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**Connected  
Equipment Summit**

# Cimetrix Product Update

**Derek Lindsey, *PDF Solutions***

**Version 1**

**10/7/2025**



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# #1.

**Who is the Cimetricx  
Product Group of PDF  
Solutions?**

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# Who is the Cimetrix Product Group of PDF Solutions?

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- We are industry leaders in SEMI Standards compliance!
- We make great products!
- We make you successful!
  - Focus on your area of expertise and leave the rest to us
    - Multi-platform
    - Solutions to common equipment control problems
    - AI/ML
    - Digital Twins
    - Shorter downtime / Diagnostics
  - Remote connectivity
  - Cybersecurity

# We are SEMI Standards experts

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## GEM/GEM300/EDA

For over 25 years, we have provided software that enables SEMI standards compliance on equipment. We participate on SEMI Standards committees, including serving as chairs. We have a full suite of products that supports implementation and testing.



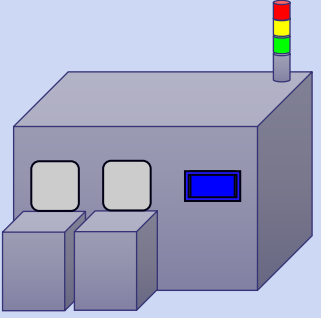
# #2.

**We make great products!**

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# We make great products!

| Product Family                                                                                                |                                        | Product/Platform                       | Interface(s)                            | Notes                                                               |
|---------------------------------------------------------------------------------------------------------------|----------------------------------------|----------------------------------------|-----------------------------------------|---------------------------------------------------------------------|
| <b>Equipment</b><br>         | Connectivity                           | CIMConnect<br>EquipmentConnect         | GEM                                     | Equipment GEM interface                                             |
|                                                                                                               |                                        | CIM300<br>EquipmentConnect             | GEM 300                                 | Equipment GEM 300 interface                                         |
|                                                                                                               |                                        | CIMPortal Plus<br>EquipmentConnect     | EDA (Equipment Data Acquisition)        | Equipment EDA interface                                             |
|                                                                                                               |                                        | EquipmentTest,<br>EDATester, ECCE Plus | GEM, GEM 300, EDA                       | Utilities to test equipment GEM and EDA interfaces                  |
| <b>Cloud Solutions</b><br> | Control                                | EquipmentControlFo<br>undation (ECF)   | GEM, GEM 300, EDA                       | Equipment software framework with integrated Equipment Connectivity |
|                                                                                                               | Secure<br>OEM/Fab/OSAT<br>Connectivity | secureWISE                             | IP-SEC VPN Tunnel<br>(double encrypted) | Secure remote equipment access & data exchange for fabs and OEMs    |
|                                                                                                               | Applications                           | Insight, ALPS, DEEP,<br>EquipmentTwin  | gRPC API                                | Additional applications in development                              |



# Broad market adoption

**Largest OEM in this industry shipped their software on approximately 6,000 pieces of equipment**

- Last year PDF equipment software was installed on over 7,600 systems
- This year over 8,000 semiconductor systems will ship with PDF equipment software Including...

- |                  |                              |
|------------------|------------------------------|
| ■ Metrology      | ■ Inspection                 |
| ■ ALD/EPI/Etch   | ■ Bonding                    |
| ■ Pick & Place   | ■ Photovoltaic               |
| ■ Cleaning/Strip | ■ Electrochemical Deposition |
| ■ Backend Test   | ■ Ion Implant                |
| ■ MOCVD & PVD    |                              |





# #3.

**We make you successful!**

— Multi-platform support

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# Multi-platform support

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## Window/Linux with .NET 8.0

.NET 8.0 enables true multi-platform development and deployment.

- Multiple operating systems
- Reduced development costs
- Enhanced security
- Consistent user experience

## gRPC API

gRPC is a modern, open-source Remote Procedure Call (RPC) framework used for building scalable and high-performance APIs.

