



EBOOK

WHAT IS A MANUFACTURING EXECUTION SYSTEM (MES)?



Introduction

A Manufacturing Execution System (MES) helps businesses ensure that their manufacturing operations and production output are working to maximum efficiency. It's a software system that connects, monitors, and controls machines, work centers, and data flows on the factory floor. The MES does this by tracking and gathering real-time data throughout the production lifecycle and on every piece of equipment involved in the production process—from order to delivery.

An MES provides businesses with data on product tracking and genealogy, performance, traceability, management, work in progress (WIP), and other plant activities throughout the production cycle. This information provides decision makers with detailed insight on how to optimize their operations. In this eBook, we're going to take a look at:

1

**What Does a
Manufacturing
Execution
System Do?**

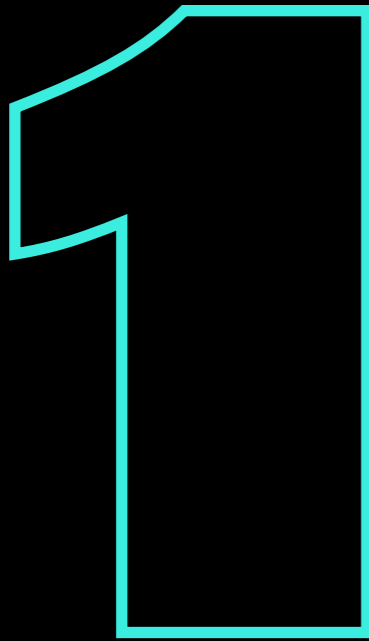
2

**Manufacturing
Execution
System
Architecture**

3

**What are the
Benefits of Using
a Manufacturing
Execution System?**

We'll also cover manufacturing execution systems in detail and provide links to other resources on our website, helping you understand how this technology can create efficiency in your plant.

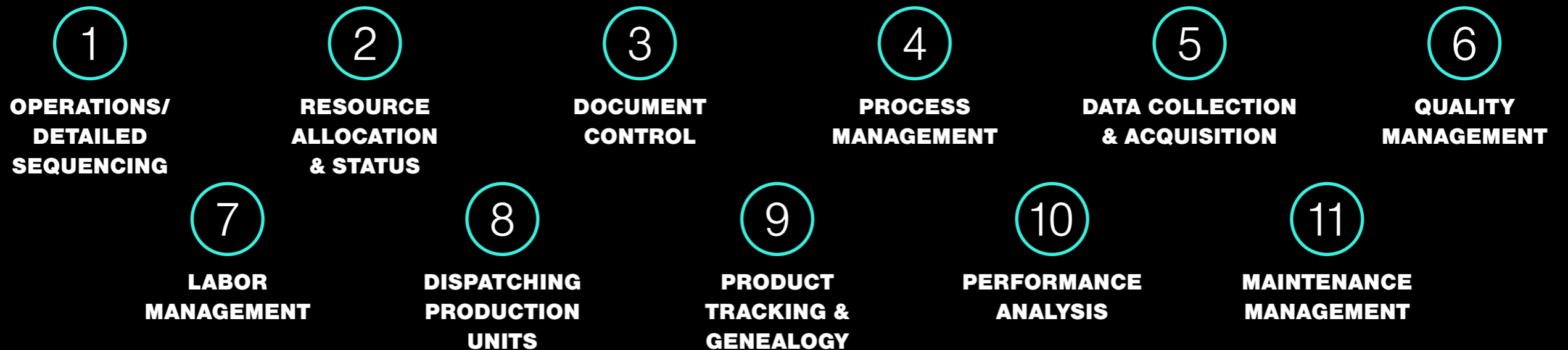


WHAT DOES A MANUFACTURING EXECUTION SYSTEM DO?

The Manufacturing Enterprise Solutions Association (MESA) is an organization that monitors the effective application of IT to help improve operations management.

