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Theme: Eletric steelworks

HIGH IMPACT INTEGRATED MELT SHOP MANAGEMENT SYSTEMS - EFFECTIVE IMPLEMENTATION WITH SUSTAINED SUCCESS*

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Abstract

Based upon 30 years+ experience in the Development, Implementation and On-going Support of Computer based Melt Shop Management Systems in about 40 plants in the UK, Europe and the USA, consideration of the overall facilities of a state of the art, comprehensive, Integrated Melt Shop System covering Melting and Secondary processes for all grades of steels and superalloys; the scope of functionality of these systems, covering Raw Materials and Consumables Procurement and Inventory Management, Laboratory Management, Melt Shop Scheduling, Furnace Charge and Additions Optimisation, Level 1.5 to Level 2.5 Materials Optimisation and Process Control Calculations, Process Data Recording, Management of Ladles, Furnace Bodies, Vessels and Moulds, Comprehensive Management Reporting and Integration with Corporate ERP Systems. The second section of the paper reviews the key 'Success Factors' to achieve rapid, successful implementation, comprehensive, fast response user support, continuing system improvement and maintaining 'perfect fit' of system to operations in an ever changing future technical, operations and business environment.

Keywords: Melt; Optimisation; Lean; Management.

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1 A CURRENT TECHNOLOGY COMPREHENSIVE MELT SHOP MANAGEMENT SYSTEM

1.1 Introduction

The Melt Shop System should provide a comprehensive range of functionality covering all aspects of the Melt Shop operations from the receipt of sales orders, through technical vetting, melt planning, raw materials and consumables procurement, melting and casting, through to despatch of the cast product. All Melt Shops are different and the system should be sufficiently configurable to provide 'Perfect Fit' for all environments. The extent to which the full range of functionality will be required will vary considerably from plant to plant. Access to the system needs to be available to all managers, supervisors and operators in the Melt Shop and also to the appropriate personnel in Sales, Planning, Purchasing, Technical and General Management.

1.2 System Functionality

Figure 1 shows in broad outline Main Modules of a current technology Integrated Melt Shop Management System and the data flow between modules.

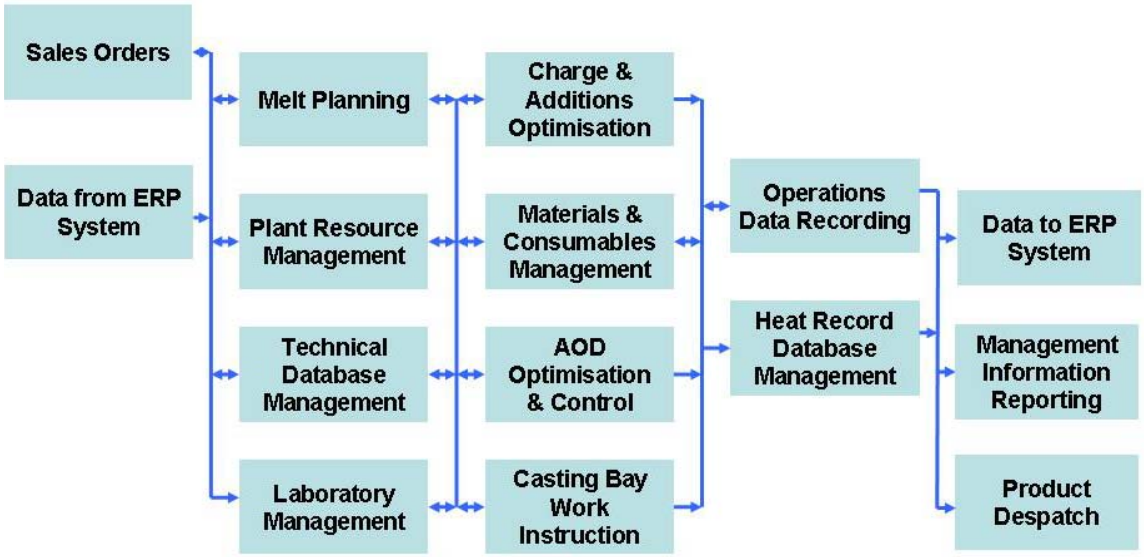

Figure 1. Main Modules and Data Flow.

