ENERGY & UTILITIES
OUR SUCCESS STORIES
Centralization of Operations and Maintenance at Power Generation Plants

**Strategy and Objectives**

- Increase reliability of power across the client's 11 fossil fuel power generation plants and critical assets — gas turbines, generators, steam turbines, etc.
- Centralization of operations and maintenance processes
- Reduce operational costs
- Support fleet monitoring, and centralized operations and maintenance using an Amazon Web Services (AWS) cloud platform

**Happiest Minds Solution**

- Defined overall solution architecture across key pillars of the Reimagine program: centralizing management and control of plant operations, and removing manual effort involved in O&M processes by leaning and technology automation to the greatest extent possible
- Assessed gaps required for seamless functioning of the client organization's Fossil Center of Work Excellence (FCWE) and Consolidate Command Center (CCC) under the Reimagine program initiative
- Defined a solution with technology interventions required for addressing identified gaps
- Prioritized solutions for execution
- Designed a high-level solution blueprint for shortlisted solutions
- Provided deep-dive details on FCWE's daily and outage work processes
- Leveraged AI/ML models for optimizing work orders and improving data quality for validation, prioritization, and scheduling of FCWE's daily and outage work

**Digital Capital Delivered**

- Effective remote management and maintenance of all of the 11-fossil fuel power generation plants from a centralized solution
- Work order optimization
- Better data quality for validation, prioritization, and scheduling of daily and outage work
- Improved operational efficiency and reduced costs
- Greater visibility into plant processes and equipment, and improved predictive maintenance

**Who Was the Client:** One of the largest energy companies in the U.S.
Smart Grid Analytics Platform
Delivering Actionable Insights, Improving Operational Efficiency

**Who Was the Client:** A leading US-based smart grid applications company

**Strategy and Objectives**
A scalable analytics platform that would integrate with SCADA and DMS distribution management systems

Ability to derive timely insights for operational efficiency

**Happiest Minds Solution**
We developed a scalable platform for managing the various intelligent sensors while providing machine learning-based analytics on the data collected from all areas of the distribution grid. The key highlights of the platform were:

**Group management**
Scalable to manage millions of data points as well as a logical grouping of end devices

**Fault and disturbance analytics engine**
Development of machine learning algorithms for fault analysis, distribution classification, and anomaly detection

**Auto-phase detection**
Data to validate and detect the feeder phase and thereby enhance safety

**Digital Capital Delivered**
- **Optimized data flow to the SCADA system**
- **Timely actionable insights resulting in better operational efficiency**
Automated Frequency Stabilization of Power System and Power Generation Equipment

**Who Was the Client:** A world leader and innovator in pioneering high technology, including power systems and nuclear energy

**Strategy and Objectives**

- Development of a power systems application
- IT integration and automation for demand and supply applications

**Happiest Minds Solution**

- Integration of the client’s demand and supply applications
- IT automation for monitoring demand and controlling supply based on demand (layer 3 of the stack)
- Porting of the whole application code from C++ to Java and executing unit testing of the code despite lack of documentation on the C++ codebase—the activity included Java-based design development for wrapper classes, database (DB) classes and business logic, as well as Enterprise JavaBeans (EJB) interface development

**Digital Capital Delivered**

Efficient frequency stabilization of the power system and power generation equipment taking place in 3 modes: manual control, scheduled control, and automatic demand/supply control
ERP and Inventory Management

Who Was the Client: A leading hardware and software manufacturer for electric vehicles (EVs)

Strategy and Objectives

Implement a reliable, more scalable solution with rapid deployment than the current QuickBooks, Expandable system

Auto-validation of sales orders based on business validation rules, and auto-processing of return orders

Reporting and consolidation across subsidiaries and locations without manual intervention

Hassle-free reporting for business users without the need to write queries

Happiest Minds Solution

Implementation of NetSuite modules: Order to Cash, Procure to Pay, Basic Manufacturing, and Advance Inventory

Integration of all third-party systems with NetSuite using MuleSoft

Data migration utilities from Expandable to NetSuite

Multi-book accounting system facilitating inter-company transactions

Enablers

End-to-end capabilities in ERP

Middleware to take care of all integration aspects

Streamlined tracking process

Real-time reports to identify shipments, delays, station activations and assembly of items

NetSuite integrations to resolve productivity issues

Process Efficiencies Delivered

Efficient consolidation and monitoring of international subsidiary locations

Greater visibility and control over the sales process and financial reporting

Effortless management of international subsidiary finances with the enablement of multi-currency transactions

Improvement in visibility and Sarbanes-Oxley (SOX) Act compliance

Complete transparency into billing and tracking in the sales process
Quote-to-cash Solution

Who Was the Client: One of the world’s largest and most open electric vehicle (EV) charging network providers.

