PRIMETALS TECHNOLOGIES

MOLD EXPERT
AN “INSIDE LOOK“ INTO CONTINUOUS CASTER MOLDS

MOLD MONITORING
MORE THAN JUST A BREAKOUT PREDETECTION SYSTEM

YOUR CHALLENGE

Sticker-related breakouts are a major reason for high repair costs and production losses. Product defects can primarily be traced back to processes in the mold – but no directly accessible information is available with conventional detection tools.

As a result, on many occasions only "post-mortem analysis", i.e. inspection of the end product, provides enough information for quality production. Disturbances in the solidification process, e.g. poor casting powder performance, tilted SENs, improper taper settings or bad steel flow patterns, are frequently overlooked due to the lack of reliable information from the mold.

OUR SOLUTION

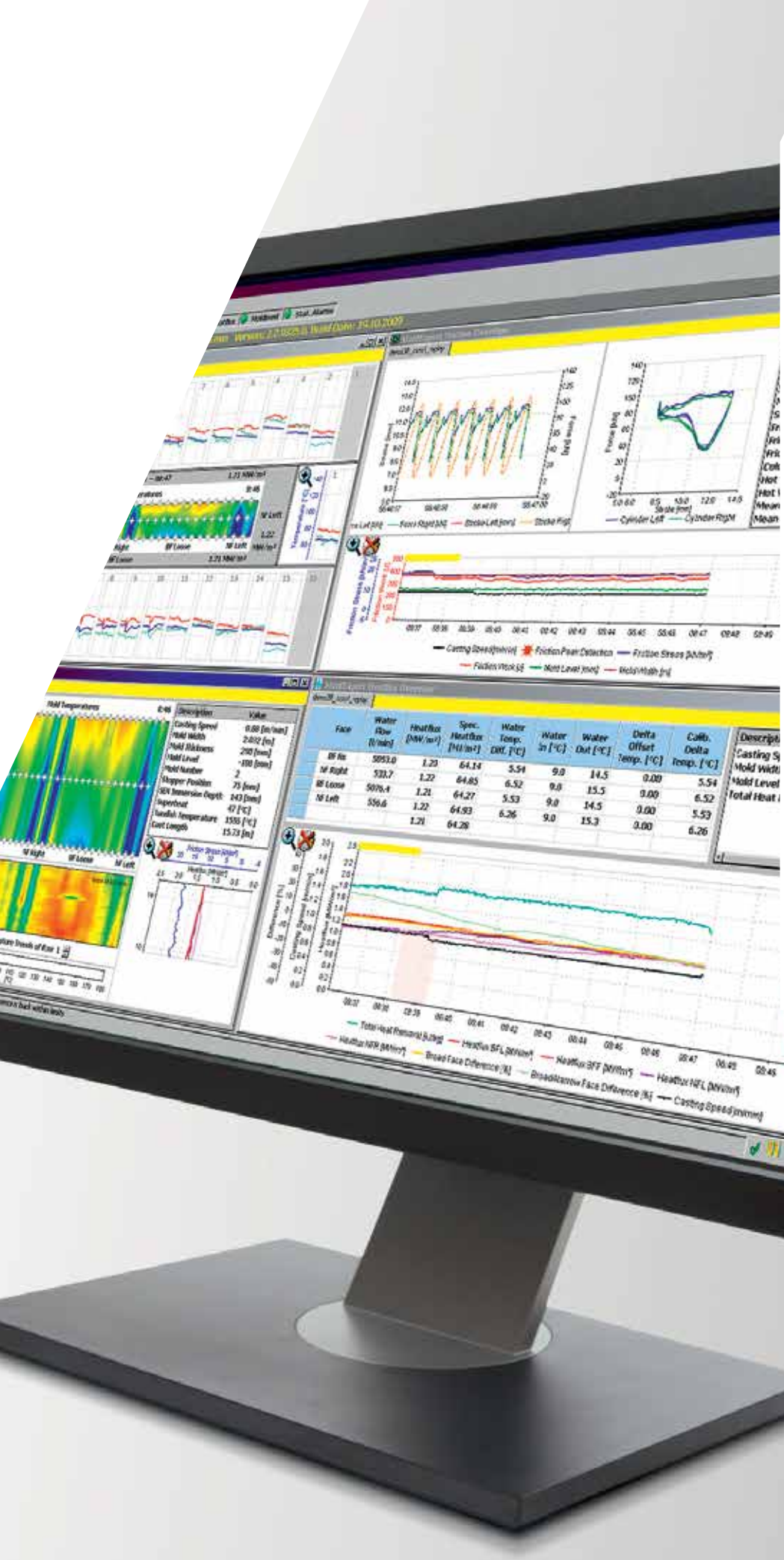
Mold Expert increases plant availability and decreases maintenance time by prompt alarming. Thanks to its superior performance the Mold Expert system has become the world's leading system for mold monitoring, with close to 200 installations worldwide.