1.3 Sales Enquiries and Orders

The system provides facilities to record the full detail of the enquiry and to ensure a rapid, accurate and well-presented response to the customer. The user is prompted through the entry of the customer's requirements including:

- The steel grade required or alternatively composition range requirement;
- The weight, the cast product types and dimensions;
- Post Casting Processing;
- Testing and certification requirements;
- Delivery requirements.

The system has an embodied cost model which provides, virtually instantaneously, a breakdown of manufacturing costs which is then complemented by user input of

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sales margins, delivery charges and a delivery schedule. A well-presented quotation document is produced to be delivered to the customer. Enquiries and responses are archived on the system to produce management reports and analyses as required. In those cases where the Sales Order has been received in response to a quotation, then the details of the quotation will be retrieved for conversion to an order.

1.4 Melt Planning

In the Melt Planning operation due account is made of:

- Delivery due dates;
- Post casting processing;
- Consolidation of orders to heat quantities;
- Appropriate sequencing of melts by composition;
- Availabilities of appropriate ladles and casting facilities;
- Multiple melt requirements for large ingots or castings;
- Partial tapping of a melt followed by a back charge for the next heat.

The Melt Planning function generates the Melting Program from which most system activities, such as charge optimisation, charge assembly and weighing control, process data recording are initiated. The heats in the program are displayed line by line with each line showing the scheduled time for each heat and its corresponding information such as grade, tap weight, the cast product type(s) and number(s), works order number, customer and the current heat status. Heats may be switched to alternative orders in the event of a bath sample being too far off composition to make the originally planned grade. An example Melting Program is shown in Figure 2.

Select Date Range From 02/20/2012 ... To 02/27/2012 ...

Furnace	Tap Date	Melt Ref	Heat No	Status	Grade Name	Grade Code	Charge (lb)	Product	Int Order	Notes
EAF	2/20/2012	M002966		Planned	M-2	1A0621	65000	24 x 16.75 OCT	0010392042	PFF
EAF	2/20/2012	M001244		Planned	6-6	1A0616	65000	24 x 16.75 OCT	0010397201	PFF
EAF	2/20/2012	M001245		Planned	6-6	1A0616	65000	24 x 16.75 OCT	0010397200	PFF
EAF	2/20/2012	M001383		Planned	CM-52 XL	1A4702	63800	24 x 16.75 OCT	0010398970	ANNEAL
EAF	2/20/2012	M001308		Planned	CM-52 XL	1A4702	63800	24 x 16.75 OCT	0010397865	ANNEAL
EAF	2/20/2012	M001312		Planned	M-42	1A0901	63800	24 x 16.75 OCT	0010397870	PFF
EAF	2/20/2012	M001313		Planned	MGR	1C2000	62600	24 x 16.75 OCT	0010397873	PFF; CHECK-SOME TO PRESS
EAF	2/21/2012	M001258		Planned	VDC	1C3000	56210	2 x 34 x 47 SLB	0010397522	PRESS; SWITCH TO 44 OCT
EAF	2/21/2012	M001307		Planned	310	1D3200	57200	1 x 34 x 47 SLB 1 x 34 x 47 SLB	0010397863,13079	PRESS PRESS
EAF	2/21/2012	M001327		Planned	310	1D3200	57410	2 x 34 x 47 SLB	0010397887	PRESS
EAF	2/21/2012	M001332		Planned	17-4	1D5500	68500	5 x 28 x 28 SQR	0010397871	PRESS
EAF	2/21/2012	M001215		Planned	15-5	2D8400	70450	2 x 34 RND	0010396413	AIR COOL & ANNEAL
EAF	2/22/2012	M001318		Planned	15-5	2D8400	63050	3 x 26 RND	0010397881	CIM
EAF	2/22/2012	M001320		Planned	15-5	2D8400	63050	3 x 26 RND	0010397882	CIM
EAF	2/22/2012	M001311		Planned	15-5	2D8400	70450	2 x 34 RND	0010397869	AIR COOL & ANNEAL
EAF	2/22/2012	M001348		Planned	300M 26"RD	2F2001-B	62750	3 x 26 RND	0010398445	CIM

Figure 2. Partial Screenshot of the Melting Program.