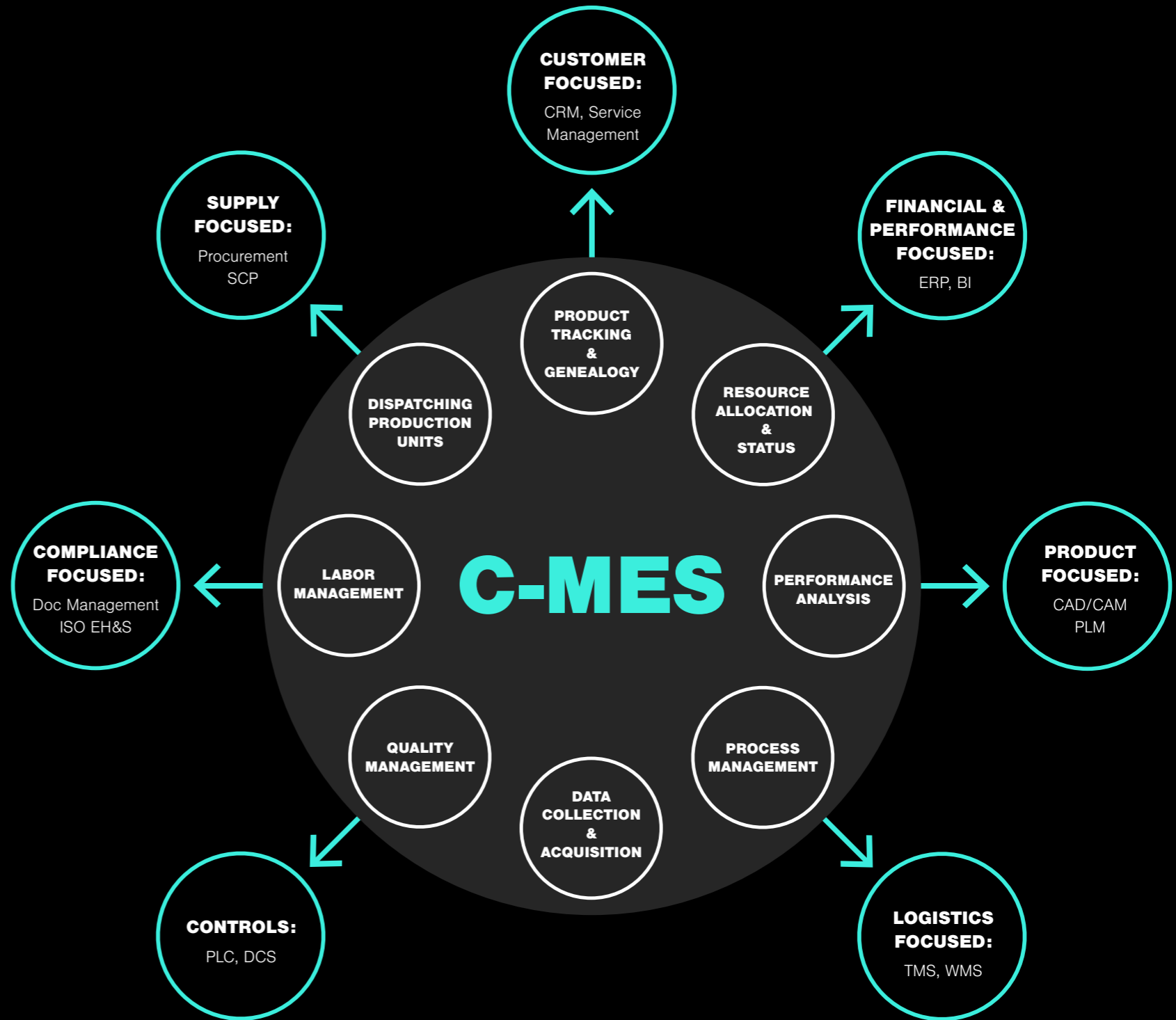
The MESA model is perhaps the most accurate definition of MES and what it does.

