Supply & Installation of IoT-Based Sensors at Durgapur Steel Plant

Turnkey Project Executive Briefing & Technical Blueprint

Executed by DG MICROPRONIX PVT. LTD.

30 Years of Engineering Excellence.

The Strategic Intent Behind Predictive Maintenance

59%

Motors consume 59% of all electricity generated worldwide.

14%

Proper maintenance reduces plant energy consumption by up to 14%.

30%

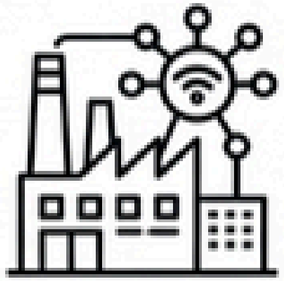
Predictive diagnostics reduce unplanned production downtime by 30%.

Shifting Durgapur Steel Plant from reactive repairs to intelligent, AI-driven asset monitoring.

Project Scope & Tender Overview

The Scale

350 IoT Smart Sensors deployed across varying plant locations for real-time motor and machine health monitoring.



The Execution

100% Turnkey Basis. Encompasses supply, installation, network infrastructure, servers, and commissioning.

The Nature

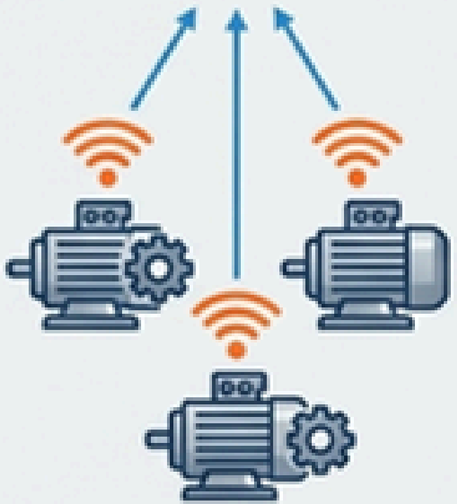
Open Indigenous Tender requiring local execution and compliance with Make in India policies.

Edge-to-Insight System Architecture

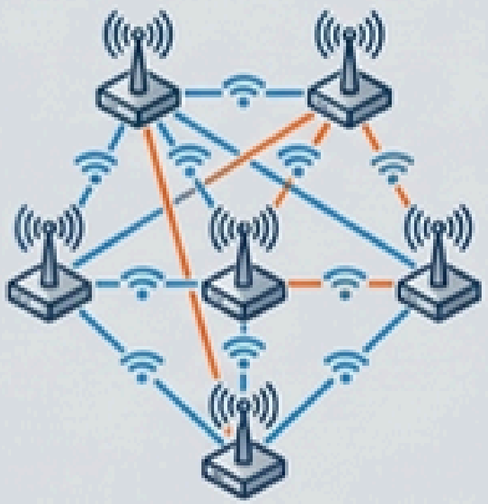
SAIL DSP Premise (The Edge & Transit)

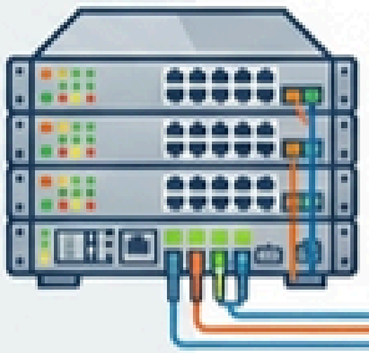
Data Center (The Core)

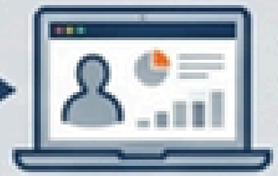
Step 1:
Smart Sensors on Motors
(The Edge)



Step 2:
Wireless Wi-Fi Mesh Infrastructure
(The Transit)







Step 1:
Smart Sensors on Motors
(The Edge)

Step 2:
Wireless Wi-Fi Mesh Infrastructure
(The Transit)

Step 3:
Core/PoE Switches & OFC Backhaul
(The Bridge)

Step 4:
On-Premise Analytics Platform Server
(The Core)

Phase 1: Advanced Edge Sensing Technologies

Ultrasound

Picks up **60-80 kHz** frequencies for early-stage bearing failures and lack of lubrication.

Tri-axial Vibration

Up to **16g** range and **6300 Hz** bandwidth. Detects mechanical unbalance and misalignment.

Temperature

PT100 RTD sensors (0-200°C) for precise drive-end and non-drive-end bearing heat monitoring.

