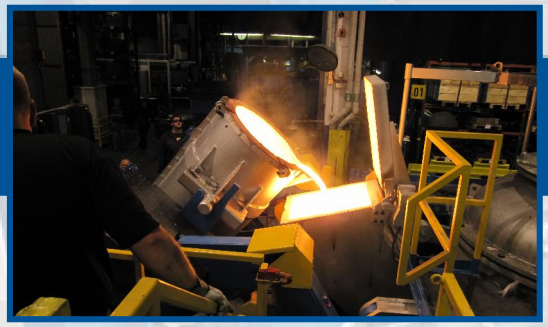
OTTOJUNKER

We understand Metals

Pouring Furnaces for Cast Iron RGD Ge



- Pressurized
- With Stopper Control
- Induction Heated / Unheated

YouTube

www.otto-junker.de

Pouring unit for automatic pouring of various cast iron grades on indexing and continuous moulding lines

Technical features/applications

- Availability of ready-to-cast iron on the moulding line
- Holding of molten iron at constant pouring temperature
- Slag-free pouring of iron
- Dosing of the iron entering the mould
- Automation of the pouring process
- Easing the job of the operating personnel
- Improvement of metal quality

Economic advantages

- Reduced rate of rejects
- No residual iron and improved ladle economy
- Increased production thanks to better utilization of moulding machine
- Casting operation independent of the melting shop
- Savings in labour cost
- Improvement of workplace conditions

▶ Pouring unit for 6 tonnes of cast iron, type RGD Ge 6/350, on flaskless moulding machine, bath level detection by float

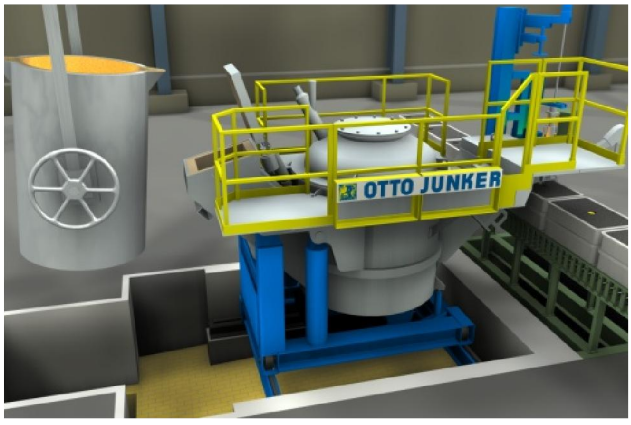
Layout and design

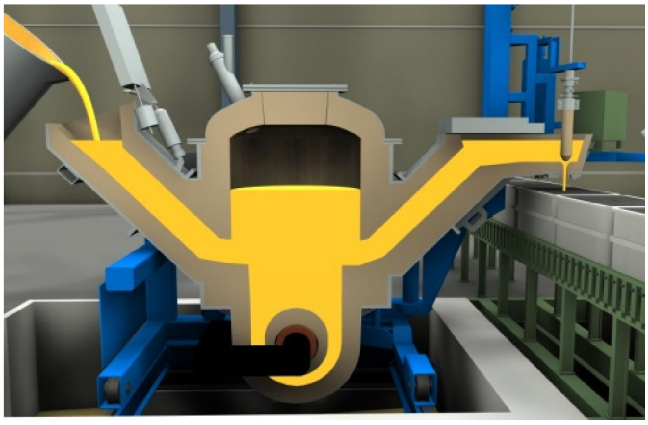
The OTTO JUNKER pouring furnace, type RGD, is made up of the cylindrical furnace vessel with siphon-like filling gate and pouring spout and a flange-mounted stopper mechanism. The easily replaceable inductor is flange-mounted at the bottom .

Filling gate and pouring spout can be arranged at an angle of +/- 90° or 180° to each other (see schematic drawings).

The furnace vessel can be tilted hydraulically around the filling gate for emptying. For approach to varying positions of the mould sprue cup, the furnace vessel is mounted on a double carriage for movement along and across the moulding line.

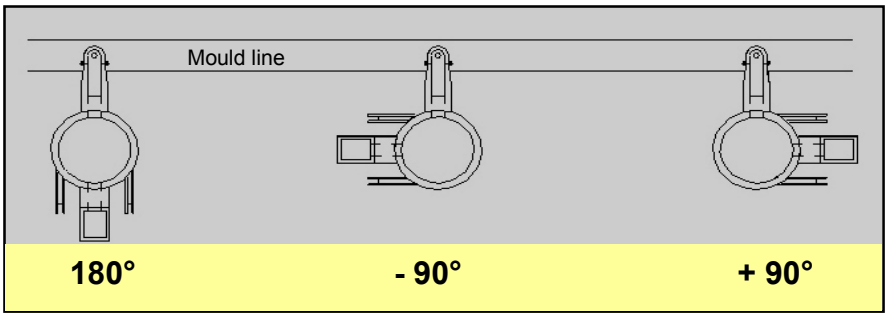
▶ Pouring furnace RGD for movement along and across the moulding line
▶ Furnace is tilted hydraulically for complete emptying.





