



***Wet Concrete Pumps, Mixers &  
Shotcrete Equipment***

**REED – Established in 1957**

**An Independent Member of the Shea Family of Companies – Est 1881**

**J.F. Shea Co.**



# J.F. Shea Co.

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Est. 1881



Hoover Dam Project – 1930's

# J.F. Shea Co.

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**Est. 1881**



**Golden Gate Bridge Project – 1930's**

# Shea Homes

*Caring since 1881*



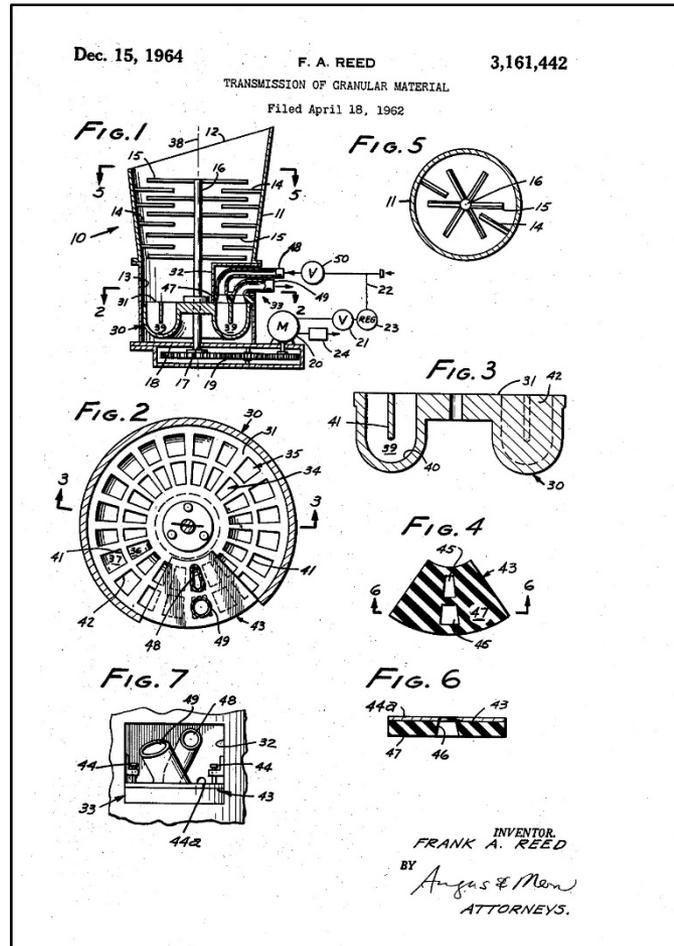
**Shea Homes is now the largest privately-held homebuilder in the United States**

# **REED** *Guncrete*®



***REED*** was founded in 1957 by Frank Reed, inventor of the bowl-type Guniting Machine.

# Bowl-Type Guniting Machine – 1964 Patent





**Shea Construction used Mr. Reed's machines in the 1960's for their tunnel projects. Shea purchased *REED* in 1970.**



***REED* continues to Manufacture the Best  
Dry-Mix Gunite Machines made in the world today.**

# J.F. Shea Co.

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Est. 1881



**Heavy Construction— 1930's to present day**

# Number 7 Proposed Alignment



**10<sup>th</sup> Avenue  
Station**

**34<sup>th</sup> Street  
Station**



Metropolitan Transportation Authority

# Reed Pumpcrete™

CONCRETE PUMPS



SMALL LINE CONCRETE PUMPS  
DESIGNED FOR PROFITABLE PUMPING

**REED** began manufacturing trailer mounted concrete pumps in the 1980's

Today – **REED** manufactures a wide variety of pumping equipment (diesel, electric, truck mount, track mount, chemical dosing units) **ANYTHING** the customer wants, we can do it!)



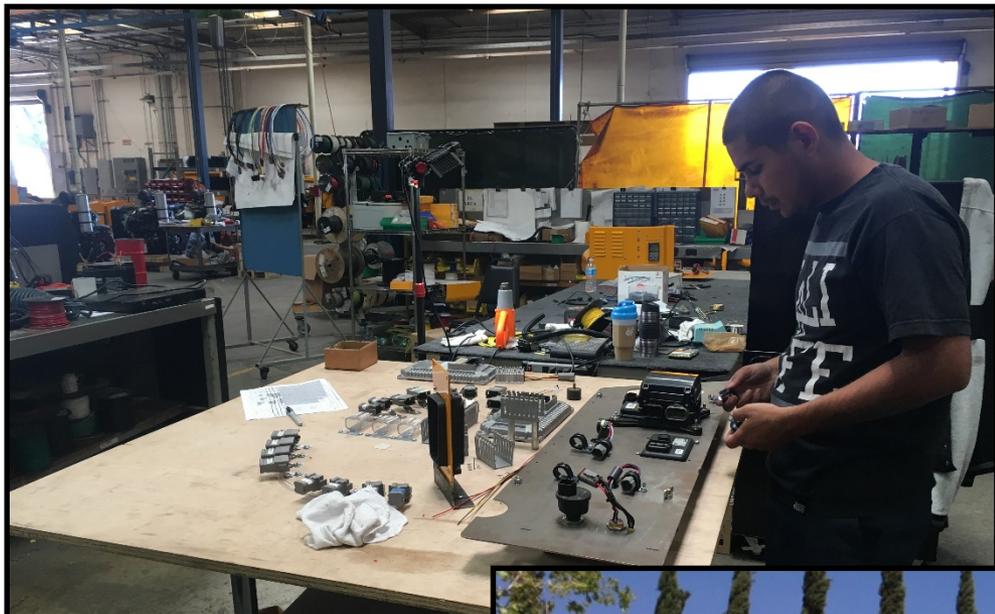
Today, REED is a self-contained manufacturer of over 16 models of trailer mounted pumps and mixers (and counting...)



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REED is Official Liebherr Boom Pump Dealer in Western U.S.





