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**Archive**

# Throughput and Capacity Improvement by Known Good Socket Process in Production

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**Modus Test, LLC**



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- Known Good Socket Process
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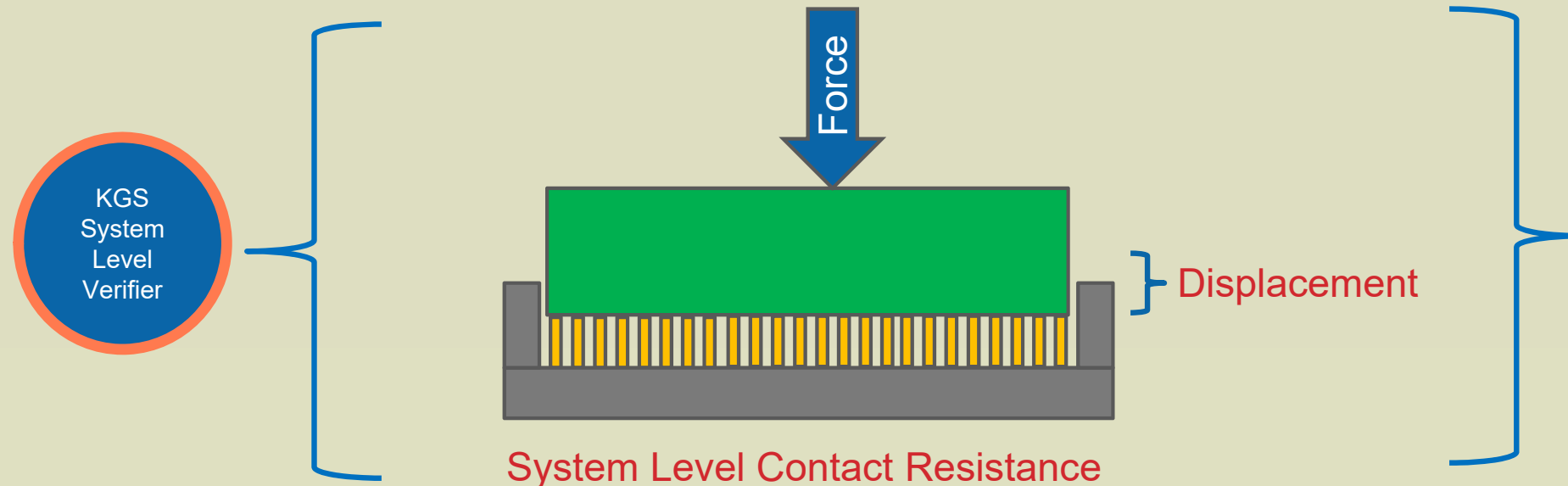
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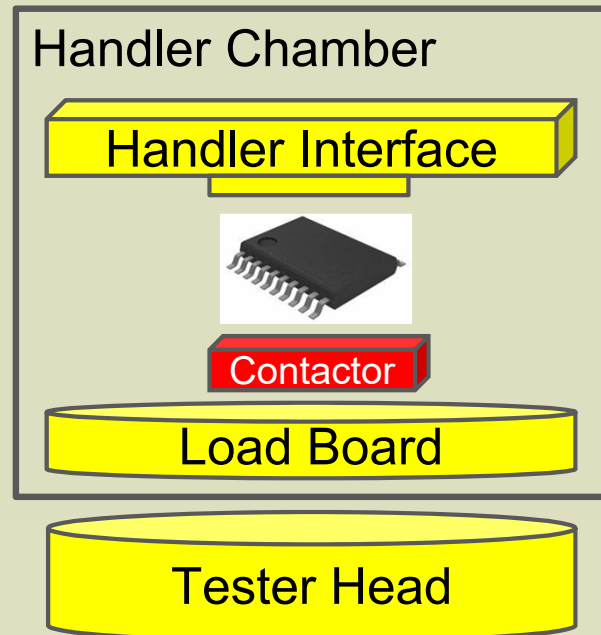
## “KGS System Level Verifier”

