Case Study

# Driving Industrial Resilience using AWS-Driven Manufacturing Control Tower for a Leading Specialty Chemicals Manufacturer

# Preface

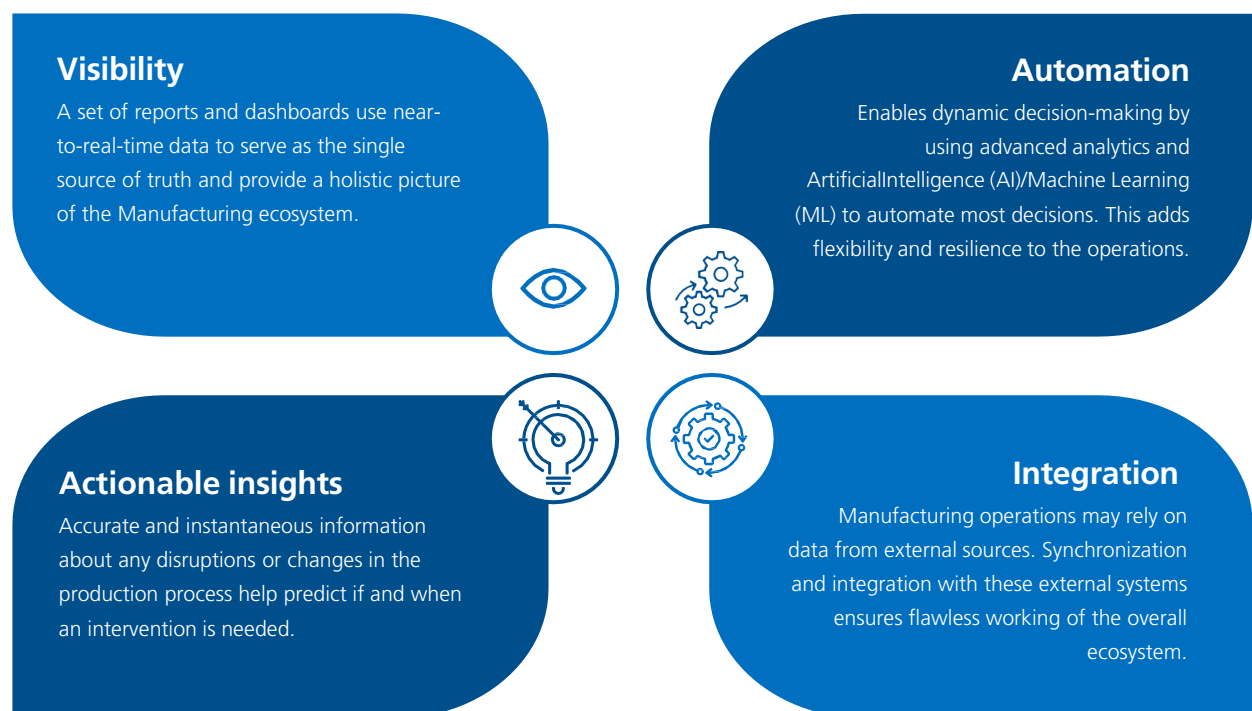## Manufacturing Control Tower – A Game changer

In today's fast-paced and interconnected world, manufacturers face unprecedented challenges in managing their production processes. With increasing complexities in product design, raw material sourcing, and customer demand, manufacturers must adapt quickly to stay ahead of the competition. The traditional production strategy is no longer sufficient, as it fails to account for the ever-changing landscape of modern manufacturing.

Enter Manufacturing Control Tower (MCT), a cutting-edge solution that revolutionizes the way manufacturers operate. By providing real-time, end-to-end visibility into the production process, Manufacturing Control Tower enables organizations to optimize their operations, mitigate disruptions, and deliver high-quality products efficiently.

With Manufacturing Control Tower, manufacturers can monitor and control every aspect of their production process, from raw material tracking to final product assembly. It provides a holistic view of operations, allowing manufacturers to identify bottlenecks, optimize workflows, and streamline their operations.

By leveraging advanced technologies such as artificial intelligence, machine learning, IIoT, Manufacturing Control Tower empowers manufacturers to make data-driven decisions, predict potential disruptions, and take proactive measures to prevent them. It also enables seamless communication and collaboration across departments, ensuring that all stakeholders are aligned and informed in real-time.

The key functions of an effective Manufacturing Control Tower are:

### Visibility
A set of reports and dashboards use near-to-real-time data to serve as the single source of truth and provide a holistic picture of the Manufacturing ecosystem.

### Automation
Enables dynamic decision-making by using advanced analytics and ArtificialIntelligence (AI)/Machine Learning (ML) to automate most decisions. This adds flexibility and resilience to the operations.

### Actionable insights
Accurate and instantaneous information about any disruptions or changes in the production process help predict if and when an intervention is needed.

### Integration
Manufacturing operations may rely on data from external sources. Synchronization and integration with these external systems ensures flawless working of the overall ecosystem.

