

SEVENTEENTH ANNUAL

BiTS

Burn-in & Test Strategies Workshop

TM

March 6 - 9, 2016

**Hilton Phoenix / Mesa Hotel
Mesa, Arizona**

Archive- Session 1

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Session 1

Ila Pal

Session Chair

BiTS Workshop 2016 Schedule

Frontiers Day

Monday March 7 - 10:30 am

Marketplace Report & Thing One, Thing Two, and Test Them We Do

"Marketplace Report"

Ira Feldman - Feldman Engineering Corp.

"How Internet Of Things Will Change Back End Processing"

Mike Frazier & Laurie Wright - Xcerra Corporation

"Serialized Programming Solutions for IoT Secure Elements"

Robert Howell - Exatron

"Internet of Things Testing Challenges"

Anthony Lum - Advantest

Serialized Programming Solutions for IoT Secure Elements

Robert Howell
Exatron Inc.



2016 BiTS Workshop
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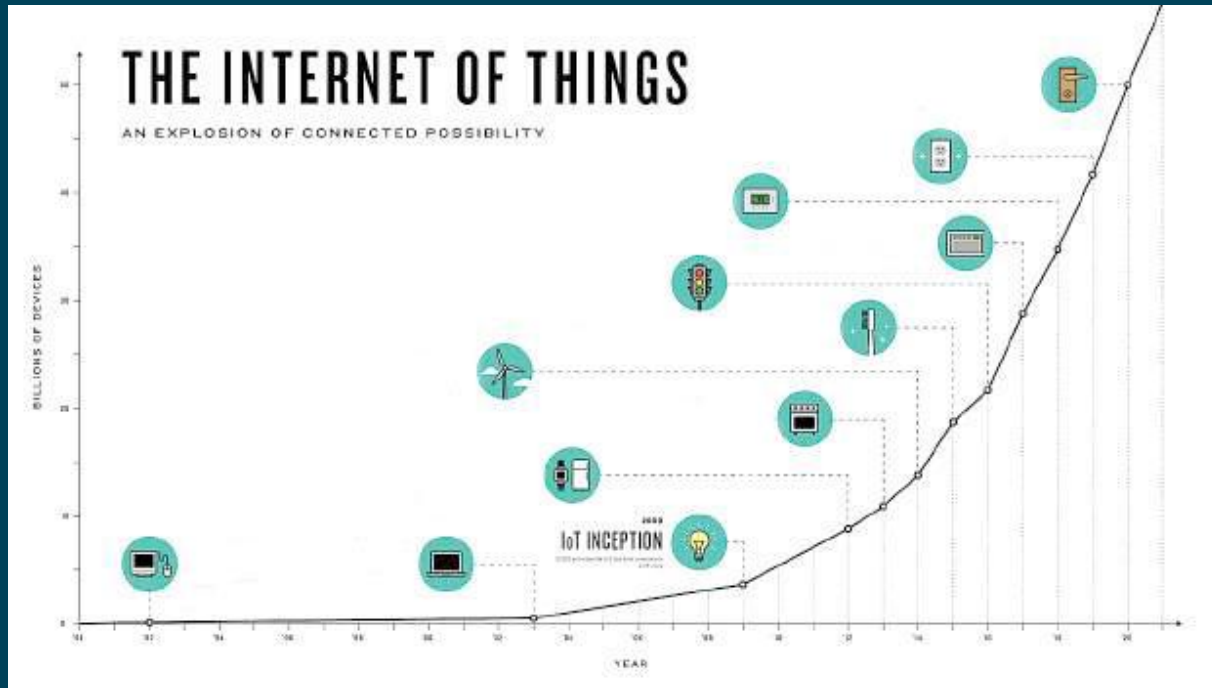


Contents

- “Smart” technology is on the rise.
- Serialization = security for smart tech.
- Challenges in the serialization process.
- Exatron automation solutions have solved these challenges.

