

## Tuthill Process Pumps Products Marketing Report Report Positive Displacement Pumps for Polyurethane Foam Applications

### Introduction

The aim of this Marketing White Paper is to familiarize users within the Polyurethane Foam Industry with the Products of Tuthill Pump Group Tuthill has manufactured Gear Pumps for many years and the company's products are installed around the world with applications across many industries

A visit to our home on the web at [www.tuthill.com](http://www.tuthill.com) will demonstrate, along with this article how we at Tuthill and yourselves can create a partnership, whatever your companies size, location or requirement



Corporate Headquarters Burr Ridge Illinois



Manufacturing Alsip Chicago Illinois

### Company History

The year was 1892, and Chicago builders needed a vast supply of construction materials to fuel the city's rapid expansion. A smart young businessman named James B Tuthill recognised a good opportunity when he saw one and purchased a quarry and kiln and began supplying Chicago common bricks to local builders

An entrepreneur at heart, Tuthill searched for an efficient way to lift the clay from the quarry floor and deliver the companies bricks to the construction sites. Enquiries turned up a new idea, a steam powered truck. However the design proved unworkable, but Tuthill salvaged the engines only good feature, a small internal gear pump which injected fuel directly into the trucks boiler.

Tuthill refined the pump design and marketed it to the producers of boilers. The Tuthill internal gear pump was widely accepted, proved itself successful and thus became the foundation for the Tuthill Corporation.

To concentrate on growing this business Tuthill Pump Group was established in 1927. Pumps that trace their design directly back to the original model are still produced in quantity today and can be found in every corner of the globe.

### Manufacturing

Tuthill's modern manufacturing systems follow the Toyota principles along with "Lean Manufacturing" techniques. The main facility is in Alsip, Chicago, Illinois in the USA. Our European manufacturing centre is at Ilkeston, Derbyshire, England there are also offices in South America, mainland Europe, China and Australia. From all of these locations we supply a global network of distributors.



Manufacturing Ilkeston Derbyshire England

## Polyols

Tuthill Pump Group manufactures several types of Gear Pump. The pump best suited to Polyol is the Globalgear. It has been successfully used for the following applications:

- Tanker loading and offloading
- Tank Farm Transfer
- Charging
- Metering
- Additives

Tuthill can transfer Polyols at up to 2000 Litres per minute with the Globalgear GG550, and at only 500 RPM. Globalgear can handle viscosities of up to 220,000 Cst, and pressures of 13.8 Bar.

If Polyols are used containing abrasive fillers such as Melamine or Calcium Carbonate then the pump can be hardened using a plasma nitriding process we call "Tutriding". This along with reducing the speed of the pump considerably extends the life of the units.

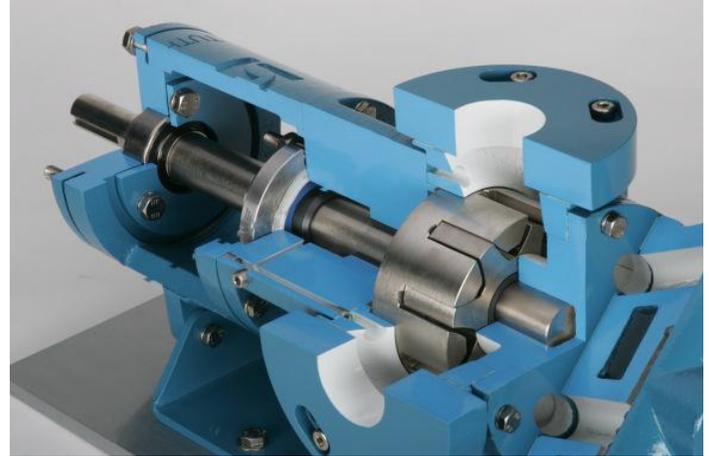
Polyol Pumps for all these applications are usually sealed using packed glands, the design of the seal chamber in the Globalgear allows any type of seal to be used giving you the best sealing solution for your application, including seals for abrasive duties.

The Globalgear Pump has a unique Modular design which allows you to have both 180 or 90 degree ports. You can also have the choice of NPT/BSP threaded ports, Ansi or Din flanged ports, or a combination of both. This gives you full control of design for new installations.

Globalgear pumps can replace almost 100% of the models of other designs physically as well as in performance

The Globalgear pump also has oversized bearings and shafts which allows pump speeds higher than most models already available in the market. The shaft deflection ratings allow sealing technologies not available to other designs.