In 1997, it was defined through 11 core functions:



2004 MESA MODEL

In 2004, the MESA model was expanded to include business operations. The model shows how the core operations in the original interact with business operations, taking into account competition, outsourcing and asset optimization. This update is known as Collaborative MES or C-MES. The purpose was to create a link between MES and other business operation areas, including supply focused systems, customer focused systems such as CRM, performance focused systems such as ERP and BI software.

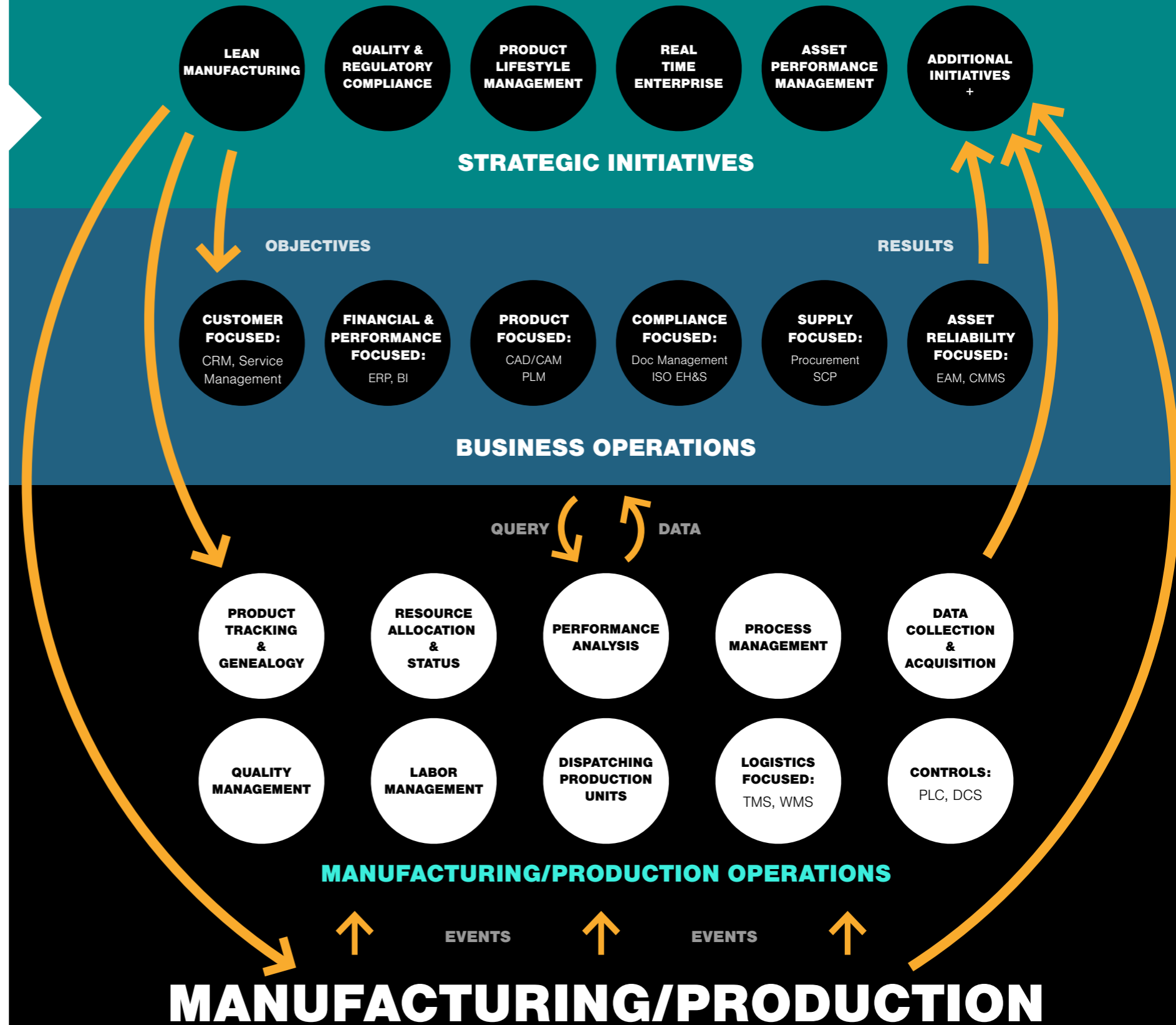


1 WHAT DOES A MANUFACTURING EXECUTION SYSTEM DO?

2008 MESA MODEL

In 2008, the model was expanded to its current version. This model covers enterprise-level strategic initiatives, business operations, plant operations and actual production, creating a link between the different levels and disciplines within manufacturing and production and providing a platform for mutual understanding and planning for improved performance.

Originally, in order for a system to be considered an MES, it must have all of the functional groups included in the model. This new model acts as an intermediary between automation and corporate management; it is an integration hub for information throughout a corporation.





MANUFACTURING EXECUTION SYSTEM ARCHITECTURE

The ANSI/ISA-95 is an international standard for the integration of enterprise and control systems.

The ANSI/ISA-95 merged the MESA-11 model with the Purdue Reference Model to create a functional hierarchy for MES. As you can see in the infographics on the next page, MES was established at intermediate level three, falling between ERP and process control.