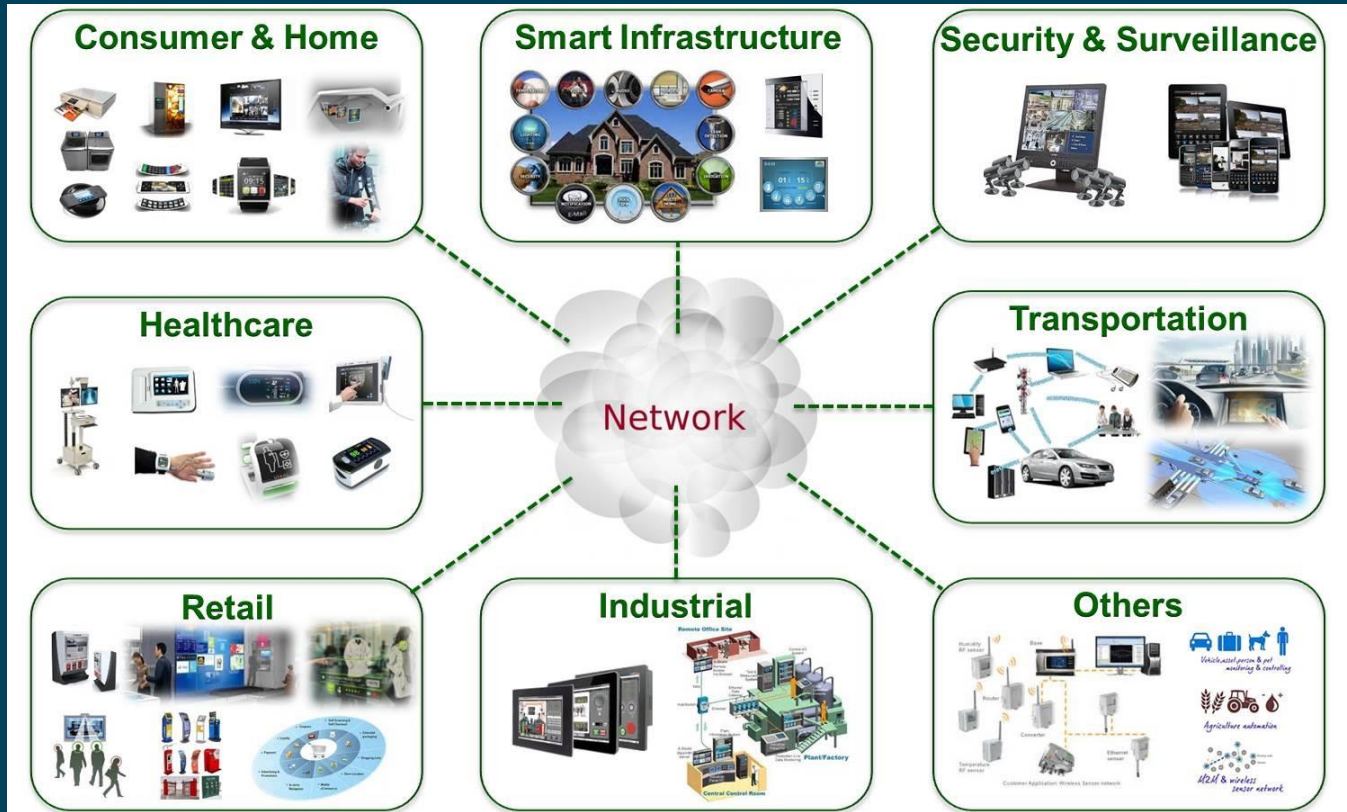
“Smart” Technology
is on the Rise.

Connected IoT devices to reach 50 billion by 2020*



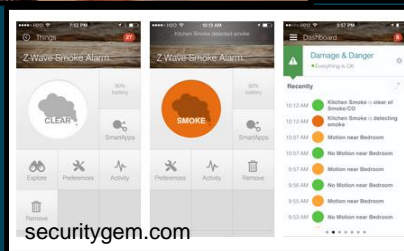
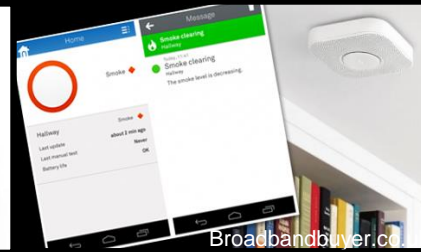
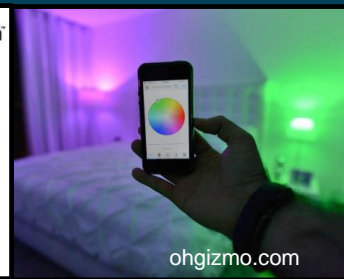
*SOURCE: Gartner, IDC; ABI Research; GRAPH: The Connectivist

