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Measurement of Melt Temperature in Ultra-high-speed Filling Process by High-response Infrared Thermometer

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Ultra-high speed injection molding is a highly effective technique for realizing very thin-walled molded parts, and application to the production of new high-value-added products are looked forward to. This technology is able to realize screw injection speeds of above 1000mm/s generally. In recent years, research and development are also being carried out to improve rising time (called rising characteristics) which is the time from the start of screw injection to the reaching of the set-up velocity, in addition to the ultra-high speed injection.

In this study, we proposed an infrared thermometer (response time 8μs, 95%) for the measurement of temperature in the flow front area during ultra-high speed filling, and clarified the effects of the rising characteristics. First, using a partial thin-wall cavity with ultra- thin-wall area (thickness: 0.05mm) at the center of the cavity, we compared the changes in filling and thickness of the ultra-thin-wall area due to the rising characteristics. Next, using a high-response infrared thermometer, changes in the temperature of the flow-front area according to the rising time were clarified through PP molding experiment.

As a result, improvement in the rising time of the screw injection was confirmed to be directly effective for enhancing fillability into ultra-thin-wall areas, and the increase in the temeperature of the flow-front area was clarified by actual measurements.