- Cross-language environments
- High-performance API

# Introducing: Cimetrix EquipmentConnect

## Next generation connectivity

### Features

- Multi-SEMI Standard
  - GEM/GEM300/EDA
- Multi-platform
  - Windows/Linux
- Same great quality you expect from Cimetrix products
  - Same test environment
- Runs out-of-process
  - gRPC API



| Fundamental Requirements                   |                                                                                                |                           |
|--------------------------------------------|------------------------------------------------------------------------------------------------|---------------------------|
|                                            | Implemented?                                                                                   | GEM Compliant:            |
| <b>State Models</b>                        | Implemented? <b>Yes</b>                                                                        | GEM Compliant: <b>No</b>  |
| Alarm Management                           | Implemented? <input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> |                           |
| Dynamic Event Report Configuration         | Implemented? <input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> |                           |
| Equipment Constants                        | Implemented? <input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> |                           |
| Host-Initiated Control State Change        | Implemented? <input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> |                           |
| Material Movement                          | Implemented? <input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> |                           |
| Operator Initiated Control State Change    | Implemented? <input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> |                           |
| Process Recipe Management                  | Implemented? <input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> |                           |
| Remote Control                             | Implemented? <input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> |                           |
| Status Data Collection                     | Implemented? <input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> |                           |
| Equipment Terminal Services                | Implemented? <input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> |                           |
| Trace Data Collection                      | Implemented? <input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> |                           |
| Equipment Processing States                | Implemented? <b>Yes</b>                                                                        | GEM Compliant: <b>Yes</b> |
| Host-Initiated S1F13/14 Scenario           | Implemented? <b>Yes</b>                                                                        | GEM Compliant: <b>Yes</b> |
| Event Notification                         | Implemented? <b>Yes</b>                                                                        | GEM Compliant: <b>No</b>  |
| On-Line Identification                     | Implemented? <b>Yes</b>                                                                        | GEM Compliant: <b>Yes</b> |
| <b>Error Messages</b>                      | Implemented? <b>Yes</b>                                                                        | GEM Compliant: <b>Yes</b> |
| Error Message Wrong Device ID              | Implemented? <input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> |                           |
| Other Error Message Scenarios              | Implemented? <input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> |                           |
| Documentation                              | Implemented? <b>Yes</b>                                                                        | GEM Compliant: <b>Yes</b> |
| Control (Operator Initiated)               | Implemented? <b>Yes</b>                                                                        | GEM Compliant: <b>No</b>  |
| <b>Additional Capabilities</b>             |                                                                                                |                           |
| <b>Establish Communications</b>            | Implemented? <b>Yes</b>                                                                        | GEM Compliant: <b>Yes</b> |
| Bidirectional Connect Request S9F9         | Implemented? <input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> |                           |
| Bidirectional Connection Request And Reply | Implemented? <input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> |                           |
| Equipment Initiated Bad S1F14              | Implemented? <input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> |                           |
| Equipment Initiated COMMACK Error Response | Implemented? <input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> |                           |
| Equipment Initiated Disabled Equipment     | Implemented? <input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b> |                           |

# #3.

**We make you successful!**

— **Solutions to common equipment  
control problems**

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# Introducing: Cimetrix EquipmentControlFoundation (ECF)

## Next generation equipment control

### Features

- Standards integration
  - EquipmentConnect
- Multi-platform
  - Windows or Linux
- Avalonia Operator Interface screens

The screenshot displays the CIMControlFramework Operator Interface. The top status bar shows the current screen as 'Operations.Main' and the user as 'sysadmin'. The main interface is divided into several sections:

- Equipment States:** Shows the processing state as 'Executing' and the equipment mode as 'Job'. It also displays the control state as 'EquipmentOffline' and the language as 'English (United States)'.
- Equipment Control Status:** Shows the equipment mode as 'Job' and the status as 'Initialized'. It includes a 'Load Port Control Status' section with buttons for 'Load' and 'Unload', and a 'Carrier Verification' section with a 'Proceed' button.
- Slot Maps:** A table showing the slot maps for the equipment. The table has columns for 'Slot', 'Value', and 'Status'. The status is 'OK' for all slots.
- Job Selection:** A section for selecting a job, including a 'Job ID' field and a 'Create' button.
- Recipe Selection:** A section for selecting a recipe, including a 'Recipe Selection' list and a 'Recipe Variables' section.
- Wafer Layout Diagram:** A diagram showing the layout of the wafer, with labels for 'PM1', 'PM2', 'PM3', 'PM4', 'LL1', 'LL2', 'LP1', 'LP2', 'LP3', and 'LP4'.

