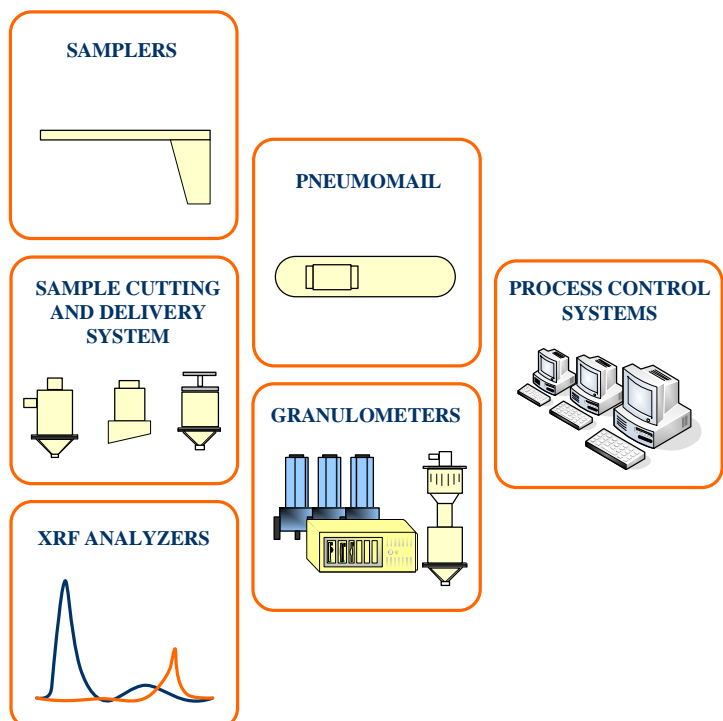


# URALAUTOMATICA ENGINEERING



## SYSTEM SOLUTIONS

For ore dressing,  
metallurgical and sinter plants





Dear colleagues!

We are calling your attention to a brief review of system solutions produced by JSC “Uralautomatica engineering”.

We produce the following equipment and system solutions;

- the sample cutting and delivery system “Kontur”;
- the automatic system of analytic control of metal content;
- the multiple-cuvette X-ray fluorescent analyzer “Saturn”;
- the single cuvette X-ray fluorescent analyzer “Pluton”;
- the pneumocontainer delivery system “Strela” (pneumomail);
- the flotation reagents and lime batching system “ASUDR”;
- the granulometric composition and density determination system “Gran”;
- the granular materials quality analysis system “Sample tower”;
- the solution, filtrates, corrosive liquids sample cutting system “SOPR”;
- the samplers for any pulp and granular products.

Our company is situated on the borderline of Europe and Asia in the Urals mountains in the town of Degtyarsk Sverdlovskaya Oblast. From 1972 the company has been carrying out its activities in reconstructions of concentrating mills and metallurgical plants in Russia and abroad. From 1999 JSC “Uralautomatica engineering” is the member of the Urals Chamber of Commerce and Industry.

In May 2007 JSC “Uralautomatica engineering” celebrated its thirty-fifth anniversary. For the years of our activity our products and engineering solutions can be seen at many ore-dressing, metallurgical, gold-mining enterprises of Russia, Kazakhstan, Uzbekistan as well as in Mongolia, Romania and Bulgaria. Our products buyers are MMC ‘Norilskiy nickel’, Kaztsink Corporation, Ural Mining and Metal Corporation and many others.

JSC “Uralautomatica engineering” is a producer of industrious equipment (triers, batchers, valves) and a creator of complex solutions of engineering processes control automatic systems (PCS) based on advanced technologies of engineering processes control. Introduced PCS systems are supplied to customers turnkey with the total complex of installation and start-adjusting work.



Systems control is carried out from controllers «Allen Bradley» «Siemens», «Ge Fanuc» or others in agreement with the Customer.

Today JSC “Uralautomatica engineering” has production departments, a design office, an engineering centre, an X-ray spectrum analysis laboratory. The enterprise possesses its own representative office in Yekaterinburg and a start-adjusting office in Norilsk. Technical and engineering specialists of the company manage modern computer-aided designs such as Eplan21, TFlex, AutoCAD. Our designers have a special training and skills in all the technological questions.

A big social activity is carried out in the enterprise: a new sports complex with a volleyball ground and a spacious gym has been constructed. Different sports and athletics meetings are permanently held.

