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# Modernizing Metals Management

MES software offers metals companies deeper insights, improved equipment utilization and better quality control



# An Unsustainable Approach.

Many metals producers rely on technology that has been obsolete for 10, 20 or even 30 years for their mission-critical processes. The reason for this can often be tied back to economic conditions. When conditions are good, there aren't enough resources to manage and implement new technology. When conditions are bad, there isn't enough funding to procure new technology.

This is a direct result of operating in a volatile metals market and trying to contend with its cyclical nature. Indeed, few industries experience the big swings in prices and demand the way the metals industry does.

But continued reliance on legacy systems is becoming increasingly unsustainable and risky. Not only is equipment obsolete, but the workers needed to support it are retiring.

Customers are demanding greater traceability of metals especially for more complex manufacturing processes and advanced materials. Additionally, metals from developing countries sold below marginal cost are continually putting pressure on producers in developed nations to better control costs and differentiate their products.

Modernizing to more agile, information-driven systems can help metals companies address these and other challenges, and put them on the path to success.



// Production of 'normal' steel will dip by almost 50 percent in the next decade, mainly due to the replacement trend of 'normal' steel by high-strength steel in the automotive industry."<sup>1</sup>

<sup>1</sup> Lightweight, Heavy Impact, McKinsey & Company

# Modernizing With MES

**Modern manufacturing execution systems (MES)** can help metals companies better understand their operations and get more out of their workforce, equipment and materials.

MES links business systems such as an ERP system with real-time operational plant-control systems such as PLCs. With MES, the manufacturing process becomes information-driven to help trigger actions or execute operations, activities, rules and more. MES also enables metals companies to move their stand-alone databases, legacy “expert” systems and Excel spreadsheets into a more integrated, holistic solution, which can help drive business value across their enterprise.

Metals companies are ideally positioned to implement modern MES as they transition to advanced materials, incorporate new equipment and more complex processes, and address emerging workforce needs. And the greater efficiencies and cost savings that MES offers only further justify the investment.

## Key MES Opportunities

- 1 More easily collect and share data
- 2 Performance management
- 3 Recipe and order management
- 4 Material and product tracking
- 5 Quality management
- 6 Workforce and knowledge management
- 7 Manufacturing intelligence

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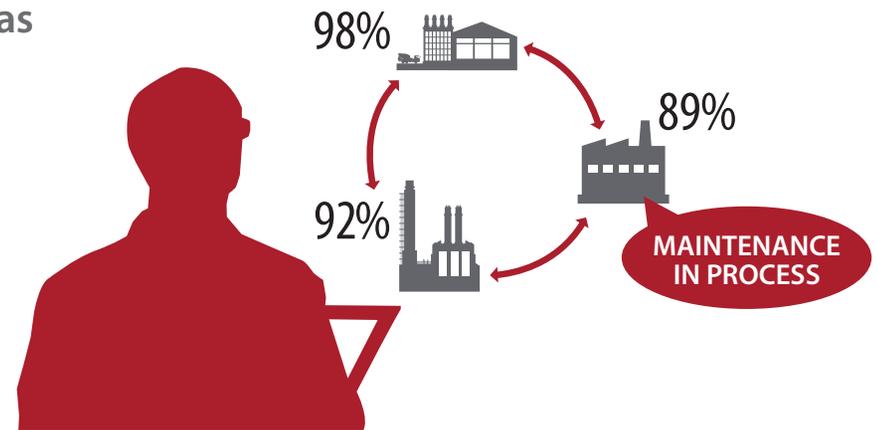
**//** *Manufacturing execution systems deliver information that enables the optimization of production activities from order launch to finished goods. Using current and accurate data, MES guides, initiates, responds to and reports on plant activities as they occur.” - MESA International*

# More Easily Collect and Share Data

Disparate legacy systems can handcuff metals producers from driving improvements in their operations or quickly troubleshooting issues. In fact, many companies can't even detect a problem until the product has moved through multiple production centers or until after the product has shipped to customers.

MES can provide users, such as operators, engineering, quality and other staff, with better tools and analytics to flag and capture issues at their source, monitor production trends, define new recipes, and improve operational practices to continually build greater quality and efficiency into production.

Data can be viewed in real time, including on mobile dashboards, logged for archival purposes, or delivered across the enterprise to multiple job functions in the form of dynamic reports. Additionally, MES offers seamless interoperability between the mill floor and the enterprise, enabling production data to be sent to ERP systems to track bill-of-material information, line performance and productivity for each order.



