



Konstantin Yurievich SUBBOTIN

Director General of ZAO (closed company) "Stromizmeritel"

He has graduated from the Gorky rechnical university the faculty of radio electronics and engineering cybernetics.

He maintained a thesis in 1955.

He has been honoured by the Russian Academy of natural sciences "For contribution to progress in sciences and economics of Russia".

In 2005 he was titled as "Honorable member of glass industry in Russia"

"STROMIZMERITEL" CLOSED JSC – PACKAGE APPROACH

TO DESIGN AND
CONSTRUCTION OF GLASS
INDUSTRY FACTORIES

"Stromizmeritel" Closed JSC is a fast developing scientific, production and project designing company, founded in 1990, which holds a leading position in Russia and CIS countries in the area of design and construction of factories producing glass and construction materials.

Being engaged in these activities for more than twenty years "Stromizmeritel" Closed

JSC has all necessary knowledge, experience and technologies necessary to solve any problems of the customer.



Main area of expertise of the company is development and production of the process equipment and microprocessor control systems for workshops producing glass mixture and different multicomponent mixtures.

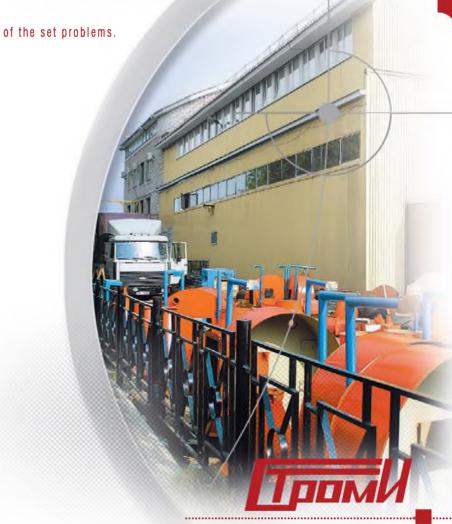






Many glass industry factories in Russia and the countries of the near abroad as well as many companies in Western Europe, Africa and China are among our partners.

The success of the company is based on precise fulfillment of contractual obligations, optimal quality-price ratio, highly skilled specialists as well as on innovative approach to solution











Project documentation development and necessary engineering and technical design is done by means of the license software. In the design process three-dimensional modeling is used for separate equipment items as well as for designed projects in their entirety.

When doing project engineering together with the foreign companies we adapt foreign documentation in order to bring it in line with the rules and guidelines of the Russian Federation.

The organization consists of several design departments, an engineering department, an automation and software department and has well-equipped production facilities which allow addressing all issues of the process and construction design of the following projects:

- batching plants;
- departments for storage and processing of sand, limestone, dolomite;
- foreign and own cullet recycling lines, taboratories and other production departments.

Different dosing-mixing lines and batching plants built upon the projects of "Stromizmeritel" Closed JSC have vertical, vertical/horizontal and horizontal configuration and capacity of 10 up to 1000 tonnes of charge material per day.

The reference list of the implemented developments of "Stromizmeritel" Closed JSC includes more than 300 plants, workshops, departments and processing lines in Russia and 11 countries of the near and far abroad.

DESIGNING AND PRODUCTION OF DOSING AND DOSING-MIXING UNITS FOR GLASS MIXTURE RAW MATERIALS

A particular equipment class manufactured by "Stromizmeritel" Closed JSC is: strain-measuring weighing dosing units of step-by-step action with a weighing range from 0,1 to 3000kg; continuous-running with a weighing range from 5 to 25 tonnes per hour; volumetric proportioners operating on liquid flow measurement principle and differential dosing units.

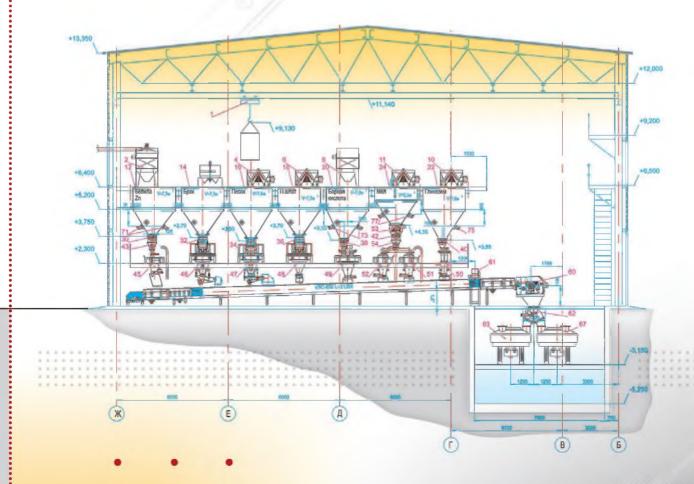
The specialists of the company successfully settle questions of dosing of liquid and free-flowing materials, caking ingredients of glass mixture as well as poorly flowing and water-absorbing coherent materials and small additives for preparing of premixes.





