



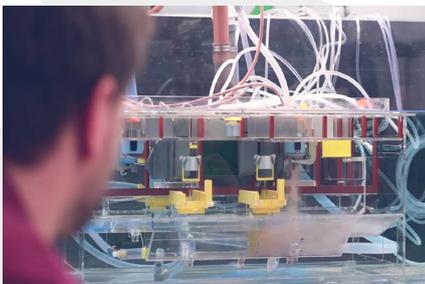
Analysis – Implementation – Compliance

Improvement of Building Ventilation with Fluid Dynamic Model Study and Subsequent Engineering Projects at Stomana Industries/ Bulgaria

Beside compliance with environmental regulations, a proper building ventilation improves the working conditions inside the building and the overall meltshop performance. In 2018 Stomana Industries started a cooperation with BSE in order to analyse and improve the building ventilation at their EAF meltshop in Pernik/ Bulgaria. The first step of the cooperation was the execution of a Fluid Dynamic Model (FDM) study with consecutive engineering projects, based on the results of the study.

Fluid Dynamic Model

The FDM study was performed by the BSE subsidiary company Bender Corporation, using a scaled Plexiglas replica of a meltshop. The model was submerged invertedly in a tank filled with fresh water. The heat sources are simulated by using salt water, which is injected at each source according to the existing equipment layout. The benefit of the FDM study is that the position of exhaust points flow rates adjusted and building geometry can be quickly modified, which allows to try and verify multiple solutions during workshop with the customer personnel.



Fluid Dynamic Model study enabling the simulation of all heat and dust sources influencing the building ventilation

After an **on-site investigation** in Bulgaria, the initial situation was simulated and consecutive tests were performed together with Stomana personnel witnessing the **test at BSE**. The results were compiled in a **final report** with the proven recommendations for the improvement of the following areas:

- ⊙ Increase the total building exhaust flow rate during charging and tapping
- ⊙ Separate the furnace aisle from the ladle aisle by installation of partition wall and modification of canopy hood
- ⊙ Controlling the emissions from the ladle furnace and auxiliary equipment by local exhaust systems



Fluid Dynamic Model of Stomana meltshop with simulated emissions from EAF

Engineering Projects

Due to the excellent partnership and project execution experience during the FDM study, BSE was also entrusted with the conceptual engineering and basic/ detail engineering for further hardware components.

The implementation of the proposed modifications required a **conceptual engineering (CE)** study in order to determine the arrangement of the future emission control system capable to deliver the total required exhaust flow rates, which was determined based on the secondary emission control system requirements established during the FDM study together with the Direct Evacuation Control (DEC) system requirements calculated in the course of the CE study.

One of the key measures determined during the FDM study was the implementation of a tapping shed at one of the electric arc furnaces in order to divert emissions from the tapping into the furnace aisle. BSE was awarded with the **basic engineering** for this **tapping shed**. This measure allows to evacuate all emissions generated during furnace operation directly from the furnace aisle and prevent dispersion of tapping emissions across the ladle aisle.

Another area for improvement was the improvement of the ladle furnace local evacuation. BSE was also responsible for the **detail engineering** for modification of the **ladle furnace roof**.

Results/ Benefits

The measures derived from the FDM study have improved considerably the conditions inside the meltshop and eliminate fugitive emissions from the building.

Since the model of the meltshop is stored at BSE, it is relatively easy and cost effective to conduct some additional tests in case of changes in the operations or compliance with environmental regulations today and in the future.

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