SIBUR

Summary booklet of best practices **at SIBUR as part of the Operation Clean Sweep program**

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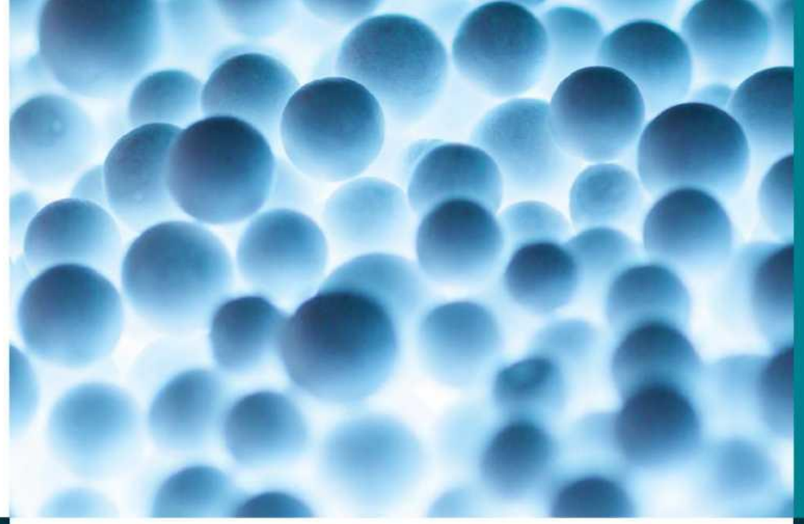
About **the Operation Clean Sweep program**



Microplastics and their impact on human health is a widely discussed issue. The World Health Organization (WHO) has released a major **► report on the impact of microscopic fragments of plastic on health**, which reports that, at least for today, there is no evidence of the danger of microplastics to humans. There is also no evidence of harm to health from the potential presence of microplastics in food (fish, shellfish)[1].

PlasticsEurope
Association of Plastics Manufacturers

The main facilitator of the program in Europe is PlasticsEurope.

OCS

The program was developed in the early 1990s by the Plastics Industry Association in the USA [1]

Currently, OCS is supported by

>1 600

enterprises in Europe

In 2013, PlasticsEurope approved/launched the Zero Pellet Loss (ZPL) initiative. In 2015, in order to focus the efforts of the global chemical industry on a common approach, the ZPL initiative was integrated into the Operation Clean Sweep (OCS) program. Since then, PlasticsEurope has become the main organizer of the OCS program in Europe and actively encourages companies to participate in the program and give priority to its implementation at all industrial sites.

The OCS Initiative provides recommendations in the form of guidance on how to approach each of the six voluntary commitments that a company undertakes by joining the initiative. The guidance is based on collective experience and aims to support companies in achieving excellence in the implementation of the necessary measures in accordance with the specifics of production processes. Among them, there are narrowly focused recommendations for conducting an internal audit of production sites, including equipment, as well as campaign materials (posters, videos, booklets).

Six voluntary commitments by companies that have joined the Initiative

- Conduct an internal audit of production sites, including potential spill prevention and cleanup sites.
- Take measures aimed at achieving zero production losses of polymer particles, strive to continuously improve practices, as well as make efforts to disseminate them.
- Provide training to employees and maintain responsibility in the field of prevention and localization, elimination and liquidation of losses of polymer particles.
- Regularly check the production efficiency.
- Comply with all applicable state and local regulations aimed at handling polymers, polymer products, and their final disposal.
- Encourage partners (contractors, carriers, distributors, etc.) to comply with the same obligations.

The purpose of the OCS Initiative

Contribution to solving the problem of environmental pollution with plastic microgranules and microparticles; implementation of best practices for preventing the release of plastic granules, flakes and particles into the environment among companies.

[1] PLASTICS, formerly SPI

Operation **Clean Sweep in SIBUR**

► **Information about the signed Initiative, including Recommendations in Russian and English,** is posted on the Company's official website.

► **List of companies participating in the OCS Initiative**

► **Strategy of PJSC "SIBUR Holding" in the field of sustainable development until 2025**

SIBUR'S PRIORITY SDGs

Operation Clean Sweep®

On January 25, 2018, at the international exhibition Interplastica 2018 in Moscow, an agreement was signed on SIBUR's joining the Operation Clean Sweep initiative.

PlasticsEurope
Association of Plastics Manufacturers

Participation in Operation Clean Sweep is a prerequisite for membership in the European association of plastics manufacturers PlasticsEurope. By joining PlasticsEurope, companies commit to join the Operation Clean Sweep program to contribute to controlling the loss of polymer granules and particles worldwide.

Minimizing environmental risks and reducing the negative environmental impact are priorities for SIBUR.

Achieving the goals of Operation Clean Sweep is one of the main priorities of the Company's environmental agenda. All relevant production sites continue to monitor potential locations and causes of microplastic spills and their elimination.

SIBUR's Joining the OCS Initiative

[1] Source: WHO policy brief summary (August 2019).

Organizational measures for the implementation of Operation Clean Sweep within the Company

- The OCS requirements are included in the Integrated Management System Policy.
- Information for freight forwarders on the need for freight forwarders to adhere to the policy of preventing the loss of polymer particles is included in the standard forms of transportation contracts.
- The OCS section is included in a separate block in the comprehensive environmental programs of relevant enterprises for 2020-2025 with a list of measures to be implemented, funding sources, responsible persons.
- The goal of minimizing the release of plastic particles into the environment as part of the OCS is included in the **► 2025 Sustainability Strategy**.
- **► The Company's online course on sustainable development** includes a training block on the OCS to engage employees, customers, and partners in the implementation of the Initiative. In 2020, the course was developed and is available on the SIBUR Business Practices Learning Platform.

