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THE MARKET SHARE

PLASTIC CONTAINERS

AUTOMOTIVE ADDITIVES, OILS & LUBRICANTS

A Brief Case Study

by Stuart Feen, President and Melissa Thompson, Vice President
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"Not all chemicals are compatible with all type of plastics used in plastic bottles."

Packagers of automotive additives, specialty oils and a variety of lubricants know that it is not easy to successfully bring a product to the retail shelf. Extensive work must be done well before the products are packed into their various containers which, for the purposes of this discussion, are considered to be plastic bottles.

The first step in choosing the right plastic container should be testing for the chemical compatibility of the product or products to be packed in the chosen container or containers. Many type of chemicals, additive packages and oils are utilized to create an automotive additive, specialty oil or lubricant. Not all chemicals are compatible with all type of plastics used in plastic bottles. A number of chemicals are fairly aggressive in their reaction to various plastics used in plastic bottles. Aggressive chemicals such as xylene and tolulene are so strong they can distort and soften some plastics to the point where what was once a rigid plastic bottle is now a fairly flexible plastic bag. Automotive additives are currently packaged in a variety of resins and/or compounds. These include, but are not limited to HDPE, PVC, P.E.T., and BAREX. The actual material to be used in the plastic bottle must be determined by thorough and complete testing.

The most popular compatibility test is to put actual product into the intended plastic bottle, close tightly and place the test samples in a laboratory oven at 120 degrees F for 30 or 35 days. The bottles should be checked daily for any changes in gram weight, color of bottle, odor on outside of the bottle indicating migration, and any other characteristics which are deemed important and appropriate to the particular product and testing protocol used by the particular testing facility, which may be an in-house QC department or a professional testing laboratory. Many people believe that 30 or 35 days in the oven at 120 degrees F approximate 6 months on the store shelf. However, this is only an approximation and we caution all of our customers and prospects to carefully test for however long they feel is proper and necessary. A part of any testing procedure should also include drop tests, both bare bottles and bottles in the intended shipping carton. Also related to dropping of the bottles, we highly recommend that bottles should not be shipped by UPS or any other such form of single package delivery. If people do wish to ship by UPS or some other such delivery service, then they should seek the help of the particular delivery service in developing the proper shipping container. Filled product in plastic bottles is best shipped on pallets. We highly recommend to all of our customer that the shipper carton be designed to carry any and all required loads and protect the bottles from side loads and most especially top loads.

The responsibility for testing the product with container and for designing and testing shipper cartons rests solely with the purchaser of the bottles. We can offer a certain amount of help in all of the areas discussed above, but in the end it is the responsibility of the customer. No company should assume that their chemicals will be compatible with any plastic bottle, nor assume a product is compatible with a plastic bottle just because another company has a similar product on the shelf. Thorough testing, either a shelf test or an oven test, should be completed to assure long term shelf life of your product. C&C

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THE BLOW MOLDING PROCESS

by Stuart Feen

Blow molding dates back to at least 1890, when it was used to produce celluloid baby rattles. From that time forward, many companies have tried numerous means to produce blow molded parts in a variety of materials. The first polyethylene bottle was blown in December of 1942. The rest is history: the U.S. currently produces 30 to 40 billion plastic bottles per year, with the number constantly growing. For an excellent history of the plastics industry through 1972, those reading this article may wish to consult Plastics History U.S.A. by Harry Dubois, published by Cahners Books, Boston, Mass., ISBN 0-8436-1203-7.

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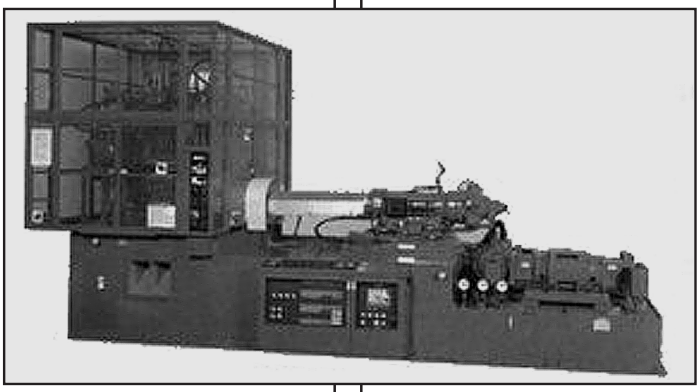
There are basically four types of blow molding used in the production of plastic bottles, jugs and jars. These four types are: extrusion blow molding, injection blow molding, stretch blow molding and reheat and blow molding. Extrusion blow molding is perhaps the simplest type of blow molding, whereby a hot tube of plastic material is dropped from an extruder and captured in a water cooled mold. Once the molds are closed, air is injected through the top or the neck of the container; just as if one were blowing up a balloon. When the hot plastic material is blown up and touches the walls of the mold the material "freezes" and the container now maintains its rigid shape. There are various types of shuttle, reciprocating and wheel style machines for the production of extrusion blown bottles. Shuttle or reciprocating type machines can be used for small, medium and high volume production with wheel machines being the most efficient for huge volume production of certain resins.



