

PDF/SOLUTIONS®
2025 Users Conference



Test and Supply Chain Orchestration

Marc Jacobs

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Customer Presentation

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Test Cell Automation: from Brown Field to Dark Factory

Massimo LONGARETTI

Test R&D – ST Microelectronics

Introduction



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The partnership in the domain of test automation



2023

STCC Controller
POC

Discovery

- Full equipment integration
- User experience
- Real time control

2025

STCC Controller
Deployment

Materialize the benefits **from brown field to dark factory**

- Standardization across test sites
- Men-Machine Ratio (MMR) / OEE improvement
- Robotics



From brown field to dark factory | KPIs

Key factors influencing MMR Man-Machine-Ratio

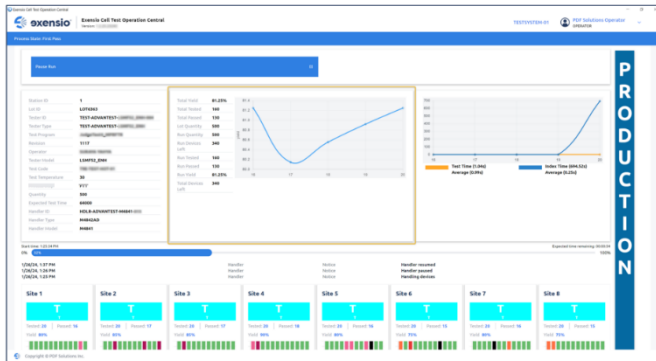
- Material Handling
- Machine setup
- Machine assist
- Retest / Rework operations
- Post-test operations (quality tasks / procedures)

The role of test cell automation

- Identify inefficiencies and the root-causes
- Execute the automatic test program / recipe loading
- Detect setup degradation
- Execute setup auto-tuning
- Execute quality checks
- Enable robotics
- Enable remote control

Obstacles:

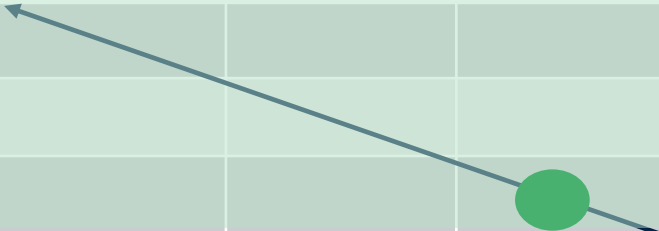
- Large product portfolio
- Variety of technologies, procedures, processes
- Obsolescence of the equipment fleet
- Proliferation of local legacy solutions



Readiness for Automation

Tester	Handler / Prober	Factory
<ul style="list-style-type: none">• Software: SEMI MQTT-RitDB compliance	<ul style="list-style-type: none">• Hardware: readiness for material handoff with robotics• Software: SEMI SECS-GEM compliance	<ul style="list-style-type: none">• Facilities / logistics / safety• Real time material dispatching systems• Monitoring systems• Internal sites / outsourcing

