

Agilent Yellowstone 3.0 Automated Test Process Center

Yellowstone Overview

Agilent Technologies Yellowstone 3.0 is an automated test process center for high-mix, low-volume manufacturing of complex electronic products used in thermal-stressed or vibration-stressed environments. It dramatically improves uptime and utilization of test assets while reducing overall manufacturing costs.

A Decade of Proven Uptime and Cost Savings

For the last ten years, Agilent installed collections of one hundred seventy Yellowstone robots and hundreds of automated test stations for testing its own complex instruments.

With uptime of greater than 97% on a 24/7 schedule, labor was reduced by 80% and test process asset utilization improved by 2X. Yellowstone systems deliver to Agilent an ongoing annual manufacturing cost savings of \$50 million while initially reducing floor space and capital assets by 65%.

Now you can have similar results for your parametric and functional tests!

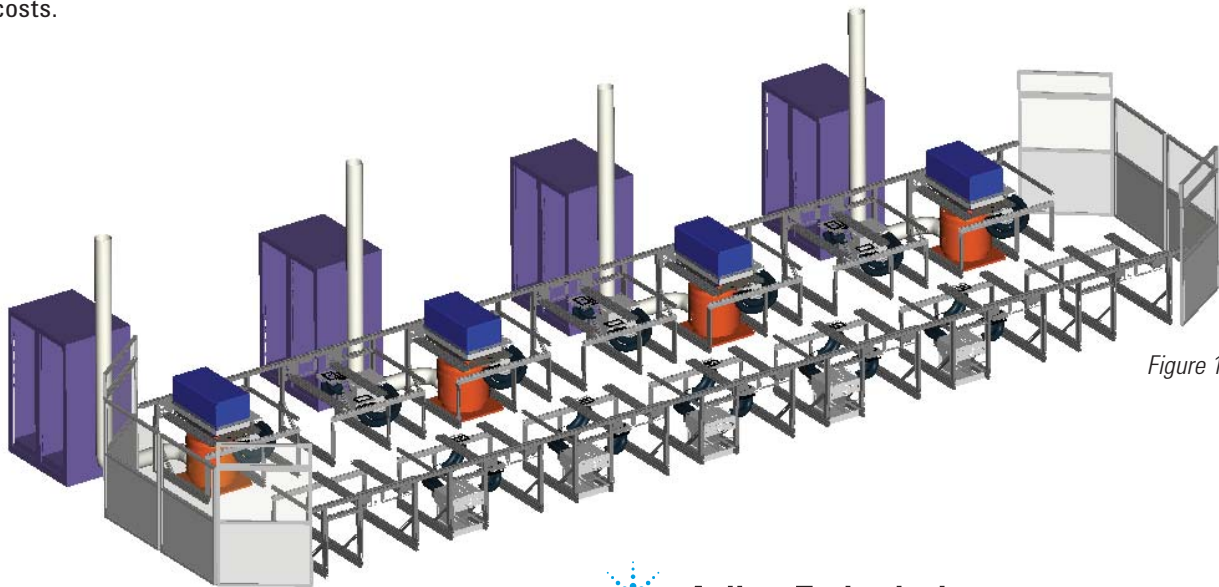


Figure 1.



Agilent Technologies

Benefits & Features of Yellowstone

Yellowstone provides automated integration of your test stations by connecting them with robotic vehicles that automatically interconnect the UUT to power & signals; running automated test suites, and coordinating results and flow via shop floor control software. This results in:

- Improvement in test process utilization
- Savings in manufacturing test costs
- Cycle time reduction
- Test equipment utilization
- Reduction in floor space
- Significant labor reduction

Key Features of Yellowstone

- Automatically transports UUTs to test stations per test plan
- Once at a test station, automatically interconnects UUTs to electrical power, and interconnects UUTs signals (including RF) and executes tests
- Simultaneously tests thermal (0 to 60 degrees C) and vibration profiles (up to 8 G's)
- Controls process via shop floor control software
- Automatically manages mix-modeled process involving multiple product families
- Runs continuously (24 /7) with a high reliability of uptime > 97%
- Integrates into existing production facilities, IT, test software

