XINYAN INDUSTRY

新研工业

XINYAN INDUSTRY

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WE DO AUTOMATIC POURING

Shanghai Xinyan Industrial Equipment Co., Ltd. is specialized in research, production and marketing of induction and vacuum melting systems. Our products include induction melting furnace, metal transfer system, automatic pouring, vacuum induction melting (VIM) and induction heating etc..

For automatic pouring system, we cover the following product categaries: unheated pouring ladle, heated pouring ladle, heated press pouring furnace with channel inductor, and heated coreless press pouring furnace.

Xinyan Industry is a proffesional induction melting system manufacturer. With many years experienece in the field of induction melting system we further offer complete automatic pouring solutions for foundry business, help foundry to achieve automatic and intellectual pouring, give better choice to the market.

HIGH SPEED, CLOSED LOOP FLOW CONTROL SYSTEM

Keeping an eye on the pour cup level

The eye of the Pouring System is a high speed, real-time sensor used to constantly monitor the iron level in the pour cup during the pour.

The sensor is protected from the hostile environment over the mold by a double walled, stainless steel water-cooled jacket together with an air purge system for cooling and protecting the sensor optics.

The actuator does the work

Based on the computer's real-time calculations, the electric high speed servo actuator throttles the stopper rod, increasing or decreasing the iron flow through the nozzle, dynamically matching iron flow through the nozzle with the intake rate of the mold. The actuator is the muscle of the Pouring System.

Making intelligent decisions

The real-time sensor sends the level information to the system controller – the brain of the Pouring System. It contains the system I/O and a dedicated computer with software based on over 25 years of iron pouring experience.

The computer uses the constantly updated cup level information to determine if the iron flow into the mold should increase or decrease, i.e. whether the system actuator should open or close the stopper rod.

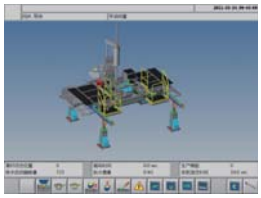
Automatic positioning

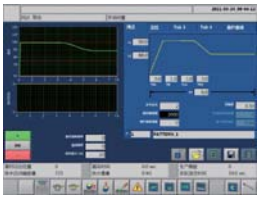
When pouring molds on a flaskless, vertically parted molding line, it is necessary to determine where the next pouring cup will be located and move the pouring vessel to this location before the pour begins. The Pouring System monitors and controls the position of the pouring vessel. By tracking the molds, the system will automatically position the vessel to meet up with the pour cup.

XINYAN INDUSTRY pour-tech AB

SCOPE OF SUPPLY

The automatic pouring control system is a real-time, high-speed, closed loop system designed to automatically and precisely regulate the level of molten metal in launders and pouring cups.





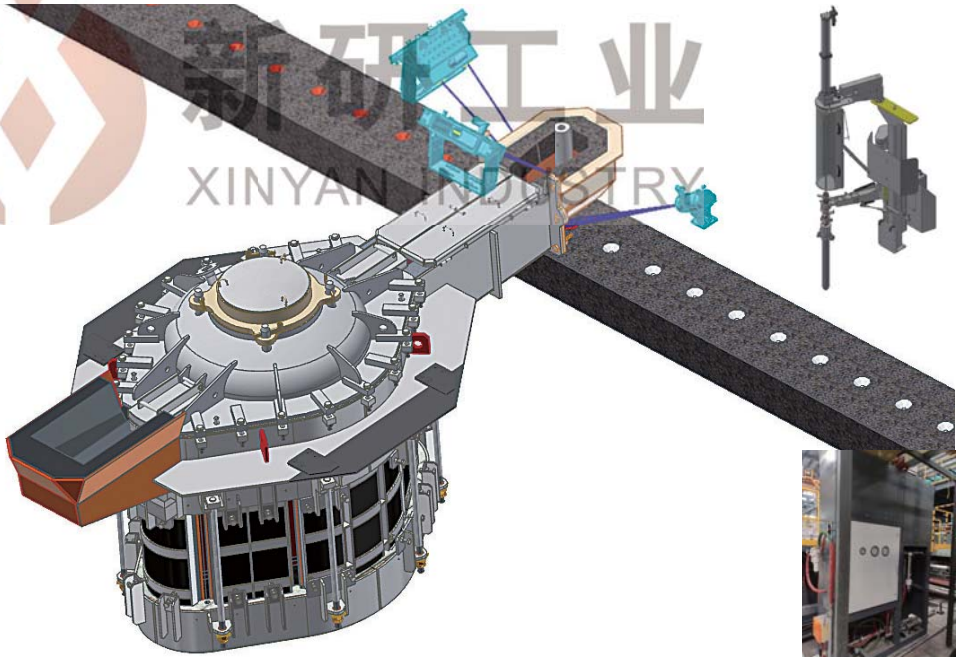
Options
- Integrated inoculation system
- Inoculation hit rate monitoring
- Mold line interfacing
- Temperature measurement
- Performance database

Sensors for various applications

Line laser sensor
Single point laser sensor
Vision technology

- High performance lines
- Space restricted applications
- Flask line application

Stopper rod actuators with twist and cleaning plunger.



Control desk with visualization
All pouring unit functions are centralized to the main controller and touch panel PC.

Pour box level and pressurization
A single point laser sensor is used for pour box and launder level control integrated in the pouring system.

BENEFITS

PREVENT OVER POURS

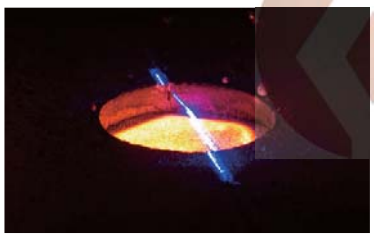
The Pouring System is a high speed, closed loop control system using real-time level measurements to monitor and control the iron level in the pour cup.

