

Metallurgical equipment.

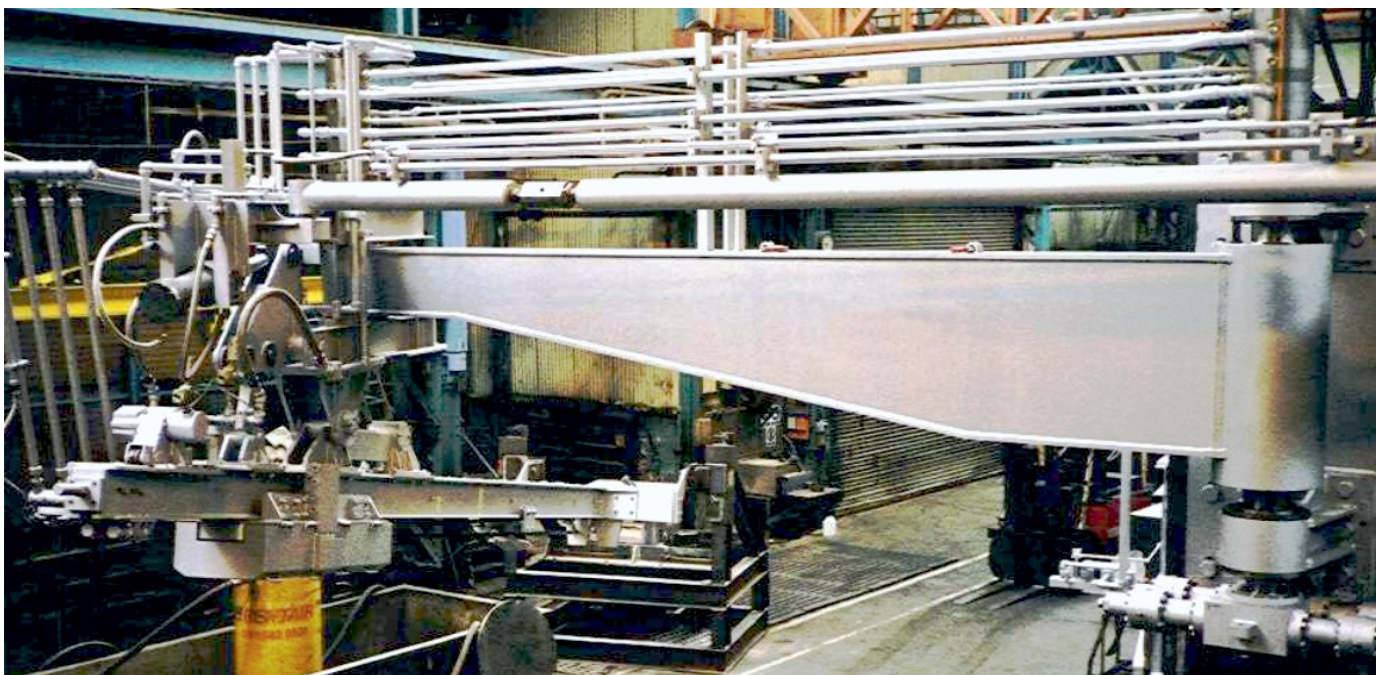
Equipment for blast-furnace melting operation stage

Equipment of hydraulic complex for the taphole servicing

Equipping the blast furnace cast house with a modern hydraulic complex for taphole servicing ensured:

- 1.5 times reduction in the opening time of a taphole,
- 50% reduction in taphole closing time

The use of up-to-date control systems (APCS) has increased the operational reliability of the complex's systems, increased the safety of opening and closing of taphole, reduced the complexity of maintenance and repair of equipment.



Hydraulic complex includes the following equipment:

- apparatus for blast furnace taphole closing;
- apparatus for blast furnace taphole opening;
- manipulators for casting trough covers;
- hydraulic and pneumatic systems of the cast house;
- control system for hydraulic complex equipment;
- tilting troughs.

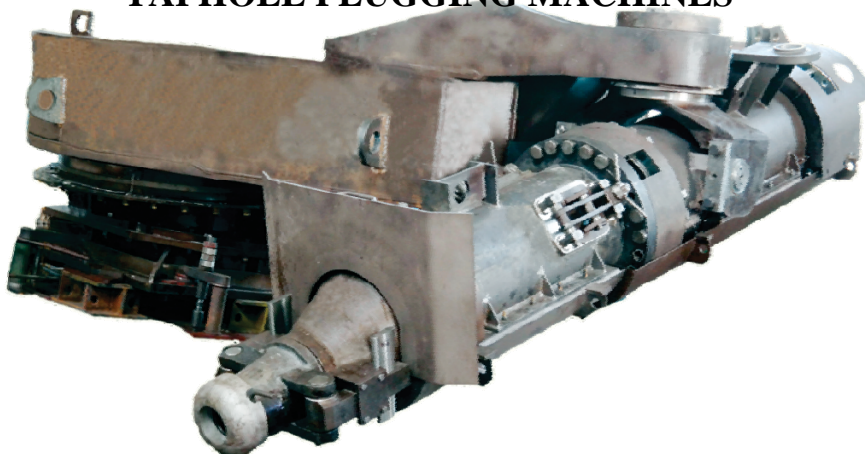
The advantages of the complex:

- the ability to control the pressing pressure ensures the operational reliability of the machine;
- reduction of losses of pig iron with slag to the level of 0.2-0.3% compared to 3% according to old technology;
- reduction in the complexity of operations for the production of cast iron;
- labor safety improvement.