***REED* has earned a reputation for outstanding customer service.**

# ***Shotcrete Equipment***

## **Common Applications**

**Shotcrete is quickly replacing many traditional construction methods**



**Shotcrete can be placed in inaccessible and irregular places**





# Spraying Walls



# Underground Parking Garages are made with shotcrete



**Shotcrete used to take a railroad track under the ground so traffic can pass above**



# Cutting into the hillside to create more land





New land can be created by cutting into a hillside using tiebacks for support



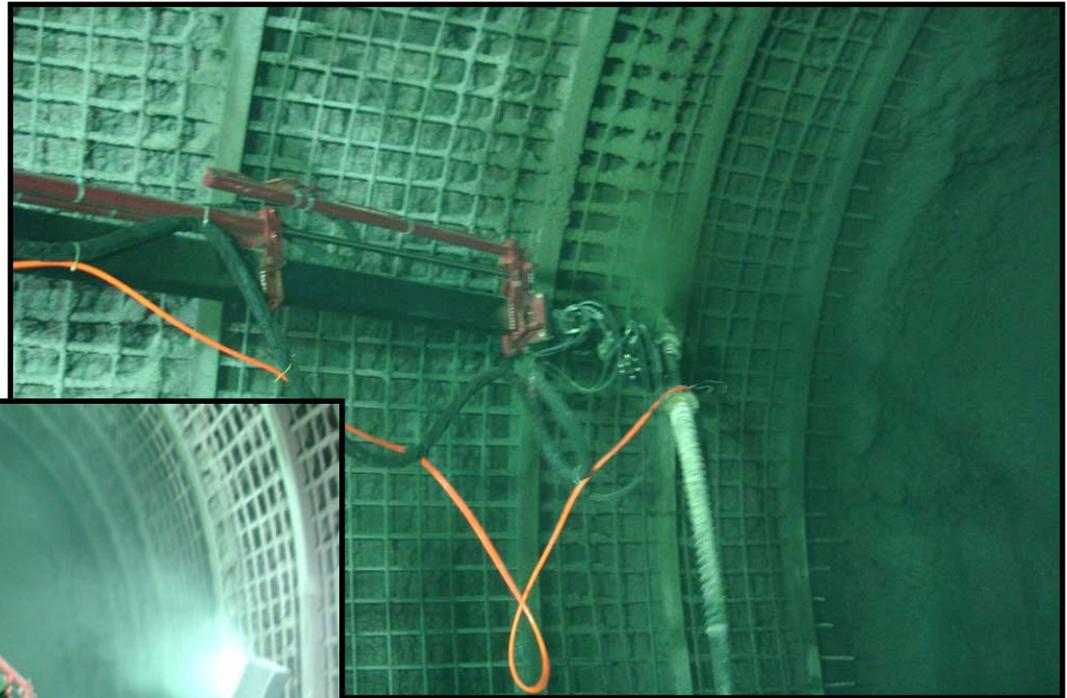
# Giant concrete domes used as containers are made with shotcrete



**Shotcrete is used at large water parks and amusement parks**



**Shotcrete is used for tunnel lining and mine support**



Small gunite machines sometimes use pre-bagged material for concrete repair projects.



**Shotcrete is used to repair old concrete buildings, brick walls, sea walls, bridges, and foundations.**



## Large dam projects use shotcrete



**Shotcrete is used to spray wet and dry refractory materials**



# Spraying Refractory Material – Either Wet and Dry **REED**



# Refractory Spraying

**REED**



***Two Different Types of  
Equipment for  
Shotcrete***

## 2 Different Shotcrete Methods



**Dry-Process Shotcrete**  
(also called "Guniting")

**Guniting Machine**



**Wet-Process Shotcrete**  
(simply called "Shotcrete")

**Concrete Pump**

**Question: Which equipment is better for shotcrete – a dry-mix guniting machine or a concrete pump?**



**Dry-Process Shotcrete  
(also called “Gunite”)**

**Gunite Machine**



**Wet-Process Shotcrete  
(just called “Shotcrete”)**

**Concrete Pump**

**Answer: Sometimes dry is best.  
Sometimes wet is best. It depends on  
many different factors at each job.**

Bags of dry repair material can be broken directly into a small gunite machine.



Dry Mix “Bulk Bags” or “Totes” are often used



A “Pan Mixer” is sometimes used to mix special materials, such as low cement refractory material.

**REED**





Shotcrete Pumps have a higher “theoretical” volume of application rate than Guniting Machines.

But, even the strongest nozzlemen can only lift a heavy 2” hose filled with wet concrete to spray 7 to 22 cubic yards per hour

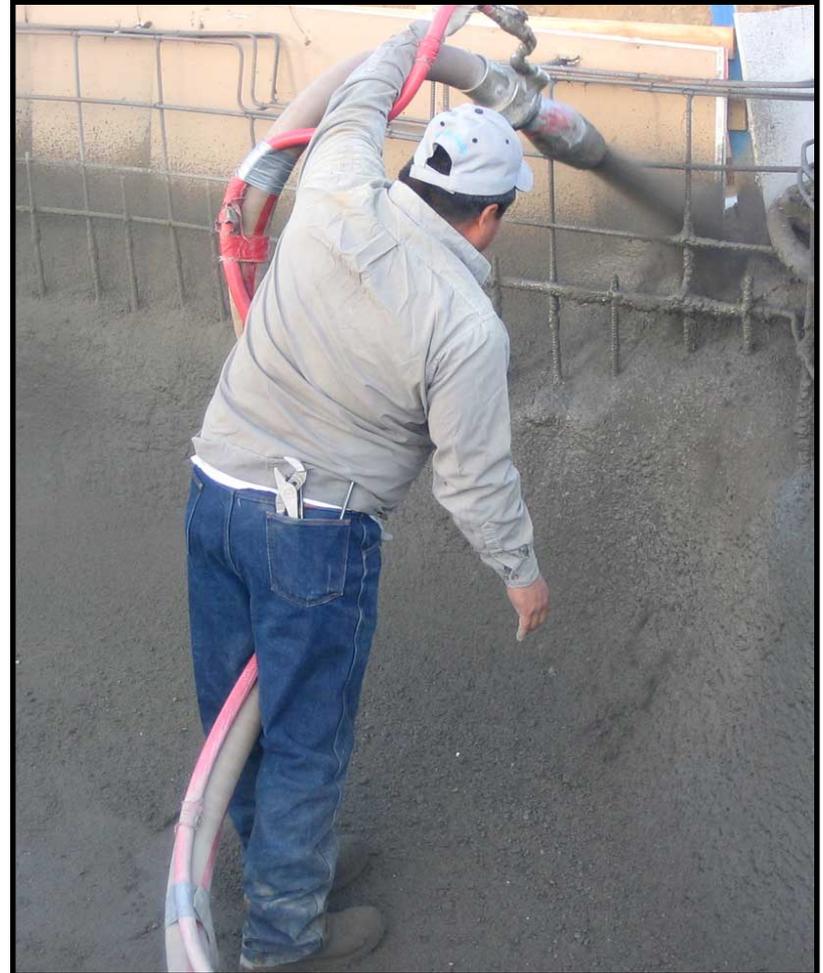
If faster application rates are required, a very powerful and large shotcrete pump with two nozzlemen spraying two 2” nozzles at the same time or a robotic arm that can lift a 3” diameter hose is required. (for 35-50 cubic yards per hour).