- 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**



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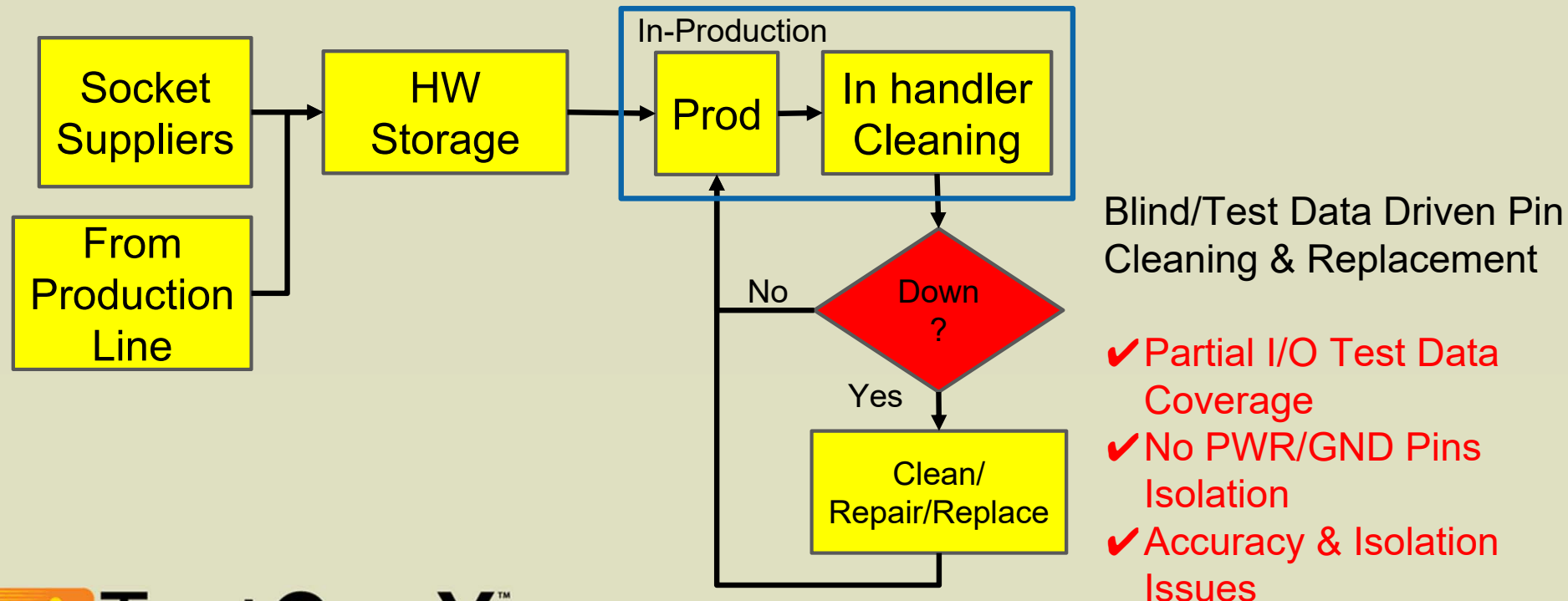
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## Typical Production Line **WITHOUT** KGS

✓ Failing & Marginal pins

✓ FPY, MSE, OEU/OEE Issues

✓ Extra Setup Time



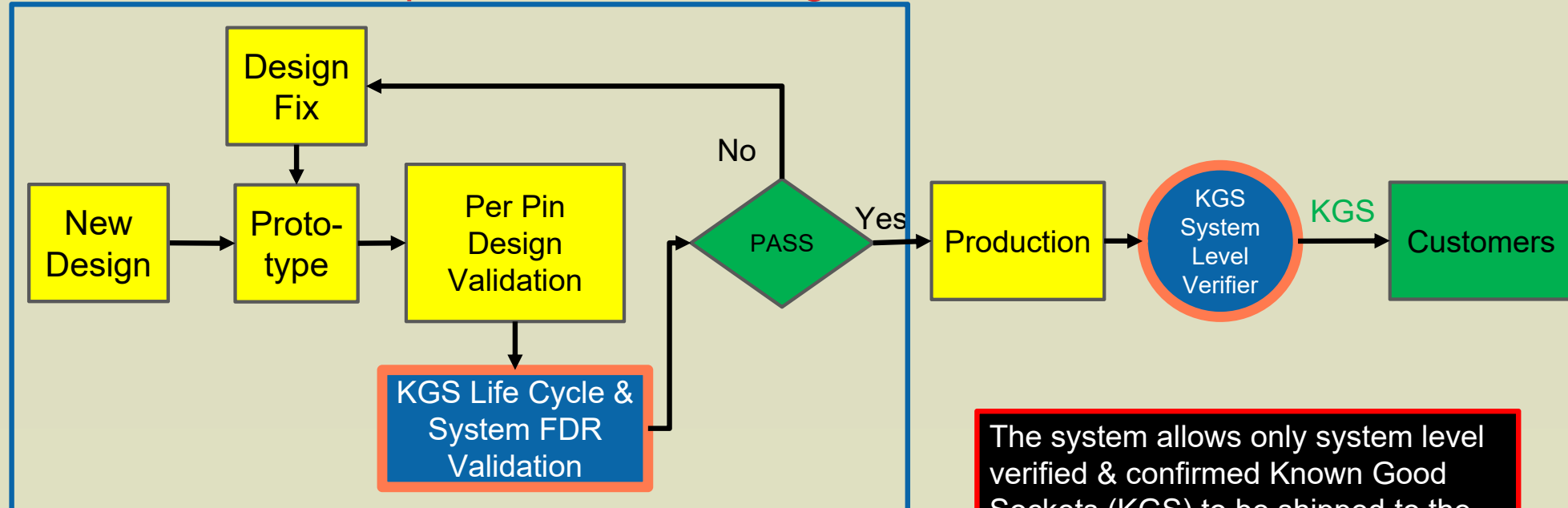
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## Pre-Production Known Good Socket Process

