Throughput and Capacity Improvement by Known Good Socket Process in Production

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- Challenges
- Known Good Socket Process
- Data
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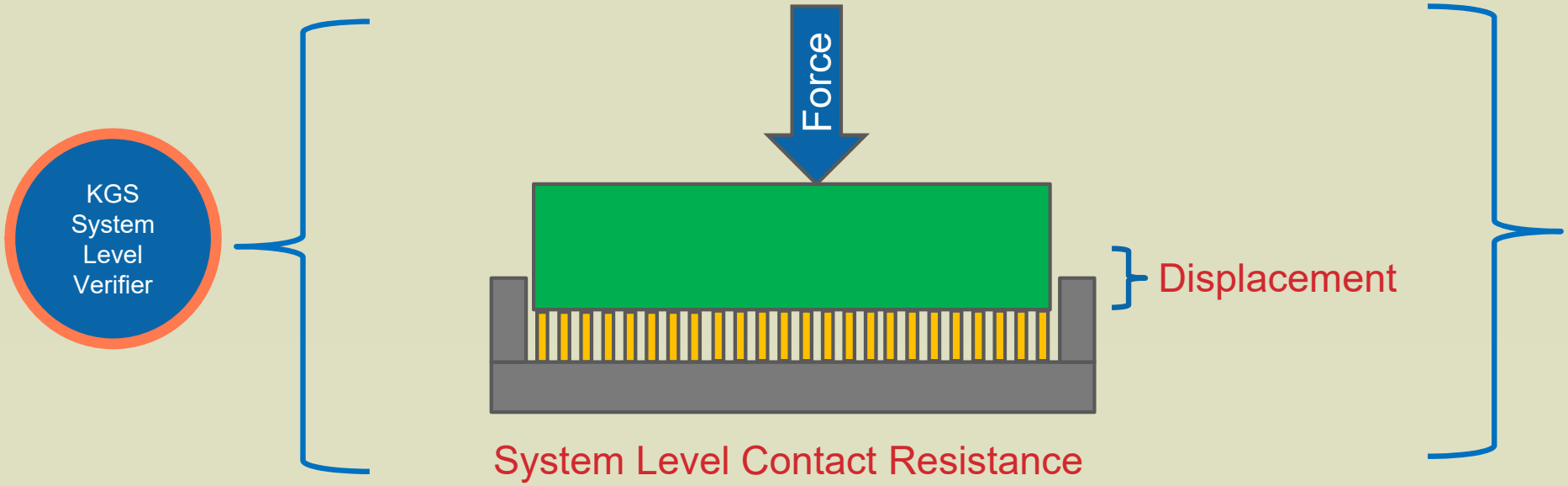
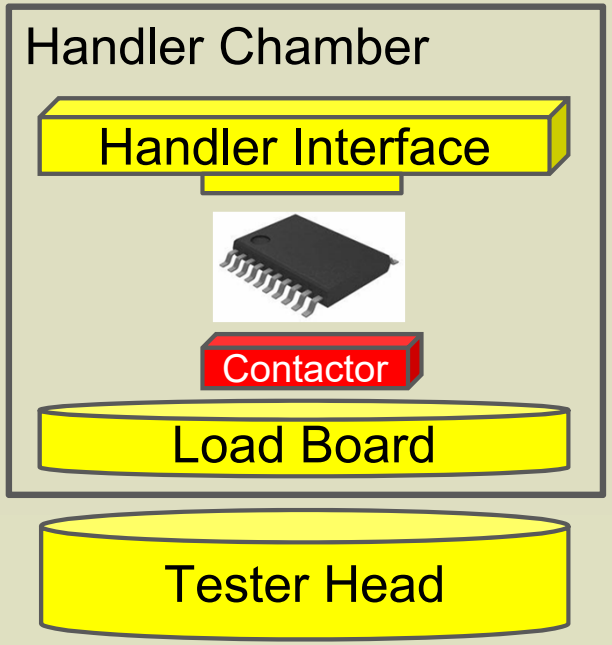
"KGS System Level Verifier"

