

PRODMOREX Ltd.

GDAŃSK



Established 1988

PRODMOREX Ltd. is a private company, established in 1988. The main activity of the company was aimed at the repair and shipbuilding sectors, with the focus on exports of services to the Russian markets and construction work for the banking sector in the eastern markets.

Since 1993, PRODMOREX has been involved in blast cleaning technology and has achieved rapid mastery of this field. At this moment this branch of production and services is leading, and the company has practically become a national leader in this field.

Our position is confirmed by an exemplary installations implemented throughout the Poland. We use the latest technology (for our products we have implemented patents).

The company deals with the design, manufacture and installation of equipment for the cleaning of metal surfaces and their protection.

We offer services and comprehensive supplies of devices and equipment:

- Construction and modernization of abrasive blasting chambers



- Abrasive Recirculation Systems
- Blast cleaners with manual and automatic control
- Filter separators
- Remote control units for cleaners
- Mechanical and underpressure conveyors for abrasives
- Suction (industrial vacuum) cleaners
- Manufacturing of steel structures, halls
- Heaters and air dryers
- Ventilation systems
- Halls and technical-industrial chambers
- Accessories
- Coating apparatus for spray metallization
- Compressors, dehumidifiers and compressed air systems
- Anti-corrosion protection services using specialized equipment performed according to needs including:
- Blast cleaning of steel structures
- Arc metalization of constructions
- Application of paint coatings by hydrodynamic methods
- Expertise and technology selection in anti-corrosion works
- Welding and treatment of welded components
- Renovations and construction of ships



PRODMOREX Ltd. has submitted and received the following utility models to the Patent Office of the Republic of Poland:

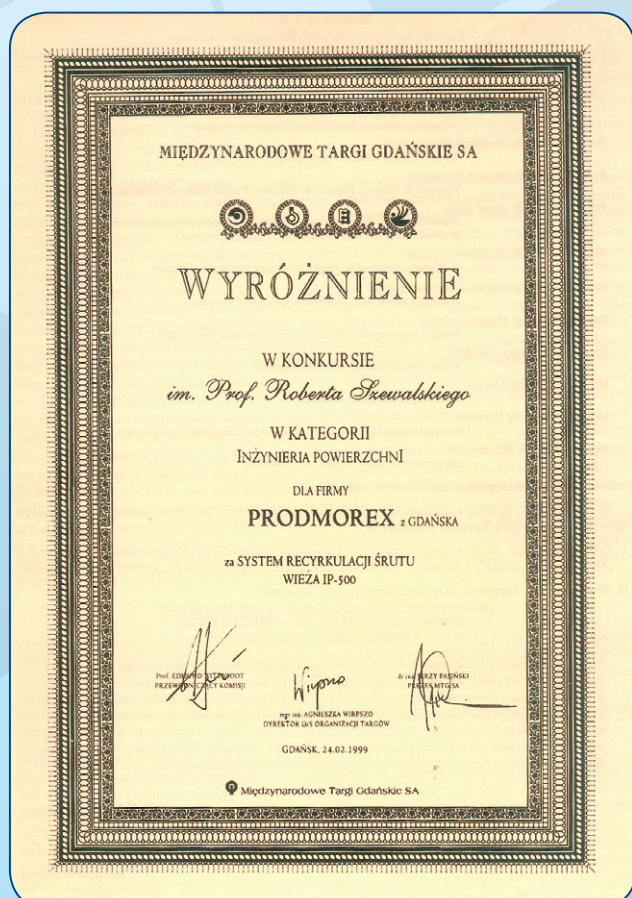
- „Modular exhaust air dust extractor chamber from blasting chambers”, application no. W.120273 and Patent Certificate no. 66208 from 27.11.2012.
- „Dust extractor from shot blast chambers”, application no. W.120227 and Patent Certificate no. 66211 from 13.11.2012.

Patent Certificate concern dust extraction technology using bag filters in shot blasting chambers based on the open blast shot blasting process and the construction of a screwed, self-supporting chamber deduster using bag filters in blasting chambers chamber based on the open blast shot blasting process.



PRODMOREX's abrasive recirculation system with pneumatic conveying TOWER1P-500 was awarded at the Gdańsk International Fair. The jury verdict of the contest:

“The solution concerns a technically important problem of abrasive blasting. The solution is an installation based on: abrasive blasting, used abrasive (steel grit) recovery, dust and paint cleaning from recycled abrasive, and use of the cleaned, recycled abrasive. Compared to existing systems (eg sand-blasting), the proposed solution is characterized by high innovativeness and moderate price. A series of devices has been created for users in the country. The product complies with environmental standards.”