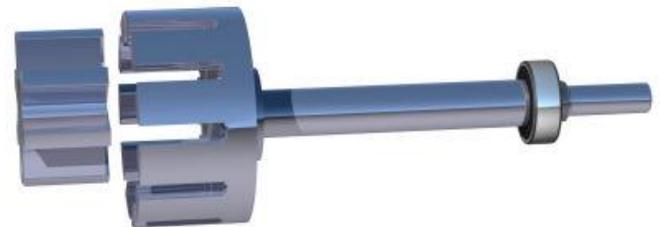
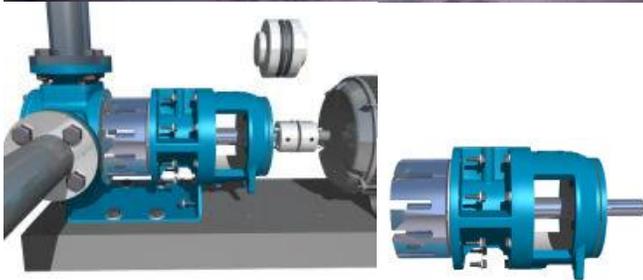
The pump also features a back pullout design which if used with extended couplings allows you to remove the complete rotating assembly without the need to disturb the Piping, flanges or the Drive, thus gaining valuable downtime compared to other designs. This feature also allows inline maintenance of the seals.



Cutaway of Globalgear Pump



Tanker Offload Installation

 **GLOBAL GEAR™**  
by TUTHILL PUMP GROUP

## Isocyanates

Isocyanates can be pumped using several Tuthill Pump Group products and we have many successful foam pumping installations around the world.

The pumping of Isocyanates such as TDI and MDI attracts regulations from most countries regarding their handling, however to meet these standards a Globalgear unit can be used in conjunction with a double seal, or inboard seal with a lip seal and flushing bottle arrangement.

The 6000 series magnetically coupled unit was first introduced by Tuthill in 1990. Its patented design giving many features of great benefit to the industry. The flow of fluid cools the magnet area and also ensures any air in the product is sent down the outlet pipework, thus stopping crystallisation of the fluid which can be harmful to the pump. This occurs almost immediately as all air is purged from the pump.

The 6100 pumps can handle pressures of up to 500 Psi, and flows of up to 26.5 Litres per minute. Usually close coupled to motors and controlled via invertors with encoders. The pumps have a smooth non- pulsating flow.

The 6200 pumps have a pressure rating of 100 Psi, with flows of up to 318 Litres per minute. Viscosities up to 22,000 Cst are handled just as easily as 3 Cps. Ports are in and out from the top with again NPT/BSP standard.

New to the range is the MD, this incorporates the reliability of the 6000 design with the modularity and flexibility of the Globalgear pump. This is surely one of the most unique magnetic drive pumps in the market place today.

There are 8 models in the range from the MD015 to the MD130, capable of differential pressures of 200 Psi with maximum flows of up to 492 Litres per minute. Viscosity is again up to 22,000 Cst.

Once again these pumps can be gear motor driven or direct drive from 4 or 6 pole drives.

This range of units for pumping Isocyanates is both reliable and inventive, giving you more choices.

For example, if you have another design of pump and wish to make it magnetic drive you can't, you would have to purchase another pump and change pipework. With MD you can replace almost 100 percent of traditionally sealed gear pumps with a magnetic drive without changing pipework. Thus giving you a solution to any scenario you might find.

A feature of all of these pumps is leak detection, sensor ports, secondary containment and dry run protection.

All of these features surely make the Tuthill range a must for new or replacement requirements.



6100



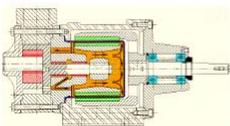
6200 cutaway



6200



MD



Flow path



Magnet assembly

## Additives

Many additives are required in today's foam industry, the requirement is however still the same. To pump these fluids safely and accurately. The Globalgear and Magnetic drive process pumps can be used for additives, however transfer rates are usually much smaller than for Polyol or Isocyanates. For these applications Tuthill has another range of pumps manufactured in Alsip, IL.

The Concorde range of magnetic drive units are very flexible and reliable, indeed finding themselves in such applications as dialysis machines. Products usually called additives are such as, Water, Silicone, Tin, Amine, Methylene Chloride, fire retardants and various colours or pigments.

These pumps can handle all of these fluids, the pump we suggest is the "D" series in 316 stainless steel with PTFE o-rings. This material choice covers all of the additives chemically.

The "D" series performance has a very wide range

Flow: 4-458 Litres per hour

Differential pressure: up to 250 Psi

Ports: 1/8 or 1/4 NPT

Speeds: up to 5000 Rpm

Service life 20,000 hours

Relief valve: fitted as standard no cost option, simply screw in to bypass

Viscosity, 0.3 Cps to 2000Cps, however up to 50,000 Cps can be achieved

Accuracy of up to 0.25% or better is achieved

"T" series pump specifications are as above but with flows of up to 1575 Litres per hour and 3/8" NPT ports