- Traditionally, we focus on pin level characterization



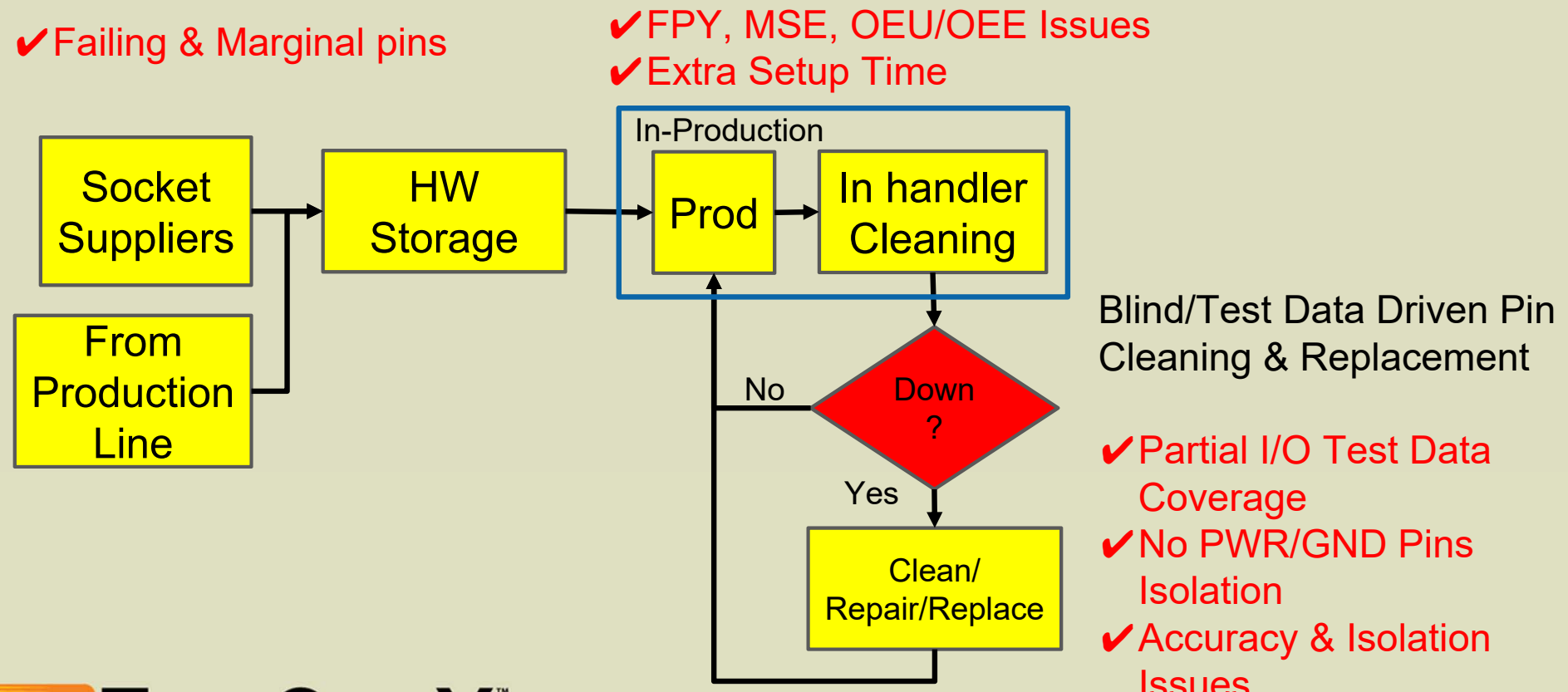
Typical Issues WITHOUT Known Good Socket (KGS) Process



- Extended production setup, downtime & low Operational Efficiency
  - OEU – Overall Equipment Utilization
  - OEE – Overall Equipment Effectiveness
- Low First Pass Yield (FPY) & High Retest Rate
- Excessive socket/pins maintenance & spare parts cost

