

FOUNDRIY TECHNOLOGY

# Econo-Pour Pouring System

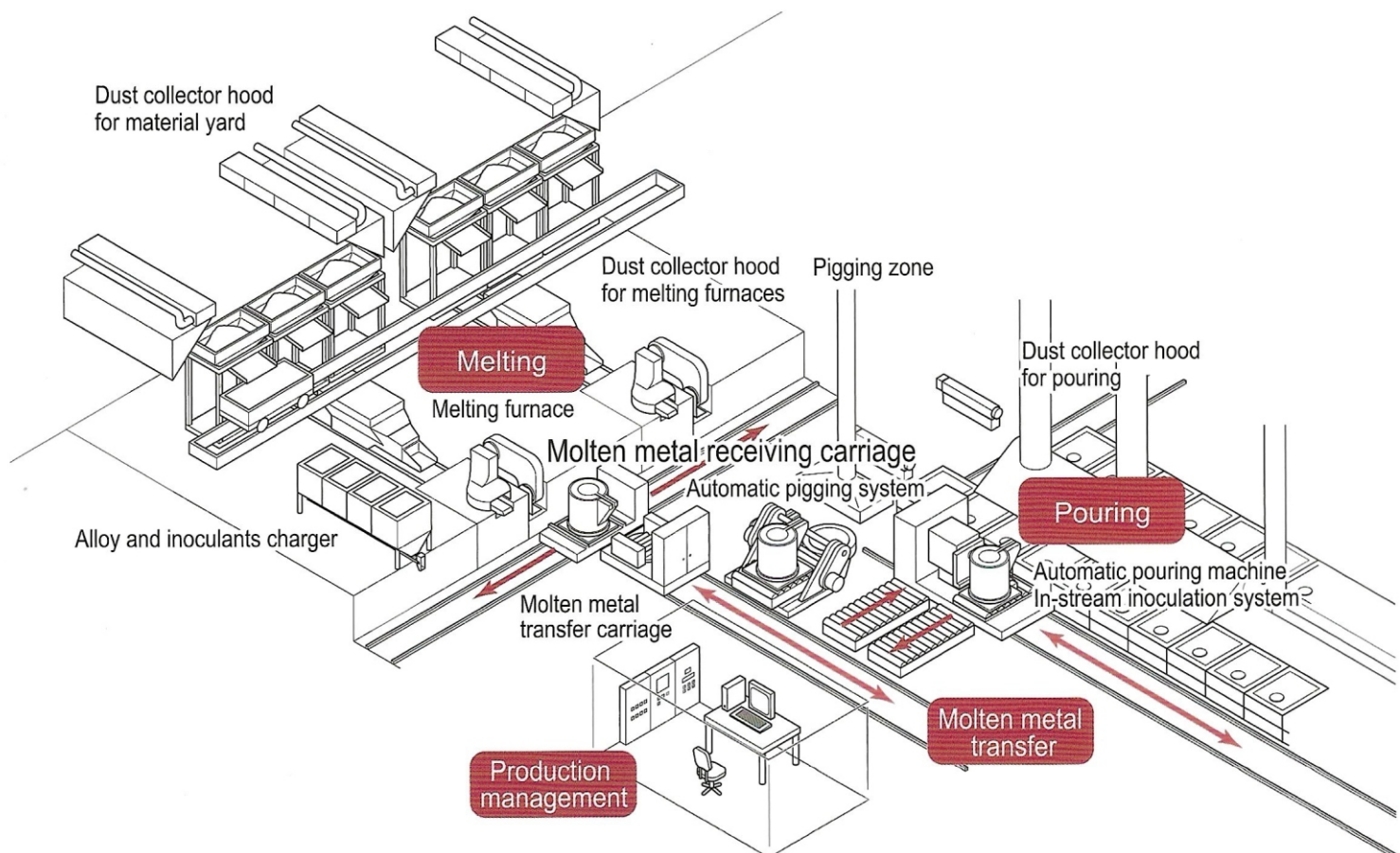


## Highly accurate and safe pouring system: Econo-Pour

### Improve yield

### A safer, cleaner, easy-to-work-in environment

Pouring correctly at the optimal temperature is important in producing high quality castings. To achieve this while protecting workers' safety, a system that operates efficiently with highly accurate automatic pouring is required. With our wealth of accumulated knowledge and experience, Sinto proposes the suitable pouring system that fits the customer's production needs and provides environmentally-conscious, safe and reliable casting production.



## Features of Econo-Pour

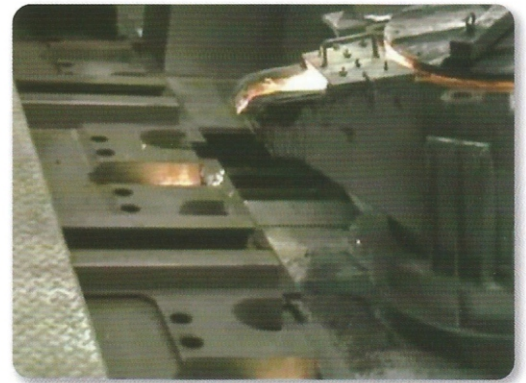
### Point 1. Safely reproduce expert work

Pouring necessarily involves the dangerous work of handling high-temperature molten metal as well as expertise in highly skilled techniques. Econo-Pour automates and simulates the exact work of expertised operator while safely reproducing consistent high quality pours.