MES ISA-95

MES is a functional layer between business planning and logistics and the process control systems in manufacturing. Using real-time workflow visibility, flexibility, and the insights provided by this technology will help decision makers improve the efficiency and quality on factory floors.

LEVEL **4**

BUSINESS PLANNING & LOGISTICS

Plant Production Scheduling, Business Management, etc

Establishing the basic plant schedule – production, material use, delivery, and shipping. Determining inventory levels.

TIME FRAME: Months, weeks, days, shifts

LEVEL **3**

MANUFACTURING OPERATIONS MANAGEMENT

Dispatching Production, Detailed Production Scheduling, Reliable Assurance, etc

Work flow / recipe control to produce the desired end products. Maintaining records and optimizing the production process.

TIME FRAME: Shifts, hours, minutes, seconds

LEVEL **2**

MANUFACTURING CONTROL

Basic Control, Supervisory Control, Process Sensing, Process Manipulation, etc

Monitoring, supervisory control and automated control of the production process.

LEVEL **1**

Sensing the production process, manipulating the production process.

LEVEL **0**

The physical production process.

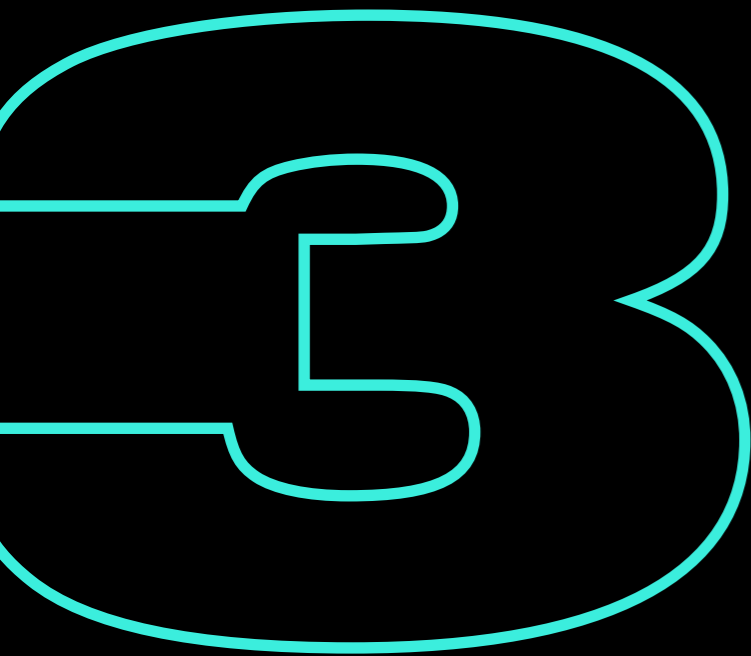
THE POSITION OF MES AS PER THE ISA-95 FUNCTIONAL HIERARCHY

MES is a functional layer between business planning and logistics and the process control systems in manufacturing. Using real-time workflow visibility, flexibility, and the insights provided by this technology will help decision makers improve the efficiency and quality on factory floors.