Yellowstone 3.0 Product Family

Yellowstone, an automated test process center, is a collection of products that can be integrated together to match the test needs of your high-mix product line. For a new installation, at least one of each of these products must be purchased to enable the test process center to work correctly (except for the Thermal Pre-soak Station). Additional products may be included in your initial purchase or added with future modifications. Call or email an Agilent expert (see details at the end) to help you determine how to integrate the Yellowstone products to optimize your test process.

Thermal pre-soak test station (U3040AK01). The thermal pre-soak station increases utilization of the thermal and vibration test station by stabilizing your UUT to a thermal environment while not at a test position. This pre-soak occurs off-line of the production process. Then the UUT transfers to the thermal and vibration test station and stabilizes to a thermal environment with minimal thermal soak time. This increases the thermal and vibration test station utilization.

- Typical thermal re-stabilization to +/- 3 degrees within 12 minutes
- Interconnections are automatically made when the tray docks in the test station.

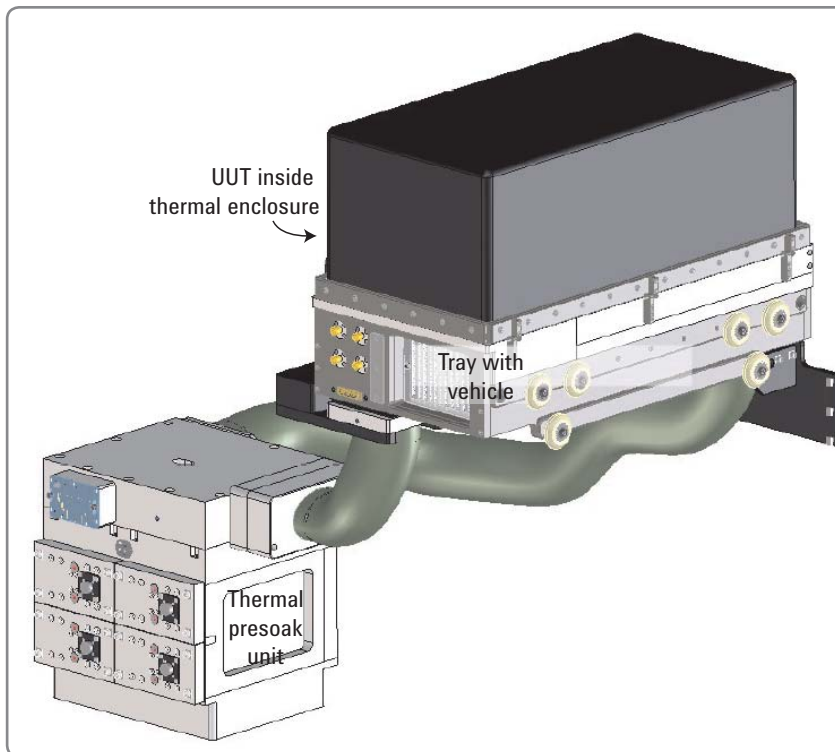


Figure 2. Thermal pre-soak test station

Thermal and vibration test station (U3040AK02)

The thermal and vibration test station provides automated electrical interconnect between your UUT and your measurement equipment, and simultaneously applies specified thermal and vibration profiles to the UUT.

(Note: typically the shaker and fixture provided by others.)

- Full parametric test under temperature and vibration
- Temperature range typically from 0 to 60 degrees C
- Thermal stability typically within 90 minutes to ± 3 degrees without pre-soak test station
- Typical vibration profiles up to 8 G's of force (RMS), 20Hz to 3KHz
- Vibration control typically within ± 3 dB

Transfer gate (U3040AK03)

The transfer gate provides a manual transfer location for UUTs into and out of the Yellowstone 3.0 process center. The transfer gate may also support custom-designed UUT connection checks as part of the UUT installation process.

