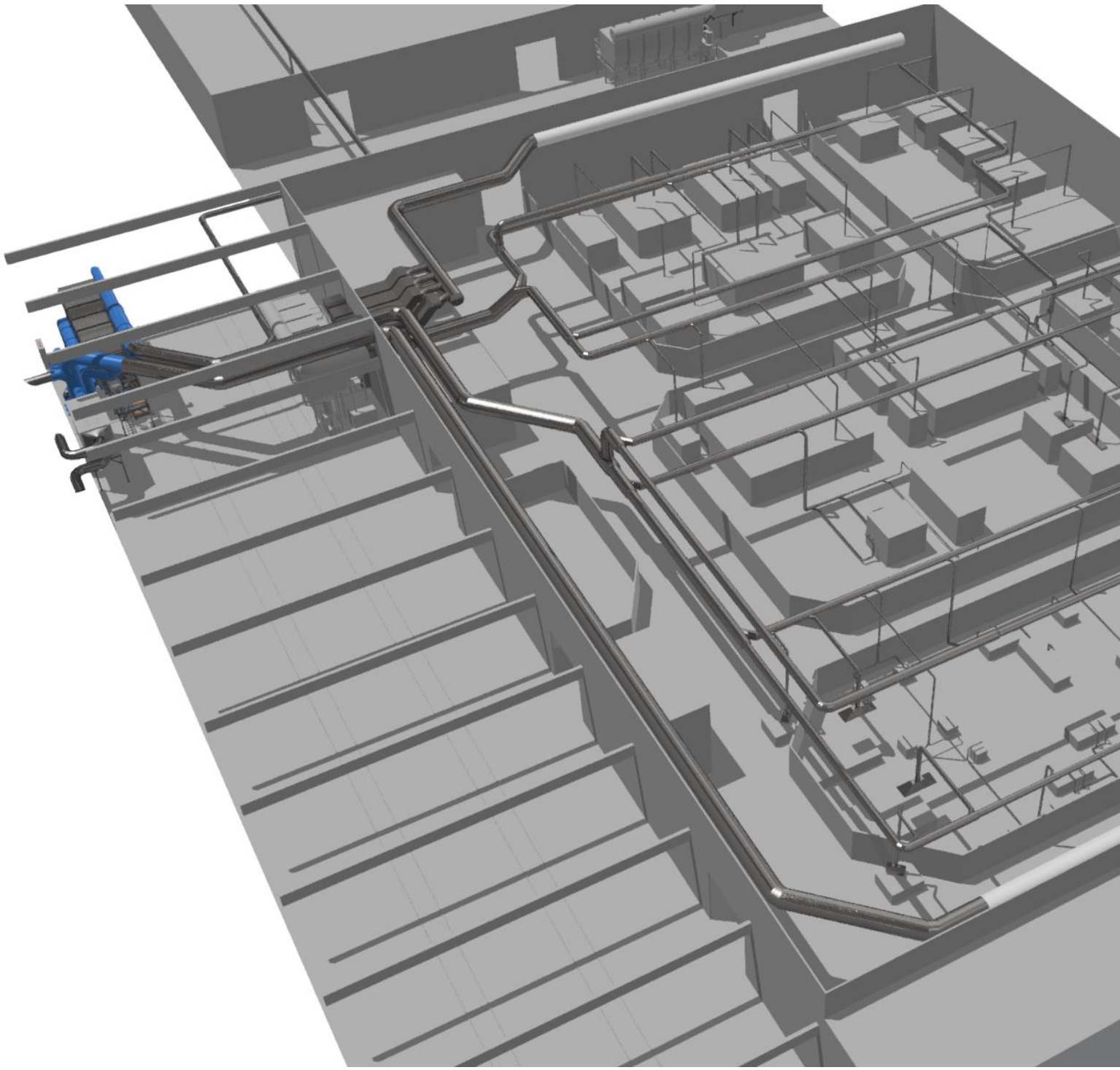
PROFILTR

WE MAKE THE WORLD CLEANER

Applications for the foundry, metallurgy, food, chemical, wood processing, and other industries.
Industrial filtration, capturing and separation of solid particles, droplets and aerosols, and gaseous impurities.

