

Gage Control for Tubular Film Production

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Several companies vend excellent equipment for measuring, displaying and/or automatically controlling film thickness during film extrusion. The equipment is expensive and the investment may not be appropriate for operation on a small scale. An alternate approach is described.

In the manufacture of tubular film, the die is normally rotated and the variations in gage are distributed across the width of a winding roll so that roll formation is usually quite good. However, the point to point variations in thickness may cause difficulty in the end uses and in converting operations, such as bag making. In bag making, sticking to seal bars is likely to occur when the equipment is adjusted for a normal thickness and two relatively thin layers come together under the sealing bars.

A useful procedure in making gage measurements on tubing is:

(A) momentarily stop the rotation of the die, or else mark the film, so that position on the die can be related to position on the width direction of the film;

(B) take a sample at the wind-up, open the tubing and measure the sheet thickness across the film width in a consistent direction relative to the die;

(C) the thickness measurements should be accurate to +/- 1% of the sheet thickness. If a simple micrometer is being used to measure thickness, the film may be folded in the machine direction and the thickness of the fold sheet averaged;

(D) the measurements of thickness should be used to calculate an average sheet thickness, to find the difference between maximum and minimum values and to plot a profile of the sheet thickness around the die;

(E) the use of control charts for the average values and the range is helpful;

(F) a series of values can be averaged and used to plot a standing profile; and,

(G) a personal computer can be usefully used for steps D through F.

The gage profiles are then useful in making adjustments to the centering of the die, in making adjustments to die gap opening and in analyzing causes of poor gage uniformity such as poor polymer blending; mismatched polymer and die temperatures; and, degraded polymer partially plugging a die.

- Kenneth L. Knox

See also:

- Basic film calculations
- Gauge control
- Selection and maintenance of cooling rolls for film casting, extrusion coating and sheet extrusion
- Sheet/film coextrusion grows
- Thickness uniformity in blown film extrusion
- Tubing draw down ratio

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