THINGWORX REAL TIME PRODUCTION and PERFORMANCE MONITORING

ThingWorx RTPPM Application:

Give your operators and business leaders the right information; enable them to make faster, more data-driven decisions and ensure optimal performance of your factories.

RTPPM powers enterprises to:

- ✓ **Optimize Performance of existing Assets**
- ✓ **Increase Throughput**
- ✓ **Increase Yield**
- ✓ **Decrease Waste**
- ✓ **Decrease Unplanned Downtime**
- ✓ **Balance Labor costs with Production Needs**

RTPPM enables manufacturers to achieve the financial impact promised by Digital Transformation in Manufacturing. RTPPM delivers real-time, holistic views of your operations to increase uptime, improve productivity, and reduce costs.

The Problem

Increased pressure on manufacturing to maximize production performance is blocked by poor, inaccurate, cumbersome, slow or no production data.

The Hidden Factory that exists today hides underperforming assets, poor process, and excessive waste due to inability to capture data.

Advanced Business Intelligence (BI) and production processes require accurate, consistent, real time, and actionable performance data.

The PTC Approach

Building an IoT Environment

RTPPM is built on top of the ThingWorx platform. ThingWorx serves as the IoT hub for RTPPM, allowing you to pull in data from several data sources, such as Kepware and Windchill.

Enterprise Architecture Readiness

RTPPM is encompassed in a larger framework of factory applications. The framework model enables you to easily and consistently roll-out to additional sites, and naturally expand your applications portfolio to include other use cases, such as Asset Monitoring and Utilization (AMU) and Connected Work Cell (CWC).

Enterprise Scale

RTPPM is architected to roll out quickly to multiple sites across multiple geographies, avoiding the pilot purgatory often experienced with POC's. This deployment capability gives RTPPM an accelerated time to value, as short as 3 months on the first implementation.

With flexible hosting options from on-premise to PTC Microsoft Azure Cloud instances, RTPPM can be easily deployed and expanded to match your manufacturing process. The deployment process is architected by manufacturing experts, whose experience and shop floor knowledge have made the process easily repeatable for fast implementation and scale to the full enterprise.

Low Cost of Entry

Subscription model removes excessive capital requirements that often hinder activating on similar manufacturing initiatives.

Reduced Total Cost of Ownership

RTPPM comes with a commitment to continuous updates and enhancements. RTPPM will be constantly improving with feedback from the field. New functionality rolling out with all functional enhancements available at no additional cost.

Rapid Impact

RTPPM delivers noticeable improvements on a much shorter timetable by using a standardized implementation approach, furthered by flexible hosting options for rapid deployments. RTPPM ensures prescriptive offerings of high value, with a no-regret use case.

Realizing the Value of your investment

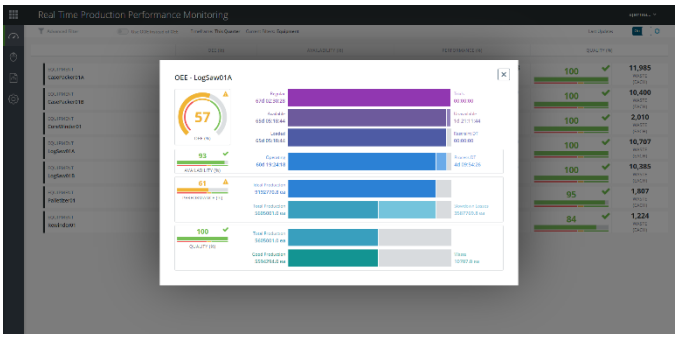
PTC offers a low risk, fast, standardized implementation for RTPPM. Whether on premise or in the Cloud you realize the business benefit sooner.

RTPPM Value

Providing **a prescriptive way to capture, contextualize and visualize critical OEE KPI data** with a solution that is architected for Enterprise Scale, Low Cost of Entry, Reduced Total Cost of Ownership and Rapid Impact.

