It is one of the important manufacturing methods used for producing many products in fast, economical and desired properties by shaping metal or plastic based materials in liquid and solid form by molding with a geometry. Parallel to technological developments, this manufacturing method has shown significant improvements. The molding industry is significantly affected by these developments and positively affected. In this sector, mold cooling is one of the important processes in terms of both the cycle time and the product quality, in order to obtain qualified product by molding molten metal at high temperature. In the conventional methods where cooling process is performed by using vertical and horizontal cooling channels formed on the mold body, since the cooling cannot be sufficient and homogeneous, the cycle time and production cost increase. The effect of the surface temperature of the mold in this cooling process is one of the important factors in the molding process. According to the experimental studies, it has determined that the mold surface temperature of the conventional cooling channel mold core is changed between 250 - 350 ° C. In this paper, the effect of different mold surface temperatures on the heat transfer and solidification time of the product in the conventional cooling channel was investigated. As a product in this work, an exhaust valve which is an important part of internal combustion engines was taken into consideration. These comparisons were made based on the results of the design and CFD (computational fluid dynamics) analysis. The mold surface temperature distributions and solidification times were compared to the 1-5 s at 250 ° C, 300 ° C and 350 ° C respectively. According to the results, it was observed that the heat transfer at 250 °C surface temperature is higher and the solidification time is shorter. At the mold surface temperature of 250 ° C about 2 times faster solidification obtained compared to the others.