

PROCESSING/CYCLE TIME REDUCTION PROGRAM

The focus of this web posting is to introduce the Uniloy Aftermarket Cycle Time Reduction Program. This service includes a complete machine survey by one of our Uniloy Aftermarket sales personnel and subsequent mathematical analysis to determine your machines capability and what it will take to achieve it. Uniloy will identify limitations in the machines current configuration and offer solutions that will provide:

- **Faster Cycle Times**
- **Increased Productivity**
- **Improved Profitability**

Typical machine cycle time limiters include:

- **Insufficient Plastic Throughput**
- **Low Hydraulic System Capacity**
- **Pneumatic System Limitations**
- **Insufficient Mold Cooling**
- **Trimmer Speed and Index Limits**

Uniloy is proud to be the sole provider of the **complete** solution to your Reciprocating Screw Blow Molding needs. As the OEM, Uniloy has the technical expertise to analyze your situation, recognize the current limitations, and recommend the solutions which meet your machinery performance expectations.

Reciprocating Screw Machine Cycle

The Recip machine cycle is built up of several individual events which must take place to process plastic resin into a quality product. Each event has its own variables and limitations, which must be optimized to achieve the quickest machine cycle time possible. The primary components of a machine cycle and the factors that control those components are displayed below:

| <u>Machine Event</u> | | <u>Controlling Factor</u> |
|-----------------------|---|--------------------------------------|
| Plastic Melt Delivery | → | Extruder Drive Size and Screw Design |
| Parison Drop Time | → | Hydraulic System Capacity |
| Clamp Close and Open | → | Hydraulic System Capacity |
| Blow and Exhaust Time | → | Air System Capacity |
| Mold Cooling | → | Cooling Water Delivery |
| Trimmer Speed | → | Trimmer Design Limitations and Index |

Plastic Melt Delivery (Extruder Drive Size and Screw Design)

The machines ability to process plastic depends on:

- **Extruder Drive Horsepower**
- **Extruder Screw Design**
- **Barrel and Screw Wear**
- **Screw Speed (rpm)**

If your Uniloy Recip is Extruder limited, Uniloy has the solution. Uniloy aftermarket offers replacement parts and extruder drive upgrades including:

- **High Output Screws**
- **Replacement Barrels**
- **Variable Frequency Drives**
- **Extended Shot Conversions**



Variable Frequency Drive

Contact your Uniloy sales representative for specific machine evaluations and pricing on upgrades which suit your needs.