Today JSC “Uralautomatica engineering” is a perspective enterprise, which really contributes to the economical development of the country. The systems, produced by our enterprise, can be configured according to your technological tasks. We are happy to offer you an individual approach and work out the exact engineering solution taking into account your requests. We are ready to a constructive dialogue with foreign partners.

Director General

Gleb Cherepanov



## CONTENTS

THE SAMPLE DELIVERY AND PREPARING SYSTEM “KONTUR” .....	5
THE PNEUMATIC CONTAINER SAMPLE DELIVERY SYSTEM ‘STRELA’ .....	8
FLOTATION REAGENTS AND LIME BATCHING SYSTEMS .....	10
THE SYSTEM OF GRANULE COMPOSITION AND DENSITY DETERMINATION .....	12
THE ANALYTIC CONTROL AUTOMATIC SYSTEM .....	14



## THE SAMPLE DELIVERY AND PREPARING SYSTEM “KONTUR”



The offered system can be used both as an autonomous testing system and consisting of a system of analytic control of concentration products at ore-dressing factories.

The ‘Kontur’ system is designed for automatic particular sample cutting, its accumulation, transporting to the analysis place and sample pumping through the X-ray spectrum analyzer.

The distinctive features of the system are;

- cutting of accumulated sample of a small volume observing the sample representativity;
- multiple sample pumping for the purpose of its averaging-out before rendering into the analyzer cuvette.

The advantages of the system are:

- the possibility of express analysis of concentration products with a little volume of sample (under 20 liters);
- the offered work algorithm renders sample cutting, delivery, analysis, splitting, its dehydrating and the system abluton completely automatic;
- the measuring cycle of the same product is about 15 minutes and it can be changed according to specific conditions;
- the complex of the technical means of the system allows to change its assembling according to specific conditions and the type of the X-ray spectrum analyzer.

The little volume of transported sample allows to reduce significantly power inputs, equipment period of service and, consequently, to increase the service life of the system. Besides, the



representativity of united samples for analysis increases, because samples are formed for a period of time from some pointed samples, which number can be changed.

The system is formed of the following equipment:

- a sample cutting device (is chosen from the available set of different types according to the cutting flow parameters );
- a sample accumulation and delivery block;
- a sample receiving block;
- splitters with a pneumatic drive;
- a sample dehydrator;
- a pumping device;
- pneumatic control boxes;
- control box with a controller;
- software.

The ‘Kontur’ system is designed for using with any flow analyzers (‘Saturn’, ‘Pluton’, ‘Courier’).



The photo of the ‘Kontur’ system with 15 lines of sample cutting. The system works with the ‘Saturn’ analyzer.



The photo of the sample delivery system “Kontur” and the control box with the “Ge Fanuc” controllers. This system is developed for Kaztsink Corporation (Kazakhstan).



The photo of the multiplexing station (for the “Courier-6” XRF analyzer) designed and made by Uralautomatica Engineering specially for Norilskiy Nickel



## THE PNEUMATIC CONTAINER SAMPLE DELIVERY SYSTEM ‘STRELA’



The system is designed for fast delivery of:

- technological samples;
- documents;
- different material objects.

The automatic pneumatic container delivery system ‘Strela’ is reliable means of fast and safe sending of technological samples and objects in capsules with compressed air along the tubing up to any distance.

The use of the ‘Strela’ system is simple and effective means to fasten the sending of technological samples, to increase the efficiency of technological process control, to fasten management decision making, as well as to free the employees of your organization of downtime.

We carry out design work, production and assembling of the tube and tube transfer system devices, including control. The questions of automatic capsule loading and unloading can also be solved.

The ‘Strela’ automatic system can be used at:

- technological samples preparing and delivery from workshops into laboratories for different analyses;
- document delivery within a working day from the office into departments and workshops outside the office building as





well as among departments, services and workshops of an organization.

