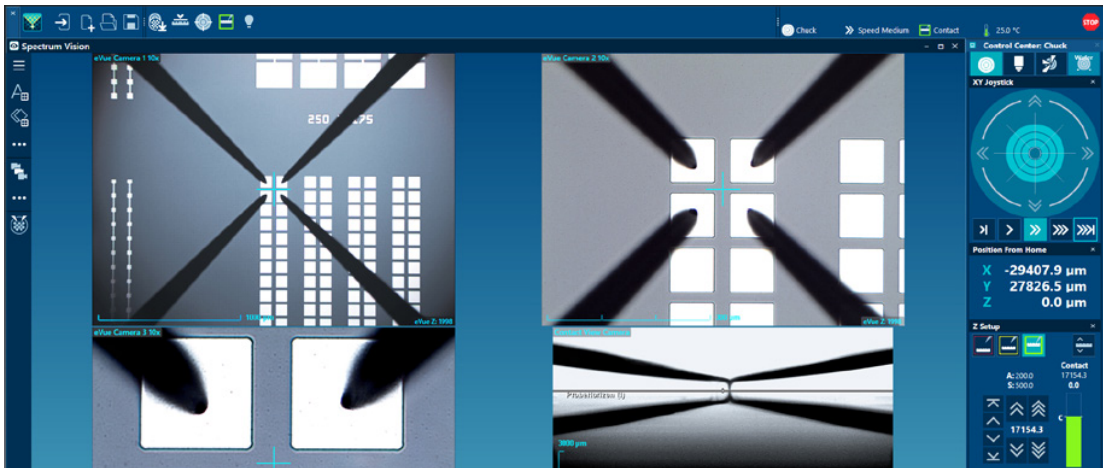
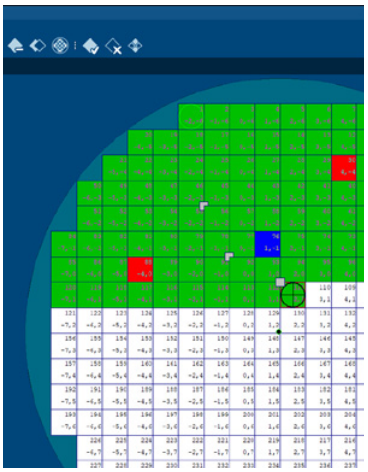


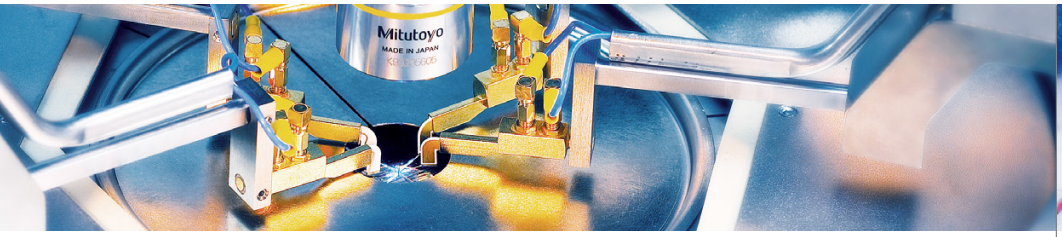


Velox™

Contact Intelligence™

The Most Powerful Engineering Software in the Market

FormFactor™



Velox™ Is the Key to Accurate and Fast Wafer Probing

Communication Between Probe Station and User

- Easily create tasks
- Obtain fast results

Flexible and Efficient

- Adapts to the user's needs and skills level
- Reduces working time
- Saves money!

The Power of Velox

- Designed to operate with maximum intelligence
- Automates workflows
- Enables autonomous measurements

Contact Intelligence™

One Software Solution for All Platforms

Velox™ is FormFactor's unique probe station control software suite. It is the universal standard for semi- and fully-automated probe systems, enabling seamless communication between the user and more than 15 different platforms. It supports our newest wafer-level test products, and provides older probe stations with the benefit of ongoing software development.

Velox reduces total cost of ownership by minimizing training efforts and providing faster time to robust and reliable data. As a key element of FormFactor's exclusive Contact Intelligence™ technology for autonomous operation, it allows the user to perform measurement tasks faster, safer and more accurately. Velox enables safe and fast wafer loading, easy test automation and measurement system integration, while preventing costly damage of probes and probe cards throughout the entire measurement cycle.

Velox is installed on more than 600 FormFactor probe stations. Strong customer relationships and continuing advancements make Velox software the clear leader in probe station control.

Key Features

User-Centered Design
Minimized training costs and enhanced efficiency.

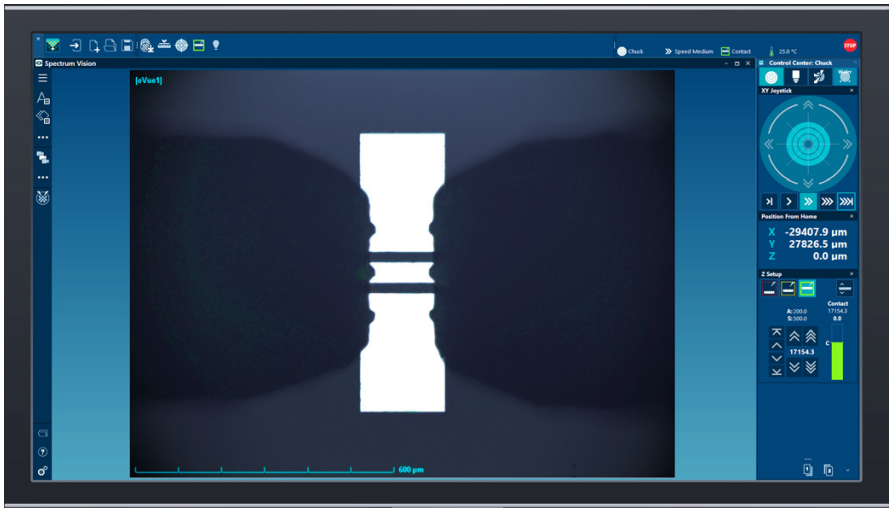
Smart Automation Features
Faster time to data due to reduced test cycle times.