Air filtration in welding and grinding shop production areas



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The company PRO-FILTR BRNO s.r.o. has implemented a number of projects aimed at filtering the air in production areas where welding and grinding processes take place. The goal of these projects was to extract welding fumes and dust, remove solid pollutants from the air stream, return the purified air back to the workplace, ventilate by supplying fresh air to the workspace, heat the area, and utilize recovery options.

The project is focused on the following operations:

- Robotic welding stations in the automotive industry.
- Manual welding stations for various castings.
- Workstations for cleaning (finishing) in foundries.
- Workstations in locksmith shops and metalworking operations.

System configuration:

- Filtration equipment for extraction and capture of solid pollutants (particulate matter – PM) with a capacity ranging from 3,000 to 160,000 m³/h and more.
- Dust collection and integration system, with stabilization in collection containers (ASP) or big-bag sacks.
- Dosing system for reactive agents, such as $Ca(OH)_2$, activated carbon, etc.
- Reaction chambers.
- Supply air ventilation unit with heat recovery and delivery of fresh air to the production hall. Heating system.
- Piping distribution.
- Switchboards and electrical installations.
- Siemens Simatic S7 automatic control system.
- Complete 3D drawing documentation for the project.

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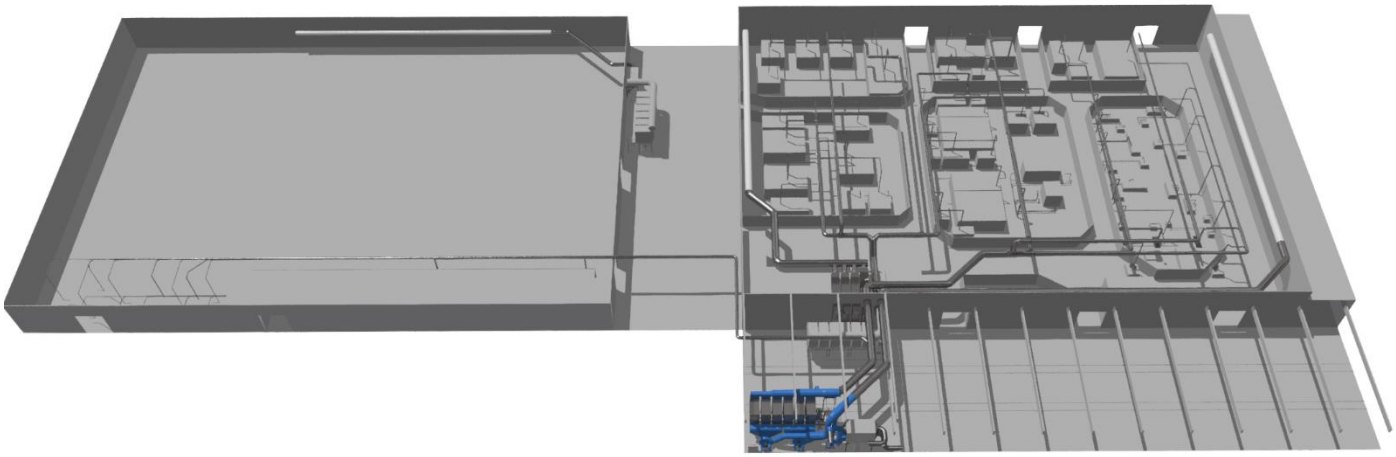

Figure 1: Layout of production halls and fume extraction

Since the extracted welding fumes may contain not only dust but also oil residues (grease) or carry odor loads, the system can be supplemented with a dosing of reactive agents. Reactive agents based on $Ca(OH)_2$, or a mixture of $Ca(OH)_2$ and activated carbon, bind the oily components, reduce odor loads, and decrease the levels of TVOCs (Total Volatile Organic Compounds).