### Point 2. Environmentally-conscious and energy saving pouring

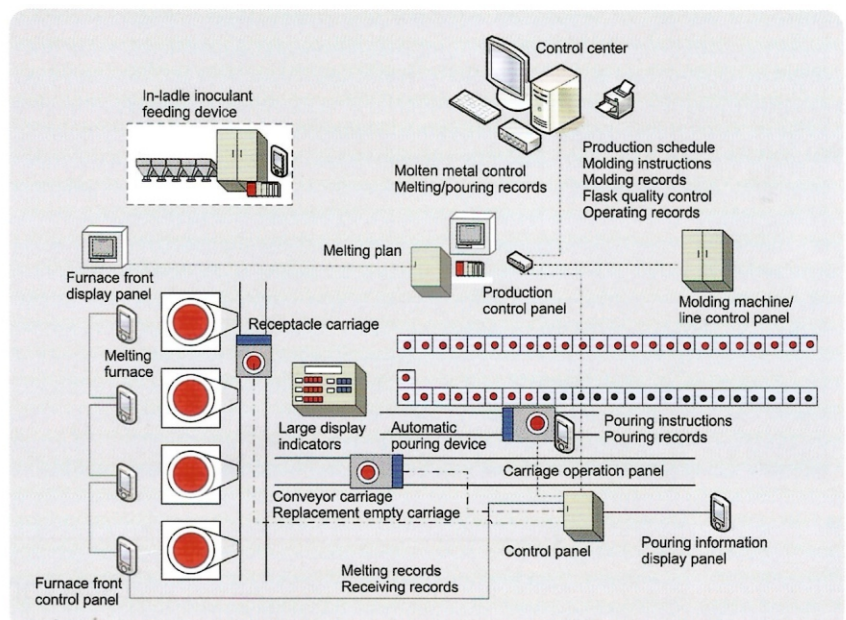
Reducing environmental burdens by saving power and using less scarce resources.

- Rapidly and accurately process constant amounts of molten metal. Minimizing the amount of metal by reducing spillage enables efficient production.
- In-stream inoculation system reduces required rare earth elements. Economic use of precious resources helps lower the costs of pouring.



### Point 3. Visualize production information with support for traceability

Support for traceability of pouring information facilitates management of products and molten metal. Linking pouring information with the molding line management system enables consolidated management of production information throughout the plant.

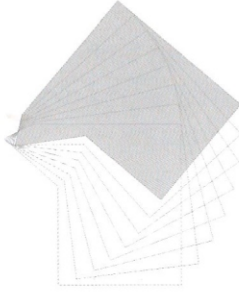


## Our broad lineup responds to the needs of our customers

### 1. Create high quality castings

#### FVNX series

- Highly accurate pouring by maintaining pouring based on teaching control technology.
- Realizes stable production of high quality castings.



### 2. Add pouring machine to your foundry with no loss of cycle time

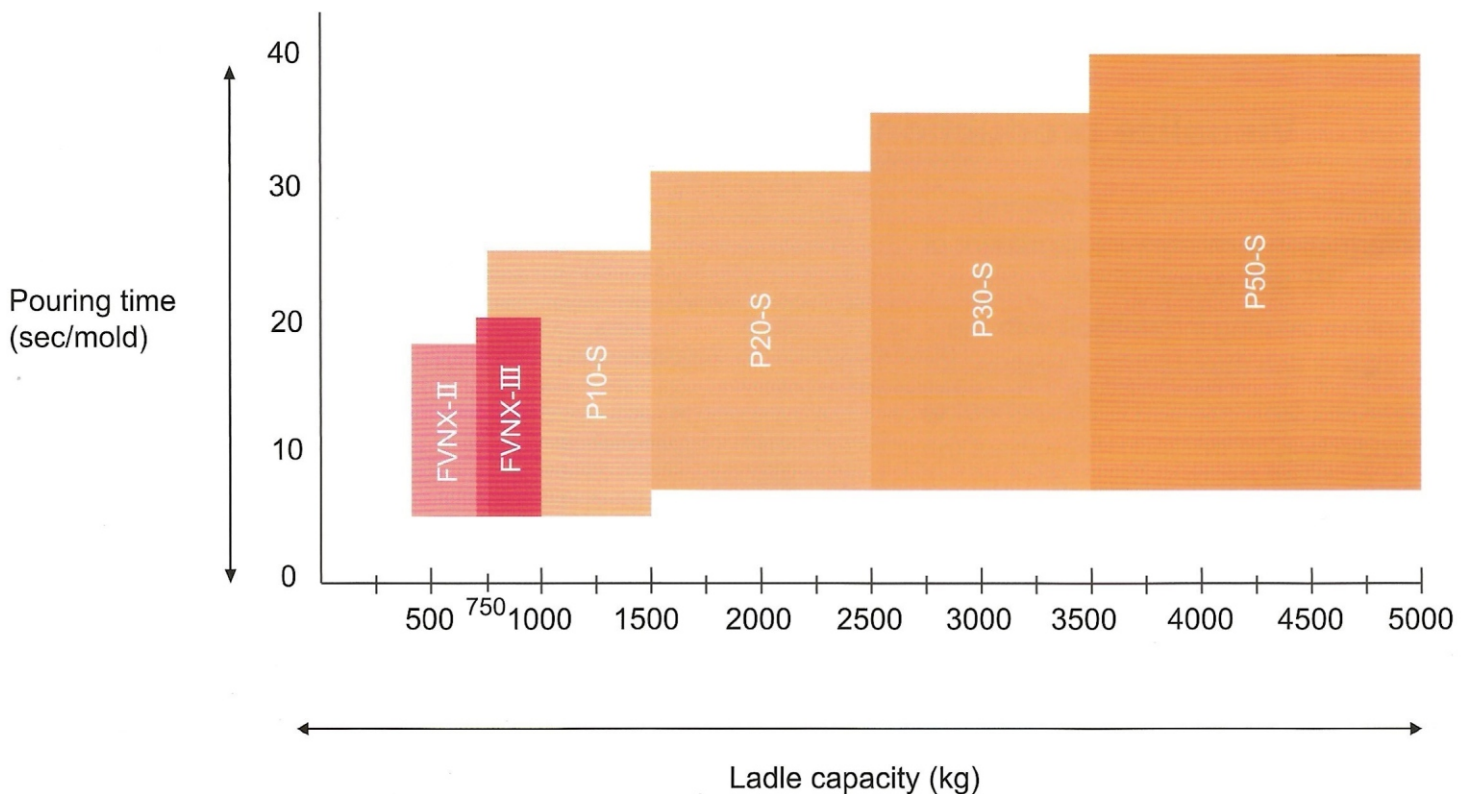
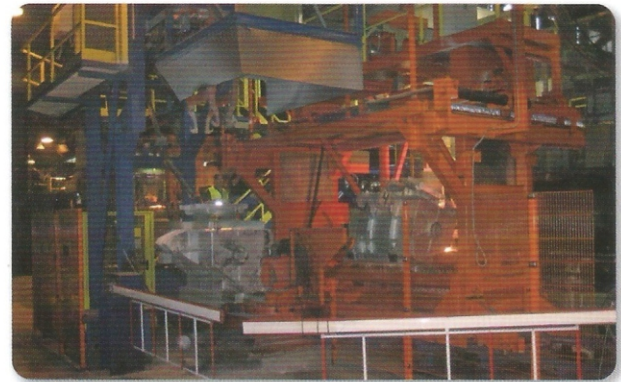
#### FVNX series