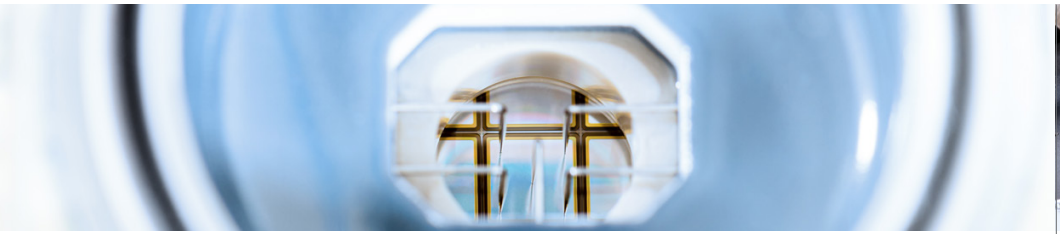
Windows 10 Compatible
Highest performance and safe operation with state-of-the-art hardware.

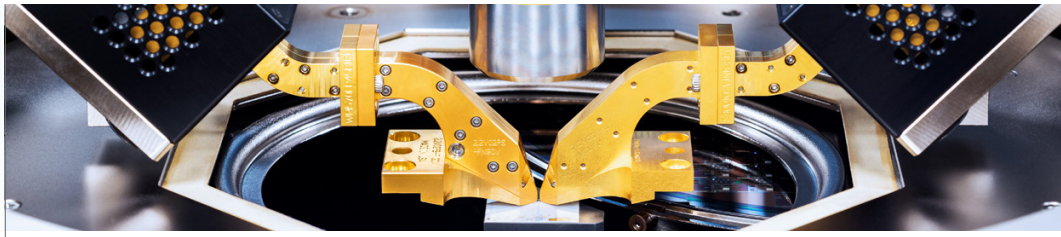
Hundreds of Tuneable Options
High flexibility for a large variety of applications.

Loader Integration
No need for any additional software. Easy creation of workflows and receipts.

Simplified Operation for Inexperienced Users
Reduced training costs with Workflow Guide and condensed graphical user interface.







Fully Configurable User Interface

Most test engineers and operators spend the majority of their working time with the test software - not with the hardware. It is therefore essential that the software suits the individual user in usability, convenience and comprehensiveness.

Velox is fully configurable for different user levels: for engineers and developers, hundreds of tunable options are available. Dedicated workflows and wafer maps can be created, and maximum information can be obtained.

The graphical user interface can also be customized for the every day recurring tasks of operators, so that only necessary functions are available. The amount of information and buttons can be reduced to a minimum, which will provide a clear view - even for inexperienced users.

Engineer / Developer

/ All information and options available

/ Highest level of freedom

Operator

/ Only necessary information available

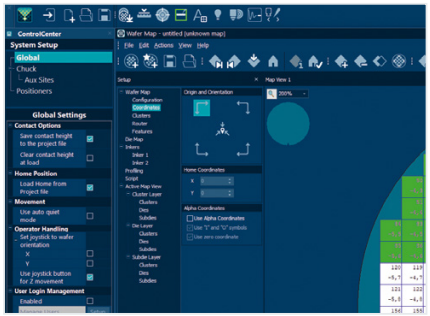
/ Defined working steps

Hundreds of Tuneable Options

Different specific applications and changing tasks put great demands on probe system performance. Velox supports the user in carrying out his tasks quickly and efficiently. In order to measure in the best possible way, there are hundreds of tunable options.

Advanced users can create their own workflows by using the Python scripting console. Modern interfaces enable the remote connection from test executive software to the probe station or full integration in fab automation.

FormFactor continuously enhances Velox: new features and regular updates ensure that all probe stations are state-of-the-art.



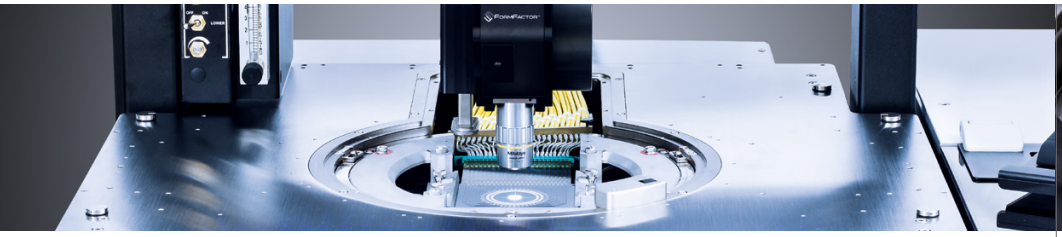
Software Quality Management

No Software Release Before Test Procedure on All Platforms

A state-of-the-art software solution needs the highest quality management. FormFactor employs an independent test team that verifies every software update on all supported probe system platforms.