1.5 Specifications/Melting Operations Database

This database contains for each grade of steel produced:

- Finished product composition specifications;
- Finished product physical/mechanical property requirements which can be related to chemistry, e.g. hardenability, ferrite control, pitting resistance, sigma phase control, weldability.

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- Working composition specifications, element recovery rates and raw material element constraints for each process stage, for example:
  - furnace charge;
  - furnace alloy additions to melt;
  - ladle alloy additions on tapping;
  - secondary steelmaking alloy additions;
  - Standard materials restrictions.
- Restrictions on materials usage by physical type e.g. turnings, light scrap, heavy scrap, bales;
- Standard operational instructions for charge calculation, melting and secondary steelmaking.

1.6 Raw Materials Database

For each type of scrap, ferro-alloy, pure metals and minerals consumed in the furnace charge or as deoxidation, desulphurisation or alloying additions throughout the process, the system stores the following information:

- Material name;
- Batch/Lot number;
- Quantity available in a useable state;
- Quantity in stock in a non-useable state;
- Unit type and unit weight;
- Cost per kg;
- Standard cost per kg;
- Location;
- Availability for which process stages/furnaces;
- Balance elemento;
- Composition wt% or ppm;
- Elements to be treated as residuals;
- % loss of weight on usage;
- Materials codes for reference by other systems;
- Availability/non availability for use in cost models.

The data in the Raw Materials Database is accessed by Raw Materials Receipts, Material Usages and updated by the Furnace Charge Optimization, Alloy Additions Optimisation, Raw Materials Purchasing and Sales Enquiries modules of the system.

1.7 Material Requirements Planning and Purchasing

The system provides purchasing facilities covering metallic raw materials and managed inventory consumables such as electrodes, refractories, tiles, mould fluxes and hot topping compounds. The raw materials and consumables requirements of the forthcoming production program are calculated taking due account of current inventory, scheduled deliveries of purchased materials. Appropriate purchase orders are generated taking due account of supplier delivery times and minimum order quantities. Based upon the output of the Materials Planning function the system provides for the generation of the Materials Purchase Orders to fulfil the plan.

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1.8 Real Time Raw Materials Inventory Control

The maintenance of raw materials inventory in real time is a fundamental requirement of optimizing the cost effective utilization of materials in furnace charges and subsequent alloying additions during melting and refining. It is also required to control the inventory overall to optimum levels through the use of the Material Requirements Planning module of the system. This is achieved by monitoring all materials movements and transactions from receipt to exhaustion in real time, weighscales, which may be used for materials weighing, are interfaced to the system and all non-bulk items (pure metals, ferro-alloys and specific scrap items – each lot has to be treated as a separate material due to composition differences) are identified with bar-coded labels upon receipt as they are added into inventory. The scanning of the bar code label is utilized to monitor all movements and weighing transactions of all non-bulk stock items. Bulk materials (e.g. types of carbon steel scrap or turnings – materials which in general are assumed to have a generic composition) are stored in large bunkers or piles. Receipts of these materials are immediately added to inventory as the delivery vehicle is tared over the weighscale after discharging its load. These items lose individual identity once they have been discharged by the truck.

1.9 Furnace Charge Optimisation

The operator selects from his Melt Program display, the charge that he wishes to calculate. From the Melt Program, Works Order and Specifications data, the Charge Optimisation screen will display to the operator:

- The Steel Grade required
- The weight of liquid steel required
- Required melt out composition range
- Standard restrictions on materials utilisation
- Standard charge make up instructions.

In the first phase of the calculation, the system displays a list of candidate materials for use in the charge. The operator may also view materials in stock but rejected for use in this charge together with the reasons for rejection e.g. unsuitable chemistry, physical form restrictions, not valid for use at this process stage. In the second phase of the calculation, the optimum lowest cost charge is determined subject to current material inventory and any standard materials usage constraints. To the user, the calculation of this optimum charge appears to be instantaneous. Figure 3 is an example of a furnace charge solution screen.

