Smarten
Augmented Analytics

Case Study

Business Intelligence & Augmented Analytics

Smarten Augmented Analytics Implementation for India Transformer Manufacturing Co. for IoT Sensor Data Analysis

QUALITY SYSTEM CERTIFICATION
DNV·GL
ISO 9001:2015

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The Client

The Client business focus is in the fastest growing business sector in the India market, with a market value of US$ 3.5 Billion. The group is comprised of fifteen companies managing diverse business interests in Automotive Tires, Infrastructure, IT and Specialty markets including Pharmaceuticals, Power Ancillaries and Plantations.

The Objective

The Client was already using Smarten for other Business Units and they planned to roll out Smarten for the Manufacturing Division.

The major focus area was for tracking of jobs in the transformer manufacturing process. The Client was using IoT platform from IBM which was connected to their shop floor and collected sensor data related to manufacturing stages, job milestones, and dispatch adherence. The data was stored on IBM Cloud.

The Client needed a vendor who could provide them with required analytics for data and build a staging database from the IBM cloud data.

Challenges

- Need for analyzing IoT data generated from IBM IoT cloud platform
- Data extraction and transformation from IBM Cloud and establishing a staging server
- Need for tracking the timeline for each manufacturing job, milestones achieved, deadline alerts for dispatch
- Day-to-Day interdependency across MIS team and business users to derive manufacturing stages to measure financial impact and reduce operational cost
- Need for dynamic ad-hoc analysis for Plan dispatch, Actual dispatch, Delivery Satisfaction etc.
- Heavy dependence on manual Excel-based reports that was non-interactive, time consuming, inaccurate and unsecured
- Need to implement KPI and Performance Driven culture for Active Orders, Delayed Units, etc.
- Eliminate the need of trained manpower to manage and develop BI solution
- Compatibility with Client current and future data sources and operating system

To overcome these challenges, the Client wanted a powerful analytical solution built on industry-standard architecture to analyze IoT from IBM platform. The Client wanted a browser-based system that could be accessed from any

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location and any device to answer all business and time-critical questions and a solution that would help it evolve with assisted predictive modeling to improve planning and forecasting and make data-driven decisions.

The Solution

After successful implementation of Smarten for one of its divisions, Client wished to implement Smarten for its transformer manufacturing division. The Smarten team developed a detailed scope of work after achieving a comprehensive understanding of the Client needs and engaging in discussions with the Client tea.

The Smarten team extracted data from the IBM Cloud Platform and data loaded to the file server (SFTP). Data from the file server was then extracted, transformed and pushed into an Oracle staging database.

Using the Oracle staging database as data source the Smarten team created datasets and various BI objects including Dashboards, KPIs, Graphs and Charts.

Technical training was delivered to the in-house IT team for administration, data source connectivity, creation of datasets and best practices to assure a smooth deployment and provide ongoing support.

Implementation was a joint effort between Client team IT team, business user team and the Smarten team.

The Smarten solution was implemented to cover crucial modules including Customer Order Status, Operations, Production Status, Loss Hours, Operator Productivity, Schedule Adherence Status etc.

Technology & Platform

Server	: Intel Xeon R processors 6 core of 2.10 GHz
O.S.	: Linux with 132GB RAM
Applications	: IBM Cloud Application (DrishTi Application)
Backend (Database)	: Staging – Oracle Database Server

Key Business Intelligence objects implementation included:

Customer Orders Module

- **Active Orders**: KPIs showing total number of orders in the system for which dispatch is not complete
- **Active Transformers**: KPIs showing total number of transformer units in the system for which dispatch is not complete and not cancelled