# Refractory Guniting vs Wet Shotcrete Output Rates

- 1 ton/tote = 2000 lbs
- **REED Guniting Machines** can spray 1-2 pallets (64-128 bags) of 55 lb refractory per hour (between **3,520 lbs – 7,040 lbs per hour**)
- (LOVA model has higher capacity, but almost doubles the air requirement – 375 cfm SOVA, 600 cfm LOVA)
- REED Wet Shotcrete Pumps have a much higher THEORETICAL output rate than Guniting Machines (plus the resulting refractory product is of higher quality, AND less rebound and dust).
- REED M2200 Pan Mixer mixing time - one 2000 lb bag of 180 pounds per cubic foot (180 PCF) material in 2.5 minutes (in reality 3.5 minutes from mixer door open to mixer close) – so  $60/3.5=17$ , so the **B20HP Wet Pump is spraying 17 tons/hr (34,000 lbs per hour)** which is easily within the capabilities of the REED B20/B20HP flatpack ( $188.888/27=7$  yards per hour output (pump rated at 20 yds/hr)

**One benefit of the dry process is that the nozzleman does not get as tired/fatigued** as with the wet process. With wet mix shotcrete, the concrete in the hoses is already wet. With dry, dry material floats in the hoses to the nozzle where water is added.



Cost for the shotcrete machine, hoses, and nozzle is much higher for wet shotcrete. But, dry required a much larger air compressor which can be expensive.



**\$50,000 to \$125,000**



**\$11,000 to \$16,000**

**\* For contractors who have access to a large air compressor, the gunite machine is a very inexpensive and useful accessory.**

With Guniting, some concrete will bounce off the wall. This is considered waste material. It should not re-sprayed. This wasted material rate is one disadvantage of the dry process compared to wet. (rebound)



But, with Guniting, workers can start and stop at any time because the material is dry. With wet shotcrete, the ready-mix concrete is wet in the hoses and needs to be sprayed and can get very messy.

Of course, the wet process is not as dusty as with the dry...and with refractory materials, the wet process gives a better product



# ***REED M2200 Pan Mixer***

## **Technical Summary**



# ***REED* M2200 with P50 50hp Electric/Hydraulic PowerPack**



# M2200 Refractory Mixer - Output Rates

- **REED M2200 Pan Mixer mixing time - one 2000 lb bag of 180 pounds per cubic foot (180 PCF) material in 2.5 minutes (in reality 3.5 minutes from mixer door open to mixer close)**
- **60/3.5=17, so the B20HP Wet Pump is spraying 17 tons/hr (34,000 lbs per hour) which is easily within the capabilities of the REED B20/B20HP flatpack ( $188.888/27= 7$  yards per hour output (pump rated at 20 yds/hr)**







# ***REED* B20HP-PP**



# B20HP-PP (B20HP with “Power Pack” to power the M2200 Mixer)



B20HP with a much smaller (and less expensive) optional hydraulic lift mixer attachment



# B20X - Mixes and Dumps



3 yards per hour of concrete max mixing speed –  
less than half of the M2200 Pan Mixer



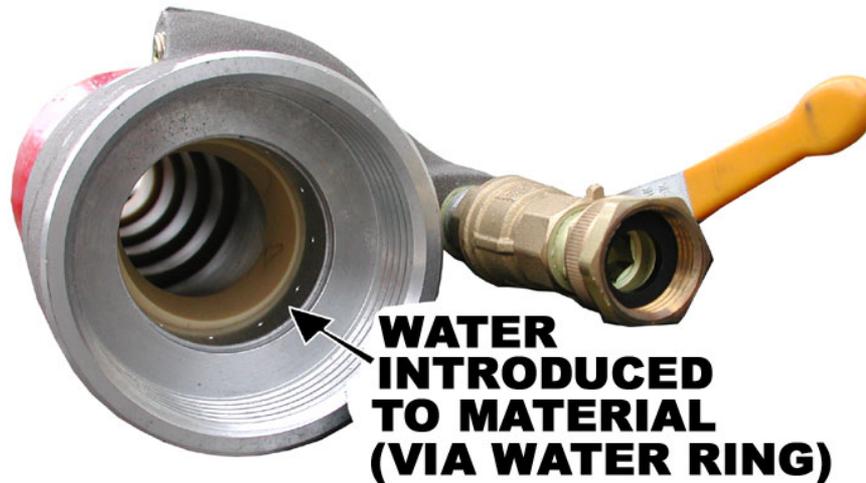
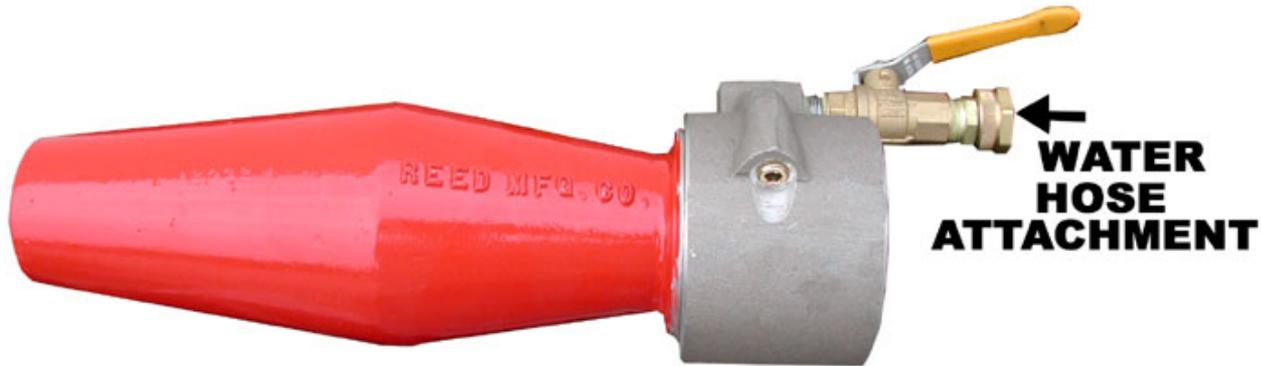
# ***Gunite Machine***

## **Technical Summary**



# Gunite Nozzle

Dry material floats through the hoses all the way to the nozzle. Water is added at the nozzle to hydrate the material.