***“ The advantage of relying on MES software is we have real-time, specific information being collected directly from each line, or from a single machine. This specific information supports users at all levels to make more strategic decisions.”<sup>1</sup>*** - Gianluigi Bertelli, Manager, Legnano Teknoelectric Company

<sup>1</sup> Legnano Teknoelectric Company improves manufacturing operations thanks to advanced MES solution from Rockwell Automation, Rockwell Automation

# Performance Management

MES enables metals companies to pull data from nearly any aspect of their operations – from smelting, casting and stamping processes to total throughput and downtime events – to address their most important KPIs. Data can be viewed in real time against production outputs or retroactively against various production events.

- Investigate production anomalies and minor machine delays to improve uptime
- Better understand KPIs such as overall equipment effectiveness (OEE) and mean time to repair (MTTR)
- Monitor and improve material stock flows across different lines, shifts and production sites
- Monitor machine energy consumption and identify opportunities for reduction

**“ Energy costs account for 30 percent of the overall operating costs in the steel industry.”<sup>1</sup>**



CASTER #1  
MAINTENANCE  
NEEDED

SMELTER #4  
RUNNING AT 89%

# Recipe and Order Management

Many metals operators must manually develop, retrieve and enter alloy or fabrication recipe and workflow information from physical documents. Individual operators often record this information in 'black books.' Manual storage and entry can be time-consuming, tedious work and prone to errors.

MES enables operators to manage these activities within the system, from creating and storing recipes to developing standard operating procedures. Production processes also can be synchronized within MES, enabling workers to adjust or transfer work between production lines or areas to maximize throughput.



## Streamlining the Order Process

When new orders are received, MES interfaces with the ERP layer to receive the production schedules which may include quality and operational settings. MES creates work orders at a level that makes sense for plant operations, selects the optimal sequence and executes those orders down to the plant floor.

MES then downloads the right recipe set-points to the control layer for automatic and accurate recipe execution. Operators can pull up Web-based screens to create and manage recipes as appropriate, eliminating the need to hardcode recipe parameters or manage recipes in complex custom databases. After a production run, summary data is collected by MES from the control system and operators that can be used for traceability and to improve recipes.

# Material and Product Tracking

Customers now demand greater traceability and accountability of the metals they receive. For example, automotive and aerospace customers want to know of the dimensional, quality and metallurgical properties of each coil, plate, sheet or product. This information gets tied into their downstream systems for optimization of production processes.

Not properly tracking and communicating this information can lead to costly returns, requirements to supply new product and lower efficiency. MES can track inventory at the lot and piece level to improve **inventory management**. The systems tracks raw-material inventory, work-in-progress inventory, materials on hold and finished goods waiting to be shipped and communicating this information back to the ERP for material resource planning, sequencing of orders and customer shipments.

**Work-in-process** visibility within MES can track everything that happens to a product from start to finish, backward and forward, on its journey through production. For example, as a coil is transformed into pipe, the pipe sections are tracked, the cuts are optimized and the optimal route through the production process is created. Scrapped material is also tracked and recorded.

Product **traceability**, through heat numbers or lot numbers for example, can provide historical information for individual pieces of metal, including their manufacturing origin and chain-of-custody history. It also can link metals back to their corresponding mill test reports, and can prove invaluable in helping trace end products back to specific mill sheets or billets if a recall is necessary.



// *Traceable records might include pipe mill records, purchase requisition, or as-built documentation indicating minimum pipe yield strength, seam type, wall thickness and diameter.”<sup>1</sup>*

<sup>1</sup> Pipeline Safety: Verification of Records, Pipeline and Hazardous Materials Safety Administration

# Quality Management

Customers are looking to the metals producers to ensure they are delivering consistent product of high quality, especially as they embrace lighter-weight and higher-performance metals. They also expect to be able to audit the metals producers to see how their requirements are passed from the customer order to production, and how they're tracked in between.

## Modern MES can help metals companies better manage quality in multiple ways:

### Enforceable Workflows

Enforceable workflows and instructions for operators can help ensure metals are properly heated, treated and handled, and products are built to specification.

### Quality Data

Quality data from different points in the production process support quality checks and ensure products, such as those that must adhere to stringent regulatory requirements, pass quality parameters within the recipe. This can help improve first-pass quality and reduce expensive rework.