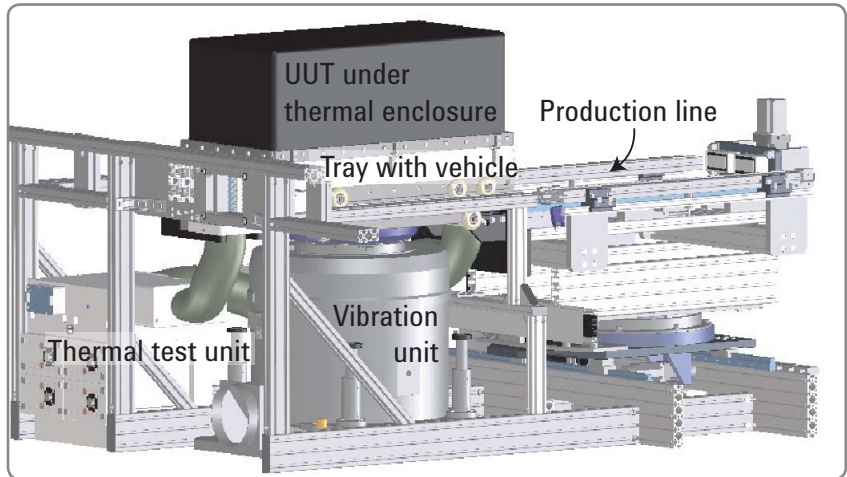


Figure 3. Thermal and vibration test station

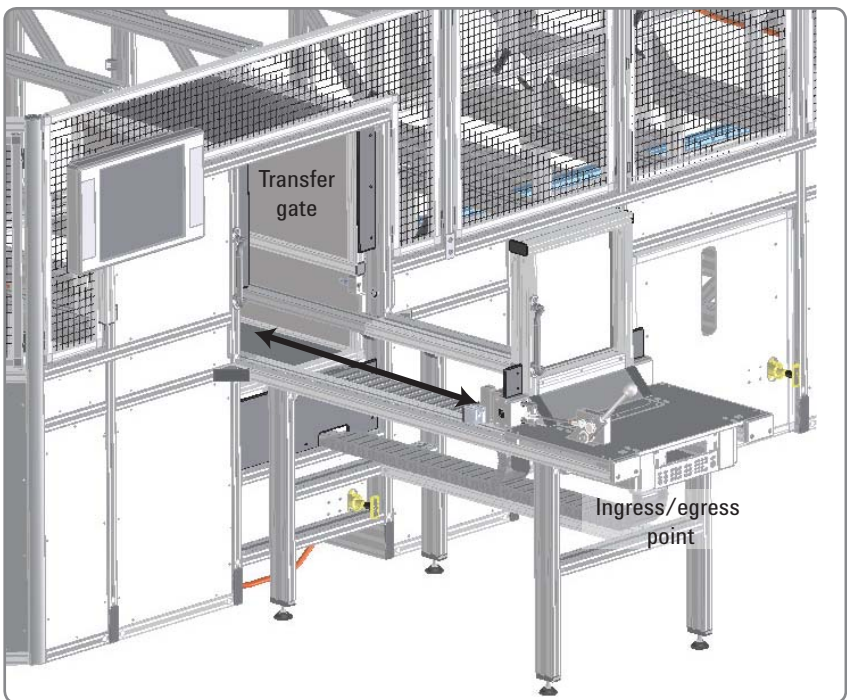


Figure 4. Transfer gate

UUT automation tray (U3040AK04)

The UUT automation tray is a standard interface device between a single UUT and the transportation vehicle, pre-soak test station(s), test station(s), and transfer gate(s) enabling automated UUT transportation and electrical, thermal, and vibration interconnects. A “personality module” includes detailed descriptions of all UUTs to be tested and can be easily updated.

