

# IntervalZero

Taiwan-based  
MPI Corporation Selects  
**IntervalZero RTX & Windows®**  
for Next-Generation  
Chip Prober



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RTX's precision delivers two high-value benefits for customers: the best throughput and the highest yields of quality chips.

## IntervalZero Customer Overview:

Taiwan-based MPI Corp., formerly MJC Probe Inc., is a leading manufacturer and distributor of chip probe cards and chip probers. MPI provides chip probe cards and related maintenance services, chip probers and solar chip cutting services. Its chip probe cards and chip probers are used for wafer testing of logic components, memory components and liquid crystal display (LCD) drive components. MPI distributes its products within its domestic market and to overseas markets.

MPI's chip prober is a precision machine specifically designed for probing applications involving laser-emitting-diode (LED) or laser diode wafers/chips. Equipped with a high-resolution camera, video-capture card, and image-processing software, the prober system performs chip/die accuracy positioning and high-speed automatic measurement.

The MPI chip prober has ultra-high-precision linear motion guides, probe needles, and high-spindle micro stepping motors, all within a computer designed platform that minimizes vibration and acoustic noise.

The MPI chip prober insures the highest quality chips at the highest throughput. Importantly, it is sensitive enough to recognize auto-alignment positioning errors, and approve good chips that would have otherwise been mistakenly rejected. This greater sensitivity increases yield and therefore profitability.



Windows® allowed MPI to provide a sophisticated human/machine interface (HMI) for their products and millions of software engineers are accustomed to working in the familiar Windows® development environment.

## Challenge:

MPI sought an “open architecture” for the next generation of its products. The goal was to use standard hardware and software products. This approach would allow MPI to quickly introduce new PC-based motion-control technology that can be integrated with other measurement systems, such as vision and data acquisition. The approach would also provide additional flexibility, allowing MPI to quickly react to changing market conditions.

MPI explored various solutions that used Linux, Microsoft® and other operating systems. It decided on Windows® as the operating system because Windows® is an “understood de-facto standard.” Windows® would allow MPI to provide a sophisticated human/machine interface (HMI) for their products and millions of software engineers are accustomed to working in the familiar Windows® development environment.

MPI’s one significant challenge with Windows® was assuring the delivery of deterministic, hard real-time required for its product.

The Windows® operating system offers a general-purpose scheduler, so mission-critical threads required to perform a chip prober’s auto-alignment and vision-inspection analysis could not be completed in the bounded latencies required to deliver the highest yields and the best throughput.

Without a deterministic capability of 5 ms to 60 ms of timer interrupt, a Windows®-based solution would be inferior to other products and would cost MPI’s customers more in terms of lower chip yields.

MPI explored hardware and software-based solutions that would deliver the required determinism within the Windows® environment.

MPI’s one significant challenge with Windows® was assuring the delivery of deterministic, hard real-time required for its product.



MPI decided on **IntervalZero’s RTX software** as the real-time solution for Windows®. RTX software allows embedded systems developers to take advantage of the Windows® environment and form factor, while also solving their scheduling, prioritization and control challenges. RTX is a self-contained, real-time subsystem that bypasses the Windows® scheduler to provide the desired deterministic hard real-time response.

## Solution:

Hardware was quickly ruled out because it added costs on two fronts: the deterministic componentry added significantly to the bill of material (BOM); and a hardware approach put the road map at risk because hardware solutions often have compatibility issues with future generations of PC hardware and future versions of Intel chipsets and Windows® operating systems.

MPI decided on IntervalZero's RTX software as the real-time solution for Windows®. RTX software allows embedded systems developers to take advantage of the Windows® environment and form factor, while also solving their scheduling, prioritization and control challenges. RTX is a self-contained, real-time subsystem that bypasses the Windows® scheduler to provide the desired deterministic hard real-time response.

RTX guarantees that MPI's software timer interrupt is at 1 ms with a variation of 300 ns. In addition, RTX guarantees product compatibility with future multi-core architectures as well as Windows® 7, Microsoft®'s next version of the operating system.

RTX not only allows MPI's PC-based products to have increased machine performance with fast and deterministic real-time, but also allows MPI to reduce its overall product system cost. Additionally, RTX with Windows® reduces development time as MPI can use commercial-off-the-shelf (COTS) hardware and software.

RTX's precision delivers two high-value benefits for customers: the best throughput and the highest yields of quality chips.

There are significant benefits for MPI as well. With Windows®/RTX, MPI can reduce the time-to-market in introducing new products that are high performance and high precision. And MPI can do it at a highly competitive price.

**IntervalZero**

**Contact:**

**In US**

[sales@intervalzero.com](mailto:sales@intervalzero.com)

**In EMEA**

[Fabrice.Boisset@intervalzero.com](mailto:Fabrice.Boisset@intervalzero.com)

[IntervalZero.com](http://IntervalZero.com)