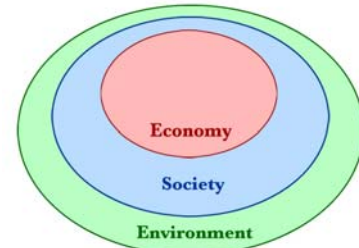


## Sustainability

The focus of this web posting is to introduce the Uniloy Aftermarket Sustainability Strategy. Sustainability is a concept that concerns all individuals as it has to do with the ability for a community to endure. Sustainability takes into account the quality of life for the individuals within a community whether that community is on a local, state, national, or global level. Sustainability focuses on three interrelated areas:

- Economic
- Social
- Environmental



These areas of focus must be viewed as connected and interdependent. The economy exists within the society and society exists within the environment. Understanding the links between the three areas is the key to understanding sustainability. Sustainability is about achieving a balance between the economic, social, and environmental pieces of a community. Uniloy's goal is to offer solutions to its customers which address problems with balanced consideration for economic, social, and environmental effects. These solutions are designed to provide you with the ability to:

- Stimulate Industry Growth and Profitability (Economic)
- Improve Machine Ergonomics (Social)
- Reduce Green House Gas Emissions (Environmental)

## Uniloy's Commitment to Sustainability

Uniloy is committed to being an industry leader in sustainability and is working hard to provide its customers with the latest technologies. One of the ways Uniloy can help its customers address the issue of sustainability is by showing them how to renew one of their most valuable assets - their existing Uniloy blow molding equipment!

The Uniloy Reciprocating Screw blow molding machine has earned its reputation as a durable, dependable workhorse in the plastics industry. Most machines built decades ago are still in production. Many of these machines are configured today just as they were when they left the Uniloy production floor years ago and that is where the Uniloy Aftermarket Group can help today.

The Uniloy Reciprocating Screw blow molder is not only one of your greatest assets but it is also one of the most renewable. Uniloy has the ability to upgrade your existing equipment which is a win, win, win when it comes to sustainability.



Uniloy Retrofit	Economy	Society	Environment
	Stimulate Growth and Profitability	Improve Machine Ergonomics	Reduce GHG Emissions
AC/VF Drive Packages	X		X
High Output Screws	X		X
Temperature Control Systems		X	X
ANSI Safeties		X	
Cycle Time Reduction Program	X		X
Reducing Petroleum Based Resin	X		X
Glycol Based Hydraulics		X	X

### Industry Growth and Profitability

Maximizing your profitability is a genuine concern and Uniloy is committed to providing its customers with the ability to attain this goal by optimizing productivity of the Uniloy equipment in your plant. One of the many ways Uniloy can assist in productivity optimization is by providing you with the necessary retrofits to minimize your machine cycle times. The Uniloy Aftermarket Cycle Time Reduction Program is a service offered by Uniloy by which we can identify limitations in your machines current configuration and offer solutions that will provide:

- Faster Cycle Times
- Increased Productivity
- Improved Profitability

The solutions include machine upgrades and retrofits which are focused on the six basic machine cycle time events. Those cycle time events and their respective upgrades are listed below:

Cycle Time Events	Controlling Factor	Retrofits
Plastic Melt Delivery	Extruder Drive Size and Screw Design	ACVF Drives & Screws
Parison Drop Time	Hydraulic System Capacity	30HP Hydraulic Systems
Clamp Close and Open	Hydraulic System Capacity	30HP Hydraulic Systems
Blow and Exhaust Time	Air System Capacity	High Flow Air System
Mold Cooling	Cooling Water Delivery	Water Delivery Enhancements
Trimmer Speed	Trimmer Design Limitations and Index	Drive and Index Improvements

For more information on the Cycle Time Reduction Program, check out the posting on the website. For more information or a quotation on any of the retrofits listed above, contact your Uniloy sales representative.



