



THE DESCRIPTION OF THE PROJECT SOLUTION **“RECONSTRUCTION OF THE BLAST FURNACE №4 CASTING YARD** **MACHINES CONTROL SYSTEM AT AZOVSTAL IRON & STEEL WORK PJSC”**



Fig. 1 AZOVSTAL IRON & STEEL WORKS PJSC

In order to improve the engineering-and-economical performance of cast iron production together with completeness of blast furnaces with the modern equipment and industrial control means and provide adherence to modern environmental requirements during cast iron production in 2014-2015 at AZOVSTAL IRON & STEEL WORKS PJSC we performed complex reconstruction and modernization of the BF 4, which included reconstruction of cast house and implementation of modern means of industrial control.

OBJECTIVES TO BE ACHIEVED IN THE DESIGNED SYSTEM

- Control of casting yard mechanisms, hydraulic system, pumping and accumulator station.

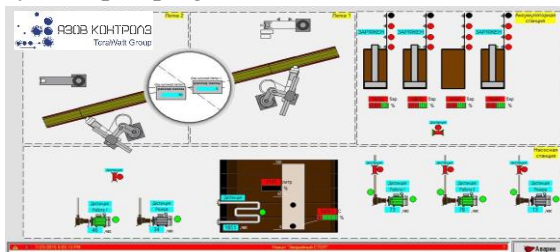


Fig. 2 Casting yard mechanisms control screen

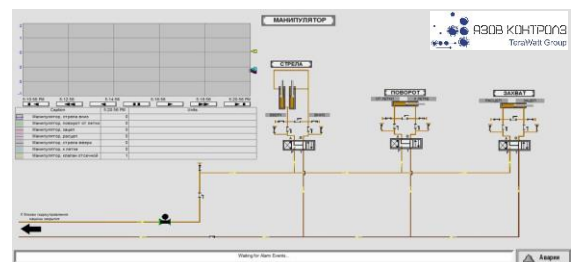


Fig. 3 Hydraulic prop handling device control screen

- Control and monitoring of process parameters.

- Control and monitoring of equipment state.

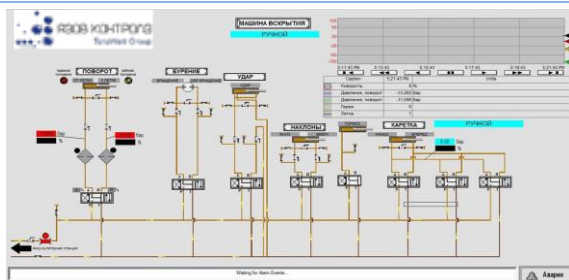


Fig 4 Control of disclosure machine's hydraulic prop screen

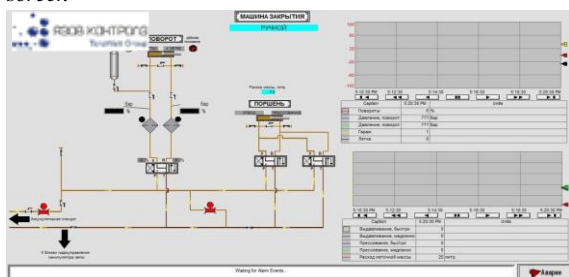


Fig 5 Control of shutting-down machine's hydraulic prop screen

- Control of manufacturing process and mechanisms in different states.
- Monitoring of casting yard mechanisms using remote SCADA stations and pump-and-accumulator station mechanisms using PanelView Plus 6 operator desk.

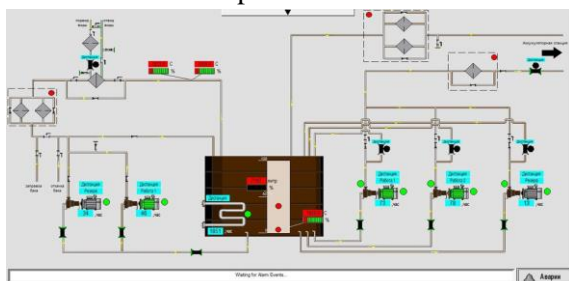


Fig 6. Pumping group screen



Fig 7. PanelView Plus 6 operator desk.

- Automatic registration and archiving of parameters in order to get report for any period of time.

- Alarming system, which provides advisory, diagnostic, warning and emergency user notification which provides proper reports over any period.

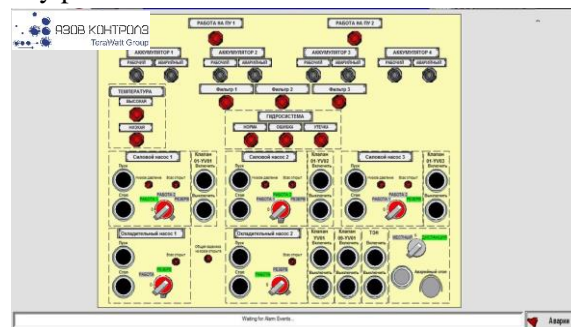


Fig 8 Pumping station control screen

- Monitoring of machines' state at the remote control panels CP-1, CP-2.

