

A P P L I C A T I O N N O T E

COKERIES

Zdzieszowice Cokery



Supervisory System for Coke Batteries No.
7 and 8

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Supervisory and Control System for Coke Batteries

Zdzieszowice Cokery belongs to the biggest cokeries in Europe. The plant produces about 4 mln tons of coke per year compared to 30 mln tons produced in European Union in 2003. In Zdzieszowice Cokery coal carbonization is made in 2 production processes, including 10 batteries. In 2002 - 2004 there were modernized the batteries No. 7 and 8.

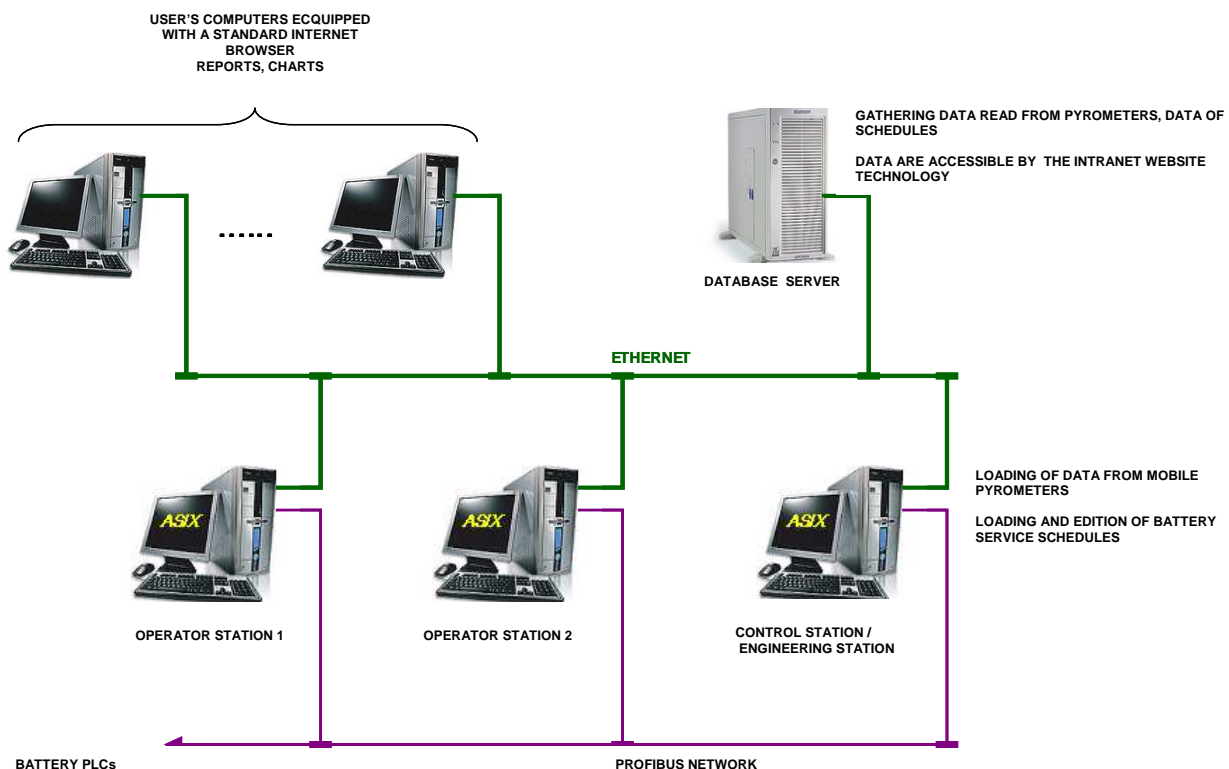
ASKOM has designed, worked out and put into operation the modern supervisory and control system for 2 coke batteries. The system has enabled to reduce maintenance costs, to keep coke quality at a stable level and to increase batteries availability by faster and more effective failure diagnosis. The coking process data gathered in the SCADA system are transferred to the supervisory system assisting in the batteries production management. The supervisory system functionality was specified in collaboration with the plant's engineers and Institute for Chemical Processing of Coal in Zabrze.

From a functional point of view, the supervisory system consists of 4 modules:

- module of chamber service schedule,
- module of portable pyrometer service,
- module of battery cars measurement analysis,
- module of burning control optimization.

The system generates the following reports connected with the modules:

- shift report of chamber service and report of planned schedule,
- text and graphic reports of portable pyrometer module,
- graphic report of batch temperature measurements (pyrometers on a coke guide).



Picture 1. Configuration of the Supervisory System.

The system of reports is based on the Intranet website technology. Authorized users can browse and print reports by means of an Internet browser on any computer connected to the network.

SCADA software has been installed on a control station and SQL database server.

