The radial temperature profiles of a polypropylene melt were examined at a point along the barrel of a twin screw extruder, using a novel thermocouple sensor. The flow patterns of the polymer melt were also investigated, the results being used to explain the changes in temperature of the melt during the flow. It was found that the melt temperature profiles and the flow patterns of the polymer melt were closely related. The heat conduction, shear heating, and the flow length of the material in the barrel of the extruder had considerable effects on the melt temperature.