

Broner Metals Solutions



Business Solutions that Create Value for Aluminium Producers

Benefits of an Integrated and Collaborative Approach

White Paper

This White Paper discusses the business challenges and requirements of the Aluminium industry and how these lead to a requirement for Business solutions that provide a collaborative approach incorporating both APS and MES solutions in a single, integrated, decision support environment.

Business Solutions for Aluminium Producers – Creating value through an Integrated and Collaborative Approach

The highly competitive nature of the aluminium industry and the constraints imposed by the nature of the market, production processes and equipment mean that aluminium companies need to be constantly improving their operating efficiency and overall performance. In the race for greater efficiency and responsiveness to customer demand, companies will need to rethink their approach to the decision support systems required to manage their business.

Different parts of the supply chain have different special requirements and need to be well integrated in order to provide timely and accurate information. The winners in today's marketplace will be those companies which have an integrated approach from shop-floor to top-floor, where accurate and up-to-date information is used to drive the business.

Some of the complex constraints influencing the aluminium supply chain include: volatility of prices for the commodity raw materials (alumina) and products (commodity ingots); long lead times for both raw materials as well as products; high production and transportation costs; high energy costs; significant environmental and quality considerations. Manufacturing equipment is capital intensive and needs to be fully utilised to achieve the expected return on investment.



Lack of, or limited, inventory buffers increase the degree of complexity in production planning and scheduling. Complex process paths and multiple bottlenecks make material flow planning and line balancing difficult.

Changes in production patterns in one part of the process affect the production patterns in other parts, either through direct links (reduction line to cast house, production to electricity consumption) or through buffered links (anode production to pot line operation).

Liquid metal handling is a continuous process, so production must be fully synchronized to minimize disruptions and at the same time maximize the production of value-added versus commodity products while keeping product inventory levels low.

Moreover complex supply chains are emerging as a consequence of industry consolidation, resulting in a more complicated decision making process.

Such complexity and interdependence demands the use of specialised, integrated solutions in the area of manufacturing operations planning, management and execution. These solutions must encapsulate all relevant constraints within the supply chain and should enable companies to decide the best course of action and take appropriate steps to reach it. The end

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objectives are: lower production and shipment costs; faster response to changes in demand patterns; lower inventory levels; efficient material sourcing and distribution strategies. Understanding customer needs while managing production efficiency should reduce overall lead times and improve on-time delivery, a key element toward gaining market share.

The result will be maximization of ROI and shareholder value.

Manufacturing Execution Systems (MES) fully integrated with Advanced Planning and Scheduling (APS) solutions can help aluminium companies, not only to face the challenges, but also to gain competitive advantage, because they achieve a high degree of collaboration between sales and production as well as synchronisation of the different stages of a very complicated production process.

MES Solutions



MES is the layer between the process control and the decision support and information systems (ERP and APS). MES operates plant-wide, collecting, analysing and reporting data from all parts of the aluminium production process: the alumina refinery; energy and utilities; calciner; anode production; reduction line; the casthouse; other logistics and operational systems within the plant, such as LIMS and energy management systems. In this role, it not only acts as a *Data Acquisition System* and a *Data Historian*, but also as a seamless, easily configurable enterprise integration platform, which can be used to develop specialised applications that monitor, coordinate and guide parts of the production process in real time. Examples of such applications are:

Production Management and Yield Accounting: Summarises the actual production, consumption and inventories into shift, day and month totals. The yield accounting engine will calculate the production management data on configurable scheduled intervals and store the results in the MES central repository and then use them in conjunction with other process and MES application data to make control decisions.

Process Logbook: Records events that happen in the plant. The user can view the process in a tree view and review events from a particular part of the plant. This set of events can then be used within a broader event and change management function within the MES.

Process Order Recording and Tracking: Facilitates production execution and reporting by reading production orders from the ERP system, analyzing them and passing them to the process control system. Process instructions and consumables are reported back to the ERP essentially in real-time.

Equipment and Process Efficiency Monitoring: Uses data from the data historian to compute and record the efficiency of processes and equipment. It can also be used to calculate area-wide Key Performance Indicators (KPIs).

Pot Line Management: Reads the cast house requirements of molten metal, in terms of quantity and quality, monitors the process condition in the reduction pots and manages the tapping schedule, anode replacement and lining functions.



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Hot Metal Management: Applicable in plants that have multiple reduction lines and multiple cast house plants, it manages the flow from the reduction lines to the cast houses, balancing correctly demand requirements with production capabilities and constraints.

APS Solutions

APS solutions cover the planning and scheduling requirements of the business, from demand forecasting and management, through production and distribution planning, including the detailed production scheduling of specific parts of the production process. These solutions enhance significantly the decision support capability, allowing companies to create, manage and evaluate business scenarios, to optimise performance and to support sound business decisions. APS solutions can be classified within three distinct groups, operating at different stages of the supply chain planning process, to provide successively more detailed levels of granularity.

Sales & Operations Planning: Creates the high level plan that is optimised for the business KPIs for a 3-36 month planning horizon. Flexible modeling ensures that the business and process environment and constraints are represented and weighted appropriately in developing plans for the mid and near term. It includes collaborative demand modelling to build forecasts based on sales history, pricing, market trends and sales intelligence, allowing direct interactions with the sales force and major customers. It provides the strategic capability to evaluate alternative 'what-if' scenarios that take account of production and operational constraints, and allow planners to choose the best, financially optimised, sales & production plan to deliver their KPIs.

