



TECHNICAL
OVERVIEW

PathWave Manufacturing Analytics

PATHWAVE

An Industry 4.0 ready big data analytics solution for optimizing manufacturing efficiencies and improve product quality

Industry 4.0 and Smart Factory

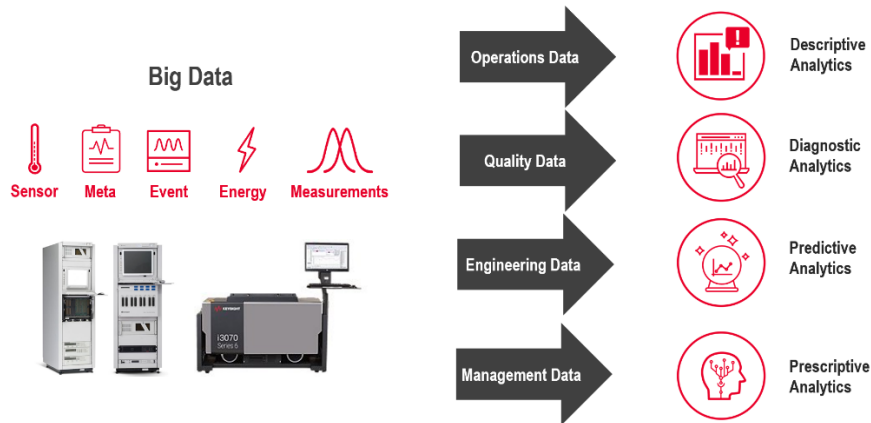
Digital Transformation in manufacturing is driving Industry 4.0, and big data analytics is the key technology driver. Large amounts of test data from machines and systems are captured and analyzed to generate actionable insights, driving the benefits of Industry 4.0 adoption. Digital Transformation is the integration of digital technology into all areas of a business, fundamentally changing how the business operates and delivers value to the customers.

What is PathWave Manufacturing Analytics?

PathWave Manufacturing Analytics is an Industry 4.0 ready electronics manufacturing data analytics platform that performs real-time advanced analytics using information extracted from big data, such as manufacturing processes, tests and equipment data agnostically.

While there are many big data analytics platforms and IoT monitoring solutions, the difference with PathWave Manufacturing Analytics is that it harnesses the hidden value of all of the granular test data being generated every second to acquire, transform and analyze to improve the actual end product quality and not just improving maintenance of an equipment or process. After all, in manufacturing the actual product quality is what matters most, where reputation is gained and lost.





Unlock the Full Potential of Data

PathWave Manufacturing Analytics built-in advanced algorithms perform a holistic and extensive range of proven and use-case driven data analytics that unlocks deeper insights about your product quality, manufacturing process and equipment.

- **Descriptive** - Transforms complex information with data visualization into reporting dashboards.
- **Diagnostic** - Performs intensive data mining, data search and multi-level drill-down analysis.
- **Predictive** - Anticipates anomalies and discover hidden correlations in equipment, process or product to mitigate risks of failures or down time.

Measurement Science Meets Data Science

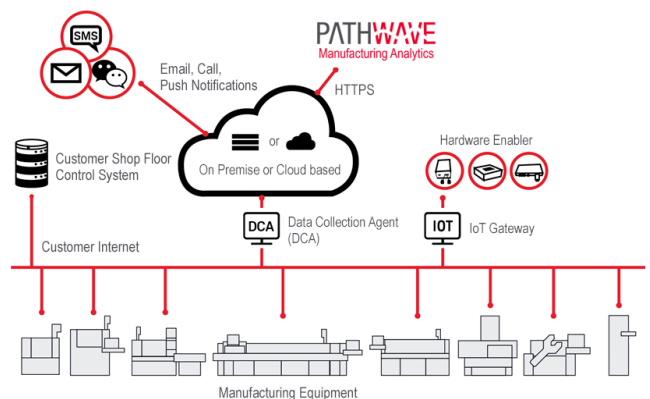
As the domain expert in test and measurement since 1930s, Keysight combines superb knowledge of measurement science with data science expertise to deliver algorithms that truly achieve the desired operational outcome.

With the built-in automated monitoring algorithms, PathWave Manufacturing Analytics trigger actionable alerts in real time in the event of anomalies. This allows manufacturers to reduce Cost of Poor Quality (COPQ) and improve Overall Equipment Efficiencies (OEE), by alerting the user to take necessary action prior to issue occurs.