- Synchronized pouring system moves according to the line movement.
- Pouring can be done while molding line is being indexed. Cycle time will not be affected.

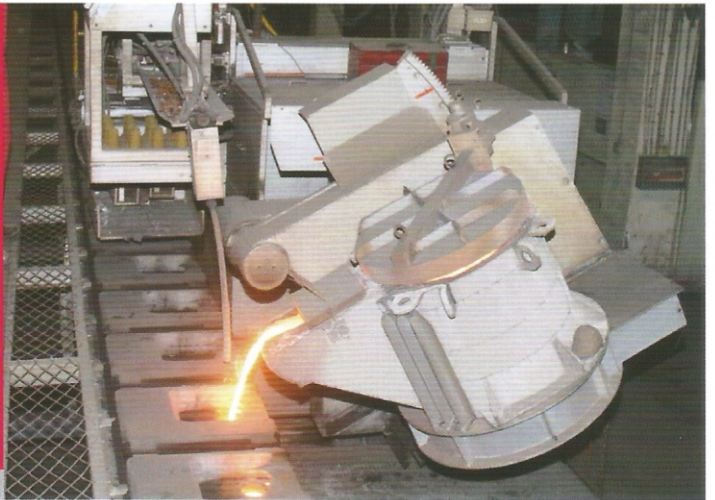
### 3. Automatic pouring for medium and large castings

#### P series

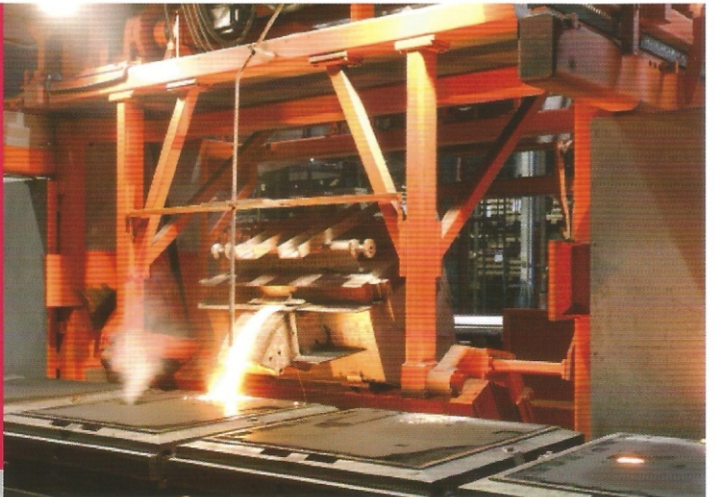
- Supports ladles up to five tons. Achieves automatic pouring for medium and large molds.
- Mobile and stationary ladle changer.
- Realizes stable production of high quality castings.



