

Driving Seamless Equipment Automation with SECS/GEM Integration

Overview

HTL Co. India Pvt. Ltd., in collaboration with HTL Japan, delivered a robust SEMI SECS/GEM solution for a leading semiconductor equipment manufacturer in Japan. The solution enables standardized, reliable communication between manufacturing equipment and factory host/MES systems, forming a critical foundation for smart factory automation.

Client Challenge

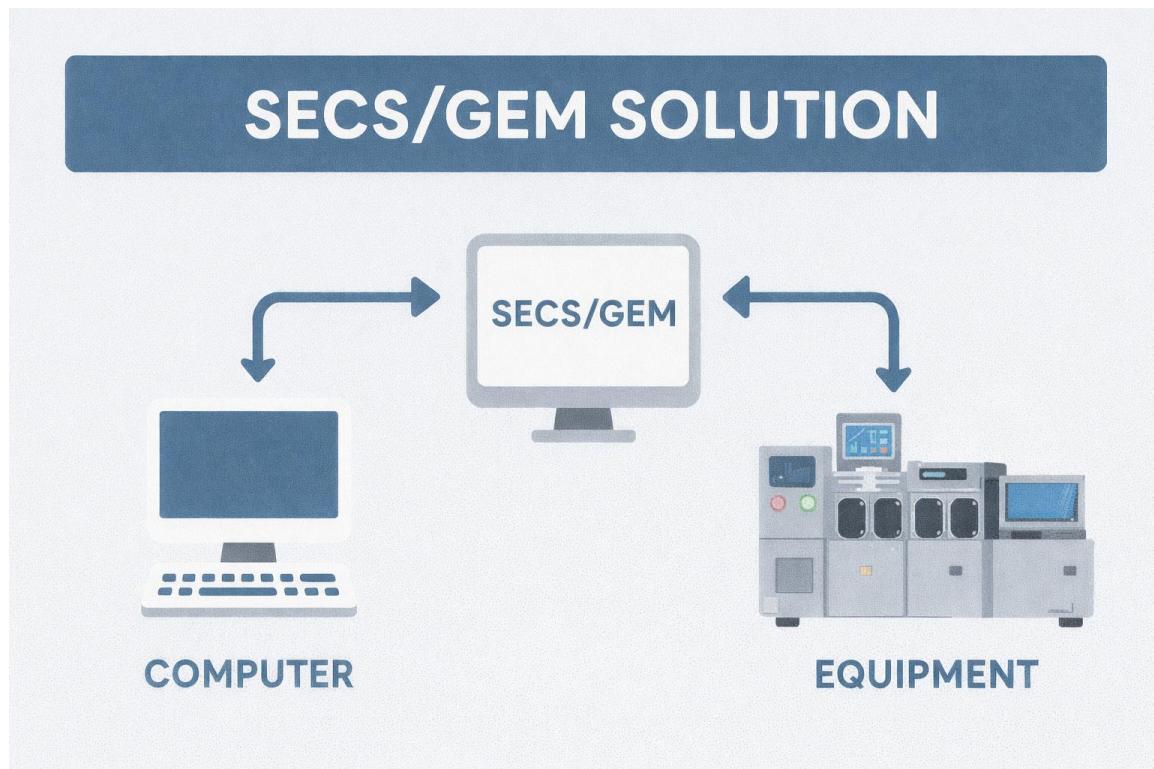
The customer sought to automate communication between semiconductor manufacturing equipment and factory host systems while complying with SEMI SECS-II/GEM standards. However, implementation posed significant challenges, including protocol complexity, interoperability issues across vendors, integration with existing MES systems, and the need for stable, reliable communication.

HTL Solution

HTL India developed a plug-and-play SECS/GEM interface solution that abstracts the complexity of SEMI protocols and exposes simple, intuitive APIs for equipment developers. Acting as a middleware layer between equipment controllers and MES/Host systems, the solution enables rapid integration, standardized behavior, and improved diagnostics without requiring deep SECS/GEM expertise from equipment developers.

Solution Architecture

The block diagram below illustrates how HTL's SECS/GEM middleware acts as an interface between equipment controllers and factory host/MES systems.



Business Impact

- Accelerated equipment integration with factory host systems
- Reduced development effort and dependency on specialized SECS/GEM skills
- Improved communication reliability and equipment state management
- Faster deployment and scalability across multiple equipment platforms

Technology Stack

Programming Languages: C++, C#

Messaging & Communication: ZeroMQ

Standards: SEMI SECS-II / GEM

Engagement Model

The project was executed under a joint onsite–offshore collaboration model, with close coordination between HTL India’s engineering team and HTL Japan, ensuring alignment with customer expectations and Japanese quality standards.

Client Feedback

“HTL India’s plug-and-play SECS/GEM solution effectively abstracts SEMI protocol complexity and enables rapid, reliable integration between equipment systems and SECS/GEM-compliant MES/Host systems. The simplified APIs significantly reduce development effort, integration time, and dependency on deep SECS/GEM expertise.”

— **Project Manager**