"Stromizmeritel" Closed JSC manufactures a wide range of the strain-measuring weighing dosing units equipped with the gravity, vibrating, screw and double-screw loading and unloading feeders:

- small-scale dosing units for partial doses (dosing according to load);
- small-scale dosing units for full doses (dosing according to both loading and unloading);
- one-component dosing units for full doses with a weight receiving device based on one or three strain sensors (dosing according to both loading and unloading);





DEVELOPMENT AND PRODUCTION OF BELT CONVEYORS



Belt conveyors are the most commonly used means of continuing transport, intended for moving different bulk goods with a wide range of various properties.

The stationary and mobile belt conveyors manufactured by "Stromizmeritel" Closed JSC are intended not only for transporting of free-flowing and small lump materials, but also for switching of transportation flows and redistribution of raw material into the hoppers.

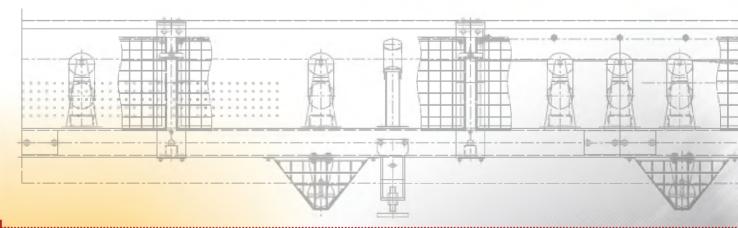
The configuration of the stationary conveyors includes a full-scale sealing of the whole materials passing channel, cages for moving parts and emergency cord switches, securing the required operation safety.

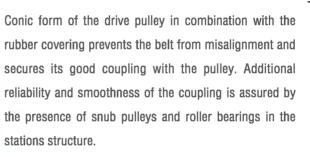
We manufacture open-type or semi-closed conveyors, horizontal, inclined conveyors or conveyors with a changing inclination angle, as well as conveyors with a screw or vertical gravity take-up.

The conveyors are supplied to the customer in form of a ready-made stations and sections and are equipped with a belt of a big endurance, with small residual stretch and increased resistance to abrasive wear.

The drive stations have different structural variations depending on the purpose of the conveyor and are equipped with the gear motors of the Italian company Bonfiglioli, the bearing assemblies SKF and cleaning devices of different structure (scraper, broom, pen-type cleaning devices, two-stage cleaning devices etc.).







KLM light-weight belt conveyors, being actually belt feeders, are used for materials transporting for a small distance (up to 4-5 meters).