### Hold Codes

Hold codes can be issued during work in progress to help prevent below-quality metal products from moving ahead in the manufacturing process or leaving a facility. This can help prevent rework, scrap or end users from receiving sub-par components while also protecting metal companies' reputations.

**“** As high-strength steels are used, new pipelines are being designed to use thinner-walled and higher strength steel pipe, and may operate at higher pressures. It is thus important to assure that the high-strength pipe material meets specifications to assure that the required safety margin is maintained.”<sup>1</sup>

# Workforce and Knowledge Management

A growing skills gap resulting from the attrition of skilled workers and high average age of employees is a major threat to metals manufacturers. This skills gap threatens every function – operations, quality, metallurgy, engineering and maintenance.

As skilled workers leave, there is a large amount of highly valuable intellectual knowledge and operations intelligence that is at risk of leaving with them. Legacy systems simply are not built to capture this knowledge and pass it on to the next generation of workers.

MES can create work instructions and procedures to help retain the “tribal knowledge” of long-time workers before they retire. These instructions and procedures can be customized to each work station, and each country of operation, and they can be enforced to reduce the likelihood of errors among newer, less-experienced employees.

MES also can use role-based access to ensure that only trained and authorized operators have access to the system.



***“ A survey of nearly 200 metalworking manufacturers found that 91 percent experienced challenges finding qualified employees, while 41 percent experienced “severe challenges” finding employees.”<sup>1</sup>***

# Manufacturing Intelligence

**Enterprise manufacturing Intelligence (EMI) solutions brings together business, energy, production, and logistics data by connecting to disparate sources – equipment, systems, applications, and databases. They also pull business systems information in order to correlate specific customer, product line, or cost information along with production, energy, and logistics information.**

EMI contextualizes data into relevant and useful information using calculations and data models to make it immediate and actionable to decision makers.

The more integrated your MES and enterprise manufacturing intelligence systems are, the more seamlessly monitor, enforce and improve your manufacturing processes. For example, you can retrieve and link time-based data from advanced historians to MES transactions such as order and material running. This allows users to analyze and optimize processes that are resulting in high levels of scrap.

**The Tata Motors passenger vehicle plant in Pune, India tapped the FactoryTalk ProductionCentre MES and EMI software suite to systematically collect and sort millions of data points, and turn them into actionable information.**

## **THE RESULT?**

***“ As soon as a defect is detected at a quality gate, an alarm is issued through the gate and depending on the defect category, messages are sent to the supervisors and managers through the system. Prompt corrective and preventive actions are taken.” - Satarupa Roy Sarkar of Tata Motors, IT***

**Besides reducing manual processing, the new MES connects the plant to the enterprise, opening the door to a multitude of production and efficiency gains. For example, data formats, modeling and design approach are all unified across three production sites.**

# Summary

**Rockwell Automation and Brock Solutions have joined forces in this volatile market to help metals producers as no else can. With the combined strength of proven automation expertise and long-cultivated domain knowledge, these two companies are helping metals producers to address their most pressing needs and gain new competitive advantages with modern MES. This includes:**

- Developing MES that is scalable to multiple facilities
- Improving asset utilization with better intelligence
- Reducing production variability and capturing issues early in process to help drive down scrap by 5 to 10 percent
- Integrating MES with external systems, such as quality and scheduling and capacity planning
- Reducing days-on-hand inventory and overproduction due to poor visibility
- Creating standard job worksheets that adhere to industry-standard quality requirements and tolerances
- Improving error proofing and reducing reliance on operator decisions
- Reducing time spent looking for and moving inventory
- Ensuring the successful completion of quality samples required to provide certificates of analysis for metallurgical testing
- Reduce unplanned downtime through reporting and analysis by as much as 20 percent
- Correlating the data that can help drive process improvements and improve visibility into equipment performance
- Using commercial systems to help position MES for future enhancements and growth

Rockwell Automation is the world's largest company dedicated to industrial automation and information, and has extensive metals experience and a dedicated team serving the metals industry.

Brock Solutions is one of North America's largest systems integrators, with a deep, rich history providing a range of services to the metals industry for more than 30 years.

To learn more about what MES can do for you, **let us know** to contact you or visit [www.rockwellautomation.com/rockwellsoftware/products/factorytalk-productioncentre.page](http://www.rockwellautomation.com/rockwellsoftware/products/factorytalk-productioncentre.page)

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## Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444

Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640

Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

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