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TAPHOLE PLUGGING MACHINES



Iron taphole plugging machines are designed to plug the blast furnace tapholes with the refractory filler material. They are installed in the blast furnace cast house.

Hydraulic control of the operations:

| Parameter | Value | |
|--|---------------|----------------------|
| Taphole plugging | 15/60 s | Step-by-step control |
| Machine rotation | 15...60 c | Stepless control |
| Pressure in pressing cylinder | Up to 300 bar | |
| Positioning control for nozzle vertical position | | |

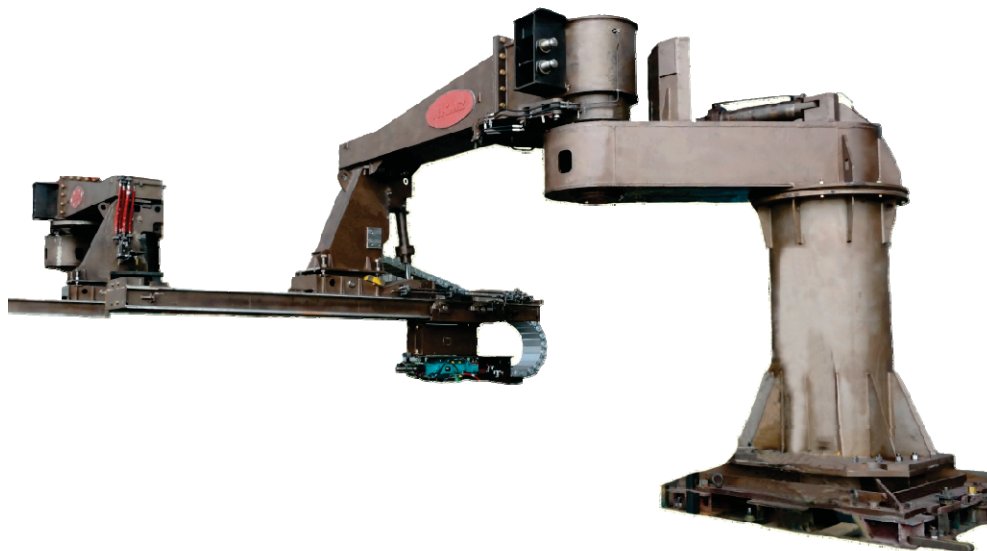
Technical characteristics

| Parameter | Value |
|--|---------------------|
| Nominal capacity of working cylinder, m ³ | 0,25...0,5 |
| Weight pressure under plunger, MPa (kgs /cm ²) | 15...20 (150...200) |
| Pressing force, t | 32 |
| Taphole clay delivery speed, m/s | 0,2 |
| Tilt angle adjustment range for clay gun, degree | 11 – 17 |
| Nozzle tip diameter, mm | 150 |
| Nozzle tip adjustment range: | |
| - up - down, mm | 200 |
| - right - left, mm | 200 |
| Machine height, max., mm | 1700 |

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BLAST FURNACE TAPHOLE OPENING MACHINES



Taphole opening machines are designed to open the blast furnace tapholes at heat tapping. They are installed in the blast furnace casthouse.

Hydraulic control of the operations:

