Since 1975 Synchro ERP has devoted its efforts to providing leading edge software systems. Continual new development, a passion for exceptional customer care and a high calibre specialist team makes the company the global success it is today, says global implementation manager Simon Adlington.

CAST METAL SPECIFIC SOFTWARE

The foundry industry is continually evolving and never faster than now that technology has opened up endless possibilities. These are exciting times, every day new technologies emerge and new capabilities are required for business. Synchro focuses on developing business value and listening to customers.

This article details a small selection of Synchro ERP's cast metal specific integrated solutions. The company is currently developing Shop Floor Apps - Android and iOS, watch this space for more on this.

LEAST COST MIX
Least cost mix should allow for the storage of melt material information and the specifications required for melting and allow calculations to be performed in order to reach the required specification at the lowest possible recipe cost (usually an internally generated specification with tighter limitations than the actual specification to be certified against).
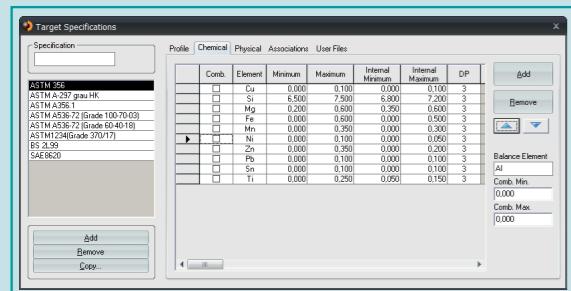
Melt Material Information
As well as a specific batch analysis, companies should also be able to store a default chemical analysis against any melt materials purchased. This allows for receipt of known specification materials without the need to carry out a spectrometer burn for those materials and to allow easy entry of data (where a direct linkage to the spectrometer is not possible) of material composition.
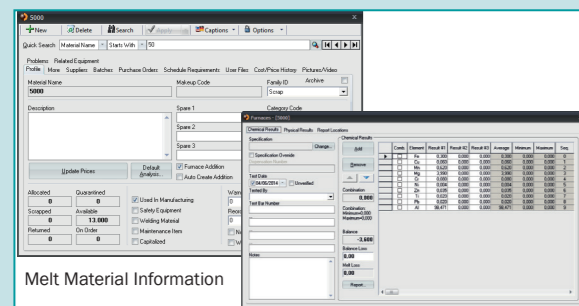
Defining Melting Requirements
When defining the melting requirements the following information should be able to be selected:
1. The specification (chemical analysis to be aimed for)
2. The heel that is left in the furnace (the melt number and the heel weight)
3. Any elemental pickup expected during the melting

Least Cost Mix

Melt Material Information

process
4. Material restrictions, these should include:
   • Materials that should not be used at all or used in limited quantities (restricted materials)
   • Materials that should be used and the quantity of each of those materials (forced materials)
   • Materials that can be used in any quantities (unlimited materials)
   • Families of materials that need to be restricted (family restrictions)

During The Melting Process
Once a solution has been calculated for a proposed melt number the melt materials should be 'soft allocated' so that these materials cannot be included in any future melt calculations. This information should also be made available to the furnace log so that the melt materials can automatically be deducted from inventory when the melt is carried out, this should remove the soft allocations made during the melt solution calculation. There should also be the ability to go back to a proposed solution and remove and release the materials that were 'soft allocated' for inclusion in future melt solutions.

During melting, if a burn is made and the melt does not meet the required specification, the system should be able to calculate the materials required to bring the melt back into specification (if indeed that is possible), to do this the following information is needed:
• The target chemical specification
• The analysis from the burn
• The liquid metal weight
• The maximum weight possible in that furnace

FURNACE LOG
The fundamentals of an efficient furnace are not so much in the actual data captured during the melting of the metal - even though that is still important - but in the integration of the information gathered during the melting process with the other functionality of the ERP system. The information should be captured as close to real time as possible so that

the ERP system has the information as close to actual as possible.