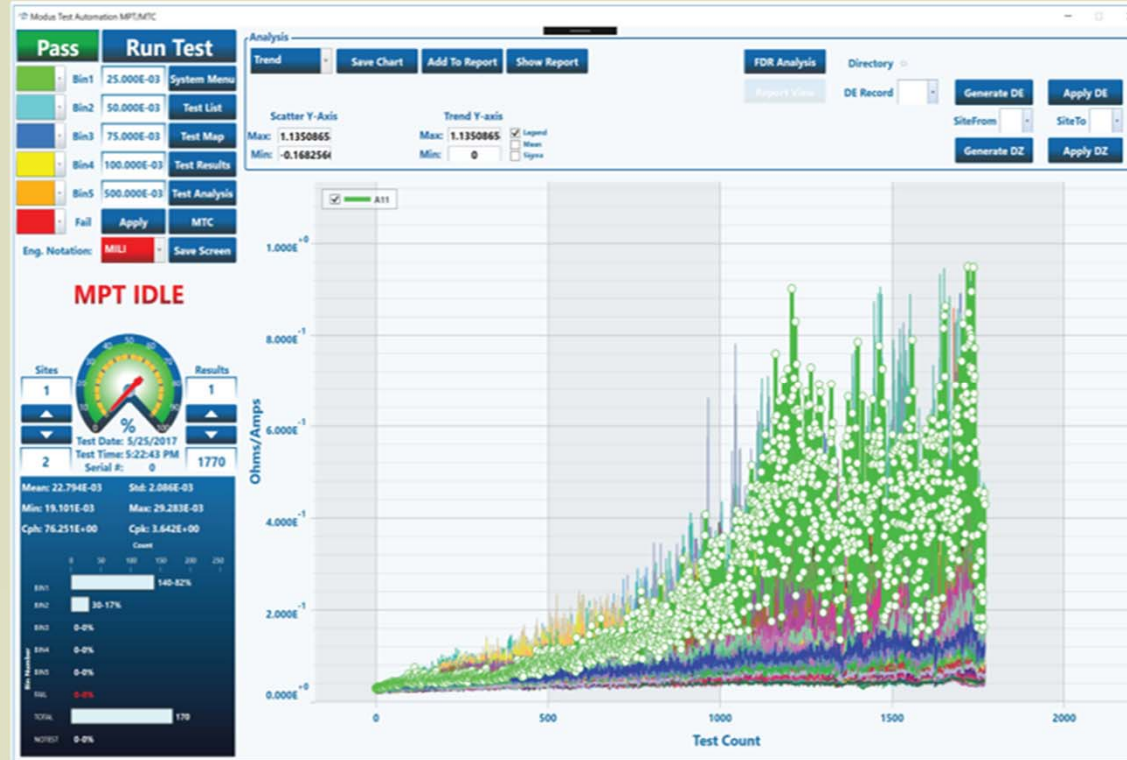
### New Socket Development/Selection Stage



- ✓ 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)



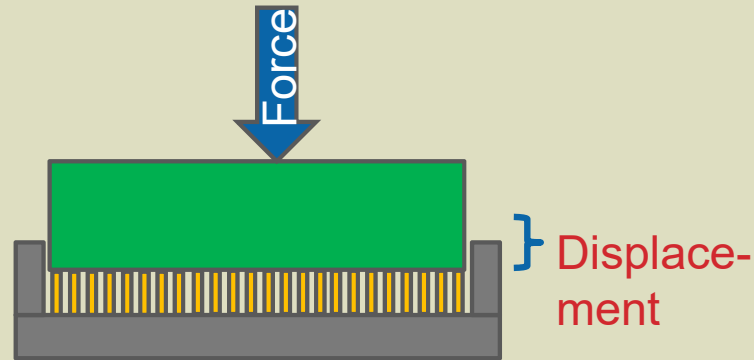
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## System FDR for Socket & handler set up optimization



