PROFILTR

WE MAKE THE WORLD CLEANER

Applications for the foundry, metallurgical, food, chemical, woodworking, and other industries.
Industrial filtration, capture and separation of solid particles, droplets and aerosols, and gaseous contaminants.

Reduction of emmision in foundries

- Reconstruction of production halls, construction of new manufacturing facilities.
- Reduction of emissions thanks to the installation of new production technologies.
- Reduction of emissions by installing equipment for the extraction and capture of pollutants such as particulate matter (PM) and total organic carbon (TOC) (VOC).
- Air-conditioning units for balanced air management in the workplace, ventilation, heating, recuperation, cooling – dehumidification.
- Implementation of control systems, sustainability, future and integration of intelligent systems.

Project benefits:

- Overall reduction of emitted particulate matter (PM) and total organic carbon (TOC) into the atmosphere, including a decrease in fugitive emissions.
- Reduction of energy costs for operating technology and heating of halls.
- Improvement of technological processes and quality.
- Enhancement of the working environment.
- Solutions for waste management.
- Gaining control over energy consumption, operational costs, etc.

Promet Foundry, realization 2023-2024

Železárny Štěpánov, realization 2023-2024

Moravia Tech, realization 2019-2021

Metalurgie Rumburk, realization 2017 - 2020

PRO – FILTR Brno, s.r.o.
V pískách 400/20, 620 00 Brno, CZ
tel.: + 420 606 437 179
profiltr@profiltr.cz, www.profiltr.cz

PROFILTR

WE MAKE THE WORLD CLEANER

Applications for the foundry, metallurgical, food, chemical, woodworking, and other industries.
Industrial filtration, capture and separation of solid particles, droplets and aerosols, and gaseous contaminants.

Existing foundries will face the challenge of having to reduce emissions and modernize their processes in line with the new BAT conclusions from 2024 and the associated stricter emission limits. To achieve optimal results, it is necessary to approach the issue globally and consider the entire range of measures in the field, from the design of filtration equipment to the replacement of extracted air with air-conditioning units. An essential part of the solution must be the management and monitoring of the entire process in relation to the current operational conditions in production.

The current state of filtration technology guarantees that after the first, primary filtration stage, the residual emission of particulate matter (PM) on the clean side of the filter is always below 1 mg/m³. However, it is necessary to take into account the nature of the operation, the incoming concentrations of extracted dust, and its characteristics. In this case, the selected values in the table below may allow for the return of cleaned air back to the production areas, considering the compliance with the 5% limit of the permissible exposure limit (PEL) according to Decree No. 361/2007 Sb., where the PEL for foundry dust is set at a maximum of 2 mg/m³ according to Decree No. 41/2020 Sb. If the air is returned to the production areas, it is always advisable to use secondary filtration. Technical solutions for secondary filtration include:

- Returning the air through secondary filtration bags, which allow for even distribution in the designated space while reducing dust concentrations.
    - Placement of filtration bags in a horizontal position. The filtration bags do not restrict the workspace, but their cleaning is a condition for functional operation. If we consider that the maximum amount of PM after the secondary filter is below 1 mg/m³, then at a flow rate of, for example, 20,000 m³/h, during single-shift operation, this would result in 40 kg of dust/year. Therefore, it would be sufficient to disassemble and clean the secondary bags twice a year. Their replacement directly depends on their pressure drop, but one can expect a change every two years.
    - Placement of filtration bags in a vertical position. The filtration bags are connected at the bottom to a collection container. This is a functional solution, as even with a higher PM content, the filtration bags operate with lower resistance. Dust settles due to gravity and can be easily removed from the bags using a simple mechanical cleaning process. The dust is collected in containers, and any cleaning is carried out without the need to disassemble the bags.
- Returning the air through a secondary filtration box and its distribution within the workplace layout via ductwork and air-conditioning outlets.
- Returning the air through a secondary filtration box and its distribution through a centrally installed horizontal duct system.

Returning filtered air back to the production areas is only considered if the air does not contain harmful or bothersome gaseous components at concentrations exceeding health limits. An example is the extraction from the finishing workstations, where it is possible to return up to 100% of the air in winter mode during the winter months.

PRO – FILTR Brno, s.r.o.
V pískách 400/20, 620 00 Brno, CZ
tel..: + 420 606 437 179
profiltr@profiltr.cz, www.profiltr.cz

In the table below we present an example of the results of PM measurement.

Results of PM (Particulate Matter) Emission Measurements at Promet Foundry			
Filter	Technology	Guaranteed PM Value (mg/m³)	Measured PM Value (mg/m³)
F1.3	Drum and Table Shot Blaster	1	0,7
F2	Shakeout Grid - Manual Molding of Stators	1	0,3
F3	Shakeout Grid Cabin	3	0,5
F4,5	Dust Extraction for Regeneration, Mixers, Pneumatic Conveying	3	0,8
F6	6t Furnace, Modification Cabin	3	1,0
F8	Pneumatic Sand Conveying	1	0,5
F10	In-Line Hanging Shot Blaster	0,5	0,24
F11	Automatic Molding Line	1	0,3
F12	Finishing works - grinding	3	0,5
F13	Finishing works - grinding	3	0,7
F14	Finishing works - grinding	3	0,4
	Notes		
	At guaranteed values of 1 and 0.5 mg/m³, secondary filtration is used to return the filtered air back into the hall.		
	PM values measured at the filter outlet to the external environment or before the secondary filters.		

The situation is different when the extracted air is not suitable for return to the workspaces. However, there is the option to return the air after cleaning of dust particles to partially or completely enclosed technological areas, where the air is simultaneously being extracted.

A typical example of such installations is the extraction from shaking screens or casting fields, where the return of air also creates an air barrier as part of our proposed PUSH-PULL system.
The returned air balances the deficient air conditions in the hall, thus reducing the need for replacing the extracted air with fresh air from the outside environment. These solutions provide significant energy savings for heating the production halls.

For the air-conditioning units, we have designed an intelligent control program that takes into account not only temperatures and the required amount of air but also operational modes. During downtime (periods outside working hours, weekends, holidays, etc.), internal circulation heating/tempering occurs, where the air drawn from the indoor environment is free of dust particles, preventing filter clogging in the units. During full operational conditions, air is drawn from the outdoor environment, heated to the required temperature with the possibility of heat transfer through a recuperator, while the waste air is freed from particulate matter, with potential odors or content of TOC, NOx, and CO.

These technical solutions minimize the need to replace the extracted air with fresh air, reduce electricity consumption, and gas consumption for the operation of air-conditioning units, especially in winter when the air must be heated. By implementing an intelligent control system for the performance of air-conditioning units, the operator gains full control over the system.

PROFILTR

WE MAKE THE WORLD CLEANER

Applications for the foundry, metallurgical, food, chemical, woodworking, and other industries.
Industrial filtration, capture and separation of solid particles, droplets and aerosols, and gaseous contaminants.

Specific examples of implementations with achieved effects:

- Metalurgie Rumburk
- Moravia Tech Brno
- Železárny Štěpánov
- Promet Foundry

In these projects, the following was successfully accomplished:

- Renewal of existing technological equipment.
- Installation of new technological equipment.
- Reconstruction and construction of new manufacturing facilities.
- Reduction of particulate matter (PM) emissions.
- Reduction of energy costs for both production and secondary technologies.
- Optimization of heating costs for facilities.
- Increased competitiveness.

PRO – FILTR Brno, s.r.o.
V pískách 400/20, 620 00 Brno, CZ
tel..: + 420 606 437 179
profiltr@profiltr.cz, www.profiltr.cz