Seamless Implementation into Existing System

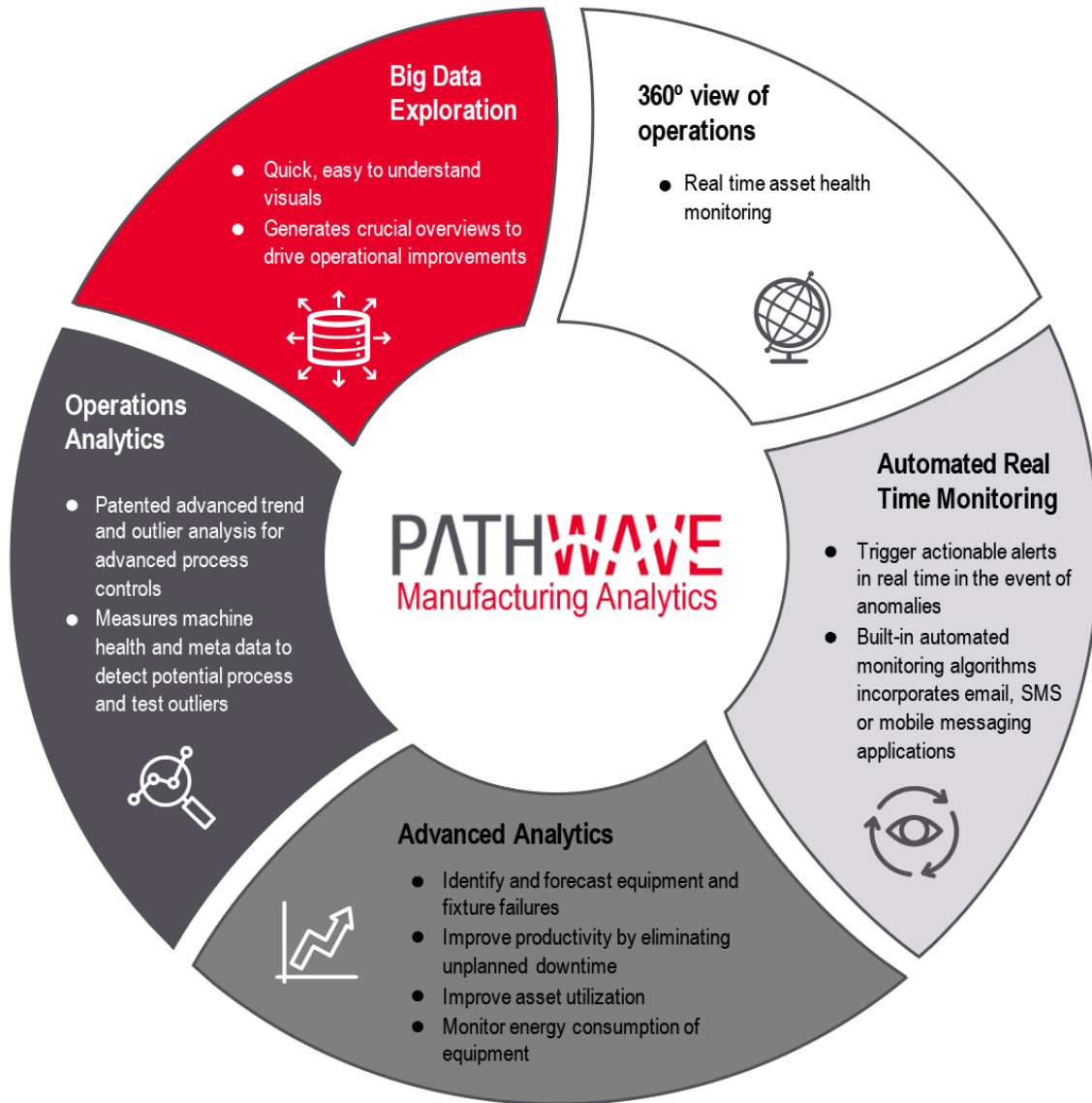
PathWave Manufacturing Analytics' powerful yet platform-agnostic nature means that any existing equipment or database can be seamlessly integrated easily with minimal changes, keeping investment costs low. The database can be configured on premise or on cloud, giving you the flexibility to scale as your business grows.

Our consultants will work with you in identifying use cases and opportunities, creating a customized integrated analytics solution for your competitive advantage.