As the level increases, the system actuator throttles the stopper rod, preventing overpouring of the mold.

PREVENT SHORT POURS

Using a high speed, fast response actuator, the pouring system is able to react quickly as level changes are detected in the pour cup.

If the level drops below the selected set point, the system will instantly increase the iron flow, thereby maintaining the desired iron level in the cup.



SAVE IRON

The Pouring System automatic positioning allows the use of smaller pour cups. At the end of the pour, the Pouring System is capable of bringing the pour cup level down to a level set by the operator, reducing the total amount of iron poured, increasing the yield. Less iron is remelted, reducing energy, alloy and material handling costs.

REDUCE SLAG INCLUSIONS

By maintaining a high and accurate iron level in the pour cup throughout the entire pour, the Pouring System ensures that slag is not pulled into the mold but stays floating on top of the iron.

The result is higher quality castings thanks to less slag inclusions.

FREE UP LABOR

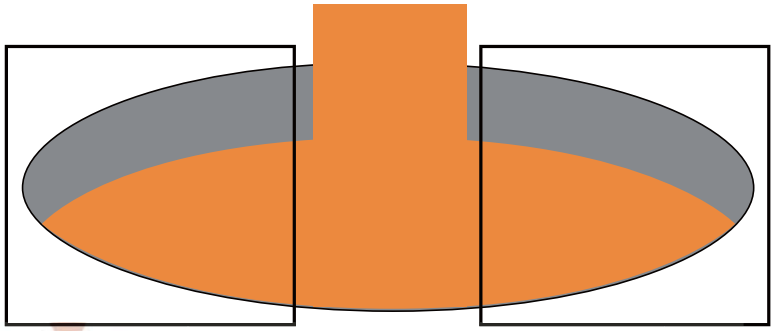
It is an automatic pouring system, requiring only minimal supervision. Therefore, there is no need for a dedicated pouring operator.

SENSOR TECHNOLOGIES

VISION TECHNOLOGY

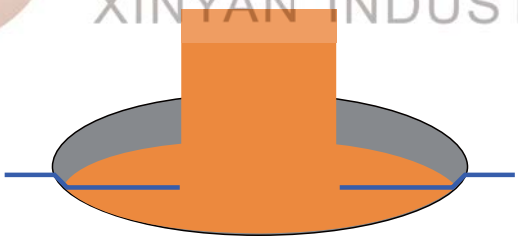
For Vision camera technology it is recommended that the pouring cup size is more than 4 times the diameter of the nozzle in order to get sufficient surface areas for measurement.

For instance, when pouring from a 35 mm nozzle, a pour cup with a minimum of 150 mm should be used.



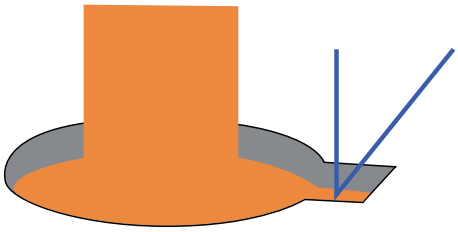
LINE LASER TECHNOLOGY

With the Line Laser technology, the pouring cup is recommended to be two and a half times the nozzle diameter to allow for sufficient measurement data and high reliability.



LASER TRIANGULATION

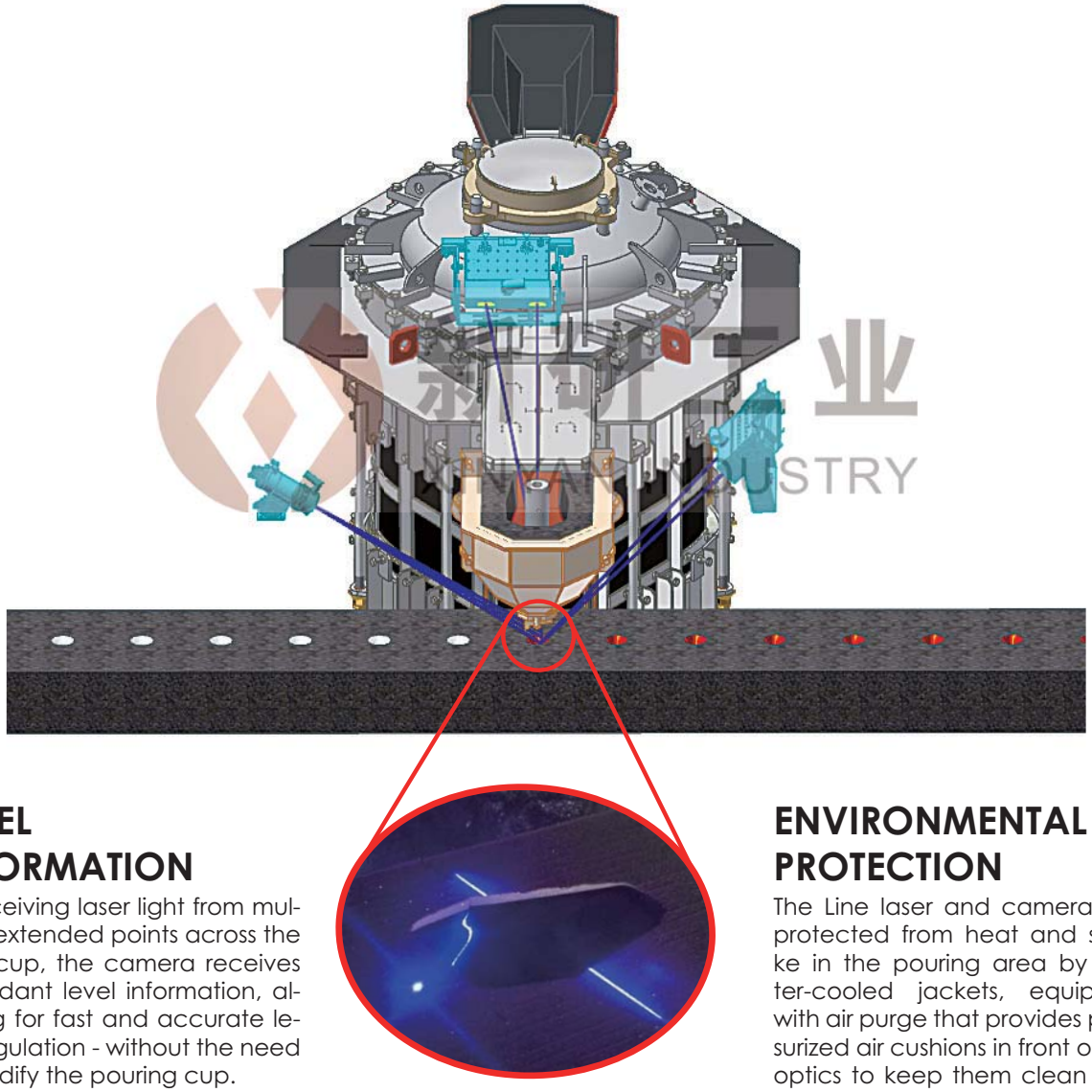
The laser triangulation measuring principle is extremely fast and accurate, mainly used together with vertical molding lines operating with pouring ladles with space constraints, hence the laser tail.



