



# COLOR SORTING

Innovative solutions  
for better products



## Caring for your products

**Color sorting** is one of the most careful ways to purify bulk products. Grains are not subjected to any mechanical treatment, washing, or calibration that may damage products. The application of color sorters ensures the delivery of homogeneous, 99.9% pure products with high consumer appeal. An increasing number of agricultural manufacturers prefer to use photo-electronic separators in the sorting process. This preference allows CSort to not only retain its leading position in the color sorter market in Russia but also to expand its sales geography: currently, more than 500 CSort devices are currently in operation throughout Russia, CIS and Eastern Europe.

### We take care. Always

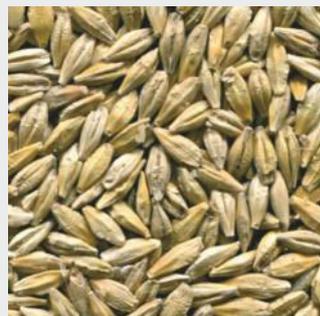
We provide uninterrupted operation of our color sorters when they become part of the customers' manufacturing process. Thanks to our state-of-the-art technology, we provide 24h color sorter status monitoring and are able to do diagnostics and make adjustments on equipment via the Internet. If necessary, highly qualified service engineers will visit you on a timely basis.

### A single separator for all your product types

CSort color sorters are designed for sorting a wide range of bulk products: cereals, beans, oil plants, seeds, berries, vegetables, nuts, salt – hundreds of different products.



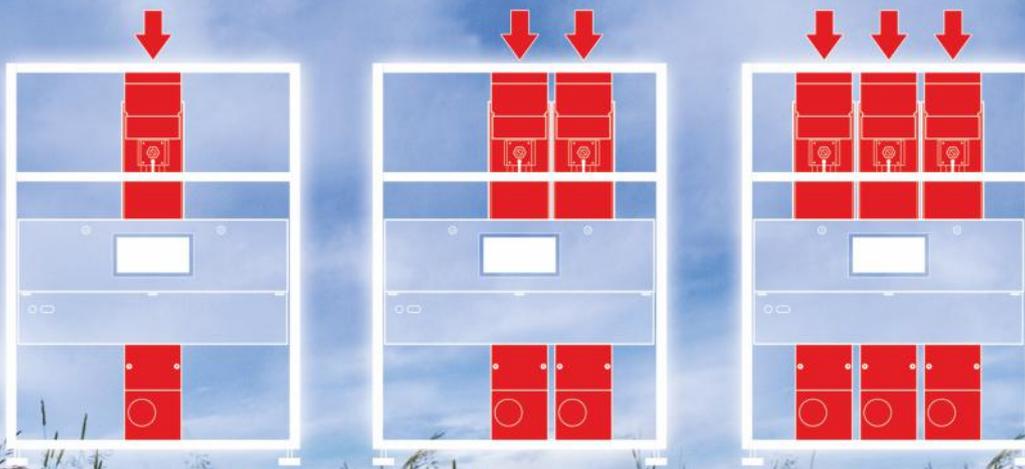
Barley before sorting



Barley after sorting  
on a color sorter



Barley sorting waste

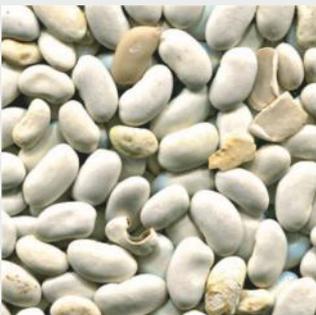


## Solution flexibility – maximum economic efficiency

The CSort company was established in 2007 as a Savinkov family business. Since then, the company has grown significantly. Despite this growth, we always treat every employee and customer problem as if they are our own. We are sensitive to the challenges and needs of each customer and are committed to modifying existing solutions or developing new ones for your individual tasks. The CSort color sorter performance varies in such a way that our equipment is suitable for both a small farm and factory with a large output. Thus, you get equipment that fits the scale of your process, without any unnecessary elements or options.

### Lean production

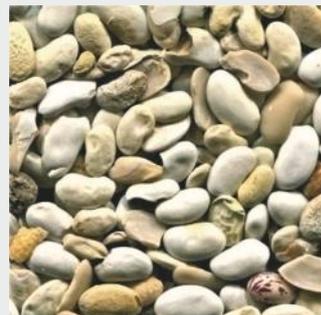
The application of color sorters allows to reduce the cost of production. Labor costs are reduced significantly thanks to automation of the final product purifying stage. The opportunity to utilize secondary product sorting on CSort separators without any extra effort ensures that product loss is minimized. Moreover, our company's equipment requires low upfront investment and operating costs, and it features ease of operation and high energy efficiency.



