The revolution on mould level measurement for continuous casting machines.
... in times were quality, performance, information and diagnosis are the key to remain competitive …

- **Mold Caster** is the evolution of steel mould level measurement for continuous cast machines.
- **Mold Caster** is a stand-alone system, and can be directly connected to the scintillator to give you the Analogic mould Steel Level.
- **Mold Caster** is not a just “black box” that gives you the mould level without understanding what happens inside…
- **Mold Caster** gives an Ethernet Interface with a lot of information such as: actual frequency, taring frequencies, real level, actual filter, diagnostics and much more…
- **Mold Caster** Ethernet Interface also allows you to command and parameterize your system.
Main Characteristics

- Single board system. No moveable parts.
- Stand alone: 100% Compatible with 7 pin scintillator connector. So the system can be ready as soon as connecting the scintillator and power supply. If Ethernet communication available, all features of this new system are available.
- Highly integrated modern system. New and powerful microcontroller.
- Ethernet interface: Lot of commands and information available.
- No more battery!!! Flash EPROM memory.
- 10msec level calculation upgrade (more than enough).
- Real level. Compensated level curve (the only one in the market).
- Level filtering: moving average (variable time) + 3rd order filter available (can be changed on the fly!!!).
- 3 high precision (0.05%), low noise Analog Outputs: V.control, Level, spare. More accurate measurement.
Main Characteristics

... and More...

- 2 spare Analog Inputs + 2 standard DI for Tara Empty and full + 2 Relay DO for System Fault (and one spare).

- Oscillation subtraction from the level → cleaner mould level signal !!!

Space requirements is also another feature for this powerfull product.
Ethernet Interface

Available as reading values (all EPROM saved)

- Actual frequency.
- Actual level (compensated and not compensated).
- Actual level compensation coefficient.
- Actual Empty and Full calibration.
- Actual calibration time.
- Actual absolute counting (as a double integer counter).
- Actual filter coefficients: moving average filter time + 3rd order filter coefficients.
- Actual V. Control (to pins 3-4 of the scintillator).
- Actual Level Current (for diagnostics)
- Diagnostics: communication, memory, and so.
- And much more information that can be on your video or level 1-2 system.
**Ethernet Interface**

**Available as writing values**

- Mode change: Level Measuring, Calibrate, Sampling, Plateau.
- Calibrate (empty & full) time. It is also possible write the calibration frequencies (empty and full).
- Calibrate time (1..255 seconds).
- Level compensation coefficient.
- Filter coefficients.
- Sampling period (for sampling mode).

**System Integration**

All the Ethernet information from Mold Caster can be integrated in your automation system in order to elaborate it and generate precious diagnosis such as alarms, logging, and so.
RS 485 Interface

For Mold Caster Sensor (Inamtech’s scintillator)

With the new scintillator from Inamtech Solutions we also have the integration for all the scintillator’s variables and Setpoints:

- 2 scintillator temperatures (PCB and casing temperature).
- Serial number.
- Plateau curve handling.
- Working hours.
- Mould oscillation position (great feature to improve mould level quality without and external mould position transmitter).
- Real time clock handling
- Logging for peak values: peak value and timestamp for maximum temperatures and impact (200g accelerometer).
- Power supply local measurement: Current, Tension and Power.
Plateau’s Curve

Plateau Curve in situ: directly from Mold Caster it is possible to see the scintillator health, even before or right after casting.
Plateau’s Curve

It is well known that the Plateau’s Curve is a characteristic of the scintillator, and the shape shows the good health of it. So the frequency Vs. Control Voltage curve must be relatively flat in the range of the working Control Voltage (around 4V). For the new MC sensor, it is done directly form the RS485 interface.

- Plateau’s Curve in situ: directly from Mold Caster it is possible to see the scintillator health, even before casting.

- So, no more need of scintillator verification to the provider, saving around € 2000 /year / casting line.

- Saving time: No need to disconnect the scintillator to do this test.

- Gaining availability and maintenance professionalism: doing this test always before and after casting.
The mould tested in this example is:
- 170mm measurement range.
- Mould diameter = 148mm

The geometry of the mould and the measurement system lead to this non-linearity in the frequency – real level curve. You can see up to 45mm of difference between the curves.