Chemistry | Restrictions | Candidates | Rejections | Solution | Instructions

	Material	Lot	Stock	Late Add	Final Add	Avail lb	USD/lb	Calc lb	Rsrvd lb	Wgh lb	Fix	Exc	Total USD	Locn	Add Method
1	CARBONR		00-09-13	☐	☐	23093	0.280	23093	23093		☐	☐	6466.04	BIN	
2	CRM_BIT		00-17-56	☐	☐	100	0.270	100	100		☐	☐	27.00	CRM BIT	
3	FRAG		00-21-70	☐	☐	29501	0.220	29501	29501		☐	☐	6490.22		
4	JEBCOLITE		00-26-99	☐	☐	15860	0.100	165	165		☐	☐	16.50		EAF Slag(NC)
5	LIME		00-24-88	☐	☐	18206	0.080	1500	1500		☐	☐	120.00	TANK	EAF Slag(NC)
6	PUNCH		00-21-81	☐	☐	1221150	0.290	567306	567306		☐	☐	164518.74		

Figure 3. Example of Optimised Furnace Charge Solution Screen.

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At this stage the operator can interact with the solution by introducing additional constraints or relaxing existing constraints on materials utilisation or melt out chemistry ranges and recalculating the charge. However, in general, this should not be necessary provided:

- The Raw Materials Data are accurate;
- The inventory data is accurate;
- Most importantly that the working specification ranges for melt out and the constraints on materials usages in the Specifications Melt Operations database have been well considered and are practical.

1.10 Charge Weighing Control

The system will cater for charge weighing control for both bulk and individual Stock Items. In the case of mobile or overhead cranes, charging buckets on a weighpad by grab or magnet, then these will be equipped with wireless mobile terminals for operator instruction and data entry. In the case of smaller floor weighscales where charge containers are manually loaded then a workstation will be placed adjacent to the weighscale. The system will be equipped with an interface to the weighscale enabling weights to be recorded throughout the weighing process.
In each case the operator will select from the Melting Program the Heat for which he needs to build a charge. He will then have a display of the appropriate previously calculated charge showing:

- Charge Number
- Grade
- Any charge weighing notes
- For each material required:
  - Material Name and Lot No;
  - Stock Item Number;
  - Material Code;
  - Location
  - Weight Required
  - Weighing Tolerance

The operator will select on the screen, the material he is about to add to the charge container or, in the case of Individual Stock Items, he will scan the bar code label on the container. The Tare weight of the container will be recorded and the screen will show the balance weight of the selected material to be added to the charge container. The operator will then continue to add that material to the charge container until a colour display on his screen shows that he has successfully added the quantity within the specified weighing tolerance. This process is repeated for each component of the charge. In the unusual event the charge weighing operator encounters a problem in achieving the required charge the system will enable him to recalculate the charge having fixed the materials added thus far. Where ferroalloys and pure materials form part of the charge these are recalculated after all the scrap has been added. In this way, having fixed the actual weights of scrap, the required, relatively expensive, additions of ferroalloys and pure materials are ‘fine tuned’. Actual charge weigh data update the scrap and alloys inventory and the Heat Record Database.

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1.11 Laboratory Management

All laboratory instruments should be interfaced to the system to enable all analytical results to be checked for completeness and released then written and stored in the Analytical Database. Analytical Results are immediately available to the Alloys Additions module for the optimised calculation of additions to the furnace or ladle during tapping or secondary steelmaking. Pit sample results are used by the system for the generation of Test Certificates. In addition to mainstream laboratory analyses, provision is also made for the storage of data from the use of portable analytical instruments which are used for the analysis of scrap.

1.12 Alloy Additions Optimization

Immediately upon completion of the analysis of samples from the furnace bath or from the ladle during secondary steelmaking, the results are displayed in the appropriate control cabin. The results are read by the Alloy Additions module to provide an immediate display of the optimised alloy additions according to the working specifications held in the Specifications Database, appropriate to the given process stage. In addition to displaying the results of the current sample, the system also displays a theoretical composition based upon the previous history of samples and additions within the current charge. This can alert the steelmaker to the possibility of a non-representative sample having been obtained due to inadequate mixing/melting of preceding additions and to proceed with caution with the current additions.