Additional tests are run whenever hardware changes are executed that might influence the software performance. Every day, hundreds of software tests are run in our labs.

Over 400 automated tests are run daily	Nearly 1600 hours of testing is performed for each software release
Software is tested on all supported platforms prior to being released	All software changes are validated for correctness



Windows 10 Compatible

Velox 3 is designed for Windows 10. This guarantees highest-performance and safe operation with state-of-the-art hardware and interfaces.

Additionally, the innovative, intuitive and widely-used Windows Fluent Design System is adopted for several Velox functions, such as the SetupTool.

Microsoft security support guaranteed	Highest data safety
Superior system performance	State-of-the-art interfaces such as USB3 Vision

Contact Intelligence™ Technology

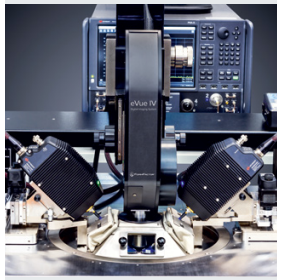
Enables Autonomous Semiconductor Test

As part of FormFactor's unique Contact Intelligence technology, Velox enables autonomous semi-conductor test. Contact Intelligence combines smart hardware design, innovative software algorithms and years of experience to create a technology that provides benefits across a wide range of applications.

This allows lengthy test routines to be performed overnight or the weekend without operator intervention - even over a wide temperature range. Contact Intelligence accelerates time to accurate data, time to market and ultimately - time to profitability.

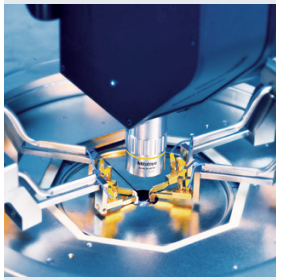
Autonomous RF*

- **Ease of use:** Autonomous hands-free calibrations and RF measurements up to 120 GHz by simply pushing a button
- **Unattended use:** Complex measurements without the need of an operator
- **Automated drift correction:** Automatically recalibrate if the system performance drifts beyond a usable limit



Autonomous DC

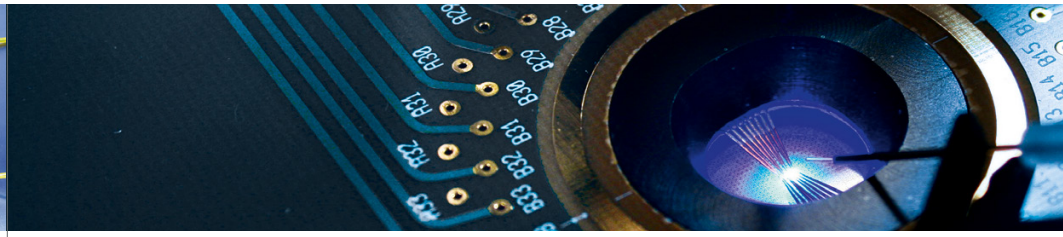
- **Ease of use:** Unattended testing on small pads over time and at multiple temperatures
- **Automated drift correction:** The system will automatically re-align probes to pads if they drift due to temperature variance
- **Reduced test cycle times:** Automated temperature ramp with optimized soak times



Autonomous Silicon Photonics**

- **Integrated solution:** Enables production-proven measurements
- **Verified performance:** Six-axis automated optical fiber positioning for precision alignment
- **Automated calibrations:** Reduce working time through a maximum of software intelligence
- **Perfected alignment:** With Z-Displacement and Light Guide Technology

* WinCal XE™ High-performance RF Calibration Software is needed additionally.
** SiPh Tools software package is needed additionally.



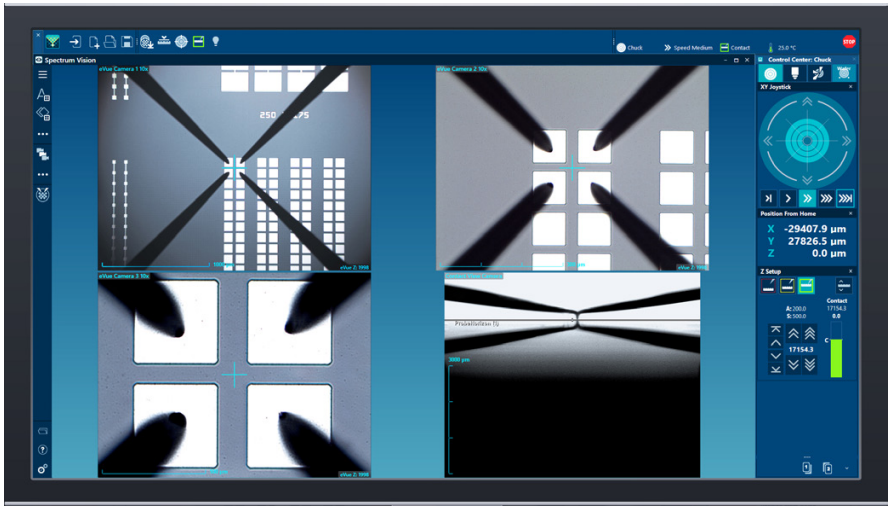
Spectrum Vision

The SPECTRUM Vision System acts as a powerful aid in wafer navigation, probe placement, wafer alignment, and sub-die navigation. It gets you where you want to go faster, and delivers more information once you arrive.