SIBUR implements best practices as part of the OCS Initiative to prevent the release of microplastic particles at all stages of the production and sale of polymer products, including packing finished products into pallets and embossed bags, stabilizing cargo during transportation, and preventing scattering of granules during transportation of finished products. We are also engaging employees, customers, and value chain partners in the OCS initiative. Annually, as part of the reporting on the sustainable development strategy, the Board of Directors provides the status of the implementation of this initiative.

The practices described herein can be implemented at other enterprises participating in the polymer production chain. SIBUR is ready to share its experience and provide support in matters related to the implementation of responsible waste management practices at enterprises.

Geography of **Operation Clean Sweep in SIBUR**

11 enterprises participating in the Initiative

15 production sites

In 2022, the list of enterprises participating in the Initiative will also include NKNKh and KOS (Republic of Tatarstan).

SIBUR-Khimprom


RusVinyl


Voronezhsintezkauchuk


Tomskneftekhim

Implementation **of the initiative in SIBUR**[1]

In 2018, SIBUR provided a report on the initiative at three pilot enterprises: SIBUR Tobolsk, Sibur-PETF, and Sibur-Khimprom. As a result of the measures taken, 186 tons of polymer particles were prevented from entering the environment, of which 86% was returned back to the production cycle. Since 2019, 11 enterprises or 15 production sites have been participating in the initiative, thanks to the efforts of which 9.4 thousand tons of polymer particles have been prevented from entering the environment[2].

2018

3 pilot enterprises (SIBUR Tobolsk, Sibur-PETF, Sibur-Khimprom)

2019–2021

11 enterprises (15 production sites)

2022

13 enterprises (17 production sites)

An inventory has been conducted at the enterprises (places associated with the formation of polymer particles) potentially subject to the requirements of the Initiative:

- the main areas of production processes associated with the formation of polymer particles have been identified;
- the main particle trapping tools have been indicated;
- further ways of handling trapped polymer particles (return to production, transfer to processing, transfer to the sale of the finished product) have been identified;
- the requirements of the Initiative have been integrated into internal documents - into the technological instructions /regulations of the relevant installations; into corporate standards (CST) for production control - the corresponding requirement into the checklist;
- the requirements of the Initiative are regulated and verified within the framework of the IMS (Integrated Management System);
- the Company has developed forms of annual reporting of the enterprises on the Initiative.

Reporting on the progress of SIBUR enterprises is taken into account when forming the pan-European PlasticsEurope report, available on the Association's ► **website**.

Plastic processors use microplastic particles sold by SIBUR enterprises in recycling and produce end products in the form of pipes, bags, films, etc.

Example of handling trapped microparticles:

POLIEF

a. Sales to consumers of the segment of resins, paints and varnishes. Geogrids are made of polymers, their main purpose is the environmental safety of the earth[3].

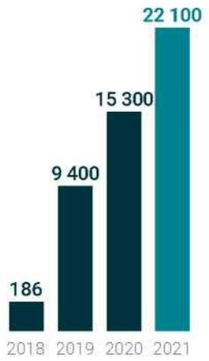
b. Thermal neutralization in solid waste incinerators at own production. The process of polymer destruction occurs at a temperature of 600-1100^{0}C, subsequently, the resulting residue in the form of ash is sent for placement at the city landfill in accordance with the approvals and permits. The off-gases generated during the neutralization of waste are cleaned at the system for the removal of purified flue gases (scrubber).

Tomskneftekhim

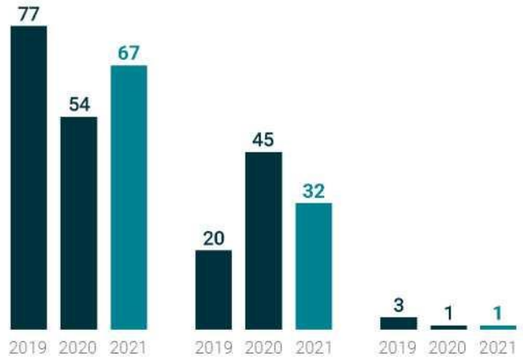
For Tomskneftekhim, the most important indicator is the return to production, since this means the efficient operation of gas purification plants, the capture of microplastic dust at the level of 99-100%, and the return of dust back to production.

In terms of sales, for Tomskneftekhim, the indicator of the share of plastic granules in the form of estimates and collection of spills, which is sold for reuse, is important (in 2021 – 2% of all plastic sold according to technical specifications.

Dynamics of collected microplastic particles in tons



in %



[1] In 2022, the list of enterprises participating in the Initiative will also include NKNKh and KOS (Republic of Tatarstan).
[2] SIBUR Togliatti LLC, which until November 2019 was part of the Company's perimeter, was also a participant in the OCS Initiative.
[3] For example, they are used in the landfill reclamation, as an insulating material.

Informing **and educating**

Tomskneftekhim

◀ Excursion at the Tomskneftekhim industrial site

NPP Neftekhimia

Initiatives to prevent emissions of polymer granules and powder are brought to the attention of employees of the enterprise and contractors during training in the field of ecology, as well as the public, interested parties during excursions to the industrial site of the enterprise, conducting environmental lessons for university students.

▼ Excursion to the industrial site of NPP Neftekhimia

POLIEF

On June 30, 2021, graduates of the School of Public Environmental Inspectors paid an information visit to JSC POLIEF. In the Republic of Bashkortostan, students of the Bashkir State Agrarian University, who undergo training in the field of environmental management and water use, successfully completed training, passed qualification exams at the South Ural Department of Rosprirodnadzor, and received the status of public environmental protection inspector. All of them have united into a specialized squad "Ekozabota-Bashkiria" and are undergoing on-the-job training.