System Level Contact Resistance

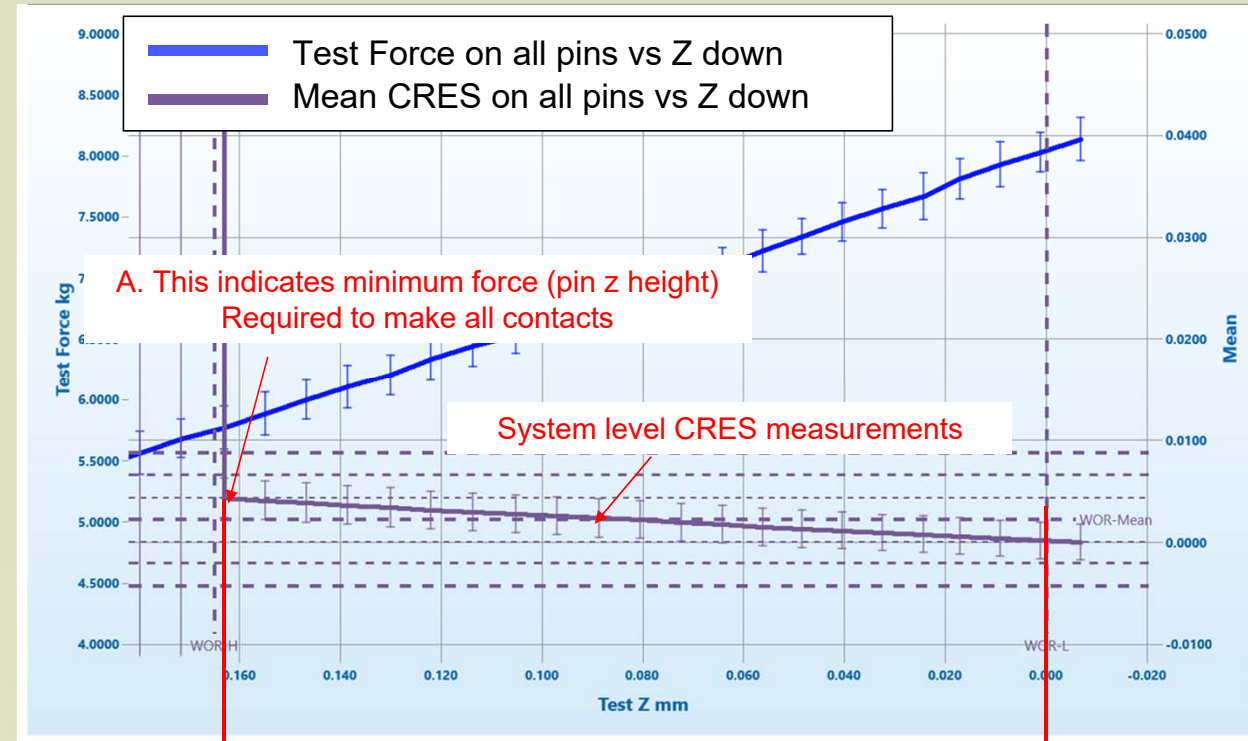
- ✓ Verifies “**System-level**” CRES measurements
- ✓ Great for contactor and stack up validation & Handler set up optimization (Ex. 300um per pin vs. 160um system)