## Machine Ergonomics

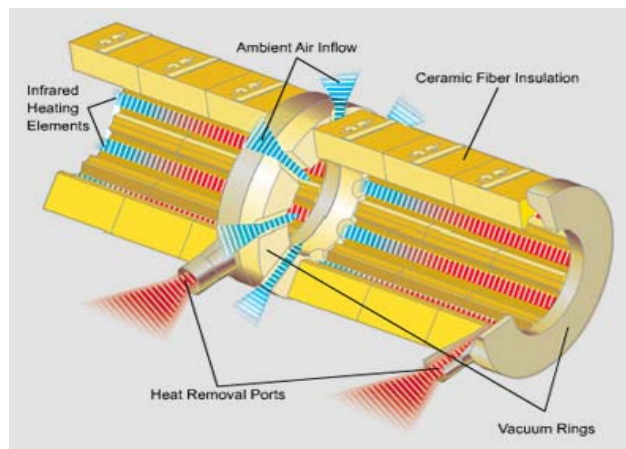
Retrofits available for the purpose of improving the ergonomics of a machine include:

- Uniloy Temperature Control System
- ANSI Safety Retrofits
- Glycol Based Hydraulics

## Uniloy Temperature Control System

The Uniloy Temperature Control System (TCS) offers significant energy savings which leads to reduced carbon dioxide production. The TCS also offers benefits to operators and maintenance personnel around the machine. The TCS is constructed using an extremely insulative ceramic fiber material which eliminates the majority of the radiated heat loss typically encountered with cast aluminum heaters and sheet metal shrouds. What this means to the operator is a lower room temperature around the machine.

This system is also an energy saver. Energy savings and the resultant reduction in green house gas emission are discussed in the green house gas emissions section of this posting. There is also a complete description of this system in the web posting titled [Uniloy TCS Barrel Heating & Cooling System](#).



***Uniloy Temperature Control System***

## **ANSI Safety Retrofits**

Uniloy offers a complete matrix of safety upgrades for all models of Reciprocating Screw blow molders. These upgrades follow the current ANSI safety standards for design and operation of blow molding equipment. Available retrofits include:

- Clamp Safety Doors and Guarding
- Hydraulic Safeties
- Electrical Interlocks and Photo Eyes
- Extruder and Drive Guards
- Trimmer Guarding and Interlocks
- Cooling Bed Clutch and Guards

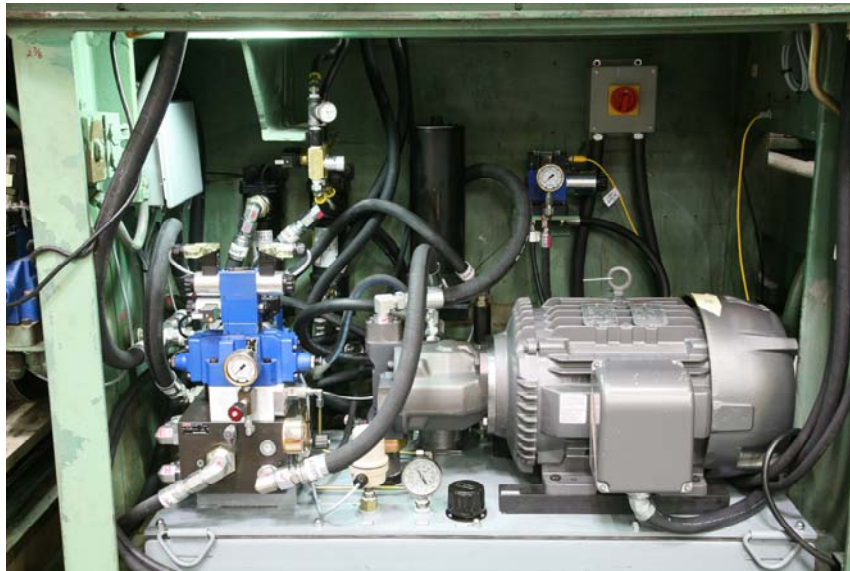


***Clamp Safety Doors***

For a complete list and to schedule a machine audit, contract your Uniloy sales representative.