Tester Handler	Obsolete	No invest	Strategic
Obsolete			
No invest			
Strategic			



To drive the equipment suppliers to **comply** with the integration standards

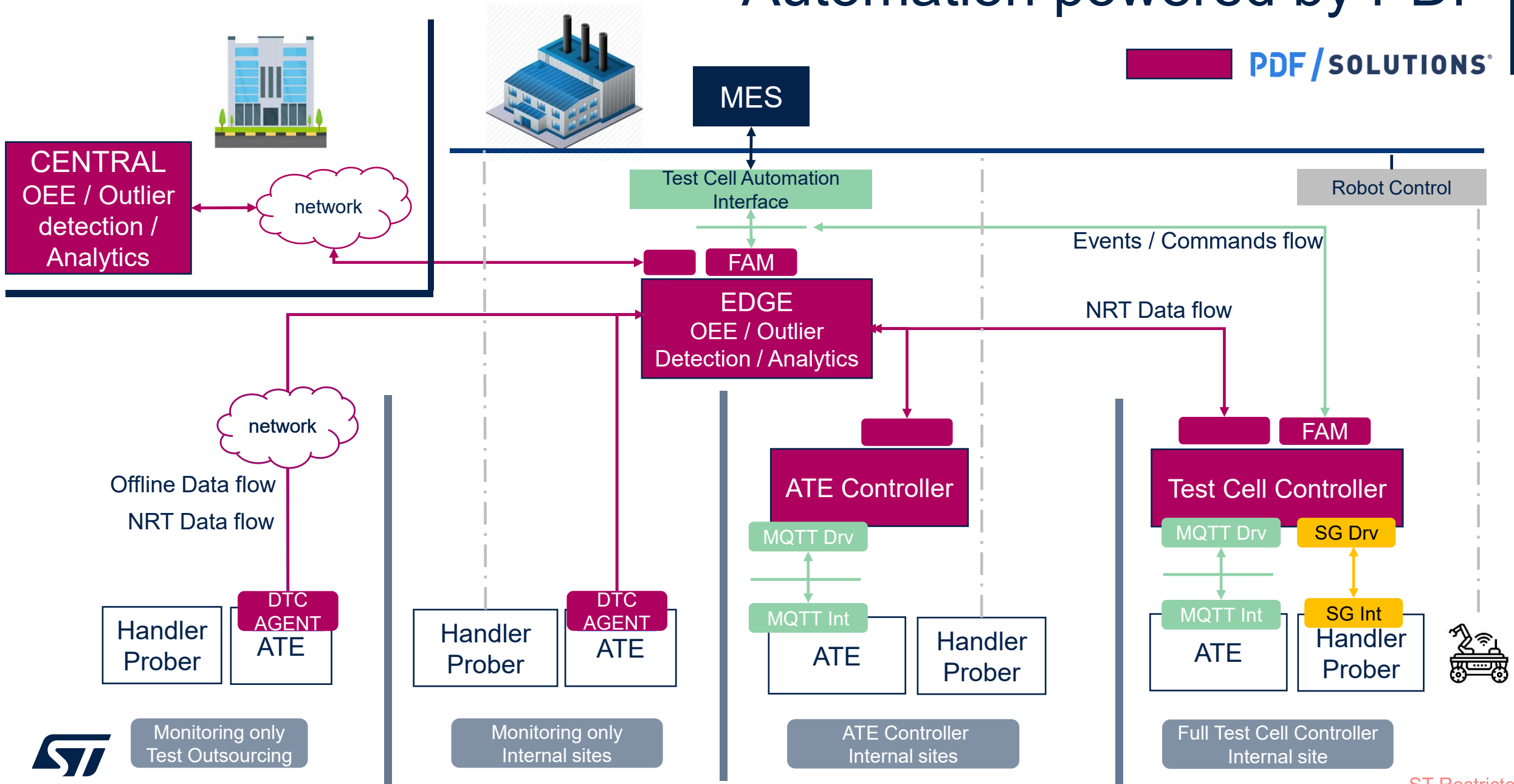
- Equipment automation readiness is a key factor for the test cell **investment matrix**

To adopt a SW solution able to support **seamlessly** brown field and dark factory with increasing capabilities














- **PDF is a key partner** of ST in this roadmap

Automation powered by PDF

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Automation Powered by PDF

	<ul style="list-style-type: none"> Automatic SxL Automatic Outlier detection 	<ul style="list-style-type: none"> ATE Monitoring OEE Calculation OEE Analysis 	<ul style="list-style-type: none"> Automatic ATE setup Real time rebinning Retest Optimization 	<ul style="list-style-type: none"> Automatic Handler setup Real time handler alarms Real time handler fine tuning Automatic material handling Remote start / stop
Test Cell Controller Internal site				
ATE Controller Internal sites				
Monitoring Only Internal sites		STDF  → DTC Agent 		
Monitoring Only Test Outsourcing		 → 		