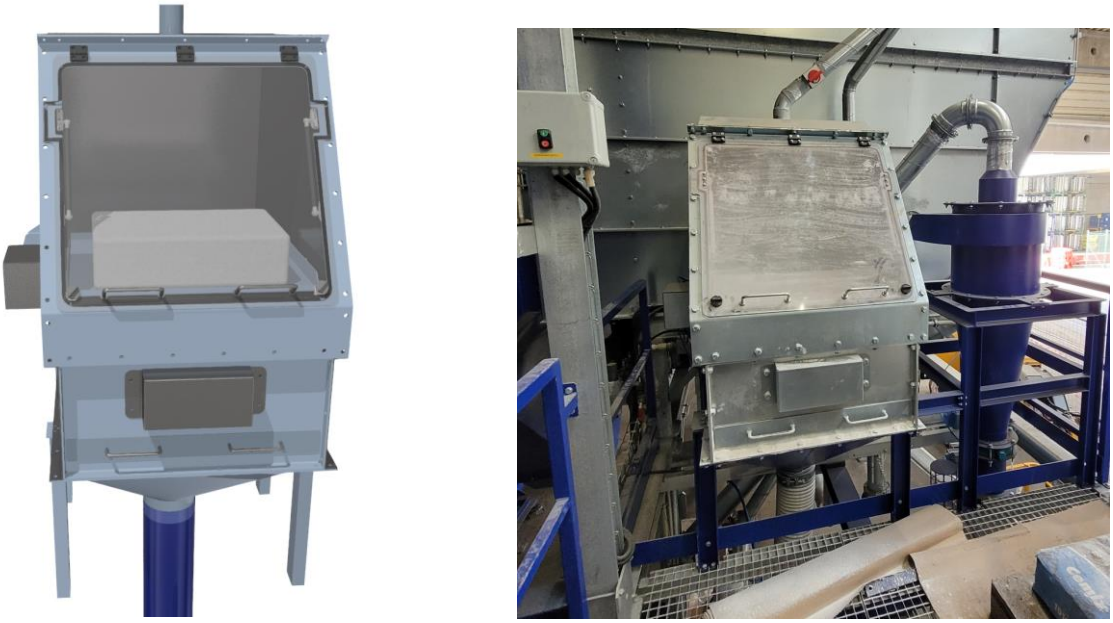

Figure 2: Sorbent dosing station feeding into the storage hopper

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Figure 3: Sorbent storage hopper with sorbent dosing, placed on strain gauges.

Figure 1 Reactor

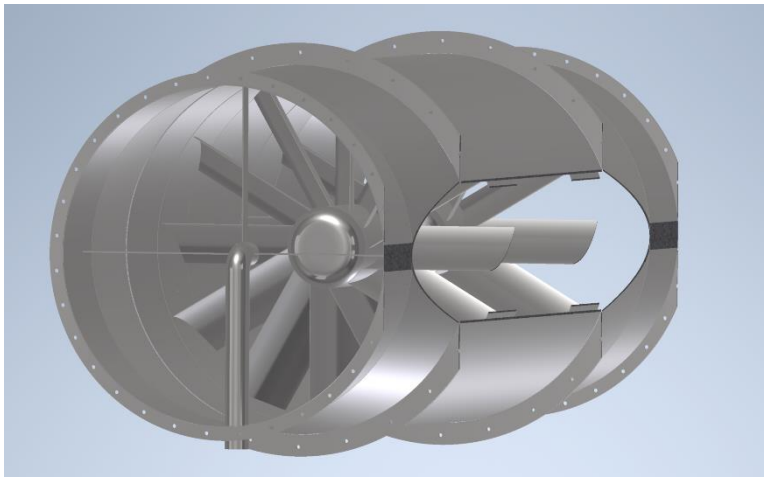

Figure 2 Reactor turbine

The dosing system for reactive agents is fully automatic, with adjustable dosing in the range from a few mg/m³ up to several g/m³ or dkg/m³.

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The cleanliness of the filtered air stream reaches up to 0.1 mg/m³, allowing the air to be safely returned to the workplace while meeting hygiene requirements to supply fresh air and ensure proper ventilation. Approximately 80% of the extracted air is returned to the workspace, while the remaining portion is discharged outside the work area and replaced with fresh air from the external environment via a heat recovery unit.