Distinction in the category of surface engineering in the competition of Prof. Robert Szewalski memorial during Gdańsk International Fair

Technology of the blasting chambers by Prodmorex

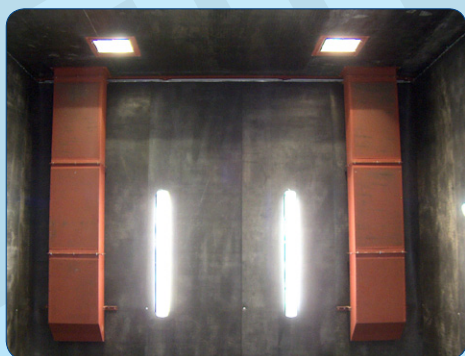
1. Construction of the chamber.

The working chamber is made of light steel construction made of closed profiles, joined by screwed connections and covered with sandwich panels with steel sheeting and polystyrene foam or mineral wool.

The basic elements of the design are: double walled, semi-enclosed, reinforced modules with contoured edges and sliding outer wall, and special profiles and elements that reinforce the whole structure of the cabin. The module is made of galvanized steel sheets coated with a polyester layer of 25 μm with an excellent anti-corrosion properties. The thickness of the sheet metal covers is 0.5 mm from the outside and 0.6 mm from the inside of the chamber. Differentiating the thickness of the filling core allows you to control the amount of noise released to the outside of the facility and also to solve the problem of heating the chamber. Standard styrofoam core or foam of 75 mm thickness used for working chambers inside curtain walls is selected taking into account the aforementioned conditions. Sandwich panels have the technical approvals required in the construction industry. In the case of installations outside the production halls - 100 mm thick structures are used together with the additional roofing of the blasting chamber.



Caring for acoustic and thermal insulation of chambers is the right direction to notice in the development of the Prodmorex product. Also the use of twisted construction is the right trend to reduce the nuisance of construction for the investor.



2. Internal protection of the chamber.

Insulation of the working chamber with rubber mats, consisting of a vertical free-hanging rubber mats of 1.2 m width and overlapping with a 20 cm plant, the ceiling cover of the working chamber made of sandwich panels, which are covered with rubber mats, effectively protects the walls and ceiling from erosive damage. The security solution is thought so that the abrasive that came behind the cover could come out of it and return to the circuit.

Replacing damaged wall and ceiling protection is very easy and fast, does not require any specialized tools and qualifications.

3. Protection of the floor.

An important element of the Prodmorex blast chambers is the introduction of 4mm thick steel sheet covering. Steel sheet protects the concrete against erosion caused by contact with steel shot. Damage to the floor under the horizontal transponder can lead to gathering of abrasives, as well as problems with re-transport to the cleaners.





4. Lighting in the chamber

Ceiling lighting - luminaires are placed outside the chamber and also accessible from the roof of the chamber. Luminaires light through the ceiling windows secured with glass and mesh. The solution ensures long life of luminaires, quick and easy replacement of light sources and easy replacement of security windows.

Wall lighting - Dust-proof luminaires with lenses and polycarbonate housing are used for their durability. In addition, the luminaire is protected by a transparent plastic cover, which is easily replaceable and protects the lampshades. The ease of disconnecting each of the fluorescent lamp luminaires allows for quick removal of damaged luminaires.

5. Chamber gates

Prodmorex uses specialized gates made by professional industrial door manufacturers (rolling), electrically controlled, providing high sealing and high acoustic insulation. The door surface is

covered with a rubber mat on the inside of the chamber. We also use hand-opened gates. The selection of gates is related to the chamber's operating program and the requirements or the investor's wishes. The working chamber is also equipped with the required number of service doors, which are additionally equipped with safety inspection visors.



6. Sweeping floor

Our standard sweeping floor is a scraper type, powered by electric motors with so-called „flexible” slats. This solution is characterized by a small mounting height of the scraper line (100 mm without grating), low failure rate, easy maintenance and repair. The scraper tracks are designed to minimize the uncovered „dead surface” of the floor. We also offer pneumatic floor drives with piston pneumatic motors. Flooring proposed by



PROD MOREX is a testament to the company's commitment to reliability, ease of operation and maintenance. The „elastic” type scrapers are com-

patible with the muting direction. Geared motors provide low energy consumption of the floor.

7. Vertical abrasive transport

PROD MOREX presents, as standard, a vertical abrasive transport carried out mechanically using a bucket elevator. We also offer solutions by means of a vacuum pneumatic transport system, powered by a side-channel fan.