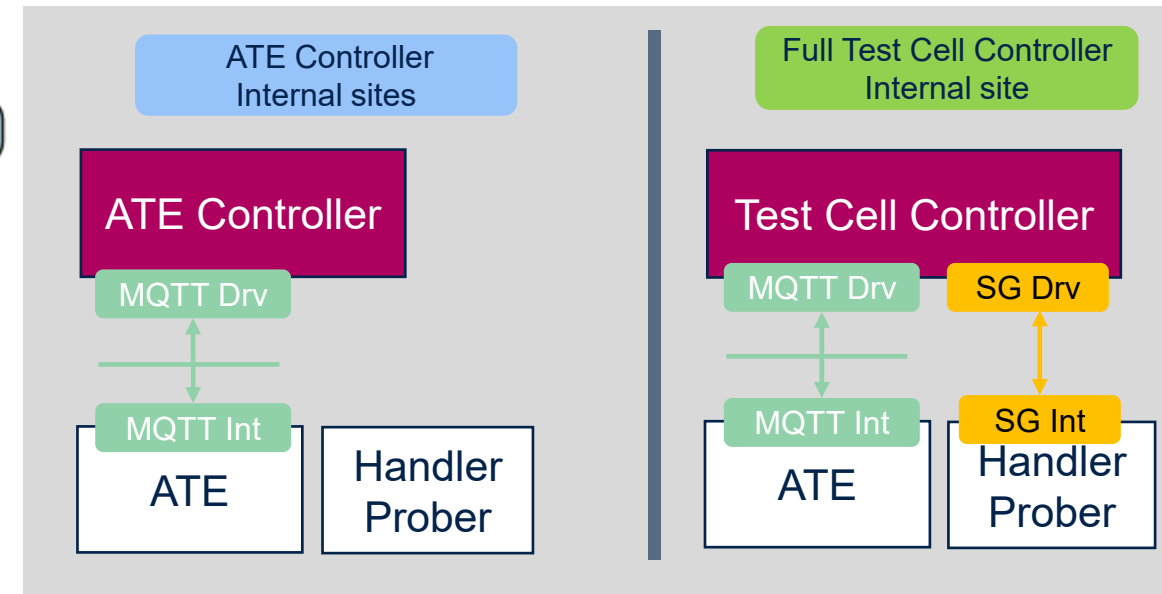
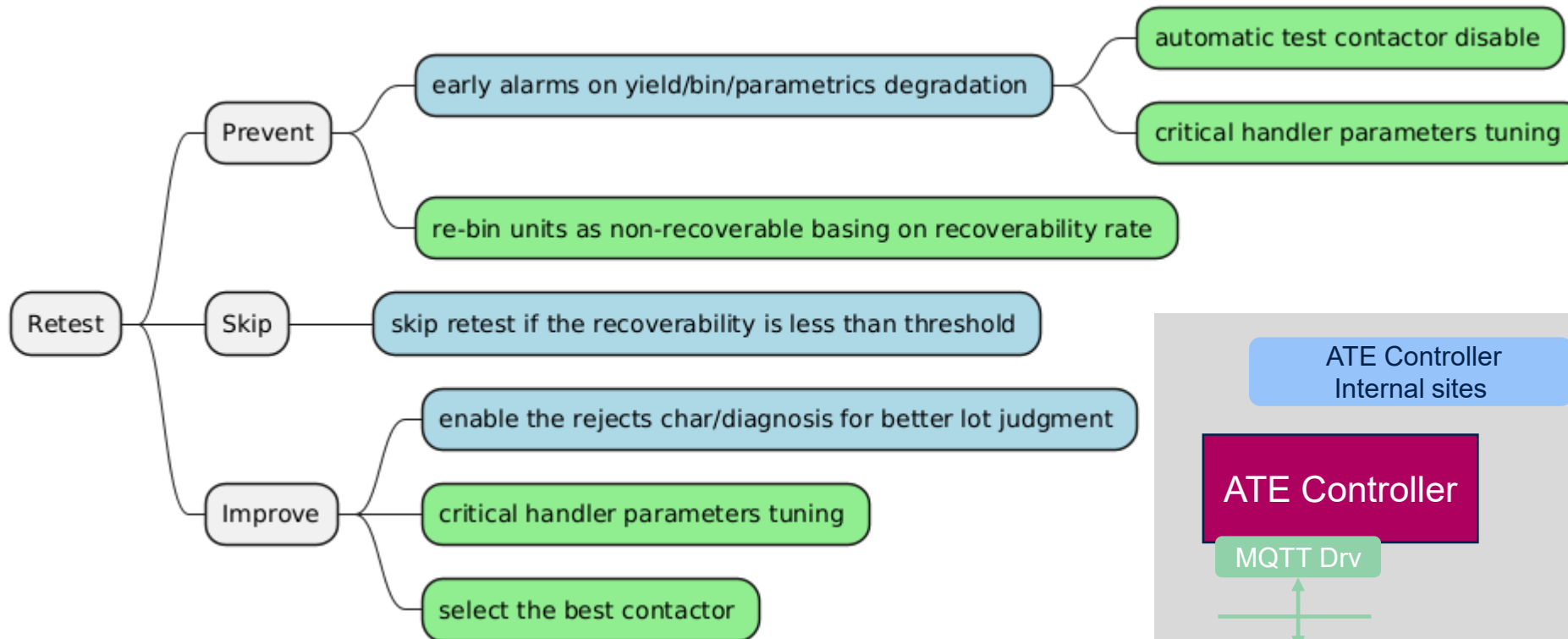
Use Case 1: Retest/Rework Cycle