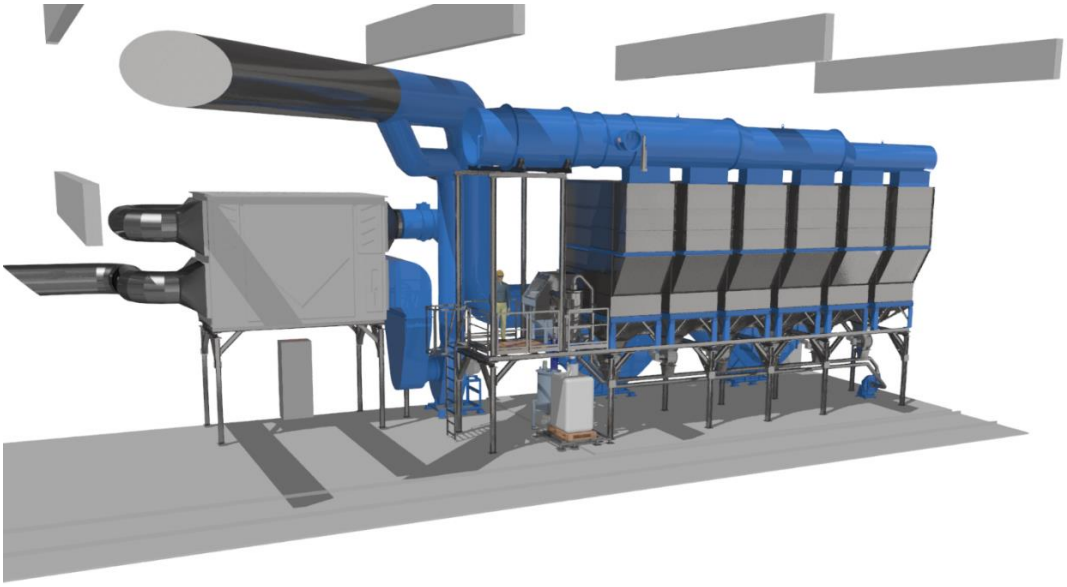

Figure 3 Filtration unit with supply air heat recovery unit

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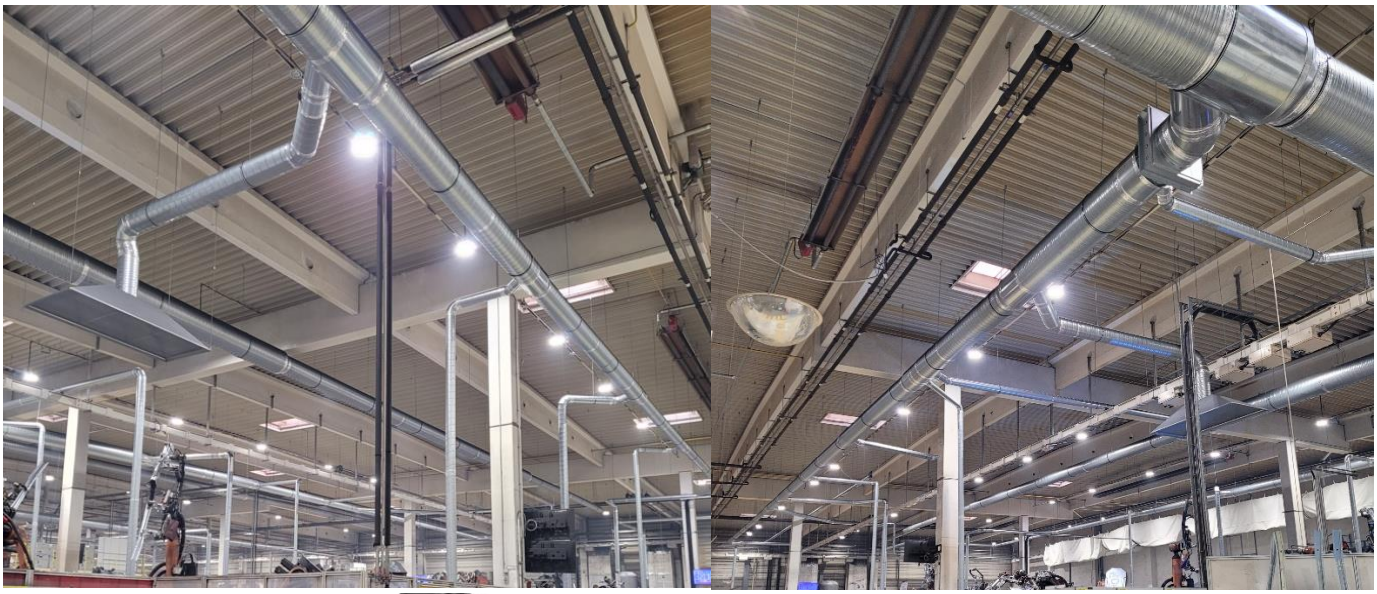
Depending on the type of workstation, welding fumes are extracted using various devices such as hoods, enclosures, or through extraction surfaces built into welding tables above the work area. It is also possible to implement a so-called push-pull extraction system. The remaining so-called fugitive emissions, which cannot be captured directly at the source, are extracted from the ceiling or roof space areas.



