

Upstack vs. Downstack

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Once upon a time, virtually all sheet extrusion line three roll stands were in a downstack configuration; that is, the molten web entered the upper-most of two available nips, and S wrapped downward. Some years ago, upstack stands, with the web entering the lower nip and S wrapping upward, appeared, and these now dominate the market. The list of advantages in going upstack is longer than that of going downstack:

1. On larger lines, the extruder barrel/die centerline is lower, minimizing platform height, stairs, etc.
2. The primary surface (from the center roll) faces up on the conveyer, making inspection easier and avoiding idler scratches on this surface.
3. Gravity assists the pull roll drive, as the conveyer is downhill from the release point on the top roll to the pull rolls.
4. A rubber roll in the kiss roll (bottom) position can be surface cooled in a water trough. Cooling a top rubber roll in a downstack line is inefficient at best.

However, the downstack line is not a complete dinosaur. In general, plastic melts will stick to and track the first roll they contact, or the warmest roll if given a choice of two. Since tracking the center roll at the primary nip is the objective, and the center roll is usually the warmest of the three, first contact is usually intentionally made on this roll through the nip height relationship.

With very low viscosity melts of some engineering resins, and with very thick sheet, there is a tendency for the melt to drape between die lip and nip. At some point this drape makes it impossible to contact the center roll first on an upstack line. The same is true on the newer 45° up stack lines. On a downstack the drape naturally goes to the center roll, avoiding potential tracking, premature cooling, and folding problems.

The real point is that layout decisions need to fit the product to be run, regardless of industry trends.

- David R. Hopkins

See also:

- Film and sheet pinning techniques to promote heat transfer to cooling rolls
- Sheet/film coextrusion grows

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