The bottom of the interface features a navigation bar with icons for 'Operations', 'Service', 'Recipes', 'Data', 'Configuration', and 'Alarms'.

# What do you look for in equipment control software solution?

- 1 Scale your business
- 2 Accelerate time-to-market
- 3 Control your destiny
- 4 Satisfy your customer's FA needs
- 5 Support AI/ML
- 6 Focus software resources



# What is EquipmentControlFoundation (ECF)

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ECF is an equipment control software toolkit

- Enables high-quality equipment control application development
- Implements all SEMI equipment automation software standards
- 80% functionality out-of-the-box for typical equipment applications
- Designed for AI/ML

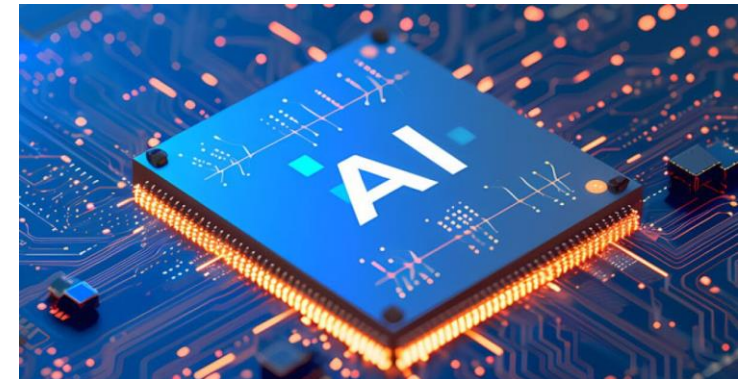




# EquipmentControlFoundation AI/ML enhancements

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- Health Indicators
  - SPC for equipment control applications
- DEEP (Digitally Enhanced Equipment Protection)
  - AI/ML
  - Preventative maintenance
  - Process improvement
- EquipmentTwin
  - Throughput improvement – even for process limited equipment



