from the blog at biofluidfocus.com

EBM vs. ISBM: For Bottles

http://biofluidfocus.com/ebm-vs-isbm-for-bottleslog

Bottle-shaped containers are molded by 3 processes: EBM (extrusion blow molding), IBM (injection blow molding) and ISBM (injection stretch blow molding). EBM is the oldest and least sophisticated of these processes. The following is a list of benefits and problems associated with ISBM and EBM produced bottles with a very limited discussion of the molding processes. A detailed discussion of bottle molding processes can be found at plasticstechnology.org.

Advantages & Disadvantages of EBM processing:

- The most cost effective process for large containers, i.e. 4L and larger.
- Capable of handling a wide variety of shapes, i.e. extreme dimensional rations (width to length or height), offset necks and molded-in handles.
- Tooling is relatively inexpensive.
- Poor control of neck dimensions.
- Variability in weight, material distribution, wall thickness.
- Trimming operation to remove flash can produce particulate.
- Frequent material built up at 'pinch' in the base of the container.
- Occasional material buildup at the junction of the neck and shoulder of bottles (see video).
- Inside of neck is ribbed, not smooth.

Left: ISBM bottle. Right: EBM bottle showing 'pinch.'

Advantages & Disadvantages of ISBM processing:

- Precision formed neck has smooth inside surface and requires no trimming.
- Maintains critical neck-finish dimensions for reliable sealing.
- Precise, repeatable bottle weight.
- Better distribution of plastic and more overall uniformity.
- Smooth glossy surfaces inside and out.
- Molecular orientation of polymer chains can significantly improve bottle impact strength, transparency, stiffness, and gas-barrier properties for resins such as PET and PP.

Accumulated plastic at neck often interferes with smooth pouring and complete drainage in EBM bottles

ISBM bottles, like the Purillex PFA shown here pour smoothly and drain completely.

Savillex Purillex™ fluoropolymer bottles are produced by a variation of the ISBM process in which a preform is injection molded and later blown to full size on a separate machine. The video illustrates pouring differences between Nalgene® EBM bottles and Purillex ISBM bottles. The uneven surface inside the Nalgene bottle reduces control of the pouring.

Large ISBM containers have become practical for biotech applications since quality considerations are often more critical than cost. PharmaTainer™ carboys bring ISBM advantages to biotech in sizes up to 20 liters.