

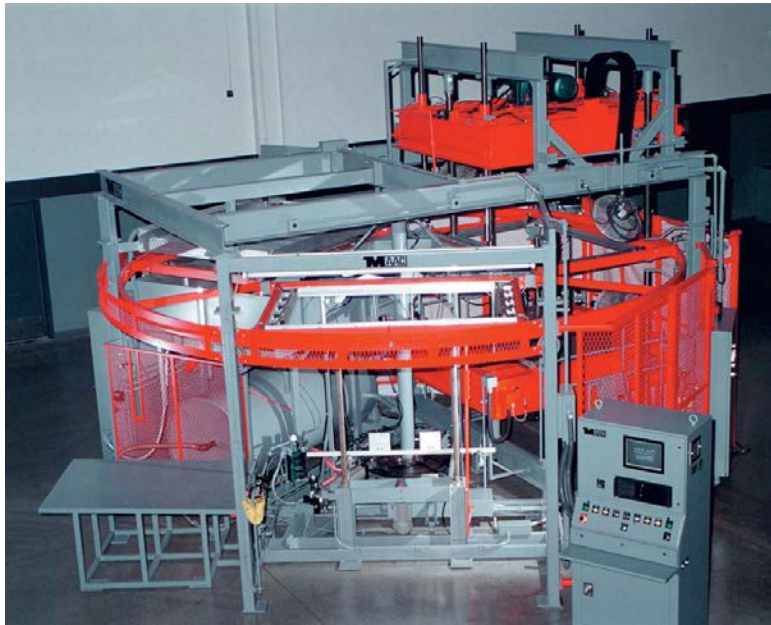
# THE ROTARY ADVANTAGE

— by Michael P. Alongi —

The Rotary Thermoforming Machine has seen constant improvements and continues to be the fastest standard sheet fed thermoforming machine manufactured in the country. As it continues to gain popularity, it is persistently being adapted to gain more and more advantages over other types of sheet fed thermoforming machines. The rotary is mainly utilized for mid to high volume production of parts, which is its single largest advantage. The latest rotaries offer many additional advantages that allow users to gain a competitive advantage, not only by having high production capabilities but much more. The additional benefits can be overlooked by companies not aware of them, whether they are utilizing a rotary or competing with one. The improved designs and technology implemented in the rotary have made it a much more versatile machine.

## More Parts Per Hour / Energy Savings

Rotaries guarantee more capacity and faster cycle times while utilizing less electrical consumption per part when compared to a single station or shuttle type machine. This is due to the fact that a rotary machine continuously has a sheet in the oven, as all stations are being utilized simultaneously. In a three station rotary, after unloading a finished part from station 1, the next sheet is loaded back into the station, meanwhile station 2 is being heated and station 3 is being formed. This allows the rotary machines to be capable of producing product with 1/3rd the amount of oven energy that a single station would require. While utilizing a rotary, the cycle time is either dictated by the heating time or cooling time, whichever is longer. The constant is 2.8 to 3 times the parts per hour output with oven electrical consumption equal to a single station. This makes the rotary machine more energy efficient. With faster cycles, less machine time is needed, allowing companies to spend fewer hours, use less energy per part and less labor while at the same time,



gain machine time and capacity.

## More Consistent and Repeatable

The Rotary machine can ensure high daily outputs regardless of the operator's influence. The machine's cycle time is not dictated by the time it takes the operator to load and align a sheet and unload a finished product like it is on a single station. The operator running a rotary is required to load and unload within the products cycle time, therefore allowing thermoformers to be more consistent with higher productions as well as more consistent with finished products.

Since a rotary cycles constantly, based on a pre-set cycle time, the atmosphere within the oven also remains very consistent. This oven consistency makes the rotary a favorable machine with some of the new applications and materials that require tight and repeatable temperatures, such as paint films. Since materials are becoming much more advanced, the oven consistency provides a more reliable oven, therefore making it much easier to hold tighter tolerances.

The finished part consistency of the rotary is beginning to force some of the lower volume applications to be utilized exclusively in this type of machine. Although most thermoformers utilize water-cooled aluminum molds when running a rotary machine, shorter runs with ceramic, resin, fiberglass or non water-cooled molds are still possible with a rotary. The limiting factor when using a non temperature controlled mold is overheating it. The machine can be slowed down to accommodate this type of situation, but cooling the tool will be the deciding factor on the cycle time.