8. Abrasive separation

PROD MOREX company for dedusting abrasives uses a cascade-dynamic air separator with rotary sieve. The construction of the separator allows to firmly, on a rotary sieve, stop all major abrasive impurities. This rotary sieve is a

self-cleaning and the impurities are removed to the special bin. Dust contaminants are removed during „washing” by air during the fall of the abrasive. For chambers where pure non-ferrous abrasive is particularly required - Prodmorex uses neodymium magnetic separators with rotary drum. Dumps from the separator are collected in a special container.



9. Blast cleaners

PRODMOREX has developed and offers range of cleaners. All cleaners are equipped with the required regulatory systems. Both electropneumatic and pneumatic remote control systems are available. The range includes 40 to 6000 liters of cleaners as stationary and on chassis. Abrasive valves and air valves are produced by reputable world-class anti-corrosion companies, (Clemco, Airblast, Thompson, others).

10. Ventilation of the blasting chamber

The ventilation of the blasting chamber is solved by means of our own dedusting filters. An innovative air purification system based on a number of dust collectors with a capacity of 3,000, 5,000, 10,000, 20,000 to 50,000 m³/h has been developed. They cover the requirements set by the different sizes of chambers.

Dry air cleaning in a closed cycle is carried out on filter of the bag type.

The filter material is a polyester fabric or membrane with up to 99.9% filter efficiency. This material ensures long life of filter cartridges and allows them to be repeatedly regenerated. Such filters are several times cheaper in operation than the patron filter-pleated ones, which need to be replaced every six months (with continuous two-shift operation). Bag filters can withstand more than 6 years, and often even more with full preservation of their properties. De-dusters of this type are very effective - measurements of dust residues after 1800 hours of operation of the chamber using fused alumina and working with four nozzles showed a value of 2mg/m³.

At the request of the investor it is possible to use standard rigid filter cartridges.

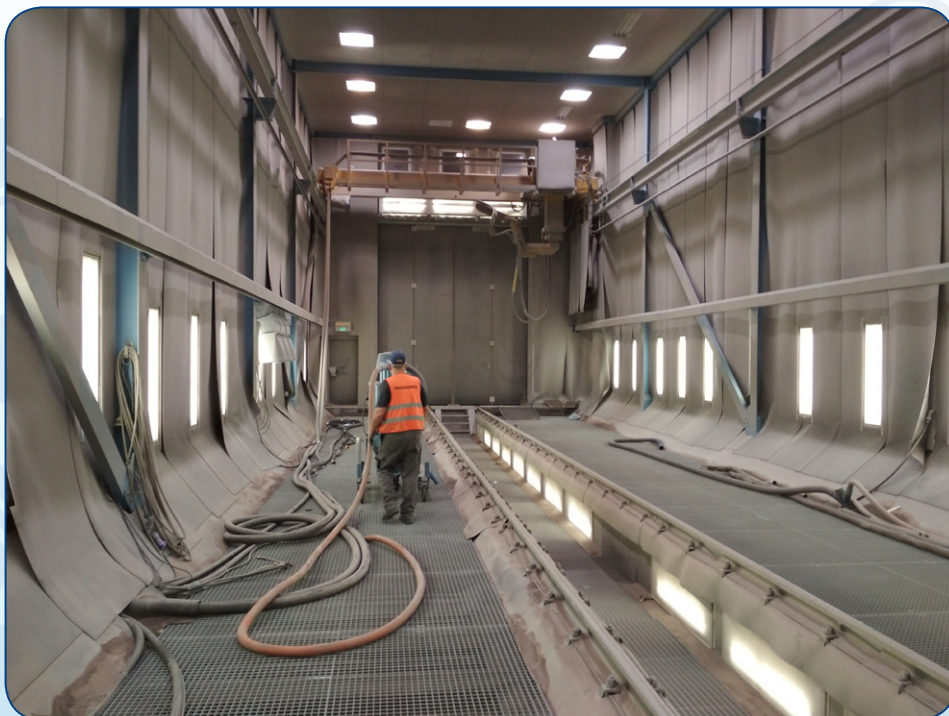
Separated dust is collected in airtight containers, easy to empty and transport during handling. Ventilation of the chambers takes place in a closed cycle, with a small (10-15%) adjustable outlet removed from the chamber; to balance the air supplied by the nozzle and to provide a certain pressure difference between the inside and the outside of the chamber during operation. This solution saves heat during the heating period and prevents dustiness of surrounding area adjacent to the blasting chamber. In special cases it is possible to preheat the ventilated air in the electric heaters.

Proposed ventilation solutions are a good standard and provide the right visibility and comfort in the industry. Meet the requirements of the industry standard and in particular the Regulation of the Minister of Economy of 16 December 2002r. on occupational safety and hygiene when cleaning surfaces, painting and spray metallization.