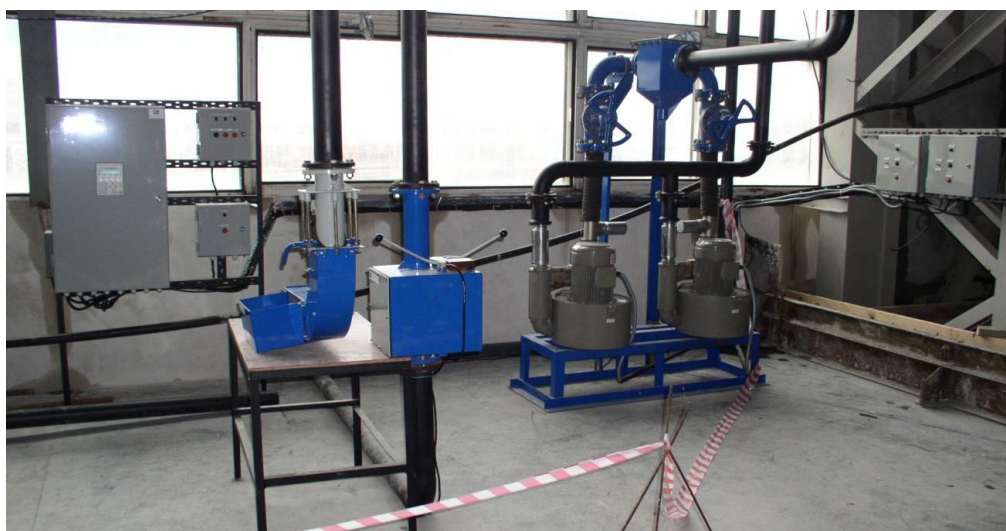
The advantages of the ‘Strela’ systems:

- high delivery speed (8-10 mps), which allows to deliver technological samples and documents into laboratories, departments and services fast and evenly within a working day;
- time registration of all the deliveries with the possibility to print the information.

Basic descriptions of the ‘Strela’ automatic system.

- Tubes (through which sending of containers with technological samples or objects is carried out) are made of steel or polyethylene pipes with the inner diameter of 95 mm.
- The system controls a capsule going along the tube.
- The capsule cover possesses a locking arm. The maximum weight of the object in the capsule is 2.5 kg.