# Our client

Our client is a specialty chemical firm serving Food, Beverage, Pharma and Personal care businesses. With a rich history of over a century, they have established themselves as a leader in innovative solutions. Their extensive portfolio includes a variety of products designed to meet the evolving needs of their customers. They operate across the globe and employ thousands of people. Their commitment to sustainability and social responsibility is evident in their efforts to minimize environmental impact and promote ethical practices throughout their manufacturing processes and supply chain.

# Challenge

The client had 40+ global manufacturing facilities, many of which it had acquired throughout its storied history. Every facility worked with multiple external vendors to meet its operational needs. Most of the facilities worked in silos and used diversified processes and KPI measurement methodologies. They also used multiple disparate data-capturing solutions. Due to this, the client did not have visibility into its operations, supply chain, freight, and manufacturing. They were not able to put together the entire product life cycle to visualize their performance against the expenses incurred across its business units and product lines.

The client also wanted to assess its vendors' performance and quality to ensure a resilient manufacturing and supply chain, foster a culture of productivity and a common measurement method, and enhance site accountability.

To do this, it sought a partner who could create a unified data platform and enterprise dashboards that would provide advanced analytical insights and drive data-driven decisions. The Manufacturing Control Tower had to be capable of tracking the following KPIs across five use cases.

Following are the use cases with their KPIs

### Manufacturing Performance

Manufacturing Performance KPIs are quantifiable and critical measures used by manufacturers to identify and improve equipment performance, effectiveness, quantity variance, overall productivity, and costs.

- Availability
- Equipment Performance
- Quality
- Overall Equipment Effectiveness (OEE)

- Total Effective Equipment Performance (TEEP)
- Opportunity Tracking Tool (OTT)
- Process order quantity variance

## Freight Spend Visibility

Freight Spend Visibility KPIs are used to measure the details of the transportation costs within a warehouse or manufacturing unit including freight spend, volume, rate and so on.

- Total Freight Spend Inbound
- Total Freight Spend Outbound
- Freight Volume
- Freight Rate
- Freight Outlook
- Price Volume Impact

## Warehouse Spend Visibility

Warehouse Spend Visibility KPIs are use to measure and evaluate the cost to move products in and out of a warehouse including truckload utilization, cost of carrying inventory or warehouse space utilization and so on.

- Total Warehouse Spend (USD)

## Maintenance and Performance Visibility

Maintenance and Performance visibility KPIs are used to monitor and improve equipment uptime, decreasing overall maintenance costs, and optimizing maintenance performance.

- % of Proactive Work
- % of Reactive Work
- Planned Work
- Planned Backlog
- Total Planned

## Quality Performance

Quality Performance KPIs are used to measure internal quality checks, customer experience, complaints, rejections, and so on.

- Customer High Risk
- Customer Rejections
- Customer Complaints
- Internal Batch Rejections
- Vendor High Risk
- Nonconformances

# Why LTIMindtree

We were the partner of choice for the client because of the following factors.

### Full stack capabilities in the data and reporting space

- We have successfully implemented Snowflake for 40+ clients.
- Our prowess and investments in accelerators, helped accelerate migration and reduce time to market and TCO.

### Extensive experience in operational transformation engagements

- We possess vast experience and outstanding expertise in building large-scale operational transformation programs.
- We have successfully implemented enterprise reporting platforms for multiple clients.

### Customized solution approach

- We achieved proven OEE improvements with accelerated deployment across multiple sites.
- We implement a unique site-first and use-case-first approach instead of big-bang deployment of the entire scope across all plants.
- We clearly understand the reporting needs and timelines requirements of specific clients across their varied sites.

### Our A-rated team and workforce management system

- We utilize handpicked teams for our clients with the right balance in governance enablement through Scrum cum PM and template-driven implementation with streamlined releases across sites, anchored by RTE.
- We actualize an agile-centric approach for increased transparency and speed.

# Our Solution

LTIMindtree took up the challenge to study, collate and unify the data and performance tracking KPIs from across 140+ manufacturing units, using which we developed a single unified data platform and enterprise dashboard. This dashboard helps business users to track and view Manufacturing KPIs like Performance, Freight, Supply Chain, Maintenance or Quality across all these 40+ units from any client location at any point in time.

## Conducted detailed discovery sessions

- With engagement sponsors/management and SMEs to capture the key maintenance/quality challenges and goals.
- With plant IT team to get a clear understanding of the existing architecture.
- To understand how the maintenance/quality metrics were being tracked
- To identify the chain of authority, accountability, and responsibility.

## Leveraged a well-architected platform

- Aligned the data architecture to the client's AWS-first cloud strategy.
- Reviewed and validated the data architecture for variety, velocity, and volume in manufacturing scenarios.
- Standardized tools such as AWS Glue, PowerBI, and Greengrass.

## Facilitated data ingestion

- Designed and developed a Data Warehouse (DW)-based Single Source of Truth (SSOT) for both OT and IT datasets.
- Unified data dictionary across the customer as a core enabler for deep insights and self-service.