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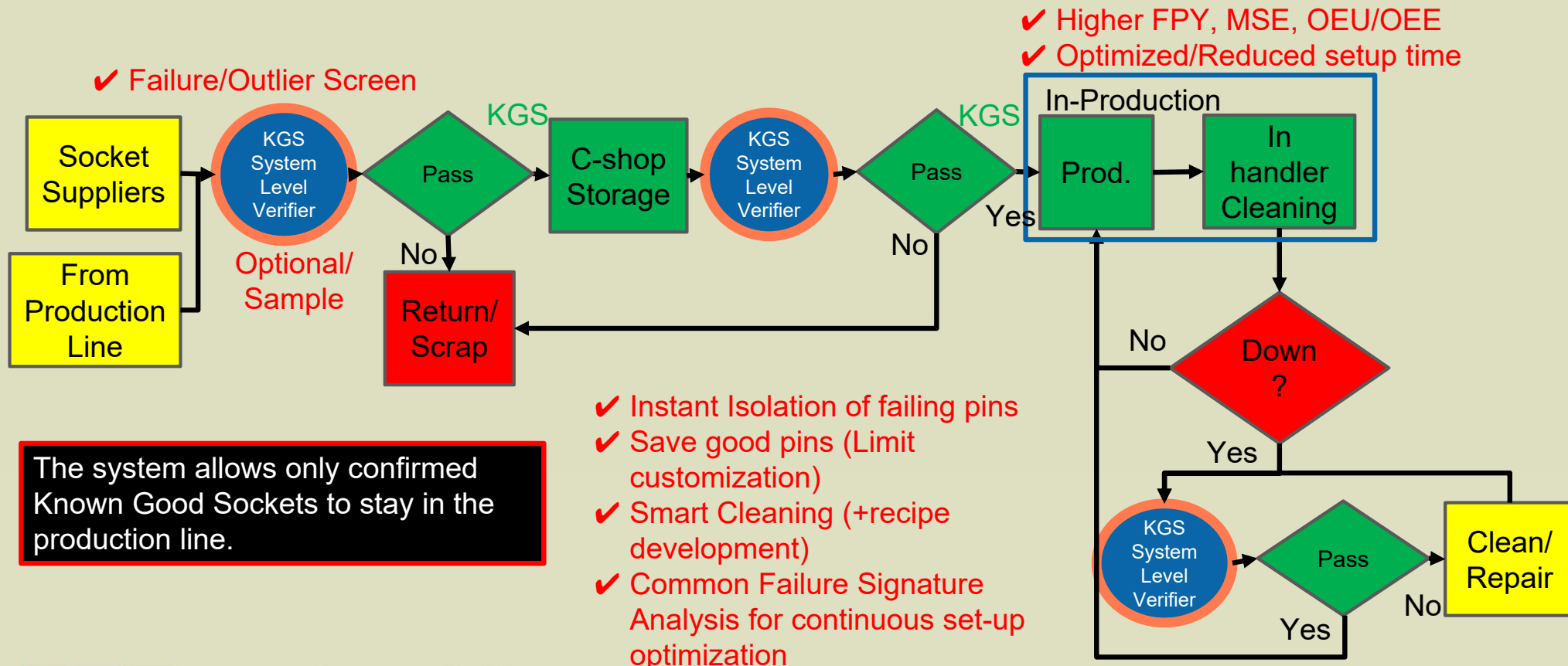
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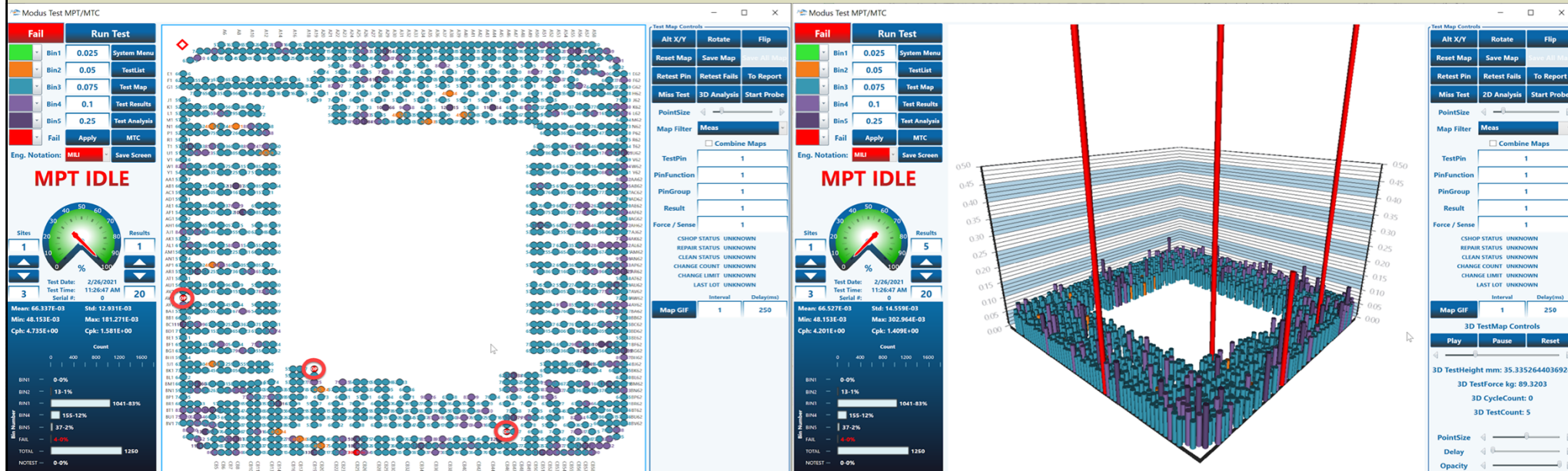


Working traveling distance of pins at system-level (300um spec per pin VS. 160um system)