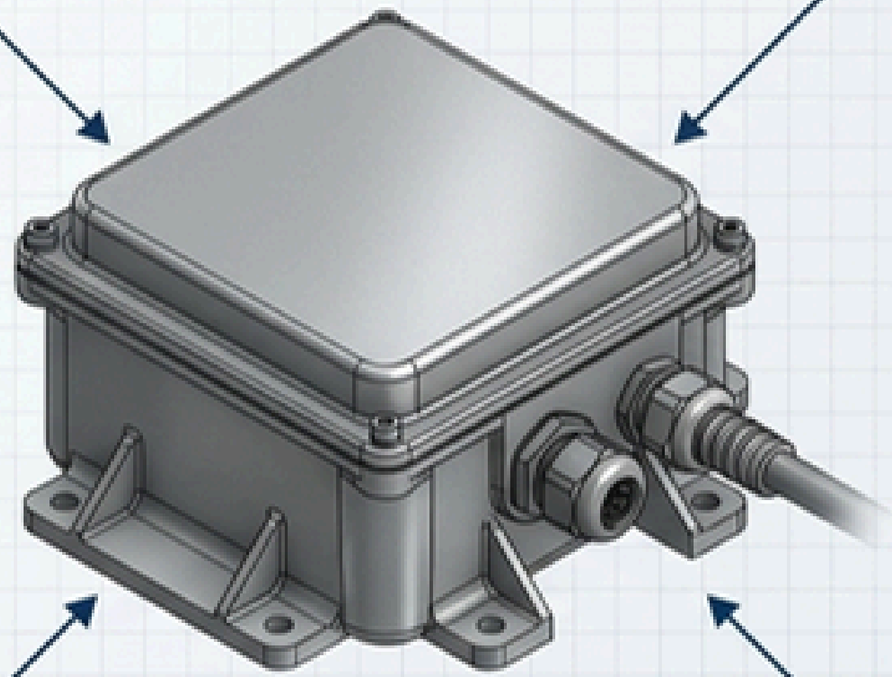
Magnetic Field

+/- 16 gauss dynamic range magnetometer to catch electrical faults and broken rotor bars.

Industrial-Grade Hardware Specifications

1 **IP66 Rated Enclosure:**
Built to withstand extreme outdoor industrial environments.

3 **Power Architecture:**
Powered via external 230V supply or internal battery with a minimum 3-year life.



2 **Magnetic or Epoxy Mounting:**
Secure attachment directly to the motor surface.

3 **Power Architecture:**
Powered via external 230V supply or internal battery with a minimum 3-year life.

Phase 2: High-Fidelity Communication Infrastructure

Network Topology:
Wi-Fi 5/6 Mesh supporting up to 400 Mbps bandwidth and ultra-low latency (<50ms).

Backhaul:
Highly secure Optical Fiber Cable (OFC) or RF link. (Cellular/SIM cards strictly prohibited).

Interference Handling:
Designed for crowded spaces with support for 256 concurrent client connections.

Enterprise Security:
WPA2 AES-PSK encryption, MAC Address filtering (up to 32 per SSID), and Hidden SSIDs.

Phase 3: On-Premise Compute & Storage Core

Processing:
Dual Intel® Xeon® Platinum 8256 processors (3.8GHz, 4 Cores/ 4 Cores/8 Threads).

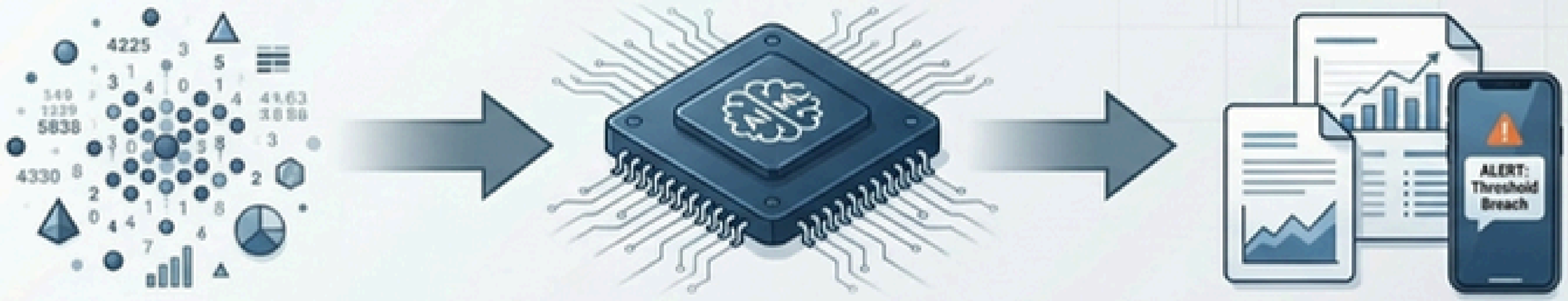
Memory & Storage:
Minimum 128GB RAM.
NVMe SSD Enterprise Class drives configured in RAID 1 for OS.

Resilience:
Hot-redundant Active-Active clustering.
Hot-pluggable drives, redundant power supplies, and fans.

Scale:
24-bay rack base with 30% free capacity reserved for future plant expansion.

Phase 4: AI-Driven Analytics Platform

Data Refinery



Raw Sensor Data

AI/ML Processing Engine

Actionable Insights

Edge vs. Core

Sensors filter critical data points at the edge; On-Premise Servers execute heavy spectrum analysis.

