BLACK SEA GROUP

AUTOMATION

ABOUT BLACK SEA GROUP

BLACK SEA GROUP is formed of:

1. **BLACK SEA TECHNOCHIM CO. S.R.L.,** having its head office in Bucharest, Romania, registered at the Register of Commerce under no. J40/18522/1994 with C.U.I. no. 6286263 and the fiscal attribute R;
   Black Sea Technochim Co. is liable for Romania and European markets.

2. **BLACK SEA ENERGY GENERATING EQUIPMENT TRADING (L.L.C.)** having its head office in Dubai, U.A.E., registered at the Department of Economic Development with license no. 515004 and Commercial Register no. 53617/1999;
   Black Sea Energy Generating Equipment Trading L.L.C. is liable for the United Arab Emirates markets.

3. **SUN ORBIT FOR GENERAL TRADING CO.,** having its head office in Baghdad-IRAQ, registered at Commercial Register no. 13116/2004;
   Sun Orbit for General Trading Co. is liable for Iraqi markets.

4. **BLACK SEA POWER GENERATING FZCO**, having its head office in Jebel Ali Free Zone - Dubai, U.A.E., License no.40146 Government of Dubai.
   Black Sea Power Generating FZCO is liable for International, Middle East and Africa markets.

The main markets for our activities are in the Middle East and Africa countries.

Since its formation, as an international trade company, Black Sea Group has been dealing in the field of power generation, representing and collaborating with famous Romanian companies, for supplying of equipments and spare parts and performing of overhaul for all types of steam power stations with power up to 330MW and boilers with capacity up to 1035t/h.

Due to an extensive experience, we offer to our clients high-quality products, short time delivery, competitive prices and a transparent collaboration.

Highly-qualified personnel work hard so that all the products, works and services to be completed according to our clients requirements and in time.

Quality Management

Black Sea Technochim Co. is certified by TÜV Thüringen e.V. for the implementation and the application of the quality system according to DIN EN ISO 9001:2000.

TÜV CERT
DIN EN ISO 9001:2000
Zertifikat 15 100 52730

From the beginning the Black Sea Group was focused intensively on quality, technical development and marketing.

The Black Sea Group's main competencies include:

- Thigh contacts with old and possible future clients;
- Thorough market studies and discover new possible tenders to take part to;
- Looks for the best designers and manufacturers for each possible future job;
- Black Sea Group buys the tender documents;
- The best offer issued on the name of one BSG member is sent to the client;
- Black Sea Group participates to the negotiations and signs the contracts as Main Contractor;
- Black Sea Group is responsible for the necessary finances required for each offer/contract like: bid bonds and performance bonds, opens L/C or makes advance payments for the manufacturers;
- During the development of each contract, in order to assure the best conditions in accomplishing the job, Black Sea Group is responsible for the delivery of goods from manufacturers to the client in short time, for the transportation and accommodation of the employed personnel during the rehabilitations and/or service period, insurances for the goods during the shipment and during the erection works;
- Black Sea Group as Main Contractor is responsible in front of the client during the warranty period of each job performed.

BLACK SEA GROUP - CONTACT

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COMPANY PROFILE

To help customers resolve successfully such complicated problem as automation of a power plant, Black Sea Group provides solutions based on our and our partners experience.

We have capability for engineering, design, procurement, manufacturing, construction and commissioning of a full range of power plants.

The DSC systems offered by us is applied to boiler control, turbine control, generator control and the unified control systems. This is ideal control system from the viewpoint of control ability, maintenance ability and operation ability because no excess spare parts are required.

For modernization of existing plants, I&C systems are key equipment. Dramatic improvement of plant efficiency and operation ability which provides maximum return on investment for the customers are realized by the optimal design of the state-of-the-art I&C systems. Black Sea Group will provide comprehensive solutions from field sensors/actuators to IT systems. As a turnkey player we will also provide a variety of advanced solution packages, ergonomic design and unified operation which gain the customer's profitability.

I&C systems offered by Black Sea Group are based on the most advanced industrial hardware and software platforms and technologies, including own platforms developed by Honeywell, Emerson, ABB platforms and platforms of other well known companies.

Black Sea Group provides the following project works on design and delivery of the **Control Systems**:

- Development of technical and commercial proposals submitted to customer;
- Development of system technical requirements;
- Project management, development of split of works between the parties involved in the project (jointly with the customer), development of project contract scheme, tracing of contracts concluded with subcontractors involved in the project;
- Development of the system hardware and software configuration;
- Development of the system functional software;
- Development of technical and design documentation in compliance with the applicable standards and customer's requirements;
- Purchase of components and manufacture of hardware;
- System hardware and software integration;
- Integrated system test;
- Verification and validation;
- Certification and licensing;
- Delivery of system to customer;
- System supervision on site;
- Start-up;
- System commissioning in compliance with the applicable rules and requirements of the customer;
- System maintenance during its operation;
- The above listed works are provided in the full scope or partially to meet the demands of the customer.