A Smart World



electronicsHub.com

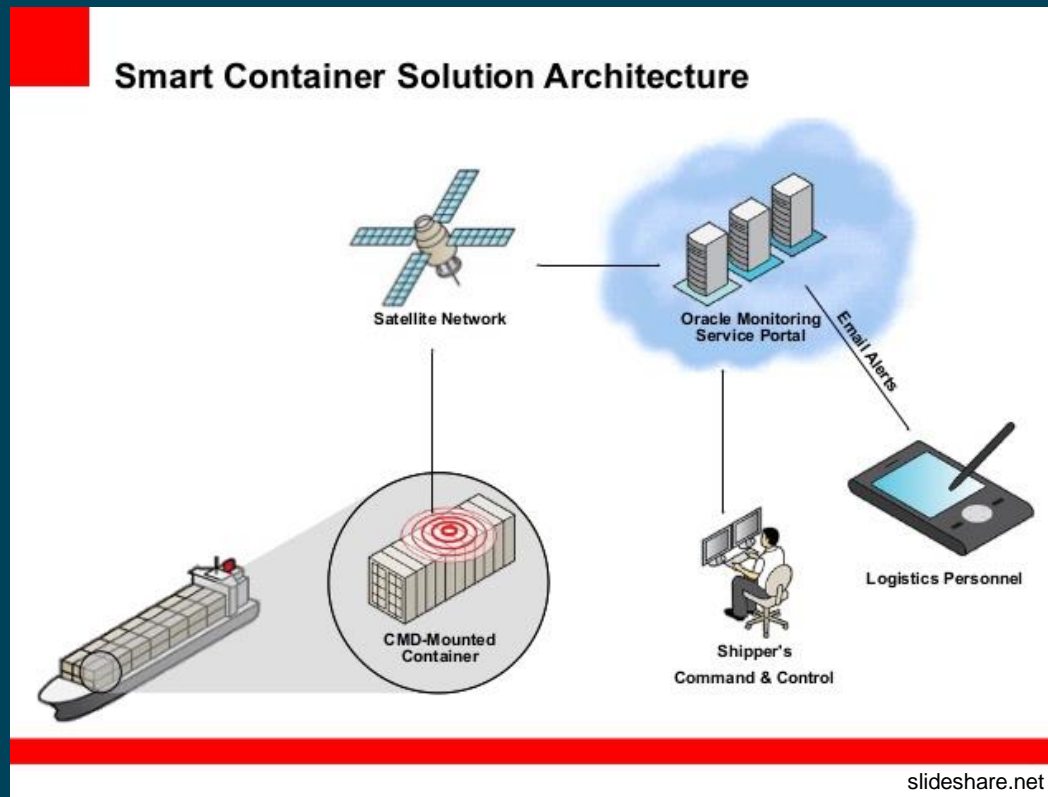
Smart Homes



Smart Banking



Smart Shipping



Serialization = Security for Smart Tech

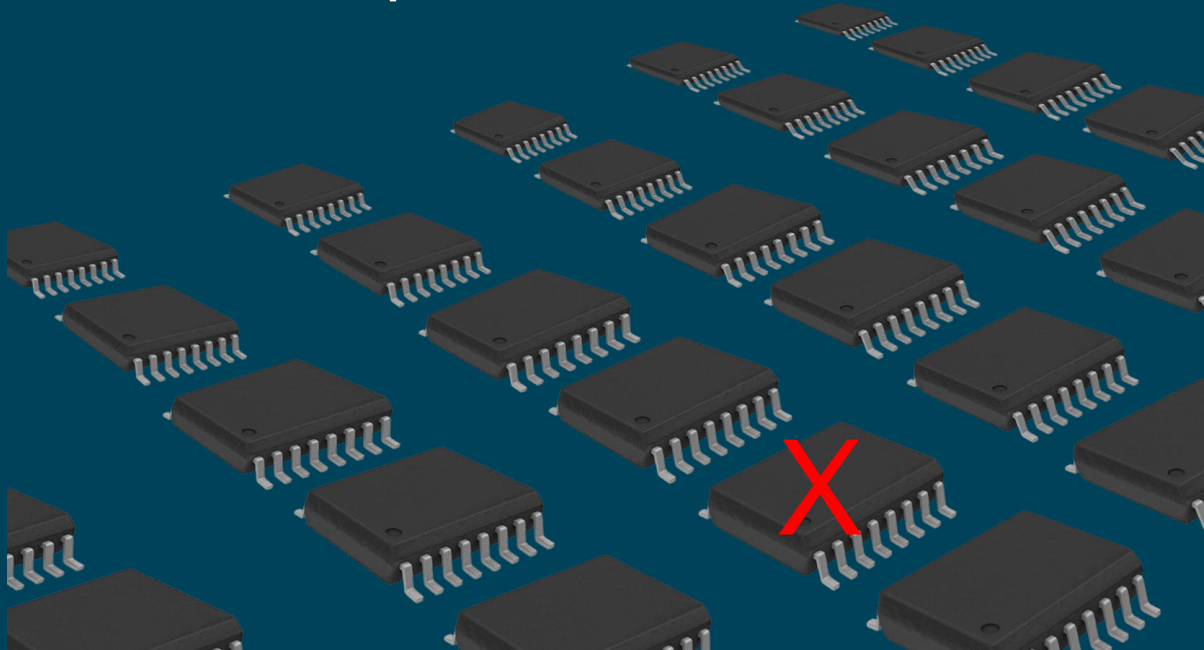
Serialization = Security for Smart Tech

- Smart devices must be paired uniquely to consumers' phones/tablets, etc.
- EMV card readers must be paired with bank software and tech.
- Fraud is easily detected if serial numbers are unique and paired.

Challenges with Serialization

Challenges with Serialization

- One incorrectly programmed device can waste a production lot of thousands.



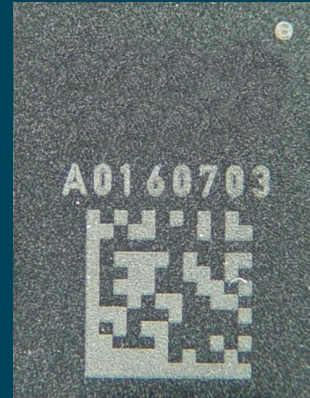
Challenges with Serialization

- Serial numbers must be tracked throughout production and output in order.