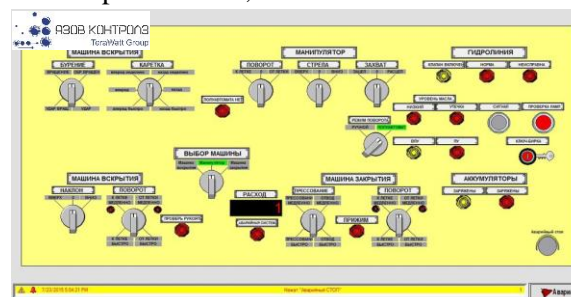


Fig 9 Tap hole №2 control screen

- Forming and sending data to the PC of furnace technical personal.

THE REGISTER OF USING HARDWARE IN PROJECT SOLUTION REALISATION

- All implemented components were placed in cabinets produced by Rittal, which meet the required IP protection.
- Control Logix controllers produced by Rockwell Automation receive process data and run program algorithm to control all cast yard equipment.
- Implemented solution for HMI and PLC level network uses newest Ethernet solutions.
- PanelView Plus 6 operator panel for equipment and pump-accumulator station's conditions monitoring.



- The control system ensure control and mathematical calculation of tap hole mass, which are shown on the furnace man console, as well as on the HMI station.
- Due to the high-precision adjustment of the system there is a possibility to approach and withdraw mechanisms of cast yard without shock.

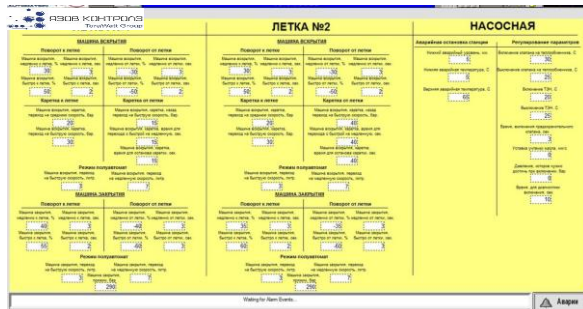


Fig. 10 Casting yard mechanisms adjustments screen

- Factory Talk SE produced by Rockwell Automation, allows to implement all required features including process monitoring, process data and alarm logging etc.



Fig. 11 Trends screen

Remote radio console produced by HBC Radiomatic is using for the casting yard's machine control. This radio console is anti-jamming and provide excellent communication quality on a wide distances. This radio console is connected by DeviceNet.



Fig. 12 HBC Radiomatic radio console

| | |
|--------------------------------|--|
| Max amount of control commands | 32 digital + STOP or 24 digital + 8 analog + STOP |
| Excluding system location | More than 1.000.000 options |
| Power supply voltage | 6 V |
| Accumulator capacity | 1500 mAh |
| Frequency range | 308 - 338 MHz, 405 - 475 MHz, 865 - 870 MHz, 902 - 928 MHz, 1210 - 1258 MHz, 2402 - 2480 MHz DECT: 1790 - 1930 MHz |
| Running temperature limit | -25 °C ... +70 °C Hazardous areas section 2: -20 °C ... +60 °C |

Fig. 13 Radio console specifications

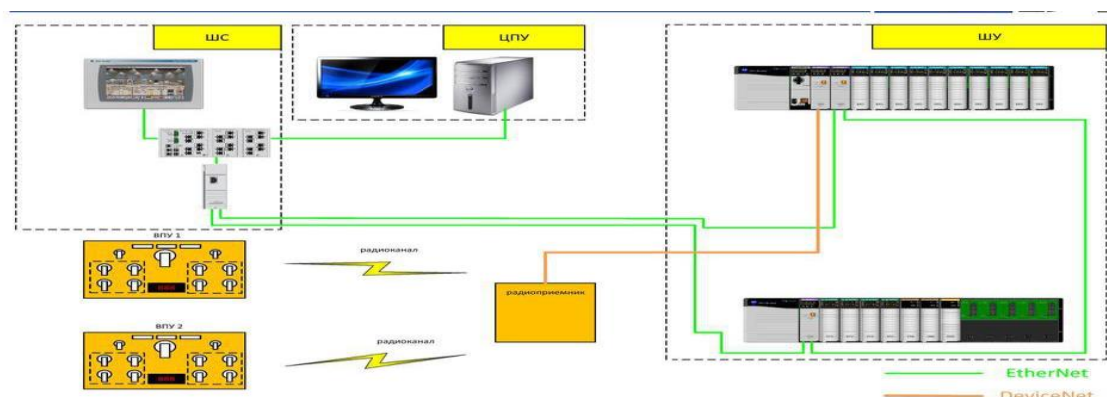


Fig. 14 The flowchart structure of the project npoekma "Reconstruction of the BF №4 casting yard machines control system at AZOVSTAL IRON & STEEL WORKS PJSC