- To move capsules along the tube one can use blowers with power of 2.2 to 12 kw, depending on the calculated power of the system.
- The ‘Strela’ automatic system can work with any number of stations. All the details and components of the ‘Strela’ system are simple, reliable and comfortable to use, joinings are strong and quick disconnected.
- Service life of the system is not less than 10 (ten) years according to the technical conditions of the producer factory.

The system has been applied and successfully works at some enterprises of ‘MMC ‘Norilskiy Nickel’ in Norilsk as well as at other enterprises.



Receiving-departure station, control panels and blowers produced for “Khakasskiy aluminiyevy zavod” Ltd.



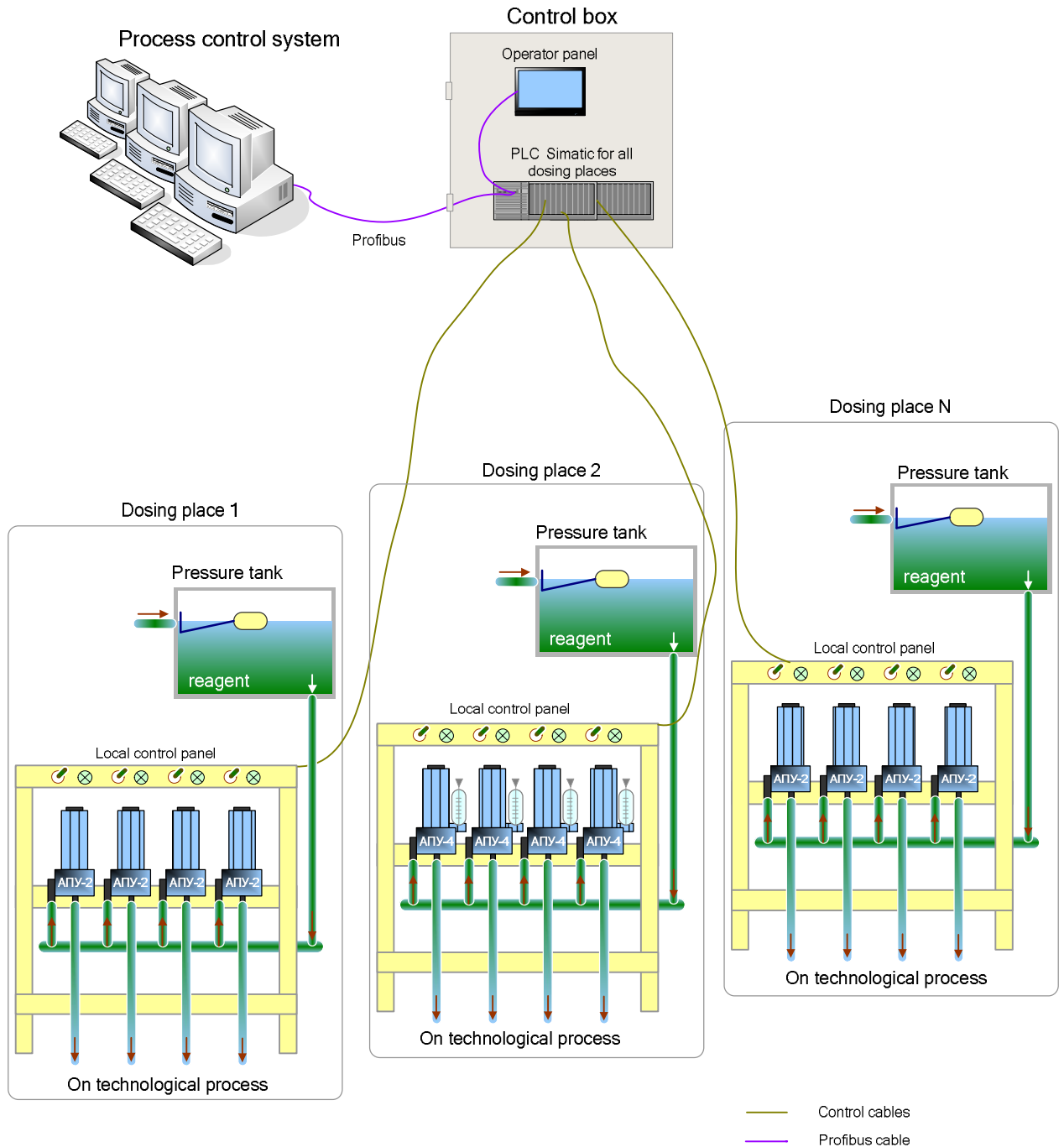
## FLOTATION REAGENTS AND LIME BATCHING SYSTEMS