In addition to breakout prevention, Mold Expert provides an ever increasing number of expert packages that are used to detect possible surface defects and inform operators about challenging casting conditions.

Quality production under safe casting conditions is placed at your disposal with the installation of an appropriate combination of Mold Expert packages.

When it comes to maximum mold monitoring performance, there is only one choice: Mold Expert – the mold monitoring system which allows plant operators to look further, even down the strand. This is what makes Mold Expert so unique. And this is why it has become the world's leading mold monitoring system.

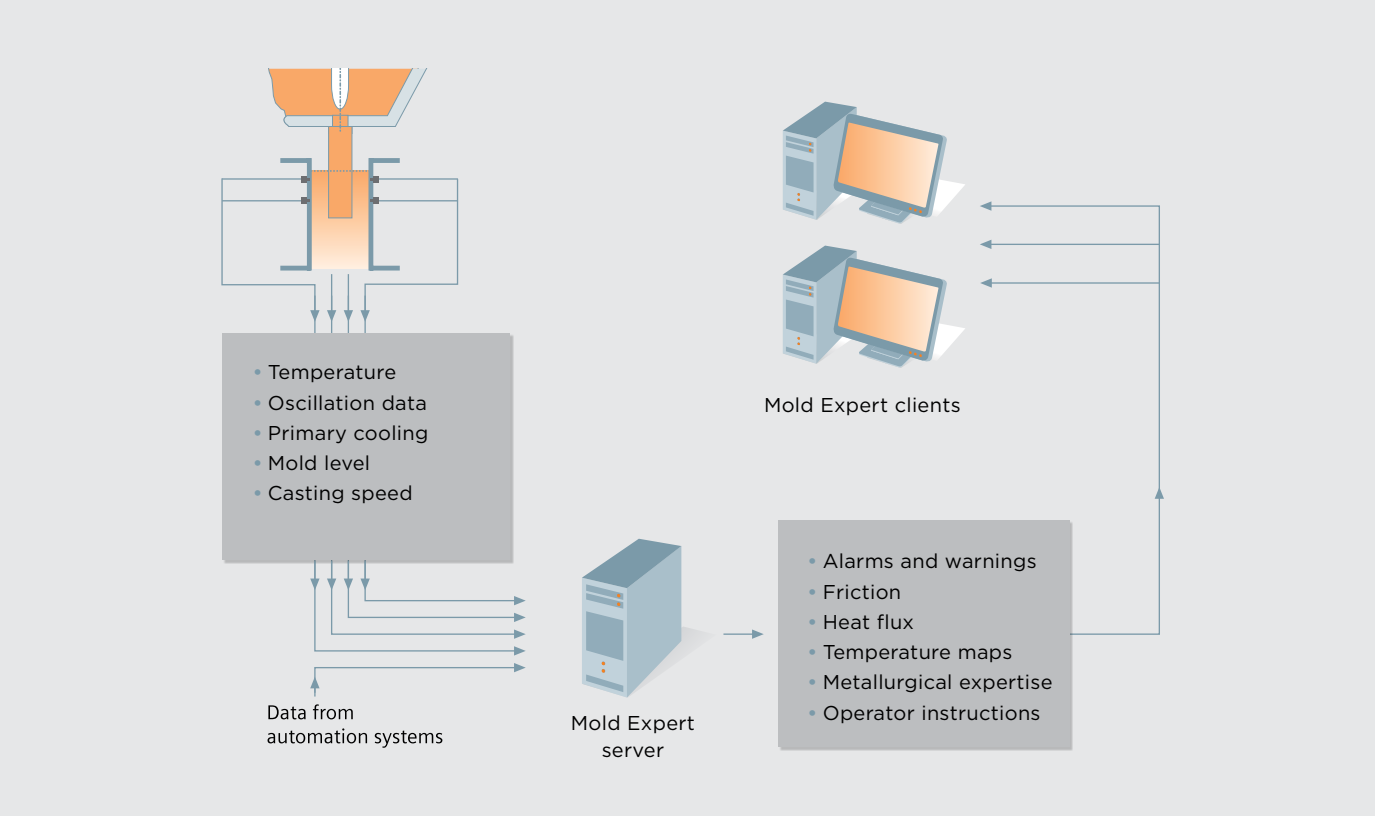
Mold Expert overview screen



ADVANTAGES OF MOLD EXPERT:

- **Safe casting conditions**
  reduction of sticker breakouts to an absolute minimum
- **No manual input necessary**
  Auto-adaptive algorithms independent of absolute temperatures, copper plate thickness, steel grades and casting powder
- **More than just breakout prediction**
  warnings in the event of abnormal casting conditions and evaluation of mold powder behavior and distribution
- **More reliable information**
  automatic detection and assessment of bad thermocouple readings
- **Offline analyzing**
  storage and custom analysis of all mold-related data in one dedicated system
- **Easy integration and upgrades**
  due to modular design and ongoing improvements

INTRODUCING MOLD EXPERT
EXPERT INFORMATION FACILITATES AN "INSIDE LOOK"



Schematic layout of Mold Expert package

MOLD EXPERT COLLECTS AND INTERPRETS RELEVANT MOLD DATA

Based on the experience gained from nearly 200 installations worldwide with a wide range of casting machine setups and steel grades, we have upgraded the Mold Expert package to a new level of performance.

Mold Expert combines state-of-the-art sticker detection algorithms with friction and heat-flux derived analysis tools. Sticker detection algorithms are continuously improved in order to reduce sticker breakouts and false alarms to an absolute minimum.