## Enabled data democratization

- Provided visibility of manufacturing, operations, quality, and logistics KPIs to boost continuous improvement.
- Ensured visibility into costs of energy and logistics to mitigate/pass on inflationary impacts.
- Leveraged an iterative approach to move from visibility to insights.

## Ensured data governance

- Designed and operated DW on Snowflake to optimize costs.
- Governed data access with well-defined data lifecycle and access controls.

## Undertook change management

- Used persona-based interviews and a collaborative approach to provide data solutions and build wireframes.
- Ensured knowledge transfer and user handholding through detailed training.
- Practiced Agile development with continuous feedback from product owners from the business.
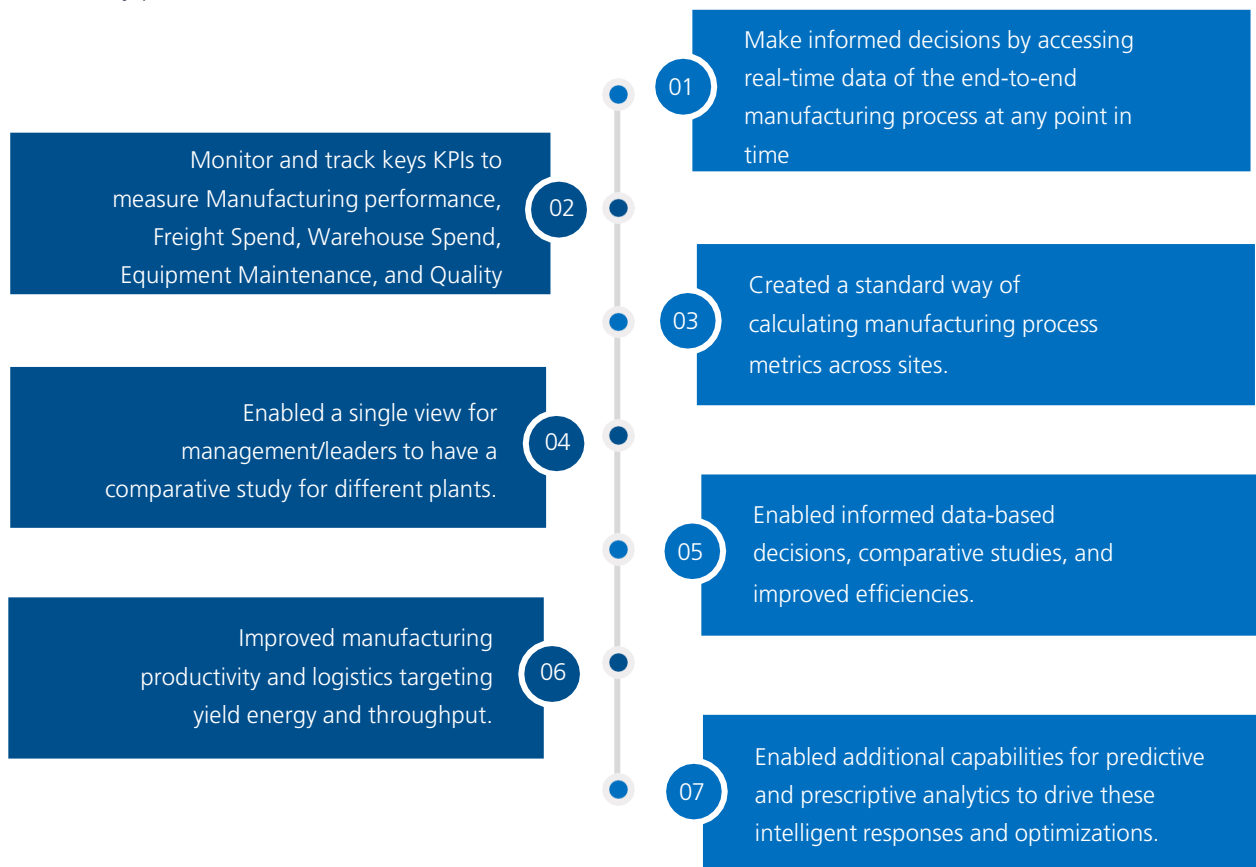
**Ensured data and template harmonization**
- Harmonized data model by standardizing the incoming data from multiple disparate systems.
- Created a global template for business rules and customized it to suit local needs.

# Business Benefits

With the help of LTIMindtree's unified data platform and dashboard, business users like plant managers, operation managers, factory managers could easily track and monitor KPIs across all the 40+ manufacturing units at any point in time.

**01** Make informed decisions by accessing real-time data of the end-to-end manufacturing process at any point in time

**02** Monitor and track keys KPIs to measure Manufacturing performance, Freight Spend, Warehouse Spend, Equipment Maintenance, and Quality

**03** Created a standard way of calculating manufacturing process metrics across sites.

**04** Enabled a single view for management/leaders to have a comparative study for different plants.

**05** Enabled informed data-based decisions, comparative studies, and improved efficiencies.

**06** Improved manufacturing productivity and logistics targeting yield energy and throughput.

**07** Enabled additional capabilities for predictive and prescriptive analytics to drive these intelligent responses and optimizations.