Velox seamlessly works with the eVue™ multi-camera architecture to provide the perfect balance of optical resolution, digital zoom and live-motion video. A new level of optical clarity is realized all the way from the whole die down to the smallest structures.

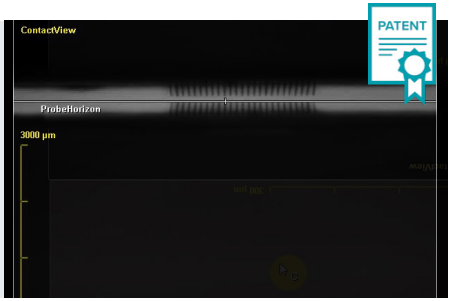
Apart from the microscope, further system-integrated cameras can be utilized to show a view of the needles from the side and/or the bottom. These patented technologies are especially helpful for applications with limited microscope view, such as vertical and Pyramid probe cards, or when using a test head.

- Multi-camera view with up to four simultaneous live views
- Enables accurate probe tip placement
- Patented ProbeHorizon™ for vertical view
- Fast and intuitive



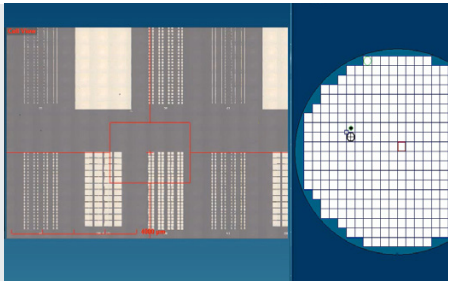
ProbeHorizon™

- Patented intelligent vertical control system
- Fast and intuitive safety feature
- Quick adjustment of preliminary contact height
- Horizontal real-time observation of needle and wafer



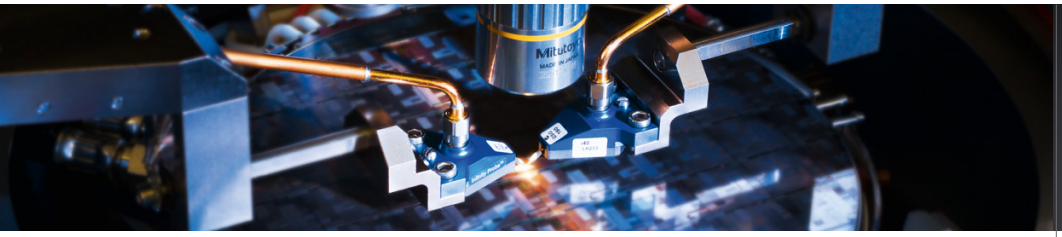
Cell View

- Creates a stitched image of the whole wafer with the capture of just one die
- Easy on-die orientation
- Fastest navigation to parts of the wafer that are out of view



Multi Camera Imaging

- Up to four simultaneous live views for accurate probe tip placement
- Shows wafer and probes in horizontal and vertical direction
- Several zoomed-in views of single probes



Alignment Tools

As measurement procedures become increasingly complex, the call for smart alignment tools is growing. Velox provides a series of alignment tools to serve a maximum range of use cases - from simple wafer alignment for faster time to test, to complex automated alignment routines for unattended test on small pads and over temperature.

Alignment wizards guide the user through the procedures and ensure a convenient and fast setup.

Basic Automated Wafer Alignment in X, Y and Theta

Auto Align

- / Uses unique, repetitive die patterns
- / Corrects the home die position
- / Determines the wafer diameter and die size
- / Corrects for thermal expansion in X, Y and theta
- / Generates a WaferMap corresponding to the evaluated die indices and number of recognized dies
- / The trained alignment can be re-used for all wafers of one lot

Align Wafer

- / Used for wafers that do not contain unique and repetitive die patterns
- / Uses two alignment markers of the wafer that don't need to be identical
- / Corrects the home die position
- / The trained alignment can be reused for all wafers of one lot

Singulated Chips

Pre-Map Wafer

- / The perfect tool for measurement of singulated dies (dies that have been cut and are either placed in a carrier, or adhered to a sticky medium within a wafer frame)
- / Finds the location of singulated dies and updates the WaferMap with the actual die positions

Align Chip

- / Aligns an individual die in X, Y and theta
- / Used for singulated die, singulated die in trays, blue tape wafers or shards

Automated Probe-To-Pad Alignment Over Multiple Temperatures

- / Ensures constant contact quality when probing on the smallest pads
- / Eliminates the need for manual re-adjustment when probing on small pads over multiple temperatures
- / Increases productivity by eliminating idle time waiting for operator intervention
- / Faster time to data due to minimized test times
- / Faster time to market due to higher efficiency of test equipment

ReAlign*

- / Automated probe-to-pad alignment for probe cards
- / Utilizes three system-integrated cameras to provide a view of the needles from the side and the bottom, and an additional view of the wafer from the top
- / The trained alignment can be re-used for all wafers of one lot
- / Recommended especially for applications with limited microscope view, such as vertical and Pyramid probe cards, or when using a test head