1.13 Raw Materials Inventory Control - Alloy Additions to Furnace or Ladle

Upon completion of each Alloy Additions Calculation following receipt of a bath or ladle sample result, the operator is required to weigh the additions using the same procedure as in the case of charge weighing control. Where automated weighing and dispensing of alloy additions using hopper and conveyor systems, then the system is interfaced to that automated system to control the dispensing of the appropriate weights of alloys. The system utilises this actual alloys weigh data to update alloys inventory and to write data of the actual materials used to the appropriate Heat Record in the Heat Record Database.

1.14 Level 2 Process Control

In addition to Level 2 functionality for melting furnace and secondary steelmaking charge and additions optimisation it has functionality to perform process calculations. For example AOD calculations covering:

- Optimised Alloying Additions throughout the refining cycle
- Decarburisation gases requirements including volumes and ratios of oxygen and inert gases
- Reduction requirements following decarburisation and/or oxide additions
- Si or Al fuel quantities and corresponding volumes and ratios of gases for heating
- Coolant addition as required
- Trim and reheat calculation
- Slag composition control throughout the refining cycle.

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The system is interfaced to the appropriate Level 1 PLC system to enable transmission of the control data and receipt of process data.
Similar Level 2 Process Control modules may be provided for all melting and secondary processes.

1.15 Process Data Recording

Process Data Recording screens are provided at the Melting and Secondary Process Control Pulpits. Much of the data displayed on the screens is collected automatically from plant instrumentation and Level 1 control systems or arises from other modules of the system. Operator input is kept to the minimum. The screen typically displays:

- Current Time and Date/Grade;
- Operator/Steelmaker/Shift Manager;
- Works Order No;
- Times/Verification of completion of Standard Operating Procedures;
- Key process times and measurements – e.g. commence charge, power on, tap changes, slag off, samples taken, oxygen blown, temperatures, tap;
- Delays – Times and reasons;
- Sample Results;
- Alloy Additions to the bath;
- Final Specification Chemistry;
- Heat No.;
- Charge materials/quantities;
- Alloy additions to the ladle;
- Ladle Identifier;
- Weight Tapped.

Full details of ingot casting and stripping are recorded and input to the appropriate cast record including:

- Pit setting, tiling and lifters, mould flux and anti-piping compounds in accordance with Standard Operating Procedures;
- Pouring times and ladle discharge rates;
- Any abnormal teeming conditions;
- Stripping times;
- Post Casting Process Data.

1.16 Heat Record Database

The system provides a Cast Record Database in which for each cast produced a comprehensive detailed record is stored. This record contains:

- Works Order details;
- Materials and weights calculated and actual usage for all melting and refining processes;
- All key process times, delays, operations data as described in the Process Data Recording section;
- All bath, ladle and pit sample results;
- Cast Product Produce;
- Process scrap produced;
- Post casting Process Data.

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1.17 Management Information & Commercial/Test Documents

A wide range of regular management reports covering production, costs and quality are generated from the Cast Record Database. This is an SQL database which can also be used to generate ad-hoc reports or downloads to spreadsheets or statistical packages for investigation of cost or quality issues for example.
The system retrieves data from the appropriate sales, laboratory and customer databases to produce Test Certificates, Shipping Documents and Invoices as required for despatch of product. Sales, QA and Logistics departments have access to the system to enable the printing of Test Certificates on demand.

2 KEY SUCESS FACTORS

2.1 Project Management

Upon identifying the need to introduce or upgrade a Melt Shop Management System, then a member of the Melt Shop management team should be appointed as Project Manager as a part time function to be carried out alongside his/her normal duties. The Project Manager should be supported by a small project team with representatives from Production, Technical/Quality, Sales Purchasing, Information Technology and Accounting Departments, all of which will have an interest in the new system. At the stage at which a system supplier has been appointed, then a representative from that company should join the project team. The objective of the project team is to ensure an effective, timely and non-disruptive implementation of the new Melt Shop System. This will be achieved by:

- Performing a Functional, Requirements Analysis;
- Carefully selecting a Melt Shop System supplier;
- Carrying out with the selected supplier a critical review of the Functional Requirements Analysis and finalise a Statement of Functional Requirements;
- Establish a Project Plan which is realistic but which recognizes that every day until the system is operational is a day of lost opportunity to operate the plant more effectively and profitably;
- Closely monitoring and co-ordinating activities between the Company and the System Supplier.