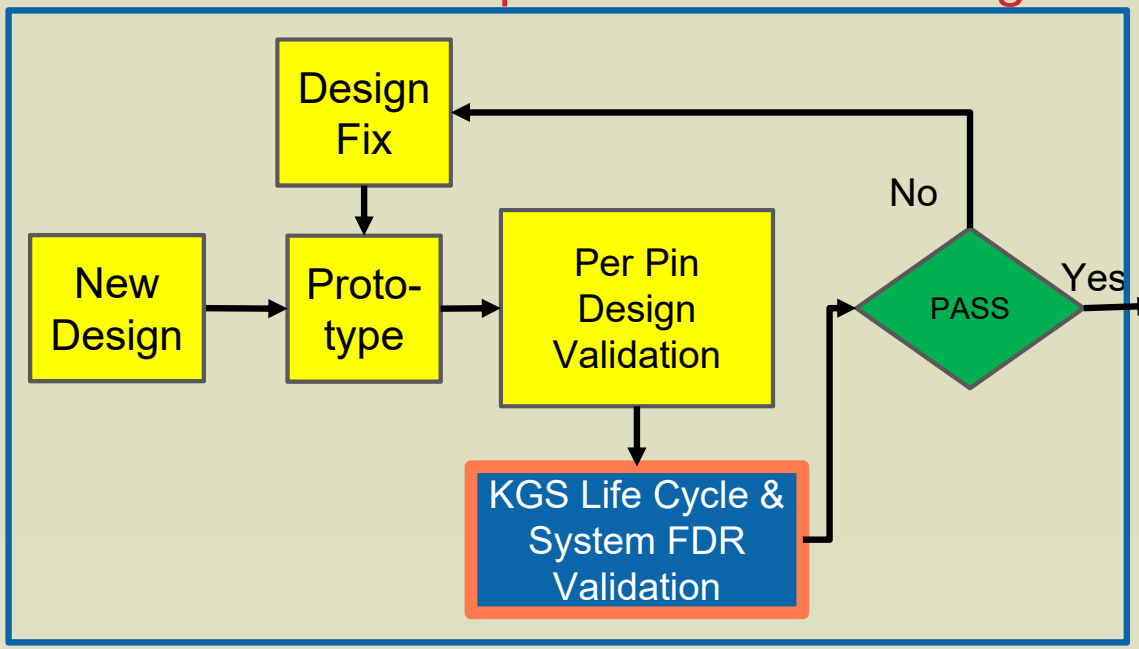
Throughput + Equipment Capacity Challenges