## Known Good Socket Process in Production



## Failing & Marginal Pin Isolation using System Level CRES Measurement

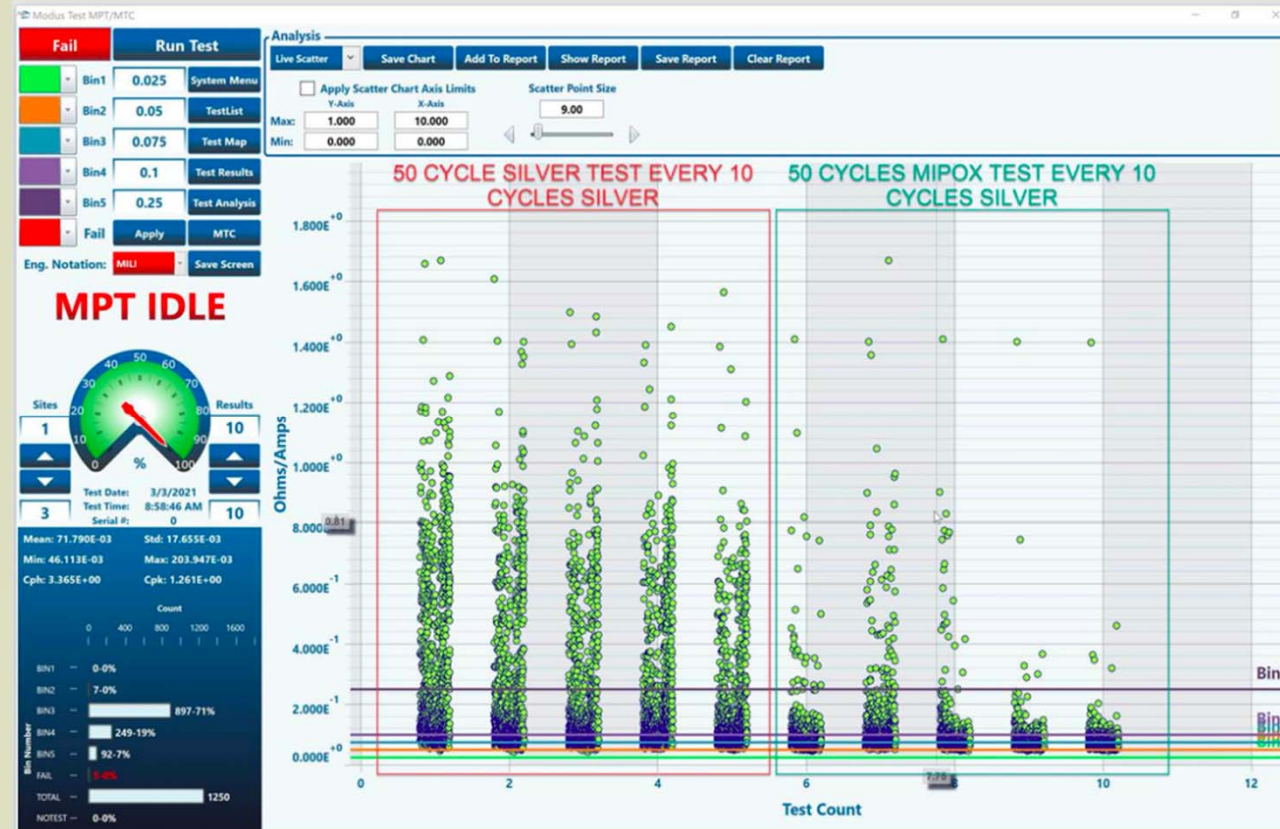


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## Cleaning Recipe Development using System Level CRES Measurement