Public environmental inspectors help to identify violations in the field of environmental protection. They can participate in inspections, independently inspect territories, and report violations to the Ministry of Natural Resources and Environment. Each graduate of the course will be able to identify environmental violations and competently report them to the supervisory authorities.

During the visit to POLIEF, the guests got acquainted with the production capacities of the enterprise, plans for the implementation of new industrial and environmental projects.

▶ Visit to POLIEF by the School of Public Environmental Inspectors. A leading environmental engineer talks about the practice of collecting PET dust as part of the OCS Initiative

Best practices at SIBUR enterprises as part of Operation Clean Sweep

Prevention of **air pollution**

POLIEF: preventing the release of PET granulate and dust into the environment

Nitrogen purification from PET dust

The production process in which the practice is applied: the production of polyethylene terephthalate (granulate) categorized (high viscosity).
Cyclones and dust collectors are installed on two production lines to protect industrial emissions from PET dust and nitrogen purification. Dust is formed during the transportation of granulate through pipelines and when moving inside the apparatus due to the supply of nitrogen. Dusty nitrogen enters the cyclone separator, is cleaned of dust therein, and is entered the dust collector using a fan.

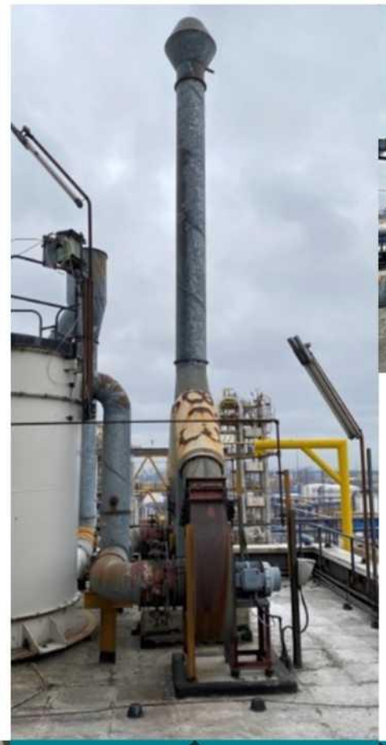
Areas for collecting dust and PET granulate (by-products) are organized. Granulate spills are sent for neutralization. The resulting by-products are formed in batches and sold as a product according to the technical specifications.

◀ Dust collector

▼ Cyclone separator

▼ Dust collection area

▼ PET granulate collection area



NPP Neftekhimia

Bag-type filters, including multistage and cyclone filters, are installed to protect air from industrial emissions of polypropylene dust.

Best practices at SIBUR enterprises as part of Operation Clean Sweep

Prevention of **air pollution**

Best practices at SIBUR enterprises as part of Operation Clean Sweep

Voronezhsintezkauchuk

Prevention of polymer crumbs from entering the environment in the production of polybutadiene rubbers and emulsion rubbers

◀ Filtration section

Crumb traps and hydraulic seals are installed under the process lines in the filtration section

During the extraction of emulsion rubber, wash waters pass through a system of hydraulic seals (settlers) to trap small particles of rubber crumbs

The standard crumb is returned to the production process in an amount of up to 200 kg per day

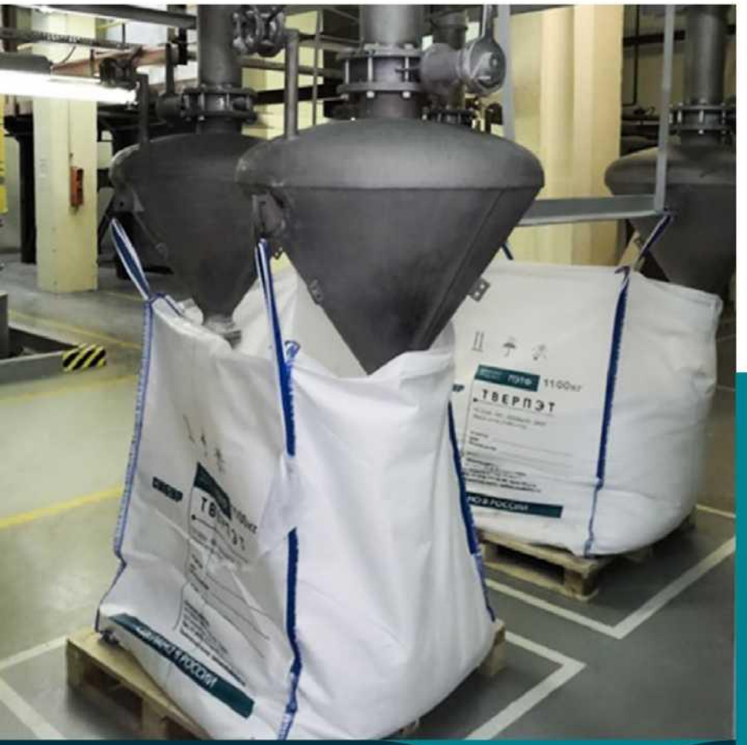
ZapSibNeftekhim

Protection of air from dust of polyethylene, polypropylene

▼▲

Bag-type filters and cyclones are installed to protect air from industrial emissions of polyethylene and polypropylene dust: granule homogenization filters, granule dedusters filters, storage silos filters, blow-off collection systems.