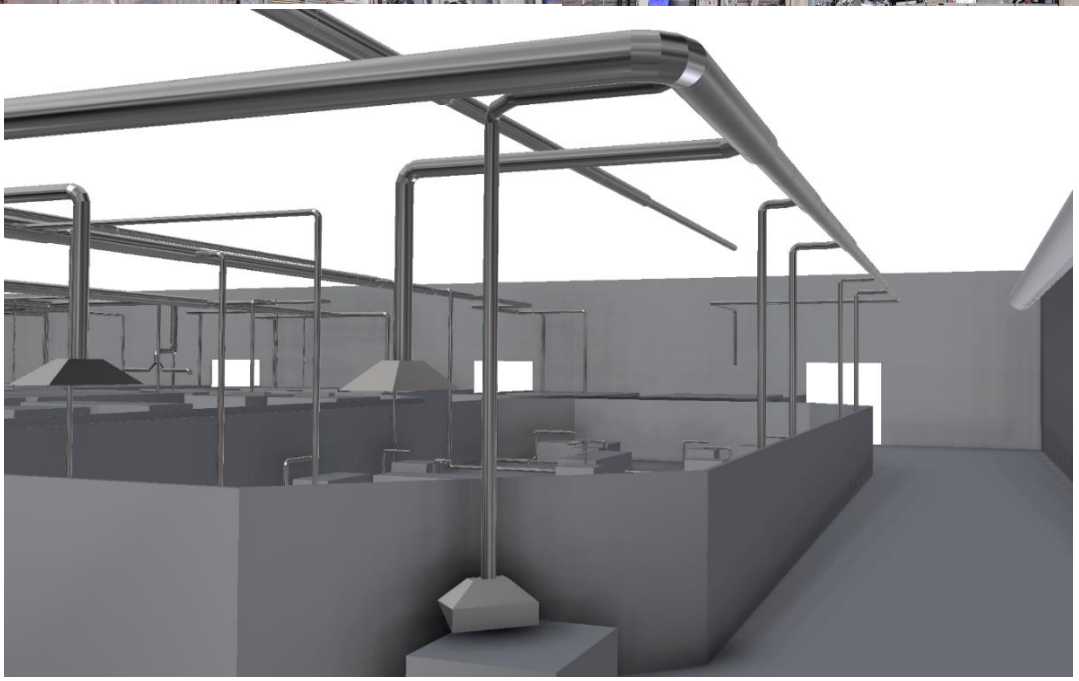


Figure 7 Extraction ducting

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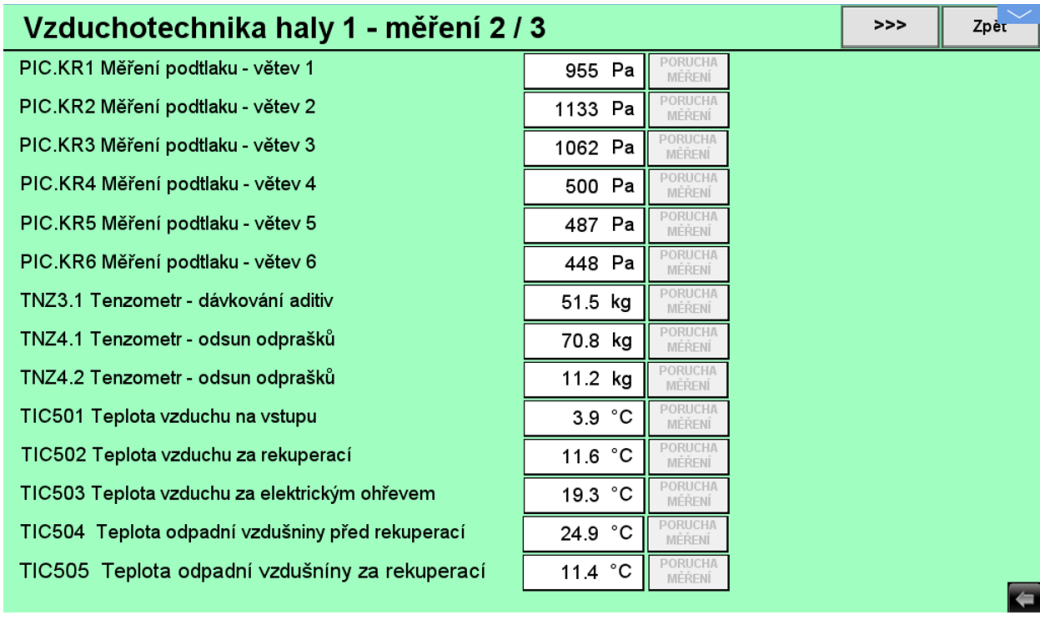
The entire system is controlled by the Siemens Simatic S7 automated system, which can be operated either via the operator panel on the switchboard or remotely via PC