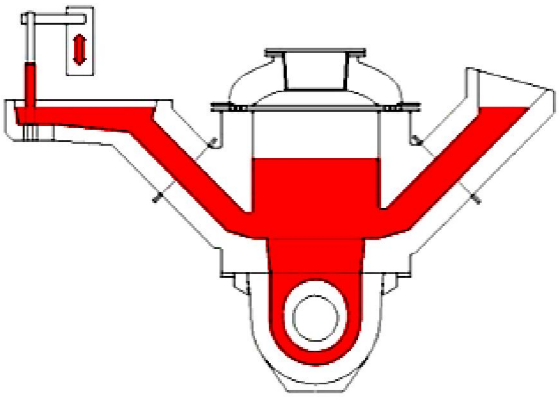
Designs

Arrangement
filling gate / pouring spout



Advantages of this concept

- Various possibilities of arranging the inductor, filling gate and pouring spout on the furnace vessel for adaptation to the space available
- Minimum heel content
- Rapid and easy replaceability of the inductor casing
- Long service lives of the inductor due to optimized wall arrangement



Stopper system concept and advantages

The furnace vessel is pressurized by dried air or protective atmosphere which makes the metal rise through the pouring siphon up into the pouring spout with the stopper closed. The metal level in the spout is controlled via a float system (alternatively contact-free via laser). Additional safety electrodes relieve the furnace pressure if the bath level is too high. The pouring rate is a function of the pouring nozzle diameter, the metal level above the nozzle and the degree of stopper lift. The pouring rate is infinitely variable during the pour by changing the stopper lift.

Design features

- Quick and precise adjustment of stopper stroke
- Three-dimensional control of stopper position
- Stopper and pouring nozzle readily and easily replaceable
- Stopper suspension can be swung out of pouring spout
- Automatic furnace pressure relief and stopper raising in the event of pouring breaks exceeding a preset time
- Reproducible mould filling cycle
- No deterioration of pouring accuracy by slag formation in the furnace vessel

▶ 8-tonne pouring unit for spheroidal graphite cast iron

▶ 6-tonne-pouring unit for spheroidal graphite cast iron with bottom-mounted inductor (shop assembly photo)

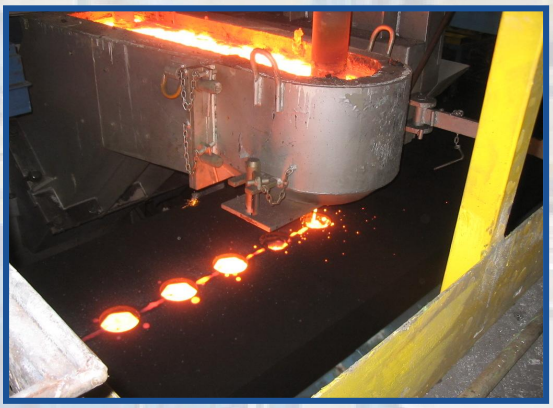
Applications and special designs

Pouring furnace (RGD) applications

- flask moulding lines (1)
- flaskless moulding lines (2)
- simultaneous pouring and filling (3)
- anode rodding plants (4)
- centrifugal casting machines
- pouring with intermediate ladle (5)

(1)

(2)



