

# Old vs. New Extruders

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» [Coextrusion: opportunities and challenges](#) » [Old vs. New Extruders](#)

In this day and age we cannot pick up any plastics magazine without reading about all of the marvelous new extrusion products that are equipped with the latest in sophisticated control and diagnostic systems.

While all of these CRT's and bells and whistles are nice (and very impressive) this does not preclude the fact that there are still thousands of older extrusion lines out in the field that still have many good years of service left in them if proper attention is given to their care and operation.

We will briefly review here some of the items to be considered in establishing a good preventive maintenance program that should provide good performance coupled with equipment longevity for this older equipment.

## The Extruder Drive Train

The extruder should be leveled and secured to the floor.

If the gear reducer is in an in-line set-up with the screw it should be bore-sighted (if possible) to minimize wear on the thrust bearing and the reducer gears.

The B-10 life expectancy rating of thrust bearings on many older extruders is 100,000 hours or less. Many lines running such items as monofilament, sheet, or blown film are operated around the clock seven days per week and in about twelve years they will reach 100,000 hours (Note: the B-10 rating of 100,000 hours means that half of the bearings in service will fail by the time 100,000 hours of extrusion is reached.)

Therefore, you should check the age of your extruders and replace the thrust bearings before they are involved in catastrophic failures that can also crack bearing housings, warp screws, and damage gears.

If the gear reducer is attached to the screw receiver by an in-line shaft coupling it is imperative that the shaft alignment between the two is held to within a few thousandths of an inch or the life of the coupling will be greatly reduced.

When the gear reducer is belt driven by the drive motor the two shafts must be in parallel so that the (matched) belts will have equal tension on them. The belt sheaves should be properly aligned with each other to prevent belt heating and accelerated wear.

The drive motor should receive frequent attention. Motors with cooling blowers should have their filters cleaned (or changed) as often as is required to maintain good airflow. Depending upon the environment this could be a period as long as a week or more or as short as a shift.

Older AC-DC or motor generator drives should have their brushes checked periodically (usually monthly) and replaced when worn to prevent arcing which will vary screw speed and output.

## Extruder Barrel and Screw

The type of resins being extruded and the type and amount of filler or colorant in that resin will cause varying rates of wear on the barrel and screw.

Some materials, such as titanium dioxide or fiberglass, can completely wear the flights off of a screw in 4000 hours or less. Therefore, screws and barrels should be checked for wear or damage at least every 1000 hours of operation. Worn screws and barrels reduce output and increase energy usage (and cost).

At the time of inspection (a) the screw should be checked for damage, warpage, and any loss in flight diameter should be recorded. The barrel should be checked for cracks, gouges, or wear rings and the I.D. recorded.

When the screw-barrel clearance reaches three to four times the clearance of a new screw and barrel the screw flights should be rebuilt and/or the barrel relined.

The hinged gates or die clamps should be checked frequently to insure both safety and efficiency. Stretched bolts or worn hinges can rupture under high load conditions and endanger safety of operators and equipment.

Worn gate sealing areas can leak and lower the effective output of the extruder (also higher energy costs). Leaking resin can also encase and entrap electrical wiring which sometimes leads to electrical problems.

The screw shank, key, and receiver key-way should be kept clean and free of burrs so that assembly and disassembly can be easily accomplished. Worn keys should be replaced.

## **Extruder Control Cabinet**

The older instruments including the three-point, anticipating, and proportioning types should be calibrated every 750 to 1000 hours of operation (if possible) and in no way should this period exceed 4000 hours of operation.

If controls or contractors or relays are malfunctioning due to overheating, do not open the cabinet doors to cool them off. Open cabinet doors allow airborne particulate matter to enter between the contractors points and relays and they will then arc and stick together with a loss of control function.

To prevent overheating of control cabinets (or any other overheating electrical cabinet) install exhaust blowers and intake filters in the cabinets to keep the electricals cool enough to operate continuously.

Thermocouple leads should be checked for loose connections and be sure that thermocouples are firmly seated in the bottom of the thermocouple holes (e.g.— good spring tension). Shorted and open circuit situations should be immediately apparent by either an off-scale or locked position indication on your control indicator.

While there are many more things that could also be included in the routine checking of your older extruders (such as making certain that clutch controlled drives have adequate coolant flow), performing the above checks will insure a higher degree of up-time, improved productivity, and on-time production schedules.

- John H. Miller

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