Basing the actual melt materials used on a default recipe stored against each metal type allows for advanced purchasing of estimated melt materials to be undertaken. This is done by using the schedule data in combination with the default recipe to create an estimate of melt material requirements into the future.

The information that should be captured falls in to the following categories:
• Furnace information
• Melted materials
• Ladle usage
• Unusual activity

Furnace Information
This should include melt/heat number, furnace name, specification to be achieved, start and end meter readings (if available), melt start date/time and melt end date/time. Additional information should also be collected based on any extra requirements that an individual facility may have. The specification to be achieved should have both specification limits and internal aim limits (to allow for element burn off etc.) Assigning the furnace being used should also enable automatic furnace lining life tracking for analysis purposes.

Melted Materials
This should include any heel from the previous melt/heat in this furnace, any transfers from melts/heats from other furnaces, materials loaded for the initial melt, any alloying materials required to get the melt/heat in to specification following a spectrometer spark and any ladle additions.

Ladle Usage
Tracking the ladles used to transfer metal from furnace to mould will enable ladle lining usage.

Unusual Activity
If any unusual events happen during the melting or pouring process it is helpful to note these so that if there are any issues later in the process with mechanical results etc. you can see if there were any issues in the

melting process that would be the root cause. Examples might be power issues during melting, metal being held in the furnace for extended periods of time, lining burn through, etc.

Once all this data is collected you can then do some statistical analysis.

HEAT TREATMENT TRACKING
Heat treatment tracking should allow for the storage of all relevant information about the type of heat treatment being carried out, where the heat treatment was carried out, who was responsible for the treatment and what was heat treated.

Metal Specifications
The details of the chemical and mechanical properties that are the aim of the cast metal and the heat treatment process should be stored so that each heat treatment cycle holds the details of what is to be achieved by the heat treatment.

Types of Treatment
In regards to the heat treatment type the following information should be stored as a selectable list to choose from when carrying out heat treatment:
• The name of the heat treatment type and any details of any specification that the heat treatment is being carried out to.
• Details of the type of cooling that is to be carried out along with any specifications that the cooling is being carried out to. It is possible that multiple cooling methods are to be used and these should be fully documented.

Treatment Oven Details
A list of available heat treatment ovens should be stored and that information should contain the following:
• Heat treatment oven name and physical location
• Nominal capacity of the oven, this can be stored as a square area or a cubic area depending upon the types of heat treatment to be carried out by the oven. This will - along with actual capacity required on a part by part basis - allow accurate scheduling of heat treatment and analysis of oven utilisation etc.
• Optionally you might wish to store additional information such as date purchased, asset tag number, make and model number, etc.

Heat Treatment Tracking
To get full traceability of heat treatment carried out and to allow

for detailed analysis the following information should be stored against each heat treatment cycle:
• The heat treatment cycle number
• The material specification to be achieved
• The oven name that the heat treatment was carried out in
• The lead operator responsible for loading and operating the oven for this cycle
• The heat treatment type and cooling method
• The oven contents, this might be tracked in one of several ways:
   • The actual serial number of the castings being heat treated
   • The quantity from specific job/batch numbers being heat treated
   • The quantity of specific part numbers being heat treated
• Information about any unusual occurrences during this heat treatment cycle (power issues, exceptional air temperatures, problems unloading the oven, etc.)
In addition to this data the ability to attach files to each heat treatment cycle would be very useful as this would enable the attachment of heat charts of actual heat by time data if this information is available from the oven's controller.