Units can driven by AC or DC Motors, invertors are available

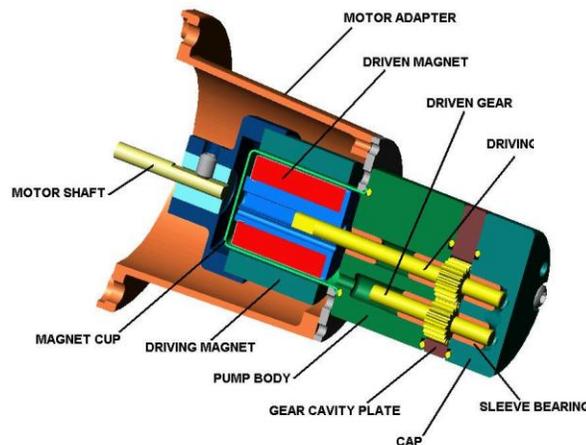
All Pumps can be panel mounted or on Baseplates



**D SERIES**



**T SERIES**



## Tanker Loading and Offloading

The Globalgear, MD, and 6000 Series pumps have been used successfully in these type of applications for a number of years. Top offloading is becoming more common especially in Isocyanates, the pumps can easily handle this.

The pumps can be fitted with dry run protectors to stop the drive if the pump runs dry during offload.

## Tank Farm Transfer

Once again, there are pumps in transfer applications around the globe. The pumps modular design again allowing you the flexibility to position the pump in the best suited position for your pipe work scheme. Very large flows can be handled when required.

## Charging

Charge pumps are usually fitted under a tank to feed a high pressure pump that in turn feeds the dispensing head. We have good experience supplying this type of pump into the industry. Again the large choice of connections we offer is a feature that is very helpful. The relief valve if fitted can be set to return to the tank not just relieve within the pump. Usually these types of systems have a set of valves and a relief valve set to do this, if you utilize the return to tank feature this means less valves and a more economical installation. Isocyanates of course can be handled by all the pumps in the range, with mechanically sealed pumps or magnetic drive, depending on the local regulations in place. Charge pumps are usually operating at 2 to 3 bar.

## Metering

The Globalgear pump is an excellent choice for metering, the pump can again be driven by a geared motor to give you the speed you require. Many applications require an encoder to be fitted to the unit. Please ask your Tuthill provider who will fit any encoder you specify. Metering units also usually have a pipe spool on each side with pressure gauges fitted. The pump actually has tapped connections on the inlet and discharge side of the body for pressure gauges or other devices to be fitted. Again, the modular body can take many variations on port angles, directions and flange combinations as standard. Seal variants allow you to use this range of pumps for all metering applications. For additive metering on low flows we have the Concord range. This pump can be seen on our additives section.

### Acknowledgement:

The photographs on this page are courtesy of: Eurospuma, Espinhio, Portugal and Beamech Limited of Manchester England



PUMP MODEL	FLOW 500RPM L/MIN	FLOW 400 RPM L/MIN
GG015	16	13
GG030	33	26
GG050	64	51
GG070	87	70
GG080	100	80
GG090	119	95
GG120	200	158
GG130	249	198
GG200	408	323

**Typical example**

**Globalgear Pumps for Polyol**

**Viscosity 1000 Centipoise**

**Specific gravity 1.05**

**Discharge pressure 10 Bar**

**Full details available on request**

PUMP MODEL	FLOW 1420 RPM L/MIN	FLOW 960 RPM L/MIN
6113	4.41	2.68
6114	7.29	4.27
6115	13.20	7.79
6202	10.70	6.26
6203	18.30	
6204		27.90
6205	109.00	49.80
6206	158.00	77.20

**Typical example**

**6000 Series for Isocyanates**

**Viscosity 3 Centipoise**

**Specific gravity 1.22**

**Discharge pressure 6 Bar**

**Full details available on request**

PUMP MODEL	FLOW 1420 RPM L/MIN	FLOW 960 RPM L/MIN
MD015	45	30
MD030	90	61
MD050	179	121
MD070	251	170
MD080	287	194
MD090	322	218
MD120	NIL	363
MD130	NIL	472

**Typical example**

**MD Series for Isocyanates**

**Viscosity 3 Centipoise**

**Specific gravity 1.22**

**Discharge pressure 6 Bar**

**Full details available on request**

PUMP MODEL	FLOW 2800 RPM L/MIN	FLOW 1420 RPM L/MIN	FLOW 960 RPM L/MIN
D.11	0.25	0.10	0.05
D.19	0.45	0.21	0.12
D.23	0.57	0.26	0.15
D.38	0.95	0.44	0.25
D.57	1.43	0.68	0.42
D.68	1.72	0.82	0.50
D.80	2.00	0.97	0.61
D.99	2.50	1.20	0.75
D1.2	3.00	1.48	0.92
D1.3	3.30	1.61	1.00
D1.6	4.10	2.00	1.30
D2.0	5.10	2.50	1.60
D2.3	5.90	2.86	1.85

**Based on water at**

**Ambient temperature**