0001	0008	0015	0022	0029	0036
0002	0009	0016	0023	0030	0037
0003	0009	0017	0024	0031	0038
0004	0011	0018	0025	0032	0039
0005	0012	0019	0026	0033	0040
0006	0013	0020	0027	0034	0041
0007	0014	0021	0028	0035	0042

Challenges with Serialization

- Serial numbers often need to be both programmed internally and human readable externally.
- Internal and external serial numbers are not always the same.



How to Solve These Challenges?

Automation!

Level 1 Program the Part

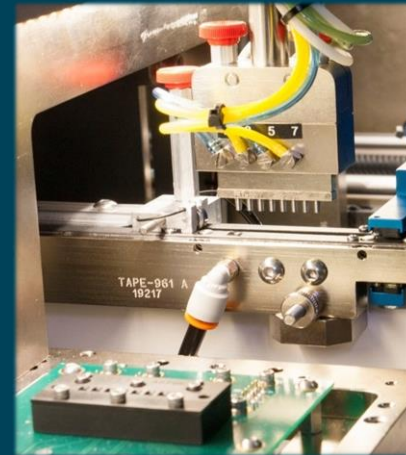
Level 1

Fast, unique internal serialization



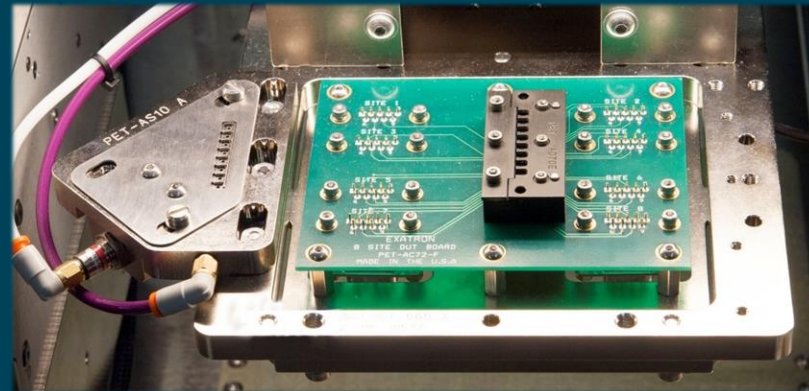
Level 1

- Tape/tube/tray to tape/tube/tray
- Programs 8 devices at once



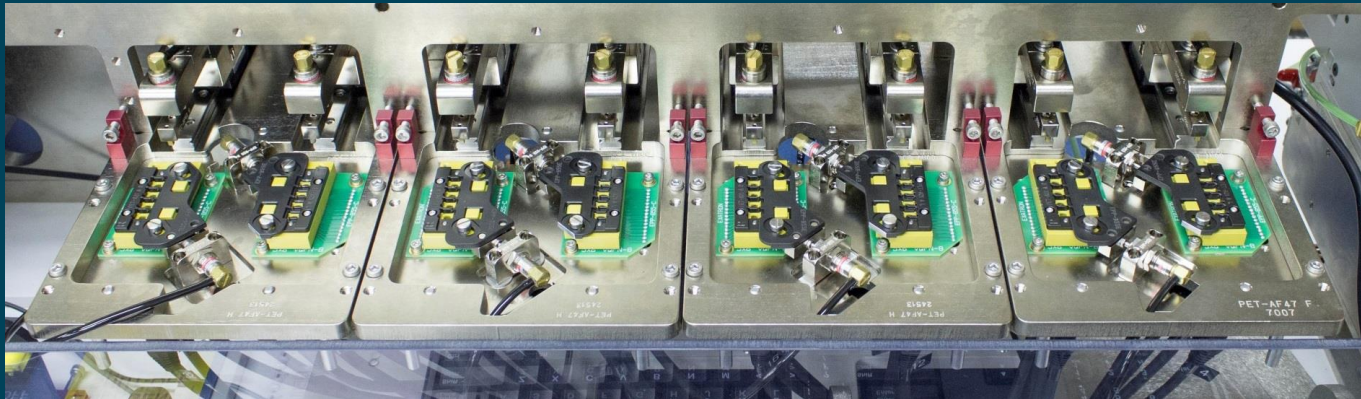
Level 1

- Adapts to nearly any third-party programmer.
- Can add multiple sites if long program time.