Prevention of **air pollution**



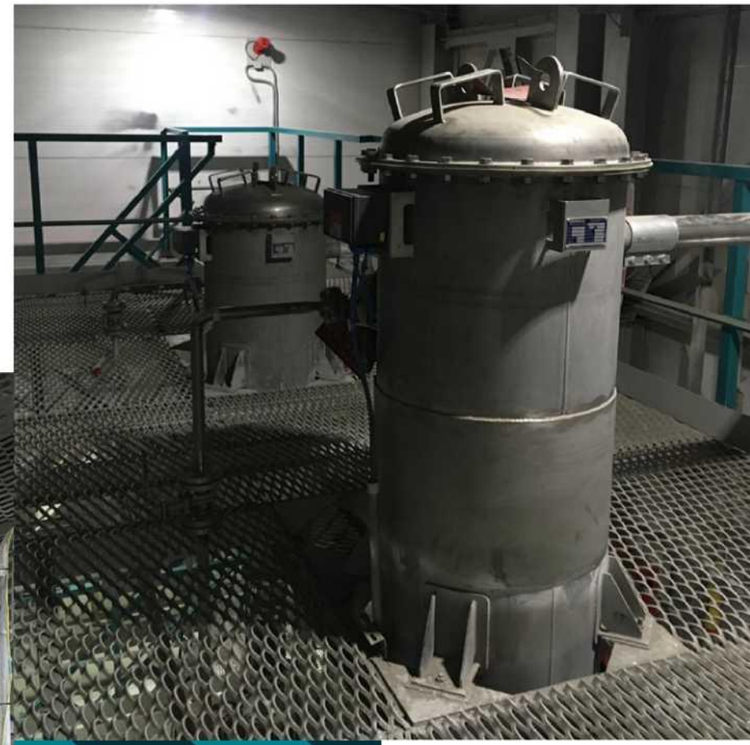
Sibur-PETF

Cyclones and granulate traps are cleaned every four hours.

A cyclone is installed to protect industrial emissions. The collected dust from the cyclone enters the secondary PET production unit

SIBUR-Khimprom

Bag-type filters, including multi-stage and cyclones, are installed to protect the air from industrial emissions of polyethylene and polypropylene dust. In order to prevent the release of dust/granules of expandable polystyrene (hereinafter – PS-E), filters are installed on mixers (hose filters; in separators, etc.).



Attracting customers' attention to the OCS Initiative

In 2020, in order to attract customers' attention to the problem of microplastics and involve them in the international OCS Initiative, Sibur-Khimprom began to attach information brochures about the Initiative to the package of documents containing a QR code with a link to methodological recommendations for combating microplastics spills in production and logistics.

Best practices at SIBUR enterprises as part of Operation Clean Sweep

Prevention of **air pollution**

POLIOM

At the industrial site of the POLIOM plant, polypropylene dust is formed at the extrusion section. Air purification in the section is carried out using gas-collecting devices – cyclones, which trap the smallest dust particles of polypropylene and its various additives.

◀ Purified air enters the atmosphere

Best practices at SIBUR enterprises as part of Operation Clean Sweep

Dry **and wet cleaning**

Tomskneftekhim

A vacuum cleaner with removable dust collectors is used in production in inaccessible places of polyethylene dust formation:

- constant use of a vacuum cleaner in the laboratory room followed by dust triggering at the dust processor;
- constant use of a vacuum cleaner in the laboratory room for comparative analyses followed by dust triggering at the dust processor;
- constant use of a vacuum cleaner for cleaning the outside and inside of dust processing containers, followed by dust triggering at the dust processor;
- use of a vacuum cleaner for cleaning technological equipment and pipelines for additional processing of polyethylene with subsequent disposal to the finished-products storage area (granules).

POLIEF

▼ Household vacuum cleaner for the collection and prompt elimination of the formed spills of PET granules and dust in production

JSC Krasnoyarsk Synthetic Rubber Plant

The collection and prompt elimination of the formed spills of polyvinyl chloride powder (hereinafter referred to as PVC), rubber crumbs, and other polymer products in production is carried out using appliances (vacuum cleaners, brooms, scoops). During the shift, the collected sweepings of rubber crumbs from the floor and equipment are collected, transported to the place of storage for subsequent shipment to the customer as finished elastomeric products. The collected dust from the cyclone enters the secondary PET production unit.

ZapSibNeftekhim

Prompt elimination of the formed spills, dust in production is carried out using appliances (vacuum cleaners, industrial vacuum cleaners). Cleaning of the territory is carried out daily at the end of the shift.

Best practices at SIBUR enterprises as part of Operation Clean Sweep

◄ A sweeping machine for the collection and prompt elimination of the formed spills of PET granules and dust in the production of Tomskneftekhim

SIBUR-Khimprom

In order to localize the dust/spill of PS-E, the spill is collected during its formation. Wet cleaning of floor surfaces, handrails and other accessible surfaces is also carried out at least once a week.

Formation **of commercial batches**

ZapSibNeftekhim

There are places for collecting spills of polyethylene and polypropylene granules, which are sold to the consumer according to the developed technical specifications as technical grades.

Best practices at SIBUR enterprises as part of Operation Clean Sweep

RusVinyl

Currently , the enterprise operates 31 air purification units, including bag-type filters and scrubbers.

1. Measures to prevent the loss of microplastics during packaging at the finished-products storage area

In 2021, the aspiration system was upgraded, which ensures maximum PVC dust trapping during the packaging process:

- the number of vacuum pockets on the filling machine has been doubled, and a more powerful electric motor has been installed to create a vacuum in the system;
- a new generation of filters with a smaller mesh size have been installed in the aspiration hopper, which makes it possible to trap fine dust of emulsion PVC (particle size from 5 to 20 microns).

The entire volume of trapped PVC dust is returned to the packaging process of the finished product.

2. Installation of an additional dust removal system on the filling equipment

Purpose: to reduce dusting when pouring PVC into the packaging by increasing the power of the aspiration system.