## **Glycol Based Hydraulics**

New hydraulic systems are currently under development and will be available shortly for most Reciprocating machines which are designed to operate with glycol based hydraulic fluid. This type of fluid is non-petroleum based and is fire retardant. This feature enhances the safety of the machine for production and maintenance personnel alike. The glycol based fluid also reduces the machines carbon foot print. The fluid is nontoxic and biodegradable.



***Uniloy 30HP Hydraulic System***

### **Green House Gas Emissions**

Green House gas emissions are largely a function of energy consumption. On average, 1 kilowatt-hour of electricity purchased in the United States generates about 1.5 pounds of carbon dioxide. The energy consumed by a Reciprocating Screw blow molder is done so by the machines motors and heaters.

### **Variable Frequency Drives**

A Recip and its downstream equipment typically include the following drive motors:

- Extruder Drive
- Trimmer Drive
- Cooling Bed Drive

Uniloy can supply Variable Frequency Drive (VFD) Retrofits for all three of these motors. A VFD retrofit provides higher efficiency in terms of energy usage compared to older eddy current and DC drive units.



***Variable Frequency Drive Retrofit***





## High Output Screw

The energy consumed by the extruder drive motor is a function of speed and load which is dependent on the rate plastic resin is being processed. Uniloy offers a full menu of state of the art high efficiency extruder screws which are capable of producing plastic resin at lower extruder speeds compared to general purpose screws.

The following Table offers a comparison between a new High Output Screw, a new General Purpose Screw, and a worn General Purpose Screw. The wear is assumed to be at least .008" on the outside diameter of the screw and the inside diameter of the barrel combined. The Table compares the energy in KW/yr used by all three screws producing 400 to 600 lbs/hr assuming 6000 hrs/yr run time. The Table also shows the energy saved by the High Output Screw and the lbs/yr of Co2 eliminated!

THRUPUT LBS/HR	ENERGY USAGE			ENERGY SAVINGS KWH/YR		CO2 REDUCTION LBS/YR	
	WORN GP KWH/YR	NEW GP KWH/YR	NEW HO KWH/YR	WORN GP Vs NEW GP	WORN GP Vs NEW HO	WORN GP Vs NEW GP	WORN GP Vs NEW HO
400	304,820	259,097	199,036	45,723	105,784	68,585	158,676
500	360,083	306,070	248,795	54,013	111,288	81,020	166,932
600	432,099	367,284	282,969	64,815	149,130	97,223	223,695

To put this in perspective, 1 acre of trees remove 5180 lbs of Co2 from the atmosphere per year so by replacing a worn out screw in a machine running 6000 hrs/yr producing 600 lbs/hr of plastic, we would be doing the job that it takes over 43 acres of trees to do in a year!



***Uniloy Extruder Screw***



## Uniloy Temperature Control System

The heaters on a Uniloy Recip are located on the extruder barrel, in the die block, and on the feed throats and dies. The extruder barrel heaters are normally made of cast aluminum and are sized at about 9KW per zone. The Uniloy TCS described in our June 2011 web posting offers a solution which lowers the barrel heater wattage to 7KW per zone. This is possible due to the insulative properties of the heater and the elimination of the heaters own thermal mass. A typical Recip machine producing 600 lbs/hr, running 6000 hrs/yr can save 11,531 KWH of electrical energy used by barrel heaters by replacing the old liquid cooled heaters with the new Uniloy TCS. This equates to 17,296 lbs of Co2 eliminated!