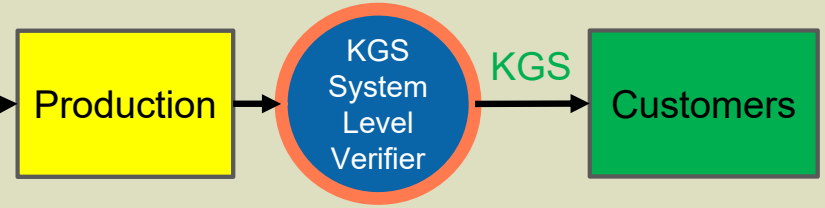
Typical Production Line WITHOUT KGS



Pre-Production Known Good Socket Process

New Socket Development/Selection Stage

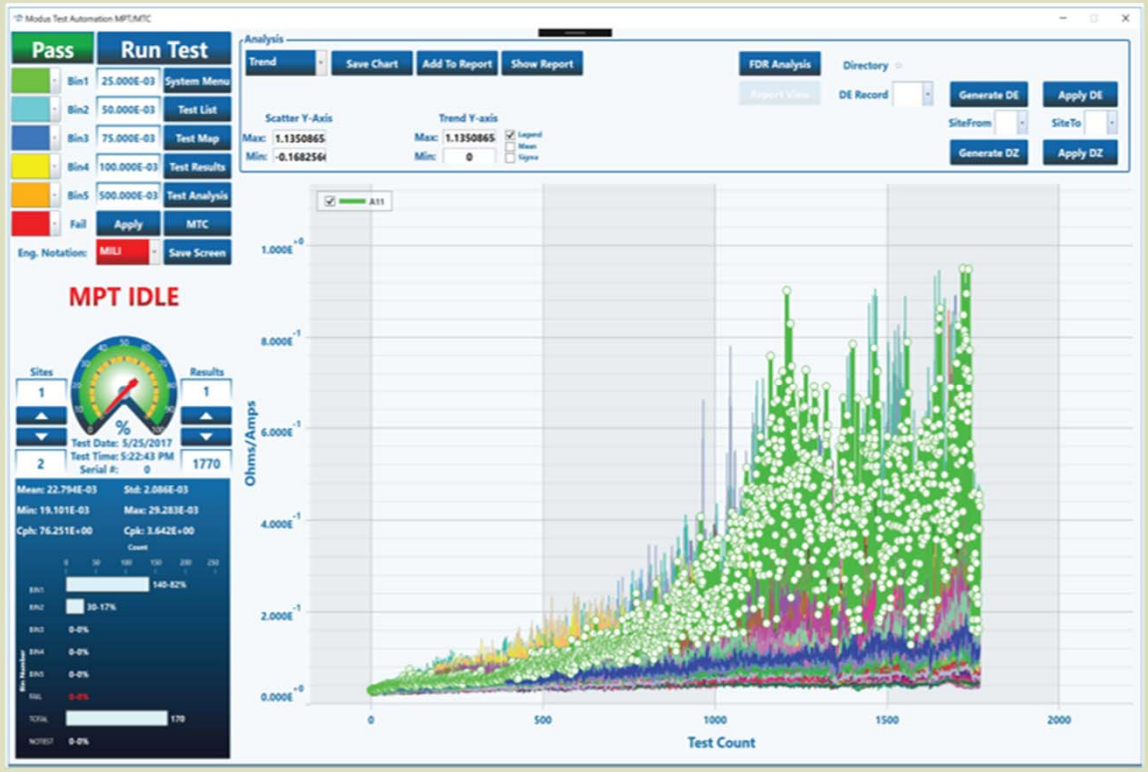




- ✔ System level design verification
- ✔ Production emulated life cycle test
- ✔ Data for the Per pin characterization

The system allows only system level verified & confirmed Known Good Sockets (KGS) to be shipped to the customers

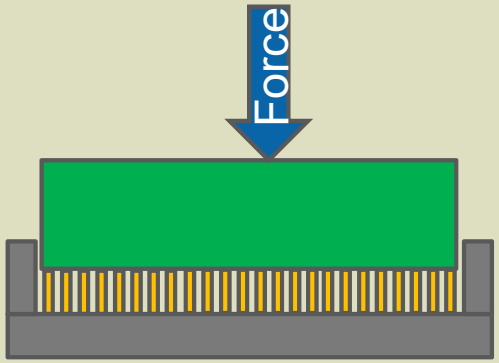
Life Cycle Validation



Example:

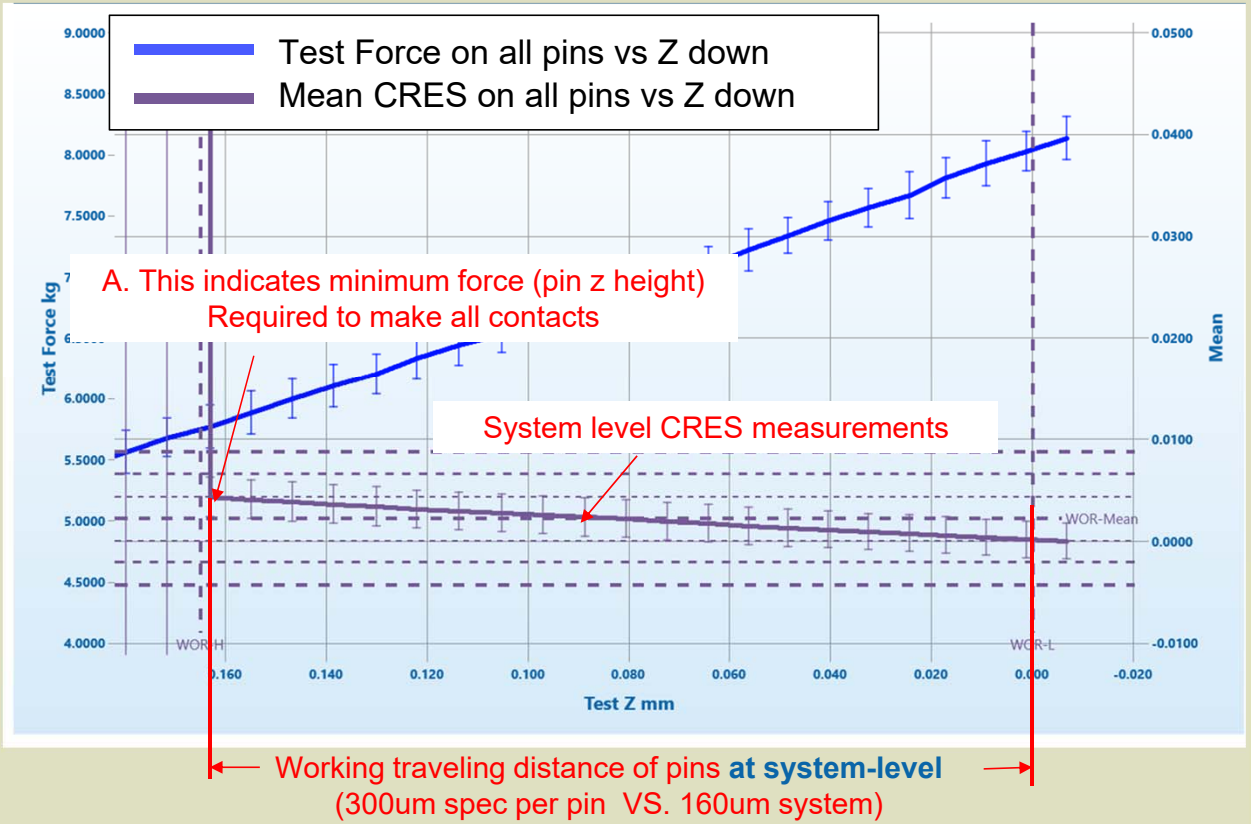
- Per pin measurement trend over 850,000 cycles (500 insertion per test count)