# Cutaway view of bowl-type gunite machine.

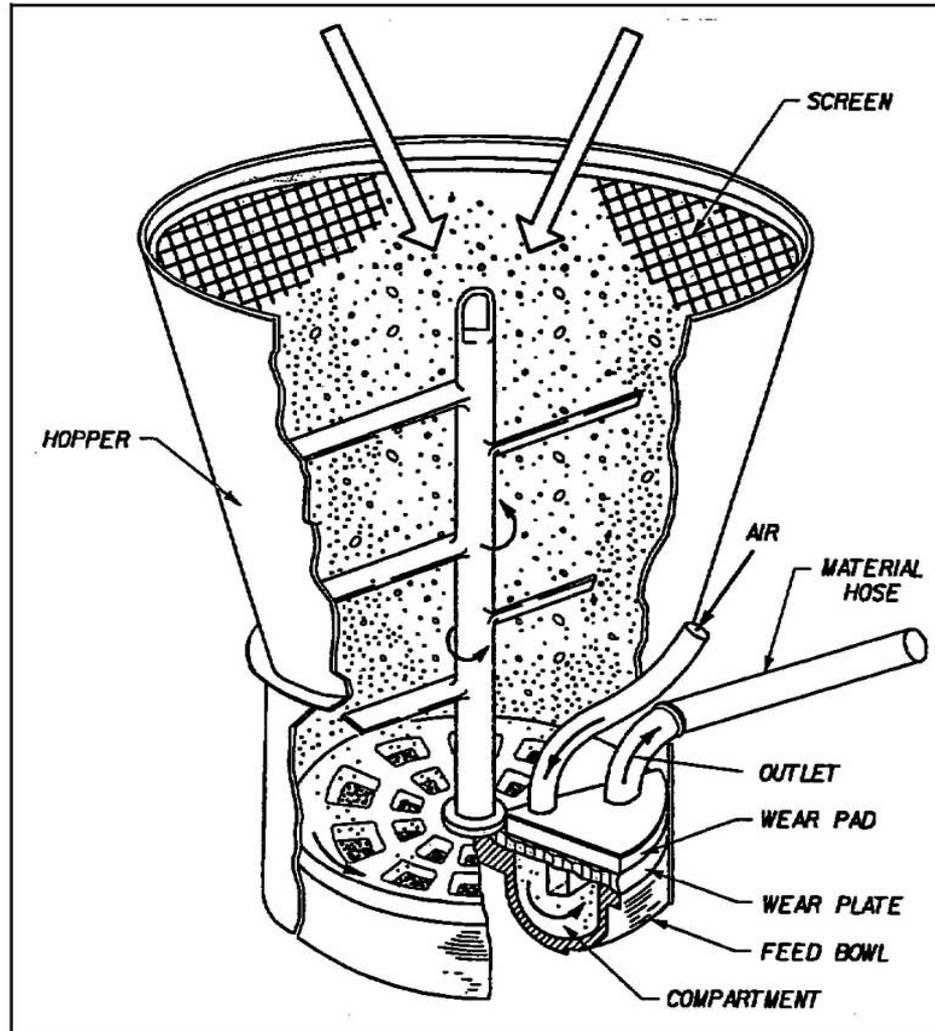
