

MODERNISATION OF FOUNDRY ARC STEEL MELTING FURNACES

with replacement of hydraulic equipment and implementation of automated melting process control system

Modernisation of equipment of an arc steel melting furnace allows to:

- increase the furnace's capacity;
- lower electric energy consumption;
- simplify maintenance and raise production standards
- with minimum capital expenditures

Objective of modernisation works:

to replace old-fashioned hydraulic equipment and implement automated arc furnace control system to improve technical and economical efficiency and the quality of melted metal.

The use of new equipment will allow to:

- increase electrode moving rate which will lead to an improvement in the regulation quality indicators;
- increase the furnace operating reliability;
- enable hydraulic equipment status control from the furnace control panel;
- significantly lower the hydraulic fluids consumption by eliminating leaks in the hydraulic equipment.

1.1. Hydraulic equipment control system

enforces the following functions:

- Direct digital control of the hydraulic actuating mechanisms;
- Control of the status and malfuctions in the hydraulic equipment.

1.2. Automated power controller

designed for regulating the power output of steel melting three-electrode furnaces and ensures the following:

- Automated maintenance of the set parameter separately for different phases (current/voltage/resistance);
- Automated arc ignition;
- Protection of electrodes when bumping into non-conductive batch;
- Prevention of electrodes immersing into molten metal;
- Control according to the melting programme;
- Elimination of the power transfer effect by formation of separate tasks according to phases;
- Bumpless transfer from manual to automated control and back.

1.3. Operator's workstation

used for interaction with the operator of the automated power controller. Operator's workstation ensures the following:

- Displaying current technological parameters and system messages in real time;
- Displaying archived technological parameters and system messages;
- Possibility to switch to backup hydraulic distributors;
- Access to tuning parameters of the hydraulic equipment control system;
- Auxiliary power supply;
- Formation of the melting programme;
- Setting the controller's operating modes;
- Access to the controller's tuning parameters;
- High-voltage equipment status control;
- Recording of the technological parameter;
- Archiving of the technological parameters;
- Possibility to exchange information with the automated control system of the technological process of the melting section of the production.

In 2009, Promtraktor-PROMLIT LLC (City of Cheboksary) was successfully modernised.

BEFORE MODERNISATION

AFTER MODERNISATION



Pump and accumulator station



Control panels







Control cabinets

As a result of the modernisation, electric energy consumption was reduced by 5%, and duration of melting, by 10%.



FURNACE MODERNISATION INCLUDES THE FOLLOWING STAGES:

	Stage	Duration
1	Specialists of COMTERM Scientific Production Company LLC examine the furnace and compile a report on the current condition of the equipment and priority areas of modernisation	3 weeks
2	A work schedule is compiled and approved	1 week
3	Hydraulic equipment, electrical diagrams, automated control system are designed; construction task, cable log, external connections diagrams are drawn	3 months
4	Production and delivery of equipment	4 months
5	Supervised installation and adjustment are performed at the Customer's site	1 month
6	Technical support of pilot operation and training of personnel	1 month
	TOTAL:	10 months
 Delivery package includes the following (subject to revision): pump and accumulator station with automated regulation of the oil pump capacity; bydrocylinders and plungers of electrode moving, roof lifting and swinging, furnace 		

- hydrocylinders and plungers of electrode moving, roof lifting and swinging, furnace tilting mechanisms;
- hydrocylinder of the working door hatch lifting mechanism;
- controlling hydraulic appliances: throttles, valves, distributors, etc., including cut-off valves preventing spontaneous movement of the mechanisms and actuating in emergencies;
- proportional hydraulic distributors ensuring precise regulation of the rate of electrodes movement from zero to maximum;
- control and signalling system sensors: power fluid temperature and level, pressure in different parts of the system;
- manual shut-off and regulating devices: throttles, taps, etc.;
- set of control cabinets and panels.

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