LINE LASER SENSOR SYSTEM

The Pouring System features a Line Laser System, consisting of a Line Laser and a Line Laser camera.

The Line Laser unit, attached to one side of the pouring vessel, projects a line across the pour cup when the cup is located directly below the pouring nozzle. The Laser camera is mounted on the other side of the vessel, also aimed at the pouring cup, and uses a triangulation method to determine the iron level in the cup.



LEVEL INFORMATION

By receiving laser light from multiple, extended points across the pour cup, the camera receives redundant level information, allowing for fast and accurate level regulation - without the need to modify the pouring cup.

ENVIRONMENTAL PROTECTION

The Line laser and camera are protected from heat and smoke in the pouring area by water-cooled jackets, equipped with air purge that provides pressurized air cushions in front of the optics to keep them clean and cool.

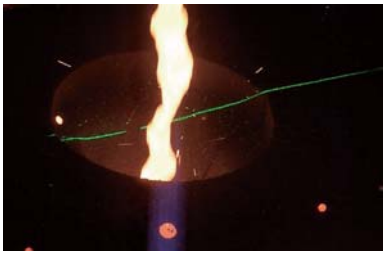
LINE LASER TECHNOLOGY

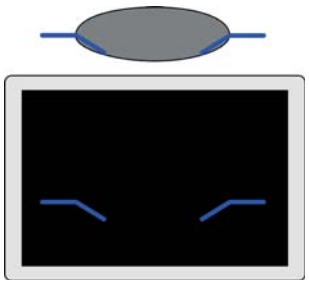
MOLD INDEX

During the mold line index, a spot laser detects the approaching cup and the system positions the nozzle over it.

The line laser is then turned on to project a line across the cup.

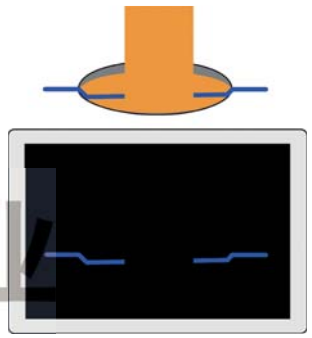
The camera uses this line to determine the location and size of the cup.





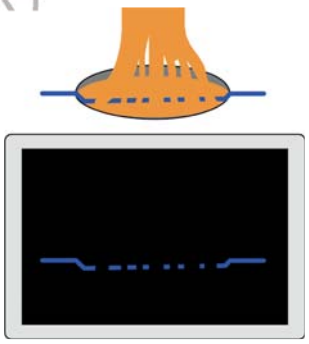
LEVEL CONTROL

Once the pouring has begun and iron starts to fill the cup, the camera uses the line (reflected in the metal) to determine the level in the cup. Since the line laser is „behind" the iron stream, the stream will „shade" the line, making it possible to make the level measurement without any interference from the stream.



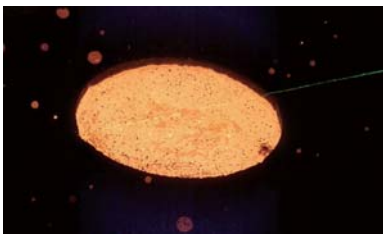
FANNING IRON STREAM?

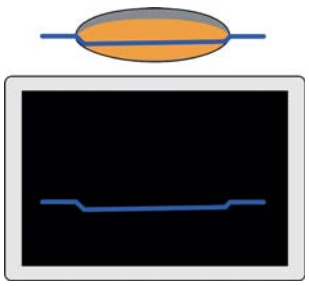
After hours of production, it is common to see the iron stream starting to move from side to side or fan out – sometimes across the entire cup. As long as a few millimeters of the laser line makes it through to the line laser sensor, the Pouring System can still make pouring decisions, keeping the production going.



FINAL LEVEL

Once the pour is complete, before the mold is indexed out from the station, the line laser system will make a final level measurement, storing the data for statistical performance analysis.