The ease of Mold Expert's integration into existing environments has been demonstrated on several occasions. Thanks to its modular design, the Mold Expert system can be installed and future extensions and upgrades implemented without disrupting the production process.

Mold Expert gives production managers and metallurgists additional expertise in the processes that influence solidification in the mold.

MOLD EXPERT FOR BLOOM AND BILLET CASTERS

In order to complete the field of application for the Mold Expert we additionally offer a solution for billet and bloom casters.

The main differences to the conventional solution are a trimmed hardware concept and adapted software architecture. Only one server-system for all strands is used and the experts for all strands are visualized within one HMI. This helps the operator to compare the strands and easily identify the one that is not working properly.

The new thermocouple design enables reliable temperature measurement in tube molds of bloom casters which guarantees the highest level of sticker detection.

For billet molds the installation of thermocouples is typically too expensive, but with green (set-point) bands for friction and heat flux and a comprehensive storage of all other caster data, the operator gets a closer look into the mold and the metallurgist knows enough data for tuning the caster.

THERMOCOUPLE CHECKER
FULL FUNCTION CHECK PRIOR TO PUTTING MOLD INTO OPERATION

Thermocouple Checker for improved safety

In order to guarantee constantly excellent results with the breakout prediction system, all thermocouples have to work properly. For this reason a full function check prior to operation is indispensable. Based on an accurate test report and derived measures, plant operators can minimize downtimes and the quality management is supported by relevant data. The Thermocouple Checker was developed to meet these requirements exactly.

The Thermocouple Checker ensures that only molds with perfectly working thermocouples are used for casting.