# #3.

**We make you successful!**

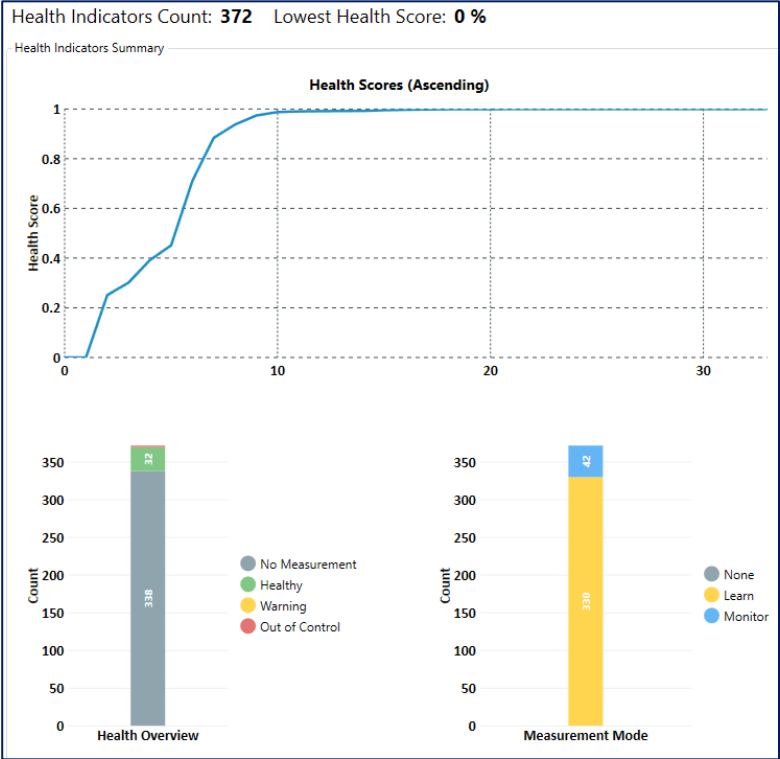
— AI/ML

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# Health Indicators

- Provides SPC for ECF
  - Preventative maintenance
  - Configurable
  - Fully documented

| Module Mode                                             | Process Jobs     | Control Jobs      | Wafer Cycling        | Materials           | Hardware            | E39 Objects | GEM | I/O | Health Indicators |
|---------------------------------------------------------|------------------|-------------------|----------------------|---------------------|---------------------|-------------|-----|-----|-------------------|
| Filter                                                  |                  |                   |                      |                     |                     |             |     |     |                   |
| Clear                                                   |                  |                   |                      |                     |                     |             |     |     |                   |
| ● Learn ○ Learning Results ○ Monitor                    |                  |                   |                      |                     |                     |             |     |     |                   |
| Name                                                    | Measurement Mode | Learning Progress | Measurements Learned | Minimum Sample Size | Maximum Sample Size |             |     |     |                   |
| PM1.GV.HealthIndicator.OpenToClose                      | Learn            | 320 %             | 32                   | 10                  | 1000                |             |     |     |                   |
| PM1.GV.HealthIndicator.CloseToOpen                      | Learn            | 310 %             | 31                   | 10                  | 1000                |             |     |     |                   |
| VtmRobot.HealthIndicator.PickFromPM1Slot1ToPM1Slot1_ms  | Learn            | 150 %             | 15                   | 10                  | 1000                |             |     |     |                   |
| VtmRobot.HealthIndicator.PlaceFromPM1Slot1ToPM1Slot1_ms | Learn            | 130 %             | 13                   | 10                  | 1000                |             |     |     |                   |
| LL1.Door.HealthIndicator.OpenToClose                    | Learn            | 90 %              | 9                    | 10                  | 1000                |             |     |     |                   |
| LL1.VacSys.RV.Sub.HealthIndicator.OpenToClose           | Learn            | 90 %              | 9                    | 10                  | 1000                |             |     |     |                   |
| LL1.VacSys.RV.Sub.HealthIndicator.CloseToOpen           | Learn            | 90 %              | 9                    | 10                  | 1000                |             |     |     |                   |
| LL1.Door.HealthIndicator.CloseToOpen                    | Learn            | 90 %              | 9                    | 10                  | 1000                |             |     |     |                   |
| LL1.VacSys.RV.Main.HealthIndicator.CloseToOpen          | Learn            | 90 %              | 9                    | 10                  | 1000                |             |     |     |                   |
| LL1.VacSys.RV.Main.HealthIndicator.OpenToClose          | Learn            | 80 %              | 8                    | 10                  | 1000                |             |     |     |                   |
| LL1.VacSys.MV.HealthIndicator.CloseToOpen               | Learn            | 80 %              | 8                    | 10                  | 1000                |             |     |     |                   |
| LL2.Door.HealthIndicator.CloseToOpen                    | Learn            | 80 %              | 8                    | 10                  | 1000                |             |     |     |                   |
| LL2.Door.HealthIndicator.OpenToClose                    | Learn            | 80 %              | 8                    | 10                  | 1000                |             |     |     |                   |



