Rapid Extrusion Line Start Up

Modified on Saturday, 31 January 2015 01:11 AM by mpieler — Categorized as: Consultants Corner

Rapid Extrusion Line Start Up
Vol. 3 #2, August 1974

This article will attempt to describe a technique which was originally developed to minimize the time required to start up an extrusion line producing sheet, although the same method can be used on other types of extruded products. Custom extruders are used to start-up times on large sheet lines of as long as twenty-four hours, but that length of time should not be required for re-runs of a familiar product by an experienced operator. In these times of material and energy shortages, it is especially desirable to use whatever methods possible to minimize start-up times.

In attempting to produce a new product on an existing extruder line, especially a line not specifically designed for that product, there is a natural tendency to run the extruder at very slow rpm's while initial experimentation with the take-off end of the line is conducted, and the take-off modified as a required to produce some sort of an acceptable initial product. This procedure is required for new endeavors, but leads to a start-up procedure which reinforces a very bad habit. Once a satisfactory product has been obtained with a slow rpm, the most logical step is to improve the production rate by increasing the speed of the output of the extruder. Thus, in three or four different runs on a new product, a start-up procedure will be come established which calls for in creasing the extruder rpm step-wise until a satisfactory output rate is reached, It is this step-wise increase in extrusion rpm which must be avoided to minimize overall start-up time.

With any extrusion product which has been run more than once on the same extruder line, it is possible to predict fairly accurately a desirable extruder speed which will achieve an output of plastic melt that will be in satisfactory balance with the capability of the take-off.

As a first step in making a rapid start-up of an extruder line, all the conditions which are believed satisfactory for efficient operation of the extruder should be set, and then the extruder controls should be left strictly alone. Even minor adjustments of one or two rpm's which many extruder operators will be tempted to make during a start up in efforts to produce a satisfactory product should be avoided. The basic reason behind this method of operation during start up is that extrusion is a gross approximation of o condition-. of equilibrium involving simultaneous heat and mass transfer. Of all components in the extruder line, the one requiring the longest time to approach this approximate equilibrium is the extruder, and it is, therefore, most effective in making quick start ups that the extruder be set, and then not disturbed.

Among the extruder items not to be adjusted would be drying temperature in the hopper (if a dryer is being used), all temperature zones on the extruder, screw speed, extruder head and adapter temperatures, and vent vacuum (if a vent is being used).

All adjustments necessary to achieve a satisfactory product should be made on the take-off end of the line, and these adjustments can initially be gross adjustments as required to bracket the final conditions on the take-off end which will ultimately be required. For example, in the extrusion of sheet product, once the web has been strung up through the chill rolls and is through the pull rolls as a very thin web, a rapid adjustment of the speed of the chill rolls and the pull rolls can be made so that the speed of the take-off results in an almost immediate accumulation of the bank of melt behind the nip roll which is desirable in producing almost all sheet products. This initial gross adjustment of the speed of the take off can be made in a period of time of less than ten minutes, and usually with. in 30 minutes of the time the extruder is first started. A thoroughly experienced operator re-running a very familiar material and product can make this initial gross adjustment in a period of time of one or two minutes.

It is reasonable to expect that a 4½" extruder line re-running a familiar product and a familiar material in the hands of at experienced operator can be on stream in most cases in three hours or less from the time that

See also:

- Gear reducer
- Melt blockage due to false start up

Return to Consultants Corner