- Mold caster correct this effect with a mould coefficient (for each size). With the coefficient, only Empty and Full calibration values are needed to get the real level.
- All other systems in the market give you just the estimated level or need other calibrating points, making this unpractical to do.
- Real level guarantee the same shroud immersion for different mould sections… so quality Is improved…
Filter changing on the fly

As shown in the above picture. It possible to see the filter changing on the fly.

In **blue** the “**Real Level**”

In **green** the “**Berthold or other system Level**”

In **red** the “**non compensated Level**”

Depending on the casting phase or the mould size, you can optimize your filter for best accuracy/dynamics rate… and once again… quality is improved…
As shown in the above picture, it is possible to “cancel” or subtract the oscillation effect from the level signal with an optional Analog Input reserved for the mould position. Adding the oscillator position to the Mold Caster will allow the release of the mould level processed signal (without oscillation).

In **red** the “normal level” measurement (with oscillation).
In **blue** the “mould level without oscillation”

This way, no matter the frequency, amplitude, or even the oscillation function, it will always be processed and subtracted by the Mold Caster. So this intrinsic measurement issue is not a problem anymore, leaving a cleaner level signal for frequency analysis, level control and so.

Mold Caster is the only one that gives this feature…

... so once again, quality is improved…
If we take standard deviation of the level as a reference for quality, you can see that it is reduced to a half.

This means, improve the quality...
Sampling Mode

For development and analysis purposes, the Mold Caster allows a sampling mode.

- Where you decide the time window (from 100msec to 25.5 sec)
- The system gives you the average frequency of this window without any further filter.
- The system also gives you the sampling number, that allows right computing.
- This is an essential tool to define an optimum filter or to study dynamics of the system.
System Integration

1 – Production Operator – TP screen
Once connected to your automation system you can elaborate the information given and show it in your HMI, log it in your Lev 2, and so…
System Integration

2 – Maintenance (password protected) TP screen
3 – Scintillator (Mold Caster sensor) TP screen
... so as diagnosis ...

- Ethernet interface: Lot of commands and information and diagnose available.
- New alarms and warnings available (only possible with Mold Caster).
- Real Mould Level → right shroud immersion.
- Empty and Full Frequencies on video → wrong calibration detection.
- Actual frequency → problem detection for calibrating of before casting.
- Very versatile and efficient filtering.
- Plateau curve (scintillator health evaluation).
- Closed radioactive source (or lack) detection.
- Sampling Mode.

All these lead to:

- Less human mistakes before startup casting.
- Better knowledge of the entire mould system behavior.
- Lot of alarms that can be generated from the Ethernet Interface information.
- More system availability… more information (new alarms and warnings)…
... and so as money saving ...

- More diagnosis → less lost lines.
- More diagnosis → faster failure detection.
- Less human mistakes before startup casting → More system availability.
- No need to change any battery or part every xx years.
- Plateau curve: saving around €2000/year/casting line.
- More system availability → more production.
- Unbeatable price
Other brands compatibility

*Mold Caster can be used in combination of serveral detector brands*

Even though Inamtech Solutions is producing its own scintillator with extended diagnosis, Mold Caster can perfectly match with most known scintillator detectors

- Mold Caster Sensor (the new scintillator from Inamtech Solutions)
- All Berthold Scintillators, including LB6639 and LB6739.
- Ronan scintillators.
- Qualtec / Qualicast (as a substitution for the measurement system)
**References**

- Tenaris Dalmine: from October 2010 (all 2 CCM – 8 lines)
- Tenaris Silcotub (Romania – Calarasi) (all 3 lines)
- Tenaris Siderca (Argentina) (all 4 lines)
- IRO S.p.A.
- Çebitaş

... in total 25 units sold

**Contact**

- Inamtech solutions (Italy)
  - [www.inamtech.com](http://www.inamtech.com)
  - info@inamtech.com
- Inamtech solutions S.r.l. (Argentina)

**Distributor in North America**

- Janus Automation (USA, Mexico)
  - [http://www.janusautomation.com](http://www.janusautomation.com)
  - info.usa@janusautomation.com