Supply Chain Planning: The optimised sales plan is used as the basis for planning the sales orders on to the production processes within the time horizon of a few days up to 3 months. These solutions will allocate raw materials, semi-finished or finished inventories to sales orders and will optimise and balance the flow of material through the supply chain, taking account of inventories, equipment capacity, production cycles and process restrictions. The result is a plan that can improve customer service by improving on-time delivery and reducing lead times, and can increase productivity while minimising inventory.



Production and Distribution Scheduling: At the day-to-day level of planning, a range of solutions may be required in order to schedule the orders on to individual pieces of production equipment and then onward to despatch to the customer. A combination of simulation and optimisation techniques is used to balance the operational rules and constraints of supply chain resources against the commercial priorities in the production plan. Scheduling solutions must consider all the detailed constraints – recipes, setups, changeovers, demand delivery requirements, production synchronization, alternative routings, inventory, limitations, etc. and must allow the user to make changes to the schedule in order to incorporate disturbances.

The Integrated Decision Support Environment

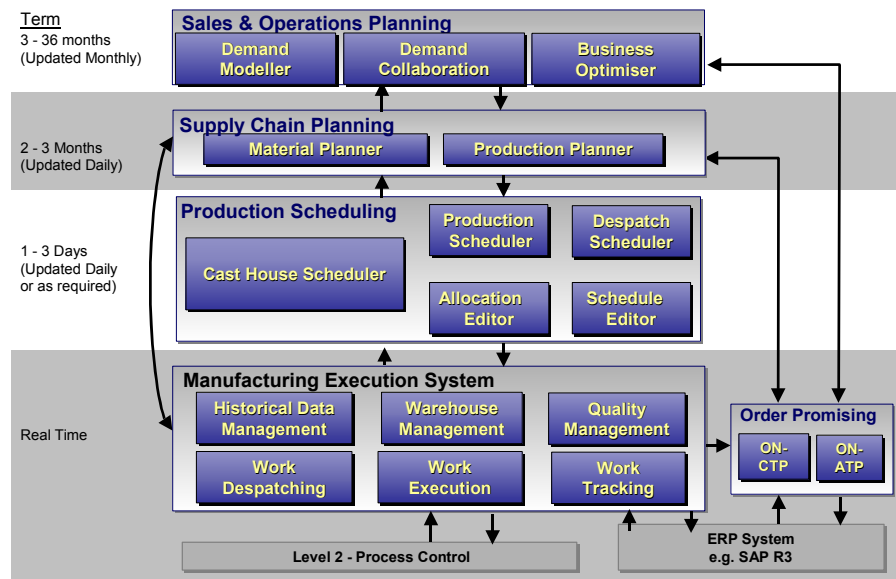
Each business has different needs. Hence, the solution requirements will vary according to the complexity and scope of the business (refining,

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smelting, casting, rolling etc). To meet this range of requirements a broad suite of decision support solutions is necessary. As an example, the diagram shows the solutions provided by Broner Metals Solutions for the aluminium industry. These have been developed over many years and are in use at metals and aluminium companies throughout the world.

MES solutions are defined according to generic headings that align with the S95 standard for MES, but they also encompass all the applications specific to aluminium, outlined above.

Integrated Supply Chain Management Solutions for Aluminium



It is important that the solutions take full account of the specialities of metals production, but also that there is full integration between different elements of the complete suite and with other solutions such as ERP, LIMS or other plant systems, as shown in the diagram.

For example, an MES Quality Management application will record and analyse the specification of each billet that is produced and as a result a Non-Conformance Report may be raised. This will be passed back to the Planning & Scheduling systems which will try to allocate this billet to another sales order or schedule for re-work, and will re-plan production to make up for the shortage.

Aluminium companies need decision support solutions that provide a full range of capabilities and allow the business to rapidly adapt and respond to changes in production and customer requirements. Real-time integration ensures information integrity and promotes manufacturing agility.

About Broner Metals Solutions

Broner Metals Solutions is dedicated exclusively to delivering value to the Steel and Aluminium industries through the application of Supply Chain Planning, Scheduling and Manufacturing Execution Systems. We deliver value to our customers through: reduced inventory; shorter manufacturing lead times; increased throughput; improved delivery performance and better customer service.

All Broner Metals Solutions products have been developed specifically for the Metals industry. Our product range includes Demand Management, Sales and Operation Planning, Availability To Promise, Capability To Promise, Advanced Planning and Scheduling and Manufacturing Execution solutions.

The Broner Metals Solutions team has almost 20 years experience in improving the performance of metals supply chains worldwide.

- Dedicated to Metals industry – 100% focus on the metals industry and nothing else
- Metals-specific solutions are a better fit to business needs and deliver results quicker
- Standard solutions encapsulate detailed knowledge of metals best practice and operational rules.
- Only company with proven solutions for complete metals supply chain functionality APS to MES
- Metals-industry specialists deliver quicker results
- Flexible, Low risk solution - Wide range of modular, packaged solutions for metals companies

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Broner Metals Solutions Ltd
1, Century Court
Tolpits Lane
Watford, Hertfordshire
WD18 9PT
United Kingdom

Telephone: +44 (0)1923 652000

Fax: +44 (0)1923 816456

Email: sales@bronermetals.com

Website: www.bronermetals.com
