Excessive screw wear

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Excessive screw wear

We are often asked to explain why an extruder screw tends to wear so quickly in the transition section before the first metering section. The answer to the question is complex and depends on one or more of the following variables:

1. How straight is the screw?
2. How straight is the barrel?
3. How concentric is the screw in the barrel?
4. What is the screw length to radius of gyration ratio (Euler's formula)?
5. Discharge pressure
6. Screw diameter
7. Melt viscosity characteristics
8. Radial flight land clearance
9. Barrel hard surface alloy
10. Screw flight land surface alloy
11. Screw RPM

An often-overlooked variable is the buckling characteristic of a long L/D screw when operating at a high discharge pressure. The resulting force will tend to cause the screw to buckle with the restraining force resulting from the hydrodynamic pressure of the melt between the flight land and the barrel. It is not surprising to find that screw wear is significantly reduced in situations where the discharge pressure is lowered.

How can the discharge pressure on a screw be lowered? Die redesign, more frequent screen pack changes, and melt pumps are three possible ways to reduce the pressure at the screw tip. A unique solution is found with the screw extruders which discharge to the side and are driven from the discharge end such as a vertical extruder or the horizontal extruders now advertised to reclaim scrap. (Egan and Hartig offer two examples).

You are welcome to respond with any questions or input you concerning this subject.

See also:

- Barrel and screw wear
- Extrusion screw wear
- Gear pumps - answers to questions
- More on screw flight wear
- Screen/barrel clearance
- Screw flight wear
- Shear rate and what it means
- Where's the wear?
- Where's the wear? Part II

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