

Dispensing Machines for Silicones

The automation of the dispensing of a silicone material can provide the end user with a number of technical and cost based advantages over hand mixing and dispensing methods. Control is the main advantage; of the mixing ratio, the size and volume of the shot and where it is applied. This improved control leads to savings in wastage of material, fewer rejected parts, increased output and overall higher product quality. Reductions in production times and the number of operators required to do the job also make for good economics.

Correct choice of machine can only be made after a thorough evaluation of the material, application and production methods. CHT is very well placed to ensure that the best machine is chosen for a particular application due to our in depth knowledge of silicone materials together with the dispensing equipment.



Factors Affecting Machine Choice

As already stated there are three deciding factors that come together and the key elements are listed below:-

Material

- ▶ 1 or 2 Part
- ▶ Cure type
- ▶ Viscosity or ability to flow
- ▶ Filler content & type
- ▶ Speed of cure
- ▶ Mix ratio
- ▶ Packaging
- ▶ Density or SG

Application

- ▶ Volume of material
- ▶ Single or multi shot
- ▶ Applying bead or filling
- ▶ Flow rate required
- ▶ Is degassing required

Production

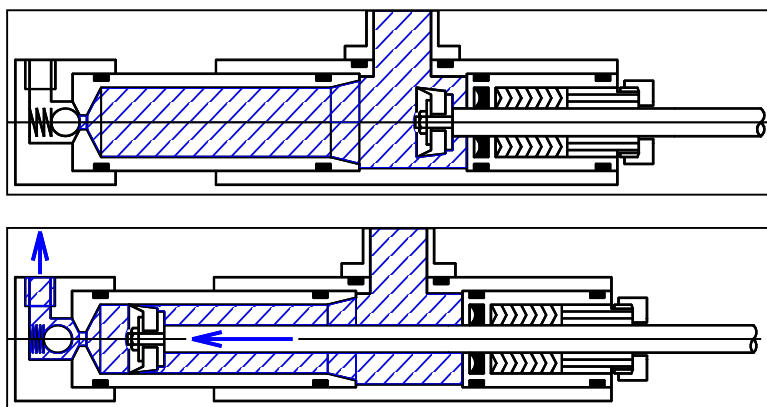
- ▶ Number of parts per hour
- ▶ Is vacuum required?
- ▶ Integrated with robot or XY
- ▶ Manual operation or automated
- ▶ Production space/area
- ▶ In line or off line
- ▶ Pneumatic or electric drive

Before a machine is supplied it is prudent to first test the material through the machine in a test environment to confirm the recommendation. CHT together with the machine manufacturers have built up a small database of tested CHT silicone materials to improve the selection process, reduce time and eliminate costly mistakes.

Machine Types

Piston Pumps

Piston pumps or positive displacement pumps offer a simple and often cost effective method to dispense silicones. The action of the piston forces material out in one direction and as it pulls back, a non-return valve closes and allows a vacuum to build. This vacuum will draw fresh material into the pump ready for the next shot. Carefully balanced mix ratios can be maintained by using pistons of differing sizes.

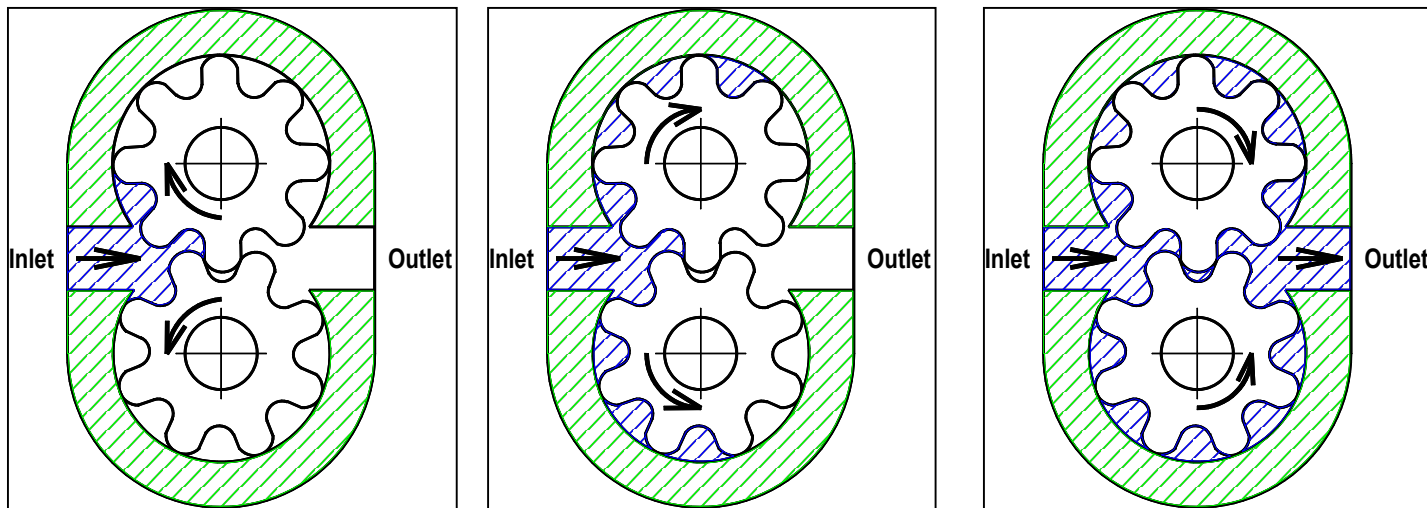


They offer the following benefits:

- Ideal for precise metered shot applications
- Adaptable for use in hazardous or “zoned” areas.
(i.e. can be totally pneumatically operated)
- Higher potential pressures can be created
- Higher viscosity handling capability
- More suitable for abrasive materials

Gear Pumps

Gear pump technology is utilised to provide a precise constant output of mixed material. As the name suggests they utilise two gears machined to very tight tolerances, as they turn material is drawn in and through the gears, matching two different size gears will enable accurate mixing of two part systems.