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- **Jobs**: Pie Chart showing LD jobs, Warranty Jobs and Special Jobs
- **Financial Impact**: KPIs showing total number of delayed units for which there are planned dates and are not dispatched and the potential financial impact
- **Order Status**: Pie Charts displaying active transformer units for respective order status viz design, on track and delayed
- **Executable Order Visibility**: Stack bar showing values of active transformer units for oil and dry based for current month and previous two months comparison
- **Weekly Production Status:** Bar graph showing actual and planned values for each week of the current month and also total value of current month
- **Impacted Customer Visibility**: Stack Bar graph showing:
    - Count of transformer units which are in time for both active and dispatched transformers
    - Count of transformer units which are delayed for both active and dispatched transformers
    - Count of transformers which are on hold/pause/cancel
- **Production Status Visibility**: Waterfall bar graph for Stage Active Transformer
- **Transformers Dispatched**: KPIs indicating total number of transformers dispatched for current month to date
- **Production Booked**: KPIs indicating total value of transformers dispatched for current month to date
- **Dispatch Status**: Combined chart of bar and line indicating production booked in t units and amount for last three months
- **Customer Order Status Summary Report**: Indicating Customer Name, Rating, Sales Person, Priority, Order Type, Order Date, Design Status, Estimated Completion Date etc.

Order Fulfillment

- **Order Size**: Pie Chart representing number of units based on delayed and on track for the order

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- **Order Status Based on Base Plan and Revised Plan**: Stack bar graph representing Count of Unit on Base Plan/Revised Plan status for a single transformer
- **Order Fulfillment Plan**: Waterfall bar graph displaying monthly count of unit for a single transformer for Revised Fulfillment Count (RFC) plan
- **Customer Order Status Report** – **ADA Status**: Cross Tab showing Transformer Number, Stage, Status, Planned, Dispatch Date, Revised Dispatched Date, Actual Dispatch Date
- **Customer Order Status Report- Stage Status:** Cross Tab showing details including Planned Start Date, Planned End Date, Revised Planned Start Date, Revised Planned Start Date, Actual Start Date, Actual End Date and Dispatched Date
- **Customer Order Status Report - Order Status (Days):** Cross Tab showing details including Elapsed Production Days, Actual Production Days, No. of Hold Days, No. of Pause Days and No. of Suspend Days

Operation Summary Dashboard

- **Transformers Dispatched:** KPIs indicating total number of transformers dispatched for current month to date
- **Schedule Adherence Index:** Gauge KPI showing % of transformers for which Revised Fulfillment Count (RFC) stage was completed as per Base Plan among the dispatched transformers in the selected period
- **Shipment Reliability (SR):** KPI showing % of transformers for which Dispatch Stage was completed as per Base Plan among the dispatched transformers for selected period
- **Delivery Satisfaction Index (DSI):** KPIs showing % of transformers for which Dispatch stage was completed as per Customer Promised Date among the dispatched transformers in the selected period
- **Loss hours Summary:** Pie Graph Showing Loss Hours
- **Overtime Days Summary:** Pie Graph Showing Overtime Days

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- **Hold Units Report:** Cross tab showing Order Status, Customer Name, Transformer ID, Contact Person, Hold Since, Count of Units and Count of Dispatched Units
- **Pause Units Report:** Cross tab showing Order Status, Customer Name, Transformer ID, Contact Person, Pause Since, Count of Units and Count of Dispatched Units

Production Status Summary Report: Report showing OA, Priority, LD Category, Order Type, Trafo Type, Customer Sales Person, Rating, Transformer, Status, Planned Dispatch, Estimated Dispatch, Actual Dispatch

Production Status Report by:

- **By Transformer**
    - Tabular Report showing value of Customer Name, Rating, OA, Transformer, Type, Status, Order Date, EPD, APD, Hold Days, Pause Days, Suspend Days, Revision and Order Status
- **By Stage**
    - Multiple Tabular reports showing value of Date From, Date to, Loss Category, Loss Sub Category, Stage, Workstation and Role
- **By Shift**
    - Cross tab showing value of Shift, Milestone, Workstation, Job Start, Job End, Supervisor, Operator, Target (Qty), Target (min), Actual (Qty), Actual (min), Productivity, Encoder
- **By Delay Contributors**
    - Tabular Report showing values of Customer Name, Rating, Total, Rework, Suspend, Hold and Order Status
    - Tabular Report showing value of Delay Contributor, Unit, Stage, Milestone, Start Time, End Time and Duration (Hrs)
- **By Loss Contributors**