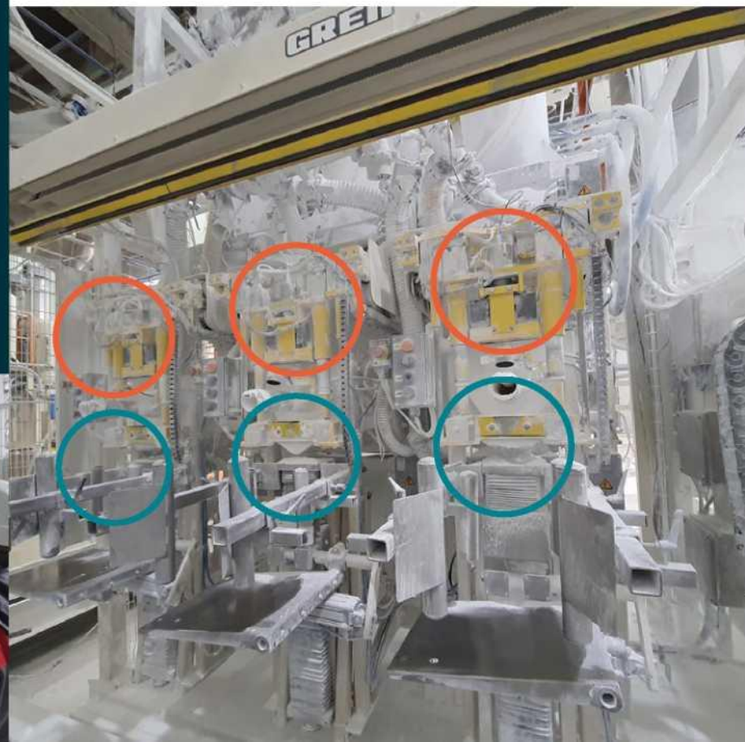
Process: installation of additional equipment on the fittings filling the PVC packaging, an additional suction manifold with the introduction of aspiration pipelines into the main system.

Dust removal system ▶

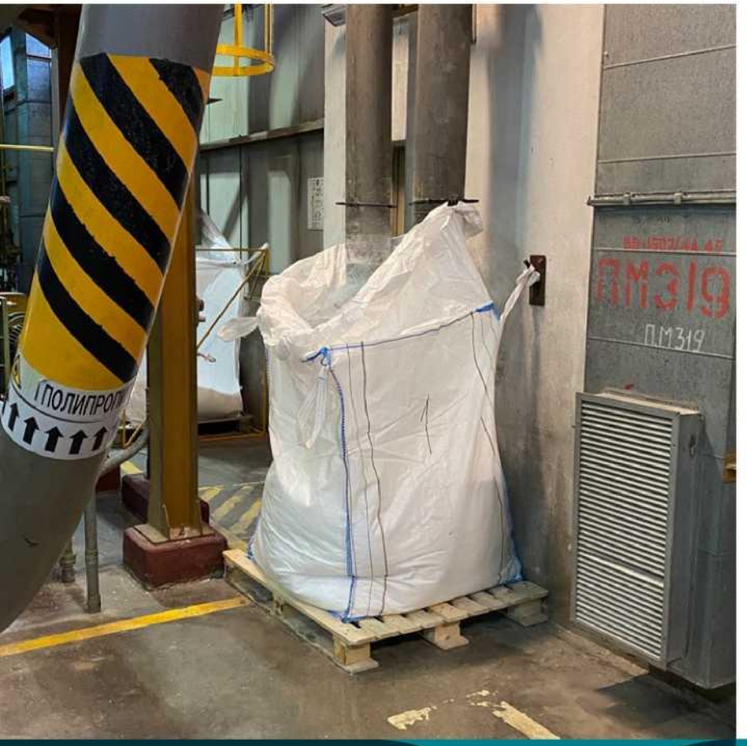
Reduction of polyvinyl chloride emulsion (PVC-E) dust emissions during packaging at the finished-products storage area due to the use of cartridges for aspiration filters of a new generation, thanks to which PVC-E dust particles are retained, making it possible to increase the filtration area, and the installation of an additional dust collection system (Greif Company).

◀ Circled in green on this photo are the vacuum pockets that were originally provided for. A vacuum is created therein to remove dust from the bagging/weighing area. PVC-E enters the system and ends up in a bunker (the bunker is circled in green). Filters are installed in the hopper, on which PVC is deposited, and clean air comes out (standard aspiration principle). PVC-E filters are discharged by triggering the shaking system on the aspiration hopper, and then by triggering the pneumatic transfer system, PVC-E goes into the main hopper of the machine for further bagging.

▼ The new system consists of an installation that includes one vacuum pocket (circled in red) for each scale (three in total) and the installation of a more powerful engine to create sufficient vacuum capacity. Thus, the system absorbs more dust from the bagging area.



Formation **of commercial batches**



NPP Neftekhimia

Bags were installed on the polypropylene granulation unit to prevent spills of polypropylene particles obtained as a byproduct during the production process (during start-up and from vibrating screen when separating from non-standard granules).

◀ Areas for collecting spills of polypropylene granules, which are sold to the consumer according to the developed technical specifications

Voronezhsintezkauchuk

The polymer formed after cleaning of the internal and external surfaces of process equipment is collected in big bags and sold to consumers as an elastomeric product.

Tomskneftekhim

The finished-products storage area at the polypropylene production unit was tooled up with the R-188 installation for applying GRIP FIX glue to bags with finished products to stabilize the cargo in pallets and prevent scattering during cargo transportation.

Containers for storage of printed bags with additives (dust additives) were installed on the additional unit for polyethylene processing.