THE MAIN TECHNICAL DATA OF THE STATIONARY CONVEYORS

CAPACITY, m³/hour 50 – 350

BELT WIDTH, mm 500 – 1000

TRANSPORTATION DISTANCE, m 4 – 200

BELT MOTION SPEED, m/sec 0,5 – 2

INSTALLED CAPACITY OF THE ELECTRIC DRIVE, kW 1,5 – 45



DESIGNING AND PRODUCTION OF BELT ELEVATORS



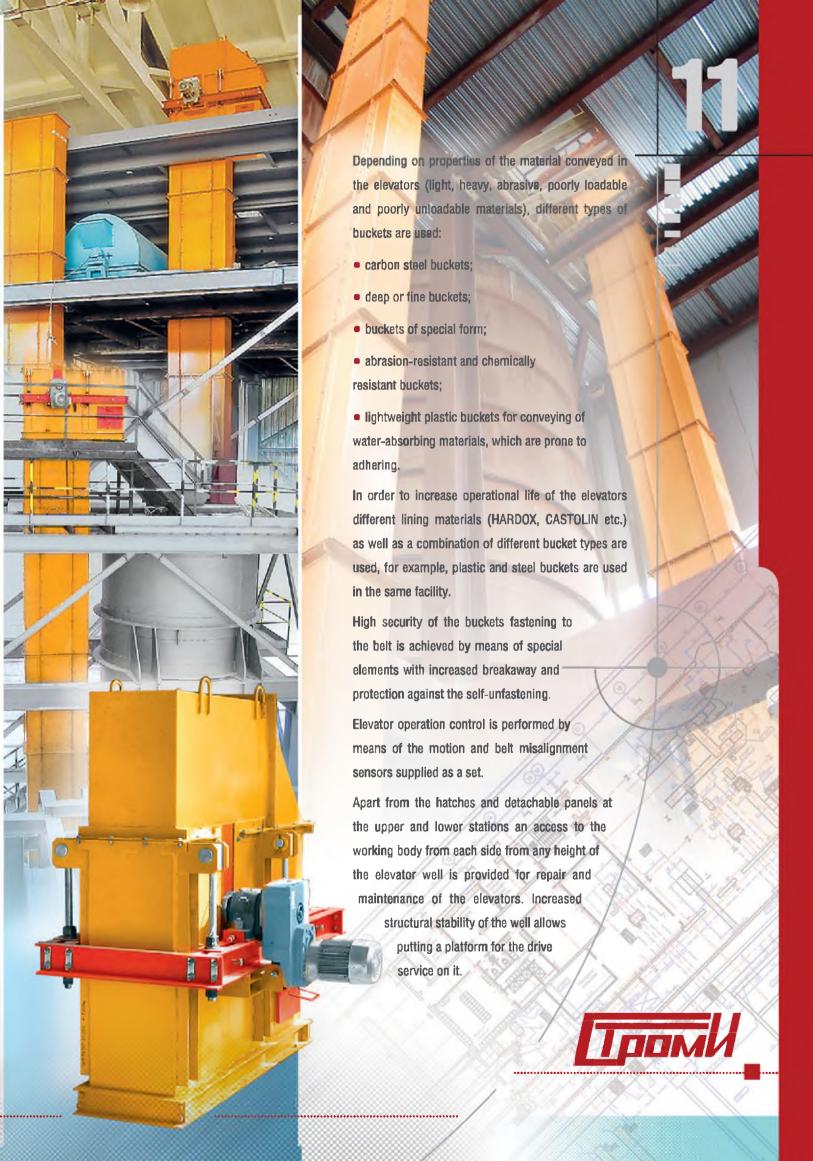
The vertical belt-type bucket elevators are used for lifting of various free-flowing and bulk materials from the loading point to the unloading point.

At the present time "Stromizmeritel" Closed JSC manufactures elevators with the bucket width of 160, 250, 320, 400 mm, capacity of 13 up to 95 m³/hour and lift of 8 up to 50 m. The buckets discharge is centrifugal.

The elevators are equipped with gear motors, bearing assemblies and belts manufactured by the leading world producers. The tension of the elevator traction part is maintained at the power-drive station, which guarantees minimal "dead areas" when the buckets turn the driven pulley and reduces overall dimensions of the lower station. The structure of the driven pulley, which is made akin to a squirrel wheel, prevents the belt from damage when abrasive material falls between the internal surface and the pulley. Conic form of the drive pulley in combination with the rubber covering secures increased adherence and stability of the belt position at a motion rate of 1,85-2 m/sec.

On the whole the elevators as well as the belt conveyors manufactured by "Stromizmeritel" Closed JSC are noted for quick assembly, reliable and dust-free operation and are of high quality and good design.

• • • • • •



DESIGNING AND PRODUCTION OF SCREW FEEDERS AND CONVEYORS

Screw feeders and screw conveyors manufactured by "Stromizmeritel" Closed JSC are used for moving free-flowing, poorly flowing and caking materials with different physical and chemical properties.



