

# PROFILTR

## MODIFICATION OF MELT

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## Introduction

The modification of melt means its alteration using chemicals (i.e. modifiers) with the aim of making certain components create more favourable structural arrangements. This is similar to inoculation of the melt, where additives are added into the melt in order to make crystallization cores, which leads to a finer structure and improved material properties. This procedure includes the adding of specific compounds or elements with a high affinity, in our case in an isolated automatic process, i.e. filled profile.

The melt modification process requires accurate batching of the additives and is simultaneously accompanied by a turbulent reaction, which is why this process is often carried out in specialized modification cabins or facilities that allow inspection and monitoring of the relevant process, and are also isolated from the surroundings together with the extraction of substances harmful to human health.

This procedure is key for the achievement of optimum results and a high quality of the final melt, with minimal temperature and time losses and pollution into the surrounding environment. In the materials attached, we submit the most frequent solution in the form of closed and open modification cabins, together with additional equipment that meet the key requirements and ensure safety and a high quality in the process of modification and inoculation.



## Controlling the modification cabins and the course of modification

The control panel of the modification cabin is equipped with the SIEMENS SIMATIC control system and specific software. This sophisticated system enables the comprehensive control of the entire modification process with maximum accuracy, effectiveness and minimum temperature losses.

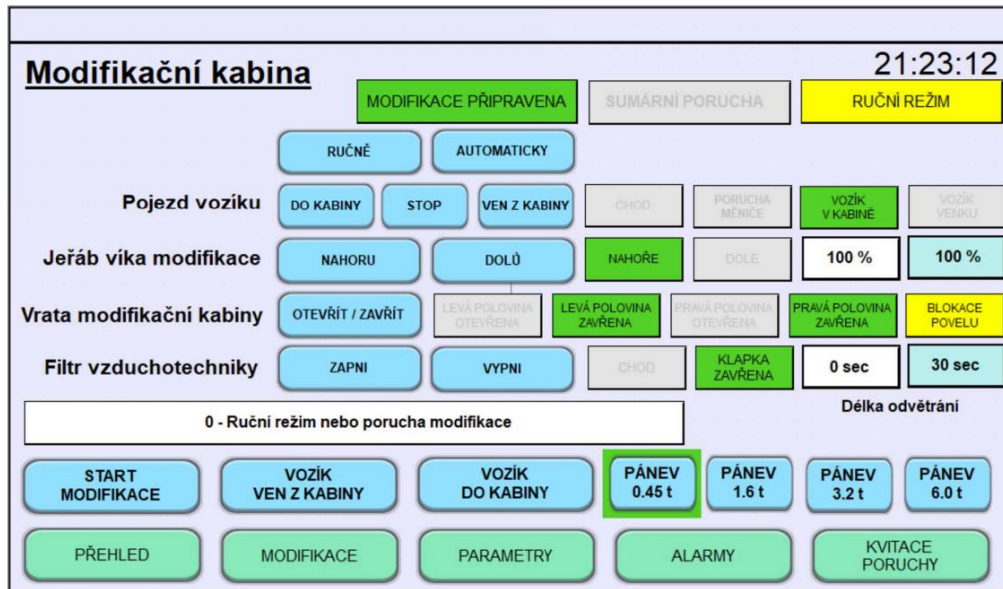


Fig. 1 The control panel of the modification cabin – PROMET Foundry Vsetín

From the control panel, it is possible to control the following:

1. **The course of the process:** The operator can monitor and control each step of the modification process via an intuitive interface.
2. **Batching of the filled profile and inoculant:** Accurate setting of the batching of the filled profile and inoculant enables the achieving of optimal parameters of the melt. The system allows for dynamic control of the course of the modification in real time - based on the current parameters, i.e. temperature, quantity and chemical composition of the metal.
3. **Extraction intensity:** The setting of the intensity of extraction ensures optimum working conditions and minimizes the risk of undesirable gases escaping.
4. **Adaptation of the environment according to the customer requirements:** The system can be adapted and allows the implementation of other processes into the control panel (e.g. the introduction of a rail vehicle, pulley system, the use of ladles of various sizes).

The control system provides:

- **Automatic Mode:** For smooth and problem-free running of the modification process.
- **Manual Mode:** For the possibility of manual control and intervention whenever necessary.
- **Information about faults and failures:** Real-time information about any faults and failures or problems during the process.
- **Monitoring of the consumption of batching of the profile and its course:** Accurate monitoring of the consumption of material and the course of the process, allows effective planning and refilling of the batched material fed.

## Closed modification cabins

Closed modification cabins are the safest solution for working with the melt. The process begins with the transportation of the ladle on a rail vehicle or a forklift truck into the cabin. Here, the actual modification takes place, with the use of a wire feeder located in the above-ceiling area away from the cabin.

The cabin is completely closed and equipped with holders for air-conditioning extraction, where the extracted volume of pollutant particles is replaced by fresh air mass that is brought inside through the input ducting between the sliding or wing doors and the floor. The enclosed construction ensures maximum safety and control over the working environment.