Scheduling Module

The scheduling module, installed on a control station placed in the battery dispatch room, creates a chambers service schedule. The schedule is generated automatically on the basis of information concerning previous operations performed on the chambers, stored in a database and parameters set by a dispatcher:

- coking set time,
- acceptable deviation for the coking time,
- minimum time between operations.

The operator can modify any item of an automatic generated schedule and activate the conversion function which updates all items. The schedule covering the horizon of one shift (50 items) is sent to all operators of battery cars via wireless network.

The scheduling module reads data from battery cars PLCs and writes them into a database. Stored data is used to generate shift reports.

An effective implementation of the scheduling system has replaced "paper" shift schedules. An automatic registration of all operations connected with chamber working cycle has disciplined work and guaranteed precise execution of planned schedules.

Drukuj		2004-08-31			Raport Obsługi Komór baterii nr 7					
Nr Komory	Plan. Godz. Wypch.	Plan. Czas Koks.	Ostatnio Zasypana	Godz. Wypch.	Czas Zasypu	Czas Koks.	Prąd	Czyst. Ram WP	Czyst. Drzw WP	
62	22:15	15:11	7:04	22:17	22:27	15:13	108,1	+	+	
64	22:30	15:16	7:14	22:26	22:38	15:12	111,8	+	+	
66	22:45	15:21	7:24	22:37	22:49	15:13	108,0	+	+	
68	23:00	15:26	7:34	22:50	23:01	15:16	111,8	+	+	
70	23:20	15:10	8:10	23:20	23:30	15:10	116,1	+	+	
72	23:35	15:12	8:23	23:33	23:43	15:10	113,0	+	+	
74	23:45	15:12	8:33	23:44	23:55	15:11	115,5	+	+	
76	23:55	15:13	8:42	23:54	0:05	15:12	119,1	+	+	
1	0:15	15:12	9:03	0:13	0:22	15:10	113,9	+	+	
3	0:25	15:13	9:12	0:29	0:37	15:17	117,7	+	+	
5	0:35	15:11	9:24	0:38	0:47	15:14	116,2	+	+	

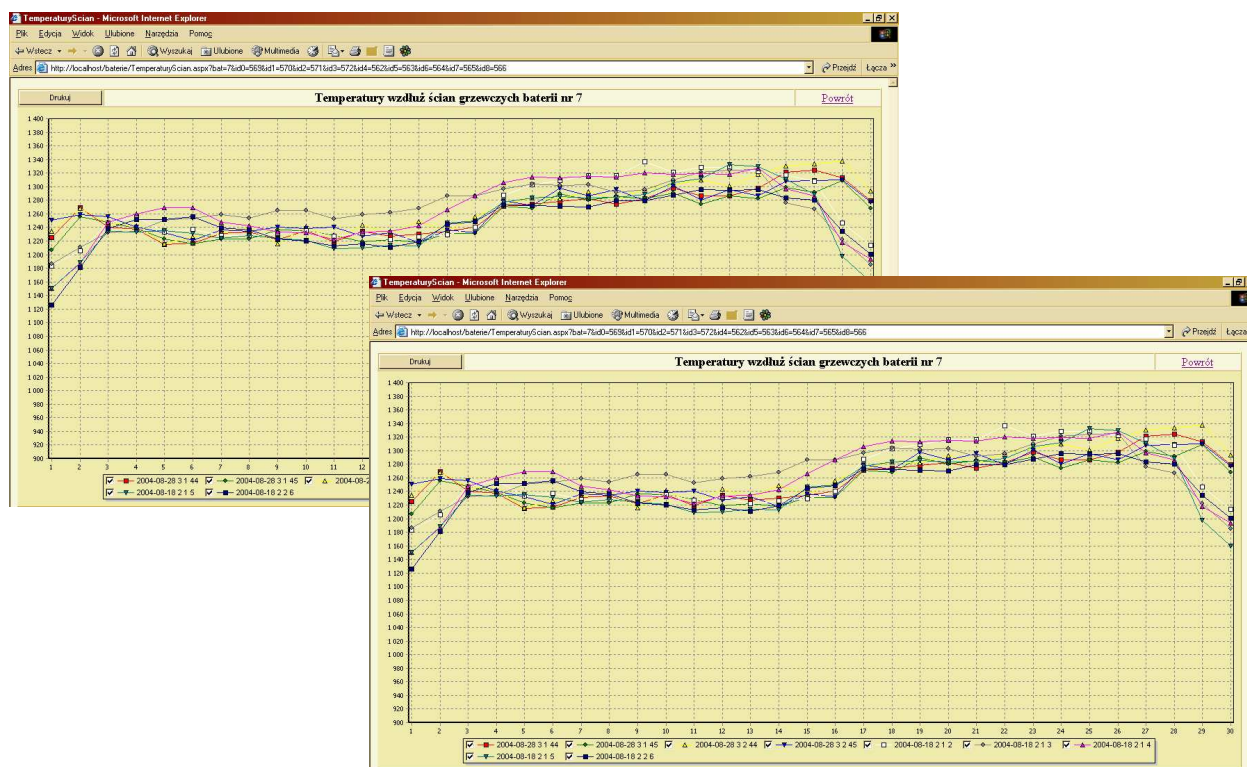
Picture 2. Scheduling Module - Shift Report of Chamber Service.