11. Robotic blast cleaning

PRODMOREX Ltd. keeps track of the current changes in the anti-corrosion industry. Technological innovations and changing trends have always been taken into account. In recent years, the use of robots for abrasive blasting in blasting chambers has been noticeably increased. We believe that this solution will significantly increase productivity and reduce production costs.



Blasting chamber (LxBxH- 33.0 x 8.0 x8,2) with robotic arm



Prodmorex already has practical experience in the use of robotics for anti-corrosion work, because in our implementations of 2016 are those that put on the most modern and most sophisticated solutions - we made two large-size shot blast chamber (LxBxH - 33.0 x 8.0 x 8, 2) using robots work, and the subject of cleaning are boxes of train carriages. We also are proud to have a chance to work with leaders in the field of robotic abrasive blast cleaning. Our company has daily contact with the work of the robots which cleans the construction of carriages and train locomotives in one of the Bombardier Transportation plants ranked among the leading manufacturers of rail vehicles in the world.

BAG FILTERS- AN INNOVATION IN DUST EXTRACTION FROM BLAST CHAMBERS BY PRODMOREX LTD. COMPANY

Prodmorex's efficient dust extraction systems that operates with open flux through CDF- Chamber Dedusting Filters in which the bag filters are installed are among the best on the market and are many times more efficient than the previously used filter cartridges in the form of pleated polyester fabric cartridges.

The most important advantages of bag filtering include:

- High efficiency of dedusting, meeting Polish and European requirements (possibility of reducing dust concentrations in purified gases below $1\text{mg}/\text{m}^3$);
- Ensure a long-term commitment to environmental protection
- Reduction of the overall dimensions while maintaining the same filter surface - Innovative bag shape reduces filter dimensions
- Increase the lifespan of the system, by delivering contaminated gas in a stable manner, ensuring the use of the entire filter surface of the bags
- Increased durability of the nonwoven fabric due to the specific design of the support basket for the filter bags, the durability of the filter bags is several times higher than those used in the traditional dust collectors made of polyester
- Guarantee of reducing the operating costs of the machine due to automatization of the regeneration process
- Easy access to individual filter elements, ensuring smooth maintenance work
- Full automation and simplicity of solutions to optimize investment and operating costs
- PUO Prodmorex Sp. z o.o. submitted the following utility models to the Patent Office of the Republic of Poland:
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 - „Dust extractor from shot blast chambers”, application no. W.120227



Applications concern dust extraction technology using bag filters in shot blasting chambers based on the open blast shot blasting process and the construction of a screwed, self-supporting chamber deduster using bag filters in blasting chambers chamber based on the open blast shot blasting process.

Dust collector with bag filter cartridges - main air cleaner. The construction of the filter housing is made of steel sheets. The contaminated gas chambers, fed into the filter and purified gas are separated from the wall of plate with holes in which the filter bags are attached. In the purged gas chamber there are large, easy-to-use inspection door for easy access to bags. Contaminated gas is delivered in a stable manner, ensuring the use of the entire filter surface of the bags. The design of the basket supporting the filter bags reduces the stresses that occur in the nonwoven fabric during the filter operation and thus increases its service life. The shape of the

basket prevents the bags from folding. An innovative shape of the bags (FLAT BAG) and their horizontally position resulted in a considerable reduction of the filter dimensions while retaining the same filter surface. No additional space above filter is required, and replacement of bags at their horizontal position is much easier.

We guarantee a dust emission of no more than 5 mg/m³, which is defined in the standard and practically our first realization is even **below 2 mg/m³ (confirmed by the necessary measurements)**.

Modular bag filter is a device with regeneration of nonwoven fabric by compressed air. Regeneration is performed by compressing the compressed air into the filter bags using a regenerative nozzle equipped with an injector. By using this regeneration system, we achieve significantly lower emissions than the existing solutions with patron cartridges and extend the life of the filter cloth. Due to very effective regeneration, the system is used in dedusting filters working in very dusty and difficult to regenerate environment, and in the case if very low dust emission standard is needed. In high efficiency filters, this system is a much more economical solution than solutions based on pleated cartridges.

Dust collectors with bag filters have been installed in the following companies: Bombardier Transportation Polska Sp. Z o.o. Wrocław, Chemar RUROCIĄGI Sp. z o.o. Kielce, Kontur Żyrardów.



Since 2008, Prodmorex has removed from offer dust collectors with pleated filter cartridges. They were replaced by modern, innovative bag cartridges, much more efficient and cheaper in exploitation.

In 2011, at the Technicon Innovation Fair in Gdańsk, PRODMOREX's Bag Filter received the Silver Medal in the Innovation Competition 2011 and in 2012 the Polish Trade Association in Warsaw awarded it with the title of EUROPRODUKT 2012.