Automatic Pouring Machine  
**FVNX series**



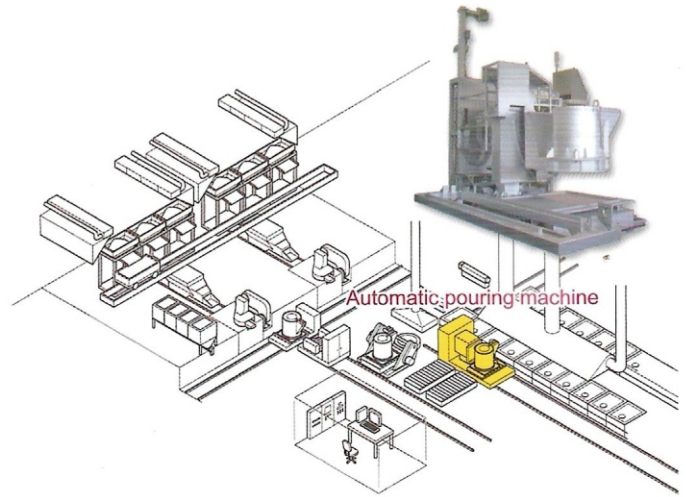
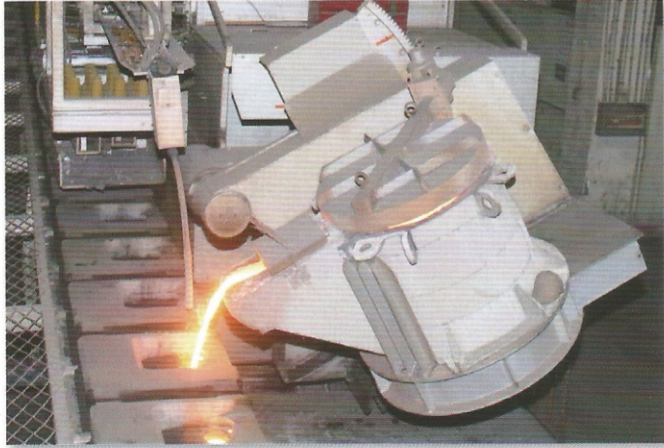
Automatic Pouring Machine  
**P series**



Molten Metal Transfer System



# Automatic Pouring Machine FVNX series



**Highly accurate pouring contributes to stable production.**

## Features

### Automated pouring work of skilled worker

Automated pouring work is same as skilled worker. Pouring machine repeats stable Automatic craftsmanship of experts.

### Maintaining high precision pouring

Constant shape of inner shape & nozzle of ladle are important factors to conduct accurate pouring. "Former for ladle inner shape forming" and "Wooden pattern for nozzle forming" to secure highly precise pouring over the long period are included in FVNX as a standard.

### Cost reduction

High speed pouring reduces frequency of "Waiting for Pouring" and efficient production becomes possible based on the melting furnace operation. Less molten metal splash and defect pouring contribute to cost reduction.

### Inherit the know-how of the existing ladle

Flexible correspondence to ladle shape. Similar ladle which is currently used can also be used.

### Equipment installation in a short period

Construction period for installation is short and immediate start-up of production line is available.

### Saving rare earth elements

Since inoculation is conducted, saving rare earth elements is possible.

## Control technology supporting the automatic pouring machine FVNX model

### 2-axis VN control

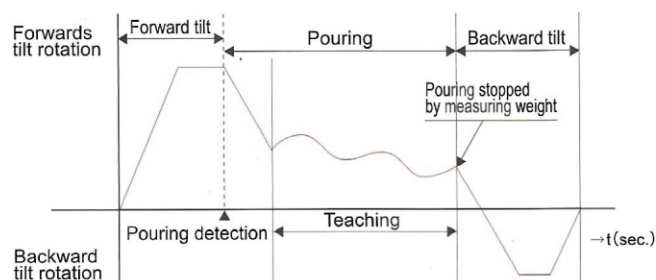
#### — Automated pouring work of skilled worker

2-axis (nozzle tilting and body tilting) enable accurate nozzle top adjustment and high quality pouring.

### Teaching system

#### — Repeating stable pouring work

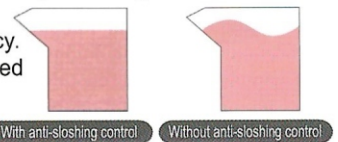
Only initial setting of pouring speed by tilt is done by the worker. Once the pouring program is the most optimum, teaching program is registered. The registered program is repeated to the same pattern. Non-teaching programming is also available by simple setting of pouring parameter.



### Anti-sloshing control

#### — High speed pouring work becomes possible

During automatic pouring or molten metal transportation, the molten metal surface forms waves in the ladle, becoming difficult to increase speed of transportation and pouring as well as pouring accuracy. The anti-sloshing control is designed to prevent these waves on molten metal surface.



### Synchronized pouring system

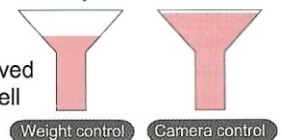
#### — Pouring is also possible while line is indexing

Pouring machine is synchronized with molding line movement. Wait time while indexing of molding line becomes unnecessary. \* It may not be possible in some high speed molding lines.