The actual cabin can be equipped with a specific cover for one selected ladle or a universal cover. Here the compensation of the height difference of the ladles is ensured using a moving cover. The basic variant lowers the cover using a pulley system or a hydraulic piston with additional pressure can be applied for optimal sealing between the surfaces of the ladle and the cover. In this way, we ensure optimal manipulation of the ladle and an effective course of the modification melt in an enclosed and controlled environment.

### *Advantages of the closed modification cabin:*

1. **Worker safety:** The closed cabin provides protection for the workers from any potential danger, e.g.. gases and droplets of liquid metal. This increases the overall safety of the working environment.
2. **Enclosed and controlled environment:** The enclosed space allows for complete control over the working environment, which is key for achieving consistent and exact results inside the modification cabin.
3. **Suitability for ladles up to 30t:** The closed variant of the modification cabin is especially suitable for more voluminous ladles with a more intensive process of modification.
4. **Unification of the equipment according to customer requirements:** The cabin can be equipped with various things like universal covers, modification vehicles, etc., which makes it possible to accommodate specific needs of the modification process.

## Walled modification cabins with sliding doors and hydraulically controlled covers



*Fig. 2 The closed walled variant of the modification cabin for ladles up to 30t*

*(part of the equipment is an automatically moving modification vehicle with a load capacity of 35t, hydraulic cover and sliding door)*



Walled modification cabins with wing doors



**Fig. 3 The closed walled variant of the modification cabin for ladles up to 6t  
(part of the equipment is an automatically moving modification vehicle with a load capacity of 10t  
and electrically controlled wing doors)**

## Open modification cabins

Open modification cabins are a variant for the improvement of the melt that is especially suitable for ladles up to 6t and in places where there is limited space. The entire process begins with the transport of the ladle using a forklift truck into the cabin, where the ladle is placed onto a jig. This ensures optimal handling of the ladle inside small spaces, and at the same time an effective course of the modification of the melt in a controlled environment.

The actual modification takes place with the use of a wire feeder, which is placed on a steel construction that is on the platform of the cabin. In this case, the cabin is open and the extraction of pollutants is ensured via the cover that is directly connected to the air-conditioning extractor. The cabin can be equipped with a specific cover for a specific ladle or a universal cover. The height difference is compensated using a movable cover. The basic variant lowers the cover using a pulley system or a hydraulic piston cylinder with sufficient pressure can also be used, which ensures optimal sealing between the bearing surface of the ladle and the cover.

### *Advantages of the open modification:*

1. **Adaptability to available space:** The open cabin is the optimal solution especially for companies with limited space.
2. **Worker safety:** An open cabin with a closed space provides safety from potential dangerous influences like gases and droplets of liquid metal. This increases the overall safety of the working environment.
3. **Controlled environment:** The closed space of the cover guarantees the achievement of consistent and exact results in the modification of the melt.
4. **Easy operator access:** The operator has a good view of the working environment, which improves control and enables fast reactions to potential problems.
5. **Suitable mainly for small ladles up to 6t:** The open variant of the cabin is especially suitable for ladles up to 6t with a less intensive course of the modification process.
6. **Unification of the equipment according to customer requirements:** The cabin can be equipped with various parts, e.g. a universal cover, which enables accommodating specific modification process needs.
7. **Lower implementation costs:** An open cabin construction can offer reduced construction



*Fig. 4 The open variant of the modification cabin for ladles up to 6t*

**(part of the equipment is a hydraulic cover)**





*Fig. 5 Open modification cabin*

*the cabin is located in a limited space between two medium-frequency melting furnaces, the track for transporting the melt and the footbridge*



## Equipment for modification cabins

For the equipment of modification cabins, we also deliver other key components that optimize the process of melt improvement and ensure safe and effective operation.

### Ladle covers

We offer a wide range of covers for ladles that are designed to meet specific requirements of various kinds of modification cabins. These covers ensure optimal closing of the working environment and minimize the leakage of undesirable gases into the surrounding environment.



*Fig. 6 Sintering of the lining of the modification cabin cover*

### Heating jigs for foundry ladles

For maximization of the length of life of the lining of the modification ladles, we offer high quality heating jigs designed so as to ensure the right temperature of the ladle lining with maximum energy savings.



*Fig. 7 Heating jigs of the ladles*

## Rail vehicles for charging the melt into the modification cabin

Rail vehicles play a key role in the handling of melt inside enclosed modification cabins. These vehicles are designed to enable the easy transport of the modification ladles inside and out of the cabin. The ladles are placed into special holders for safe transport via the rail vehicles using a bridge crane or forklift truck. This flexibility enables precise handling of the metal, too, which is key for the correct guiding of the wire into the centre of the modification ladle and achieving optimum results inside an enclosed and controlled environment.

*Fig. 8 Rail vehicles for the transport of melt*