Furthermore, the new rotaries are programmed to allow formers to use a skip frame technique, which will form a part every other cycle, allowing the mold additional time to cool. By not loading a sheet into station one; the machine will remember not to perform any function when that station

reaches the forming area. Although this may not be an ideal procedure, formers with high and low volumes can still adapt to their marketplace and utilize the consistency of a rotary. You can also simply slow down the rotary, or just apply the right amount of cooling to your tool, depending on your specific applications.

With the higher demand of lower volume rotary applications, machine manufacturers have quickly implemented features that allow machine changeover times to be drastically reduced. Three station rotaries can be changed over in less than 35 minutes with the use of adjustable clamp frames, mold centering and securing devices and the latest in machine controls. Preheated tooling is also becoming more common for even faster part to part changeover times.

Several advantages of recent model rotary machines are apparent with machines that have a high sheet line and lift table system for semi-automatic bottom loading and unloading of parts. Older rotary designs that have low sheet-lines and are top loaded manually do not provide as many advantages, nor do traditional single stations or shuttles that are toploaded.

## Safety

Safety is a primary benefit of the overhead design of a high sheet line machine with a semi-automatic loading device or lift table. This feature removes the possibility of placing hands into the clamp frame when loading and aligning sheets of plastic. It also reduces the risk of touching hot clamp frames and machine components that cycle through the oven. This design also greatly reduces the risk of personnel walking into the rotating carousel. As most thermoformers running single stations and top load machines know, burns, pinched fingers or any type of injury can get expensive.

The “no pit design” also eliminates the need for personnel to enter a pit for maintenance purposes, which helps to reduce the risk of an accident occurring. The “no pit design” allows for a quick and easy installation and gives the flexibility of moving the machine around your facility instead of being forced with a permanent machine location due to a platen pit requirement. The “no pit design” also tends to improve housekeeping of your facility.

## Floor Space

Floor space is a valuable item in today’s thermoforming facilities. Another reason the high sheet design is preferred, is it creates additional floor space for loading, unloading and trimming. With room for a skid of material (usually on the right side of the load/unload station), loading and unloading can be accomplished within the perimeter of the machine. The high sheet line design allows you to incorporate the vacuum reserve tank within the machine’s parameter, therefore eliminating the need for any additional floor space.

## Easier on the Operator

The ergonomic high sheet line design, coupled with the lift table, eliminates the need for an operator to bend over to load and unload material. With a stack of material to the right or left of the lift table, an operator can ergonomically



slide sheets onto the lift table instead of carrying or lifting sheets. Since the lift table also retrieves the formed part when the cycle is complete, the operator can also select what height he wishes to unload the part, once again making it easier on the operator.

A larger selection of machine operators can also be considered to operate these machines as they no longer need to have the 3-foot arm span that is typically needed to reach over the clamp frames to load any top load style of machine. Since lifting is kept to a minimum, the operator can also be less physically fit and still keep up with production.

Since the operator has less physical stress and can load much quicker, additional free time becomes available. This can allow operators to do better secondary operations or additional operations such as: quality assurance, trimming or even tweaking the machines parameters for more efficiency.

## Smaller Sheet Sizes and Lower Scrap Rates

Loading sheet is more precise by the use of a lift table and sheet guide system. Sheet material is easily positioned onto the lift table; adjustable stops are provided for repeatable positioning of sheet into the clamp frame. Sheets can be loaded much more accurately and repeatably, which nearly eliminates sheet “pullouts” or clamping of unaligned sheets, which are two major causes of increased scrap rates. On low sheet line, top load machines the operator is responsible for the continual alignment of loading sheets accurately, therefore allowing for more error or more scrap.

The precision lift table in conjunction with good clamp frames requires only the minimum blank size of material. By loading sheets more accurately and repeatably you can reduce the material blank size by 6% to 12%. With low sheet line, top load machines most formers oversize the starting dimensions of their sheet to accommodate the operator on loading and aligning of the sheet. They have found the larger sheet size reduces operator error and lowers scrap, but the bottom line is it still adds cost to use a larger sheet size.

The thermoforming manufacturing world is now being forced to use the most efficient procedures and equipment in order to maintain its competitive edge in today’s marketplace. Lower labor costs, lower material costs, lower energy costs, shortest changeover times and improved part-to-part

consistency are all the main reasons our marketplace is making changes and why the latest rotary technology is being further implemented and utilized.

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