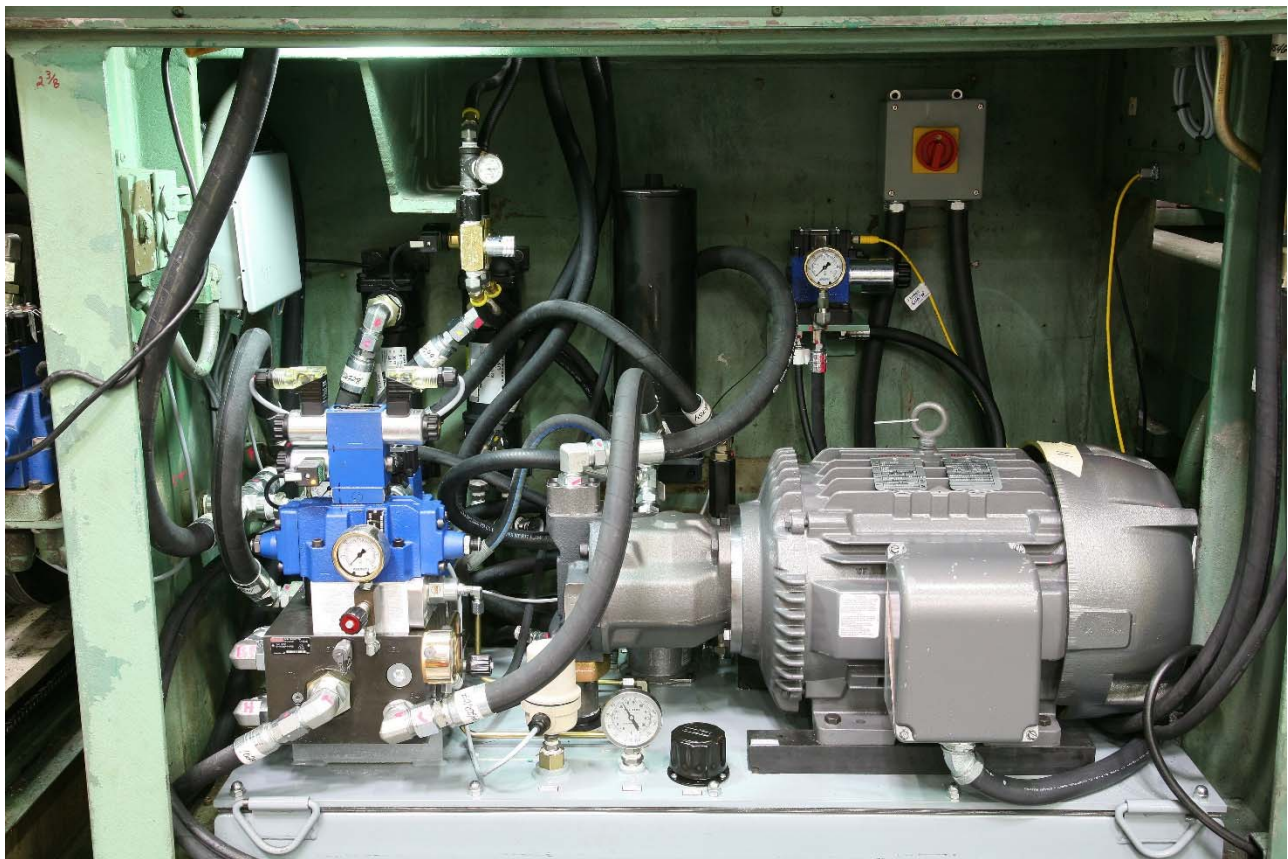
Plastic Drop Time and Clamp Speed (Hydraulic Capacity)

The shot cylinder and clamp rotary actuators are hydraulically powered. A machine that is hydraulically limited will run out of reserve oil and demonstrate:

- **Slow Shot Speed**
- **Sluggish Clamp Movement**
- **Limited Machine Cycle Time**

Uniloy has developed hydraulic system upgrades for most Recip models. These state of the art power unit upgrades increase hydraulic capacity allowing for faster cycle times. Uniloy Hydraulic upgrades include:

- **Dual 10HP to Single 30HP Pump and Motor Conversions**
- **Single 10HP to Single 30HP Pump and Motor Conversions**
- **Complete 30HP, 33GPM Hydraulic System Upgrades**



30HP 33GPM Power Unit

Contact your Uniloy sales representative for specific machine evaluations and pricing on upgrades which suit your needs.

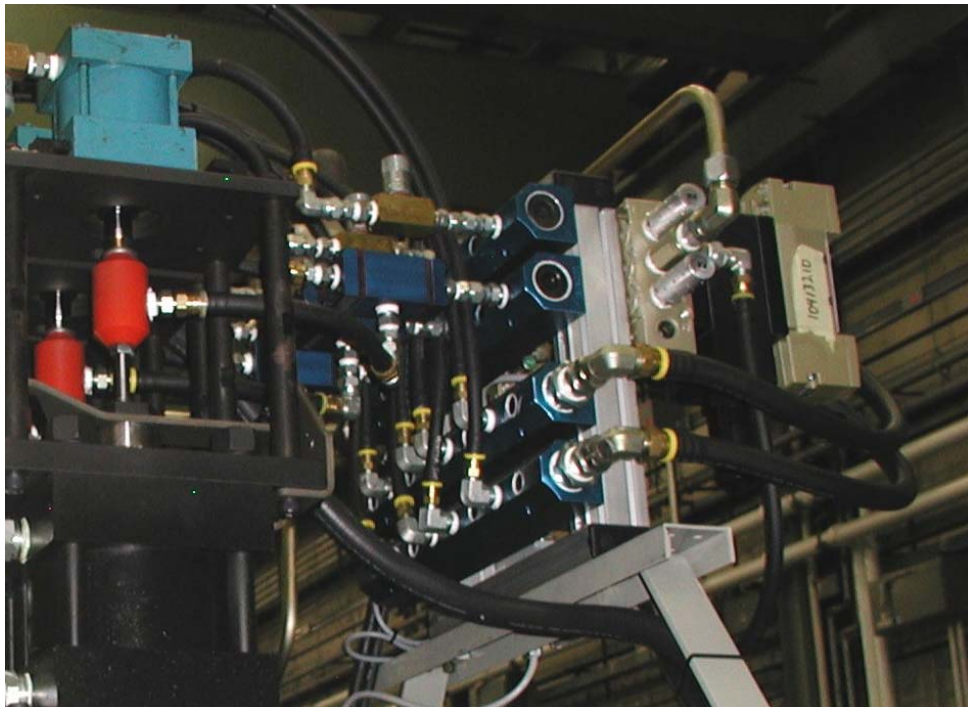
Blow and Exhaust Time (Air System Capacity)