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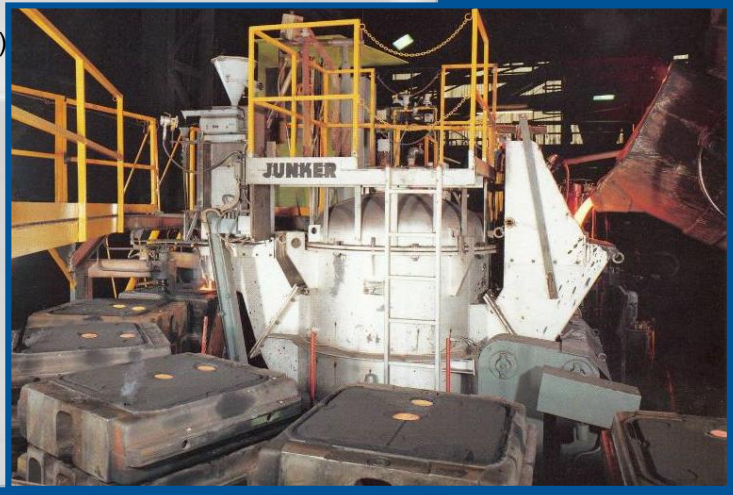
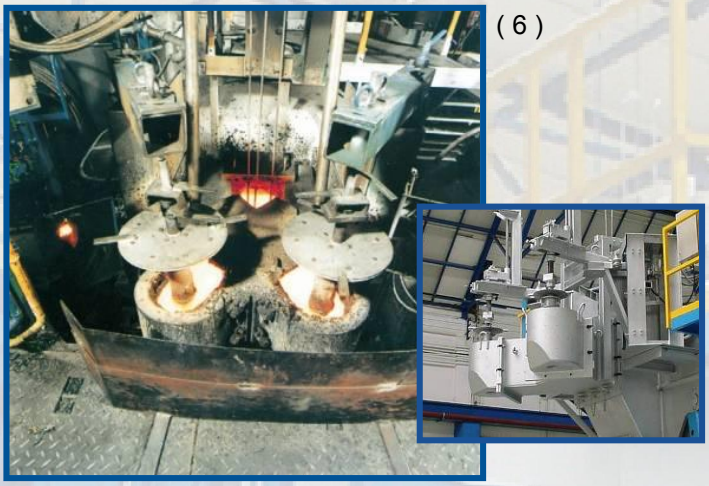


(4)

(5)

- double stopper system (6)
- filling station for automatic tilting of the molten iron ladle (7)
- RGD with filling station (8)
- UGD – unheated pouring system, inductor ca be retrofitted anytime (9)
- integrated weighing system for weight measurement (10)

(6)



(7)

(8)

(9)

(10)

Metal level control in the pouring spout

Laser system

Contact-free detection of the bath level is effected via laser system. The set metal level is kept constant by adaptation of the pouring pressure.

Pouring spout with metal sensing electrodes and quickly replaceable stopper

Float system

A ceramic float is immersed into the melt. As the bath level changes, the change in buoyancy is detected and the pouring pressure is adjusted such that the set metal level is reached again.

Safety electrodes

These electrodes limit the max. admissible metal level in the pouring spout. When the electrodes get in touch with the melt, there is an instant safety relief.

Pouring control systems

1. Fully automatic pouring control with Teach-in system

Pouring operation according to a given pouring profile is effected via the Teach-in system.

For each pattern plate the stopper lift movements are controlled by hand using a joystick in such a way that the ideal metal level is achieved in the mould sprue cup. The stopper lift movement thus ascertained is stored as a pouring profile and can be reproduced continuously to maintain the same quality.

To compensate for erosions or accretions on nozzles and stoppers, the pouring profile can be adapted at any time.

2. Automatic mould filling via laser pouring system

The metal level in the sprue cup is detected via laser distance measuring system and kept at a pre-determined set point. This is done automatically by adjustment of the stopper lift allowing for a proper adaptation of the mould filling process to the swallowing capacity of the mould.

The system can be parameterized such that by the end of the pour, the metal level in the pouring spout is lowered in order to minimize returns.

This automatic mould filling is not affected by changes to the stopper or nozzle geometry.

Inoculation

For specific iron grades and superior castings, inoculation into the pouring stream is necessary. For such applications, OTTO JUNKER pouring furnaces are equipped with an inoculant dosing facility. The inoculant is taken from the storage bin via a variable worm conveyor into a blowpipe and then blown into the pouring stream using compressed air or nitrogen. An electronic control system provides the choice of starting the automatically monitored inoculant input on.

Inoculation system

commencement of the pouring operation or with a given time delay

Refractory lining and maintenance

The refractory lining material is selected depending on the metal quality and the mode of operation of the pouring furnace. Usually, the inductors are lined with dry corundum or magnesite mix, the furnace vessel with corundum mix (dry or cast).

Maintenance work is restricted to cleaning and deslagging of the filling gate, the filling tube and the pouring spout with nozzle and to replacement of the pouring nozzle or stopper subject to wear.

Checks are primarily made of cooling water and shell temperatures and the electrical data of the inductor which are indicative of the lining condition of the inductor and the furnace vessel.

Power supply equipment and control gear of compact design

The electrical equipment comprises the power supply equipment, the electric controls and measuring and monitoring facilities which are installed in a compact cubicle ready for connection.