MAIN TECHNICAL DATA OF THE SCREW FEEDERS AND CONVEYORS ARE REPRESENTED

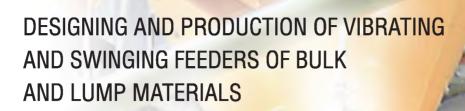
Model	Capacity, m³/hour	Screw diameter,mm	Length of conveying, m	Drive power, kW
PS-28 (ΠC-28)	0,03	28	0,32	0,37
PV-47 (ΠB-47)	0,1	47	0,32	0,37
PV-75 (ПВ-75)	1,2	75	0,52–2,5	0,75–2,2
KVS-125 (KBC-125)	3,6	125	0,6–4,0	2,2
KVS-200 (KBC-200)	7,5	200	0,8–4,0	3,0
KVS-250 (KBC-250)	12,0	250	1,0-4,0	4,0
KVS-315 (KBC-315)	36,0	315	1,0–6,0	5,5–9,0
KVSZh-315*(KBCЖ-315*)	40,0	315	3,0–30,0	2,2–15,0
KVSZh-500*(KBCЖ-500*)	95,0	500	4,0–21,0	5,5–30,0

* Angle of conveying 0...15°

Screw feeders are mainly used as charging und discharging units of different weighing batchers, air-actuated pumps and other equipment. Special screw structures, multi-speed work mode and a shut-off sealing flap at the outlet allow ensuring by means of the screw feeders the

minimum dosing errors at high efficiency. In order to reduce the error in addition we developed special structures of the screw feeders with a changing winding pitch and the double-screw feeders with different screw





Vibrating feeders with electromagnetic and unbalanced mass electric vibration generators are the most widespread vibratory mechanisms and are used either as a part of fan batch feeders and dosing-mixing systems as a loading and unloading feeders or as an independent unit for unloading of bulk and lump materials from receiving hoppers, measuring hoppers and silos.

"Stromizmeritel" Closed JSC manufactures
a wide range of the stationary installed and
swinging vibrating feeders of different structure
and capacity:

- piped with a front discharge (model line PVT (ΠΒΤ));
- piped with a bottom discharge (model line PVS-0,15 (ΠBC-0,15));
- tray-type with a front discharge (model line PVS (ПВС));
- tray-type with a bottom discharge (model line PVN (ПВН));
- tray-type inclined with a possibility to install the controlled shut-off shutters (model line PV8(2) (ΠΒ8 (2)));
- tray-type with a front discharge
 and a sorting grid (model line PVSR (ΠΒCP));
- all types of swinging feeders.

Depending on properties of materials being dosed and transported the trays of the vibrating feeders are equipped with the replaceable lining plates with different characteristics. Wearproof plates of high-carbon hard-alloy materials (HARDOX, CASTOLIN) as well as plates with polymeric coating on the basis of polyurethane are used for high-abrasive components.

Swinging vibrating feeders allow to change the direction of the materials trasporting, for example when discharging the glass mixture from a mixer into a kibble, if the glass mixture is defective, or when loading the conveyed materials into a group of hoppers or silos.



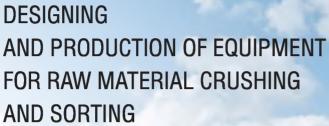


The installation of shut-off rotary gate valves on the vibrating loading and unloading feeders of the weighing dosing devices increases the accuracy of dosing and prevents the material falling from a conveying tray after the drive has been switched off. Equipment of the vibrating feeders with a sorting grid allows to separate preliminary small faction when feeding glass cullet into a crusher what essentially reduces load on the operating crusher and increases its service life.

Vibrating feeders can be equipped with control units, securing both capacity adjustment and operation in multi-speed mode in order to solve the task of the accurate dosing.

It is advisable to use the tray-type swinging feeders produced by "Stromizmeritel" Closed JSC for unloading of lump materials with changing humidity and different particle sizes (dolomite, limestone, sand frozen together, glass cullet). The capacity of such feeders is 50-70 m3/hour and can be changed by means of a frequency-regulated drive or by changing of the crank mechanism stroke.





Crushing, sieving, pulping and grading (sorting) of glass mixture and different multi-component mixtures raw materials are essential process operations, which are performed when processing lump dolomite, lump limestone, sheet and bagged cullet as well as waterabsorbing bulk materials, caked during storage and transportation.