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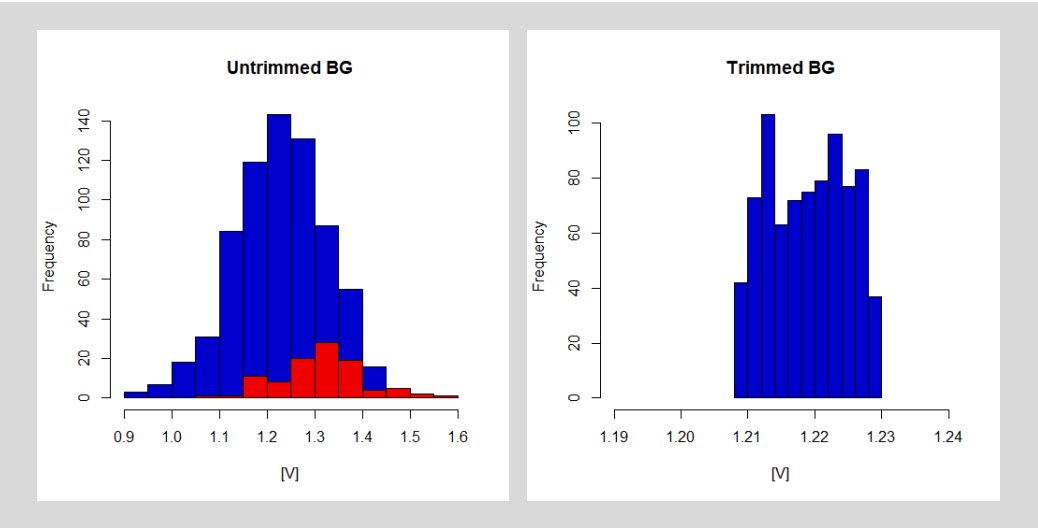
Controller rules