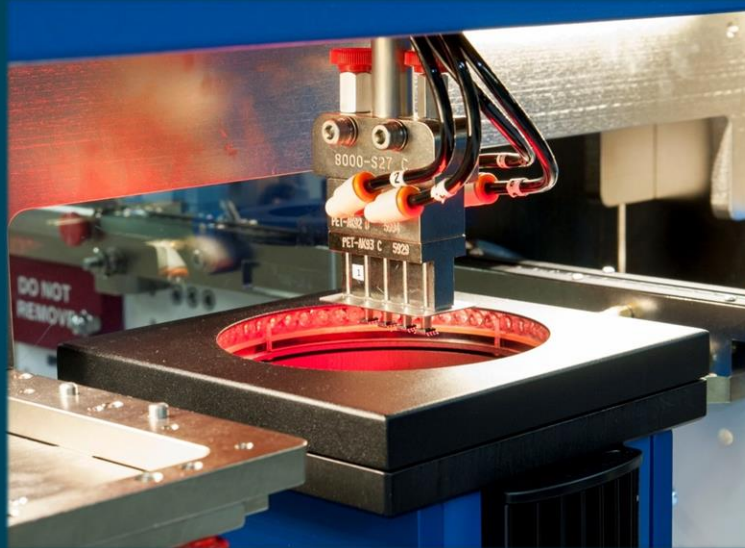
Level 1

- Can fit up to 32 program sites.



Level 1

- Bottom-side inspection ready.



Level 1

No empty pockets in output tape.

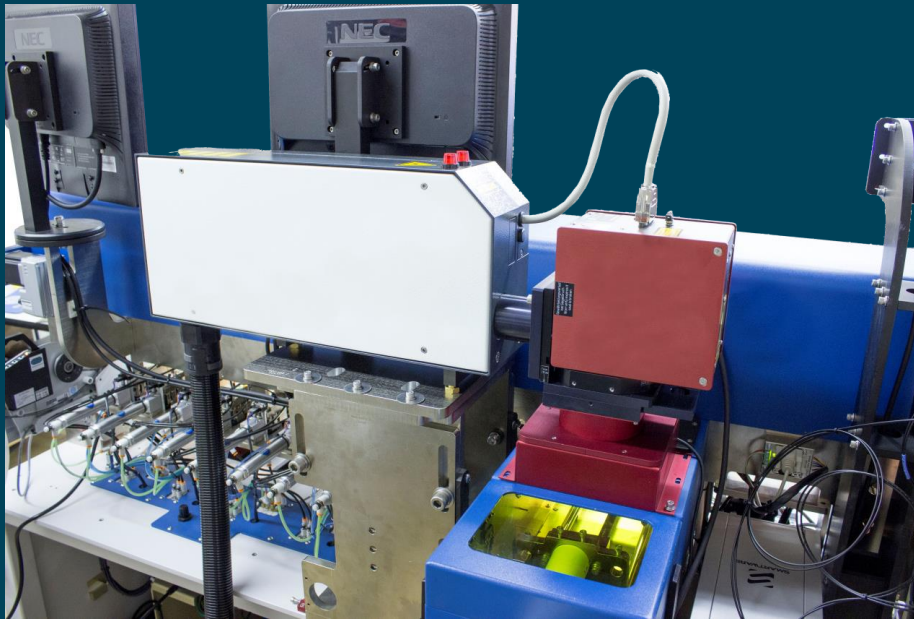


(video)

Level 2 Adds External Serialization

Level 2

Fast, unique internal and external serialization

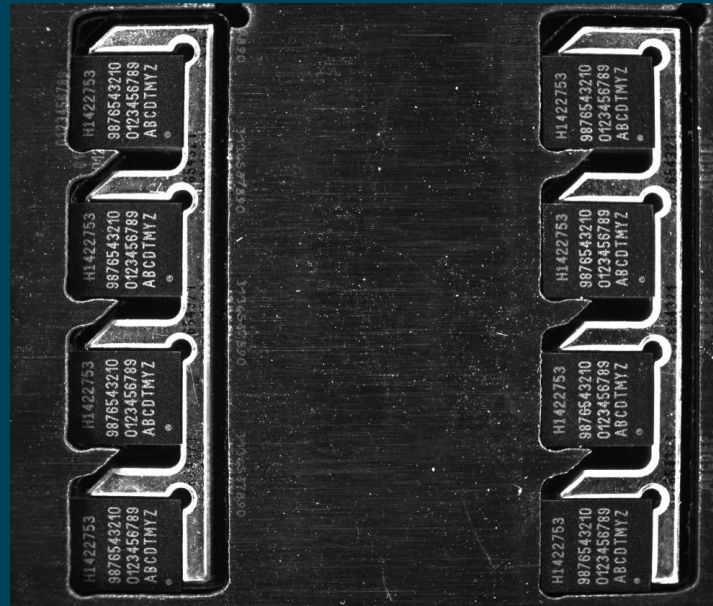


Level 2

- Laser-marked serial number can be tied to the internal number, can be unique to each element, or can be the same number on each element.
- 2,000+ UPH (units per hour) with 20-30 second program time and laser mark.

Level 2

- OCR inspection verifies laser mark and ensures quality.



