that when we need an enhancement, TenAsys does it very quickly and it always does what they

say it's going to do. This was a very effective working relationship as we migrated to Ethernet I/O and interfaces in the real-time product."

He cites another benefit of the relationship, which is the fact that TenAsys focuses its expertise on INtime and the Microsoft platforms, allowing Entivity to focus on its own products.

"A key thing is that they worry about their interface into the Windows products, which means we don't have to," Fisher says. "So when it comes to XP or 2000 or NT, it's all taken care of. Our value-added and our core competency is not the raw real-time operating system. TenAsys sends it to us in a box, we add the tools to make it transparent in the industrial automation market, and it works."

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