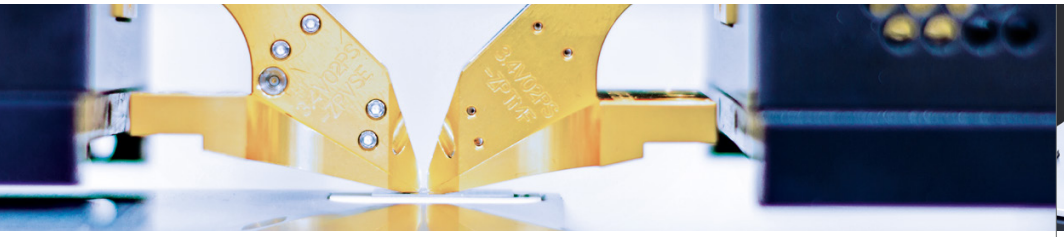
* Available on the CM300xi and SUMMIT200

VueTrack**

PATENT

- / Automated probe-to-pad alignment for positioners or probe cards
- / Utilizes the eVue Pro microscope to detect the location of the wafer alignment markers as well as the location of the probes
- / The trained alignment can be re-used for all wafers of one lot
- / If motorized positioners are used, VueTrack enables additional automatic adjustment of probes

** Availabe on CM300xi, SUMMIT200, Summit 12000 and Elite

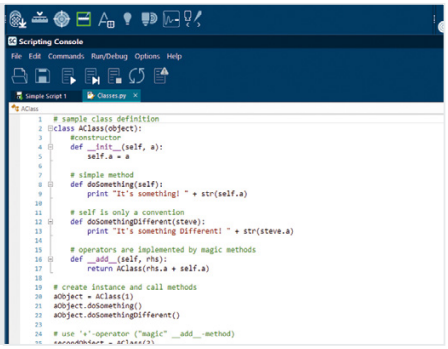


The Right Tool for Every User Level

A comprehensive set of Velox functions enable easier, faster and safer testing. From pre-defined workflows, up to a scripting console for advanced operators – FormFactor has the right tool for every user level.

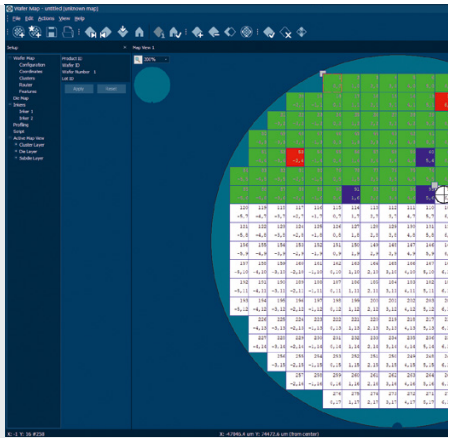
Scripting Console

- / Integrated development environment for editing, executing, and debugging automation scripts
- / Extensive interface for programming Velox applications
- / 400 Velox SCI (Server Command Interface) commands available
- / Send commands to Velox with pre-defined simple test scripts or use fully programmable automation with Python



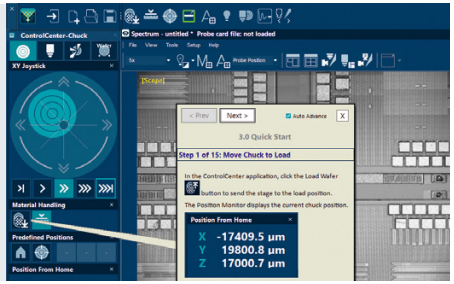
Wafer Map

- / Fully-customizable
- / Shows the current position on the wafer, the status of the measurement process and test results
- / Compensation of height differences for accurate contact quality on uneven wafers
- / Clustering for parallel testing
- / Supports >2,000,000 dies
- / Sub-die and binning support
- / Fully integrated into SPECTRUM Vision System



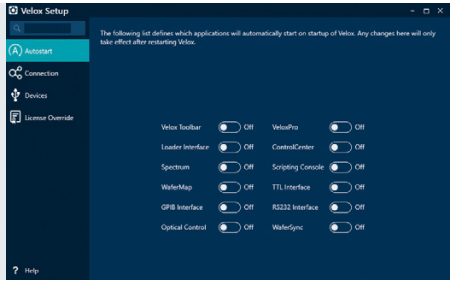
Workflow Guide

- / Pre-defined workflows
- / Step-by-step guidance
- / Individual process-specific workflows can be defined
- / Reduced training time
- / Enables inexperienced users to perform successful measurements



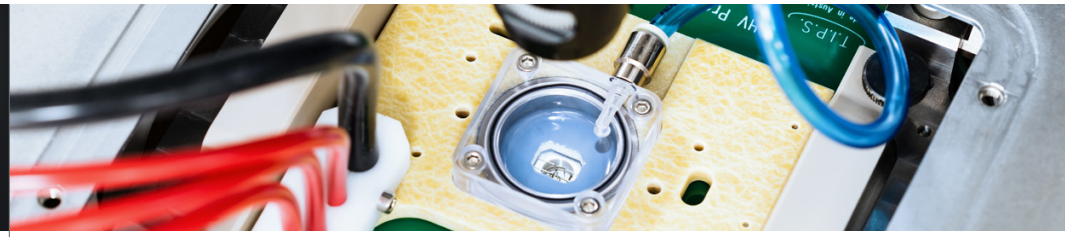
Velox Settings

- / Will combine all global Velox settings in one place in the future
- / Easy and intuitive to use
- / Modern Windows 10 like settings dialog
- / Fluent design inspired with transitions and animations