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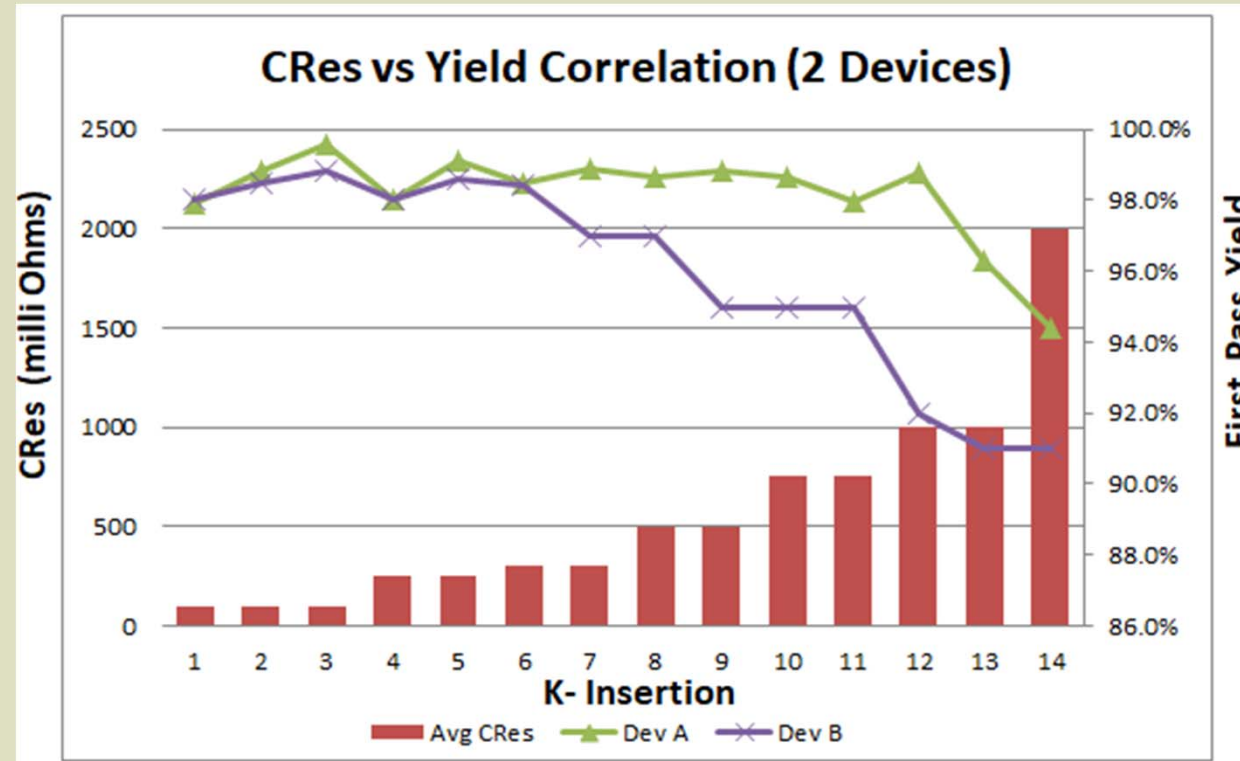
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## Typical Improvement Examples

### CRES vs FPY by Device



### Test Setup Down Frequency

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



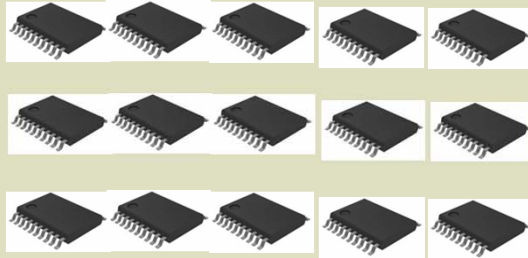
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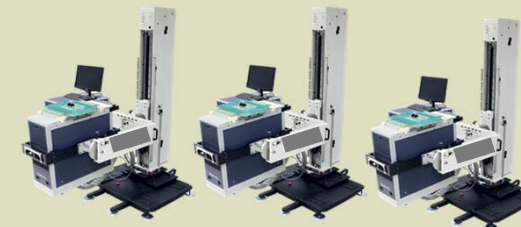
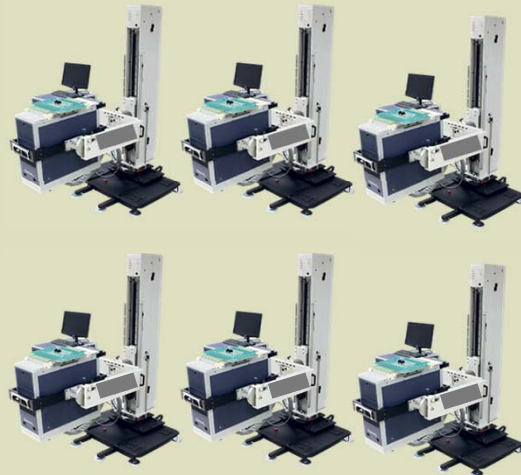
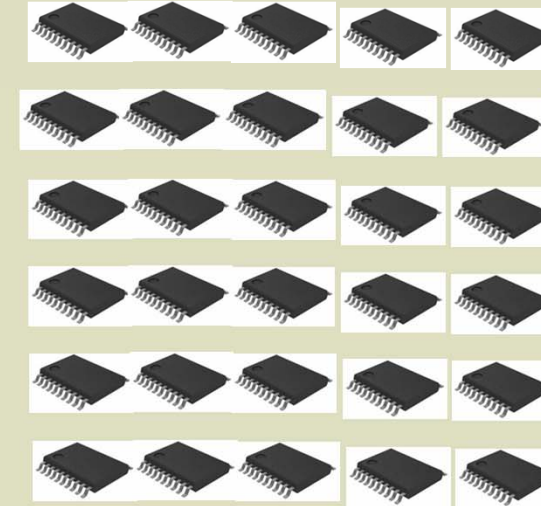
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## Impact of KGS on THROUGHPUT & CAPACITY