Strategy and Objectives

Salesforce, which was used by the client only till the phase of managing opportunities, had to be leveraged for other activities such as product configurations and pricing—which were being stored on external repositories.

Automation of the final quotes which were being created manually—by copying information into the quote template document.

Elimination of rework in the quote creation process and real-time tracking of quote status.

Happiest Minds Solution

Leveraged Salesforce CPQ and Billing to configure products and price books, and create bundles.

Utilized the quoting engine to ensure seamless data flow and accuracy of information with respect to opportunities.

Enabled easy tracking of the quote status after it was sent to the end customer.

Facilitated quote PDF file generation using DocuSign for Salesforce CPQ with customer e-signature feature for a faster turnaround time.

Process Efficiencies Delivered

Integration with Steelbrick resulted in increased efficiency with quote creation and approval time reduced to one-tenth of the original time and errors dropping to less than 2%.

With all data stored in Salesforce, sales managers could analyze reports and view intuitive dashboards concerning quarterly revenue generation.
Renewable Energy Management Solution

Who Was the Client: One of the largest clean energy generation companies in India

Strategy and Objectives

Enhancing the value proposition for the independent power producer (IPP) through predictive maintenance of the entire farm

Creating dashboards to help farm owners foresee energy production and make predictive maintenance decisions

Happiest Minds Solution

Developed a monitoring system for renewable energy farms by aggregating data from wind turbines, solar panels, and hydro plants

Set up a multi-tenanted system to cater to multiple customers owning multiple farms, which included:

- An on-field data acquisition and control (DAC) system with multiple connectors (such as OPC, Modbus, and PI) to the farm
- Commissioning of an IoT platform
- Application development and integration
- Remote infrastructure management and L2/L3 support

Created a DAC system for acquiring data from wind turbines and solar panels, and it hosted instances of the client services (OPC DA, OPC XML DA, MODBUS, PI, and RDBMS Client) for subscribing to tags data from servers.

Process Efficiencies Delivered

Efficient aggregation of data from wind turbines, solar panels, and hydro plants, enabling optimal management of renewable energy

Intelligent data analysis and predictive maintenance
Anomaly Detection and Predictive Maintenance for Wind Turbines

Who Was the Client: One of the largest clean energy generation companies in India

Strategy and Objectives

Cleansing and standardization of data insights offered by the client to windfarms on possible predictive maintenance required at windmills. Each windmill generated about 500 data parameters every 5 minutes, including the location master data, windmill master data, and historical failure information.

Happiest Minds

Solution

Developed routines in Databricks Spark for data cleansing and standardization, and facilitated collaboration among data engineers and data scientists using Databricks features.

- Data aggregation by meaningful units of time for analysis
- Creation of meaningful targets to identify failures
- Enabled identification of important factors by looking at correlation, facilitating failure prediction well ahead in time
- Created pre-defined models based on windmill data and adjacent windmill characteristics
- Evaluated the performance of trained and re-trained models in a systematic manner

Process Efficiencies Delivered

On-time failure prediction enabling predictive maintenance
Who Was the Client: Renewable energy solutions provider in the U.S.

Strategy and Objectives

Automated solar deployment management platform and application—to do away with the manual process of periodic checks performed by the client's support staff visiting installation sites or attending support calls from customers

Summarized and drill-down data view for customers to help them understand the power generation of their installations and receive alarms or notifications on the current state and operations of installations

Happiest Minds Solution

We developed a connected monitoring system with the following features:

- Connects Enphase, eGauge and SMA APIs with Azure IoT Hub through HTTPS protocol
- Reads data from the gateway provided by eguage.net (19785), Enphase, and SMA through respective APIs for power generated and utilized
- Parses and stores data on the Azure blob storage
- Builds reports on monthly power generated and consumed as provided by the gateways and delivers them based on schedule

View Solution Diagram

Process Efficiencies Delivered

Automated monitoring and management of solar deployments
Who Was the Client: A leading IP cable operator in Europe

Strategy and Objectives

An ecosystem with the following components that would allow the rollout of home automation services to customers:

- Smart home devices including smart meters
- Smart home gateway vendors
- A common platform interface (CPI)
- The controller layer for the network
- Multiple smart home applications

Happiest Minds Solution

- Developed CPI framework components, including smart meter device
- Integrated the smart meter with the CPI layer
- Developed a web application for monitoring and managing homes energy consumption
- Customized use cases for different smart home services

Process Efficiencies Delivered

Efficient rollout of home automation services
Who Was the Client: A USA-based Fortune 100 clean, healthy energy generation company

Strategy and Objectives

Create a data model or schema for visualization of raw data in MYSQL, displaying energy consumption trends with daily, weekly, and monthly comparison charts.

