Planning the Extrusion Line

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Planning a new extrusion line requires common sense. If the new line is in tended to increase production for an existing product, you should already be familiar with the requirements that the line must meet.

Assume the line is for a new product. Numerous factors must be considered, beginning with output ratings. Once you determine the size required, other factors must be considered in the planning stage. Below is a list of important points for a new line.

- Desired output
- Maximum linear speed
- Direction of line
- Space (width, height, length) required for line operation and maintenance
- Centerline height
- Lighting
- Floor drains and piping requirements

Output and Speed - Extruders have different output ratings for different materials. It is important, for example, to make certain the take-away equipment can handle the full extruder output. A few years ago, we were producing 100 and 300 foot coils of polyethylene pipe. I decided to switch from a 4 1/2 inch machine to a 3 1/2 inch machine because the take-away equipment could not handle the speed of the pipe.

The footage counter activated the pipe cutter. Because the linear speed of the pipe would have been too fast for the operator to attach the cut pipe to the rotating coiler (winder), the 3 1/2 inch machine was a practical decision. It also required ethylene glycol for cooling the pipe in place of water.

Direction of Line -Think twice about the direction of extrusion. Unless out door resin silos are used, ample space must be provided close to the extruder, preferably to the rear of the machine. The finished product is usually moved to a place in the storage area.

Space- Overall width of the line is important. Provide ample walking space on each side. Also, you may need space for the forklift truck in moving auxiliary equipment in and out. Height should be sufficient to accommodate the hopper and any other gadgets you may need above the hopper. The first location of our small extrusion plant was in a low ceiling barn. We had to cut a hole in the ceiling to make room for the hopper! Since the barn was there first, we had no choice on ceiling height. Don’t forget to allow space around the extruder control cabinet for maintenance.

The length of the line must accommodate the maximum length of the product plus room for unanticipated auxiliary items. For example, one company was extruding vinyl house siding with holes drilled in the siding for future assembly. The drilling operation was initially per formed away from the line. Fortunately, when the company later acquired a special machine to perform the drilling operation in line, space was available for this improvement.

In our plant, we had been running two lines for about a year producing medium density polyethylene pipe. Out of the sky came a major resin producer with a newly developed high density, high molecular weight polyethylene that they claimed was superior to any pipe material on the market. With caution, we started a crash program with a laboratory to check the resin company’s claims. Tests showed it was a superior material - with one drawback. It was almost impossible to extrude! With a working pressure of 6000 psi, on a single head die, it was difficult to see the material move!

To make this a practical operation, we positioned six dies around the extruder head. Each die had a gear pump. Because the linear speed was so slow, specially designed takeoff coilers were made. After many weeks of debugging, this operation became practical. By good fortune (and luck), we had sufficient space to handle this special operation since we eliminated the cooling troughs. Cooling was done by water cooling the diecores.

The finished product must be moved away from the end of the line quickly- either to the warehouse or the shipping dock. Avoid cluttering the end of the line. It shows poor housekeeping and invites accidents.

Centerline Height - Height from the extruder to the floor is important - even more so when a product requires additional operations in line. The typical height for a 2 1/2 inch extruder is 42 inches. Most line equipment can be adjusted to this height. However, when selecting a new machine for special products, it is best to specify height that can accommodate unusual downstream operations. For example, one company I worked with, was coating steel wire through a crosshead die. Following this were three large and heavy wire braiding machines having a centerline height of 24 inches. To raise these ma chines to 42 inches height was not practical. Rather than angle the coated wire down to a 24 inch height, the extruder was designed to a 24 inch centerline height.

Lighting - Good lighting is critical along the extrusion line, especially over the extruder and die, and any location where product inspections or added operations are required.

Floor Drains and Piping - Water al ways seems to collect on the floor along cooling troughs. On a new floor, screen covered trenches with drains should be used to catch spilled water. Though there may be small amounts of water, it is advisable to provide a wood platform along the cooling tank area. This not only minimizes slipping, but may prevent a serious accident if a worker contacts ungrounded electrical equipment.

Piping for water (or coolant) should not be a problem, but give thought to re- circulating your water.

To summarize, plan your new line for full extruder output. Provide ample lighting, sufficient space for maintenance, auxiliary equipment, and special operations - width, length, & height.

- Don Biklen Springbriar

See also:

- Extruder alignment
- Machinery installation
- How to buy a screw - Part II
- How to buy a screw - Part I
- Project management

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