System FDR for Socket & handler set up optimization

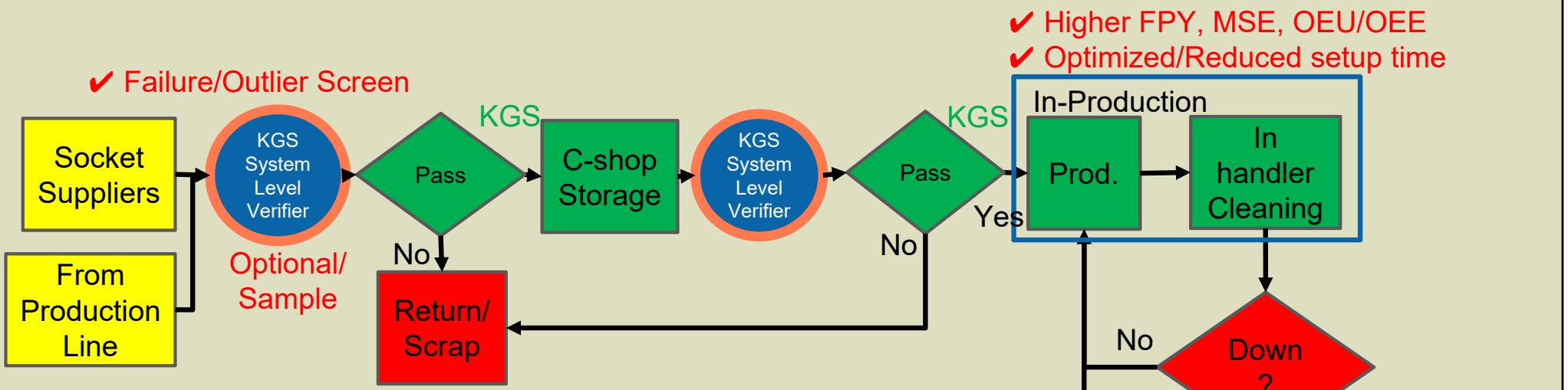


System Level Contact Resistance

- ✔Verifies **"System-level"** CRES measurements
- ✔Great for contactor and stack up validation & Handler set up optimization (Ex. 300um per pin vs. 160um system)



