The purpose is to optimize the design factors of the mathematical model of heat transfer in the cooling chamber of aluminum ingots. The issues of optimization criteria are considered, the objective function is defined with restrictions on the set of feasible solutions of the function. Target function was compiled for complex optimization of design factors, a set of its feasible solutions and optimization criteria were determined.
The first optimization criterion is the width of the channel $\delta$, m.

\[ M_{\text{al}} = \frac{\pi}{4} l \cdot \rho_{\text{al}} \cdot A \cdot d \left( \frac{h + \delta}{d + \delta} \right) = K_1(\delta) \]

The second optimization criterion is the total cooling time of the ingot $\tau_c$, s.

\[ \tau_c = -0.25 \cdot c_{\text{pal}} \cdot \rho_{\text{al}} \cdot d \cdot \frac{1}{\alpha(\delta)} \ln \left( \frac{T_f - t_a}{T_0 - t_a} \right) = \frac{1}{K_2(\delta)} \]

Objective function that has a set of feasible solutions, in the following constraints:
- the speed of the cooling air should not exceed 15 m/s.
- the weight of the charge, which should not exceed 20 tons, in order not to exceed the loading capacity of the loading machine.
Figure presents the results of optimization of design factors for an aluminum ingot $d=0.24 \text{ m}$. When optimizing, the following initial data are used: set width $A=2.5 \text{ m}$, set height $h=2.0 \text{ m}$, length of ingots $l=8 \text{ m}$, initial temperature of cooling air $t_a=20^\circ \text{C}$, initial temperature of cooling of ingots $T_0=500^\circ \text{C}$, final temperature of cooling of ingots $T_f=60^\circ \text{C}$. The heat transfer coefficient $\alpha$ was determined depending on the set value of the channel width $\delta$ and air velocity $w$.

The area "1" shows the values $\delta$ at which the speed of the cooling air exceeds the values $15 \text{ m/s}$, which increases the power of the blowing devices and increases the cost of electricity. Increasing the speed of cooling air, will lead to the hardening of aluminum ingots. Area "2" shows the values $\delta$ at which the mass of the charge exceeds the maximum possible. The optimum is the largest value of the channel width from the specified area for each ingot. With this value, a large, but not the maximum possible, mass of the charge and a lower cooling air velocity had.