Use Case 2: Setup Issues

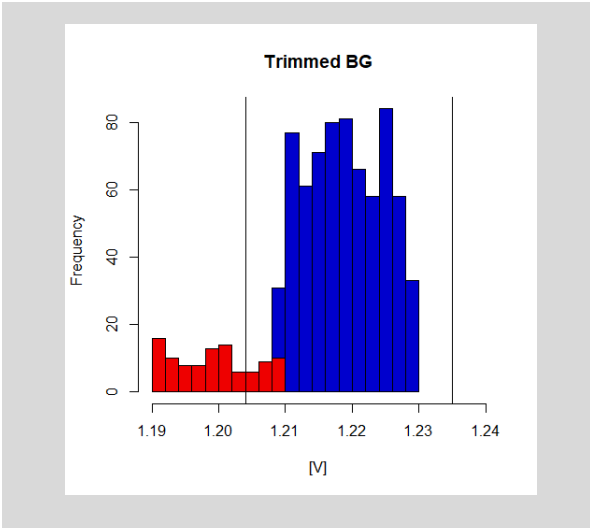
Step T1 - Trimming

Measurement issue on one site (e.g. contact resistance)
Over-trimmed units



Step T2 – Trimming Verification

All the sites well calibrated
Over-trimmed units are rejected scrap

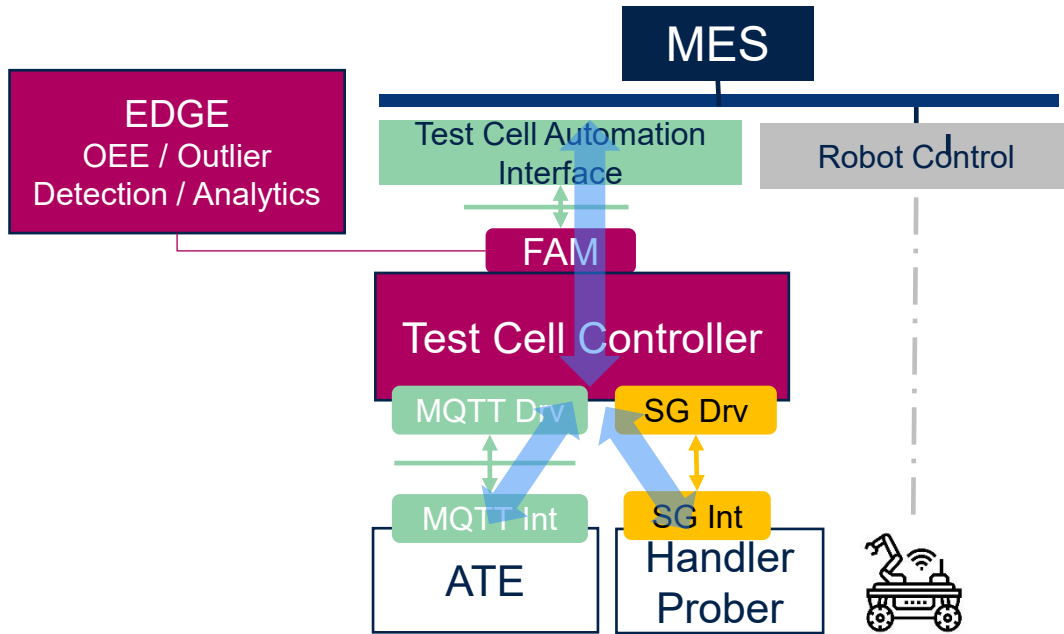


- Scrap of units
- Waste of tester time
- Engineering time for MRB
- Late detection > re-occurrence

	Monitoring Only STDF	Monitoring Only DTC	ATE Controller	Test Cell Controller
Detect	Offline T1 outlier detect	Near real time (NRT) rule	NRT rule	Near real time rule
Prevent	Offline T1 outlier detect Automatic hold	NRT notification	NRT notification	Machine stop / site-disable / socket cleaning / work order
Recover	Eng offline retest Temporary instr.	Eng offline retest Temporary instr.	Production inline recovery flow	Production inline recovery flow