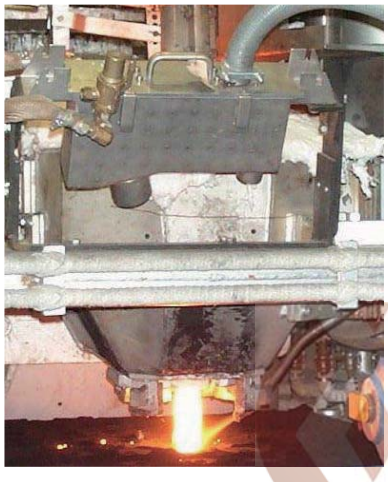


SINGLE POINT LASER & VISION

POINT LASER TECHNOLOGY

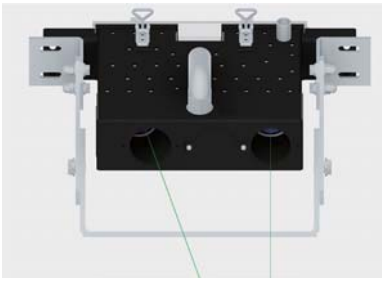
The Laser Sensor is a level measusring laser designed for molten metal applications. The Sensor features a linear measurement over its entire range and provides both digital and analog interfaces.

The laser is housed in a water cooled jacket (WCJ) to protect it from the extreme heat. The WCJ is equipped with an external air purge system to keep smoke and dirt away from the sensor optics.



FITS IN LIMITED SPACES

Since mounting of the single point Laser system requires very little space, it is an alternative solution to the Line Laser system where space is limited.



The point laser are designed, manufactured and classified according to IEC 825-1. Accoring to this standard, the point laser is classified as a 3B laser device.

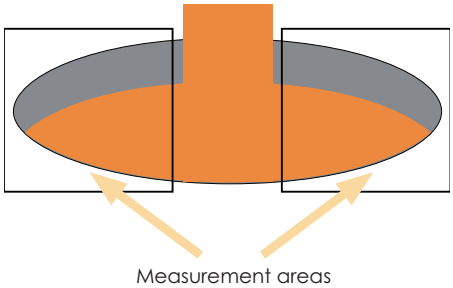
Care should be taken to avoid direct intrabeam and direct specular reflection viewing of the laser.

VISION CAMERA

Vision technology is used for flask line applications where large pouring cups are used and positioning is not required. By accumulating the number of illuminated pixels on the detector, and interpreting this information, a measurement proportional to the metal level in the pour cup is created. The level signal is then used for throttling the stopper rod during the pouring process.

ONLY VISION TECHNOLOGY IS NOT APPLICABLE FOR AUTOMATIC POSITIONING!

Vision technolgy is not suitable for detection of pouring cup for automatic positioning. Instead, positioning function uses the pour cup information provided by the molding machine.

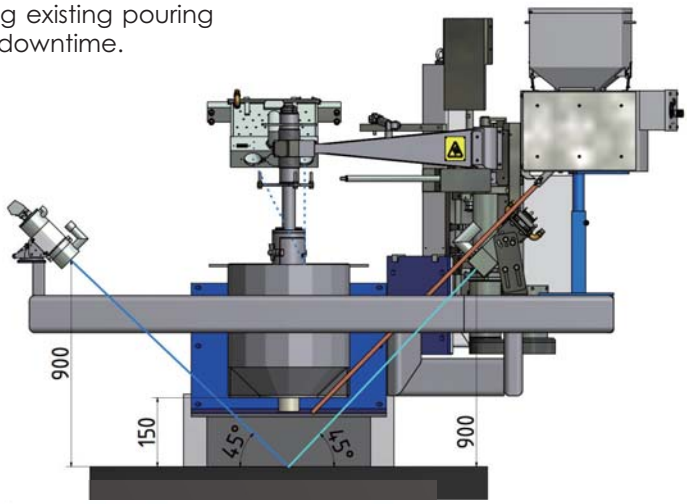


LARGE SPRUE CUP

For vision technology, it is recommended that the sprue cup size is at least 4 times the diameter of the nozzle, in order to obtain sufficient surface areas for measurement to provide high uptime. For example, if the nozzle diameter is 35mm, it would require a minimum sprue cup diameter of 150mm.

FURNACE RETROFIT

The Pouring System provides solutions for upgrading existing pouring furnaces to improve the performance and reduce downtime.



INTEGRATED CONTROLS

The furnace controls are integrated with the pouring system, making it possible to operate all aspects of the furnace from one operator's panel. From here, the operator controls the launder level, inductors and hydraulics, as well as the pouring.

CONTROL UPGRADE INCLUDE:

- Automatic pouring
- Automatic positioning
- Inductor control
- Pressurization
- Hydraulics control
- Cooling control

Launder Level Laser in its Water Cooled Jacket

HARDWARE UPGRADE INCLUDE:

- Laser based pouring
- Stopper rod actuator
- Launder level laser
- Pressurization system
- Proportional positioning

BENEFITS

- Improved pouring
- Reduce downtime caused by old controls
- Replace obsolete parts
- Improve pressure system response
- Improve launder level regulation and reduction of nitrogen up to 70%
- Add automatic positioning
- Replace outdated stopper rod actuator
- Reduce inductor maintenance
- Intelligent operators's interface

MAXIMIZING PRODUCTIVITY

The fill rate of molds is determined by the runners and the ferrostatic pressure in the mold. By maintaining a high level in the cup throughout the pour, the Pouring System a chieves the shortest possible fill time.