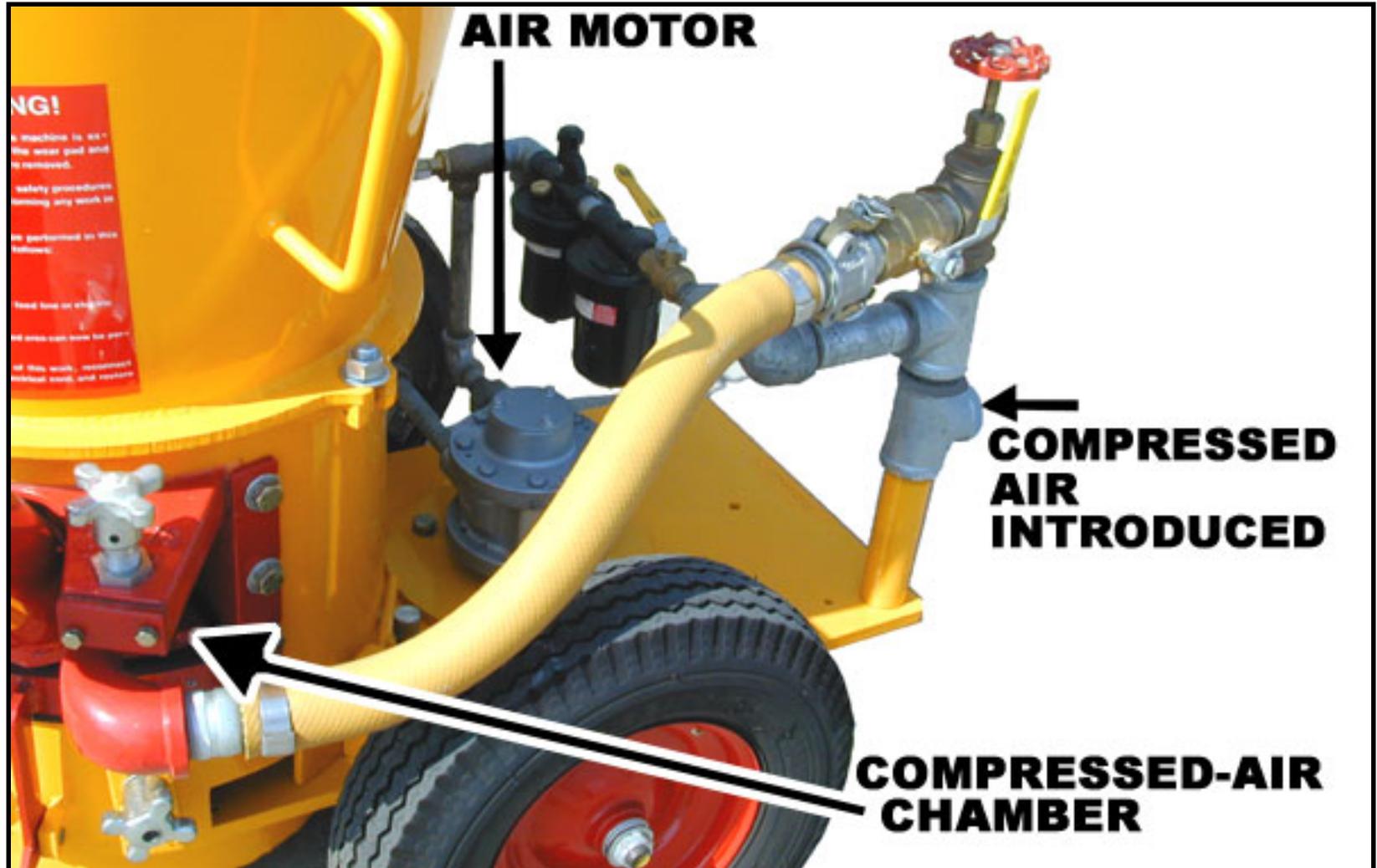
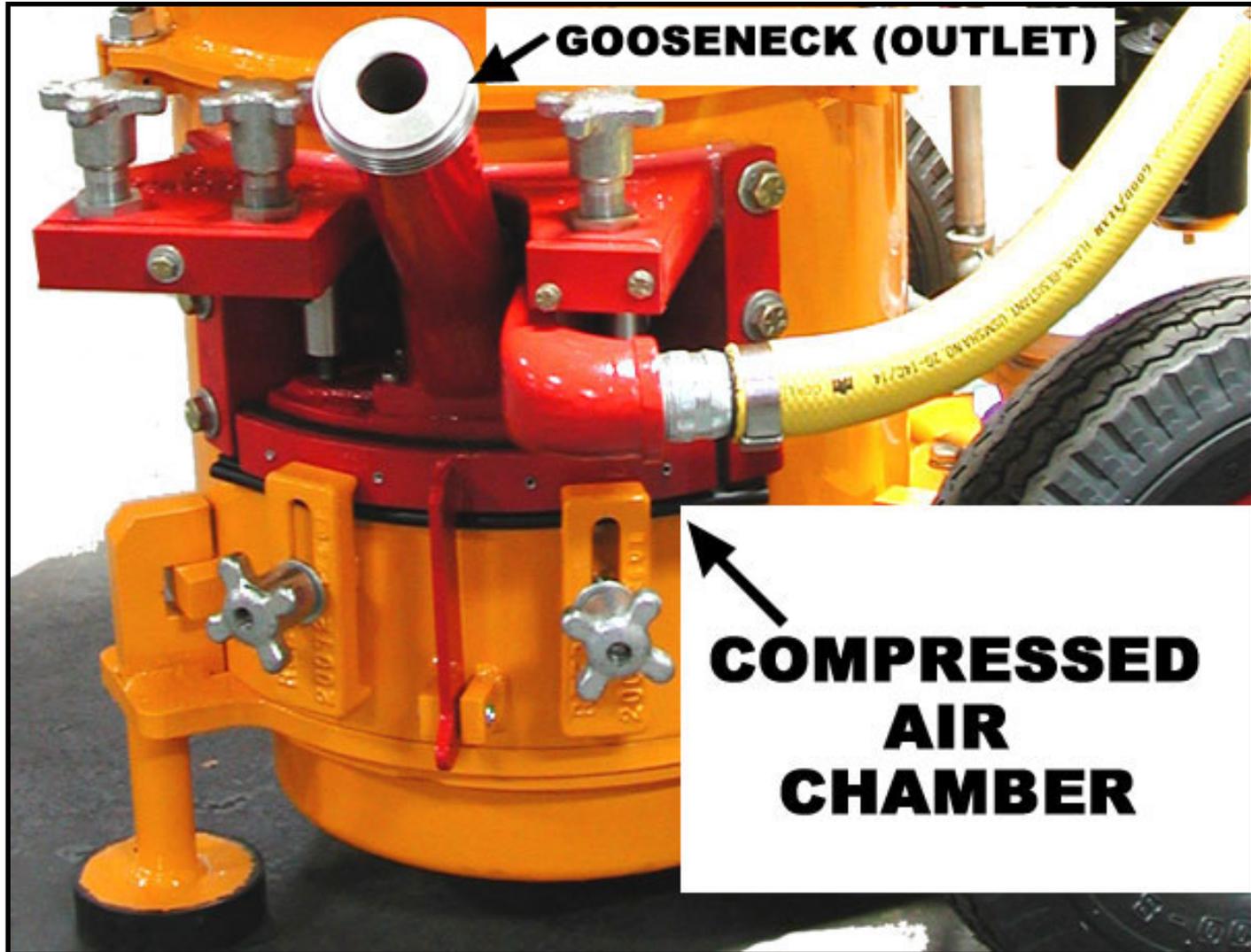