Reagent batching control automatic system (“ASUDR”) is designed for automatic control of reagent batchers by means of a hardware and software complex. The complex ensures automatic calculation and feeding of reagents according to the calculated or established flow rate in real time.

Used in the complex, serially produced by JSC “Uralautomatica engineering”, automatic reagent batchers APU ensure feeding of reagents noncrystallized in the air, purified of the mechanical impurities. Direct-flow valves or pumps (Burkert, Milton Roy, Etatron) can be used as reagent batchers in our system.

The complex ensures the calculation of the expenditure of reagents for each point of dosing in the required time intervals, using flow meters or by calculation. The possibility of using the information about the residual concentration of reagents in the process of the flotation is provided.





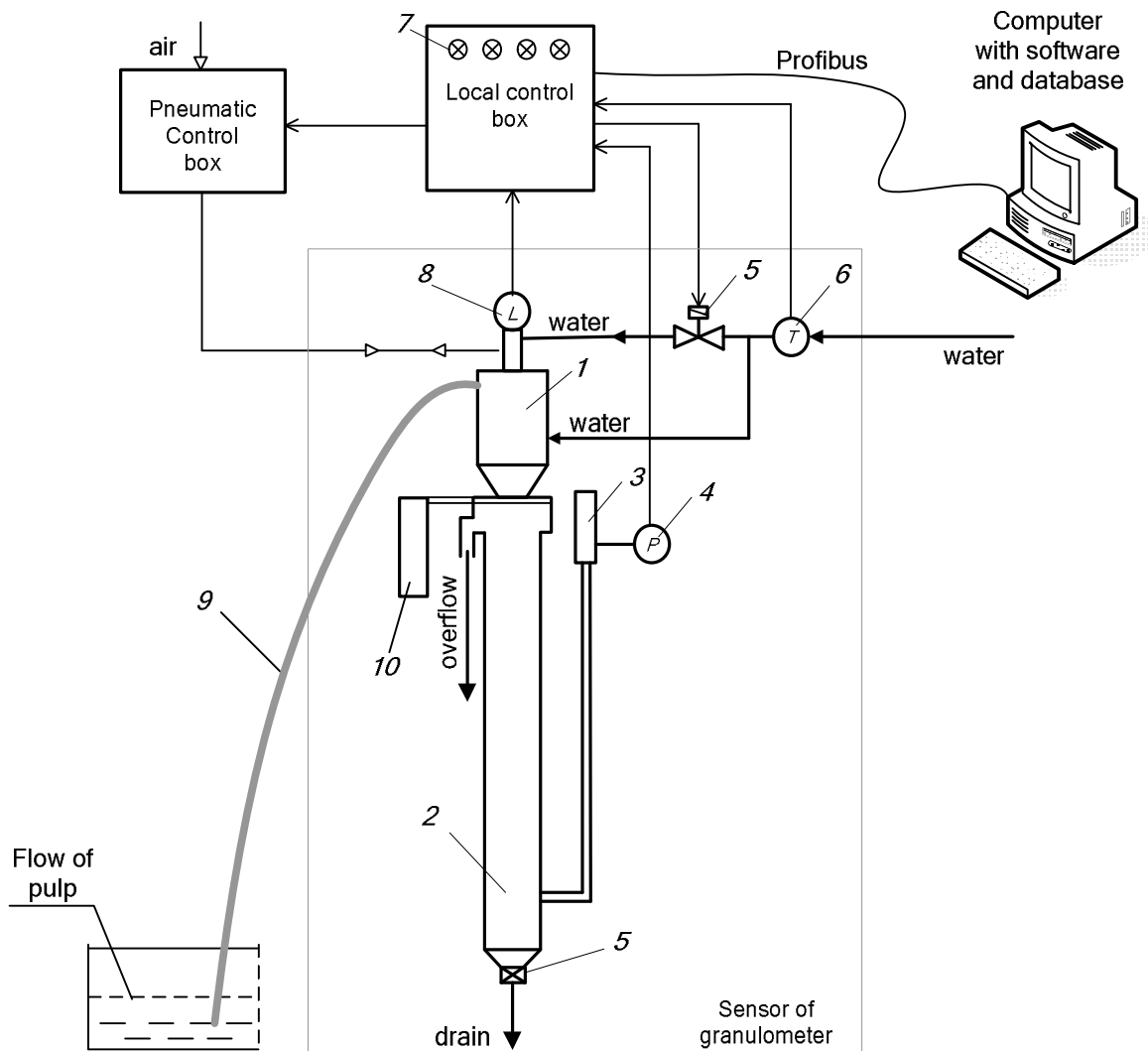
Functional scheme of the reagent batching system

Our company successfully solves the problems of lime batching without crystallization. We produce special lime batchers in 0,1...500 litres/min range. Using our experience in lime batching allows to reduce expenses for technical service.

## THE SYSTEM OF GRANULE COMPOSITION AND DENSITY DETERMINATION

The reliable determination of granulometric composition and density is a very important parameter determining the quality of the work of a flotation department of a concentrating mill. Stabilization of decomposition and classification conditions is not enough for stability of pulp, granule composition, that is why it is necessary to control it permanently, especially during the processes of copper ore-dressing as well as sulfided gold ore.

JSC «Uralautomatica engineering» produces the system of automatic determination of granular composition and pulp products density «Gran». The system is designed for measuring the percentage of solid particles of the required size and density grade in decomposition products (pulps, hydraulic mixtures).



Functional scheme of granulometer

1 - camera of samples, 2 - settling tube, 3 - measuring device, 4 - pressure meter, 5 - gate, 6 - thermometer, 7 - signal lamp, 8 - level meter, 9 - pulp tube, 10 - calibrating vessel