| Module Mode                                                                                                                             | Process Jobs     | Control Jobs   | Wafer Cycling       | Materials                        | Hardware      | E39 Objects                            | GEM                   | I/O                 | Health Indicators |               |
|-----------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------|---------------------|----------------------------------|---------------|----------------------------------------|-----------------------|---------------------|-------------------|---------------|
| Filter <input type="text"/>                                                                                                             |                  |                |                     |                                  |               |                                        |                       |                     |                   |               |
| <div>Clear</div> <div><input type="radio"/> Learn <input type="radio"/> Learning Results <input checked="" type="radio"/> Monitor</div> |                  |                |                     |                                  |               |                                        |                       |                     |                   |               |
| Name                                                                                                                                    | Measurement Mode | Out of Control | Current Measurement | Current Measurement Health Score | Alarm Enabled | Out of Control Measurement Count Limit | Control Limits Source | Lower Control Limit | LCL Enabled       | Upper Control |
| LL2.VacSys.RV.Main.HealthIndicator.CloseToOpen                                                                                          | Monitor          |                | 105                 | 100 %                            |               | 0                                      | SPC                   | 82.43               | ✓                 | 141.2         |
| LL2.VacSys.PV.Sub.HealthIndicator.CloseToOpen                                                                                           | Monitor          |                | 112                 | 100 %                            |               | 0                                      | SPC                   | 85.86               | ✓                 | 156.3         |
| LL1.VacSys.LV.HealthIndicator.OpenToClose                                                                                               | Monitor          |                | 108                 | 99 %                             |               | 0                                      | SPC                   | 78.9                | ✓                 | 161.5         |
| LL2.VacSys.LV.HealthIndicator.CloseToOpen                                                                                               | Monitor          |                | 120                 | 99 %                             |               | 0                                      | SPC                   | 107.2               | ✓                 | 143.7         |
| LL2.VacSys.RV.Sub.HealthIndicator.OpenToClose                                                                                           | Monitor          |                | 98                  | 99 %                             |               | 0                                      | SPC                   | 80.6                | ✓                 | 130.7         |
| LL1.VacSys.PV.Sub.HealthIndicator.CloseToOpen                                                                                           | Monitor          |                | 135                 | 99 %                             |               | 0                                      | SPC                   | 90.85               | ✓                 | 158.1         |
| PM1.GV.HealthIndicator.OpenToClose                                                                                                      | Monitor          |                | 125                 | 99 %                             |               | 0                                      | SPC                   | 83.09               | ✓                 | 146           |
| LL2.VacSys.MV.HealthIndicator.CloseToOpen                                                                                               | Monitor          |                | 117                 | 97 %                             |               | 0                                      | SPC                   | 108.6               | ✓                 | 136.6         |
| LL1.VacSys.LV.HealthIndicator.CloseToOpen                                                                                               | Monitor          |                | 119                 | 94 %                             |               | 0                                      | SPC                   | 108.4               | ✓                 | 150.9         |
| LL1.VacSys.PV.Sub.HealthIndicator.OpenToClose                                                                                           | Monitor          |                | 130                 | 88 %                             |               | 0                                      | SPC                   | 75.74               | ✓                 | 144.3         |
| LL2.VacSys.RV.Main.HealthIndicator.OpenToClose                                                                                          | Monitor          |                | 101                 | 71 %                             |               | 0                                      | SPC                   | 97.56               | ✓                 | 123.3         |
| VtmRobot.HealthIndicator.PickFromPM1Slot1ToPM1Slot1_ms                                                                                  | Monitor          |                | 361.4               | 45 %                             |               | 0                                      | SPC                   | 236.5               | ✓                 | 370.8         |
| PM1.GV.HealthIndicator.CloseToOpen                                                                                                      | Monitor          |                | 130                 | 39 %                             |               | 0                                      | SPC                   | 88.92               | ✓                 | 132.5         |
| LL1.Door.HealthIndicator.CloseToOpen                                                                                                    | Monitor          |                | 136                 | 30 %                             |               | 0                                      | SPC                   | 82.44               | ✓                 | 138.4         |
| LL1.VacSys.PV.Main.HealthIndicator.OpenToClose                                                                                          | Monitor          |                | 154                 | 25 %                             |               | 0                                      | SPC                   | 78.17               | ✓                 | 156.7         |
| LL1.Door.HealthIndicator.OpenToClose                                                                                                    | Monitor          | !              | 127                 | 0 %                              |               | 0                                      | SPC                   | 90.59               | ✓                 | 123.7         |
| LL2.GV.HealthIndicator.OpenToClose                                                                                                      | Monitor          | !              | 139                 | 0 %                              |               | 0                                      | SPC                   | 84.28               | ✓                 | 136.1         |



