Repair and Renewal Works
Repair of refractory masonry of coke ovens without stopping production.
2015
CONCORD GROUP possesses a high level of competence when it comes to the provision of complex and special services in coke oven repair without suspension of production operations, including:

- repair of refractory masonry of coke ovens by the innovative ceramic welding method;
- repair of refractory masonry with one-side, two-side and through re-laying of oven heating walls;
- routine repairs of the walls of oven chambers and bottoms;
- repair of supporting structure of coke oven batteries, including flues and grate bars;
- repair of coke oven battery roof with replacement of paving, charging hole frames, coke oven gas burners etc.;
- refractory facing of oven equipment;
- repair of masonry over and under flash plates;
- insulation and sealing of façade walls of regenerators, gas and air valves;
- adjustment of coke oven battery heating system;
- repair of reinforcement equipment of coke oven batteries;
- repair of coke machinery;
- repair of installations in sulfur removal and recovery chemical shops;
- comprehensive repair of coke dry-quenching installation blocks;
- repair, refractory facing, cleaning of industrial pipelines and gas pipelines.
Repair and Renewal Works
Repair of refractory masonry of coke ovens without stopping production.

SIE "MAK" Ltd., Ukraine
Company specializing in coke ovens repair by the ceramic welding method and in hot repairs.

KOKSOHIMREMONT Ltd., Ukraine
Company specializing in refractory bricking, erection of processing equipment, steel structures, systems and communications for coke production facilities.
SIE “MAK” Ltd. is a specialized company for coke oven repairs with the ceramic welding method, implementation of “hot” and “cold” repairs of refractory brickwork.

The company was started in 1982. In 2005, SIE “MAK” Ltd. has become a member of CONCORD GROUP.

As of today, the company staff includes 150 employees, out of which about 100 experts are involved into the repairs of industrial ovens proper.

SIE “MAK” Ltd. are having all the required permissions, licenses and certificates for the repairs works implementation:

- License of State Committee of Ukraine for construction and architecture;
- Patents of Ukraine as well as other European countries for the technologies, equipment and gunniting mixtures;
- SIE “MAK” Ltd. is working at introduction of ISO 9001-2008 Quality Assurance System.
SIE “MAK” Ltd. is constantly improving the equipment and technology of industrial furnace repair. Here are our new developments and implementations:

- thermit mixture for coking box sole recovery;
- partial rebricking of refractory materials of industrial furnaces using zero expansion module;
- tools for solid surface processing (electric and pneumatic cutter with air-cooling) used to eliminate coke oven narrowities. It allows to delete impacts on refractory masonry. Used instead of pneumatic hammers;
- mixture for bacor refractory repair;
- «dust inflation» technology for sealing-in coking box joints;
- video monitoring system to examine the damages and to control the process of the work.

Safety of our innovations is verified by international certificates and is recognized by the leading experts in this field.
KOKSOHIMREMONT is the successor of the Soviet company and is having more than 40-years experience in the sphere of repairs-construction services for coke making plants.

For a long time, KOKSOHIMREMONT has been the internal company of KRIVOROZHSTAL (ArcelorMittalKryvyiRih, Ukraine), and provided the services on technical maintenance of the coke oven plant being a part of steel plant, as well as participated in repairs and construction of many coke making plants both in USSR and abroad.

KOKSOHIMREMONT is highly experienced both in “turn-key” capital construction, and in current technical maintenance of the whole coke making plant.

The company has been a member of CONCORD GROUP since 2010.

As of today, the company staff includes 150 persons, out of which about 100 experts are involved into the repairs of industrial ovens proper.

KOKSOHIMREMONT has all the required permissions, licenses and certificates for the repairs works implementation.

Quality Control System SO 9001-2008. International Safety and Health Protection Standards OHSAS 18001-2010 are presently under introduction.
KOKSOHIMREMONT is capable of implementing the whole cycle of “turn-key” activities related to the coke making facilities and steel making plants, from the technical documentation designing to commissioning, including:

- demolition of facilities;
- organization of construction process;
- activities on repairs, rebuilding and construction of coke oven plants;
- commissioning, including all types of specialized activities;
- repairs of coke oven brickwork;
- repairs of coke oven machines:
  - quenching cars;
  - coke pushers;
  - coke guide cars;
  - electric locos;
  - wagon tipplers.
- repairs of by-product plant units;
- repairs of CDQ blocks
The key markets of the Group are Former Soviet Union countries, Central and Eastern Europe, Asia, Africa.

CONCORD GROUP’s reputation is supported by more than 50 successful projects accomplished in over 10 countries across the world.
Concord Group is highly competent in rendering the complicated and special services related to coke oven repairs without interrupting the production process.

Depending upon the extent of brickwork damages, technologies applied, and work conditions, coke oven repairs are subdivided into 5 groups:

1. "HOT REPAIRS" without putting the ovens out of operation or with non-durable production interruption

2. "HOT REPAIRS" with partial cooling of repaired vertical flues and other oven areas

3. "HOT REPAIRS" with partial interruption of heating and cooling the brickwork of adjacent heating walls group

4. "COLD REPAIRS" with cooling the oven group brickwork or the whole coke oven battery

5. Erection of technological equipment, steel structures and pipelines
Complex of services
Ceramic welding

TEMPERATURE MODE:
Temperature in all the vertical flues of the repaired and adjacent heating walls is not lower than 900°C.

TYPE OF RENDERED SERVICES:
- ceramic welding;
- wet and semi-dry gunniting with various mixtures;
- manual puttying.