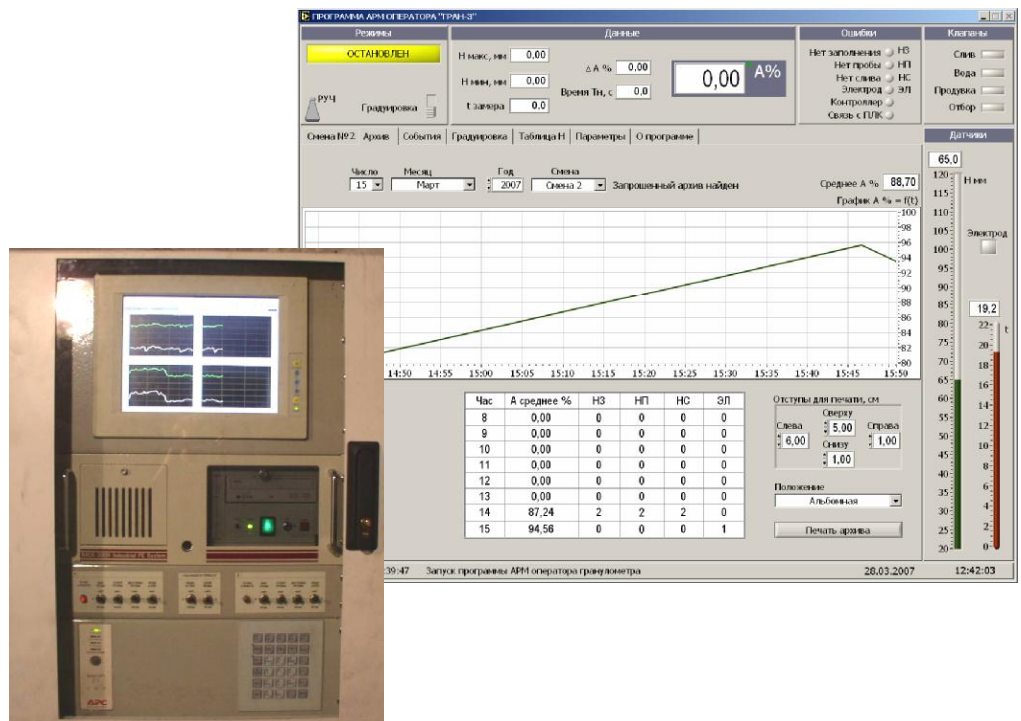
The principle of sedimentation analysis is in the basis of the measuring means. “Gran” is the only granulometer using the sediment principle, which distinguishes it from the known automatic granulometers, for example, laser ones or those that can measure the average size of particles. In the same device together with the granule composition you can determine the density of pulp technological flow, which is very important for technologists of a factory.



Stability and observational accuracy is guaranteed with the following solutions:

- automation of sample cutting and loading operations;
- temperature compensation of particles concretion speed from changes of hydraulic mixture viscosity;
- differential measuring means, excluding inaccuracies of pressure monitor setting (it is not necessary to set ‘zero’ of the pressure monitor ).

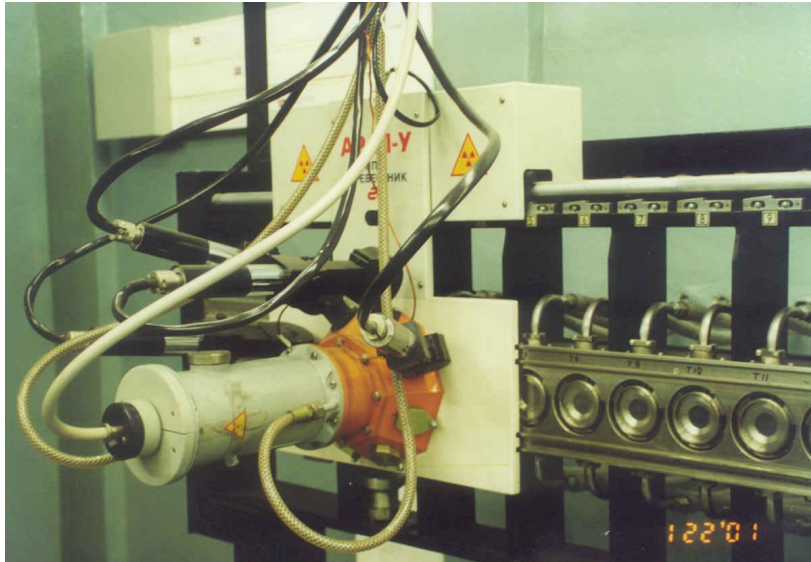
‘Gran’ is used from 1984 at many enterprises of Russia. ‘Gran’ is protected by the patent for invention (patent of Russian Federation “Sediment granulometer # 2196974”).





## THE ANALYTIC CONTROL AUTOMATIC SYSTEM

JSC “Uralautomatica engineering” can offer an analytic control automatic system ASAK on the base of 15-cuvette analyzer “Saturn” with the possibility to work with 15 lines of sample delivery. Besides, the ASAK system can be supplied with a single-cuvette analyzer “Pluton” with



the possibility to work with 8 lines of sample delivery. Our system ASAK is protected by the Russian Federation patent for invention # 2173452.

The analytic control automatic system (ASAK) is a complex of technical means for an X-ray fluorescent analyze and sample cutting, methodic-mathematical supplying and software united

in one system allowing to ensure receiving, processing and giving analytic information to consumers of ore-dressing plants.

Below the main window of the analyzer’s software

In the basis of ASAK there is a principle of necessary and efficient analytic information at the minimum of capital outlays directly in the pulp flow on the base of an automatic X-ray analyzer ‘Saturn’.

In the analyzer there are two vacuum canals (calcium and barium),

the number of flowing cuvettes is 15, spectrometric canals with Johansson focusing are used, which significantly reduces a hardware inaccuracy.