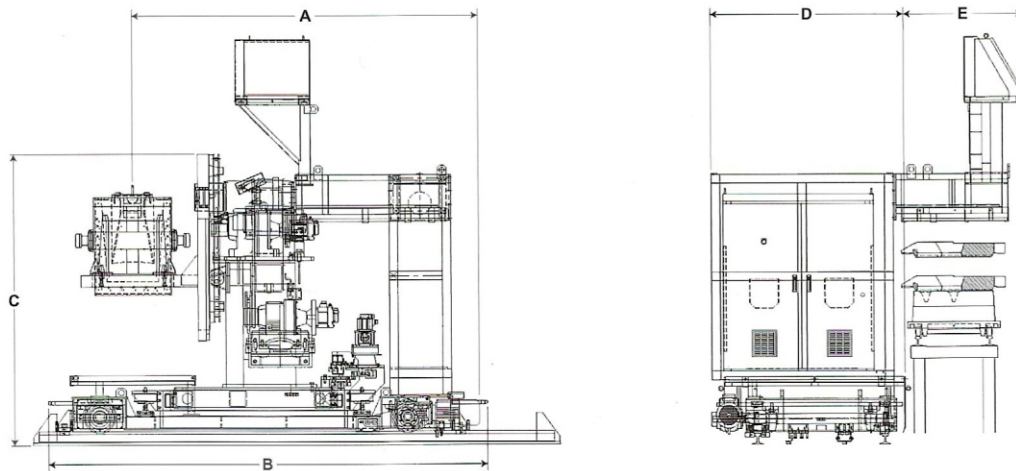
### Weighing system

#### — High precision pouring weight is possible

Changes of molten metal weight is measured by the load cells and then used to stop pouring based on a per-pattern preset pouring weight. Improved measuring accuracy is achieved through statistical processing of load cell measurements.



# for small to medium size ladles



## Dimensions (mm)

	FVNX-II	FVNX-III
A	3,200	3,500
B	3,900	4,100
C	2,500	2,700
D	1,800	2,000
E	1,000	

\*Use Ladle Exchange method by roller conveyer to change metal.

## Specifications

	FVNX-II	FVNX-III
Ladle Capacity	400-700 kg	700-1,000 kg
Processable Molding Speed (MAX)	25 sec/mold	30 sec/mold
Weight Control	Load cells	
Pouring Time *One Machine	5-18 sec.	5-20 sec.
Pouring Speed	2-10 kg/sec.	2-15 kg/sec.
Driving Units	Servo drives	
Functions	<ul style="list-style-type: none"> <li>• Teaching</li> <li>• Poured mold detect</li> <li>• Auto weight-measuring</li> <li>• Pouring-speed setting</li> <li>• Pouring-position automatic selection</li> <li>• Synchronized travel with molding</li> <li>• Tapping detect (pouring start)</li> </ul>	

## Option

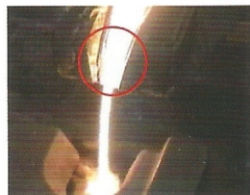
### In-stream inoculation device

Inoculation is done simultaneously with pouring. Amount of inoculants is adjusted in proportion relatively to the amount of pouring metal.



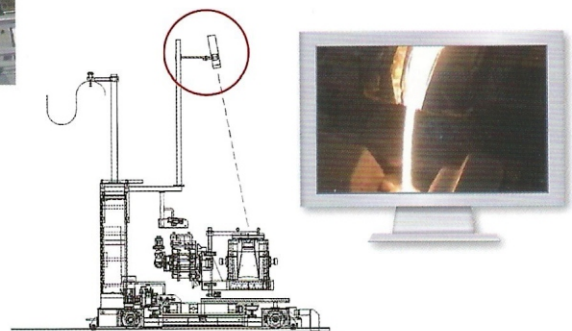
### Metal stream temperature measurement unit

Noncontact temperature sensor monitors temperature drop and enables detailed quality control.

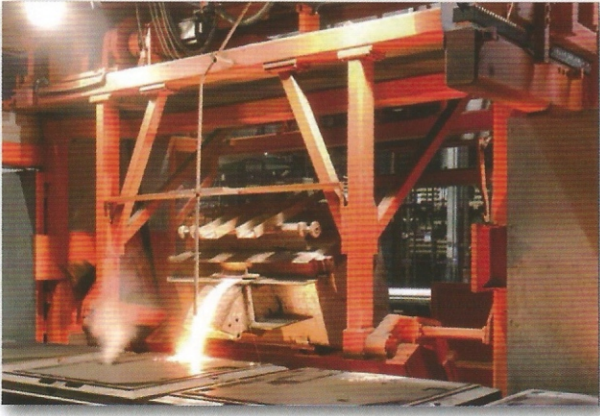


### Remote operation unit

The camera synchronized with pouring machine projects pouring condition around pouring cup and enables remote watching. Remote control and adjustment of pouring machine are possible.



# Automatic Pouring Machine P series

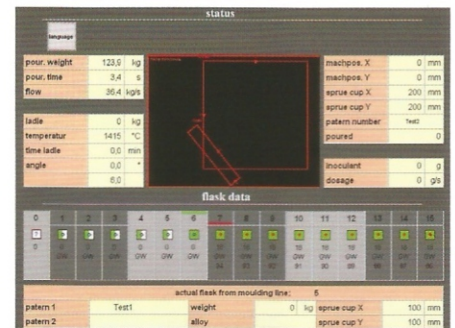


Fully automated pouring for ladle capacity up to five tons.