At the core of the blow molding process, the machine air system provides the pressurized air to inflate the blow molded articles and the ability to evacuate them before the clamp can be opened and the parts removed. An air system with limited capacity will possess:

- **Air Flow Restriction**
- **Extended Blow Time**
- **Limited Set Time**
- **Extended Exhaust Time**
- **Limited Machine Cycle Time**

Uniloy has developed a state of the art two pressure air system with improved flow. This High Flow Air System features:

- **1/2" Hose and Fittings to the Blow Stems**
- **Improved Flow Air Adaptors**
- **1/2" Poppet Style Shuttle Valves**
- **Quick Flow Aluminum Manifolds**



High Flow Air Assembly

The new High Flow Air System can be fitted to any Uniloy Recip. Contact your Uniloy sales representative for specific machine evaluations and pricing on upgrades which suit your needs.

Mold Cooling (Cooling Water Delivery)

As blow molded containers are produced, heat from the extruded and blown parison is transferred to the aluminum molds mounted in the machines clamp. Cooling water is supplied to each mold through a network of piping and hose for the purpose of removing that heat. Machines with insufficient chilled water supply will often be cycle time limited because of the poor bottle quality at faster cycle rates. Insufficient cooling causes:

- **Increased Finished Bottle Temperatures**
- **Increased Shrinkage**
- **Increased Neck Ovalization**
- **Poor Finished Part Quality**
- **Limited Machine Cycle Time**

The mold cooling water delivery system can often be improved by:

- **Increasing Hose and Fitting Sizes**
- **Increasing Mold and Platen Port Sizes**
- **Increasing Return Water Manifold Port Sizes**
- **Booster Pump Installation**

Improvements to the mold water supply system can be customized to fit most Uniloy Recips. Contact your Uniloy sales representative for specific machine evaluations and pricing on upgrades which suit your needs.

Trimmer Speed (Trimmer Design Limitations and Index)

The trimmer's ability to deflash the number of container being produced per minute can be a limiting factor depending on the style of trimmer. The typical impact trimmer can only run between 30 and 35 rpm, which means 1.7 to 2 sec per index. A trimmer set up with a single trim station would limit a Recip machine producing 4 containers per cycle to no better than a 6.8 second cycle, and a 6 head machine would be limited to no better than 10.2 seconds, allowing minimal trimmer load time.

Uniloy has the ability to provide a number of solutions to improve the trimmer capacity limitation. Most impact trimmers can be upgraded to dual index, double trim arrangements. Uniloy also offers higher speed trimmers. Possible trimmer productivity solutions include:

- **Single to Dual Trim Conversions**
- **Variable Frequency Drive Upgrades**
- **Rotary Trimmer Solutions**



Dual Index Impact Trimmer and VF Drive

Customized Quotes to Suit Your Specific Needs

The Cycle Time Reduction Program is a service which is designed to pinpoint production limitations and identify specific solutions for your Reciprocating Screw Machine. This service accounts for each machines unique configuration and results in a customized quote including only the enhancements required to fulfill your production requirements.

Contact your Uniloy sales Representative for more information about the program or to request a machine audit and quote.