Текущие концентрации				Относительные интенсивности						Абсолютные интенсивности								
Cu	Zn	Fe	Фон	Cu	Zn	Fe	Фон	Zn*	Pb	Cu	Zn	Fe	Фон	Zn*	Pb			
01	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	01	0	0	0	0	0			
02	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	02	0	0	0	0	0			
03	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	03	0	0	0	0	0			
04	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	04	0	0	0	0	0			
05	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	05	0	0	0	0	0			
06	60.3911	35.6891	0.1668	0.0000	06	0.9662	1.0661	1.9039	0.9994	1.0570	0.5711	06	285749	152480	274	603	107902	606
07	57.2097	39.1711	0.4185	0.0000	07	0.8934	1.0859	3.7670	0.9860	1.0708	1.6285	07	264228	155316	521	595	109310	1954
08	58.1448	39.3889	0.4524	0.0000	08	0.9235	1.0995	4.4961	0.9880	1.0720	1.1085	08	273105	157257	622	596	109428	1331
09	59.4303	39.0261	0.3967	0.0000	09	0.9589	1.1025	4.2622	0.9788	1.0819	0.7688	09	283578	157682	589	591	110443	923
10	61.1267	38.1291	0.3480	0.0000	10	0.9848	1.0795	3.9656	0.9699	1.0459	0.5366	10	291246	154396	548	585	106764	645
11	63.0433	36.3547	0.2772	0.0000	11	0.9987	1.0314	3.3002	0.9842	1.0217	0.4030	11	295359	147521	456	594	104301	484
	62.6129	35.7855	0.0544	0.0000	12	1.0179	1.0533	0.7371	1.0027	0.3707	0.7968	12	294220	134329	155	595	96966	1776
13	0.0000	0.0000	0.0000	0.0000	13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	13	0	0	0	0	0	0
14	0.0000	0.0000	0.0000	0.0000	14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	14	0	0	0	0	0	0
15	0.0000	0.0000	0.0000	0.0000	15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	15	0	0	0	0	0	0

Опорные интенсивности РО					Интенсивности РО					Текущая дата: 07.10.2001				
Cu	Zn	Fe	Фон	Zn*	Pb	Cu	Zn	Fe	Фон	Zn*	Pb	Текущее время: 18:33:42		
1	299053	148029	138	605	137420	1204	1	297452	141526	136	600	93755	1202	Время начала цикла:
2	306999	130787	250	598	125884	1625	2	302131	127538	243	594	95179	1624	С начала цикла:
3	293664	132103	206	592	124906	2227	3	288984	127491	211	593	93420	2226	Кювета: 0

Изменение интенсивностей РО от опорных, %						Изменение интенсивностей РО от предыдущих, %							
Cu	Zn	Fe	Фон	Zn*	Pb	Cu	Zn	Fe	Фон	Zn*	Pb		
1	-0.54	-4.39	-1.14	-0.69	<b>-31.77</b>	-0.10	1	0.60	<b>-1.02</b>	<b>-1.45</b>	-0.50	<b>-8.07</b>	0.26
2	-1.59	-2.48	-3.10	-0.61	<b>-24.39</b>	-0.07	2	<b>-1.54</b>	<b>3.05</b>	<b>-4.93</b>	-0.17	<b>30.14</b>	<b>-1.01</b>
3	-1.59	-3.49	2.31	0.24	<b>-25.21</b>	-0.02	3	<b>-5.31</b>	<b>-5.95</b>	<b>18.93</b>	<b>-2.31</b>	<b>20.43</b>	<b>28.91</b>

Интенсивности Ф0						Условные обозначения		
Cu	Zn	Fe	Фон	Zn*	Pb	■	■	
1	302009	138578	174	606	94149	1727	■	■

■ - выход параметра за максимум  
 ■ - выход параметра за минимум  
 ■ - вода в кювете  
 ■ - пустая кювета