- Test bed for UUT
- Attaches to vehicle
- Operator can swap UUTs on a UUT tray in less than 5 minutes
- Customized design and prototyped for your UUT
- Ensure personality module fit and design

Robotic vehicle (U3040AK05)

The vehicle is the fundamental transportation robot responsible for the transportation of Tray/UUT pairs throughout the Yellowstone Automation Process Center.

- Holds up to 960 mm x 490 mm automation trays
- Up to 400 lbs thrust
- Efficient footprint
- Movement: fore, aft, rotation
- Available for moving other trays while previous is in test station.

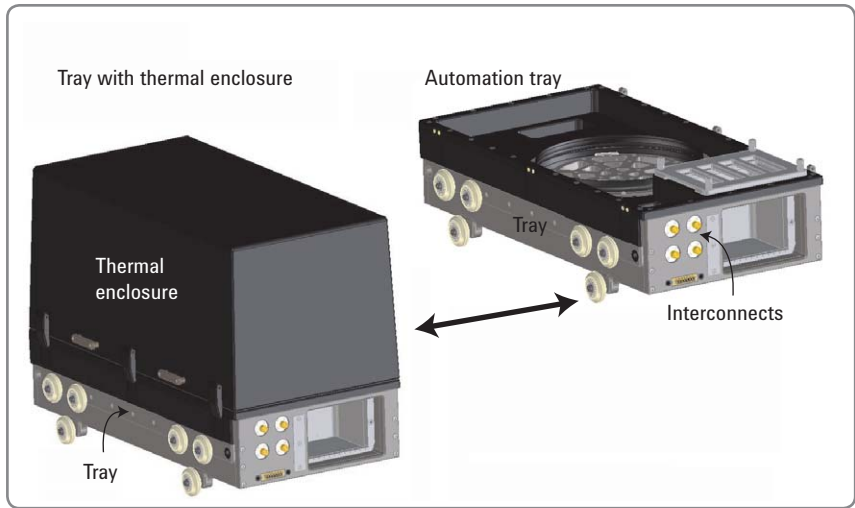


Figure 5. UUT automation tray

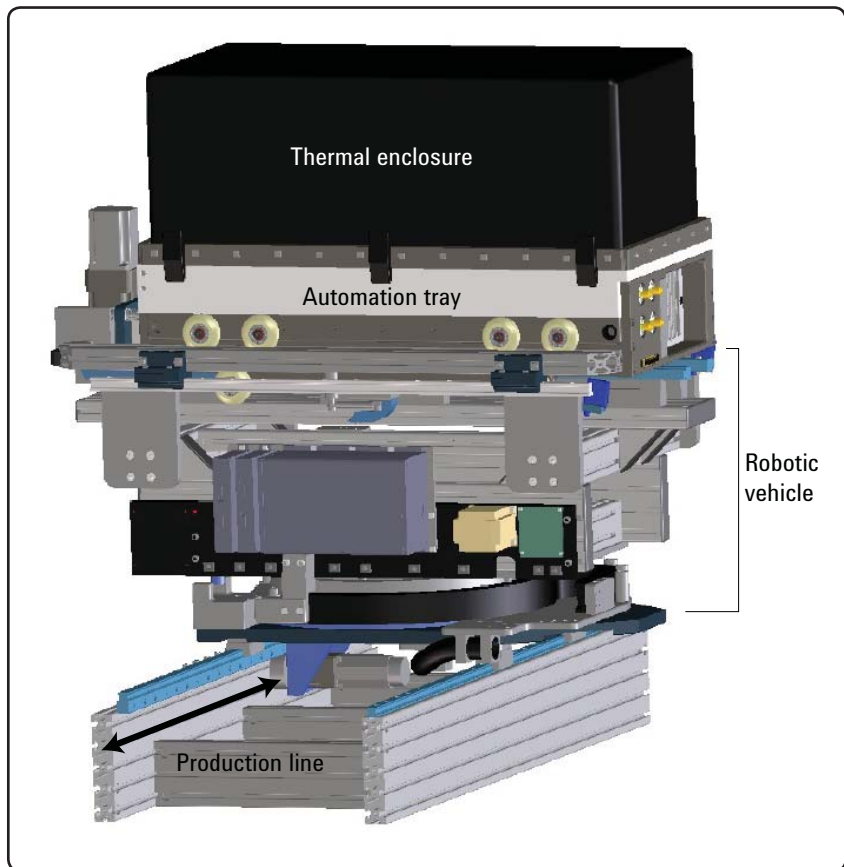


Figure 6. Robotic vehicle

Track module with facilities and safety guarding (U3040AK06)