Still, today's high speed molding machines are capable of producing molds in less time than it takes to fill them, making the pour time the factor that limits productivity.

FORCEpour™, **EXPRESSpour™** and **TWINpour™** are three high productivity solutions that increases the productivity in these cases.

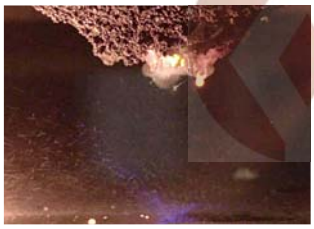
Existing pouring system can be upgraded with those three solutions.

FORCEpour™

FORCEpour™ does not pour the molds faster. Instead, it pre-starts the pour and uses up to 2 sec of the index for the initial pouring.

As the mold is indexes, FORCEpour™ monitors the cup movement and calculates where it will stop - and moves the pouring vessel if necessary.

The pouring cycle begins before the index is complete – timed so that the cup arrives just before the metal is about to hit the top of the mold. As the mold comes to rest, FORCEpour™ measures the exact position of the cup and fine tunes the position of the pouring vessel and completes the pour without interruption.



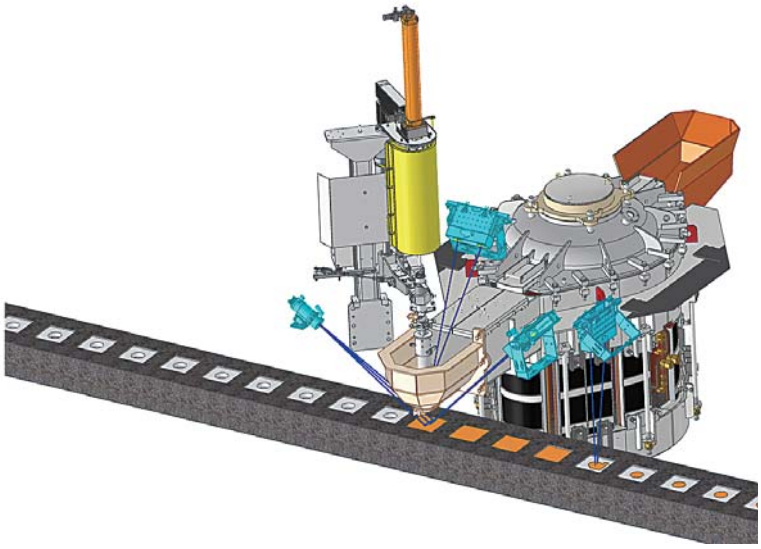
EXPRESSpour™

By adding an oversized pour cup to the mold, the cup can be used as a metal reservoir that continues filling the mold after the pouring system has finished pouring.

The reservoir keeps filling the cavities while the mold is indexed out.

A couple of molds down stream, when all cavities has been filled, a point laser is used to measure the level in the cup.

The level readings from this secondary laser is used by the pouring system to optimize the pour time, making it as short as possible while still ensuring proper mold fill.



MAXIMIZING PRODUCTIVITY

TWINpour™

Some vertical molding lines are capable of indexing two molds in a double index. By indexing two molds together, the time to fill them will almost double.

To meet the challenges of double pouring, a system dedicated for double indexing molding machines.

With several TWINpour™ systems already in operation, it is leading the way in developing this new technology.

HIGH SPEED

By operating TWINpour™ on a high speed double indexing machine, mold rates of over 550 molds/hr can be achieved.

FLEXIBLE

Molds as small as 250mm can be poured with this technology. The maximum size only depends on the molding machine.

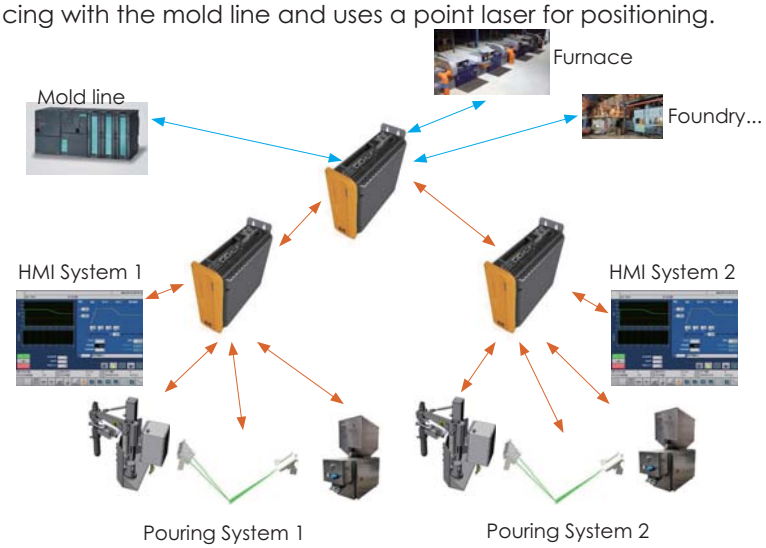
A special nozzle block is used to make mold size changes fast and easy. The nozzle block reduces mis-alignment between the nozzles for molds up to 600mm.

OPERATAOR DESK

The operator desk features complete sets of operator controls for each pouring system, together with the required furnace controls.

FULLY AUTOMATIC POURING CONTROL

TWINpour™ is equipped with two independent pouring systems, featuring Line Laser technology for pouring. A Master controller provides synchronization with the two pouring systems, interfacing with the mold line and uses a point laser for positioning.



OPTIONS

MOLD MAPPING & COOLING TIME CONTROL

The Pouring System can tag every mold with vital process information, such as final cup level, part#, iron batch# and other data provided from the plant. It can track the molds all the way from the molding machine to shake-out, and molds that need to be removed due to bad chemistry or other quality issues can be marked and removed at shake-out.