It is used to test complete molds as well as single copper plates, preferably in the maintenance shop. The advanced software ensures the highest possible degree of safety.

EASY OPERATION WITH MENU-GUIDED TEST ROUTINE

The Thermocouple Checker can be operated very easily by the plant personnel. Thanks to the menu-guided test routine, no specific expertise is required from the testing personnel. Visual and acoustic measurement results assist staff in performing their tasks. Two different testing modes (manual/automatic) give more flexibility in operation.

DETECTS A NUMBER OF POTENTIAL SOURCES OF ERROR

The thermocouples are checked for open thermocouples, wrong wiring, inverted polarity and bad contact to copper plate. This way, several potential sources of error can be detected before the mold is put in operation. Thermocouple Checker automatically creates a test report for handover from the workshop to the factory.

MAIN BENEFITS

- Measurement of both, single thermocouples and complete molds
- Quick measurement and error location
- Simple operation
- Only one operator necessary
- No manipulation of measurement results
- Operator-configurable HMI

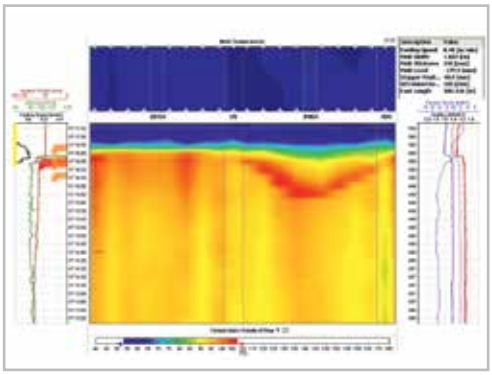
MOLD EXPERT PACKAGES
INDIVIDUAL EXPERTS CAN BE INSTALLED INDEPENDENTLY OR AS A CONFIGURABLE PACKAGE

BREAKOUT EXPERT

Breakout prediction starting at the first heat thanks to auto-adaptive algorithms based on the Connect & Cast® principle

Auto-adaptive sticker detection and thermal monitoring for optimal breakout prevention

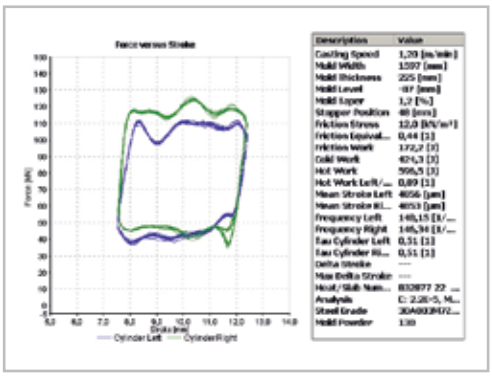
- Successful sticker detection for the very critical corner areas
- Operator warnings in the event of abnormal temperature distribution - such as hot spots and hot areas



FRICTION EXPERT

Online measurement of friction between strand shell and copper plates of the mold

- Evaluation of casting powder behavior
- Calculation of friction coefficient, stress and hot-work
- Online monitoring of oscillator behaviour



HEAT FLUX EXPERT

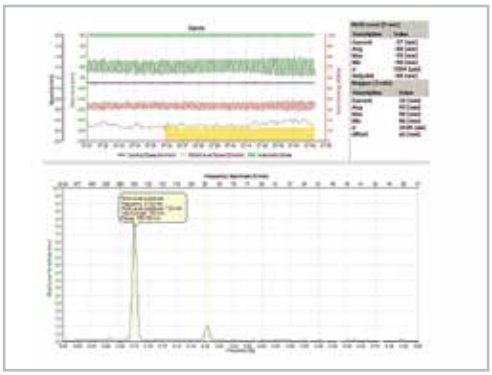
Online calculation of heat removal for all copper plates and coatings

- Shows important information relating to the solidification process inside the mold
- Immediately indicates cooling problems
- Compares heat fluxes between different mold faces