## Features

### Pouring condition monitoring system for high quality casting

The pouring stream of molten metal is monitored by means cameras, and a programmable control system regulating the pouring speed to match the in-flow capacity of the sand molds thereby ensuring more precise production of cast iron parts of every type and design.



status	
pour. weight	123.0 kg
pour. time	3.4 s
flow	36.4 kg/s
ladle	0 kg
temperature	1416 °C
time ladle	0.0 min
angle	0.0 °
angle	0.0 °
machpos. X	0 mm
machpos. Y	0 mm
spruce cup X	200 mm
spruce cup Y	200 mm
pattern number	tw2
pouring	0
inoculant	0 g
dosage	0 g/s

flask data														
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

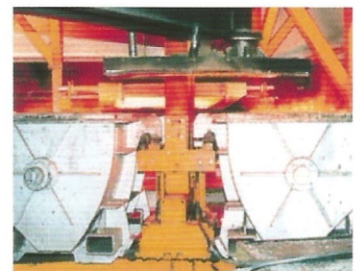
actual flask from moulding line: 5			
pattern 1	Test1	weight	0 kg
pattern 2	alloy	spruce cup X	100 mm
		spruce cup Y	100 mm

Online display of all pouring parameters on the monitor

### Suitable systems for each customer

Standard stationary type and optional mobile type ladle changeovers are available and can be expanded with additional functions as required.

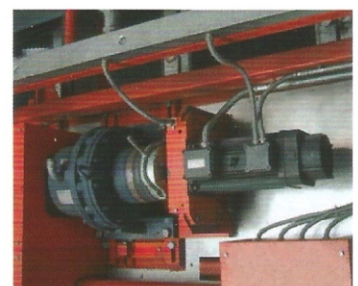
These have proven their value when used at molding plants of various designs.



Stationary revolving ladle changeover

### Precise pouring to achieve high quality castings

In all models pouring ladles with a segment construction are used, i.e. the flow rate is proportional to the angle of tilt of the ladle – a prerequisite for precise and loss-free casting.



Tilting mechanism

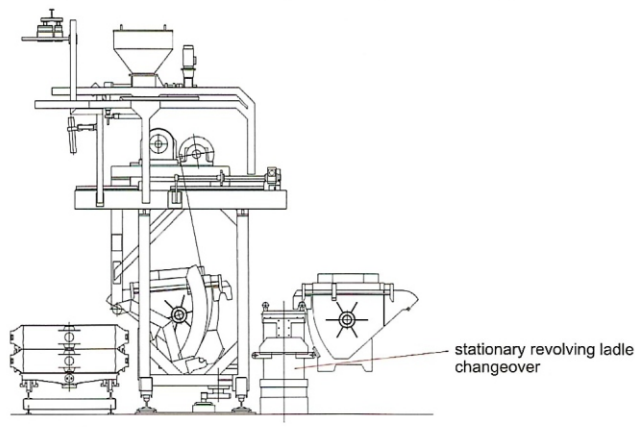


# for medium to large size ladles



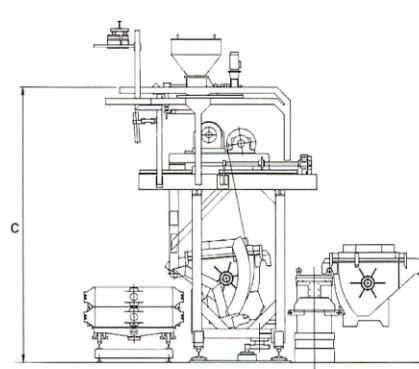
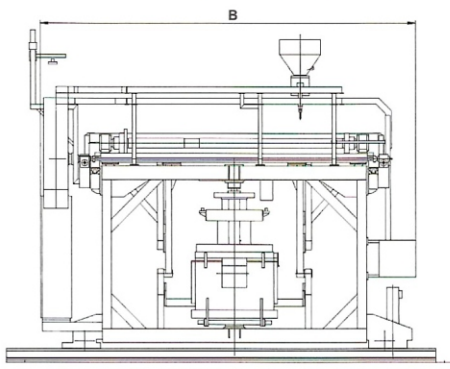
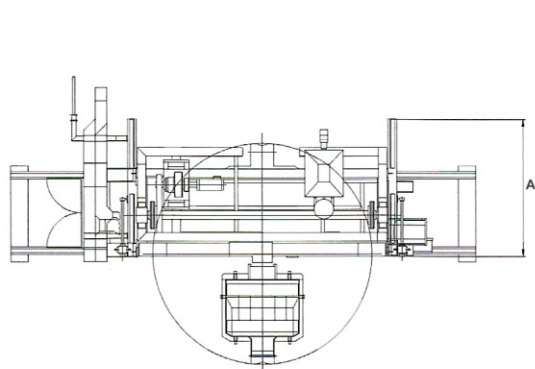
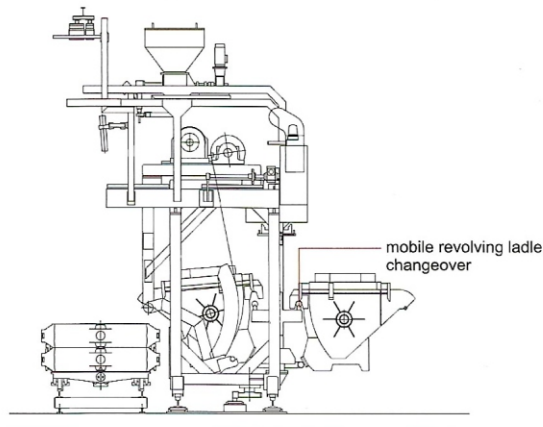
## P 10-S · P 20-S · P 30-S · P 50-S