▼ Pallets. Finished products of polypropylene, polyethylene are formed for delivery to consumers

Best practices at SIBUR enterprises as part of Operation Clean Sweep

Formation **of commercial batches**

BIAXPLEN

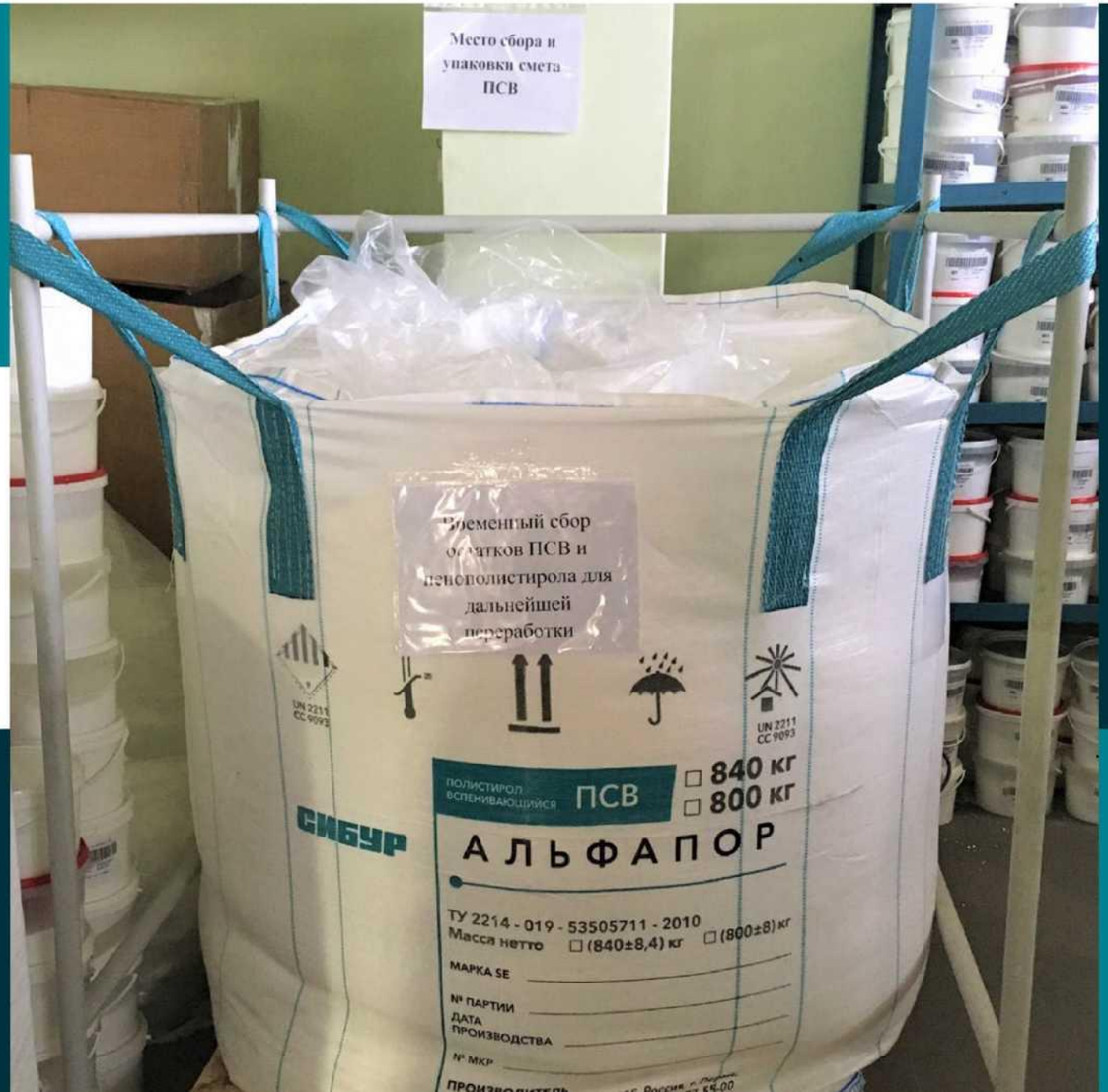
Sweepings of polypropylene granules are collected in big bags in areas of temporary accumulation, transferred to the storage area for further sale to contractors. The regranulate is used on the sites as crude materials or sold to contractors.

SIBUR-Khimprom

In order to localize PS-E sweepings, special areas for the accumulation of PS-E sweepings are organized, then the sweepings are sent for sale.

► Area for collecting PS-E sweepings

Best practices at SIBUR enterprises as part of Operation Clean Sweep

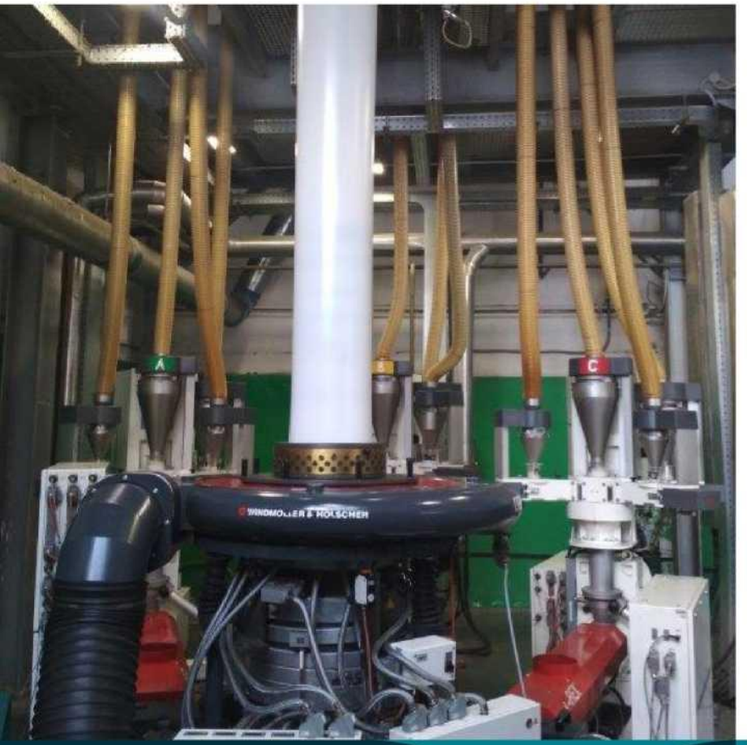


Sibur-PETF

Processing of film residues, secondary polymers into regranulate. Storage of regranulate in big bags/silos. Elimination of regranulate spills.