Figure 4-2. Cross section of typical continuous-feed dry-mix gun (Mahar, Parker, and Wuellner 1975)

# How does the Guniting (Dry-Shotcrete) Process Work?



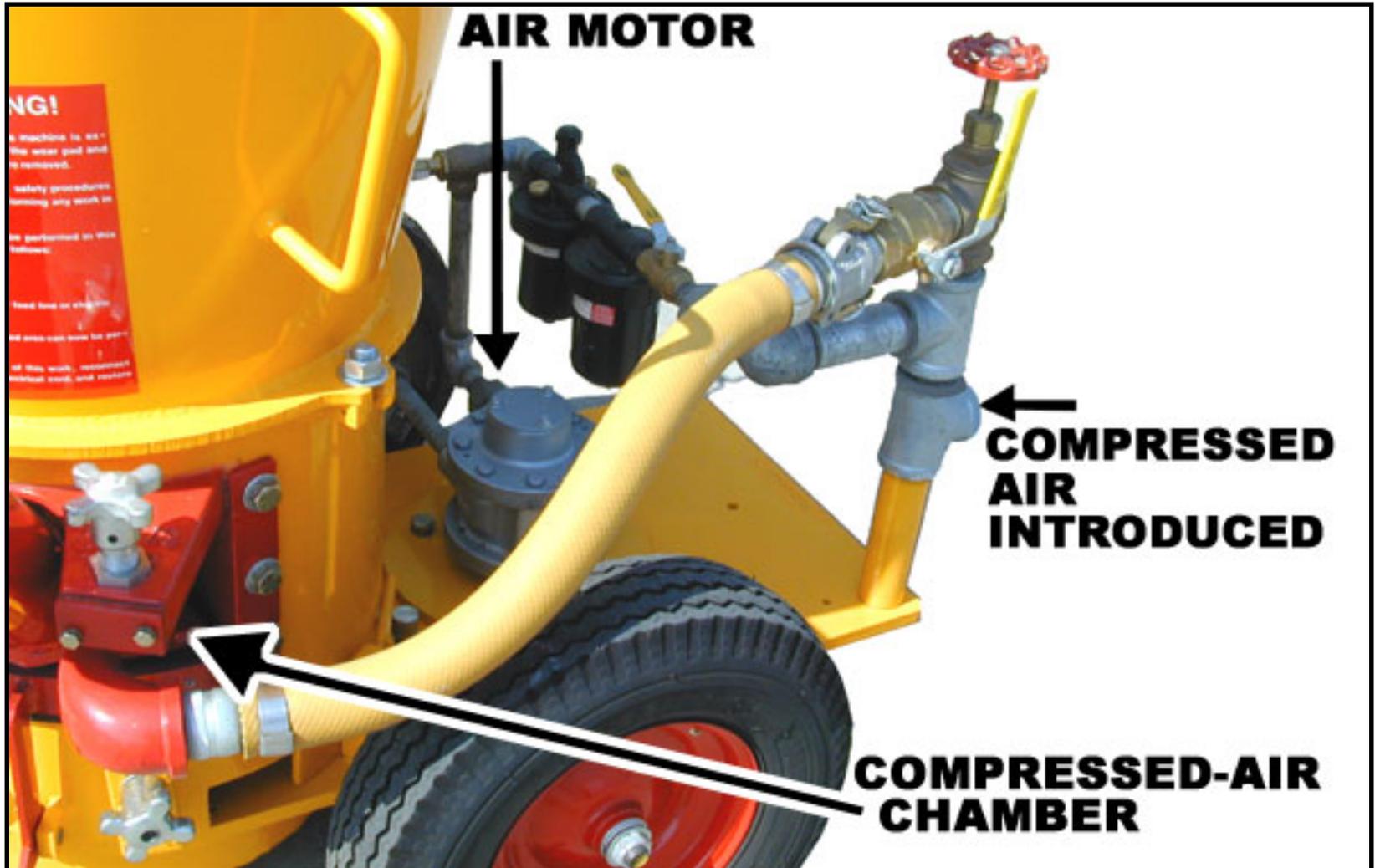
# How does the Guniting (Dry-Shotcrete) Process Work?



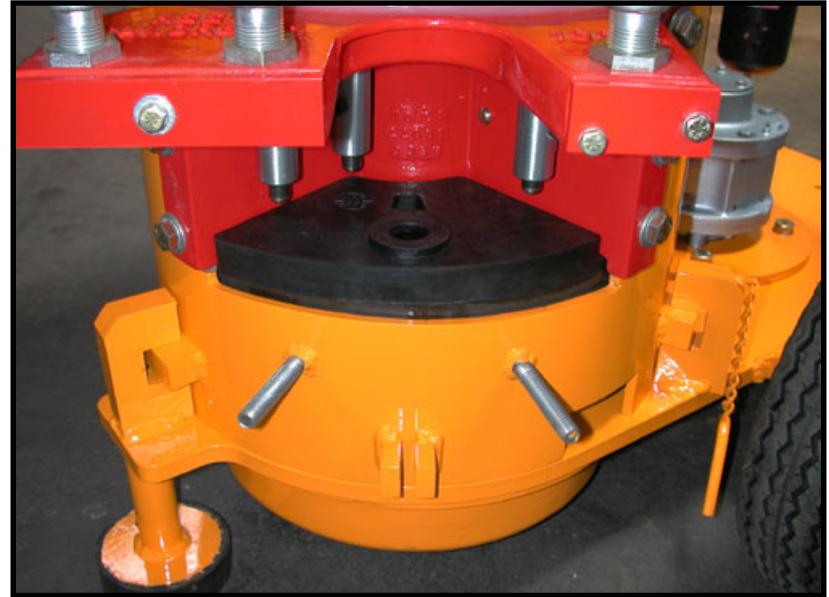
# By changing feed bowls, the output rate can be changed.

<p><b>12 Pocket</b> Feed Bowl - 10797 Wear Plate - 10796</p>		 <p>Wear Pad for <b>12 pkt</b> p/n 10336</p>
<p><b>15 L.A. (Large Aggregate) Pocket</b> Feed Bowl - 10803 Wear Plate - 10802</p>		 <p>Wear Pad for <b>15 L.A. pkt</b> p/n 10336</p>
<p><b>15 Pocket</b> Feed Bowl - 10801 Wear Plate - 10800</p>		 <p>Wear Pad for <b>15 pkt</b> p/n 10338</p>
<p><b>20 Pocket</b> Feed Bowl - 10806 Wear Plate - 10805</p>		 <p>Wear Pad for <b>20 pkt</b> p/n 10338</p>
<p><b>21 Pocket</b> Feed Bowl - 10808 Wear Plate - 10807</p>		 <p>Wear Pad for <b>21 pkt</b> p/n 10339</p>
<p><b>30 Pocket</b> Feed Bowl - 10809 (no wear plate)</p>		 <p>Wear Pad for <b>30 pkt</b> p/n 10339</p>

