Calculation of the slot die cavity pressure using numerical computation

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Slot coating is a widely used coating method due to its various strengths, such as handling the film thickness. In the slot coating process, the coating flow encounters sudden expansion (at a die cavity) and sudden contraction (at a feed slot channel) passing a coating die manifold. These geometric characteristics cause a pressure difference in the slot die system.

Meanwhile, one of the issues in the slot coating process is the segmentation of the coating solution. Viscous non-Newtonian coating solution used in the battery industry is easily segmented in a die cavity and causes lousy quality in the product.

From this study, we have conducted a three-dimensional finite element analysis at a steady-state to calculate the pressure gradient in the cavity. Also, we are planning to measure the pressure in a cavity to determine whether a coating solution is segmented or not before the actual coating process is conducted.