

ATAS METSTAR

NEXT GENERATION OF METALLURGICAL
PROCESS CONTROL SYSTEMS

A NOVACAST SYSTEMS PRODUCT

NOVACAST

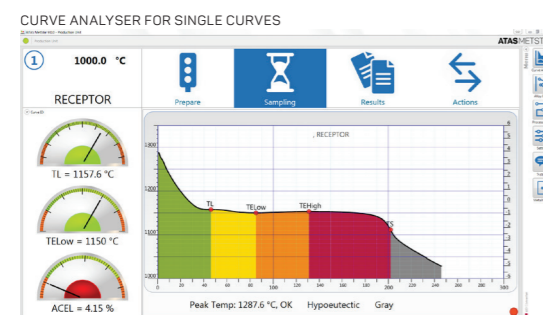


ATAS METSTAR

ATAS MetStar is an easy to use, adaptive metallurgical process control system for analyzing, stabilizing and optimizing the metallurgical production process. ATAS MetStar is the fundamental tool for a foundry to improve quality, control and increase stability of the metallurgical parameters. The result is reduced scrap rate, less energy consumption and a greener planet.



ATAS (Adaptive Thermal Analysis System) MetStar is a flexible metallurgical process control system for analyzing, stabilizing and optimizing the metallurgical production process. The system has been developed from a metallurgical point of view, based on years of foundry experience both from NovaCast's own personnel but also customers' day-to-day challenges. The system is used to create routines and rules for developing a lean production method.



The analyze phase consists of analyzing a number of physical samples of a specific alloy or melt quality and find the best practice. The stabilizing phase consists of extracting data from

the analysis and defining the unique fingerprint for a specific desired quality to secure the best practice. The optimizing phase is the final stage, where fine tuning and improving the best practice takes place. This leads to a process with less variations and a stable quality and results in reduced scrap rate, less energy consumption and a greener planet.

ATAS MetStar predicts the possible risk for defects in the castings such as;

- micro shrinkage porosity
- macro shrinkage porosity
- chill tendency (cementite)
- inverse chill tendency
- oxygen content
- mechanical properties

ATAS MetStar can be used in small to large foundries with different production layouts. The system is developed to control the production of the following alloys;

- gray iron
- compacted graphite iron
- ductile iron
- white iron
- SiMo iron
- Ni-resist iron

In order to use more realistic material data for micro structure and shrinkage prediction, ATAS MetStar is connected with NovaCast System's casting simulation system, NovaFlow&Solid.

Modularisation - production and engineering unit

The system is divided into production units and engineering units to facilitate planning of the complete process control system, ready for installation in a foundry. The production unit is a complete system for sampling and providing information to the operators. The engineering unit is handled by production management to decide upon which parameters that should be evaluated. Changes or replacements in parameters in both the production and engineering unit are only performed by licensed personnel and is controlled by a security password.

Security password

All the customized settings in ATAS MetStar concerning general information, the production

unit, the engineering unit, the alloy database and the reports, are controlled by a security password, in order to protect the foundries unique production setup.

Thermal Analysis

Thermal analysis is based on recording the cooling curve (temperature vs. time), and solidification of a standardized volume of metal. During the solidification process austenite and graphite is precipitated and energy is released which causes temporary arrests on the temperature/time curve. ATAS MetStar detects temporary arrests with cooling rate from which we receive melt quality. ATAS MetStar act as the metallurgical spectrometer in the foundry.

Alloy database

The alloy database is the heart of ATAS MetStar. The database is easy to use and easy to customize according to the foundries specific processes. The metallurgist/production manager sets up the parameters for the different alloys (base and final iron) with regards to chemical composition, production window limits and actions such as;

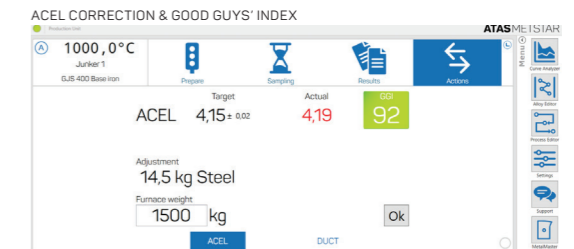
- ACEL control (Grey solidification)
- CEL control (White solidification)
- Dynamical inoculation
- Ductile iron optimizer
- Mechanical properties (pearlite module)

Usability and interactivity

ATAS MetStar is easy to use, for the operator, the metallurgist and the foundry manager, due to the clean and intuitive interface with distinct symbols. It is also easy to interact with since it follows a structured process approach. It demands few actions and input from the operator and thereby limits the influence of the "human factor" on results and performance.