Microsoft Security Essentials Support

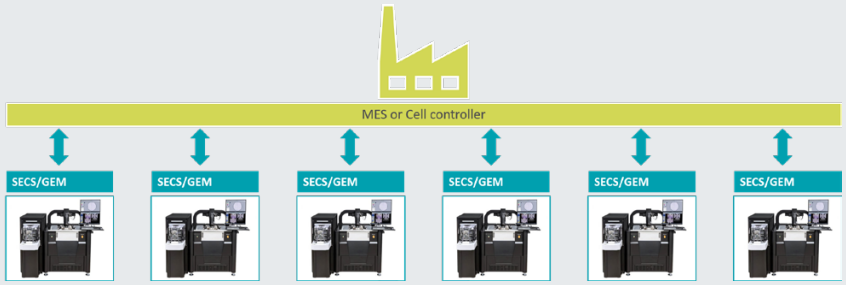
- / Integration of antivirus software
- / Real-time protection against spyware, viruses, rootkits and other malware



SECS/GEM Option

SECS/GEM interfaces are a SEMI-standard industry-specific integration layer for semiconductor production. SECS/GEM interfaces establish the connection between the system and the higher level.

Production and plant data, alarms, process values, process parameters etc. are transferred via SECS/GEM.

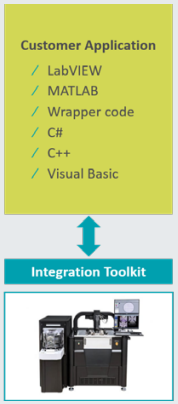


Velox Integration Toolkit

The Velox Integration Toolkit is an interface between Velox and custom applications.

It allows remote control of the probe station and supports many third party libraries and programming languages like LabView MATLAB and Visual Basic.

The Velox Integration Toolkit allows test executives to interface to Velox.

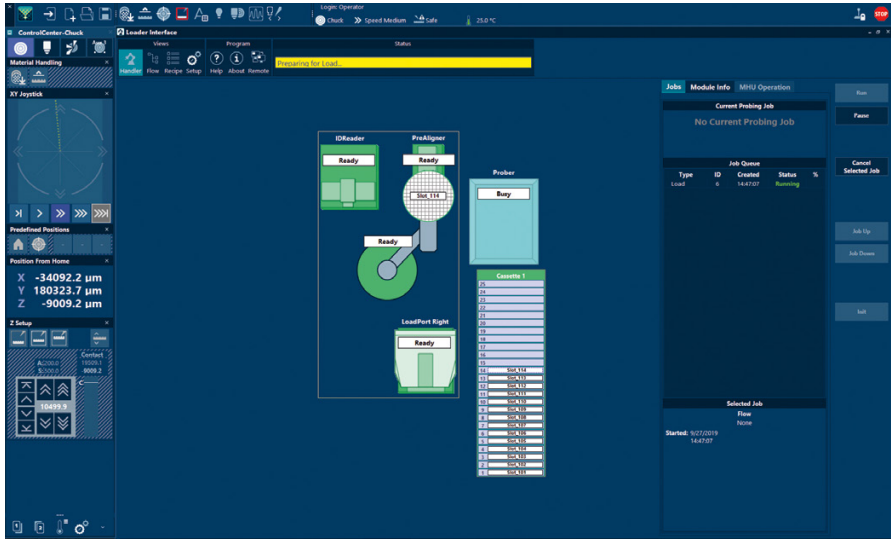


Loader Integration

A loader can now be operated directly with Velox. There is no need for any additional software.

The creation of workflows and receipts is as simple as it can get.

This drastically improves the operation with fully-automated probe stations that include a loader, reducing time and training efforts.



VeloxPro

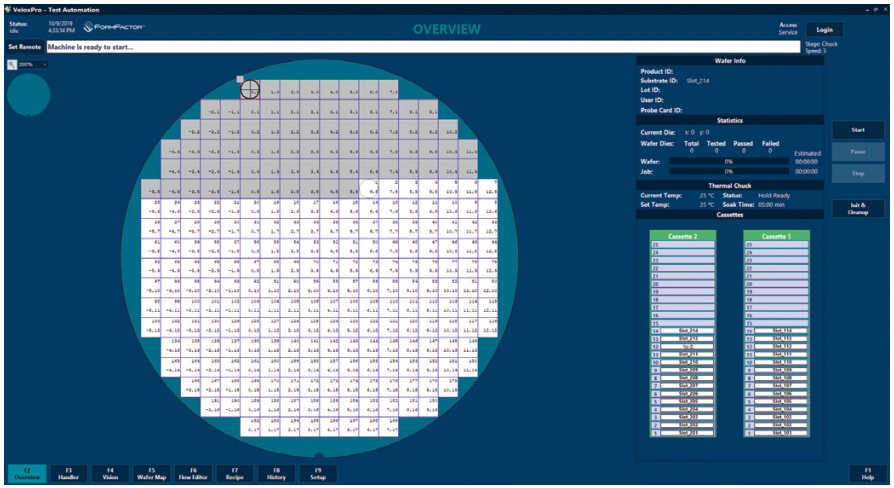
SEMI E95-Compliant Enhancement With Test Executive Capabilities

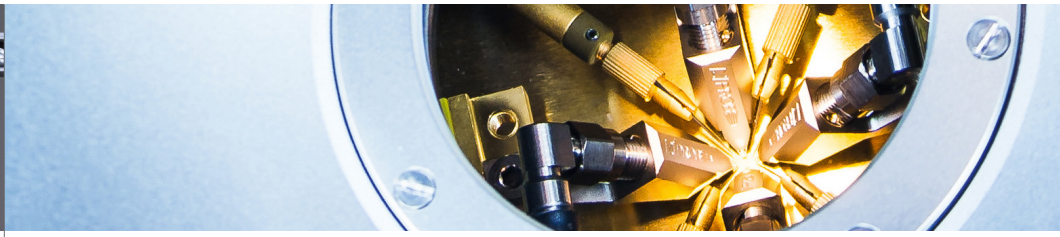
VeloxPro is a SEMI E95-compliant enhancement option for Velox. It provides a condensed graphical user interface for simplified and safe operation.

