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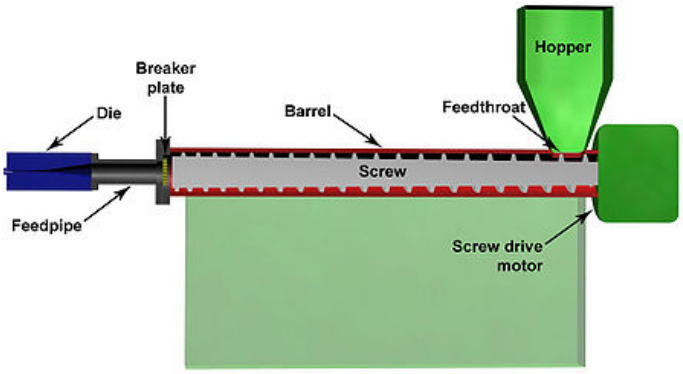
National Distributor For EASY-LASER®

Extruder Alignment with Easy-Laser®

By Paul Berberian

Extruder Alignment with Easy-Laser®

The process of plastics extrusion involves high volume manufacturing in which raw plastic material is melted and formed into a continuous profile. In the extrusion of plastics, raw thermoplastic material in the form of small beads (often called resin in the industry) is gravity fed from a top mounted hopper into the barrel of the extruder. Additives such as colorants and UV inhibitors (in either liquid or pellet form) are often used and can be mixed into the resin prior to arriving at the hopper.



The material enters through the feed throat (an opening near the rear of the barrel) and comes into contact with the screw. The rotating screw forces the plastic beads forward into the barrel which is heated to the desired melt temperature of the molten plastic (which can range from 200 °C (392 °F) to 275 °C (527 °F) depending on the polymer).

To achieve a good, consistent flow of material, the screw needs to be aligned such that is does not rub against the barrel. The friction caused by the misalignment can create “hot spots”. This can cause the plastic to melt hotter and faster in those spots, causing the material to be of varying consistency. The area opposite the hot spot can produce material that does not mix properly and can be cooler and harder. These material inconsistencies can prevent the material from being used in the manufacturing process, increasing costs due to scrap, waste and time lost. Severe rub can result in foreign material from the barrel in the product.

Other problems caused by poorly aligned extruders are:

- Excessive wear on the extruder screw and tube – more maintenance, less production time
- Higher energy consumption
- Reduced availability of machine for production time
- Higher consumption of spare parts

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The alignment of an extruder can be divided into 4 stages:

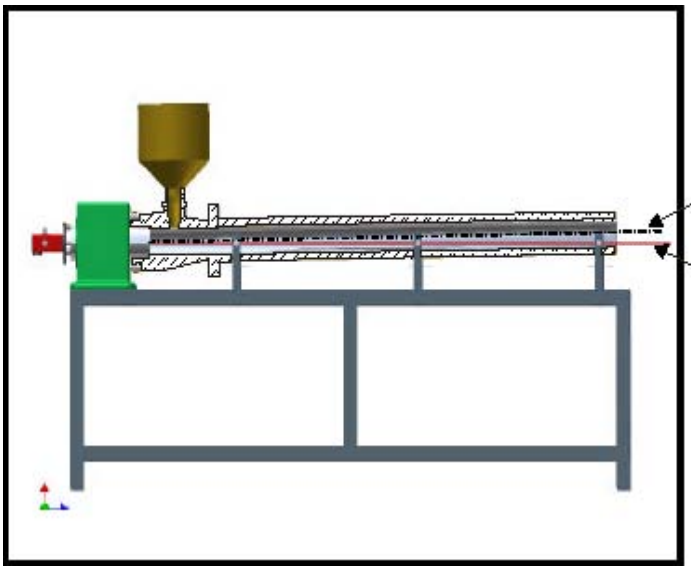
- Alignment of the transmission
- Alignment of the spindle center of the gearbox compared to the extruder tube at inlet
- Alignment of the spindle center of the gearbox compared to the extruder tube at outlet
- Straightness of the extruder tube

Alignment of the transmission

Transmission alignment is a shaft alignment process, aligning the motor with the screw drive – either belt driven or direct drive. The Easy-Laser® EasyTurn™ program for shaft alignment of direct drive motors or the Easy-Laser® belt alignment tools are designed for this application.

Alignment of the spindle of the gearbox compared to the center line of the extruder tube and straightness on the extruder tube

The D75 Laser transmitter with a magnet bracket is placed at the end of the spindle of the gearbox. A 2-axis detector with an adapter in plastic which is suitable for the diameter is oriented inside the tube. With an extension rod, which is mounted in the back of the detector, the detector can be slid through the whole length of the extruder tube. The result of both the spindle direction and the straightness of the tube are displayed. Measurements should be taken at points where adjustments can be made.



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It is important that the center line of the spindle coincide with the center line of the extruder tube. Otherwise the screw at the inlet's end will be pressed against the tube, which will lead to abnormal wear of both screw and tube along with increased energy consumption. This can also result in metal fragments in the produced material.

During the alignment procedure we will rotate both detector and spindle to measure how the center line of the spindle is compared to the tube's center at the inlet end.

Normally the gearbox and extruder tube are linked together so that it is easy to believe that the spindle's center line always coincides with the tube's center line. But experience shows that is not always the case, because the gearbox, due to its weight, will bend and a parallel offset occurs and the spindle's center does not coincide with the center line of the tube.

An unacceptable misalignment at the connection has to be adjusted or shimmed.

Straightness of the Extruder Barrel

It is important that the tube is straight so that the screw does not rest against the tube in any part, which also can result in abnormal wear and fragments of metal in produced material. If the tube is straight, the screw can more easily center itself due to the forces in the produced material. We will also get a more even temperature of produced material which, in the end, also results in a better product.

This measurement uses the Easy-Laser® Straightness program. The D75 laser is still in place from our earlier measurements. Measurement is made with the detector in the x and y-axis at pre-determined spots. The straightness program shows the vertical and horizontal misalignment of the extruder barrel. Live on-screen values can be used to make adjustments in real time.

Easy-Laser® Alignment Solution for Extruders

Easy-Laser® has developed a solution expressly for extruder alignment applications: the Easy-Laser® D630. The step-by-step manual and optional on-site training

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makes this solution easy for maintenance teams to learn.

The D630 can measure bore diameter sizes down to 1.65” (42mm) (accessory detector available down to .79” (20mm)). With the D630 it is possible to offset the reference line in the measurement program. The Straightness Program can handle up to 150 measurements over 130’ (40 meters). Each Easy-Laser® program guides the user through the measurement process for accuracy and to speed up the work.

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Since 1985, Alignment Supplies, Inc. has served the rotating machinery industry with a complete line of alignment-related products for shaft and machinery alignment. As the US Master Distributor for Easy-Laser®, Alignment Supplies, Inc. has the experience, resources, and equipment to address any alignment need. Contact us at 419.887.5890 or at www.alignmentsupplies.com.

Sources:
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