Nylon - the great misconception

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A number of old wives' tales haunt the industry regarding nylon extrusion resins. I hope this article will lay to rest the primary misconception that nylon is a singular material which has a high melting point and a low melt viscosity making it difficult to process. This concept was born some thirty to forty years ago when injection molding grade nylon 66 resin was the primary nylon resin on the market. The first attempts to extrude this resin were truly disastrous because this nylon 66 contained too much water, was too fluid for most extrusion processes, and the short barrel extruders with constant tapered screws would not pump the material at a uniform rate. Memories of these difficult days have lived to the present time.

The first point to be made is that the present day nylon family consists of a large number of extrudable resins. These materials may be based on nylon 6, nylon 66, nylon 11, or nylon 12, etc., as is discussed by Kohan1. Furthermore, commercial nylon extrusion resins may be homopolymers, copolymers, blends of nylon or other resins. These nylon compounds usually melt in the range of 300 to 500°F depending upon the composition of the resin. Clear, non-crystalline nylons with no definite melting point are also available.

Nylons may have a high or low melt viscosity depending on molecular weight, composition and other factors. Thus, one can usually find a nylon composition suitable for any extrusion process including co-extrusion.

Contrary to the belief of some processors, molding grade nylons, including nylon 66. can be extruded into commercial products. For example, these highly fluid resins are used in monofilament and wire coating applications. When using a molding grade resin, one should make sure the moisture content is sufficiently low (ca 0.1 wt %) and a properly designed screw is used.

Another misconception is the use of a nylon screw (i.e. a rapid transition-metering type) for processing nylon resins. It was shown some nineteen years ago that the so-called nylon screw was far from the optimum design for extrusion of nylon resins. The gradual-transition metering screw described in this publication is still satisfactory for many nylon resins. However, numerous extrusion processes have been improved by conversion to a barrier screw. Usually a properly designed barrier screw yields more output and more consistent output (i.e. less surging) than a metering screw. The resin supplier and machinery manufacturer should be consulted to obtain the best screw design for a particular resin and process.

Finally, my advice to the nylon-doubter is, try it, you might like it!

References

1. Kohan. M.I.: Nylon Plastics, M.I. Kohan Ed.. John Wiley & Sons. N.Y. (1973), pp 1-13.
2. Bonner. R.M.; "Evaluation of Screws for Nylon. SPE Journal 19 1069 Oct. (1963).

- Robert Bonner

See also:

- Extrusion of nylon 66 simplified
- Extrusion with plugged vented barrel extruders
- Naming screws for materials
- Nylon 6 screw design
- Purging of extruders
- Technical developments

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