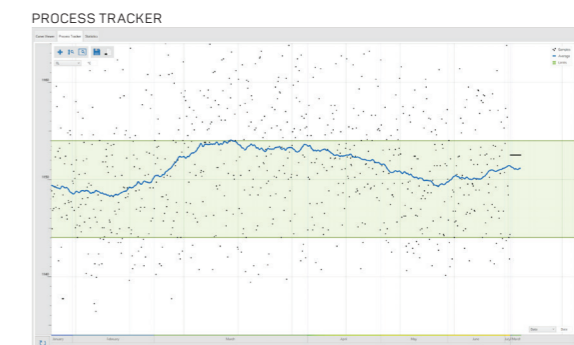
Good Guys' Index (GGI)

The Good Guys' Index in ATAS MetStar shows how successful the operators are to minimize the foundry's environmental footprint. GGI value takes melting and holding time in the electrical furnace and addition of new materials into account. GGI has a value of 1 to 100, where 100 is the best score.



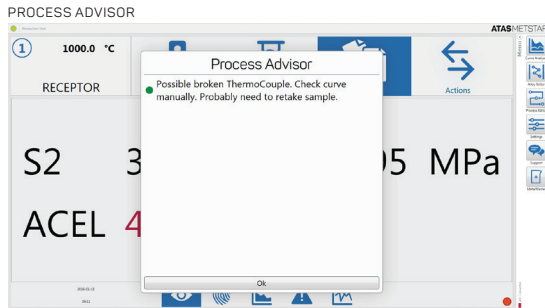
Process tracker - real time process information

The Process tracker is an instant information system that visualizes how crucial metallurgical parameters vary over time. Process tracker supports the operators on the shop floor to minimize changes in the metallurgical process. With this information the operators can actively take required actions and break the trend towards declining quality of the base and final iron. The process tracker is capable of evaluating an extensive amount of data from different alloys (for example 60.000 samples) and present it instantly.



Process Advisor

The Process Advisor is an expert system that advises the operators about sampling and process quality. It informs the operators about possible defects and basic explanations why these defects may be formed in the castings. It has pre-defined rules for bad sample detection and alerts the operators through a warning window when a faulty sampling is made. Alerts will for example indicate; if the pouring temperature in the sampling cup is too high or too low, when the thermocouple is broken during measurement and if the cup is not correctly filled or the sampling time is too short. The expert system is possible to customize with user defined equations and rules based on the foundry's own specific production process.



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Support

If you experience any issues, or have any questions, click on the "support" button in the main menu and you will be remotely connected to a NovaCast team member who will be more than happy to assist.

Curve Analyzer

The Curve Analyzer is a vital part of the system. The main objective is to find and set up a process window for a good quality of the melt. From a physical sample of the melt, a cooling curve is generated showing the cooling and solidification process from which the metallurgical parameters are evaluated. With curve analyzer it is possible to compare, assess and make significant conclusions about the nature of solidification. In order to assess correct limits for a specific quality a statistical approach should be used. Using the functions in the Curve Analyzer allows to distinguish samples before and after correction in base melt. By looking at the final good and bad quality castings and find their respective sample curves, a foundry can analyze these sample curves and learn the limits of the unique finger print for the optimal process window. The filtered data is used to create customized information, such as comparison between an unlimited numbers of cooling curves, detailed information concerning metallur-

gical parameters, generating pictures and export data to other formats (.xls or .csv). The learning function is intuitive and intelligent. The system will automatically filter bad samples (i.e. too low or too high pouring temperature in sample or interruption during measurement of sample) and therefore bad curves will not be used in the evaluation process.

Communication with external devices

To make full use of generated data, ATAS MetStar works as a hub with different external systems; spectrometer, tensile/hardness testing equipment, charging machines, inoculation machines (e.g. Pourtech), industrial scales, lamps/sound signals, PLC (Programmable Logic Controller) interface, ERP Systems like SAP and DISA Foundry Cockpit.

MetalMaster and LabViewer

MetalMaster is a charge optimizing tool based on the foundry's internal quality requirements. The aim is to reach the targeted chemical composition for a specific quality to the lowest possible cost. The results from the charge calculation are saved as a receipt and can be sent as a .pdf to the charging area for further actions. MetalMaster is a support system to ATAS MetStar and is directly started via the ATAS MetStar menu. LabViewer is a viewing tool that collects all laboratory information and sends it to ATAS MetStar for further study.

Reporting system

With the enhanced customized reporting system, the operator, the metallurgist and management team can make daily/weekly/monthly, internal and/or external reports in a few seconds. The reports can easily be pre-defined in settings, saved and exported in PDF-format. The operator works with the database in Process Tracker, activates the desired group of samples and receives a readable, accurate and ready to present report for internal as well as for external use for management or customers. This allows the foundry to make everyday life of reporting duties much easier for all levels in the foundry. The design of the reports are made by the user. The user could choose different types of parameters to be evaluated, units on x and y axis (sample, date, or parameter versus parameter). There are two types of diagrams; scatterplot or Bell diagram.