

# Machinery Installation

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This article describes the techniques and procedures used to mount and align extrusion machinery.

An extruder is the type of machine that requires careful attention to installation procedures. It is a train of components that must be held in alignment with each other despite torsional twisting, bending loads, thermal gradients and the pull of attached auxiliary equipment. The prime objective is to have and keep the screw and barrel centerlines coincident. Installation is a multistep procedure that consists of building a foundation, setting and leveling the machine supports and aligning the machine components to each other.

A good foundation provides a level bed for the machine and does not move or settle during operation. The contractor laying the foundation should be familiar with the underlying soil conditions.

Depending on the soil and other ground conditions, a bed of reinforced concrete is put down with sufficient thickness and strength so that it can distribute both static and dynamic loads to the ground without settling. In many cases, because of concern for load distribution and need to have a machined level surface, a steel soleplate is set in the concrete.

The machine is attached to the foundation using anchor bolts, jack screws, shim and grout.

The anchor bolts are part of the foundation. They are either inserted and extend up through the soleplates and subplates or through hollow steel cylinders mounted in the concrete. A washer attached at the bottom is needed to prevent the bolts from unscrewing during tightening of the extruder supports.

To mount and level the extruder supports, which may be either a stand or pier, requires positioning on the anchor bolts between a set of nuts. The nuts remain loose until the alignment is complete. A gap of several inches between the bottom of the stand and the foundation is needed for making adjustments. Jack screws, attached to the bottom of the stand, bear down on the foundation and are used for adjusting the support stand and piers. A precision level placed on a machined top surface is used for measuring and obtaining the required levelness.

Once it is determined that the supports are level, alignment of the various components to each other can begin. One component of the assembly should be the starting point and is fixed to its support. Usually it is a gearbox. All other machine components are aligned to it. If the extruder was aligned and assembled on a base at the factory, it should still be rechecked after site installation. Assemblies, too large and too long to be shipped in one piece, must be aligned onsite.

To align the drive motor to a gearbox, the coupling must be open. The coupling allows a small amount of axial play as well as radial and angular misalignment. A dial indicator is usually mounted on one coupling half and checks the axial and radial runout of the other half. Jack screws are placed on the motor base to move it back and forth as well as side to side. Shims are placed under the motor footings to get the proper elevation. The dial indicator readings are rechecked until they are within the manufacturers' limits. Then after the motor has been checked electrically, the coupling halves are bolted together. Dowel pins should be inserted between the motor pads and base to hold the alignment.

The barrel assembly (or individual barrels) are attached to machined surfaces on the gear box. A screw jack can be placed under the barrel during assembly to make it level in the vertical direction. The barrel bore should be swept by a dial indicator attached to the gear box driveshaft to check horizontal and vertical position. If satisfactory, the barrels are then bolted together using a procedure that tightens the bolts in sequence and with the proper specified torque to prevent flange bending. This step is critical for good barrel alignment. Check the barrel flange with a feeler gage for evenness.

Because the barrels are heated during operation, allowance must be made for thermal expansion. Growth in the axial direction is significant and slides must be provided under the barrel supports to allow movement. Depending on how the barrels are supported, the elevation adjustment should consider radial growth in the hot condition.

A shim is placed between the barrel flanges and their supports to get and hold the correct elevation. Dowel pins are usually inserted between adjacent barrel flanges to hold the alignment.

After the machine is aligned and supports tightened, a shim is placed under the anchor bolts and the nuts are then tightened.

The final step is to put grout around the machine base and foundation, removing all air gaps. Grout is an inert, high strength, non-shrinking cement filler of plastic consistency. After it hardens, the machine is ready for further use.

— Thomas Crouch

See also:

- Barrel heater maintenance and installation
- Extruder alignment
- Extruders that have been exposed to fire
- Misalignment
- Proper extruder installation insures optimum performance and safety
- Planning the extrusion line
- Screw installation and removal

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