Bean before sorting



Bean after sorting  
on a color sorter



Bean sorting waste



## Science at your service

At CSort we believe that the main goal of science is to raise the quality of people's lives by making them easier and more convenient today. Therefore, we have put together a team of mathematicians, engineers and programmers with the expertise and ambition to find nontrivial solutions to the most complicated engineering problems. The Company Engineering Department continuously operates to search for and implement new technologies in developing the company's equipment and to improve existing solutions. The company invests 10% of the turnover in research and development, as we know our customers expect only the best from us. CSort supports young researchers and collaborates with lead engineering universities. Also, we are willing to share our experience in establishing innovative production with other companies to make a difference in people's lives.

### Thought-out software

You will be able to control a CSort color sorter confidently even if you have never operated one before. The machine startup is a simple as a single press of a button. The initial level provides access to options required for regular operation only. The setting up and switching from one sorting program to another is as fast and easy as possible. The software is continuously updated and improved. It may be updated to the current version remotely.



*«The cost of the equipment and services paid for itself after our first year of operation, and now only yields income. We sell all processed stock [sunflower seeds] at the most generous prices. Our consumers highly value the quality of our seeds».*

**Avdeev Ilya Vladimirovich,**  
Deputy Director for Operations  
SMART-AGRO, LLC (Russia)

## Reliability and quality

Our best engineers choose only high-quality components for our equipment. Each assembly undergoes mandatory quality control prior to becoming a part of CSort color sorters. The equipment is manufactured on precision German equipment at the company's factory. Our EU certificate of conformity (CE) attests to our compliance with safety standards.

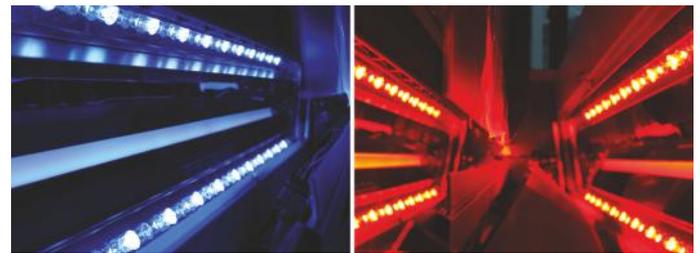


Each minor thing counts



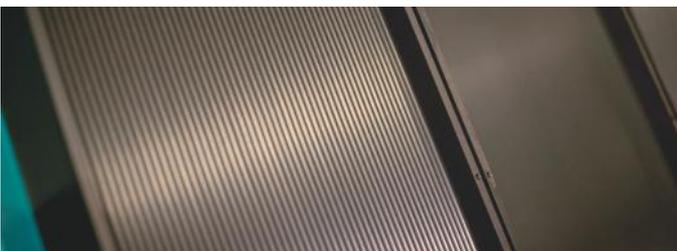
## Ergonomic Design

CSort's color sorters are maximally maintenance-friendly and easy-to-use and easy-to-install. The hinged sections of the inspection system allow to easily access the most remote components of the color sorter such as chutes, branch tubes of the accept and reject product, pneumatic rod etc. for cleaning which is especially topical in case of sorting of dusty and oily products. The convenient arrangement of the control panel increases comfort when adjusting and operating the apparatus. The lightweight frame makes it easy to transport and assemble color sorter at the production line.



## LED-Lighting

The specially designed LED-lighting with the light-emitting diodes of world leaders has service lifetime exceeding 80 000 hours which provides the sustained sorting quality over the whole lifetime of the apparatus. The combination of 4 basic lighting colors and backgrounds enables a higher sorting quality of complicated low-contrast products as compared to the traditional lighting systems. The adjustment and change of lightning are performed from the operator's panel in a split second and don't require intervention to the apparatus structure.



## Chutes

Our color sorters are equipped with universal double-sided chutes. The side with narrow grooves is intended for sorting of small-seeded products – each removed grain will be directed exactly to the stream center of the corresponding nozzle, excluding the risk to stay in the good product flow. In case of sorting of fine products, the even side of the chute with maximum performance is used.



## Stable performance under any conditions

Equipped with a built-in cooling system color sorters are ready for operation in hot and dusty premises, while the excessive pressure in the body prevents the sorter from dust.