Byproducts (granulate dust and PET dust), granulate spills are collected in big bags in areas for temporary accumulation and, as they accumulate, are transferred to a storage area for further sale or processing at a secondary PET unit.

Measures to prevent the loss of microplastics **during loading and transportation**



Tomskneftekhim

Cargo stabilization (bags with polypropylene and polyethylene granules) in pallets during loading at the finished-products storage area of the enterprise and transportation of the finished product to consumers

◀ Film extruder (at the polypropylene production unit, a sleeve film with embossing is produced for packaging polypropylene and polyethylene granules in bags)

▶ Embossed packaging bags (embossing on bags for packaging finished products is an additional degree of protection during transportation of finished products)

ZapSibNeftekhim

Dust trapping on the filling machine

Filling machines are equipped with spillage sensors. In the event of a spill, the line is stopped to prevent spillage from spreading along the filling line.

▼ Filling machine with spillage sensors

Best practices at SIBUR enterprises as part of Operation Clean Sweep

On a polypropylene film extruder at the polypropylene production unit, a sleeve film with embossing is produced for packaging finished products in bags. Embossing on bags for packing finished products provides an additional degree of protection, stabilization of cargo in pallets (prevention of ruptures, scattering of granules during transportation).

Wastewater **treatment**

Tomskneftekhim

1. Catching meshes are installed on the drain holes.
2. Treatment of wastewater discharges from the polypropylene production unit.
3. Treatment of wastewater discharges from the polyethylene production unit at a thermal destruction unit (sludge incinerator).

Tomskneftekhim does not discharge wastewater into water bodies. After preliminary treatment all effluents from the enterprise are transferred to the city biological treatment facilities for posttreatment.

◀ Storm water tank No. 1

▼ Storm water tank No. 2

Storm water from polyethylene production with a possible content of polyethylene granules enters a storm pit consisting of two open-type chambers, then the liquid phase is transferred to the city treatment facilities for biological treatment, and suspended residues are removed mechanically with subsequent transfer to a specialized organization.

JSC Krasnoyarsk Synthetic Rubber Plant

Prevention of release of nitrile butadiene rubbers (including powder rubbers) into the environment

To exclude the release of pollutants into wastewater, a drum sieve is used at local treatment facilities. All collected particles are returned back to the production cycle. A wastewater sump is used at the wastewater pumping station.

Best practices at SIBUR enterprises as part of Operation Clean Sweep

Wastewater **treatment**

POLIEF

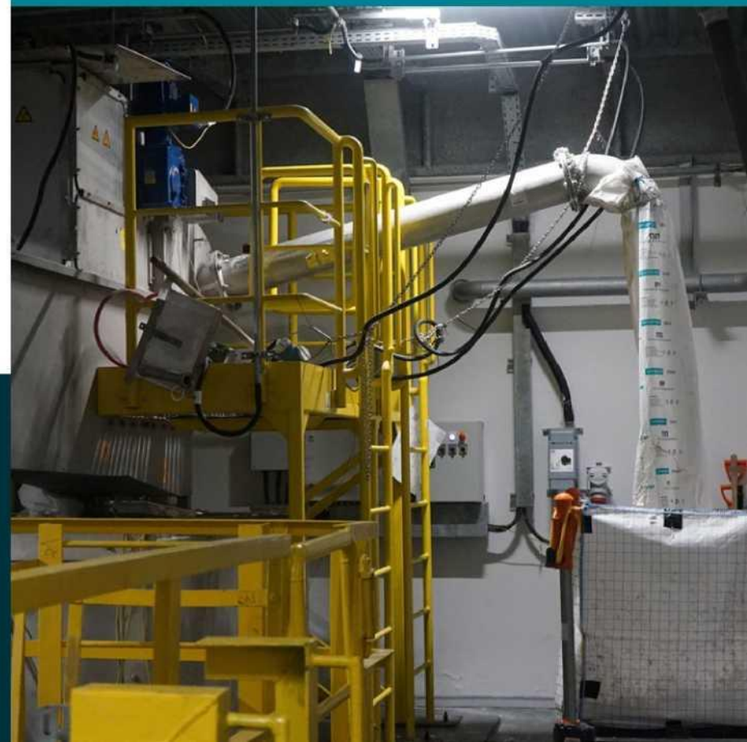
At the stage of polymer granulation, the polymer veins are cooled by cooling the water flow.

All water flows from the granulation unit are collected in the filter machine. The filter machine is a rectangular container for collecting water with a filter cloth located therein on rollers. The filter cloth is designed to trap microplastic particles in water. Polymer particles from the filter cloth are collected in big bags and sold to consumers in accordance with technical specifications 2226-013-39989731-2011. The contaminated filter cloth is collected in big bags and sent for disposal in a solid waste incinerator. Microplastic-free water is reused in the process.

◀ Purification of process water and microplastics on fabric

ZapSibNeftekhim

Waste wash water, possibly containing polypropylene powder and granules, enters the wash water pit, from where it is fed by a circulation pump to a hydraulic sieve that retains solid particles. The scraper moves the trapped particles to the dewatering worm, they are dehydrated and collected in a big bag.



Best practices at SIBUR enterprises as part of Operation Clean Sweep

After preliminary treatment all wastewater of the enterprise is transferred to the treatment facilities of the neutralization and industrial wastewater purification unit for posttreatment as a final barrier to prevent the release of polymer particles into the environment.