ПЕЧАТЬ    ВЫХОД

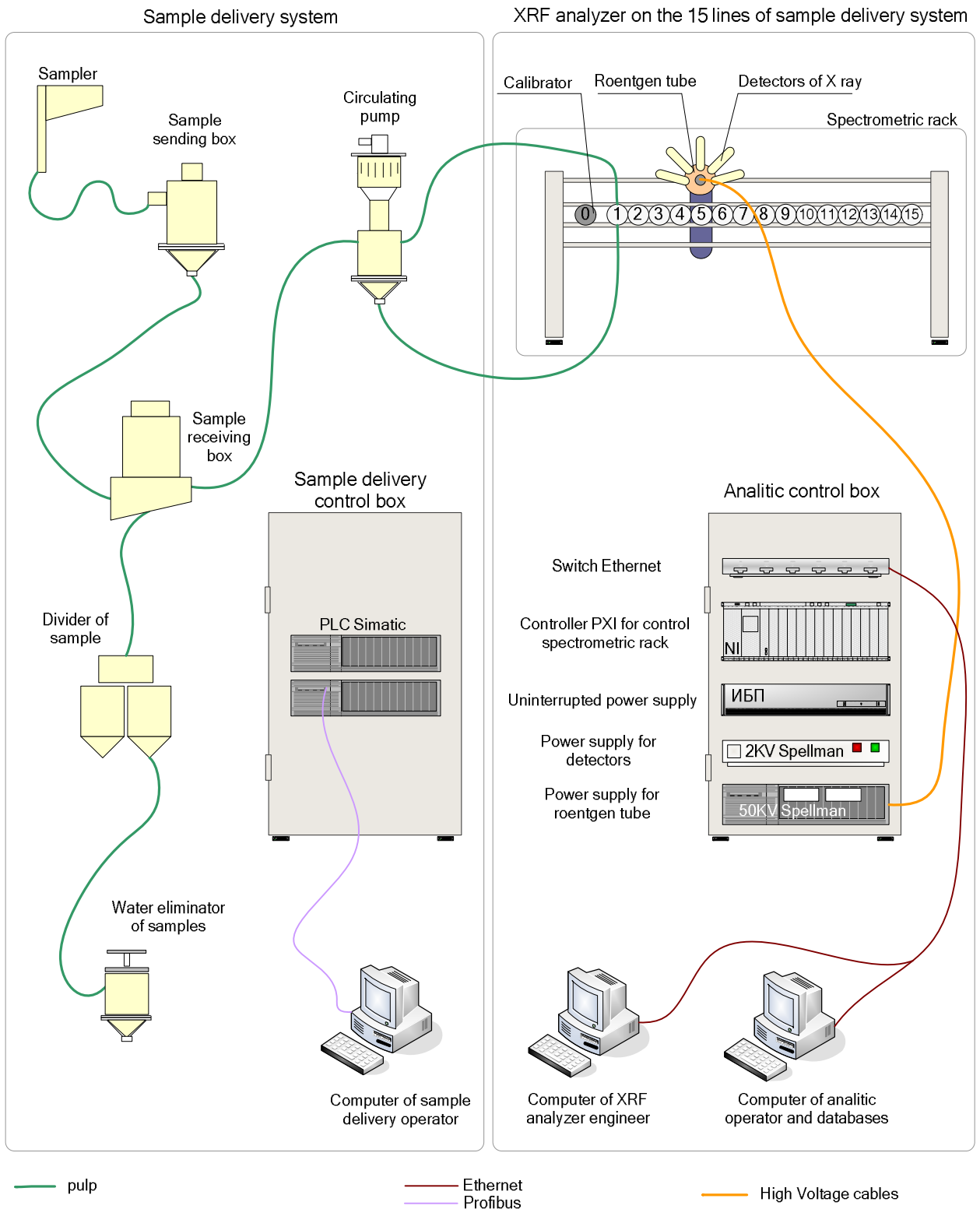


The analyzer allows at the same time to determine up to 8 elements with atomic numbers from Ca (Z=20) to U (Z=92). The time of one flow analysis is 20-100 seconds and is determined by the analyze method.

The methodic-mathematical supplying allows to carry out an analyzer calibration and calculation of elements content in solid pulp phase by regression constraint equations. To increase consumer characteristics, we are developing other ways of analyzer calibration, ensuring a rapid putting into operation of new devices.



The leading specialists of JSC “Uralautomatica engineering” carrying out start-adjusting work with the ASAK system. The sample delivery control box “Kontur” is in the background, the analytic control box ‘Saturn’ with 15 lines is on the right.



The functional scheme of the ASAK system with the “Saturn” analyzer.

The offering ASAK system affords new opportunities of technical re-equipment of concentrating mills, their perfection according to the real conditions, reducing projection and introduction expenses. The continuity of technical solutions allows to carry out a step-by-step modernization of existent analytic complexes without long stops and enormous capital outlays.