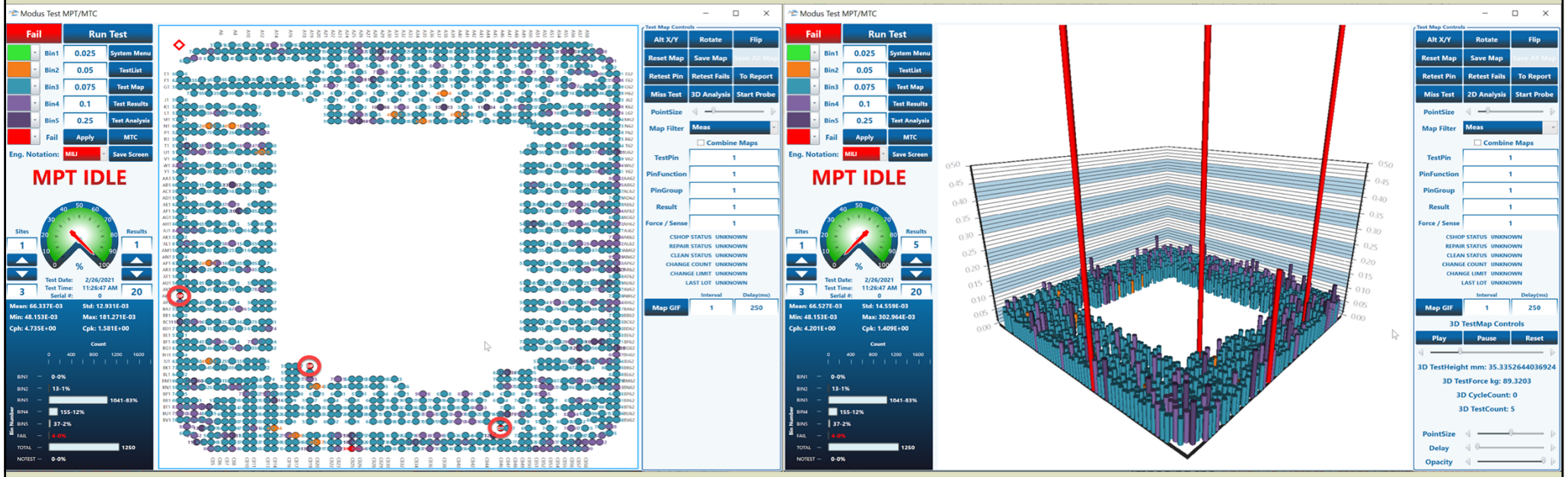
Known Good Socket Process in Production



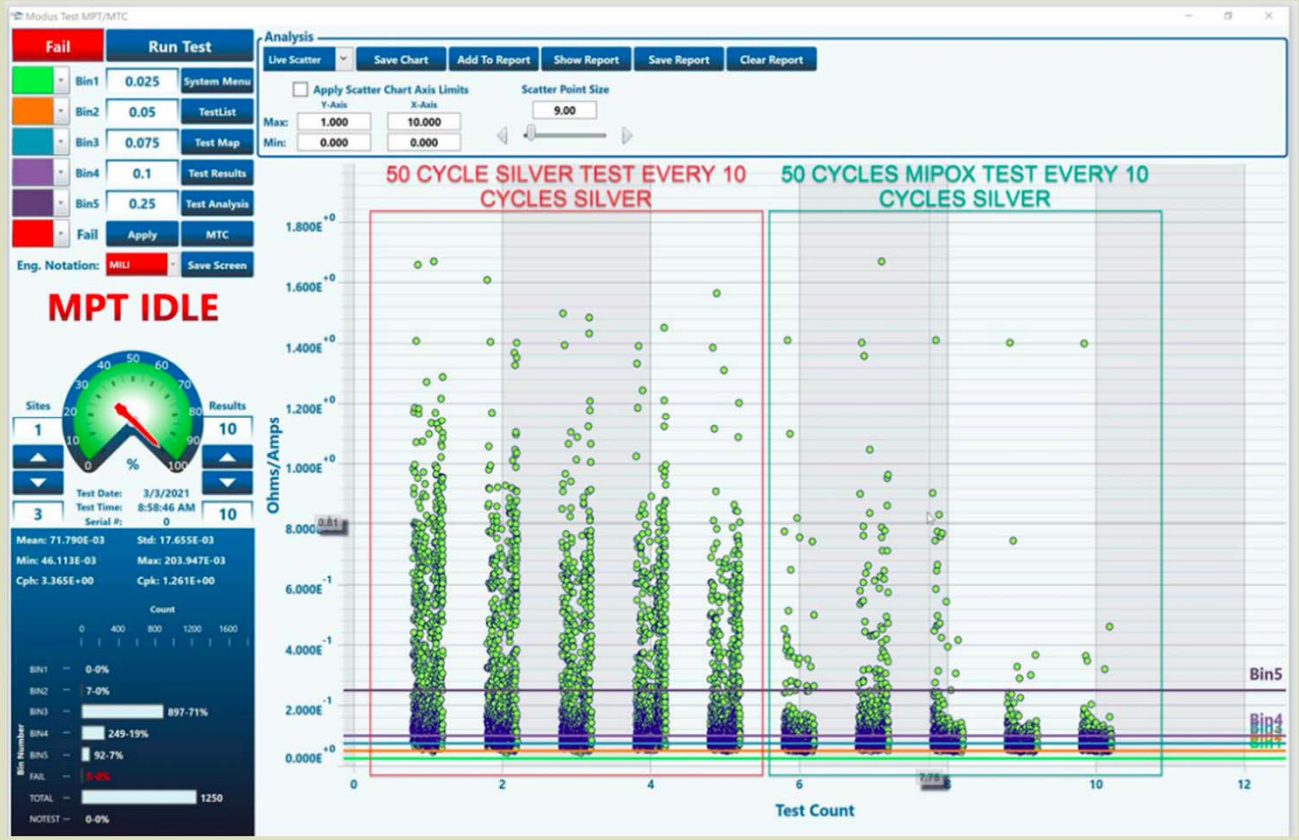
The system allows only confirmed Known Good Sockets to stay in the production line.