Black Sea group can supply a complete integrated, flexible and scalable control system, based on microprocessors which will ensure: monitoring, controlling, displaying, alarming, recording and supervising of inputs and outputs.

The system meets the base functional requirements:

- **expandability**: system capability to be expanded more than offered basic system as following:
  - adding of new controllers and I/O modules;
  - adding of I/O signals to existing process controller;
  - adding of operation and engineering stations;
  - adding of peripherals;
  - on-line adding of opened / closed control loops through data acquisition functions, data processing, performance calculations, protocols, graphical displays.
- **reliability**: system capability to operate in high reliability conditions and assure the following functions:
  - reducing to minimum of the failure period by on-line equipment and system diagnosis;
  - redundancy at levels of communication system, controllers, power supply.
- **maintenance**:
  - hardware: system capability to on-line substitute the defect modules;
  - software: supplying necessary instrumentation for the system maintaining, re-configuring and re-loading. The system offers possibilities to on-line load the new versions of the base programs.
- **self-diagnosis**: system capability to on-line self-diagnose during normal system operating without affecting system performances:
  - the diagnosis contains at least the software package and the supervising package for diagnosis (internal circuits and communication network). Graphical active images of the entire system, going up to the electronic card level, helps the operator to find out the failures and evaluate the system, processors and I/O modules working state. The type of perturbation / failure will be textually indicated, not in a code language. By this, the personnel is capable to carry out corrective actions or little repairs / replacements which will lead to an increased system availability;
  - all functional modules and supplying ones will allow to be replaced when the cubicle is under voltage and will have more indicator lamps to facilitate identifying and repair defect modules;
  - the system assures continuous operating of self-diagnosis and indication in CCT of the level where there are failures, by phonic signals and display on screen;
  - failures are identified at the module level in order to allow repairing / replacements. At putting under voltage or voltage reversion, the system will run an automation diagnosis procedure before real operating process;
  - possibilities of self-documentation and self-diagnosis of the system allows listing of all system elements, with present status indication and listing of all inputs / outputs signals for a certain module, including the spare circuits;
  - when a 5 W radio - receptor will operate at a distance of less then 1 m from the DCS equipment, radio - frequency interference won't appear. Keeping the cubicle doors closed, it won't appear changes among the analog values more then 0.5% of the calibrated domain.
- **security**: system capacity to provide various security levels. The system has possibility to offer up to 6 security levels:
  - view only;
  - alarm acknowledge mode;

- operator;
- supervisor;
- engineering mode;
- manager.

Each operator can have his own user name and password for having access to the operating station.

Boiler

The control philosophy is to provide a complete control system designed to operate a unit safely and efficiently over the unit's entire operating range. The exact control configuration is dependent on unit design, operating philosophy and process instruments.

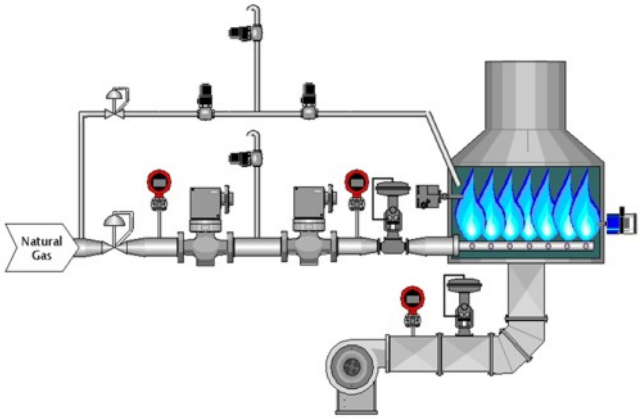
Steam Temperature Control

The offered technology replaces existing stand-alone controllers, limited-function systems (dedicated steam temperature control systems) and obsolete systems with a complementary set of modern hardware, software and services. The advanced control package is intended for steam temperature loops that exhibit instability due to interaction with other loops – where rate-of-change operation is critical, where closer tolerances would allow a high setpoint to be established, where responses are inverse, and where other disturbances affect stem temperatures.

Burner Management Systems (BMS): The control system dedicated to combustion safety and operator assistance in the starting and stopping of fuel preparation and burning equipment and for preventing misoperation of and damage to fuel preparation and burning equipment.