Common Use Cases in Electronics Manufacturing Industry

PathWave Manufacturing Analytics effectively addresses five key areas that advanced analytics can be leveraged to impact your manufacturing ecosystem and add value to the entire supply chain.

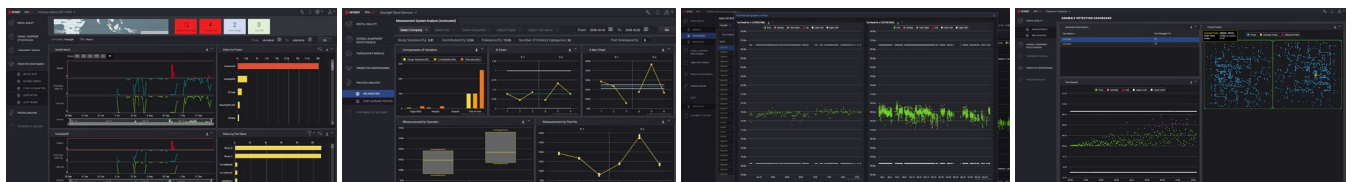


Find the Right Solution That Fit Your Needs

There are 2 versions for PathWave Manufacturing Analytics:

- **Workcell Edition** – Best for manufacturers at early stage of digital transformation in Industry 4.0. Simpler setup and easier maintenance for a selected site as well as accessibility to full features.
- **Enterprise Edition** – Industry leading real time advanced analytics with nearly limitless scalability. Automate and connecting manufacturers' site globally with unlimited user access.

Features and Specifications	Workcell	Enterprise
License type	Annual Subscription	Annual Subscription
Comprehensive dashboard (Yields, Volume, Failures) *Drilldowns to Individual Projects and Tests	v	v
Retest and False Failure analysis	v	v
Test station utilization (OEE) *Downtime monitoring	v	v
Global map view - a glance to your factory health	v	v
Real-time, On-Demand and Instant (CPK Analyzer, Test Results Viewer, Test Statistics)	v	v
Measurement Comparisons (Fixture to Fixture, Tester to Tester or combination)	v	v
Automated CpK calculation	v	v
Failure analysis	v	v
Real-time Probe Heatmap	v	v
Real-time Predictive Alerts	v	v
*Anomaly Detection	v	v
*Probe Degradation Prediction	v	v
*Part Average Test (PAT) Anomalies	v	v
*Golden Units Prediction	v	v
*AUTO Measurement System Analysis (MSA)	v	v
*PAT Limits Recommendation/Reference	v	v
*Test Limit Change Detection	v	v
*Low CPK	v	v
Alert Notification	Email Only	Push notification on mobile application, Email
Summary report generation	v	v
Administration access control	v	v
Daily Total Data Volume (Test Result x Number of Device)	50Mil	Unlimited
Replication Factor	-	3X
High Availability	-	v
Data Redundancy	-	v



Minimum Server Configuration	Workcell	Enterprise	
Number of Server Nodes	Single Node	6 Nodes Cluster	
		3 x Master Nodes	3 x Data Nodes
Processor	8 Cores (16 Threads)		16 Cores (32 Threads)
Memory Per Node	256 GB	128 GB	
Hard Disk Per Node	3.2 TB (800GB *4)	2 TB	
**Max Data Retention Without Housekeeping	7 Years	5 Years	
Operating System	Red Hat Linux 7.8		
Database	***TSDB	****NoSQL	
Deployment	On-Prem or Cloud		
Preferred Cloud	Amazon Web Services Huawei Cloud Alibaba Cloud Google Cloud Microsoft Azure		

* Subject to the data log size, vary by customer

** Based on 0.7GB per equipment daily which is equivalent to a typical 1M test result daily. Annual or sooner big data housekeeping is recommended. A script is provided.

*** TSDB: A time-series relational database that is optimized for handling time series data, arrays of numbers indexed by time (a datetime or a datetime range) in a predefined schema and table.

**** NoSQL: A non-relational database that does not use tables for storing data. It has no predefined schema, able to handle unstructured data and scales horizontally.

Embark on Your Transformational Industry 4.0 Journey

As more and more companies seek to adopt the right technologies and be Industry 4.0 ready, PathWave Manufacturing Analytics aims to lead the digital transformation for the electronics manufacturing industry, specifically in the area of data analytics.

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

