Nattapong Charungruk 2012: The Development on Design and Manufacturing of the Multi-Cavity Transferred Moulds for Precision Rubber Products. Master of Engineering (Mechanical Engineering), Major Field: Mechanical Engineering, Department of Mechanical Engineering. Thesis Advisor: Assistant Professor Supasit Rodkwan, Ph.D. 160 pages.

Generally, compression moulding process of rubber is widely used for conventional products with less complicated shape and less precision requirement. Nevertheless, for most rubber products used in electronics and electrical industries, where smaller product size and high accuracy of part dimensions are usually found, transferred and injection moulding are often utilized instead. Moreover, in transferred moulding, unbalanced pressure in each cavity of the mould is still the challenging major task for operators to overcome. Therefore, in this research, the design and manufacturing of the multi-cavity transferred moulds for precision rubber products is proposed. The silicone rubber product used as a component in cameras is chosen as a case study. The main investigated mould design parameters include the gate types: fan and film gates, with various widths of 6.00, 8.00, 10.00 mm. at the constant thickness of 0.05 mm., as well as the runner geometry types: H and X ball nose shapes with the width per height ratio of 0.90. In this work, Computer Aided Design/Manufacturing (CAD/CAM) techniques were used to assist in 24 cavity mould design and production process; in addition, Computer Aided Engineering (CAE) was also performed to study rheology behavior of silicone during moulding process. Both experimental and simulation work were carried out. The numerical results show that the mould with a film gate with the width of 8 mm. and a H runner type 2 provides the optimized balancing of silicone rubber filling in each mould cavity. Such a case, the pressure loss, shear stress of incoming silicone rubber into the cavity, speed of rubber material running into the cavity, filling time, and curing temperature were found as 531 bar, 229 kPa, 406 mm./s, 4.99 seconds, and 180 degree Celsius, respectively. The empirical data correlates well with the predicted numerical result. Consequently, it can be seen that the procedure used in this research can be further developed for rubber products in other industries; as a result, Thai rubber product manufacturers can compete in the international marketing level in the near future.

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