There are certain industries that will benefit further from an MES. The material traceability makes MES technology invaluable to manufacturers who must adhere to strict regulations. This includes food and beverage, automotive, medical device, and aeronautics and aerospace industries. This is because MES documents processes, events and actions, and proof of these is often required when manufacturing regulated products. Our site includes further resources on how MES can benefit certain industries, including automotive and food and beverage.

Position of MES as per the ISA-95 functional hierarchy.





WHAT ARE THE BENEFITS OF USING A MANUFACTURING EXECUTION SYSTEM?

If you're considering an MES, it's important to understand all the benefits it will bring your business.

Here are some examples of how your plant or factory will benefit from an MES:



**PAPERLESS
MANUFACTURING**



**ERP
INTEGRATION**



**REDUCES WASTE
AND IMPROVES
EFFICIENCY**



**DECREASES
DOWNTIME**



**REDUCES
COSTS**



**REDUCES
INVENTORY**

Paperless Manufacturing

With an MES, labor, scrap, downtime and maintenance are all recored in real-time from the plant floor. This allows you to keep record of all the various costs without using paper notes and spreadsheets. It also helps collect useful data to evaluate unprofitable business models and forecast future prices. MES provides you with the information needed to increase productivity and efficiency on your plant floor.

ERP Integration

An MES allows you to integrate with other systems as shown in the MESA model. This eliminates the need for stand-alone systems and mindless data re-entry, while providing more accurate projections of delivery dates and improving decision making through more accurate data collection.

Reduces Waste and Improves Efficiency

A key benefit of using an MES is its precision in analyzing production lines and finished products. It can detect any inconsistencies on the shop floor, immediately halting them to reduce wasted material and help businesses cut down on unnecessary expenses.

Decreases Downtime


An MES creates realistic production schedules and tracks raw materials and parts inventory. This eliminates time wasted from re-configuring schedules while parts are in transit. This can be applied to employees too, effectively scheduling the staff you have available.

Reduces Costs

An MES provides you with real-time data on all your operations. Using this real-time data to inform decisions on the product, time and labor required to complete a job, you can streamline operations and improve efficiency. This process eventually enables you to save costs on orders and frees up personnel from operation production lines and controlling inventory.

Reduces Inventory

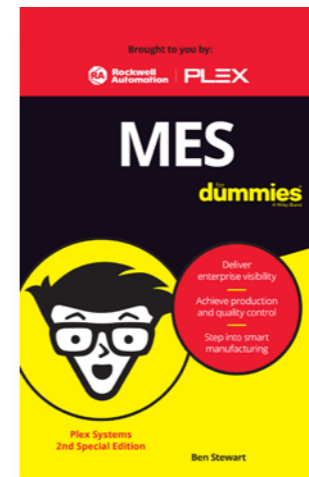
An MES constantly updates your inventory records with new production, materials, and products. This provides insights directly to your purchasing, shipping and scheduling departments, so they know what is available and what needs to be ordered. Transporting, warehousing and monitoring goods is expensive. The MES ensures you have the right amount of inventory on hand while minimizing surplus at all times.



All of these activities contribute to a more efficient workforce, increased quality, and delivering higher profitability. There are also different types of MES available, each with their own advantages and disadvantages, including SaaS-based software. We have a range of resources on our website that expand on the different types of MES and how they influence business operations.

We've covered the benefits of using a Manufacturing Execution System, but how do you know it's the right fit for your business?

If you're looking for more information on how MES could benefit you, start with this comprehensive MES guide.



MES for Dummies

DOWNLOAD