By entering a minimum cooling time, the system can automatically reduce the mold rate and, in certain circumstances, speed up the line after a production stoppage - thereby recovering some of the production loss during the stoppage.

STATISTICS AND PROCESS DATA

By communicating with other plant systems, such as the mold line, pouring unit and melt shop, the pouring data can be coupled with additional data, such as iron chemistry, inoculation rates and pouring temperature. Together, this information can be gathered into a database and become the basis for a comprehensive quality record for every produced mold.

REMOTE SERVICE

With the ability to connect to the system via internet, through a Virtual Private Network (VPN), it is possible to provide remote system support.

This increases the support level and reduces trouble shooting downtime.

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NON-HEATED POURING LADLE

The non-heated bottom pouring ladle is suitable for grey, malleable, ductile, CGI and mixed production. The pouring ladle provides continuous operation by allowing the ladle to be refilled without interrupting the pouring.

Compared with tilt pouring, bottom pouring prevents floating slag from entering the mold, and allows for more accurate pouring control and smaller pouring cups. By designing the ladle correctly, the temperature loss and ductility fade rate can be controlled within tight tolerances. In order to have full control of the heatlosses and magnesium fading, it is necessary to refill the ladle every 7-10 minutes with fresh iron.

BACK TILT FRAME

The ladle system can be equipped with a hydraulically actuated back-tilt frame, including the hydraulic power pack.

This option is recommended for ductile iron operation or when metal grades are changed frequently.

LADLE BENEFITS

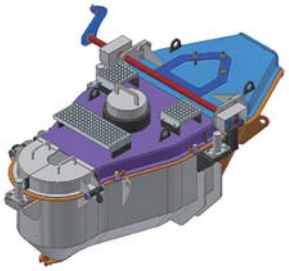
- Low energy cost
- Low investment cost
- Low maintenance cost
- Easy to change iron grade
- Continious casting improves the production rate
- Improved casting quality
- No fill or pour siphons to maintain

NON-HEATED POURING LADLE

AUTOMATIC LEVEL COMPENSATION

Automatic level compensation is an option for reading the weight of the pouring ladle, using load cell sensors built into the ladle frame. It dynamically and automatically compensates the pouring parameters for the ferrostatic pressure variations in the ladle when the ladle goes from full to empty. The operator is also informed of the contents (weight) of the ladle and when it is time to refill with new iron. The load cells can also be used to tell when the ladle is charged so fade timers can be reset automatically.

STANDARD LADLE SIZES					
		1.0 T	1.5 T	2.0 T	2.5 T
Maximum capacity	kg	1450	1800	2090	2690
Minimal capacity	kg	350	500	500	550
Usable capacity	kg	1100	1300	1590	2140
Temperature loss	k/min	1,5 -3			

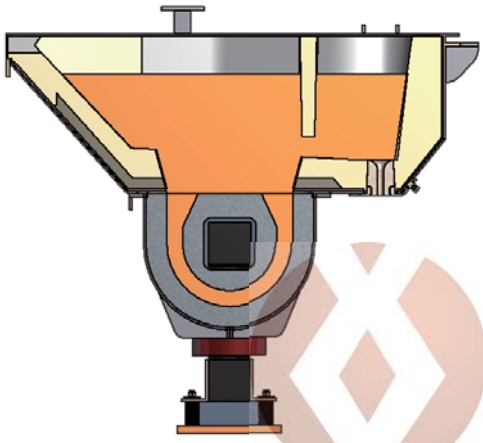


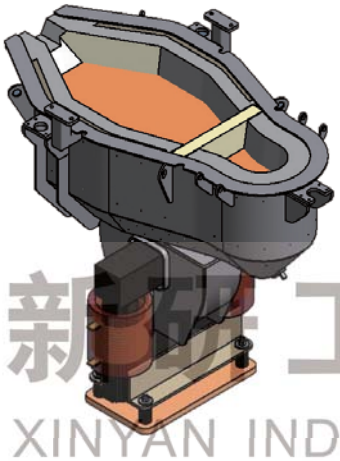
HEATING POURING LADLE

If the foundry needs the flexibility of an unheated ladle system, but have high iron temperature control requirements, we can provide a heated ladle solution.

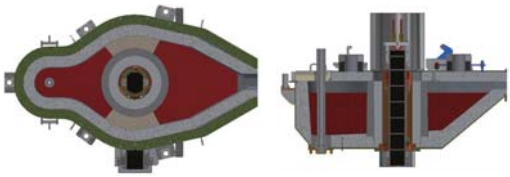
By installing a new ladle body equipped with anchannel inductor, the system can deliver up to 100kW into the iron bath. This will give the foundry the ability to keep the metal at a stable temperature. The electrical efficiency of channel inductor can be up to 90%.

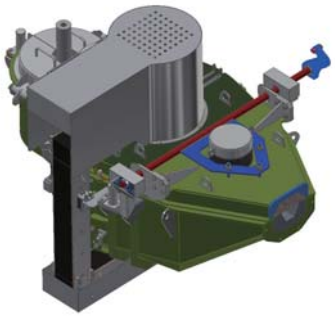
The heated ladle is designed with back tilt. This ensures a quick and easy way to empty the ladle for metal grade changes.





We supply heated pouring ladle to meet the requirement of different foundry applications. The heated pouring ladle is equipped with power supply and induction heating coil, can supply up to 200KW holding power to maintain constant metal temperature during pouring.