Level 3 – “Smart Queue” System Adds Verification and Guarantees Perfect Serial Order at Output

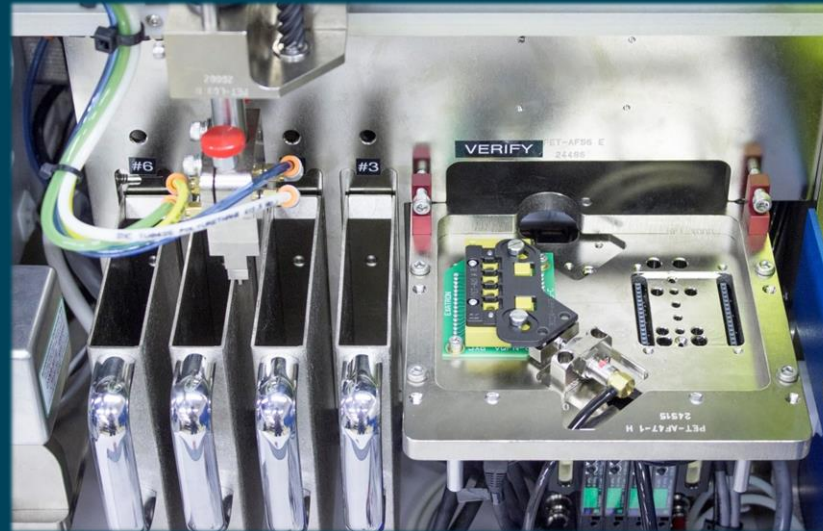
Level 3 – Smart Queue

Unique internal and external serialization required while maintaining perfect serial order.
No missing numbers. No duplicates.

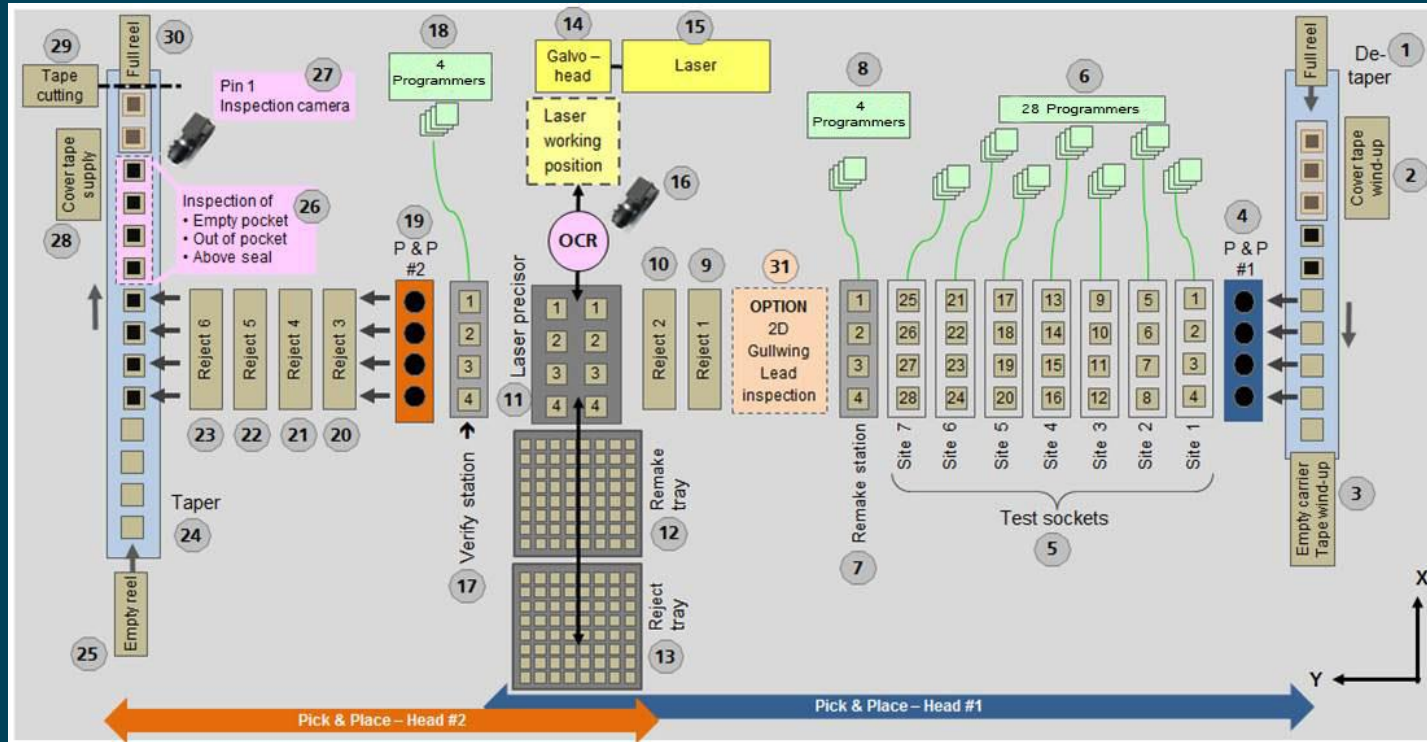


Level 3 – Smart Queue

- Verify site ensures no bad devices make it to output tape.