Once all this data has been collected and stored it can be used as part of traceability and certification information. The data can also be used for business analysis.
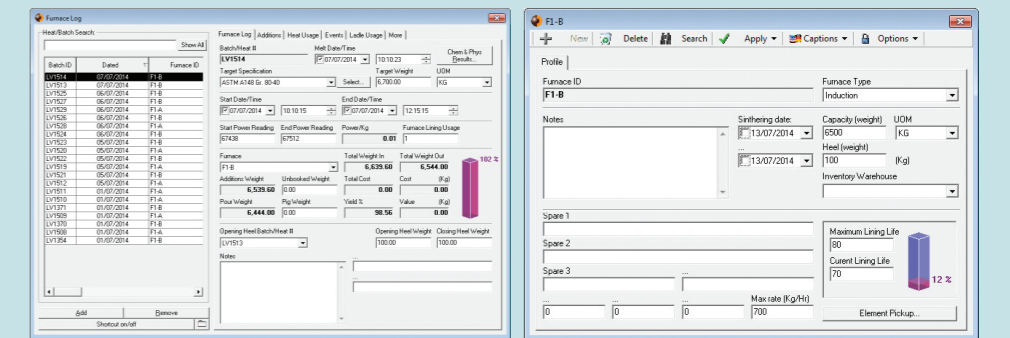
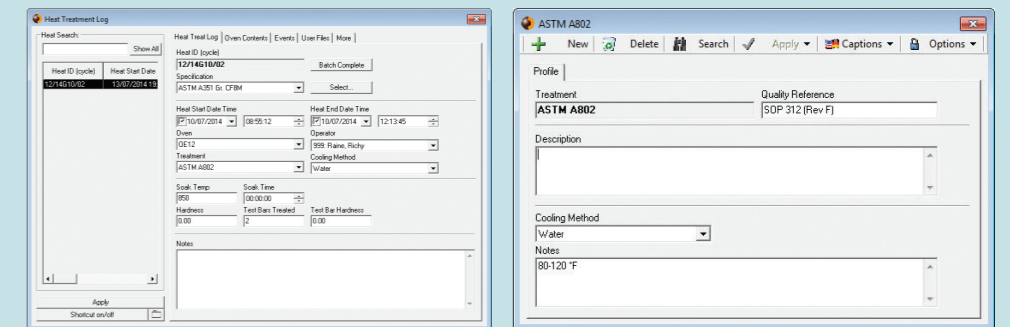Contact: Synchro ERP, email: sales@synchroerp.com   web: www.synchroerp.com
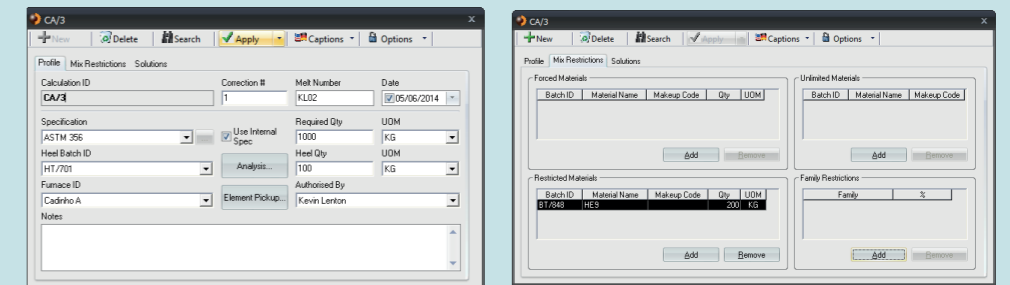
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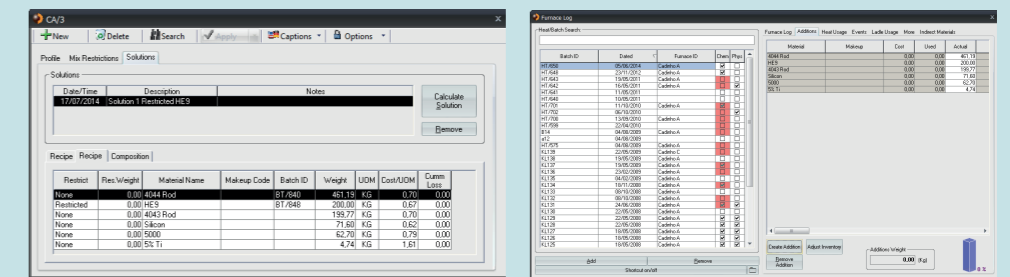
During the Melting Process

Furnace Log

Heat Treatment