Pouring automat with stationary revolving ladle changeover



## Option P 10-W · P 20-W · P 30-W

Pouring automat with mobile revolving ladle changeover



### Dimensions (mm)

	P10-S(W)	P20-S(W)	P30-S(W)	P50-S
A	2,000	2,400	2,600	3,000
B	5,700	6,200	6,500	7,200
C	4,000	4,400	4,800	5,500

### Specifications

	P10-S(W)	P20-S(W)	P30-S(W)	P50-S
Ladle Capacity	750-1,500 kg	1,500-2,500 kg	2,500-3,500 kg	3,500-5,000 kg
Processable Molding Speed (MAX)	18 sec/mold	30 sec/mold	40 sec/mold	60 sec/mold
Weight Control	Load cells			
Pouring Time *One Machine	5-20 sec.	5-20 sec.	5-48 sec.	5-52 sec.
Pouring Speed	3-12 kg/sec.	8-15 kg/sec.	10-25 kg/sec.	15-30 kg/sec.
Driving Units	Servo drives			
Functions	Pouring control by means of sensor and camera system ; weight measurement and pouring time			

### Option

#### Mobile revolving ladle changeover

Ladle changeover built in pouring machine realizes quick ladle change. This achieves pouring without stopping molding line. (W series)

#### Ladle lid lifting unit

Ladle lid with integrated automatic removal device for minimisation of temperature drop during spheroidization.

#### Inoculation unit (chute included)

Inoculant dosing device to regulate the exact feed of the injection agent into the pouring stream of molten metal molding lines.

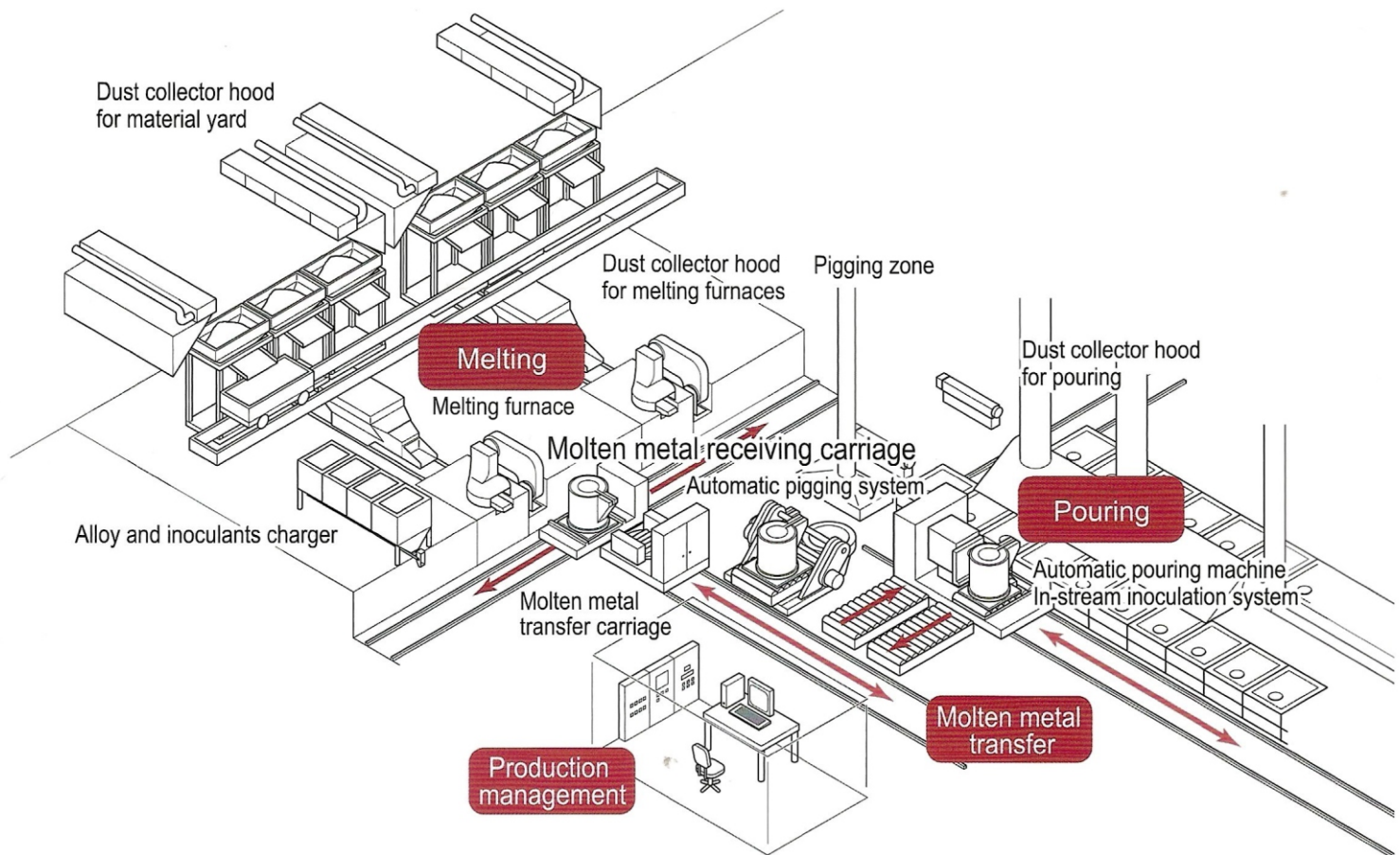
#### Ladle lifting unit

#### Synchronizing with pouring line pusher (encoder)

Control module accompanying the pouring process in continuous molding plants or on advance feed through synchronisation.