A set of graphical windows display the wafer and cassette maps (if a wafer handler is used), and update to reflect pass/fail progress when the test cycle executes.

Additionally, VeloxPro provides test executive capabilities, enabling control of third-party measurement equipment via the probe station.

- SEMI E95-compliant
- Simplified and safe operation
- Condensed graphical user interface
- Test executive capabilities: can control all connected measurement instruments



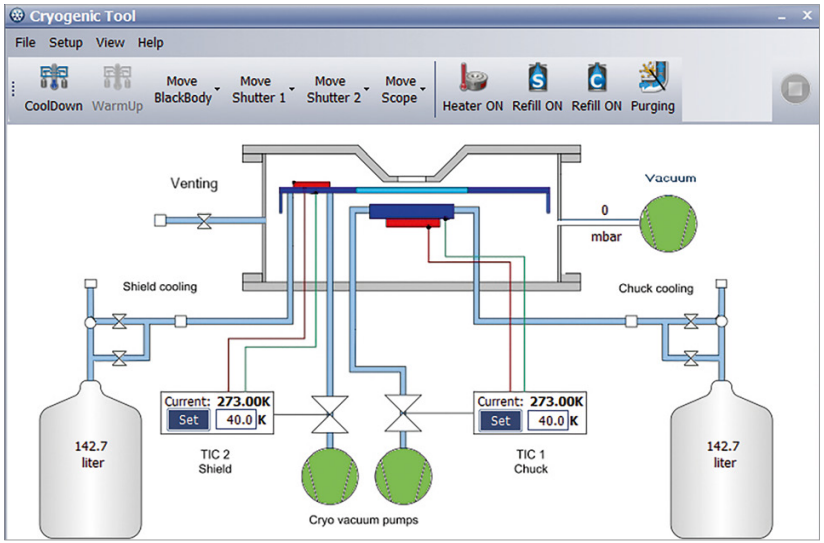


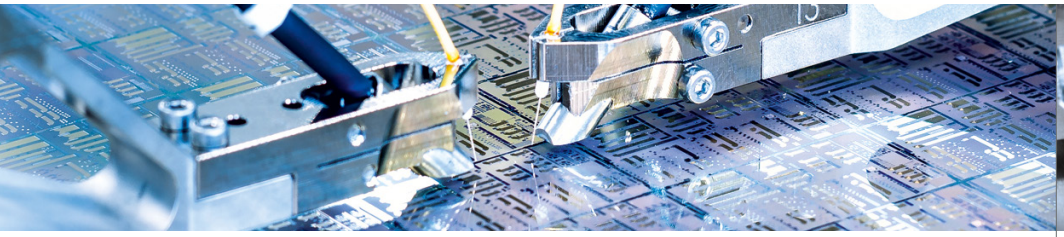
Cryogenic Tool

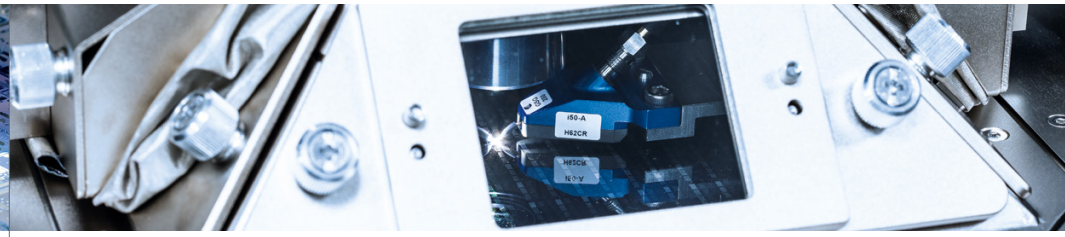
Controls Extreme Environments

The Cryogenic Tool is a Velox application that enables precise on-wafer measurements in extreme environments by controlling vacuum pump and coolant parameters. It has been developed for cryogenic probe systems that enable testing of cooled IR sensors and cutting-edge technologies that require cryogenic temperatures. It supports auxiliary functions like automatic refill of the liquid nitrogen dewars and automated swapping of the IR radiation sources (blackbodies).