The power section is made up of the multi-tap transformer, the furnace power switches and the capacitors for power factor correction which is done automatically via a program within the PLC. Usually, phase balancing equipment is provided for three-phase balanced connection to the mains. As an alternative, the power section may include a transistorized (IGBT) frequency converter with infinite power control

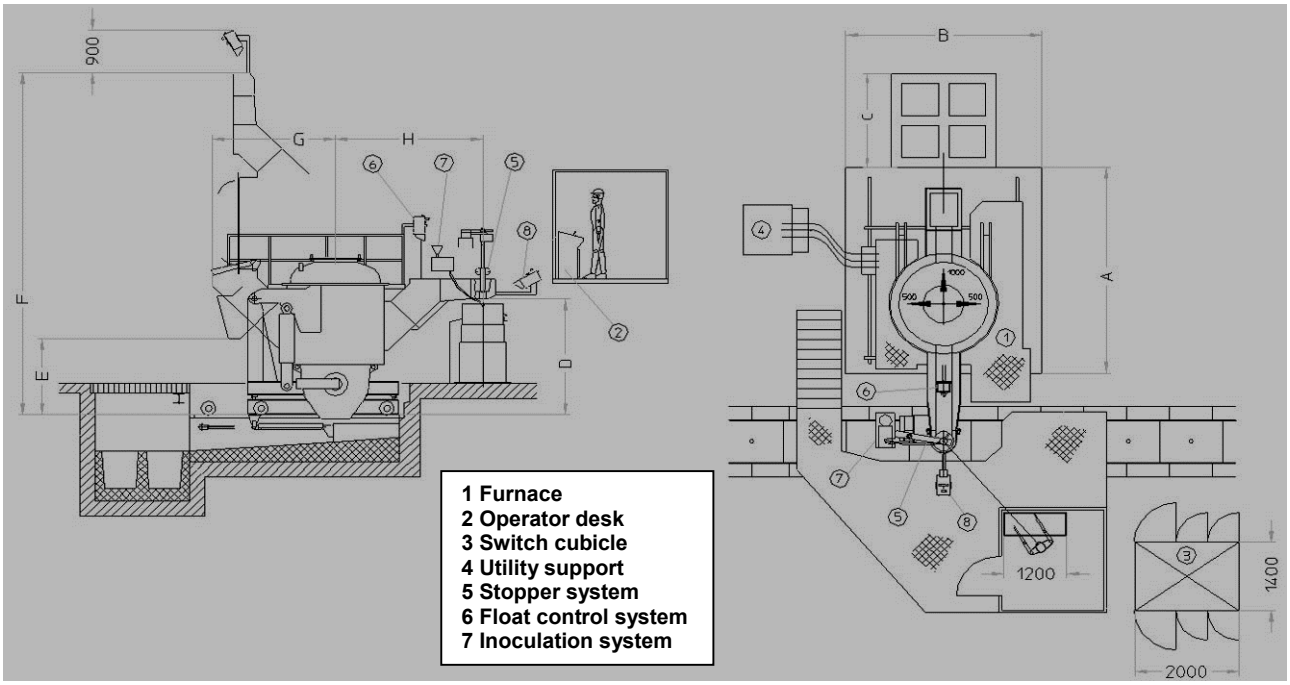
▶ Operator desk of pouring furnace

Control of the plant is via PLC. All the actuators required for operation of the furnace plant are clearly arranged by functions on a central operator desk A multi-function panel with colour display arranged in the middle of the desk shows the electrical measuring data of the furnace heating system, the condition of the pressure control, the pouring system and further plant components. Adjustment of all the required parameters is via clearly structured menus. The desk is arranged such that the operator has the best possible view of the pouring process.

▶ IGBT converter

Pouring furnaces are available in different power rating/useful capacity combinations (see table overleaf) allowing holding at temperature and superheating of the melt.

Space requirements for cast iron pouring furnaces of type RGD



type	t[1)]	kW[2)]	A	B	C	D	E	F	G	H[3)]
2/150	2	150	3900	3200	1400	2300	1850	6500	2100	2200
3/200	3	200	3900	3200	1400	2450	1930	6700	2100	2400
4/250	4	250	3900	3200	1400	2450	1930	6700	2160	2400
5/300	5	300	4200	3750	1800	2350	1550	7000	2350	2800
6/300	6	300	4200	3750	1800	2350	1550	7000	2350	2800
8/350	8	350	4700	4800	2200	2550	1600	7700	3000	3000
10/350	10	350	4700	4800	2200	2550	1600	7700	3000	3000
15/500	10	500	5000	5500	2500	3350	2800	9100	2750	3250
20/600	20	600	7200	5100	2800	3400	5150	10800	3200	3300
40/1200	40	1200	8500	7100	3550	3900	5300	11500	4400	4400

1) Useful capacity
2) Other combinations of useful furnace capacity and inductor rating are possible.
3) Depending on moulding line cross section and sprue cup position
All data refer to standard travels of +/- 500 mm along and 1,000 mm across the moulding line, Subject to change.

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WE UNDERSTAND METALS

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