***Uniloy Temperature Control System***



## Reducing Petroleum Based Resins

### **Reduction by Substitution**

One possibility for reducing the amount of petroleum based HDPE in plastic resins is to use a calcium carbonate additive to replace a percentage of the HDPE. Calcium carbonate can be used to replace up to 4% of the HDPE by weight. A six head machine producing dairy gallon bottles at a 7 second cycle time will use over 3.5 million lbs of HDPE in a year running 6000 hours/year. By replacing 4% of the polyethylene with calcium carbonate, 141,000 lbs of polyethylene would be saved. The production of polyethylene generates .049 lbs of Co2 for every pound HDPE produced. Using the 4% calcium carbonate substitute in the example above would eliminate 6,909 lbs of Co2 from the environment! Calcium carbonate offers the following benefits:

- Improved Cooling Characteristics
- Improved Dimensional Stability of Product
- Improved Stress Crack Resistance
- Reduction in HDPE By Weight

Uniloy offers barrels and screws designed for use with calcium carbonate additives. These screws and barrels are available for all Uniloy Reciprocating Screw blow mold machines. The correct barrels for this application have an X-800 liner and the correct screws are designed with Colmonoy 83 on the flights.

### **Reduction by Light-weighting**

A second possibility for reducing the amount of polyethylene used in production is by light weighting the product. This can be accomplished by using:

- Parison Programming
- Ovalized Head Tooling

Parison programming is comprised of a hydraulic cylinder and proportional valve which move the mandrel in a vertical direction in relation to the die creating a desired die gap profile. The profile is a series of mandrel positions which produces a varying parison thickness during each shot. The profile is normally set up to produce a heavy wall thickness in the neck and bottom of the container for strength, and a thinner wall thickness in the body. The proportional valve and cylinder are controlled by a programmable controller. If your machine does not currently have parison programming, contact your Uniloy sales representative for more information and a quote to suit your individual needs.

Ovalized head tooling is another way to redistribute resin in an extruded parison. Uniloy's uniquely designed tooling provides a thicker walled parison in weaker areas of the container and a thinner walled parison in stronger areas. This is accomplished by redirecting the flow of plastic using the geometry of the die and mandrel. The optimized parison wall distribution allows for running a lighter weight container with the same top load strength as a heavier container run on standard round tooling. For example, in a typical dairy gallon application, containers being run at 62 grams using standard round tooling can be reduced in weight to 58 grams using Uniloy Tri-Ovalized tooling. This represents a 6.4% reduction. Running lighter weight product saves you big dollars in resin cost and also reduces the Co2 in the atmosphere by lowering the demand for polyethylene. A six head machine running dairy gallons 6,000 hours a year would use 163,266 lbs less polyethylene, eliminating 8,000 lbs of Co2 from the environment!

### **Evaluate Your Machines**

Sustainability is an issue that concerns everyone. The retrofits and upgrades described in this web posting can all help in the effort to move toward your "earth friendly" goals. As a review of the presented material use the following check list to see how your Uniloy machines measure up.



Machine Serial No.	ECONOMIC	SOCIAL	ENVIRONMENT		
RETROFITS	Growth and Profitability	Machine Ergonomics	Green House Gas Emissions	ON MACHINE	ORDER NOW
<b>Temperature Control System</b>		X	X		
<b>ANSI Safety Retrofits</b>					
Clamp Safety Doors and Guarding		X			
Hydraulic Safeties		X			
Electrical Interlocks and Photo Eyes		X			
Extruder and Drive Guards		X			
<b>Cycle Time Reduction Program</b>					
AC/VF Drive Package	X		X		
High Output Screw	X		X		
30HP Hydraulic System	X		X		
High Flow Air System	X		X		
Water Delivery Enhancements	X		X		
Trimmer Drive and Index Improvements	X		X		
<b>Reducing Petroleum Based Resin</b>					
Calcium Carbonate	X		X		
Parison Programming	X		X		
Ovalized Tooling	X		X		
<b>Glycol Based Hydraulics</b>		X	X		

Using this check list for all of your Uniloy Reciprocating blow mold machines should provide you with a clear picture of the potential sustainability improvement available to you right now. If there are retrofits on this list that you have not yet applied to your machines, call your Uniloy sales representative today for a quote and start the process of becoming more sustainable. Your local, state, national, and global communities will thank you!