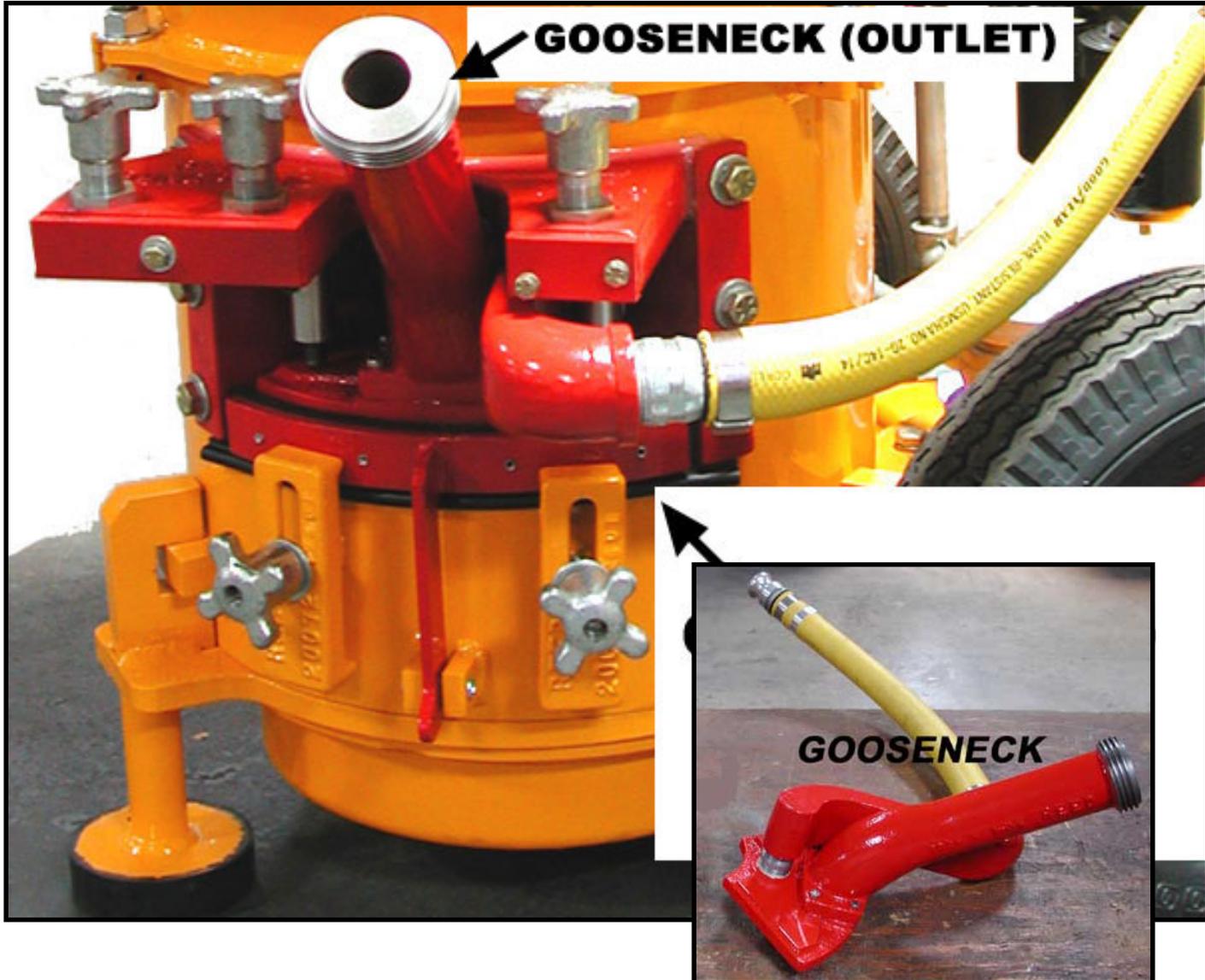
1. Connect compressed air hose to the machine.



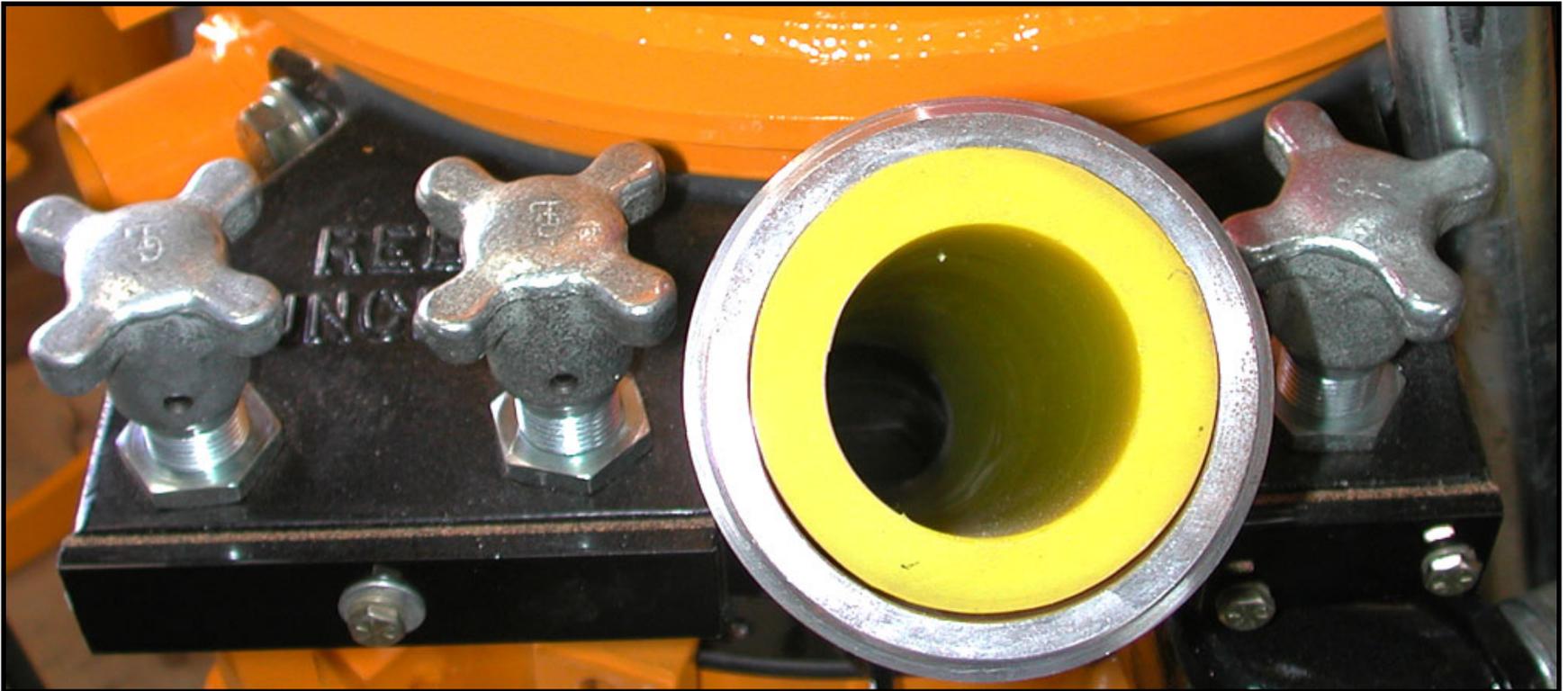
2. Place a rubber wear pad on top of the steel feed bowl.