or mobile phone. The system allows monitoring and adjustment of key parameters such as pressure loss trends, sorbent consumption, dust removal weight, and electrical energy usage.



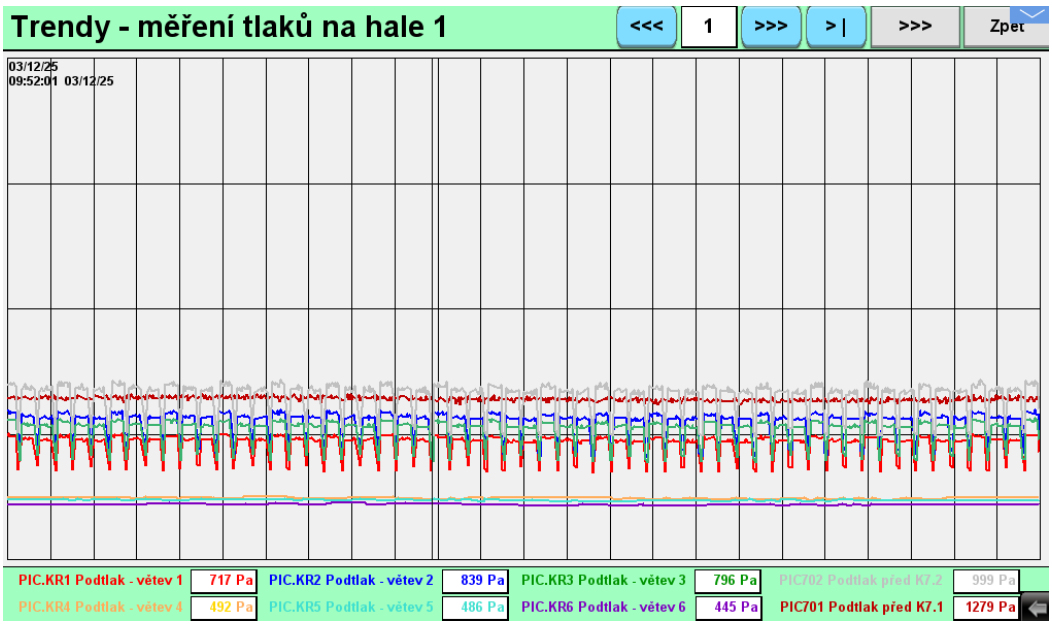


Figure 8 Continuous measurement of vakuum pressures, dust removal weight and sorbent, and air temperature