- ✔ Instant Isolation of failing pins
- ✔ Save good pins (Limit customization)
- ✔ Smart Cleaning (+recipe development)
- ✔ Common Failure Signature Analysis for continuous set-up optimization

Failing & Marginal Pin Isolation using System Level CRES Measurement

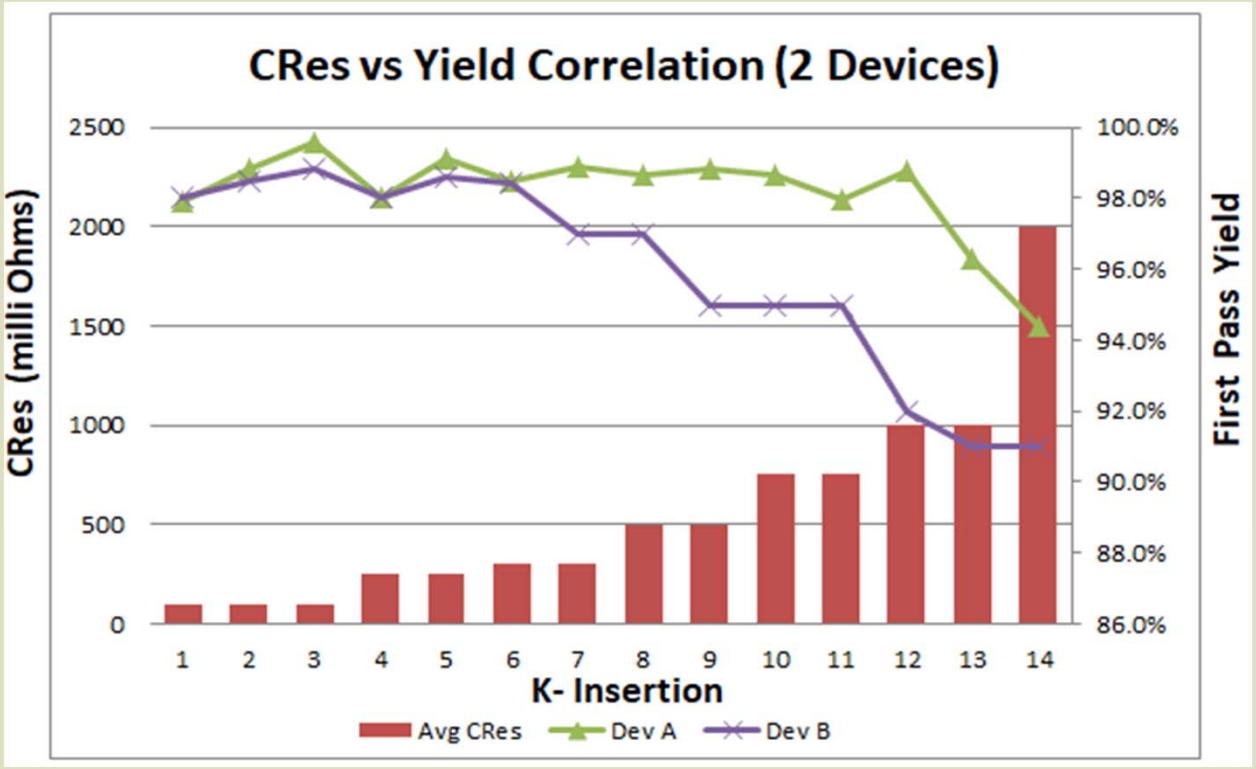


Cleaning Recipe Development using System Level CRES Measurement



Typical Improvement Examples

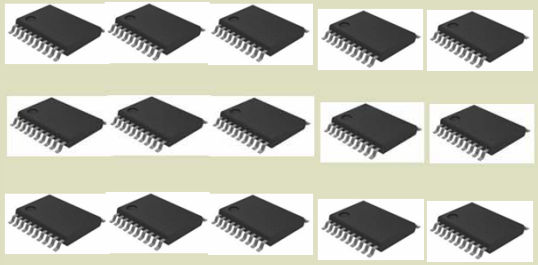
CRES vs FPY by Device



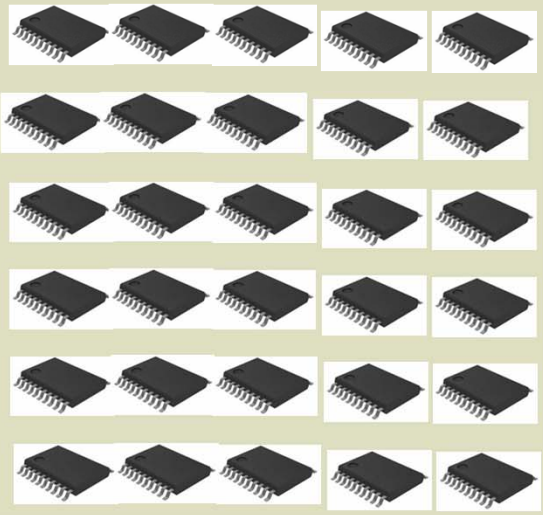
Test Setup Down Frequency

- ✔ Customer A: 1 day to 5~7 days
- ✔ Customer B: 3 days to 7 days

Impact of KGS on THROUGHPUT & CAPACITY



KGS System Level Verifier



- ✔Higher FPY, MSE, OEU/OEE
- ✔Optimized/Reduced setup time
- ✔Higher Throughput

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KGS ROI Estimator

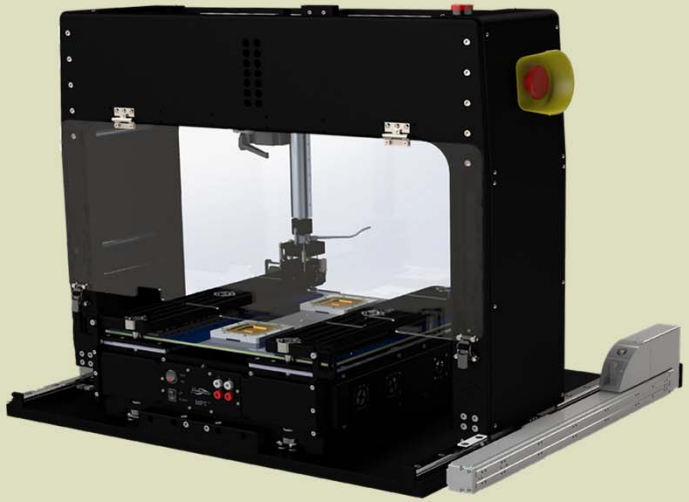
https://modustest.org/roi-calculator

Major Savings from KGS Process with MPT (Edit White Cells Only)

Action	Setup/Debug Time Reduction	FPY	Total Savings
OEE Improvements by Setup/Debug Time Reduction with 95% FTY	0.50%		
FPY Improvement (%)	N/A	1%	
# of set ups		50	
Total Tester Cell Saving	0.25	0.5	
Cost of tester ($)	$	300,000.00	
Cost of Handler ($)	$	250,000.00	
Monthly Savings	$ 137,500.00	$ 275,000.00	$ 412,500.00