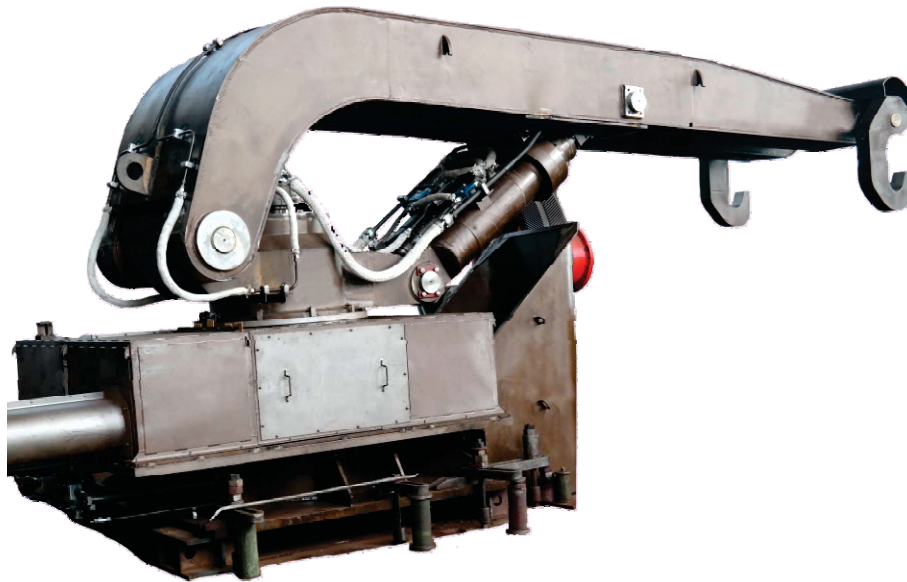
| Parameter | Value | |
|-------------------------------|-----------|----------------------|
| Arm rotation time | 10...30 s | Stepless control |
| Carriage travel | 5/15 s | Step-by-step control |
| Opening mechanism inclination | 3/6 s | |
| Taphole opening | 30/600 s | |

Technical characteristics

| Parameter | Value |
|--------------------------|-------------|
| Feed travel, mm | 4000 |
| Penetration speed, m/min | 1,2 |
| Delivery speed, m/sec | 1 |
| Rotation angle, degree | +145...-145 |
| Rotation radius, mm | 4100 |

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LAUNDER COVER LIFTING MANIPULATORS



Manipulators are designed to lift laundry covers conveying taphole plugging and opening machines to the iron tapholes. They are installed in the blast furnace casthouse.

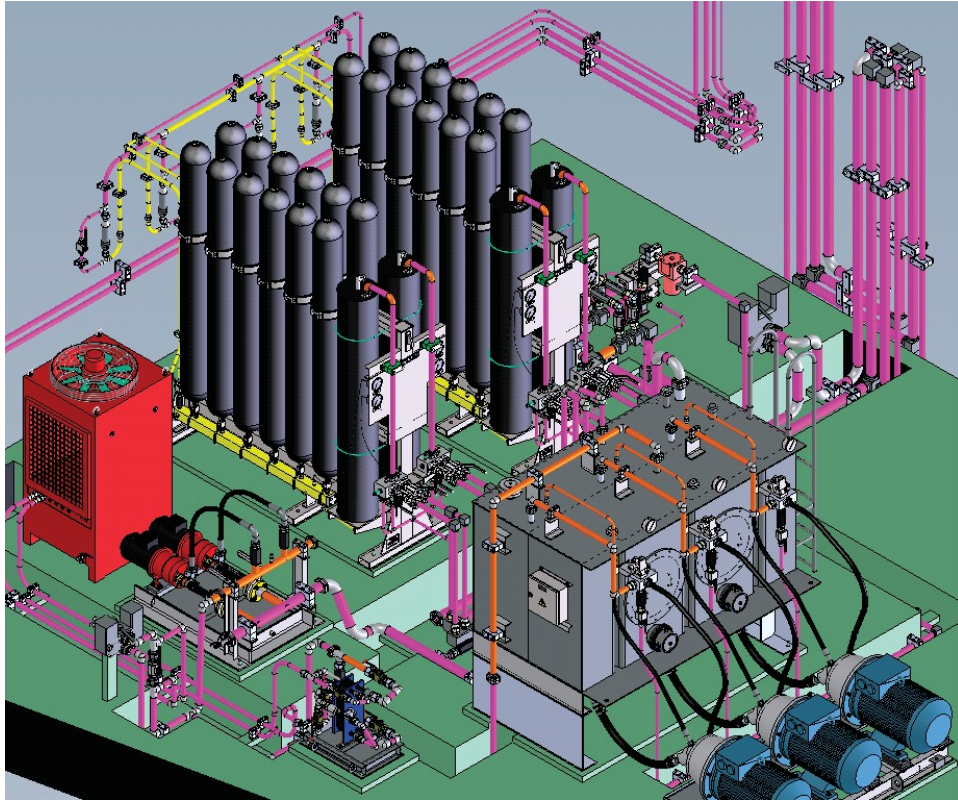
Technical characteristics

| Parameter | Value |
|---------------------------|-------|
| Load carrying capacity, t | 20 |
| Rotation angle, degree | 130 |
| Lifting speed, m/min | 10 |
| Clamping length min, m | 2,5 |
| Clamping length max, m | 9,15 |

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PUMP-AND-ACCUMULATOR STATION



Pump-and-accumulator station is designed for servicing of taphole plugging/opening machines and launder cover lifting manipulators. It consists of hydraulic tanks, pumps unit, hydraulics columns, air (nitrogen) preparation plant, compressor.

HYDRAULIC COMPLEX CONTROL SYSTEM

It is designed to control the operation of taphole plugging / opening machines and manipulator.