Modules for Portable Pyrometer Service and Battery Cars Measurement Analysis

The module for portable pyrometer service is dedicated for storing and archiving measurements made in control channels and along the battery wall. Data is stored in a database and used to generate any report user needs. After reading values of measurement series from pyrometers, the module calculates average temperatures which are sent to the module of burning control optimization.

The SCADA software enables to define a 'route', i.e. to assign successive measurement values saved in pyrometer to appropriate measurement points on the walls.

Values read from pyrometers installed on a guiding car and values of bar drive current of a pushing car are transmitted via wireless network and saved on the data server. Temperature and current values concerning discharging coke are reported on charts. The averaged temperature values are sent to the module of burning control optimization.



Picture 3. Trends of Values of Controlled Temperature and Bar Drive Current.

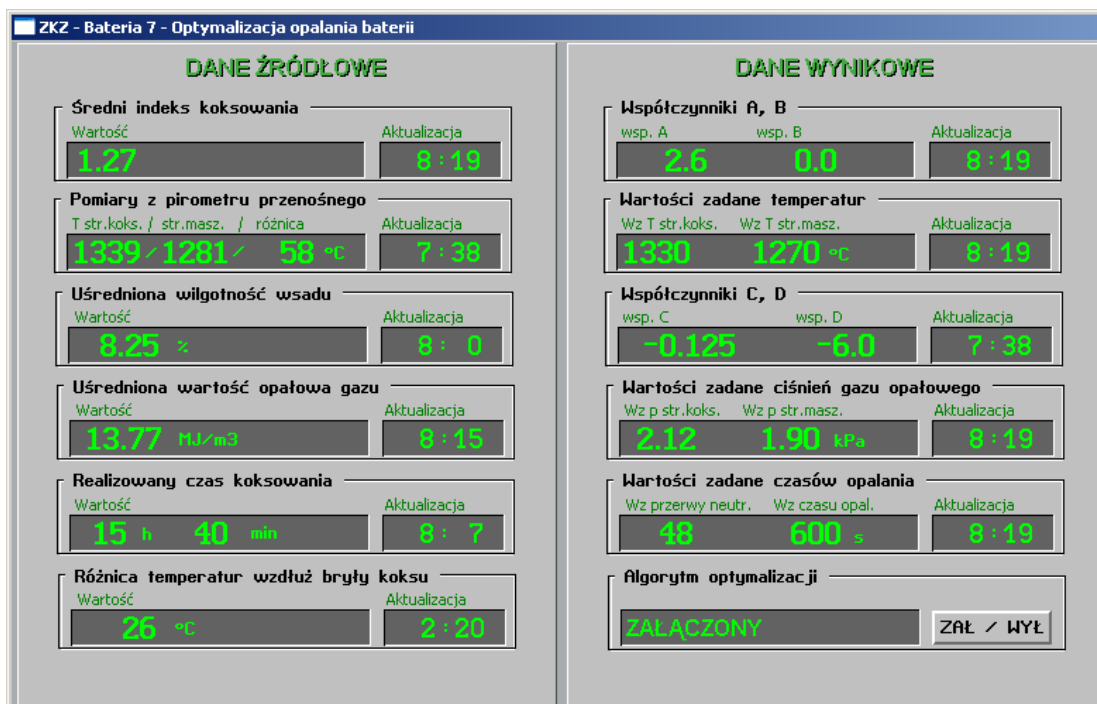
Module of Burning Control Optimization

The optimization module is used for determining optimal set values of fuel gas pressure and intervals in burning process. It' foreseen that calculated indexes will be in future included in the set of correction values used inside automatic battery control systems.

The module realizes the following functions:

- preliminary calculation of temperature set values in control channels and the length of burning break intervals based on coking time and averaged batch moisture content,
- calculating the average coking index used for correcting temperature set values in control channels,
- correction of the set value of gas pressure and the length of neutral interval based on analysis of measurement values read from mobile pyrometers,
- calculating averaged caloric value of gas.

All calculated parameters and indexes are archived in a database. That makes possible to display and analyze them on charts.



Picture 4. The Table of Optimal Parameters for Battery Burning Process.