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- Cross tab showing value of Loss Category, Loss Sub Category, Stage, Milestone, Unit, Workstation, Supervisor, Shift, Start Time, End Time and Loss Duration (Hrs)

Coil Detail Report: Tabular Report showing value of Required Turns, Cumulative Required Turns, Actual Turns, Cumulative Actual Turns and Completion Status

Loss Hours Report:

- **By Stage**
  - Tabular report showing value of Dated From, Dated To, Loss Category, Loss Sub Category, Stage, Workstation and Role
- **By Stage and Workstation**
  - Tabular report showing Dated From, Loss to Date, Loss Category, Loss Sub Category Workstation and Role in the Dashboard

Operator Productivity:

- **Summary Report:** Cross tab showing Operator Name, Productivity, Overtime and Loss
- **Detailed Report:** Tabular Report showing Date, Designed Shift Time, First Job Start Time, Last Job End Date, Target (min), Actual Time (min), Loss (Hrs.), Productivity (%) and Overtime (Hrs.)

Delay Contributors:

- **Summary Report:** Cross tab showing value of Stage, Order Status, Count of Delay and Delay Hrs.
- **Detailed Report:** Cross tab showing value of Date, Delay Contributor, Stage, Milestone, ADA, Transformer, Unit, Start Time, End Time, Duration (Hrs.)

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Schedule Adherence:

- **Schedule Adherence Index**
- **Shipment Reliability**
- **Delivery Satisfaction Index (DSI)**

Smarten covered the critical areas like Production, Order Status, Loss Hours, Dispatch Status etc

Smarten Team Role

For manufacturing industry it is extremely important to track, evaluate, monitor and identify actual Production, Loss hours, Dispatch Status and Financial Impact on the organization due to loss hours and non-dispatched status. To achieve a complete production management through BI, the Smarten team helped the Client in structure data and establish a corporate Business Intelligence system.

- Understanding data sources
- Cleaning, Structuring and staging the data to database
- Understanding current reporting structure and flow
- Functional and Operational Specifications
- Conceptualization, Design and Development of Dashboards, KPI, Reports
- UAT
- Go Live Support
- BI concepts and best practices sessions
- Technical training
- Administration training
- Business analyst training
- End user training

Conclusion

The Smarten solution and the Smarten team helped the Client to support its users with tools to analyze important data and identify overall production performance, and monitor the financial impact of loss hours and non-dispatch on the organization. The Smarten solution allows the Client team to measure tactical and operational results at a summary level and at a detailed level with respect to production stages, delay contributors, operators etc.

Key Benefits and Deliverables:

- Understanding and designing data analytics across various stages of production to dispatch
- Consultancy for Data cleaning and Structuring

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- Centralized access to information through interactive graphical, ad-hoc, KPI analysis
- Defining key KPIs like Active Orders, Delayed Units, Transformers dispatched, Production Booked, Potential Financial Impact for various jobs and for Management
- Compiling, structuring and harmonizing flow between all the stages and jobs of production cycle and its potential financial impact
- Exceptions and alert analysis for monitoring loss hours, operators performance etc
- Automating all operational reports with pristine quality data
- Training for IT staff, power users and other end users
- Low cost of acquisition, short rollout time, and minimal training needs to achieve lower TCO
- User-friendly interface reduced burden of ad hoc queries to IT team
- Enterprise architecture with zero footprint browser interface ensured rapid rollout across various locations to a large number of users
- Responsive user interface allowed users to access the solution with all popular smart phones, tablets, and other mobile devices

With the Smarten solution foundation and the skills and support of the Smarten team, the Client has achieved its goal of plant performance monitoring. The Smarten augmented analytics intuitive interface allows users to make the most out of available data and effectively manage production counts, equipment efficiency, operator efficiency etc. This project implementation allows the Client to track their production performance to reduce unplanned downtime and increase the delivery satisfaction index without compromising on the quality standards.

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