

# Monitoring and Control Systems for Industrial Processes



## Complex system for the monitoring of coal quality

Complex system for the monitoring of the quality of energy coal (hereinafter "KSSK") is one of the products of MIP's activities in the field of monitoring and control of industrial processes.

### Essence of System

The essence of the system lies in the continual collection of data from the technological process - measurement of the ash content, sulphur, humidity and volume of transported coal. Further, the state of the individual production equipment, bins and dumps. The output is subject to the concrete requirements of the users...

### Application

- control of coal extraction at mines, thus in connection with geological research regulate the volume and quality of the output product,
- control of coal separation plant (continuous monitoring of inputs, outputs and coal mixing at the dump, attainment of increased coal production as per desired parameters, automatic removal of poor quality coal and initiation of further processing),
- control of coal preparation plant (reduction of losses arising from unseparated coal, minimization of deviations from the desired quality standards),
- control of coaling for electrical power plants, heat plants and cement works (increase efficiency in the production of electrical energy and heat, coal quality control from the ecological point of view),
- control of operations at steel works (with regard to ash content in coke).

### Description of system

- information from the technological process is received from sensors of domestic and foreign production (ash meters, sulphur meters, humidity meters, level indicators in bins and reservoirs, samplers, high-rate analyzers, conveyer belt and railway scales, etc.),
- signals of state are indicative of the mode of operation and resetting of the individual equipment (excavators, conveyer belts, draw-out heads, measuring equipment, samplers, etc.),
- changes in the state of the technological equipment with regard to the flow of material may be automatically or manually entered into the system, there is a change in the technological schemata, calculation algorithmus (for instance, changes in the position of the excavators, conveyer belts, etc.),
- information on the geological model of the locality of the mine is fed to the system, respectively, on the incoming coal from the suppliers,
- after the processing of previous information from the technological process, the operator is immediately informed of the processes taking place in the technology (live technological scheme), the state of the bins and the dumps, defined error and alarm indicators, actual expedition (dumping, coaling of bins), time and cumulative behaviour of the measured variables (in form of tables and graphs), chemical analysis of the selected products,
- the operator runs the extraction or processing (mixing) of the coal

## System Configuration

- system values on the quality of coal
- comparison with laboratory samples (recalibration of measuring instruments and the system)
- supplies information on geological research for the locality
- input for mining control and blending
- calculation constants for further coal parameters (calorific value)

### Connection to superior control system

- live technological schemata, tables and graphs showing state of equipment, bins, dumps (sectors) and extracted or processed product (coal)
- time behaviour of the measured variables
- shift, daily and monthly protocols in the form of tables and graphs
- alarm and error state of technology and actual system (with archivation)
- changes in technological schemata in accordance with technological changes
- intervention of operators in the system as per arising state
- evaluation of operation period and failure rate of equipment



**Sales, Loading Point**

- brings forth the requirements on sales volume and quality
- gives collection rate and its correction
- obtains an idea on the state of reserves



**Laboratory, Geologist**



**Production Planning  
Quality Control**



**Operator  
Dispatcher**

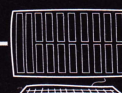
### Processing Stations



Analogue and digital signals on the state of the technological equipment and the processed product (ash meters, sulphur gauges, hydrometers, sensors, samplers, etc.)



Wire transmission of information from wireless mobile technology (for instance, excavators and dumping machinery)



Operator's point of access from the technology



Output signals for the operation of technological equipment (automatic or manually entered by the operator)

Information Control Network  
Technological Network

according to the state of the mining equipment, setting of the technology and information from the geological model of the mine locality in order to attain the desired end product, the system continuously reacts to the changing technological conditions and indicates them, evaluating new processing variations,

- the system issues expedition documents at point of loading (weighing lists, wagon lists, train lists, evidence lists, delivery notes, etc.), feeds data to the buyers information network,
- the system evaluates the running time of the monitored equipment, failure rate and planned repairs,
- the system processes data for the simple interactive evaluation of the archived information, from partial samples through variable cumulation and conversion of values in table and graphic form, which supports the simplicity of the operation on the part of the operators and dispatchers, as well as for other specialist or control workers,
- the system processes archived information in protocol form (shift and daily production protocols, dump maps),
- the system prepares database information for specific use,
- the preceding information may be supplied to other specialist and control workers in the information-control network (sales, laboratory, management and production planning, product quality control, geologist, etc.),
- information from the system may be used as an input for other automatic control systems (for instance, control of combustion processes).

## Structure of system

The system is modular and open to the possibility for extension and connection to other existing or future information and control systems. The system may be built on the basis of large-scale collection of data backed up by a technological network linked to an own information control system. It may also be built to receive a minimum of signals from the technology, processed on one computer, with eventual feeding of the data to a superior computer as per requirement.

## Services

The system may be solved in a complex manner as a project to measure (realization of initial analytical studies, project, supply of measuring equipment, cables, hardware in office or industrial design as per working environment, standard and application software, etc.) or as per customer requirement, it is possible to use a partial solution using the current measuring equipment and computer technology.

## Contact

If you have the feeling, that it would be suitable to consult your feelings, problems and requirements with regard to offer, please feel free to contact us. We look forward to mutual cooperation.

## Motto

**"Complex information on production and automation of its management guarantees your success!"**

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