This investigation studied the temperature gradients and degree of crystallinity of polypropylene melt across a circular duct during the cooling process, where the coolant used was chilled water. The effects of glass-fiber content, varying from 0 to 44 wt%, and coolant temperature, varying from 5 to 20°C, were our main interest. The results suggested that the rate of cooling of the polymer of each position across the duct was not significantly affected by the temperature of the coolant and glass-fiber contents, although the rate of cooling was influenced by the size of the duct. The crystallization temperature and degree of crystallinity of the polymer increased with increasing glass fiber contents and the coolant temperature. These phenomena were associated with the heat transfer between the coolant and the polymer, crystallization temperature, exothermic crystallization process, and thermal properties of the polymer.