Following the implementation of the system, the Project Manager should then adopt the role of Melt Shop System Supervisor alongside his/her normal duties. The project team should remain intact and review the progress of the system at intervals of 3 to 6 months to consider the maintenance of the effectiveness of the system and its continuing improvement and take actions as required.

2.2 Functional Requirements Analysis

The client should carry out an Analysis to define the Functional Requirements that the proposed Melt Shop system should satisfy.
Having carried out the analysis, the client should request the chosen system supplier to critically review the Melt Shop operations then refine and enhance this analysis using his generally broader and more specialised Melt Shop knowledge and experience. The outcome of this review will be to confirm that the Requirements have been adequately covered or, more likely, that additional improvements to operations

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can be achieved and appropriately amend the Functional Requirements Specification.

2.3 Development of a 'Perfect Fit' System Using a Prototype Approach

Using the Functional Requirements Analysis, the supplier should configure a Prototype System which very closely fulfils the requirements. In parallel with the configuration process, the supplier will convert the current client data on materials, specifications, orders, production planning and other relevant items to a suitable format for the 'new' Melt Shop system.
This prototype system will then be demonstrated to all supervisors and operatives in order to obtain feedback to finely configure the system to achieve a perfect fit to plant procedures and operations prior to implementation. This activity also provides initial user training.

2.4 Training

As it should be anticipated that all managers, supervisors and operatives will be users of the system, then it is essential that every member of the Melt Shop Team, together with appropriate personnel in Sales, Planning, Purchasing Downstream Processing, Logistics and Accounting Departments are trained to a high level of competence prior to implementation.
The training given to each individual should be adequately broad, such that they are not only fluent in their own specific use of the system but also fully understand how the accuracy and timeliness of their data entry affects the activities of other users of the system as a whole. A formal structured training program for each employee should be provided. On completion of training their competence should be formally tested against a range of scenarios using actual plant data. Retraining should be given to correct any lack of fluency in the use of the system. Following the initial training prior to implementation, all users should have access to the system to consolidate on training by practise. Training should be carried out within a relatively short time of the implementation.Trainers should be available throughout the initial implementation with remote access to the user screens to provide such assistance and further training as required in real time.

2.5 System Testing and Implementation

The system testing should be considered to commence upon completion of the initial data translation of the existing data and continues through the final 'fine tuning' configuration stage and training stages. Any inaccuracy in data translation requiring modification of the translation process should be fixed and a new translation carried out at the earliest possible stage. All parts of the system must be thoroughly tested and signed off by the users before the live running of the system. It is usually the case that a period of parallel operation of the 'old' and the 'new' systems is not feasible. This is mainly due to the real time nature of the 'new' system which means that data are being continually updated automatically by multiple weighscales, laboratory instruments, temperature recorders, and loadcells concurrently with manual keyboard input. To replicate all this data input simultaneously on both the 'old' and the 'new' systems would demand multiple connections of both systems to laboratory instruments, weighscales and other devices, together with a feasible

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demand on operative resources in duplicating operations. Nonetheless all parts of the system will have been tested many times against real data during the user training phase. It is possible to implement various parts of the system prior to operation of the 'new' system as a fully integrated system. For example, the Laboratory Management module can start collecting analytical data for some time prior to the switch.

The switch to the 'new' system should take place during a planned period of plant shutdown, e.g. a weekend, plant maintenance, a holiday. During this period, whilst the plant is non-active, the final data translation will be carried out so that the 'new' system picks up where the 'old' system finished. If possible it is preferable that a physical inventory check is carried out in this shutdown period so that the 'new' system commences operation on current inventory values. The 'new' system will be critical to the operation of the plant and the potentially high cost of any interruption to plant operations must be recognised. If the system testing and user training has been carried out as described above, there should be a very low risk of interruption to production and a high probability that the plant should commence to operate more efficiently from the outset. However, as the ultimate back up, the supplier must have personnel available on-site and at the suppliers offices to provide 24/7 support for a period until the system has been in problem free operation for an agreed period.

