

MANUFACTURING EXECUTION SYSTEMS (MES)

WHAT ARE THEY & HOW CAN THEY HELP YOU?

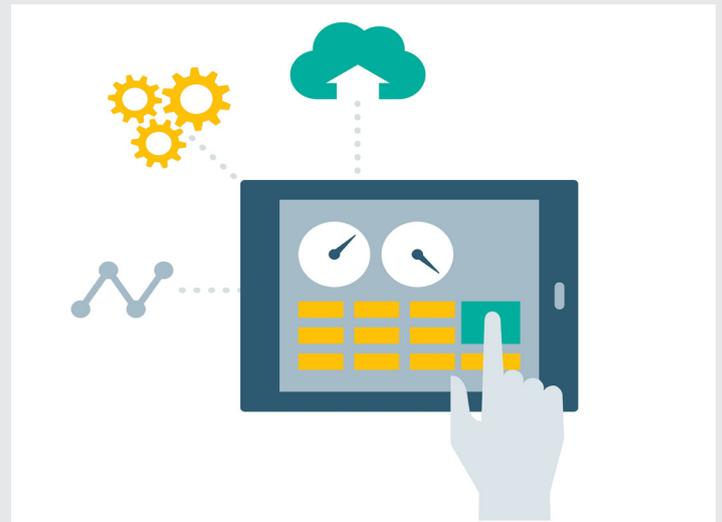
At Bilfinger UK, our customers have one thing in common when it comes to data, they have vast amounts and it is usually in unusable formats. The original MES appeared at a time when storage capacity for historical data was both expensive and much smaller in comparison to our current capacities. This resulted in advanced data compression and retrieval techniques being deployed, which left a gap in the market that process automation OEM's could not fill, but software companies could. This enabled them to sell to both endusers and OEM's alike. The value of the operational data was then recognised by the industry, as well as the ability to store and analyse it efficiently. Therefore, it became very valuable and went beyond historical trending, which was an early use of MES.

The Purdue Model

On a typical customer control system, the data infrastructure can broadly be divided into two categories: 'machine friendly' and 'human friendly'. at the field level, we gather 'machine friendly' information and industrial protocols including Modbus and Profibus, which transport data for use in text files and databases for automatic manipulation, this data is then translated into 'human friendly' data by the MES at level 3 of the Purdue Model.

This data may be used natively by the MES to provide real-time trouble shooting for the process, i.e. to indicate a turbine fault, to maintain process health or to capture 'golden batch' data, the data can also be exported to enterprise resource planning software at level 4 or business intelligence systems for reporting tools such as financial, for instance.

The ease of use is critical for MES users and sandbox environments, where users can create scratch trends are an important feature, typically the MES has a mimic library with drag and drop tagging of points to quickly and intuitively create a plant area or an algorithm for a one-off project or for long-term analysis.



Why MES may use data natively

1. **Data management** – Ensuring the data is archived securely, yet still accessible readily.
2. **Analysis** – Access real-time or historical data across the enterprise at any time to any licensed user.
3. **Notifications** – Events delivered in real-time to people from plant to boardroom.
4. **Visualisation** – View data, identify problems, and take corrective action via a simplified HMI, allowing the user to mimic plant graphics using the MES's own graphics tool.

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MES data

The data is typically made available to external systems for use in further data analytics and reporting. Traditionally applications such as Microsoft Excel were used for this but we now see the transition to cloud based services such as PowerBi.

Downtime analysis & process optimisation

Optimisation is a common use for MES, customisable dashboards give users the actionable data at a glance, ensuring the process operates at optimum levels. These dashboards are available via thin-clients, meaning they can be viewed on both desktop machines and tablets providing truly portable solutions. The ability to input data manually is also an important feature, so data logging is another feature of an MES, collected from field inspections or lab values, for instance.

Industry 4.0

With the advent of Industry 4.0 and the IT-driven change it has made to manufacturing systems, we see a greater emphasis on interconnection as more data-sets are digitised. Once we see this, we can start to look at Overall Equipment Effectiveness (OEE), Key Performance Indicators (KPI) along with other Asset Performance Management (APM) measures, these provide tangible savings to clients and make the data meaningful, rather than sitting in a data lake, gathering virtual dust. Realising this is key to the sale of MES to clients, as the 'nice to have' becomes a money-saving tool, which clients eventually adopt as an essential operating feature.

OEE helps us to measure productivity throughout our client's operations and gives us a measure for how productive their operations are and allows us to start to highlight performance inefficiencies. OEE also brings together quality, performance and availability to give us a combined metric to measure their operations against and in implementing this we can gain insights into how to systematically improve our operations.

This metric isn't just used at a local level, it can also help us to identify trends across multiple locations and assets and continually improve based on best practice. KPI's are unique to the customer site, and are used to measure asset performance, whether that be part of an O&M effort to gauge gain/pain over the course of a contract or to measure one site team's effectiveness against that of a similar operation elsewhere in the company portfolio.

We use data from vibration, tribology (*oil analysis*) and other failure prediction measurements to calculate such things as Mean Time to Failure (MTTF) and catastrophic failure prevention, amongst others.

This type of analysis can be invaluable in maintaining plant uptime, directing maintenance efforts cost-effectively and in a timely manner as well as prolonging asset life. An example of this is monitoring bearing wear on a pump, the vibration measurement data can be extrapolated (*using specialist software*) to predict end of life or partial failure, this allowing replacement in a planned manner minimising downtime and thus production losses and most importantly improving safety of operation for plant personnel.

Why choose Bilfinger UK?

Bilfinger UK are an independent and approved solution partner working closely with all of the major technology providers in the field. Whether your solution is designed to provide OEE, or simply to provide more information at the ERP level; we have the capabilities and experience to consult, design and deliver from machine interface and integration right through to enterprise layer data-management. This allows us, regardless of your existing infrastructure, to provide fully integrated, agnostic, solutions across all of your platforms.