The track module with facilities and safety guarding includes track and its structure, the vehicle bearing system, safety guarding, a flexible power and facilities bus, and noise abatement panels. This module provides equal length of safety guarding and track to match the length of the system.

- Track for robotic vehicle
- Double-sided structure with guarding for personnel protection
- Flexible power bus with modular outlets built into structure
- Necessary pneumatic and cooling lines
- Noise abatement panels at test stations constructed of foam core with vinyl casing (venting ports allow air flow to shaker)
- Safety guarding around thermal and vibration test stations

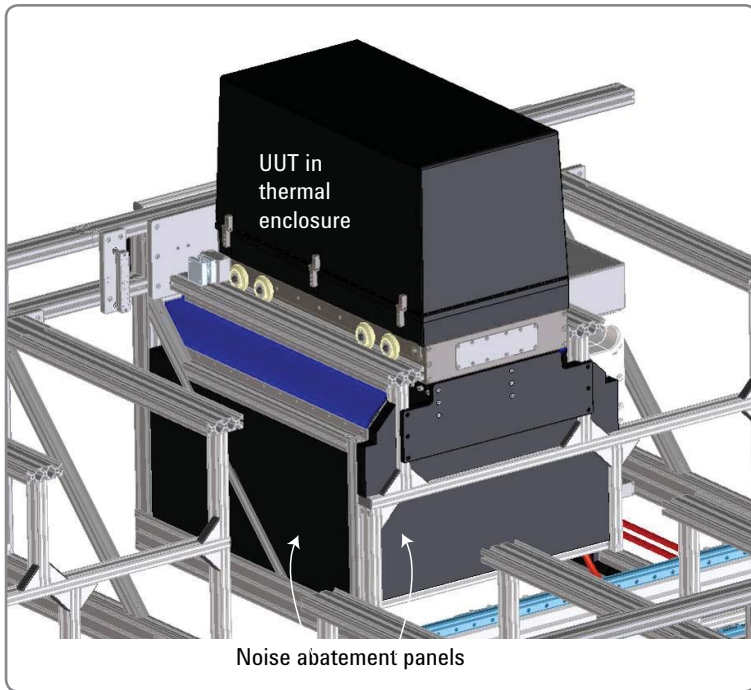


Figure 7. Noise abatement panels

Basic facilities and safety guarding (U3040AK07)

Basic facilities and safety guarding includes the basic facilities and safety guarding needed for each end of the automation test process center.

