

Slot coating experiment: Vacuum calibration

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Slot coating is one of popular methods to produce thin and uniform film including battery electrode and optical film. It is classified as a *pre-metered* method: final wet thickness is only determined by flow rate and production speed, which can be precisely controlled. Because of the geometry, liquid bridge, or *coating bead*, is formed between slot die and moving web and bounded by two gas/liquid interfaces. To stabilize it, vacuum is applied to the upstream. We visualize the coating bead flow using a lab-scale slot coating device with the transparent quartz roll. An image of face of the die lips are directly taken through the roll by a camera located inside it. The image allows us to identify locations of the interfaces. As a result, the range of desirable vacuum ranges at a given wet thickness, so called the *coating window*, can be demarcated for stable film productions. However, the pressure near the upstream meniscus can be different from the gauge pressure typically measured near the vacuum pump. The experimentally measured pressure value need to be adjusted using the computationally predicted pressure. For this purpose, G/FEM are used to solve the slot coating model, and the location of the menisci are detected by image analyses.