Level 3 – Smart Queue

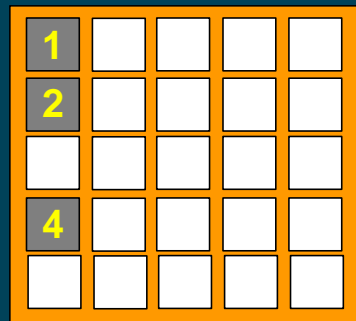


Level 3 – Smart Queue

- Guarantees perfect serial order at output.
- Eliminates costly production stoppages spent sifting through and individually verifying devices in the event of a failure.

Level 3 – Smart Queue

- If any device(s) fail at program, laser or verify, passed devices are placed at a buffer tray.



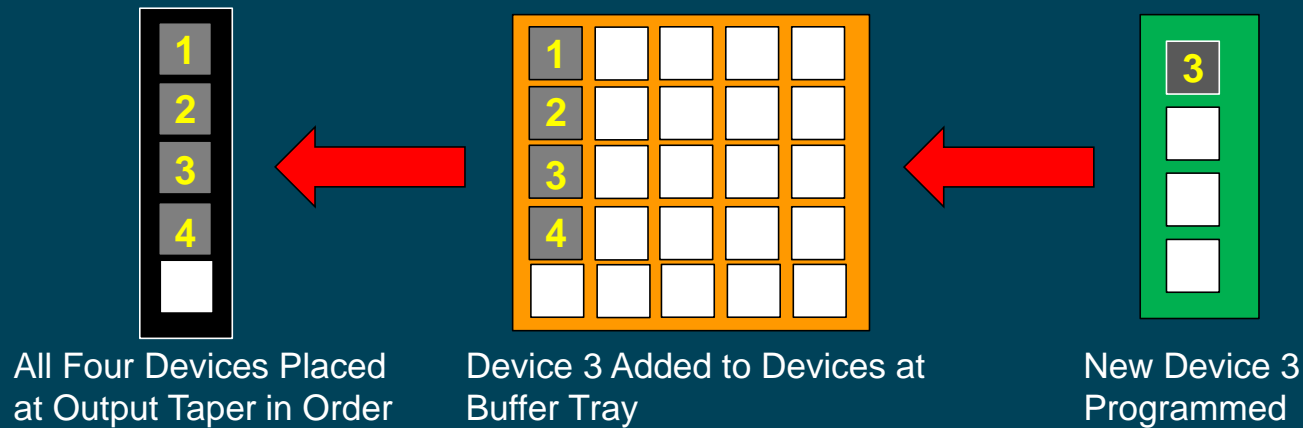
Devices 1, 2, and 4 are Placed
at Buffer Tray



Device 3 Fails
Programming

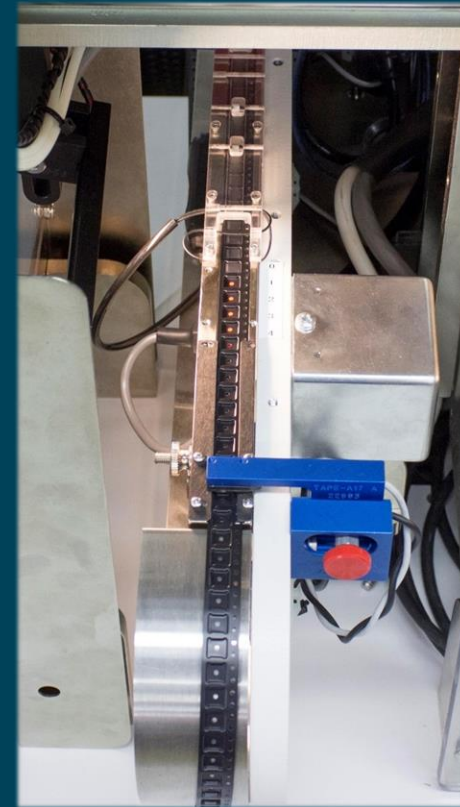
Level 3 – Smart Queue

- New device(s) are programmed with the replacement serial numbers, laser marked, added to devices at buffer tray, and then output to tape.



