Maintenance *Optimization*

AI, Analytics & Optimization for Smarter Maintenance Planning, Scheduling, and Execution

What Is *Maintenance Optimization?*

The use of analytics, AI, and optimization to define optimal maintenance decisions across assets lifecycle.

- **Maximize Asset Availability**
- **Reduce Downtime & Costs**
- **Optimize Workforce & Spare Parts Inventory**
- **Minimize Total Cost of Ownership & Ensure Compliance**

*To stay competitive, organizations must embed **AI**, **machine learning**, and **optimization** into maintenance planning, scheduling, and execution.*

Key Concepts *Explained Simply*

- **Outcome-Based Maintenance**
  Maintenance based on outcome, not tasks
- **Predictive Maintenance**
  Predict failures using historical and real-time data
- **Prescriptive Analytics**
  Recommend optimal actions under constraints
- **Territory Sizing**
  Group tasks to reduce visits and shutdowns
- **Maintenance Planning**
  Define optimal plans, bundling, and execution windows
- **Maintenance Scheduling**
  Assign tasks to technicians, dates, times, and locations
- **Risk-Based Maintenance**
  Prioritize actions by risk, cost, and impact
- **Smart Activity Bundling**
  Intelligent grouping of tasks to improve efficiency

Top Use Cases *High-impact Applications*

Maintenance optimization supports a wide range of operational and strategic use cases across industries, such as:

- **Condition-based & predictive replacement**
- **Workforce planning & skills matching**
- **Dynamic and real-time scheduling**
- **Preventive vs. predictive frequency optimization**
- **Spare parts & inventory optimization**
- **SLA and contract compliance**
- **Turnaround reduction through bundling**

Problem Formulation

Objectives
- Minimize Costs
- Maximize Availability

Decision Variables
- Task Timing
- Workforce Assignment
- Routing

Constraints
- Labor & Skills
- Safety & Labor Regulations
- Geographical Limitations

Approach
- Strategic
- Tactical
- Operational & Real-time

Main KPIs *Measuring Performance*

- **Asset availability and uptime**
- **Downtime and turnaround reduction**
- **Maintenance cost reduction**
- **Workforce efficiency and travel optimization**
- **Spare parts inventory efficiency**
- **SLA and regulatory compliance**

Software Tools *Powering Optimization*

- **Optimization Engines**
  for maintenance planning and scheduling
- **Machine Learning**
  for predictive maintenance
- **IoT, sensors, and real-time data**
  real-time condition monitoring and decision-making
- **DB Gene Platform**
  low-code optimization platform
- **Integration with CMMS**
  bi-directional work order and asset sync

***Maintenance optimization** turns maintenance into a strategic lever for **performance** and **competitive advantage**.*

✓ ***McKinsey's research indicates*** that Predictive maintenance AI solutions cut maintenance costs by 10-40% and reduce downtime by up to 50%

Artesis / Oxmaint (2025/2026 Data Reports)

✓ Prescriptive AI can reduce decision latency by up to 80%, ***according to McKinsey***.

Gartner – Strategic Roadmap for Asset Management (2025)

✓ ***Research by Aberdeen*** found that a typical manufacturing business loses about $260,000 for every hour of downtime.

Sumitomo - Costof Downtime in Industrial Manufacturing and the Value o fProactive Maintenance (2025)