Injection blow molding is part injection molding and part blow molding. With injection blow molding, the hot plastic material is first injected into a cavity where it encircles the blow stem, which is used to create the neck and establish the gram weight. The injected material is then carried to the next station on the machine, where it is blown up into the finished container as in the extrusion blow molding process above.

Injection blow molding is generally suitable for smaller containers and absolutely no handleware. Extrusion blow molding allows for a wide variety of container shapes, sizes and neck openings, as well as the production of handleware. Extrusion blown containers can also have their gram weights adjusted through an extremely wide range, whereas injection blown containers usually have a set gram weight which cannot be changed unless a whole new set of blow stems are built. Extrusion blow molds are generally much less expensive than injection blow molds and can be produced in a much shorter period of time.

Many people have heard about stretch blow molding in conjunction with P.E.T. bottles commonly used for water, juice and a variety of other products. There are two processes for stretch blow molded P.E.T. containers. In one process, the machinery involved injection molds a preform, which is then transferred within the machine to another station where it is blown and then ejected from the machine. This type of machinery is generally called injection stretch blow molding (ISBM) and usually requires large runs to justify the very large expense for the injection molds to create the preform and then the blow molds to finish the blowing of the container. This process is used for extremely high volume (multi-million) runs of items such as wide mouth peanut butter jars, narrow mouth water bottles, liquor bottles etc.

Another stretch blow process is commonly called reheat and blow (RHB). In this process, a preform is injection molded by an outside vendor. There are a number of companies who produce these "stock" preforms on a commercial basis. Factories buy the preforms and put them into a relatively simple machine which reheats it so that it can be blown. The value of this process is primarily that the blowing company does not have to purchase the injection molding equipment to blow a particular container, so long as a preform is available from a stock preform manufacturer. This process also allows access to a large catalog of existing preforms. Therefore, the major expense is now for the blow molds, which are much less expensive than the injection molds required for preforms.

There are, however, some drawbacks to this process. If you are unable to find a stock preform which will blow the container you want, you must either purchase injection molds and have your own private mold preforms injection molded, or you will have to forego this process. For either type of stretch blow molding, handleware is not a possibility at this stage of development. The stretch blow molding process does offer the ability to produce fairly lightweight containers with very high impact resistance and, in some cases, superior chemical resistance.

Whether using the injection stretch blow molding process or the reheat and blow process, an important part of the process is the mechanical stretching of the preform during the molding process. The preform is stretched with a "stretch rod." This stretching helps to increase the impact

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resistance of the container and also helps to produce a very thin walled container.

The extrusion blow molding process allows for the production of bottles in a wide variety of materials, including but not limited to: HDPE, LDPE, PP, PVC, BAREX®, P.E.T., K Resin, P.E.T.G., and Polycarbonate. As noted above, a wide variety of shapes (including handleware), sizes and necks are available. Injection blow molding allows for the production of bottles in a variety of materials, including but not limited to: HDPE, LDPE, PP, PVC, BAREX®, P.E.T., and Polycarbonate.

Besides the P.E.T. noted above for stretch blow molding, a number of other materials have been stretch blown, including polypropylene. As time goes on and technology moves forward, more materials will lend themselves to stretch blow molding as their molecular structures are altered to suit this process.

The decision as to which process will be used is based upon the desired appearance (clear or not), whether chemical or impact resistant is desired, and the desired cost/benefit relationship. The ultimate choice of materials and processes is also based upon the cost of the tooling involved and the sizes of the production runs. Some materials lend themselves to certain types of decorating better than others and some to certain types of decorating to the exclusion of others.

Listed below are representative brands of some types of the machinery we have discussed above. This list is not all-inclusive and you will find additional brands by looking through this and other packaging industry journals and magazines.

For shuttle extrusion type machines Bekum, Battenfeld/Fischer, and Hayssen are probably the best known in the United States. For injection blow molding machines JOMAR is a well known brand. For stretch blow and reheat and blow type machines there are Sidel, Nissei and other machines produced by Johnson Controls and others. For wheel machines you might wish to contact Johnson Controls or Wilmington Machinery. C&C

Special thanks to Nissei for the photographs.