Yearly Savings	$ 1,650,000.00	$ 3,300,000.00	$ 4,950,000.00

Major savings come from Setup/Debug time reduction, FPY improvement + Volume regardless of pin count/cost

System level CRES Tester, Cycler with MTC-Thermal



MPT with MTC

MPT with MTC-Thermal

- Up to 16,128 Kelvin
- CRES (+/- 1mOhm)
- Leakage Test Capable
- Special Tests for Coaxial sockets
- Bench Top (24” X 20” X 8”)
- 1 um Z step resolution
- 0.01g – 452 kg force range
- Thermal Chamber option with -55 to 160 C

Applications

Applicable Products – Devices sensitive to CRES	Maintenance Team
✔High mis-contact PPM, retest Rate & OEE/OEU Issues ✔High Power ✔High Speed ✔Multisite Solutions ✔Strip Test solutions	✔CRES Test ✔Leakage Test (Pin2Pin, Pin2All) ✔Coaxial Socket Tests (CRES on IO/ICC/VSS pins, IO/VCC Shorts, VSS to GND Body Contact %)

Engineering Team
✔Life Insertion Cycle Test ✔System FDR ✔Leakage Test ✔Hot & Cold Temperature characterization ✔Cleaning recipe development test ✔Coaxial Socket analysis (CRES on IO/ICC/VSS, IO/VCC Shorts, VSS to GND Body Contact %) ✔Stack up validation with MPT module docked to the handler

Final Thoughts

ARE YOU STILL RUNNING PRODUCTION WITHOUT

KNOWN **G**OOD **S**OCKET Process?

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