2.6 Ongoing User Support

Following the completion and consolidation of the implementation of the system, it is essential that comprehensive rapid response continuous ongoing support is available from the supplier this support should be offered by email, telephone and by direct connection to every users PC or thin client workstation. Support calls will range in required response time from medium term (weeks) covering for example, a request for a new system feature, to immediate, where, for example, there is a heat in the furnace, secondary steelmaking or ladle and a calculation has failed. In all cases, users should seek the advice of the clients designated Melt Shop System Supervisor who will usually resolve the problem or request assistance from the supplier. The supplier must be able to connect to the operator workstation and take the operator through the resolution of the problem, taking control of the operator workstation if appropriate. Support requests, other than those requiring immediate support, should be made via email giving a clear description of the support required.

2.7 Continuing Development

The system supplier should have a policy of continuing product improvement based upon feedback arising from close contact with client companies and their system users, in addition to keeping abreast of the latest technology developments in steelmaking and systems and software engineering. This will also result in extending the functionality and overall effectiveness of the supplier's Melt Shop System.

All successful companies undertake timely change in response to developments in technology and the demands of the market in which they operate. It is recommended that supplier should meet with the client Melt Shop project team, preferably face to face at the plant or by conference call, every six months, to discuss strategic issues such as proposed changes to plant and/or operations, product changes arising from entry to new markets, changes in management processes. With this information the supplier can appropriately reconfigure or extend the Melt Shop System to ensure that

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'Perfect Fit' of the system to operations is maintained in advance of those changes taking place.

2.8 SELECTING A SUPPLIER – KEY CONSIDERATIONS

The Melt Shop System Supplier should have a team of engineers with:

- Strong Metallurgical and Steelmaking background and having an in-depth knowledge and experience of Melt Shop operations
- Substantial experience in developing and implementing Melt Shop systems and software in a wide variety of plants
- High level skills in systems and software engineering, optimisation techniques, computer networks, interfacing to laboratory equipment, weighscales temperature recorders, other measurement devices and PLCs
- Excellent interpersonal and communication skills with the ability to have effective dialogue with all levels of management and operatives using Melt Shop terminology and language
- High level of professional and personal integrity as they will become privy to the clients highly confidential and sensitive information regarding such items as costs, pricing, manufacturing technology.

The supplier company should be able to demonstrate to the client, from the outset, a system which the client can clearly see is able to be configured to provide a good fit to the user requirements and presents new opportunities for improved operations.
They must have a substantial reputation and track record of successful implementations of Melt Shop systems with referees who will verify the quality of installed systems, the levels of long term ongoing technical and user support.
Cost in itself should not be a priority consideration in the supplier selection process. As the benefits are likely to many times exceed the costs, the direct and indirect cost benefits relative to cost should have the focus of attention.

3 CONCLUSION

3.1 The Sustained Benefits of a Comprehensively Supported Integrated Melt Shop System

The following benefits arise from the use of a plant wide integrated system to replace disjointed legacy systems, individual spreadsheet based systems and paperwork:

- Sustained achievement of lowest cost production;
- Improved composition control throughout the process reflected in the final product
- Productivity improvement;
- A single database accessed by all the managers and operators maintained in real time and readily accessed by all personnel;
- No replication of data;
- Data entered once only;
- All functionality provided by a single integrated system;
- A common look and feel across all facilities of the system;
- Knowledge and experience of 'experts' built into the system rather than walking around in 'experts' heads;
- Empowerment of operators enabling them to undertake tasks previously considered to be in the domain of 'specialists';

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- Enhanced flexibility of personnel more readily cross-trained to undertake a wider variety of tasks;
- A system which always remains a ‘Perfect Fit’ to the ever changing Melt Shop operational and commercial environment, ensuring that the initial beneficial impact is sustained into the long term future.

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