To this effect "Stromizmeritel" Closed JSC manufactures the following equipment:

• npulping devices, material agitators and lump rippers;

• double-roll crushers with a productivity rate of 5 to 15 tonnes/hour;

 rotary crushers with a productivity rate of 10 to 20 tonnes/hour;

 hammer-type crushers with a productivity rate of 25 to 40 tonnes/hour;

• jaw crushers with a productivity rate of up to 20 tonnes/hour;

 vibrating sieves N 20 with a productivity rate of 20 to 40 tonnes/hour for materials of small and medium abrasive power (soda, dolomite, sand etc.);

 classifiers A 10 with a productivity rate of 5 to 12 tonnes/hour for materials of medium and high abrasive power (glass cullet, refractory materials etc.).





DESIGNING AND PRODUCTION OF MACHINERY FOR LOADING AND UNLOADING OF FREE-FLOWING MATERIALS

In order to prepare glass mixture and different multicomponent mixtures one often uses raw materials supplied in big bags. Therefore a big number of transportation and processing operations in relation to loading and unloading of big bags is performed on the shop floors.

"Stromizmeritel" Closed JSC manufactures several modifications of big bags unloading stations and two models of loading stations.

The big bags unloading station SRB-1 (CP5-1) consists of a frame, a conic receiving hopper with a rubber packing and a grid for lumps holdup, knives for big bags cutting and an unbalanced mass vibration generator. In the process of unloading at SRB-1 (CP5-1) a big bag is held by a lift and transfer mechanism that's why the unloading of different materials is performed sequentially. For parallel unloading of several big bags the unloading station SRB-2 (CP5-2) is used, the structure of which includes an additional frame, adjustable for height and cross traverse, to which a big bag is fixed. The presence of a traverse allows using the lift and transferring mechanism for other operations after the big bag is fixed for unloading.

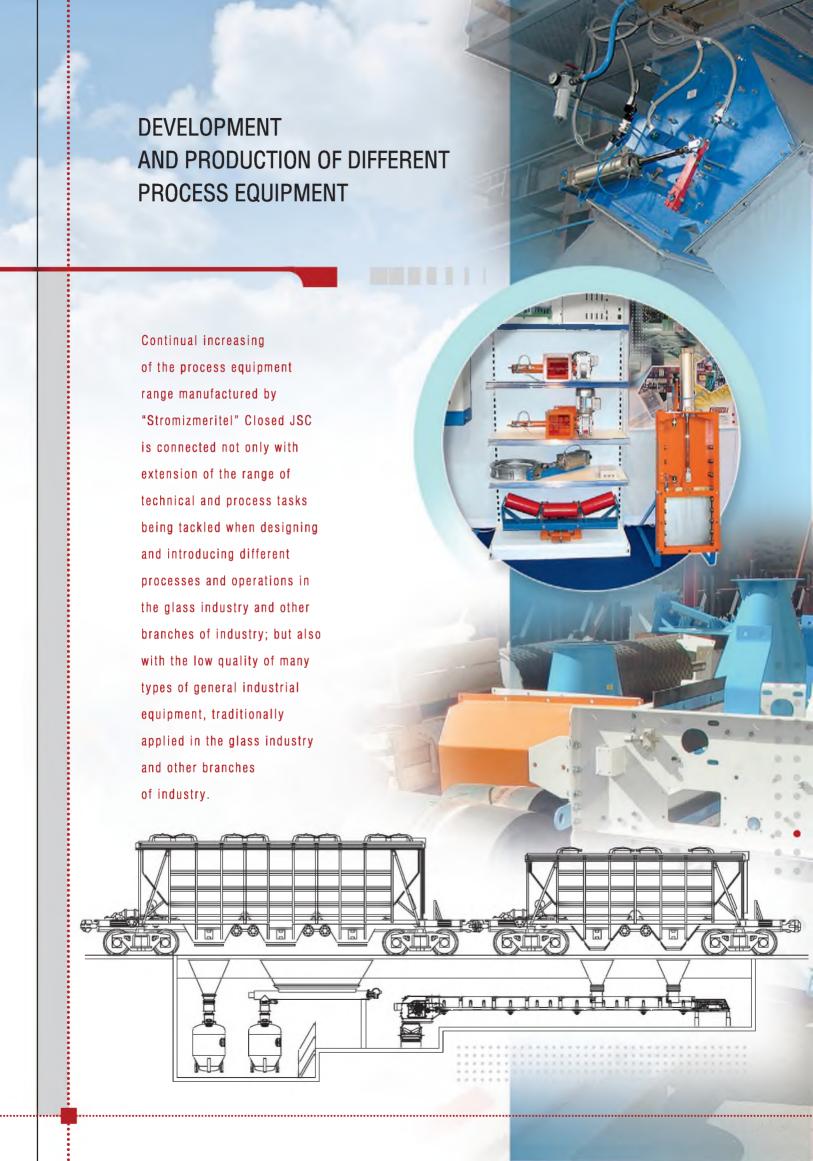
The station SRB-4 (CPE-4) has smaller dimensions and is recommended for usage in space-limited process plants.













