

Manufacturing Data Engine

[Manufacturing Data Engine \(MDE\)](#) is an end-to-end solution delivering scalable and seamless connectivity between the factory floor and the cloud. Functioning alongside [Manufacturing Connect \(MC\)](#), MDE provides a pre-configured set of Google Cloud infrastructure designed to ingest, process, and store data from industrial devices based on user configuration. By simplifying the traditionally high-complexity and high-cost process of acquiring industrial data, MDE accelerates cloud-based industrial information management to make it shorter, more efficient, and more predictable.

MDE is delivered as a packaged solution which deploys all required components and integration code directly into your Google Cloud project.

MDE operates as a core component within an interconnected suite of manufacturing solutions. While these components can function independently, they share a common configuration and are semantically interoperable to ensure smooth data flow.

Manufacturing Data Engine (MDE)

The secure data lake and hub serving as the acquisition, transformation, and storage layer for all manufacturing information.

Manufacturing Connect edge (MCe)

An edge-to-cloud gateway that processes and stores data locally while translating over 270 industrial communication protocols into standardized Pub/Sub messages.

Manufacturing Connect (MC)

The cloud component used to remotely manage MC edge instances and provide a web interface for MDE configuration.

Manufacturing Analytics and Insights

A prebuilt LookerML integration with MDE that enables Looker as a BI tool to explore factory data.

Key benefits



Time-to-value

Enables fast deployment in standard Google Cloud environments, with quick machine connectivity setup available via MC.



Scalability & cost-effectiveness

Scales seamlessly from Proof of Concepts (PoCs) to global enterprise deployments across hundreds of factories, with no extra MDE costs beyond standard cloud consumption.



Ownership & adaptability

Because MDE deploys entirely within your Google Cloud tenant project, you retain full control over your data, processing, and transparent underlying components like Pub/Sub, Dataflow, and BigQuery.



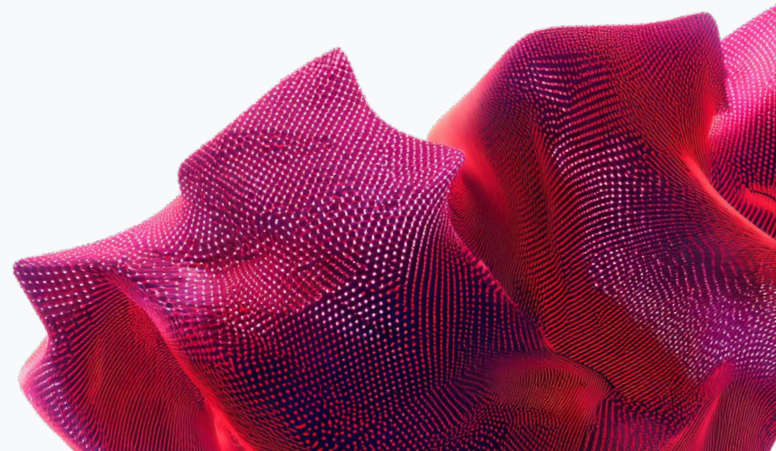
Efficiency

Captures data once in MDE as a “factory abstraction layer,” allowing all use cases to be driven from a single, cost-efficient setup.



Flexibility & extensibility

Works with any edge stack requiring data to land in Pub/Sub directly or via an MQTT bridge, and supports default Google Cloud integrations or custom extensions.



Core capabilities

Data ingestion & integration

Ingests data from MC or proprietary edge stacks, seamlessly integrating with Google Cloud and Pub/Sub messages

Standardization & contextualization

Provides syntactic standardization for reusable data archetypes and semantic flexibility using standards like ISA-95, DTDL, and OPC-UA to enrich incoming sensor streams.

Processing & analytics

Calculates streaming analytics in real-time based on user configurations and maps or transforms data according to defined schemas.

Storage & output

Stores processed records in BigQuery, Bigtable, and Cloud Storage, while managing metadata.

Federation API

Provides an API to access all data repositories using a common interface, allowing users to query data independently of where it is stored using the same configuration language.

Monitoring & configuration

Offers a user-friendly interface to monitor and manage the entire solution, accessible via API or web interface for programmatic access and automation.

Strategic use cases

MDE is designed to augment and complement, rather than replace, existing automation systems like SCADA and Manufacturing Execution Systems (MES). It utilizes MES as a data source and sink to gather context required to make sense of machine sensor data. Typically, a single instance of MDE can serve all factories globally, enabling three primary use case categories:



Analytical use cases

Combine streamed factory data with Google Cloud data analytics products to calculate KPIs, produce reports, and create real-time dashboards.



AI and agent use cases

Use Gemini Enterprise to train and execute models that optimize operations and integrate predictions back to the MES for alerting.



Integration use cases

Connect manufacturing data with enterprise systems or digital twin solutions for an integrated, company-wide view of manufacturing data.

[Learn more](#) about the AI advantage for manufacturing