# DEEP – Diagnostically Enhanced Equipment Protection

- **AI/ML powered by PDF Solutions**
  - ❖ Equipment-focused AI/ML
- **Equipment reliability performance**
  - ❖ Ability to check overall equipment health
    - Monitor critical equipment sub-component's health
    - Create golden fingerprints for each sub-component
  - ❖ Predict failures before they happen
    - AI/ML monitors and identifies when component health starts to deteriorate over time
    - Prevents costly unscheduled tool downtime
- **Enables a new flow of recurring revenue from services contracts**
  - ❖ Ability to compete for recurring revenue

# EquipmentTwin

- Boosts throughput by optimizing wafer flow and robot scheduling.
- Emulates exact robot motions.
- Validate EFEM, loadlock, and chamber layouts in days, not months.
- Reduce risk on multimillion-dollar equipment investments.
- Reuse insights across tool families for faster development.



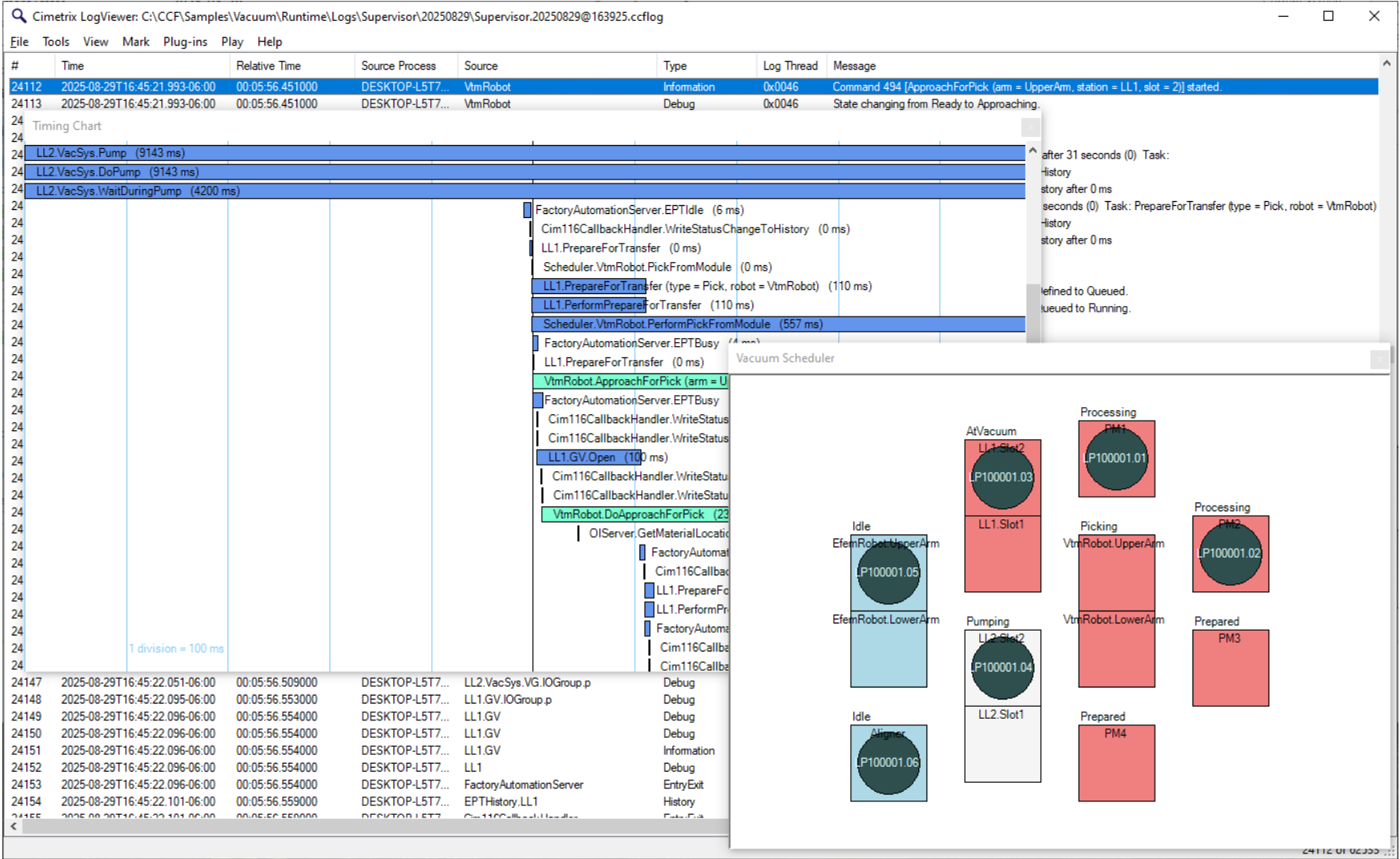
# #3.

