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Case Study

Japan's First SEMI E187 Certification—The Case of JEOL

TXOne Element Solution Helps Enterprises Meet Compliance Requirements for Vulnerability and Malware Scanning

Background

Established in 1949, JEOL Ltd. (hereinafter referred to as "JEOL") provides physicochemical instruments—including electron microscopes, medical equipment, and semiconductor manufacturing devices to universities, research institutions, and enterprises in over 130 countries worldwide, supporting the advancement of cutting-edge technologies. To deliver high-quality semiconductor manufacturing equipment, JEOL became the first company in Japan to obtain the SEMI E187 Verification of Conformity (VoC) certificate. TXOne Networks' Element series products played a critical role in JEOL's process of achieving SEMI E187 certification.

As networking of manufacturing equipment advances in the semiconductor industry, the risk of cyberattacks targeting the entire supply chain is increasing. In response to this situation, the international semiconductor association SEMI issued the SEMI E187 standard (Specification for Cybersecurity of Fab Equipment) in January 2022, which defines cybersecurity requirements at the equipment shipment stage. The main objective of SEMI E187 is to enhance security at the time of equipment deployment, ensuring that equipment is in a secure state at the time of shipment. This helps minimize the risk of malware intrusion and propagation.

"When SEMI first issued the E187 standard, we didn't initially expect that compliance would become mandatory for us," recalls Dr. Kaneda, General Manager of the PL Research and Development Department at JEOL Ltd.

However, in April 2023, a major customer issued a directive stating that, starting January 2025, SEMI E187 compliance would be a mandatory procurement requirement for all equipment—without exception. This turned E187 compliance into an urgent priority for the company.

At the time, no certification services for SEMI E187 compliance were available, so the team set out to address the challenge on their own. They began by acquiring the standard documentation and working to interpret it internally. "We had to look up unfamiliar security terminology online as we read through the material. But more fundamentally, we didn't even understand what it meant to be compliant with the standard—we were completely in the dark," says Dr. Kaneda.

JEOL

"ElementOne's report has been approved by a third-party organization for compliance with SEMI E187."

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"We chose TXOne products as tools that meet the requirements for SEMI E187 compliance."

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Solutions

While exploring concrete measures to comply with SEMI E187, they proactively gathered information through various events and the internet. However, they found that most of the publicly available information on SEMI E187 at the time came from TXOne Networks. "For us, who had almost no knowledge of cybersecurity, the SEMI-related seminars by TXOne were extremely helpful and easy to understand," said Dr. Kaneda. "The news that the world's first SEMI E187 compliance certificate had been issued in Taiwan left a particularly strong impression on us."

They were committed to achieving proper compliance with the standard. However, their internal efforts still lacked a clear path forward, and a growing sense of urgency began to spread throughout the company. In February 2024, while in consultation with TXOne about implementing the Element series, they were introduced to a third-party certification body with a proven track record of issuing SEMI E187 compliance certificates. In June, just six months before the mandatory compliance deadline, the first kickoff meeting and training session for compliance support was held. This clarified the SEMI E187 evaluation criteria, significantly accelerating JEOL's progress.

Complying with SEMI E187 requires fulfilling 12 technical criteria, covering OT vulnerability management, network security, endpoint protection, and security monitoring. The initial compliance plan submitted by JEOL was met with revision requests from the certification body, covering nearly every item. In response, the team carefully examined each issue, addressed the feedback through multiple review cycles, and steadily advanced toward full compliance.

One of the most difficult hurdles was meeting the vulnerability scanning requirement, which falls under 'endpoint protection.' Mr. Koizumi from the design department recalled: "We were required to provide a scan report demonstrating the absence of any critical vulnerabilities, but we had no clear idea how to go about creating one. Most commercial vulnerability scanners aren't designed for the internal PCs of equipment prior to shipment, making them hard to apply in OT environments. We were at a loss as to how to proceed."