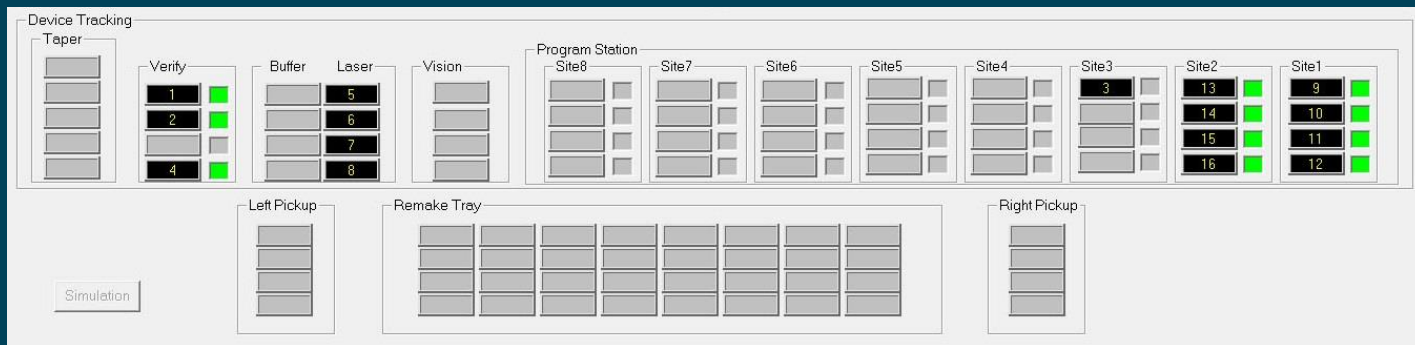
Level 3 – Smart Queue

- No UPH hit, even with a 1% fail rate.
- All devices in perfect serialized order with NO missing or duplicated numbers.



Level 3 – Smart Queue

- Serial numbers are tracked by software at each inspection step.

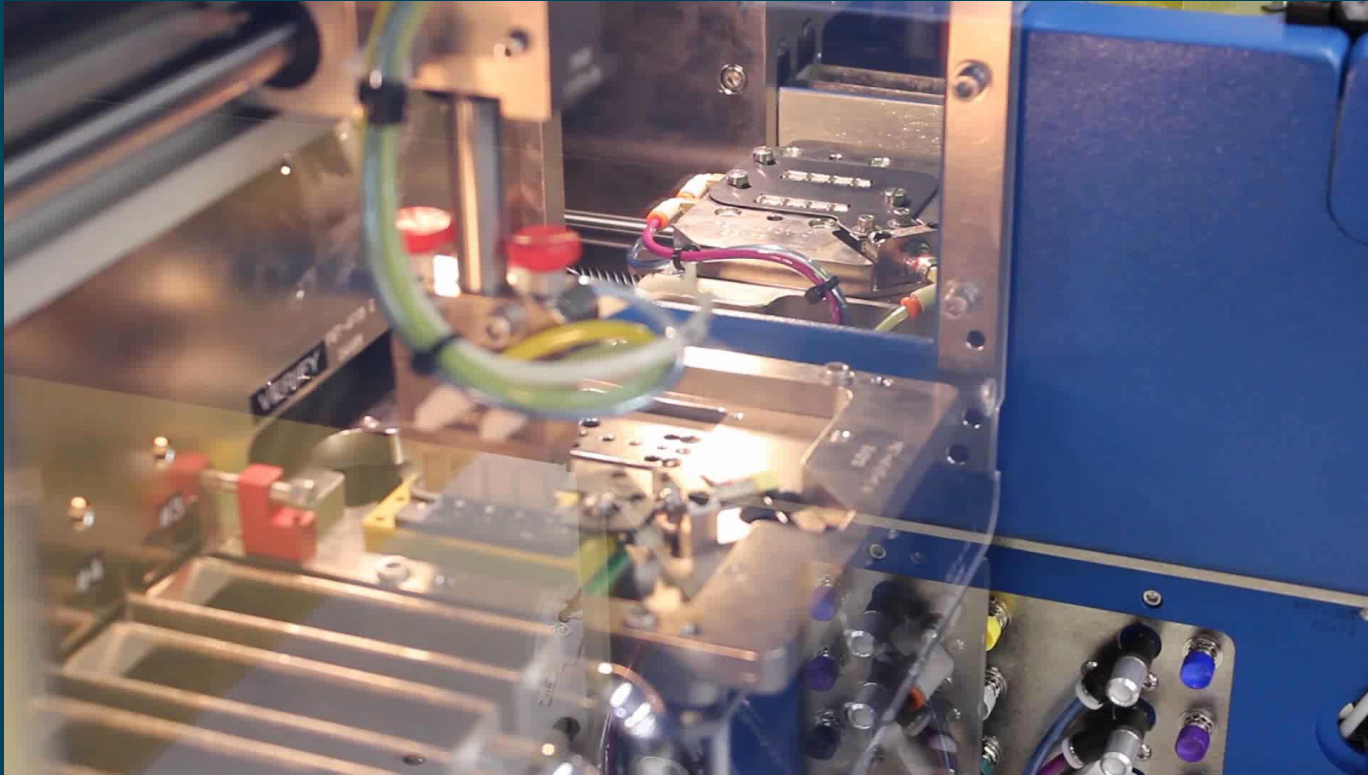


Level 3 – Smart Queue

- Tape inspection ensures proper seating and rotation.



Level 3 – Smart Queue



(video)

Conclusion

- The future of smart technology depends largely on security.
- Security depends largely on unique, trackable serial numbers.
- Automation guarantees perfect serialized output, logged and tracked at each production step.