#### Rail extension

# Molten Metal Transfer System



**Transfers molten metal safely from melting furnace to pouring area.**

## Features

### Automation of hazardous ladle operation

System automation dispenses workers from direct ladle operation and provides safer operation.

### High productivity

Accurate and high speed transfer achieves efficient operation.

### Safe transfer work

Ladle transfer without crane and forklift prevents metal spillage and reduces workers' risks.

### Saving energy

Reducing frequency of emptying ladle prevents molten metal from temperature drop and saves electric power consumption.

## Our transferring system enables accurate pouring and safe operation

### Molten metal receiving carriage

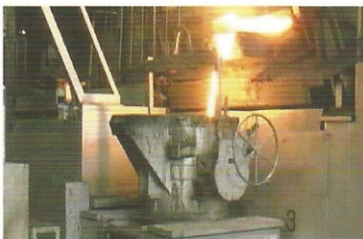
This receives molten metal from furnace and transfers it to the molten metal transfer carriage. There, the empty ladle is exchanged with the full ladle.

### Molten metal transfer carriage

This receives molten metal from furnace and transfers it to the pouring unit. There, the empty ladle is exchanged with the full ladle.

### Alloy and inoculant charger

This calculates amount of alloys and inoculants from molten metal materials and amount, then feeds the alloys into empty ladles.

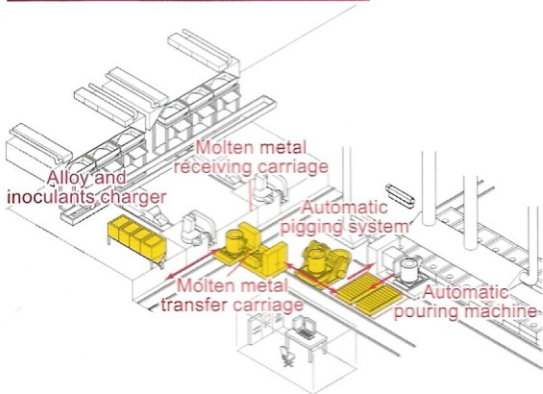


Accurate inoculant feeding by electromagnetic feeder and load cell.

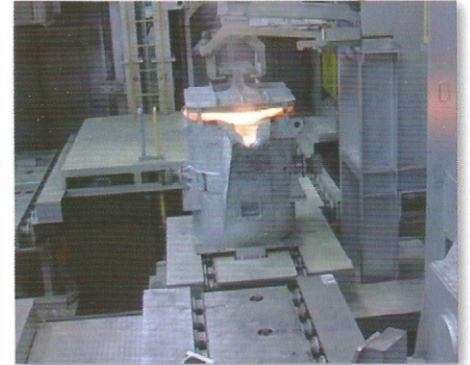
## Molten metal supplying device

Molten metal supplying method is an important point in whole transfer system. We propose optimum system from two alternate systems. The best automation is proposed to make the most of their own know-hows.

### Ladle change method



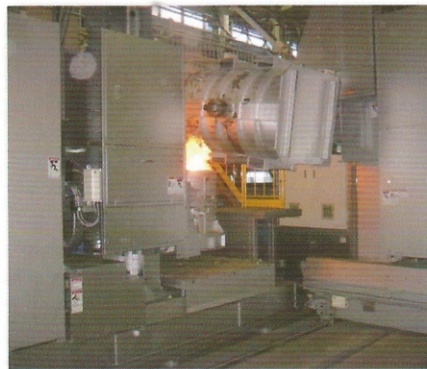
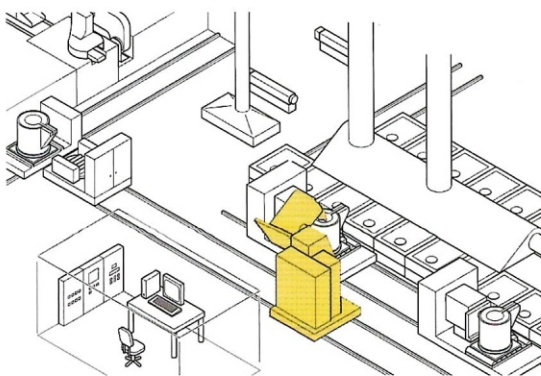
Molten metal transfer carriage



Ladle change by roller conveyor

Molten metal is transferred by exchanging ladles between transfer carrier and pouring machine. This method prevents temperature drop of molten metal and is good for reduction of casting defects.

### Empty replacement method



Molten metal transfer from transfer carriage to pouring ladle. (Left: Transfer carriage, Right: Scene from pouring ladle)



Molten metal is transferred from the transfer carriage into the pouring ladle. This method assures alloy reaction and enables accurate molten metal composition control.

## Production information management system