Together with a wide range of different transportation, weighing and dosing equipment as well as equipment for crushing and sorting of raw materials, filling and unloading of big bags etc. "Stromizmeritel" Closed JSC manufactures the following process equipment:

- vibrating bottoms of five standard sizes;
- sliding shutters with a manual and pneumatic drive;
- two-position and three-position flow switches with a pneumatic and electric drive;
- diagonal ploughs with a pneumatic drive;
- different sectorial damper valves and damper plate valves;
- pneumatic hammers for breaking materials in the hoppers;
- raw materials pneumatic conveying systems;
- heat generators for drying systems of bulk and lump materials;
- pulping units for water-absorbing materials;
- agitators and rippers of caking materials;
- hopper units;
- pressurized enclosures for transportation of overdimensioned glass plates in the railway cars;
- different non-standard equipment, outlet discharges, switches etc.



DEVELOPMENT AND PRODUCTION OF EQUIPMENT FOR MACHINE DEPARTMENTS

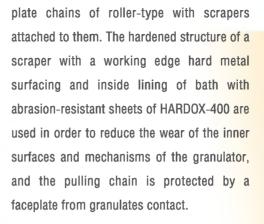
One of the new lines of activity of "Stromizmeritel" Closed JSC is development and production of equipment for machine departments.

Together with processing, transportation and dosing lines of return cullet, previously produced for these departments, "Stromizmeritel" Closed JSC manufactures the following types of the process equipment:

- glass mass scraper granulators;
- glass batch and cullet fan loaders for loading into the glass furnace;
- glass batch and cullet plunger swinging loaders;
- tray-type glass batch and cullet loaders;
- glass batch screw loaders;
- shifting air-smoke dampers;
- shut-off and swinging gate valves;
- craddles and support brackets for the glass furnaces.



The glass mass scraper granulator produced by "Stromizmeritel" Closed JSC consists of a metal case, made of several sections attached together, inside of which is a chain conveyor, consisting of two



Spring-mounted sprockets of the turntable section are used in order to reduce load impact on the traction element and the drive of the granulator. Increasing of the granulator operational efficiency is achieved by means of an additional bottom of the chain conveyor upper arm, glass gobs collapsing by means of special rolls and crushing of the whole afloat bottles by means of a crusher installed in the tail section of the granulator.



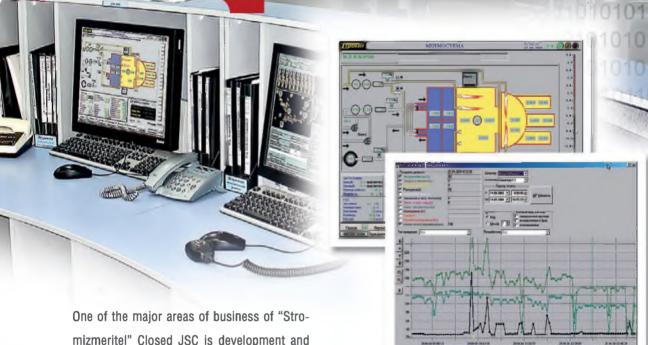
MAIN TECHNICAL DATA OF THE GRANULATOR

LENGTH, m
WIDTH (bath width), mm
DROP HEIGHT OF THE GRANULATOR, mm
SCRAPER MOTION SPEED, m/min
CAPACITY, tonnes/hour
DRIVE POWER, kW

Batch chargers structure depends on the requirements to the loading pocket structure, glass mixture melting characteristics and glass melting process as well as other factors. The glass mixture and cullet chargers produced by "Stromizmeritel" Closed JSC can be used in production of glass plates and other glassware.







One of the major areas of business of "Stro-mizmeritel" Closed JSC is development and manufacturing of the automatic process control systems (PCS) for production of glass mixture, building materials and different multicomponent mixtures.

