

# Container Light Weighting Programs from GEC

## REDUCED RESIN USAGE

The resin you purchase is your largest cost component.

Whether it is a new container that needs to be designed, or an existing container in need of light weighting, Graham has the right tools and the skilled people to make it happen.

## FASTER CYCLE TIMES

While making your containers lighter will reduce the resin you buy, in most cases you can also increase production rates.

Reduced wall thicknesses lead to faster cooling in the molds, and thus faster cycle times.

## REDUCED ENERGY REQUIREMENTS

Light weight containers require less resin to melt for each container. They also require less resin to cool for each container. And you make more bottles per hour of production. All of this can combine to result in significant energy savings. GEC can also assist you in energy audits – to show how you can reduce utility costs in your plant.

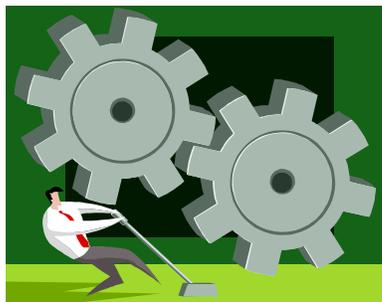
## Reducing Bottle Costs through Light Weighting Analysis and Development

**Graham Engineering** has been designing and processing containers of all shapes and sizes for over 40 years. During that time, we have learned a lot about how to design and process extrusion blow molded containers.

### Weight - Your Largest “Cost Lever”

When optimizing your production process, all possible efficiency gains should be considered. GEC can help you evaluate your use of labor, energy, lost production, and other drains on your efficiency.

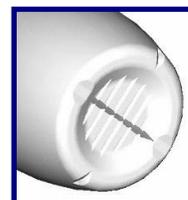
Typically, 70-80 percent of the cost to manufacture a container is in purchasing the resin. Reducing the amount of resin in each container is the biggest “cost lever” you have to pull. Let us help you pull the lever.



### Computer Aided Engineering

Graham Engineering utilizes a scientific approach to container light weighting.

The first step is to utilize Finite Element Analysis (FEA) to analyze the strength of the existing container. We look at the stresses and deflections of the container, using simulated loads to approximate the demands placed during filling, packing, or shipping. The results of this analysis are used to modify the design, in order to maximize strength while reducing stresses.



## Design

Know How

1203 Eden Road, Box 12003  
York, PA 17402-0673 USA  
1-717-505-4857 ph  
1-717-846-1931 fax  
[www.grahamengineering.com](http://www.grahamengineering.com)



GRAHAM ENGINEERING CORPORATION

## DESIGN OPTIMIZATION

If you have a need for a new container, we can work with you from concept to finished product. Our goal is to design aesthetic, functional containers at the lightest possible weight, while retaining a wide processing window.

## PROCESSING KNOW HOW

Knowing how to process a bottle is an important part of weight reduction. With Graham processing expertise, we will help ensure that your process is running efficiently. And by optimizing the parison programming, we can help you put the weight where it is needed – while reducing the thickness in other parts of your container.

## THE PAYOFF

Weight reductions of 8-12 percent are typically achieved when applying GEC expertise and analysis to existing container designs. In some cases, the savings are even more significant.



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## Proving Out the Concepts

Graham can then conduct a processing trial, using a unit cavity mold, to produce samples of the optimized bottle. A mold is produced, and then processed to produce samples at varying weights. These samples can then be passed through your production process, in order to verify the results of the FEA analysis.

Production mold sets are then procured to enable you to process your new container design.

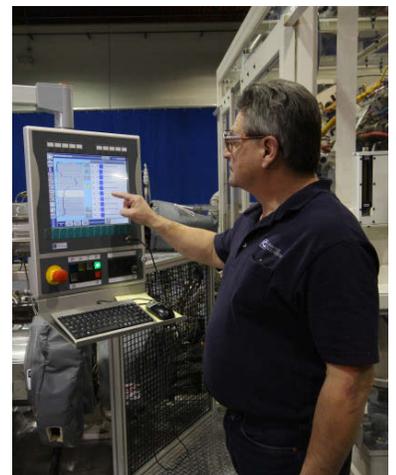
If you need a new production machine, Graham is also well-equipped to help you. We have the widest array of Extrusion Blow Molding (EBM) equipment in the business, including rotary wheel machines, shuttle machines, shot pot and reciprocating screw machines, and accumulator head machinery.

## Sustainability

Graham Engineering can help you optimize the amount of energy and plastic that you use, whether it is in making your bottle lighter or improving packing and shipping efficiencies.

Graham rotary wheel machines offer unsurpassed light weighting capability. With low conversion energy and high efficiencies, wheel machines are at the forefront in offering the industry's best manufacturing practices and material conservation. We can modify your wheel machines to incorporate Post Consumer Recycle (PCR) resin, either in a single layer, or as a middle, buried layer.

In many cases, the savings in resin, energy and labor can justify the cost of recapitalization. Graham stands ready to help you with this analysis.



## Processing Expertise

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