A burner management system is responsible for the safe start-up, operation, and shutdown of a burner:

- monitors and controls igniters and main burners;
- utilizes flame scanners to detect and discriminate between the igniter and main flames;
- employs safety shut-off valves, pressure, temperature, flow, and valve position limit switches;
- controls blowers to cool the scanners and/or provide combustion air for igniters;
- provides protection for the boiler water circulation pumps;
- links the burner management system of auxiliary boilers to the main burner management system and with the basic process control system.



Advanced Combustion Control

This suite of applications is designed to deliver optimal thermal efficiency while minimizing CO and NOx emissions for pulverized-coal fired boilers operating in cycling regimes. Their open OLE for Process Control (OPC) based interface allows the applications to be easily connected to any third party DCS that is OPC compliant. Performance measurements have shown that Advanced Combustion Control can improve the heat rate by 2 percent and significantly cut emissions levels and their variations.

Turbine Electro-hydraulic Control System

Many steam turbines are continuing in service beyond their original design life. These older units suffer from lack of reliability, maintenance difficulties, obsolescence and service problems - all of which present operational challenges and lead to downtime and lost revenue.

Using proven, commercially available hardware, together with our in-depth expertise of steam turbines, Black Sea Group delivers fully engineered packages to upgrade and modernize steam turbine controls, valve actuators and instrumentation. These upgrades increase turbine automation, improve reliability, reduce obsolescence, and enhance operation of older steam turbines, extending the useful life of the equipment and minimizing downtime losses.

The proposed control system is of electro-hydraulic type, with the electronic circuits realized in digital technology. The system is organized in redundant structure for both signal acquisition and signal processing. The PLC's used for the system integration, the application software and the general configuration know-how are The electro-hydraulic converters (servo valves) and the signal transducers are, also from the European Community.

The main functions of the control system:

- turbine start-up, either in manual or automatic mode, with imposed warming speed holds;
- turbogenerator synchronization to the grid;
- automatic operation mode interlocking;
- turbine load control in condensation mode;
- island mode operation at rated frequency (isochronous mode);
- participation to the grid frequency control;
- load limiting (by operator demand or by process conditions);
- live steam pressure drop limitation;
- turbine protection against overspeed (dedicated '2 out of 3' protection circuit);
- free running speed hold at the rated value after load rejection;
- communication with the boiler control system;
- abnormal operating conditions detection and automatic intervention for turbine protection;
- general control system check before turbine start-up with self calibrating signals range.

Machine Monitoring Systems

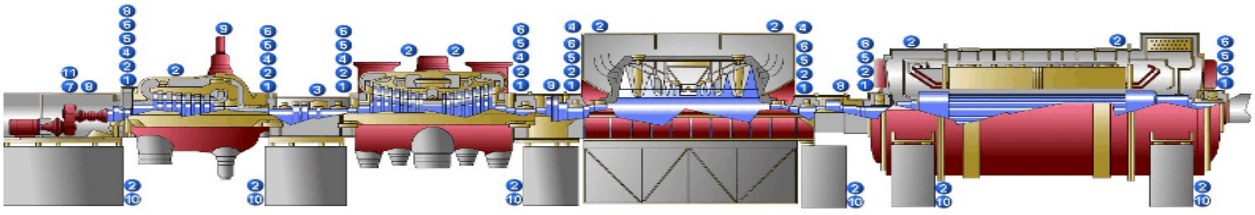
Precision measuring of mechanical parameters at any displacement, vibration and speed assures safe, economic and continuous operation of essential rotating equipment. We can provide continuous condition monitoring for fans, blowers, pumps, gears, compressors, turbines and any other rotating machinery in operation:

- Relative Shaft Vibration / Orbit;
- Bearing, housing and foundation vibrations;
- Axial shaft position / Thrust bearing position;
- Housing expansion;
- Shaft deformation / Radial shaft position;
- Absolute shaft vibration;
- Key pulse;
- Differential expansion;
- Valve positions;
- Foundation displacement;
- Shaft speed.

The offered products and services include:

- Eddy current sensors for measuring vibrations and displacement;
- Seismic and piezo-electric sensors;
- Inductive displacement sensors;
- Sensors for measuring speeds and phase responses;
- High temperature sensors up to 380°C;
- Condition and Vibration Monitoring Systems;
- Speed Measurement and Protection Systems (2 out of 3);
- Data Aquisition Systems;
- Analysis and Diagnosis Software;
- Development, design and planning, commissioning, servicing;
- Special applications and customer specific adaptation.

Black Sea Group stands ready to assists you in Minimizing Machinery Shutdowns.



Measuring point overview at a three stage turbine