SMART solution for  
outstanding results

# SmartSort

Color sorter



For those striving  
for the best we have  
developed a **SmartSort**  
color sorter

**SmartSort** is designed to sort a wide range of bulk stocks not only according to their color but also according to their shape and texture. The combination of innovations and the most modern components of the best quality, together with the long-term experience in designing the photoelectronic sorters allowed us to create a new model of the color sorter capable of solving the most complicated sorting tasks with maximum performance and convenience.



## SmartSort distinctive features

### Neural Sorting Algorithm

Innovative neural algorithms of sorting objects analysis help to solve the tasks which earlier were considered unsolvable, for example, sorting of striped sunflower seeds, raisins with and without stems, wheat according to vitreosity, etc.

Application of the neural algorithm means that the program is capable of learning how to identify the set of the most difficult features describing such sorting criteria as intensity of a product or a defect, shape, size, mottling, flickering, etc.

### Control

The self-intuitive menu of the operator's panel with the user-friendly interface and a high degree of visualization simplifies and facilitates the work of the operator. The machine start-up is carried out by one touch.

### Self-Diagnostics

**SmartSort** real-time monitors working efficiency of the major assembly units and aggregates, timely notifying the operator of the events happening. If necessary, you can look up the self-diagnostics information in the log sustained.

### Industrial Light Signal

Enables a quick visual tracing of the apparatus condition at a distance in the following modes: sorting, standby, error or emergency.

### Block-modular Design

SmartSort is ready to double or even triple production capacity on the basis of the already existing color sorter. This helps to save the funds threefold as compared to the purchase of a new color sorter as well as to save the area and avoid dismantling the old equipment and acquisition of additional transport mechanisms.

### Level Sensors and Remote Control

The intelligent control system of the peripherals automatically monitors the apparatus operating modes, adaptively adjusting to the change of the product level in the supply hopper with the help of connectable sensors.

The color sorter can be also connected to the management information system to provide remote control and monitoring of basic operation modes.

### Air Flow Reducer

**SmartSort** can independently adjust the operating pressure of the nozzles in accordance with the value set in the operator's panel. When going from one sorting program to the other, the pressure changes automatically without human intervention.

# Model Range and Technical Characteristics

Nº	Parameter	SmartSort 1	SmartSort 2	SmartSort 3
1	Channels	54	108	162
2	Production capacity (wheat), tons per hour, min *	4	8	12
3	Cleanness coef., %, min **		99,5	
4	CCD-matrix resolution (per chute), pixel		2048	
5	Power voltage, V		220±5%	
6	Power line frequency, Hz		50±1	
7	Nominal power, kW	0,6	0,8	1
8	Air pressure, Mpa		0,6	
9	Air consumption for the technical process, m <sup>3</sup> /h, max	40	80	120
10	Environment temperature, °C	from 5 to 40		
11	Relative air humidity at 25 °C, %	from 20 to 80		
12	Air consumption for aspiration, m <sup>3</sup> /h, max	1800		
13	Dimensions, mm, max: - length	1488		
	- width	1500		
	- height	1980		
14	Weight, kg, max	550	600	650
15	Electric shock protection class	I		
16	IP of the electric equipment	IP54		
17	Service life, years	5		
18	Period of storing, years, max	2		
19	Operational life, h	41000		
20	Noise level at the workplace, dBA, max	80		
21	Workplace level of vibration acceleration corrected by frequency, dB, max	100		
* Production capacity depends on the kind and percentage of the impurity content in the product to be sorted. ** With initial impurity level less than 2%, reject is max 300 kg/h and bulk weight of the product is 0.750 t/m <sup>3</sup> . Any model can be completed with NIR, RGB or InGaAs cameras depending on requirements to sorting.				

## Reconfiguration

The unique feature: choosing SmartSort you can always be sure that even if you have purchased the machine of the minimum configuration you can at any moment upgrade it up to NIR, InGaAs, bi-chrome and RGB.

## Ejectors

The reliable and high-efficiency Italian ejectors secure over four billions operations. The width of the air nozzles is 4.5 mm which provides exact elimination and concentrated rejection of the product at a low air flow rate.

## CCD-Cameras

The smart cameras of the apparatus are assembled exclusively from high-tech components produced by Kodak, Toshiba and Nikon. High-sensitivity CCD-matrices with the resolution of 2048 pixels provide super high image detailing of the product to be sorted which guarantees precise analysis and top quality of sorting, respectively. Flexible adjustment system of the sorting algorithm analyses defects from 0,13 mm.

