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IGATE Overview

Full spectrum Technology, Business Process Outsourcing and Consulting Services with a focus on delivering outcomes through integrated platforms and optimized processes

- Revenue >$1.2 Billion
- 34,455+ employees
- 45 Sales Offices and 32 Global Delivery Centers
- Focus on few customers with Strategic Shared Value & tightly aligned quality relationships
- Deliver business outcomes valued by customers
- Provide Innovation through ITOPS (Integrated Technology & Operations) to sustain results (e.g., Growth, Cost, or Cycle Time reduction)
Industry Relations:

- Automotive Research Association of India (ARAI): Hi-end automotive research, analysis, & testing
- Industrial Design Houses, Rapid Prototyping & Testing Vendors
- Specialized Consultants: Automotive & Engine Design
Business Drivers

✓ High SCR
  - High Service Call Rate (SCR) and Reactive maintenance
  - High Down time due to ineffective diagnosis
  - High Maintenance related Costs

✓ Lower Customer Satisfaction Index

✓ Knowledge base to enable better design for NPD Initiatives

IGATE has come up with IAUTOPULSE - a Prognostic Asset Health Solution (PAHS) framework to address this need of the industry.
Approach

IAUTOPULSE is IGATE’s Proprietary framework for prognostic asset health solution.

- Global operating model
- RUL within a defined operating context by visualized asset condition
- IAUTOPULSE aggregates real-time asset data.
- Leverages Big Data Analytics to reliably predict remaining economic life
- The physics based failure prediction
IAUTOPULSE - Solution Architecture
Solution Architecture

**Input**
- Assets in Field (Stationary/Mobile)
  - Asset 1
  - Asset 2
  - Asset 3
  - Asset...

  - Big Data
  - SPLUNK
  - AXEDA
  - SQL
  - Sybase
  - Oracle
  - Access
  - Excel

**Decision Making Engine**
- Data Filtering
  - Live Data / Log
- Condition Monitoring - Normal, Alarm, Alert, Threshold
- Diagnostic Engine - Using Advanced Algorithm e.g. ANN, Fuzzy logic
- Prognostic Engine – Using Advanced Probabilistic Algorithm e.g. Bayesian, Regression
- Failure Diagnosis
- Alerts/Alarm/Trip
- RUL PDF*
- Advisory & Work Order Generation

**Output**
- Decision support, Advisory & Work Order
- Communication

**Benefits**
- Warranty Cost Reduction
- Uptime Improvement
- Planned Maintenance
- Product life Improvement
- Avoid catastrophic Failure
- Better Customer Engagement

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*RUL – Remaining Useful Life, PDF – Probability Density Function*
IAUTOPULSE Salient Features

- Open and scalable architecture in real time sense
- Advanced knowledgebase based on physics of failure
- Customized visualization in the form of detailed dashboard and usable advisories
- Interfaces with existing ERP systems, MES, and PLM systems
- Big Data handling capability with fast response time
- Advanced algorithm & decision making engine
IAUTOPULSE  System Implementation
IAUTOPULSE Implementation using MATLAB Tool Boxes

- System integration - MATLAB Database toolbox e.g. for SQL DB etc.
- Open & scalable architecture – Applied for multiple assets for multiple domain
- User friendly graphical user interface -MATLAB GUI
- Collaboration with communication e.g. mobile, Tab, email, SMS, Web updates
- Server based Application
- The system has flexible interface to connect seamlessly with other enterprises systems e.g. ERP, PLM etc.
Assets Summary

**Salient Features** –
Flexible platform to adopt to various domains
Collaborate with various standard databases. e.g. Big data, Splunk.
Uses MATLAB which is well known in the industry for dealing with higher level of complexities.

Open Architecture, efficiently handles Medical equipment, Heavy engineering, mining equipment, etc.
Executive Summary & Advisory Generation

![Asset Health Management Diagram](image)

**Figure 1**
Plot of Sensor Value over Time

**Table 1**
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Subassembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Engine Unit</td>
</tr>
<tr>
<td>2</td>
<td>Brake</td>
</tr>
<tr>
<td>3</td>
<td>Steering Unit</td>
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</table>

**Table 2**
<table>
<thead>
<tr>
<th>Asset Name</th>
<th>Asset No.</th>
<th>Date</th>
<th>Time</th>
<th>Asset Condition</th>
<th>Advisory ID</th>
<th>Advisory Condition</th>
<th>Risk Score</th>
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<tbody>
<tr>
<td>CAR1</td>
<td>P-IV4NA118...</td>
<td>10-Jun-14</td>
<td>09:00 AM</td>
<td>Threshold Indic..</td>
<td>A1002</td>
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<tr>
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<td>10-Jun-14</td>
<td>11:00 AM</td>
<td>Threshold Indic..</td>
<td>A1005</td>
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<td>CAR4</td>
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<td>10-Jun-14</td>
<td>09:00 AM</td>
<td>Threshold Indic..</td>
<td>A10010</td>
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<td>0.5800</td>
</tr>
<tr>
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<td>P-IV4NA118...</td>
<td>10-Jun-14</td>
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<tr>
<td>CAR6</td>
<td>P-IV4NA118...</td>
<td>10-Jun-14</td>
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<tr>
<td>CAR10</td>
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<td>Threshold Indic..</td>
<td>A10010</td>
<td>OPEN</td>
<td>0.5800</td>
</tr>
</tbody>
</table>
Advisory Communication

IAUTO PULSE → Web Based Server → Email To OEM

→ SMS to Customer

→ SMS/Email to Service

Advisory Email
Benefits and Conclusion
Benefits

- Improved reliability and longer uptime of vehicles
- Significantly reduced maintenance and warranty costs
- Reduced operating expenses - more fuel efficient driving, minimized inventory
- Rapid identification of aging and damaged onboard systems
- Established supply chains of to-be-replaced parts
- Efficient assignment of labor resources
Outcome using MATLAB

Advantages of using MATLAB –

- Ease and flexibility to work with different databases using database toolbox.
- Data computation using advanced functions like, PCA, clustering, etc.
- Quick turnaround of overall development using Ready made statistical toolbox
- Easy to use AI modules e.g. ANN
Conclusion

- **IAUTOPULSE** is based on open system architecture and can be customized to suit vertical-specific needs.

- It has been a proven success in ensuring increased equipment uptime, and enabling predictive maintenance.

- It has been instrumental in the reduction of maintenance cost and development of knowledge base that is useful for increasing workplace safety and creating the new-generation, highly reliable products.

- **IAUTOPULSE** can reduce the maintenance cost by 20 to 40%. Further reduction in maintenance costs is possible by integrating IAUTOPULSE with ERP, MES and PLM systems.
Thank You