They can be used to put down long beads of adhesive or dispense encapsulation and moulding materials. Gear pumps are better suited to low viscosity materials they do not cause excessive wear on metal parts. If a metered shot is required, this can be done using a timer.

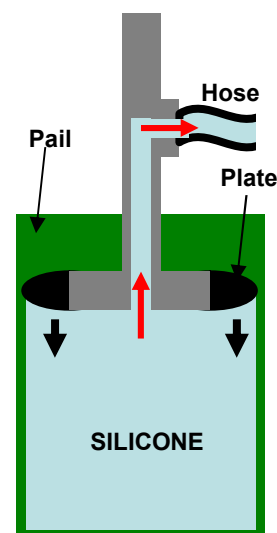
They offer the following benefits:

- ▶ Constant material flow rate.
- ▶ Less moving/wearing parts.
- ▶ Low retained capacity/volume in pump.
- ▶ Low air entrapment
- ▶ Relatively compact in size.
- ▶ Rotary rear seal for longevity.
- ▶ Electrically driven.
- ▶ Longer material hose length capability.

Pail Presses

Used primarily to dispense high viscosity liquids or paste materials. Material must be supplied in a suitable straight sided container usually 20kg or 200kg's. A follower plate of the correct diameter is lowered into the top of the container (inside the plastic liner) and hydraulically forced down, as it moves down the material is pressed out through an opening in the follower plate which is connected to a hose. An airtight seal is provided around the edge of the follower plate via a rubber seal attached to the plate.

This process is ideal for dispensing 1-part silicones and 2-part silicones can be mixed using two pail presses moving at different rates to provide the correct mix ratio.

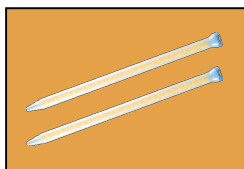


Mixing Heads

Mixing of two part materials is normally carried out just prior dispensing in order to avoid the need for excessive purging and cleaning of pipe work and hoses. The type of mixers used will in the main depend upon the rheology of the material. Wherever possible we recommend the use of static mixers as these are low cost and disposable. Some slightly more difficult materials may require the use of a rotary static mixer although the gun will be more expensive the mixers are still disposable. The final choice of using a dynamic mixing head is by far the most expensive and will require regular purging and cleaning to avoid cure of material in the head.

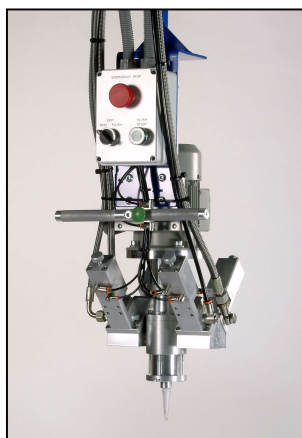
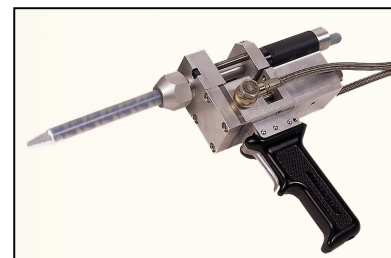
Static Mixers

- ▶ Disposable mixer
- ▶ Low shear
- ▶ Cost effective
- ▶ Low maintenance
- ▶ Low ratios (i.e. 1:1 to 15:1 ratio)



Rotary Static Mixers

- ▶ Disposable mixer
- ▶ Medium shear
- ▶ Cost effective
- ▶ Low maintenance
- ▶ Low to medium ratios (i.e. 5:1 to 25:1 ratio)



Dynamic Mixing Heads

- ▶ Non-disposable mixer
- ▶ High shear
- ▶ Higher flow rates
- ▶ Requires solvent flushing
- ▶ Medium to high ratios (i.e. Greater than 15:1 ratio)

Ancillary Products

The choice of additional standard options may be necessary due to the nature of the material being used or by the individual application, in other cases they may be chosen to simply to meet specific customer requirements. Standard available options include:

Auto-Bulk feed

Enables automatic replenishing of reservoirs by gravity or pumped feed

Level sensing

High-level sensors will give a visual & audible alarm if bulk feed supply runs out.
Low-level sensors give visual and audible alarm when reservoirs run low

Stirring

Prevents filler fallout and maintains constant S.G

Vacuum

For encapsulating electronic components within a Vacuum Chamber

Hardened parts	Normally required when processing heavily filled materials (thermally conductive) Includes hardened gear pumps, pump tubes/piston rods & mixer valve spools
Anti-Gel timer	To dispense a shot to “purge” the mixer.
Shot counter / repeater	To dispense several pre-set metered shots into the component
Dispensing valves	Variety of valves available to control and meter the flow of material

Product/Machine Recommendations

Product Code	Description	Recommended Machines	Required Options
QGels	1:1 Low Viscosity Silicone Gels		
QSil 216	1:1 Clear Addition Silicone		
QSil 550	1:1 Addition Encapsulant		
QSil 553	1:1 Thermally Conductive Encapsulant		
QSil 12	10:1 Clear Condensation Silicone		
SE2003	1:1 Thermally Conductive Encapsulant		
SE 2005	10:1 Condensation Encapsulant		
SE 2008	1:1 Thermally Conductive Encapsulant		
AS2500	10:1 Fast Cure RTV Adhesive		