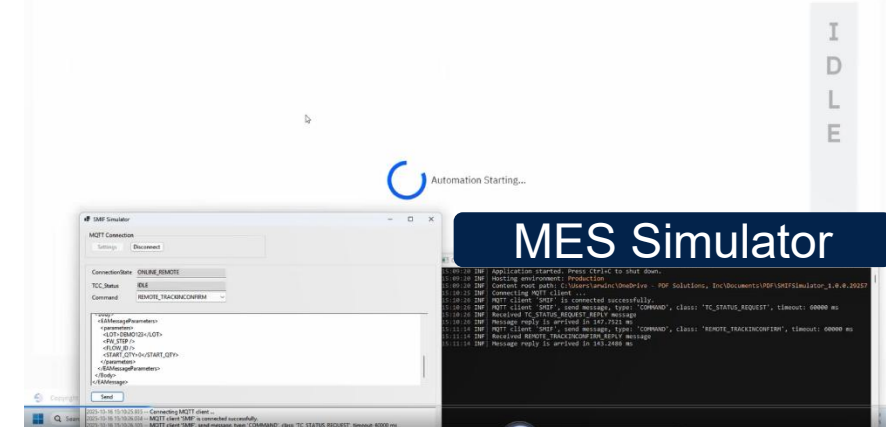


Use Case 2: Remote Control



Trigger test cell setup

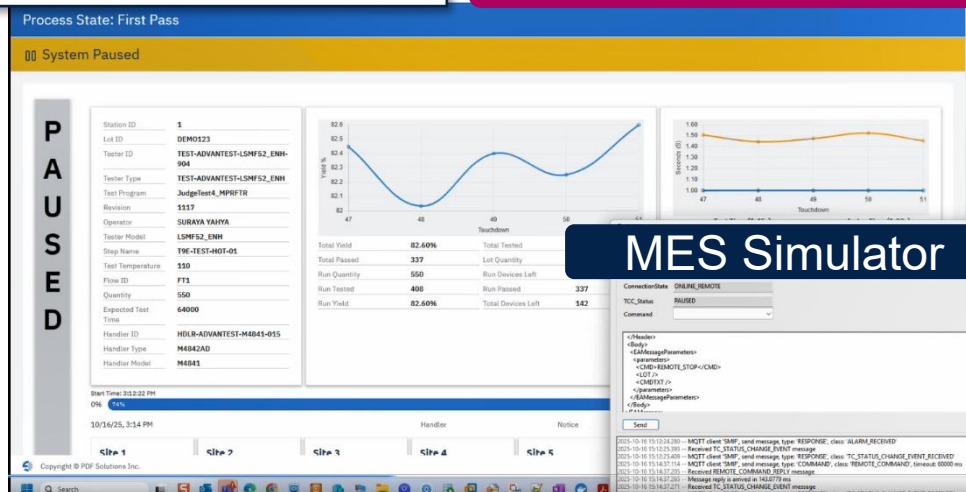
Test Cell Controller



MES Simulator

Trigger handler PAUSE

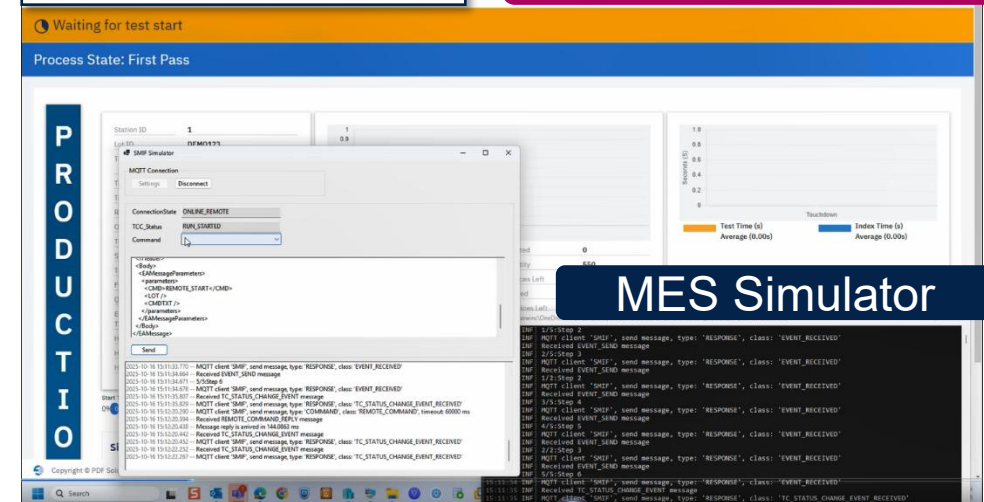
Test Cell Controller



MES Simulator

Trigger start of test

Test Cell Controller



MES Simulator

Conclusions

- Strategic partnership ST-PDF
- To develop an automation framework
- That is highly modular and scalable
- And provides increasing capabilities
- To improve the efficiency and quality in the brown field
- And to enable the dark factory

THANK YOU



Our technology starts with You



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