Centralized or distributed control systems developed by "Stromizmeritel" Closed JSC are built on the basis of either PC-compatible controllers "IPC", 8000 series, or Programmable Logic Controllers "Siemens", "B & R", "Festo", "Omron", "Twido". The control systems allow displaying the process on the monitor screen, archiving and recording all operations, troubleshooting and stating faults and malfunctions, as well as actualizing control algorithms of weighing-dosing and other process equipment.

A flexible tuning scale put into the system enables the operation personnel which does not have special skills quickly master the operation of PCS and essentially expands its functional capabilities.

Together with the industrial microprocessor controllers of different foreign producers we use the following automation aids developed and manufactured by "Stromizmeritel" Closed JSC as a part of the PCS hardware and local control systems of the autonomous process units and separate weighing dosing units:

- weighing indicator WT-4007 (is used as a secondary sensing element in the dosing weighing device);
- weighing terminal WT-4008 (is used for preparation of multi-component mixtures by means of a strain-measuring truck scale);
- control unit BU-1051 (БУ-1051)
 (is used in flowmeters and systems of continuous weighing and dosing);
- weight controller KV-1052 (KB-1052)
 (is a fully self-contained unit of weighing and dosing process control);
- control unit BU-1053 (БУ-1053)
 (is used as a part of the differential dosing units);
- normalizer 1580 of strain-gage sensors signals (sensitive amplification and conversion of signals from the strain-gage sensors);
- converter 6000 of strain-gage sensors signals (analog signals conversion to digital code).

Apart from these hardware components of the PCS for production of multi-component mixtures "Stromizmeritel" Closed JSC manufactures: microprocessor control panels for air-actuated pumps, operating in the raw material pneumatic transport lines; automation systems of the drum-type driers; control systems for the thermophysical testing and ion-exchange glass strengthening lines; as well as other automation and controlling means.



STRATEGY AND POLICY OF "STROMIZMERITEL" Closed JSC IN THE AREA OF PRODUCTS AND SERVICES QUALITY



The primary objective of "Stromizmeritel" Closed JSC is maintaining of a high quality level of its products and services provided to the customer. The quality management system implemented by "Stromizmeritel" Closed JSC in 2003 complies with the international standard ISO 9001, in respect to process design, development, production, assembly and maintenance of the processing, transportation and batching equipment for bulk materials and liquids and process control systems in factories of different segments of industry.

The quality of the products manufactured by "Stromizmeritel" Closed JSC is assured by:

- continual improvement of the quality management system;
- intelligent personnel policy and creating of an atmosphere of mutual confidence in the company;
- qualification and due care of the staff;
- effective solutions based on the analysis of the up-to-date information;
- optimum resources for securing the company's activity and its sustainable development.

All that results in continual improvement of all product life cycle processes, increasing of the process level of developments and complete satisfaction of the customer's needs.

• • • • • •







Performance standards and quality of the products manufactured by "Stromizmeritel" Closed JSC were many times awarded with international exhibitions and forums certificates. Many developments are covered by inventor's certificates and patents for inventions and useful models.

In 2004 "Stromizmeritel" Closed JSC was awarded with Main All-Russian Award "Russian National Olympus" in nomination "Outstanding small and medium enterprise". And in 2005 the cyclus of works of the company's employees "Development and large-scale introduction of the multipurpose software-based process equipment systems for production, storage and transportation of glass mixture and multicomponent mixtures in different branches of industry" was presented for a science and engineering prize of the Government of the Russian Federation.

Henceforth this cyclus of works constituted a ground for a monograph "Raw materials, glass mixture and glass manufacturing" issued in 2008.



CONTENTS:

"STROMIZMERITEL" Closed JSC – package approach to designand construction of glass industry factories	1
Design, reconstruction and construction of modern batching	4
Designing and production of dosing and dosing-mixingunits for glass mixture raw materials	6
Development and production of belt conveyors	8
Designing and production of belt elevators	10
Designing and production of screw feeders and conveyors	12
Designing and production of vibrating and swinging feeders of bulk and lump materials	14
Designing and production of equipment	16
Designing and production of machinery	18
Development and production of different process equipment	20
Development and production of equipment for machine departments	22
Development of hardware and software	24
Strategy and policy of "STROMIZMERITEL" Closed JSC	26