LEVEL EXPERT

Detailed mathematical analysis of the mold level

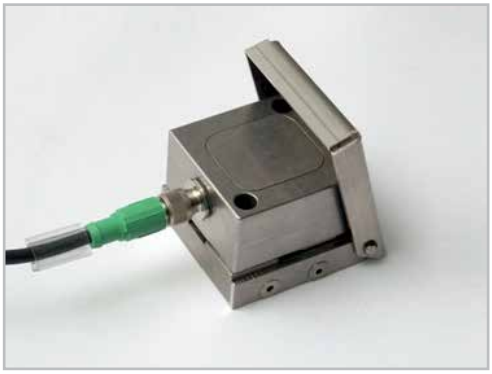
- Continuous analysis of mold level frequency spectrum allowing earlier detection and localization of bulging and roller deformation effects (mold level hunting / unsteady bulging) and free surface waves
- Avoids interruption of a caster sequence through prompt recognition of clogging or erosion phenomena
- Monitoring of mold level deviation from setpoint (basic statistics)



OSCILLATION EXPERT

Online monitoring and diagnosis for the oscillator with acceleration sensors

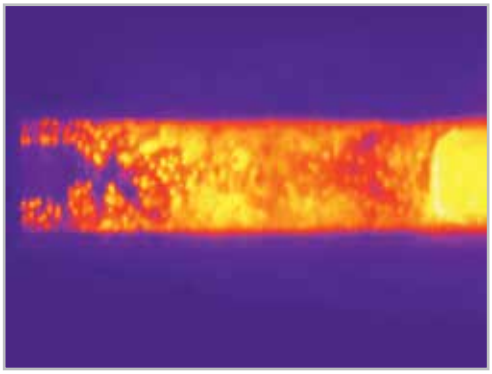
- Prevents loss of productivity through online recognition of oscillator malfunction based on 3D acceleration sensor readings
- Supports condition-oriented maintenance based on 3D moment analysis
- Reproduceable status of oscillator quality when analyzing slab quality



SURFACE EXPERT

Temperature monitoring of casting powder surface

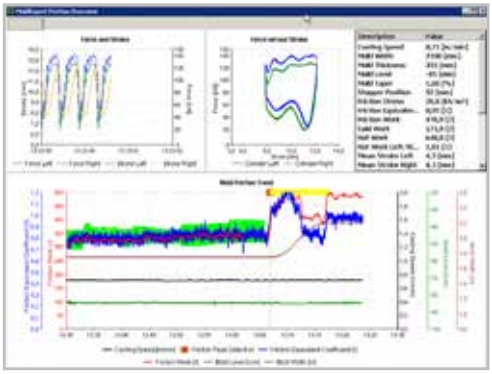
- Provides information to ensure uniform feeding of casting powder
- Designed for combination with automatic powder feeders
- Detects problems with too hot or too cold SEN
- Helps detecting the optimum casting powder thickness
- Improves start-up practice



PROCESS EXPERT

Gives the operator a green band for optimum values of important casting parameters such as heat fluxes or mold friction

- Simple operator guidance for abnormal casting conditions
- Database for setpoint values is generated automatically
- Knowledge about current casting condition
- Better technical capabilities during troubleshooting



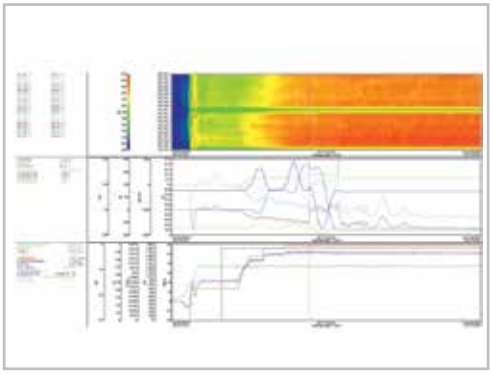
ANALYSIS TOOLS

Replay Tool for detailed review of automatic or on-demand stored data

- Used for investigating critical situations

Long Time Viewer for analyzing the vast dataset generated by complete casting sequences

- Easy browsing through a sequence
- Individual setting and storage of plot configurations



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