**We make you successful!**

— Reduce down-time / Diagnostics

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# Diagnostics





# #3.

**We make you successful!**

— Remote connectivity

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# How do you debug an equipment problem in the factory?

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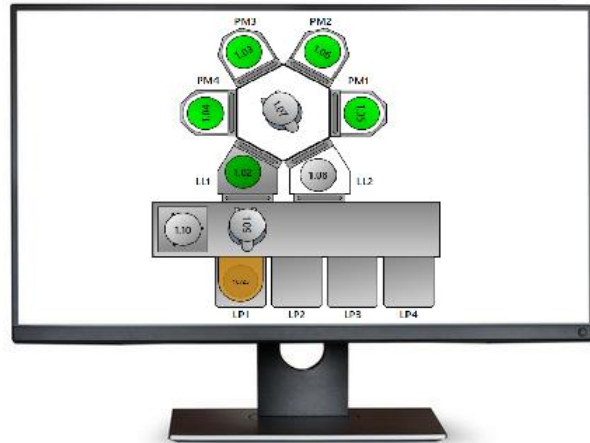
**OEM Location**



**Factory**

# What does secureWISE allow you to do?

## Factory Equipment



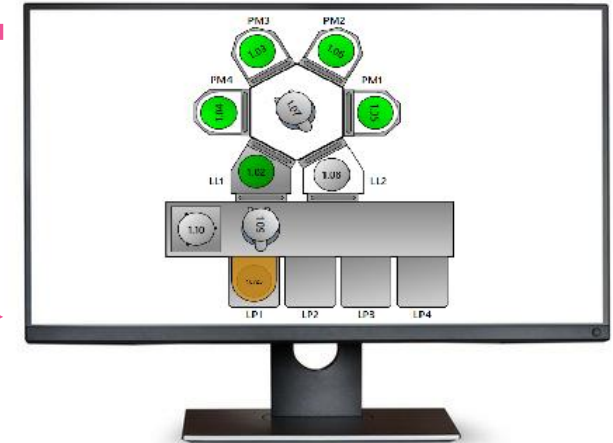
## secureWISE

Remote control



Gather data

## OEM Facility



Firewall

Firewall

# With secureWISE

Everyone is happy

## OEM Location



- No travel
- Fix problems quickly
- Data for process improvement (DEEP)



## Factory



- Problems fixed quickly
- Process improvement (DEEP)

# #3.

**We make you successful!**

— Cybersecurity

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# Cybersecurity

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- SEMI Standards
  - E187, E188, E191
- European Cyber Resilience Act (CRA)
  - Gather system data
  - Software Bill of Materials (SBOM)
  - Declaration of Conformity
- SMCC webinar
  - Cybersecurity compliance required starting July 2026
  - Full compliance by December 2027
- Utilize secureWISE functionality for cybersecurity
  - Malware scan when installing software
  - Dashboard
  - Remote data gathering



# Thank You

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