Delivering insights that identify underperforming assets and foster new efficiencies for continuous improvement.

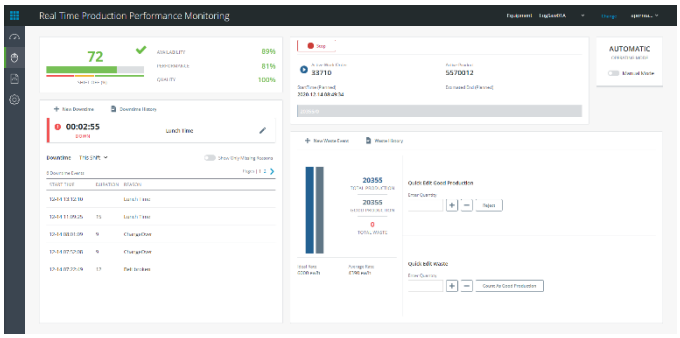
Enables enterprises to **move away from manual reporting** to dynamic monitoring of their production performance, across assets, lines, and factories, with real-time KPIs.



RTPPM Out of the Box

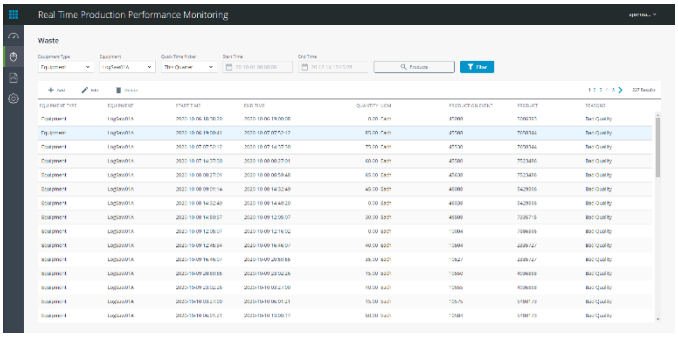
- Reporting Feature for critical performance metrics
  - ✓ KPI's out of the box (OOTB) for OEE, OOE, MTBF, MTTR by work unit
- Core Data Services contain a KPI Engine that Pre / Re calculates data when new data arrives
- Connectivity to Existing Brownfield Assets
- KPI Dashboards
  - ✓ Hourly KPI trending
  - ✓ Availability Overview
  - ✓ Performance Overview
  - ✓ Quality Overview
- Event Types - Events managed for:
  - ✓ Downtime
  - ✓ Waste
  - ✓ Production
  - ✓ Product Changes
  - ✓ Work Order Changes
  - ✓ Shift Changes

- OEE Overview
  - ✓ With Drilldowns, Filters
- Integrations to existing enterprise systems
- Physical Model
  - ✓ Data by Enterprise, Sites, Areas, Work Centers, Work Units, Equipment, Control Groups
- Operator Display with
  - ✓ Downtime
  - ✓ Waste
  - ✓ Production



- System Administrator Displays
- Advanced Filtering
  - ✓ Filtering options on Equipment Type, Product Type, Work Order, Shift
  - ✓ Quick Time Options (This Week, Last Week, This Month, Last Month)
- Support for Ideal Rate by Product by Equipment
- Reason Trees can be unique to the Asset and Event Type

- Downtime Categories
  - ✓ Trial
  - ✓ Plant Not Open
  - ✓ Unavailable
  - ✓ Unit Restraint
  - ✓ Process
  - ✓ Performance



Technical Requirements

Software Component	Version	Provider
ThingWorx RTPPM	Latest available at time of contract execution	PTC
ThingWorx	8.5.7, 9.3.1	PTC
Kepware	6.8	PTC
SQL Server	2016 or later	Microsoft

Guardrails and Technical Limitations

Category	Limitation
Number of Work Units	Up to 50 Work Units can be connected to RTPPM. More than 50 can be connected, but you may notice a decrease in performance.