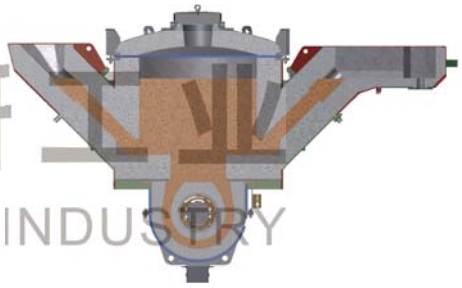


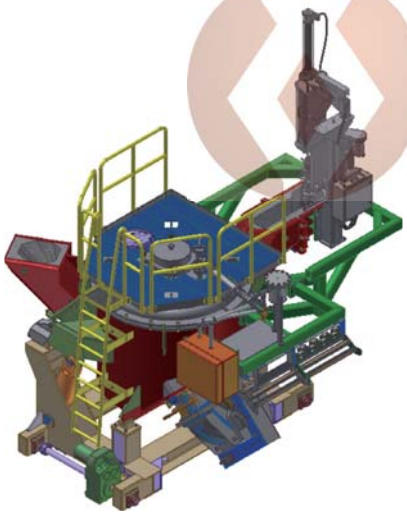


HEATED AND PRESSURIZED POURING SYSTEMS-WITH CHANNEL INDUCTOR

ADVANTAGES:

- Pressurized system, metal level is maintained constant in the pour box to insure a stable metal flow during pouring
- Equipped with medium frequency power supply, stepless power control
- Temperature can be controlled by superheating molten bath and holding
- Wide capacity range from small to larger as a good metal buffer between melting furnace and molding line
- High electrical efficiency, up tp 90%. Energy saving
- Suitable for long time and continuous production, good for producing single casting with fixed grade. Efficiency is very high and enrgy cost is extremely low





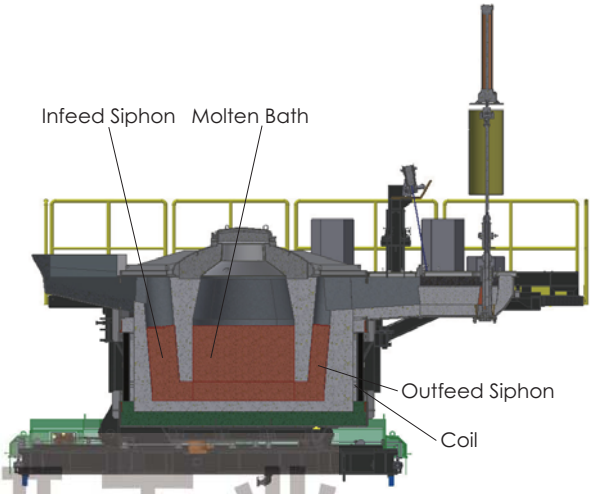
DISADVANTAGES:

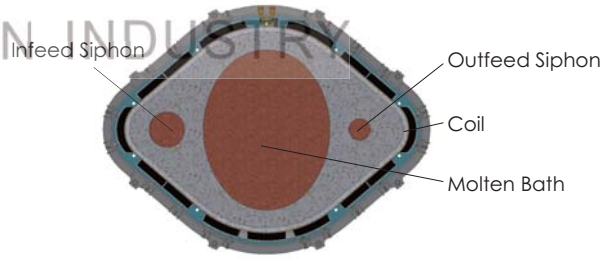
- Furnace can not be emptied completely at any time, a heel is always required inside furnace, always power on. The metal grade change is not easy
- Channel inductor is usually located at the furnace bottom or rear side, the inductor circultesand heats the metal inside channel loop only. The temperature is not uniform through the entire molten bath, especially for in/out siphons which are not exposed to any heating directly. To pour at 1400 deg. C, channel inductor need to heat the metal inside channel loop up to 1500 deg.C
- Need regularly cleaning and de-slagging channel loop
- In/out sipphons is located at both sides of furance, the molten metal there has the lowest temperature through the entire molten bath. There is a risk for slag build-up in siphons. Maintainance downtime, de-slagging and heawy cleaning in siphons is needed
- For all ductile iron production, downtime of several shifts per week is needed for maintenance and de-slagging
- Not suitable for ductile iron production

HEATED AND PRESSURIZED POURING SYSTEMS-CORELESS

ADVANTAGES:

- Pressurized system, metal level is maintained constant in the pour box to insure a stable metal flow during pouring
- Equipped with medium frequency power supply, stepless power control
- Temperature can be controlled by superheating molten bath and holding
- Entire metal area including main bath and in/out siphon is suroundded and heated by the induction coil, and has uniform temperature. Keep the pouring temperature almost as same as the molten bath inside furnace
- Wide capacity range from small to larger as a good metal buffer between melting furnace and molding line
- Can be totally emtied by back-tilting for easy metal grade change. Cold start is allowed after power off under emergency situation. Complete power off is possible for a long time production stop
- Nodularization fading can be delayed efectively by introducing nitrogen atmosphere protection inside furnace
- The entire molten bath and in/out siphon is heated, less slag build up in siphons and it is easy to clean. Maintainance downtime for de-slagging work is much less and easier than channel inductor furnaces
- Useable capacity is high. The usable volume is more than 80% of total furnace volume
- Suitable for long time and continuous production, good for producing castings with all sorts of grade including ductile iron





DISADVANTAGES:

- Relatively lower electrical effiency and higher energy cost compared with the system with channel inductor

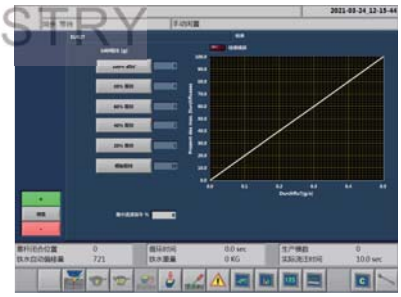
INOCULATION TECHNOLOGY

The pouring control system is designed to interface with in-stream inoculation units. By integrating the inoculation controls with the pouring system, the user has full control of the inoculation process. By selecting an inoculation unit with a variable, controllable feed rate, the rate can be made part of the pattern data for each job. Whenever there is a job change, the feed rate is automatically changed, eliminating the risk of pouring with the wrong inoculation amount. (Allowing the feeder to operate with reduced feed rate when possible, saves inoculation material). Feedback signals from the inoculation unit are picked up by the pouring system. Based on the settings, it will generate alarms and interrupt the pour if necessary.