Wastewater **treatment**

Best practices at SIBUR enterprises as part of Operation Clean Sweep

SIBUR-Khimprom

Wastewater treatment from suspended particles, including polystyrene polymer granules

◀ Decanter (drum centrifuge)

The separated product enters the decanter through the feeding nozzle, where it accelerates to operating speed and is discharged into the main chamber of the decanter through the inlet openings. In this chamber, under the influence of centrifugal force, mechanical impurities are deposited on the walls of the drum in a short period of time. The drum is made in the form of a cylinder. In the final phase of the process, the solids are discharged through the holes of the drum and enter the solids collection chamber, which is located in the body of the decanter, and then "squeezed" out. At the same time, the liquid is discharged through the opposite end of the drum, where it, being divided into two phases due to centrifugal force, is discharged by gravity through the drain holes.

POLIOM

▼ POLIOM also ensures trapping of polymer particles from water, which is periodically discharged from one of the columns of the polymerization plant. Water containing a fine fraction enters the separator, where the particles are retained by the screens of the apparatus and, as they accumulate, are loaded into containers

All trapped polymer particles are collected in big bags and sent for sale according to technical specifications.

Voronezhsintezkauchuk

In 2018, the idea was implemented to divert a fine fraction of the product directly into the pneumatic transmission lines by installing a corrugated hose to prevent the release of polymer crumbs from the production of thermoplastic elastomer into the environment (hereinafter referred to as TEP). The fine fraction of TEP after screening on vibration coolers enters the pneumatic transmission lines and then goes to the packaging.

▼ At the separation stage, in order to reduce the release of crumbs into wastewater, the captured crumbs are collected in a hydraulic seal and then formed as a grade B elastomeric product

The use of additive technologies to prevent **the release of polymer dust and TEP crumbs into the environment**

Voronezhsintezkauchuk

The use of 3D printing made it possible to unify the dust and pollution collection system at the TEP-50 production capacity, increasing the system performance and reducing the work time.

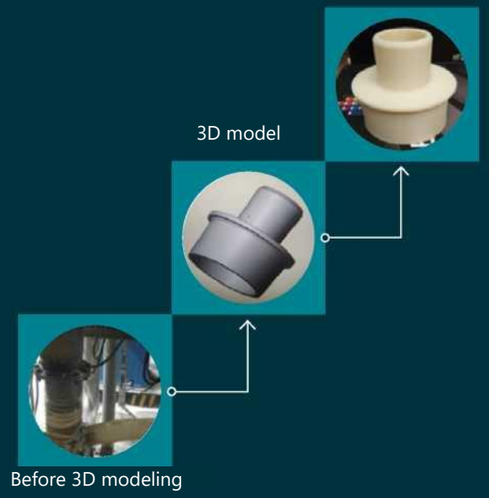
Best practices at SIBUR enterprises as part of Operation Clean Sweep

The need to manufacture adapters is due to the lack of corrugations of the desired diameter for the dust and crumb cleaning system when using more powerful equipment. Replacing corrugated channels is an impractical solution in this case.

Solution

- 3D scanning: not required
- 3D modeling: Solidworks
- 3D printing: FDM printing method, ABS material
- Finishing: not required
- Production time: two days

Result: reducing adapter for connecting pipes



Glossary

Aspiration is a process in which dust, suspensions and impurities are absorbed from the external environment by creating a zone with certain pressure parameters near the source of contamination.

Big bag is a soft container for packaging packed and bulk materials.

Homogenization is a process of mixing various substances in order to obtain a mixture of uniform consistency.

Granules (granulate) are combined dry bulk substances and mixtures or separate solid dosed and undosed substrates compressed in the form of spherical, irregular cubic or cylindrical grains.

Decanter is a horizontal drum centrifuge with continuous screw unloading, designed for mechanical centrifugal separation due to the difference in the density of substances.

Pallets are transport containers specially designed to be moved by a forklift, which have a rigid platform and space sufficient to create an enlarged cargo unit, used as a basis for collecting, warehousing, transshipment and transportation of goods.

Regranulate is a polymer granule obtained as a result of processing polymer secondary material resources.

Bag-type filter is a dry gas cleaning system in which microplastic particles settle on the filter fabric, and the purified air is vented outside.

Scrubber is a wet gas cleaning apparatus in which microplastic particles collide with water droplets and settle on them.

Technical specifications is a document that establishes the technical requirements that a specific product, material, substance, etc., or a group of them, must comply with.

Cyclone (dust collector) is an apparatus used in industry for cleaning gases or liquids from suspended particles.

Cyclone separator is a device for eliminating residual moisture and oil vapor from compressed air produced by compressor units.

Extruder is a machine for continuous processing of polymer crude materials (granules, crushed particles, agglomerate) into a homogeneous melt and shaping it by pushing through an extrusion head and a special calibration device, the cross section of which corresponds to the configuration of the finished product.

Contact Details

LEGAL ADDRESS
Eastern Industrial District, Block 1, No. 6, building 30, Tobolsk, Tyumen Region, 626150
Phone/fax: +7 (3456) 266 686

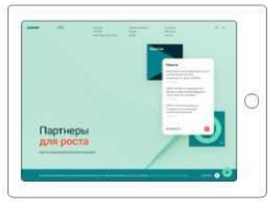
MOSCOW OFFICE
16 Krzhizhanovskogo Str., bld. 1, Moscow, 117997
Phone/Fax: +7 (495) 777 5500

MEDIA RELATIONS
Information Policy Direction
Phone: + 7 (495) 937 1726
E-mail: press@sibur.ru

SUSTAINABLE DEVELOPMENT
Maxim Remchukov
Head of Function
Sustainable development
Phone: +7 (495) 777 5500 (*60-26)

Almira Bayguskarova
Expert
Sustainable development
Phone: +7 (495) 777 5500

E-mail: SustainableDevelopment@sibur.ru



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