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**

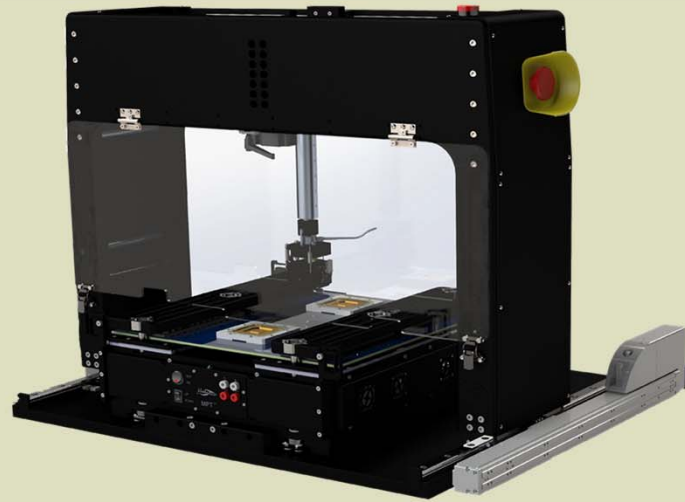


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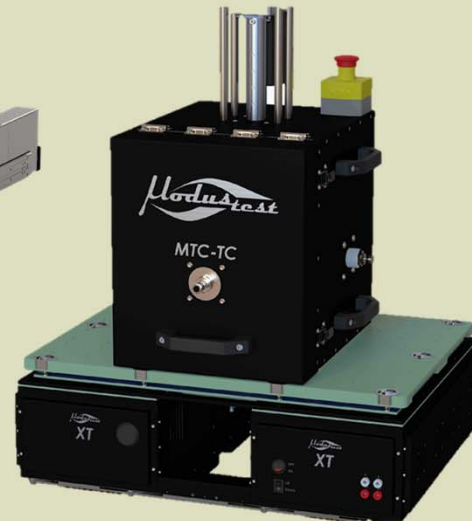
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## System level CRES Tester, Cyclor with MTC-Thermal



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
<ul style="list-style-type: none"> <li>✓ High mis-contact PPM, retest Rate &amp; OEE/OEU Issues</li> <li>✓ High Power</li> <li>✓ High Speed</li> <li>✓ Multisite Solutions</li> <li>✓ Strip Test solutions</li> </ul>	<ul style="list-style-type: none"> <li>✓ CRES Test</li> <li>✓ Leakage Test (Pin2Pin, Pin2All)</li> <li>✓ Coaxial Socket Tests (CRES on IO/ICC/VSS pins, IO/VCC Shorts, VSS to GND Body Contact %)</li> </ul>
Engineering Team	
<ul style="list-style-type: none"> <li>✓ Life Insertion Cycle Test</li> <li>✓ System FDR</li> <li>✓ Leakage Test</li> <li>✓ Hot &amp; Cold Temperature characterization</li> <li>✓ Cleaning recipe development test</li> <li>✓ Coaxial Socket analysis (CRES on IO/ICC/VSS, IO/VCC Shorts, VSS to GND Body Contact %)</li> <li>✓ Stack up validation with MPT module docked to the handler</li> </ul>	



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## Final Thoughts

ARE YOU STILL RUNNING PRODUCTION WITHOUT  
**KNOWN GOOD SOCKET Process?**



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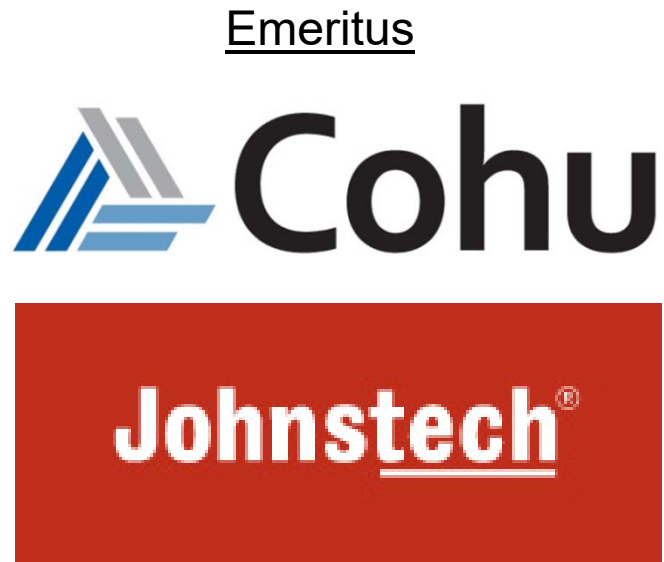
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