The breakthrough came with TXOne's Element series. Using the Portable Inspector tool to scan devices before shipment, they generated vulnerability and malware inspection reports from the ElementOne management console. These reports were accepted by the third-party certification body. Based on this success, JEOL officially adopted the Element series. "When it came to obtaining the vulnerability information required by SEMI E187, there were simply no viable alternatives to TXOne," said Mr. Koizumi.

Additionally, JEOL leveraged all internal knowledge and engaged in continuous trial and error to tackle other key issues, such as disabling unused services, closing unnecessary ports, and strengthening internal communication security within devices. Then, in November 2024—just five months after the third-party assessment began and only one month before the compliance deadline—they became the first company in Japan to obtain SEMI E187 certification. Overcoming numerous technical challenges, this achievement stands as a testament to the unity and collective strength of the entire team.

Results

After achieving the important milestone of obtaining SEMI E187 compliance certification, JEOL has officially adopted the Element series and integrated it into their pre-shipment inspection process. A structured workflow has been established in which malware and vulnerability scans are conducted using Portable Inspector just before equipment shipment, followed by internal evaluation. The resulting report and checklist generated by ElementOne are then submitted to the customer.

Mr. Koizumi shared the benefits of adopting the Element series: "It's extremely convenient to be able to perform malware and vulnerability scans simultaneously. I also find the automatic PDF report generation feature to be highly effective."

He further noted that the ability to easily verify the version of various software installed on the internal PC of the equipment has been recognized within the company as an additional benefit.

The key strengths of the Element series are its flexibility tailored to OT environments and ease of implementation.

"TXOne's product lineup offers highly practical solutions for strengthening OT security. In particular, I believe the Element series is a powerful tool that can serve as a starting point for industries and sectors where OT security has traditionally been difficult to implement," Mr. Koizumi concluded.

"It's extremely convenient that malware scanning and vulnerability assessment can be conducted at the same time. We also find the automatic PDF report generation feature to be highly effective."

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Looking Forward

Reflecting on this initiative, Dr. Kaneda shared his sense of accomplishment, stating, "The reliability of our products has significantly improved." He added, "One of the major takeaways was gaining clarity on the appropriate level of compliance required for SEMI E187. Realizing that we had misinterpreted parts of the standard and being able to correct those mistakes properly ultimately led to stronger product security and increased confidence. Additionally, offering products that comply with SEMI E187 is an important way to demonstrate our technical capabilities and commitment to cybersecurity to external stakeholders."

Mr. Koizumi also shared a message for companies considering compliance with SEMI E187: "Cybersecurity initiatives are often not immediately linked to profit, so many companies may struggle with gaining internal understanding or securing budgets. We too initially thought that obtaining certification would be difficult in terms of workload and cost, but we decided to proceed as part of our long-term product development strategy. The requirements of SEMI E187 cover the fundamentals of cybersecurity standards, and we believe it serves as a valuable first step in preparing for more advanced requirements in the future."

Building on the insights gained through the SEMI E187 compliance process, JEOL has already begun taking the next steps to address global security requirements. The company is currently working across departments to comply with the Cyber Resilience Act (CRA), which has been formally adopted in Europe. Concurrently, they are also considering compliance and certification with international standards such as IEC 62443.

"There is a growing trend, both domestically and internationally—especially in critical infrastructure sectors—to include security requirements as part of procurement conditions. Japan is home to many manufacturers of industrial equipment and embedded systems, and the importance of OT security will only continue to grow. In this context, we believe the OT-specialized product lineup that TXOne offers is extremely valuable. We have high hopes that TXOne's efforts will contribute to reducing cyber incidents globally, even if only by one," Dr. Kaneda concluded.

Related Products

TXOne Element Series

- ElementOne
- Portable Inspector

About TXOne Networks

TXOne Networks offers cybersecurity solutions that ensure the reliability and safety of industrial control systems and operational technology environments. TXOne Networks works together with both leading manufacturers and critical infrastructure operators to develop practical, operations-friendly approaches to cyber defense. TXOne Networks offers both network-based and endpoint-based products to secure the OT network and mission-critical devices using a real-time, defense-in-depth approach. Website: www.txone.com

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CS-TXON-025 (Original language: Japanese)