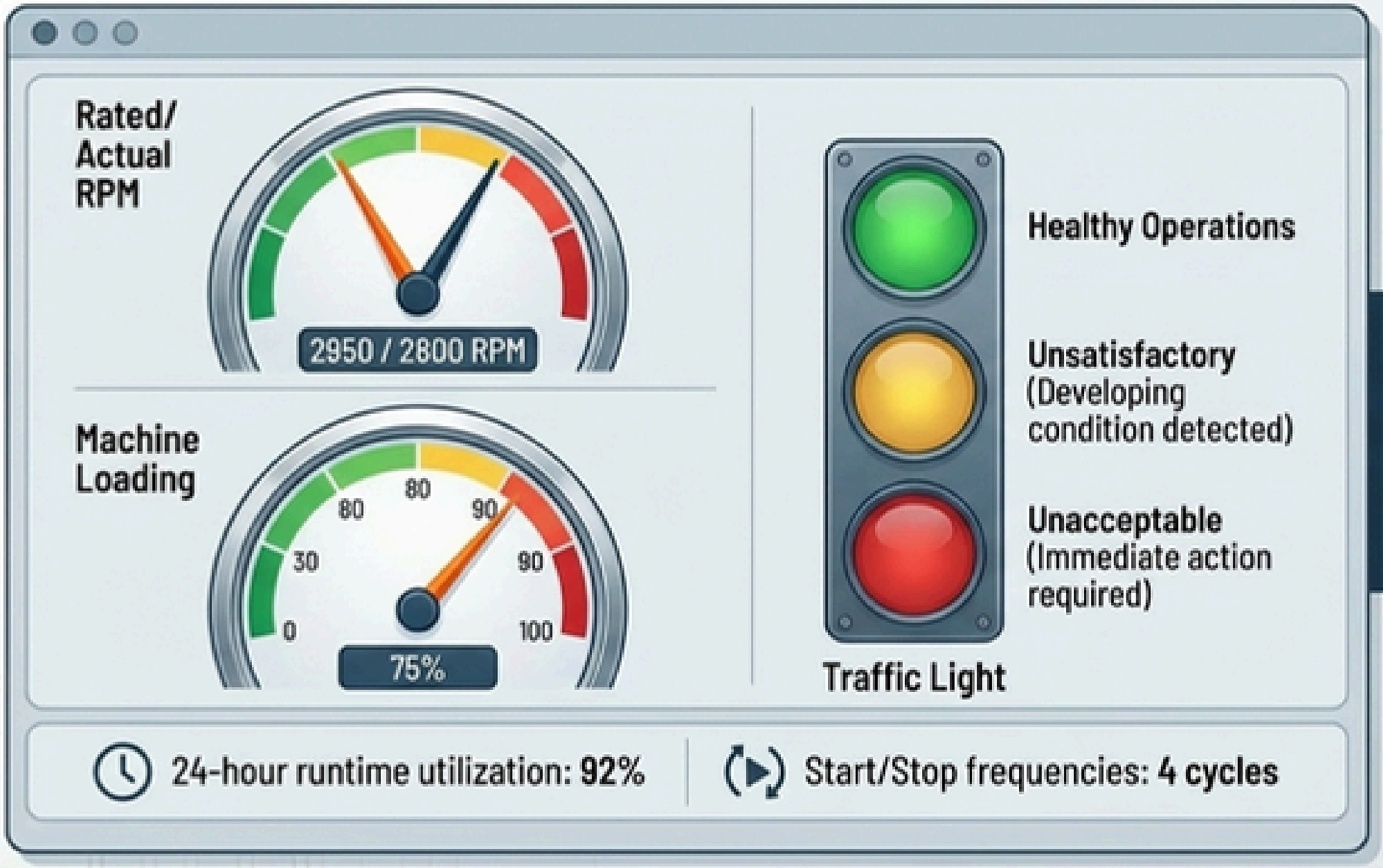
Machine Learning

System utilizes AI to automatically compute user-defined outputs and identify developing adverse conditions before they become critical faults.

Automated Delivery

Real-time SMS and Email alerts dispatched immediately upon threshold breaches.

The Operator Dashboard (ISO 10816 Standard)



PDF

Reporting:
On-demand, automated PDF asset health health reports generated daily.

Comprehensive Predictive Fault Matrix

Mechanical Faults	Electrical & Drive Faults	Bearing & Pump Faults
- Unbalance - Looseness - Soft Foot - Angular/Parallel Misalignment - Bent Shaft	- Voltage Unbalance - Rotor Bar Crack - Belt-Pulley Misalignment - Pinion Eccentricity	- Early Stage Wear - Lack of Lubrication - Ball Spin/Cage Issues - Pump Cavitation


The Future of Maintenance at DSP
End-to-end turnkey delivery of 350 smart sensors
Complete transformation from reactive repairs to AI-driven predictive asset management.
Securing the prime movers of heavy industry to ensure uninterrupted production.