# ZORKIY

Color sorter

Watchful. Careful. Fast.



The modern electronic element base, «know how» in the sphere of algorithms for video image processing, pneumatic units of a new generation and the cutting-edge metal processing technologies constitute a distinctive feature of Zorkiy family. Our own production site enables to implement the complete production cycle. New ideas in optimization of the sorter functionality, performance characteristics, and improvement in the sorting effectiveness are immediately realized in the manufactured machines.



«Over the period from 2011 through 2014, our company purchased [...] four ZORKIY color sorters. For the period of operation, we've appreciated their benefits and advantages completely, specifically we emphasize the minimization of waste during stock treatment and the continual output of high product quality».

**S.A. Penshin,**  
head of a farming enterprise  
(Russia)



## Zorkiy distinctive features

### CCD-Cameras

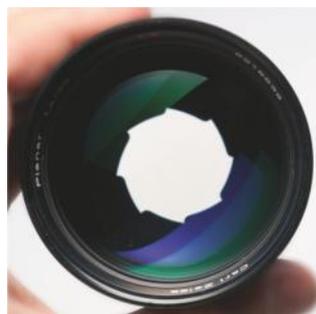
2048-pixel CCD camera of the Japanese manufacture with the resolution of 0.13 mm. Improved quality and high image detailing of the product to be sorted are achieved thanks to Toshiba CCD cameras providing a qualitative analysis of the product and increasing the sorting accuracy.

### Control



The touch screen of the computer system with the diagonal of 15.6" visualizes all the functional parameters and the analyzed signal. Special functions help to display and analyze video/photo image of the particles to be sorted.

### Reconfiguration



The variety of cameras' configuration of the color sorter helps to select an ideal set of inspection cameras depending on the sorting tasks. Even if you have purchased the machine of the minimum configuration you can at any moment upgrade it up to NIR and bi-chrome with maximum 4 cameras per section.

### Ejectors

The width of the air nozzles is 4.5 mm enabling precise removal of the bad product both of coarse and fine fractions, minimizing the loss of the good product in the process of sorting. The ejectors are directly installed in the nozzle unit which reduces the response time on the release of the bad product. Guaranteed quality of the ejector operations amounts to 500 million cycles at the working speed. The nozzle structure provides a low air flow rate.



«Using the color sorter we get a product that sets a high standard, which in turn allows us to manufacture competitive products at minimal cost».

**G.V. Shabalin,**  
General Director  
JSC Masloboyniy Zavod  
(Oil Mill) (Russia)

# Model Range and Technical Characteristics

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12	Air consumption for aspiration, m <sup>3</sup> /h, max	1800		
13	Dimensions, mm, max: - length	1480		
	- width	1511		
	- height	2000		
14	Weight, kg, max	470	500	530
15	Electric shock protection class	I		
16	IP of the electric equipment	Ip54		
17	Service life, years	5		
18	Period of storing, years, max	2		
19	Operational life, h	41000		
20	Noise level at the workplace, dBA, max	80		
21	Workplace level of vibration acceleration corrected by frequency, dB, max	100		

\* The capacity depends on the kind and percent of the impurity content of the product to be sorted.  
 \*\* With initial impurity level less than 2%, reject is max 300 kg/h and bulk weight of the product is 0.750 t/m<sup>3</sup>.  
 Any model can be completed with 2 to 4 cameras per 1 section, each of them can operate in the visible and infrared spectrum (NIR), depending on requirements to sorting.

The model range varies from 1 to 3 sections. The universal frame structure of the machine is designed so, that in case of increased production output there is no need to acquire the apparatus of a bigger power, since you just need to install an additional section.

## Block-Modular Design





## Innovative solutions for better products

*«Back in 1997 we launched our business as a small oil-producing plant. We were striving to enhance the quality of our products that eventually pushed us to purchase the color sorting machine and change our profile. In 2007 our company was a successful supplier of the color sorting equipment and, bearing in mind the ideas of continuous growth, we started R&D of our own sorters to achieve the best sorting quality. By the end of 2015 CSort has put into operation over five hundred machines and become a leading producer of the color sorting equipment in Russia. We would be happy to show you the possibilities of our machines. We would be happy to share the experience of our machines' usage with you!»*

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[www.csort.org](http://www.csort.org)

**Maksim and Vitaliy Savinkov,  
CSort Company Founders**