

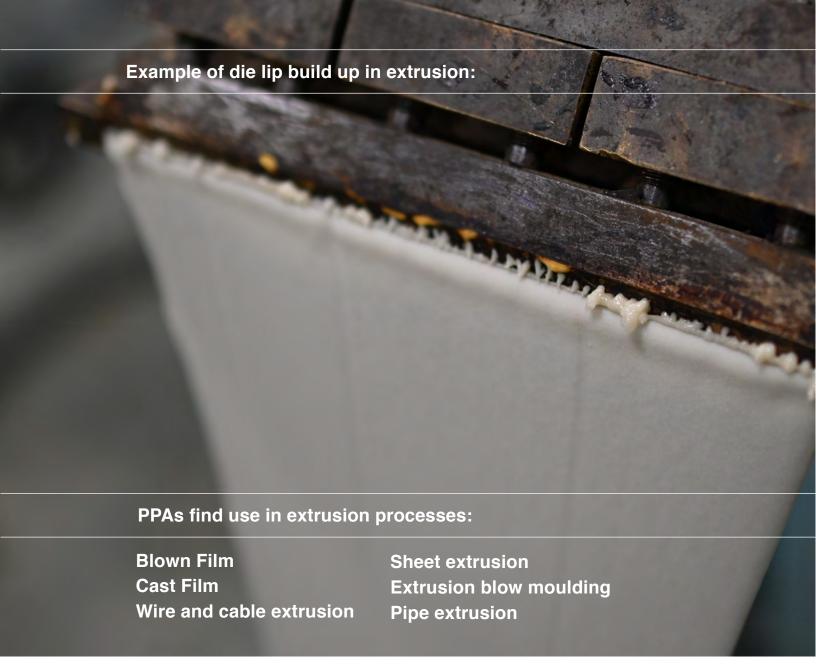
Ingenia Extrusion Brief

Polymer process aids are additives that are used to improve the processability of polymers, primarily in the extrusion process. The use of polymer process aids helps to alleviate melt fracture and die lip build up. In industry, melt fracture is also known as 'sharkskin', 'orange peel' and 'apple sauce'. Die lip build up is also known as plate out.





Melt fracture in blown film noted in picture on the left, while picture on the right has no melt fracture



Generally, Polymer Process Aids (PPAs) consist of Fluoropolymers, sometimes combined with synergistic additives. The PPA coats the metal surface in the extrusion equipment thereby lowering the CoF between the polymer melt and the metal. Thus, it promotes slippage at the polymer and die interface. This reduces the large elongational stresses at the exit of the die, which is the root cause of melt fracture. Also, this leads to a production rate increase which is another benefit of using PPAs.

The polymer process aid is incorporated into the molten polymer through the melt extrusion process. Polymer process aids are introduced into the host matrix using masterbatches and the amount of PPA required in the melt varies from 100 ppm (parts per million) for die lip build up to 1000 ppm for melt fracture depending on the resin type, additives incorporated, processing conditions, and die type. For maximum efficiency, the dispersion of the PPA, including the PPA droplet size and their distribution in the masterbatch, has to be optimised. Optimum dispersion depends on the type of polymer process aid used.

Schematic of polymer process aid coating metal surfaces

PPAs can interact with certain polymer additives including antiblocks, UV stabilisers, minerals and pigments. Selection of the type of polymer process aid is important to reduce negative interactions. As PPAs are an expensive component of the film blend on a unit basis, it is imperative that dosage levels be optimized - to use the least possible amount and reduce total film cost. Further, excessive use of PPAs can lead to other issues such as PPA build up on the die or on downstream equipment. Also, excessive use of certain PPAs causes difficulties in sealability and printability of the film. Therefore, careful selection of the type of polymer process aid is important.



PPAs provide several benefits to the processor. These include:

- Elimination of melt fracture
- Reduction of Die lip build up
- Extrusion of high viscosity, low melt index resins
- Reduction in back pressure
- Reduction/Elimination of interfacial melt instability
- Facilitate use of lower die gaps
- Elimination of gels, black specs
- Increase productivity
- Reduction in change over times
- Improvement in the optical properties of high clarity films

To learn how the correct PPA can help solve your processing challenges, contact your Ingenia Sales and Technical Service team. With a leading industry position and a variety of stock and specialty products, the solution to your melt fracture or die lip buildup problems is available at Ingenia.