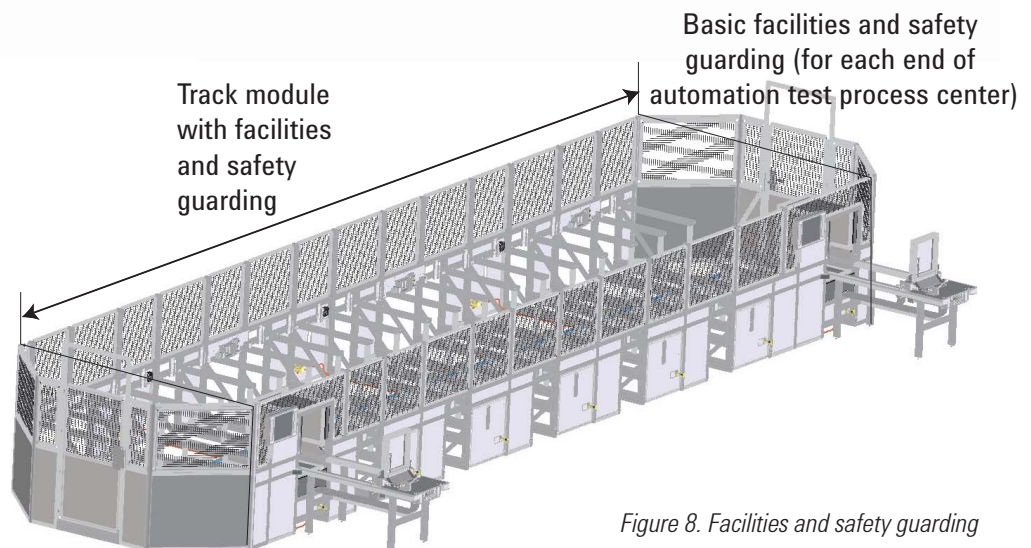


Figure 8. Facilities and safety guarding

Yellowstone shop floor control software or SFC (U3040AK08)

The shop floor control software tracks products and provides process gate keeping functions on the production line.

- System control
- Slot control
- Transfer gate control
- Vehicle and slot firmware
- High mix complexity management
- Real-time Web based visibility and control
- Real-time factory measures
- Software tools provide a supporting framework for customization. Web scripts provide common functions like viewing/editing UUT status and history information, WIP reporting tools, material shortage tracking, etc.

- **SFC: Build It** is pre-Yellowstone step management software
- **SFC: Ranger** is reverse-flow management software for UUT repair and root cause analysis
- **SFC: Assembly Ranger** is PCA repair and root cause analysis
- **SFC: Ship It** is post-Yellowstone step management software
- **SFC Shop Floor Management** provides assembly, test, repair, and field support

Integration services (U3040AK09)

Integration services provide customization of Agilent Yellowstone automated test process center product family, as well as documentation and tools for further monitoring of performance.

- **Configuration** of Yellowstone based on capacity requirements and test specifications
- **Site facilities requirements** are designed and defined to ensure proper support
- **Customer site IT requirements** are described with standard punchlists for setting up a virtual machine server and a web-server
- **Customized software tools** provide registration, software interfaces for monitoring calibration, tray tracking
- **Customized design** of Yellowstone include 3D models, material database, indented drawing list, mechanical drawings, schematics, parts lists, parts quantities, revision control
- **Repetitive testing** of tray customization, test stations, and complete subsystems ensures lower risk and clear communication of designs. Prototype testing includes:
 - Vibration and vacuum coupling
 - Thermal temperature cycles
 - Vehicle movement of trays
- **Demonstration of thermal and vibration profiles** ensures design is accurate and specifications are achievable
- **Installation** includes on-site setup of all ordered components and installation of all custom and standard software

Support contract (U3040AK10)

A support contract ensures maximum uptime for all physical structure, hardware and software. Documentation is provided to enable self-maintenance and basic troubleshooting.

Yellowstone product description	Product number	Minimum for new Yellowstone	Minimum for modifications
Thermal pre-soak station*	U3040AK01		
Thermal and vibration test station*	U3040AK02	●	
Transfer gate*	U3040AK03	●	
UUT automation tray*	U3040AK04	●	
Robotic vehicle*	U3040AK05	●	
Track module with facilities and safety guarding*	U3040AK06	●	
Basic facilities & safety guarding*	U3040AK07	●	
Shop floor control software*	U3040AK08	●	
Integration services	U3040AK09	●	●
Support contract	U3040AK010	●	●

* Requires integration services (U3040AK09) and support contract (U3040AK010)

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For more information on repair and calibration services, go to:

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Yellowstone Assistance

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