- Graphical interface of vacuum/cryogenic probe station
- Wizard-guided operation
- Real-time display of process parameters
- Semi-automated process tools







SiPh-Tools

Powerful Silicon Photonics Software Package

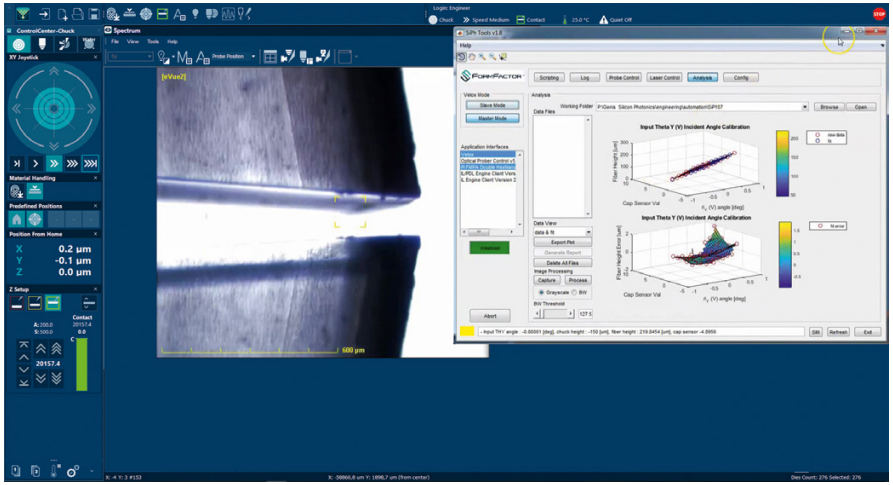
SiPh-Tools is a powerful software package that includes a vast tool set for enabling and facilitating optical probing.

By integrating probe station vision capability with optical positioning and even test equipment, SiPh-Tools automates manual tasks.

From training measurement positions to performing optical scans during die-to-die stepping, SiPh-Tools provides the functionality needed to quickly gather data from your devices.

In addition, SiPh-Tools has a wide range of tools for capturing, logging and interpreting the data you collect.

- Measurement Position Training
- Automated Alignment Functions
- Optical Alignment Verifications
- Wafer Training
- Calibration Wafer Verifications
- Sub-Die Management



WinCal XE™

High-Performance RF Calibration Software

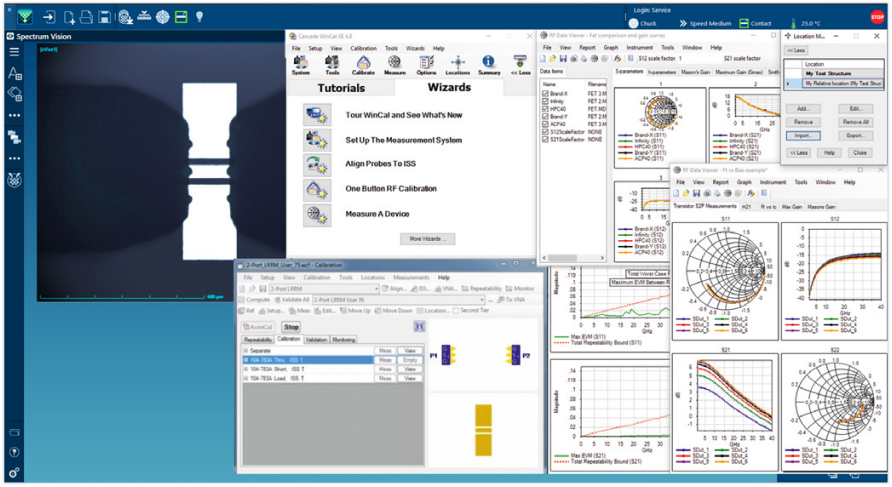
WinCal XE from FormFactor is a comprehensive and intuitive on-wafer RF measurement calibration tool to achieve accurate and repeatable S-parameter measurement, which is crucial for precision device modeling/characterization and engineering RFIC test.

WinCal XE is fully-integrated with Velox: A two-way channel of communication synchronizes probing processes with RF measurements and calibrations.

The combination of both software solutions empowers FormFactor's Autonomous RF Measurement Assistant, which enables operator-independent calibrations and RF measurements that lead to faster time to profitability.

The WinCal XE features a guided system setup complete with customizable Wizards to ensure fast and easy access to reliable VNA calibration and repeatable data.

- Exclusive 1-, 2-, 3-, and 4-port calibration algorithms
- LRRM™, LRM+™, SOLT, SOLR, hybrid LRRM-SOLR and NIST-style multi-line TRL calibrations
- Immediate and live data measurement and viewing
- Error Set Management capability for data comparison and augmentation



Modular Concept

Fully Customizable to Your Requirements

Velox Module	Description	Hardware Requirements
Velox	Base probe station control software suite	All semi- and fully-automated probe stations from FormFactor
AutoRF	Assistant for autonomous calibration and measurements of RF devices over multiple temperatures	CM300xi, SUMMIT200, Summit 12000 and Elite
SiP-Tools	Software package for autonomous silicon photonics measurements	CM300xi, SUMMIT200
VueTrack	Automated probe-to-pad alignment over multiple temperatures	eVue Pro
VueTrack Pro	Automated probe-to-pad alignment over multiple temperatures + motorized positioners	eVue Pro, Motorized Positioners
ReAlign	Automated probe-to-pad alignment over multiple temperatures for applications with limited microscope view	CM300xi with system-integrated off-axis cameras
Identification	For reading data matrix, bar code and OCR code	All semi- and fully-automated probe stations from FormFactor
SECS/GEM	SEMI-compliant interface for connection between station and higher level interfaces	All semi- and fully-automated probe stations from FormFactor
Cryogenic Tool	Graphical user interface of vacuum/cryogenic probe stations	Vacuum/cryogenic probe stations
VeloxPro	SEMI E95-compliant operator interface designed for production environment and test executive: can control all connected measurement instruments	All semi- and fully-automated probe stations from FormFactor