"HOT REPAIRS"
without putting the ovens out of operation or with non-durable production interruption
TYPES OF ELIMINATED DEFECTS

Ceramic welding technology is applicable for the repairs of coke oven brickwork damages of any level of complicatedness, and enables to eliminates various kinds of defects:

- bosh cleavages;
- cracks with 30-70 mm edges opening including through ones;
- burnouts and breakdowns in refractory brickwork;
- cavities of various area and depth;
- erosion of brick jacket;
- undercuts;
- brickwork damages within the charging holes and gas holes area;
- deformations with brickwork pushing into the chamber (handling with application of special equipment of hard surfaces – milling unit, pneumatic hammers, abrasive-blast unit);
- cracks and damages within roof shapes;
- cracks and empty joints up to 5 mm (air-tightness);
- gaps between the old and new brickwork.
Complex of services
Ceramic welding

TECHNOLOGY PECULIARITIES
Ceramic welding is one of the most efficient methods for repairs of refractory brickwork of heating units aimed at extension of their service life.
Specific peculiarity of ceramic welding method – at the combustion of mixture fuel component, melting of mixture refractory components is taking place within the oxygen area, and brickwork damages are getting filled. The material applied is analogous to refractory brick as far as its crystal structure and physical-and-chemical properties are concerned. As the hotmelt is getting hard, there is formed a structure with ceramic binding between the brickwork material and coating.

ADVANTAGES OF USING THE CERAMIC WELDING METHOD
▪ implementation of repairs without interruption of production process;
▪ immediate fusion of welded material with the repaired refractory brickwork;
▪ extension of coke oven batteries service life.
This particular method ensures smooth operation of heating units, decrease of costly refractory brick consumption, reduction of labour-consuming “cold” repairs quantity related to refractory brickwork relining.
Complex of services
Ceramic welding

STAFF, DURATION OF WORKS COMPLETION

- ceramic welding works are carried out by crews consisting of 3-4 persons;
- working schedule – daylight hours;
- duration of repair works (average): 2 days/chamber.

SERVICE LIFE OF THE WELDED LAYER

3-years guarantee is given for the completed repairs at the condition that technological standards of oven maintenance are observed.

EQUIPMENT AND MATERIALS

SIE “MAK” Ltd. are the designing and producing the ceramic mixtures and equipment for ceramic welding.

Chemical-and-Technological Research Department of the company is continuously working at developing the new compositions of ceramic mixtures and modernization of ceramic welding technological process.

Strict laboratory control of all the produced materials can guarantee the stable high quality of the product.

All the materials for repairs are patented and are licensed with the appropriate safety certificates.
Complex of services

TEMPERATURE MODE:
Temperature in the adjacent heating walls and non-relined vertical flues is not lower than 800°C.

TYPES OF RENDERED SERVICES:
- one-side repairs of individual heating walls to the depth of 4 vertical flues;
- two-side relining to the depth of 8 vertical flues with possibility of inclined flues area repairs;
- repairs of regenerator walls and checkerwork.
Relining of the end part of heating walls is carried out only in those cases when defects and destructions within the brickworks are impeding the coke pushing, cause the sticking of coke cake even if the chambers are not completely filled with coal blend, as well as at the heating walls of ovens operating at extended gross coking time and taken out of the pushing sequence.

As a rule, it is not possible to eliminate these failures by usual methods of routine repairs.

In case of relining the end part of heating wall to the depth of 4-6 vertical flues, 5 ovens including 2 buffer ones shall be taken out of operation.
TEMPERATURE MODE:
Temperature in adjacent Heating walls and non-relined vertical flues is within the limits of 400 - 800°C depending upon the quantity of buffer chambers (2 buffer chambers or 4 buffer chambers).

TYPES OF RENDERED SERVICES:
- relining of individual heating walls and regenerators;
- relining of heating walls and regenerators with sequential-group method;
- relining of the oven roof.
Complex of services

TECHNOLOGY OF REPAIR ALLOWS:

- to keep safe the refractory brickwork of heating walls adjacent to the repaired ones due to maintenance of 850 - 950°C temperature during the repair, preventing structural transformations of silicon oxide in silica bricks;
- to execute accelerated heating up and commissioning of heating walls after repair;
- to minimize reduction of production capacity.
Complex of services

TEMPERATURE MODE:
Complete interruption of the repaired area heating.

TYPES OF RENDERED SERVICES:
- complete relining of coke oven battery within the previous dimensions with repairs of flues, reinforced concrete slabs and buttress walls;
- rebuilding of individual oven groups.
Complex of services

TYPES OF RENDERED SERVICES:

Erection, dismantling and capital repairs of:

- coke pushers, coal charging cars, coke guide cars, quenching cars and other coke oven plant equipment;
- by-product recovery equipment in by-product plants and desulphurization;
- coke oven battery equipment and technological pipelines.
Heating modes for the repaired and “buffer” heating walls are selected in such a way so that to minimize the heating interruptions, ensure the required temperature in the end vertical flues and eliminate the possibility of over-heating in the medium area of oven chamber.

Complex approach towards the repairs implementation, availability of various-type technologies and possibility of applying the different combinations of those enable of eliminating practically any defect within the oven chamber brickwork without any considerable impact at the adjoining heating walls.

Technologies used by CONCORD GROUP enable to restore completely the coke oven battery operating capacity, minimize the decrease of its production capacity and maintain the high quality of coke in the course of repairs implementation, as well as to improve the environmental parameters and working conditions.