Enable customers to track and reduce energy consumption with comparative depiction, allowing them to study occupancy level inside rooms, units, zones, floors, and towers of buildings.

Happiest Minds Solution

Created a data model or schema for visualization of raw data in MYSQL

Created Java APIs that the front end could call for visualization

Created customized visualization for the depiction of energy consumption

Process Efficiencies Delivered

- Reduced energy consumption, resulting in revenue savings
- Comparative analysis between different towers, floors, zones, and units to pinpoint encouragement of lagging units for energy conservation
- Lower carbon footprint and achievement of green buildings
About Happiest Minds

Happiest Minds, the Mindful IT Company, applies agile methodologies to enable digital transformation for enterprises and technology providers by delivering seamless customer experience, business efficiency and actionable insights. We leverage a spectrum of disruptive technologies such as: Big Data Analytics, AI & Cognitive Computing, Internet of Things, Cloud, Security, SDN-NFV, RPA, Blockchain, etc. Positioned as "Born Digital . Born Agile", our capabilities spans across product engineering, digital business solutions, infrastructure management and security services. We deliver these services across industry sectors such as retail, consumer packaged goods, edutech, e-commerce, banking, insurance, hi-tech, engineering R&D, manufacturing, automotive and travel/transportation/hospitality.

Headquartered in Bangalore, India; Happiest Minds has operations in the U.S., UK, The Netherlands, Australia and Middle East.

Write to us at business@happiestminds.com

www.happiestminds.com
Centralization of Operations and Maintenance at Power Generation Plants

IoT Data Ingestion
- AWS IoT Hub
- Messaging
- Rules Engine
- Dynamo
- API
- Kinesis

Integration Layer
- Data Lake (AWS S3)
- Query Engine

IOW Module
- AI/ML Models
- IOW Rules
- Optimizer
- ECM

Maximo Replica (Postgres DB)
- Maximo
- SAP
- FACTS

CCC
- Maximo Dashboard
- Operational Analytics
- HMI
- Plant Status Dashboard

Digital Worker App
- WO for the day
- WO Updates

Document Library
- WO for the day
- Prioritization
- Validation

Scheduling
- AI/ML Models

FCWE Application
- Alerts
- Manual WO

ESB
- API Gateway

FCWE Data
- Progress Updates

Sensor Data
- MQTT

Fossil Plant
- DCS
- Edge Gateway

Sensors
Smart Grid Analytics Platform Delivering Actionable Insights, Improving Operational Efficiency
Automated Frequency Stabilization of Power System and Power Generation Equipment

- Sensor Gateway
- MM3
- Sensor Events
- Event Ingress Logic
- Sensor Event Store
- Analytics Engine
- Analytics Cache
- Unsolicted DNP Point
- DNP Polled Points
- Sensor Poll Data
- Sensor Waveforms
- Poll Ingress Logic
- Sensor Condition Store
- Coherency Monitor
- Bulk Ingress Logic
- Sensor Bulk Data Store
- Coherency Rule Set
- Data Coherency Controller
- Sensor Data Req.
- Sensor Data Req.
- RESTful API
- Cache Update Request
- Coherency Rule Set
- Processed Data
Renewable Energy Management Solution

Wind Farm
- OPC DA Server
- OPC XML DA Server
- Modbus Server
- PI Server
- RDBMS

Solar Farm

IoT Platform
- Weather Data

Applications
- Archive
- Pulse
- Publish
- Cognito
- Workflow
Anomaly Detection and Predictive Maintenance for Wind Turbines

- Gateway
- Weather Station
- Combiner
- Invertor
- Meter
- Solar Panels

Dashboards for Commercial Use
Dashboards for Residential users
Dashboards for Control Room

Azure IoT Platform
Anomaly Detection and Predictive Maintenance for Wind Turbines