AUTOMATIC ERROR CHECKING

The system controls are designed to monitor:

- Low level in the hopper
- No (insufficient) air supply
- Faulty screw feeder operation
- Incorrect injection pressure (pipe blocked)

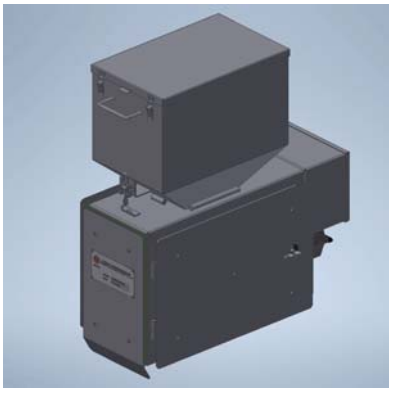


ADDED FEATURES

- Dynamic inoculation
- Motorized adjustment of the pipe direction
- Double feeder system

SPECIFICATIONS

Feed ranges	0,5 - 45 gr./sec.
Hopper capacity	22 - 50 l
Removable hopper	
Powder grain size	0,2 - 0,8 mm
Feed rate tolerance	< 2 %



inoTECH™ INOCULATION DETECTION

inoTECH™ is a system for detecting in-stream inoculation. The inoTECH™ camera counts the granules heading towards the stream, allowing the system to calculate a hit-rate.

The hit-rate is displayed after each pour and can trigger alarms and even abort the pour if the rate is too low.

On the system's real-time video screen, the operator can see where the inoculant hits the stream, so corrections can be made.

inoTECH™ uses customized technology for inoculation detection.

Unlike passive systems (that only detects inoculation in front of the iron stream), inoTECH™ features an active light source.

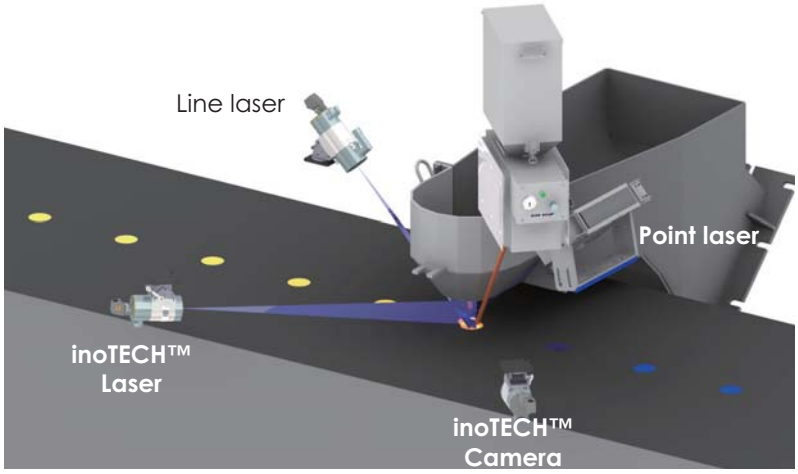
A blue laser allows the inoTECH™ camera to see ALL inoculant, both in line with and outside the iron stream, making it possible to estimate an inoculation hit rate.

BENEFITS

The system monitors the inoculation process and provides the following benefits:

- Reduces the risk of castings with inoculation defects shipped to the customer
- Alarm if hit rate is too low
- Stopping production if hit rate is below minimum
- Possible to increase the inoculation yield
- Increased casting quality
- Dynamic inoculation with process control

Inoculation system



DATA STORAGE & TRANSFER

PROCESS DATA

Pouring data per mold produced

- Mold identity
- Pouring performance
- Iron and stopper rod graph
- Inoculation data
- Images
- Iron Temperature

Operator Activity

- Operator identity
- Process parameter change log

Event data

- Alarms log

Asset management

- Maintenance log

ACTUAL POUR DATA	
Operating mode	auto / playback / manual
Actual pour time	sec.
Rise time	sec.
Pour cup level graph	measured metal level in pour cup
Stopper rod movement graph	actual stopper rod position
Image(s) of actual pouring	RAW camera image
Images of cup after pour complete	RAW camera image
Pour result (final level)	good / bad / not poured
Pattern identity	Name and / or number
Pouring parameters	Pattern set data
Pouring position	CT & LT
Iron batch	#

ACTUAL FURNACE DATA	
Furnace pressure set point	mbar (psi)
Pourbox level setpoint	mm (in)
Furnace pressure actual	mbar (psi)
Furnace Power	kw, kVAr, A, ..
Iron temperature in pour box. (Thermocouple dip lance)	C° (F°)
Iron Temp stream (Pyrometer)	C° (F°)

ACTUAL INOCULATION DATA	
Inoculant set point	g/sec. or g/kg
Dynamic inoculation graph	Actual inoculant per time unit
Actual amount of inoculant ejected	g
Inoculation hit rate	% of inoculant hitting the iron stream
Image of inoculation flow	RAW inoTECH camera image

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