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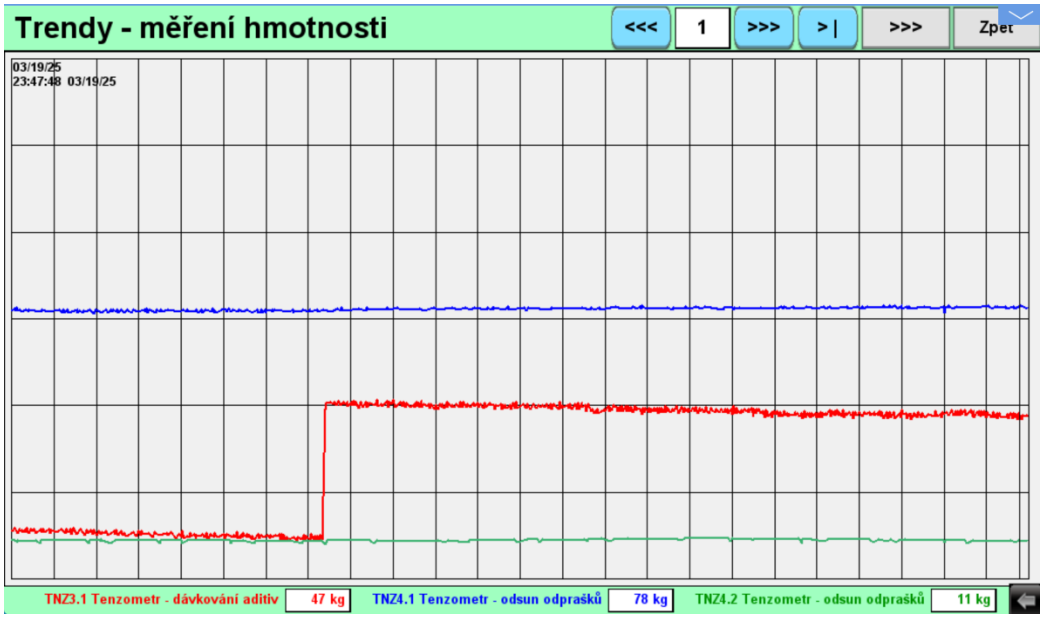

Figure 9 Reactive agent consumption and dust removal quantities

In the final phase of the project, a control measurement of the extracted air volume is always carried out using a calibrated device, the TESTO 512-1, and a Prandtl tube. The system is configured to operate in an optimal performance mode. All monitored and guaranteed parameters are measured and verified.

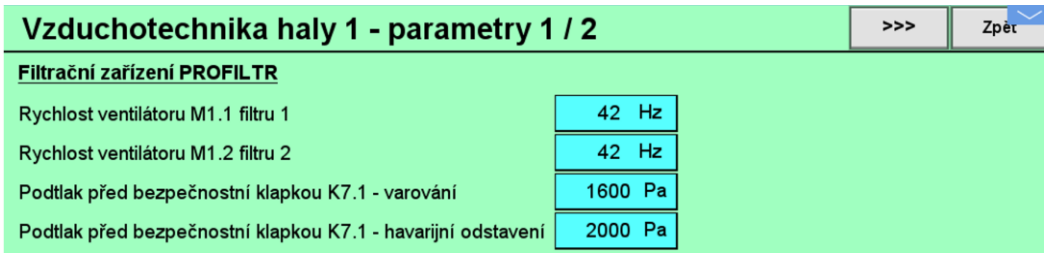

Figure 10 Performance parameter settings