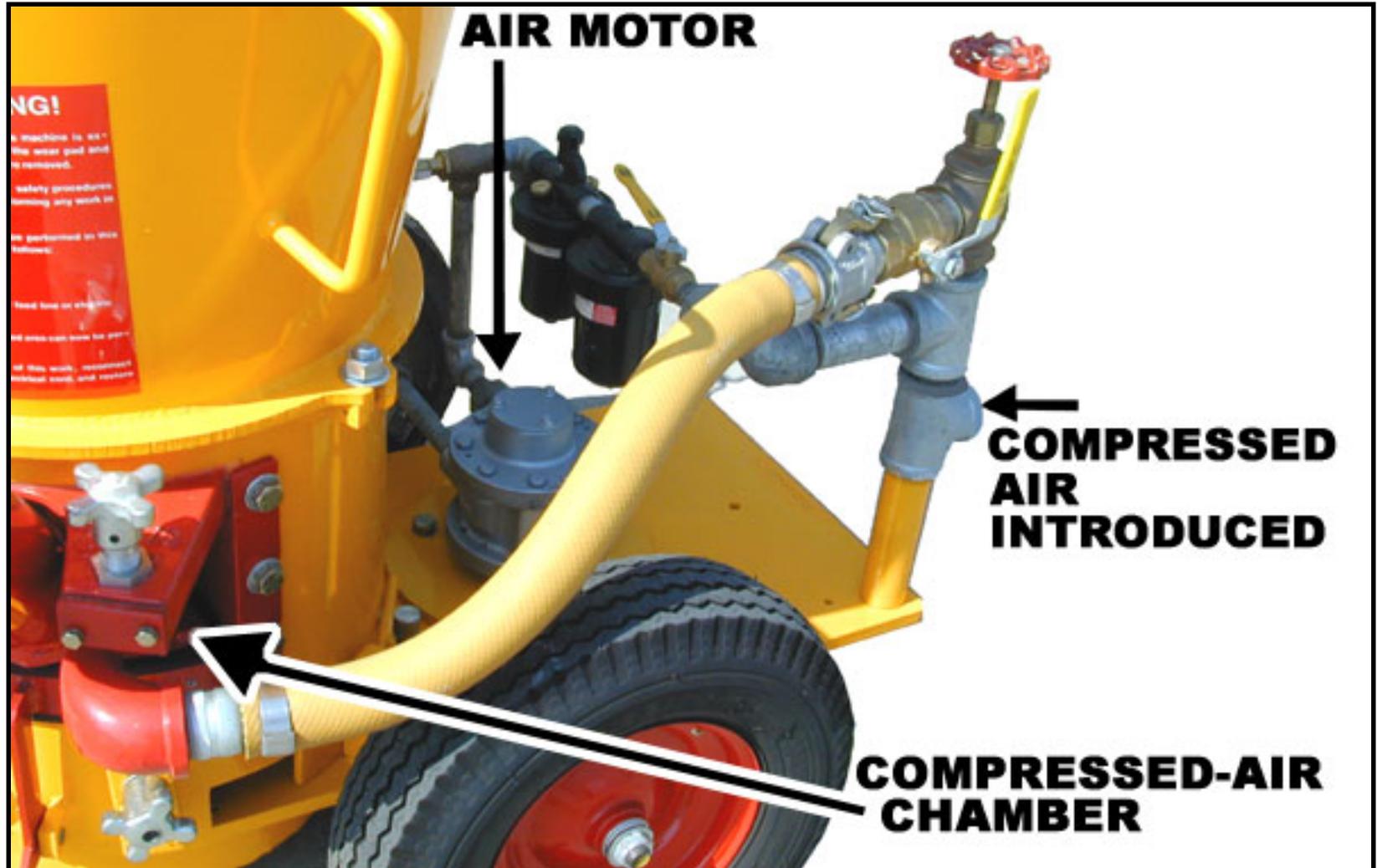
3. Place the gooseneck on top of the rubber wear pad.



4. Turn the pad adjusters to make sure there is even pressure on the rubber wear pad.



5. Turn the main air valve to the material hoses. Then, turn the other valve to begin rotating the feed bowl.



6. Adjust the water valve on the nozzle assembly for proper hydration levels (refractory companies add chemicals to the water for “shotgunning” for better product)

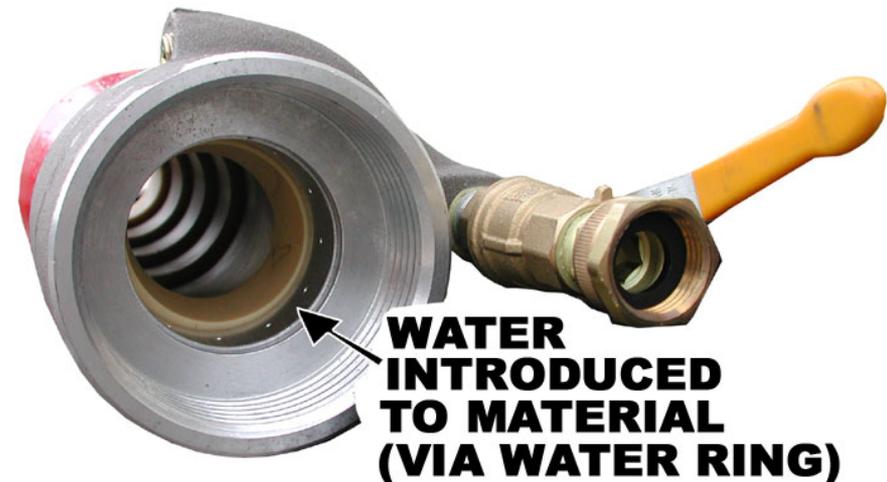
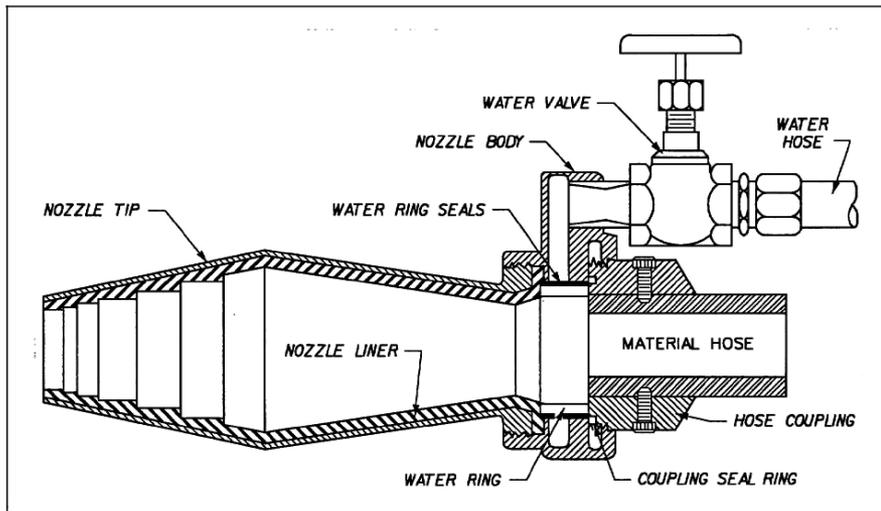
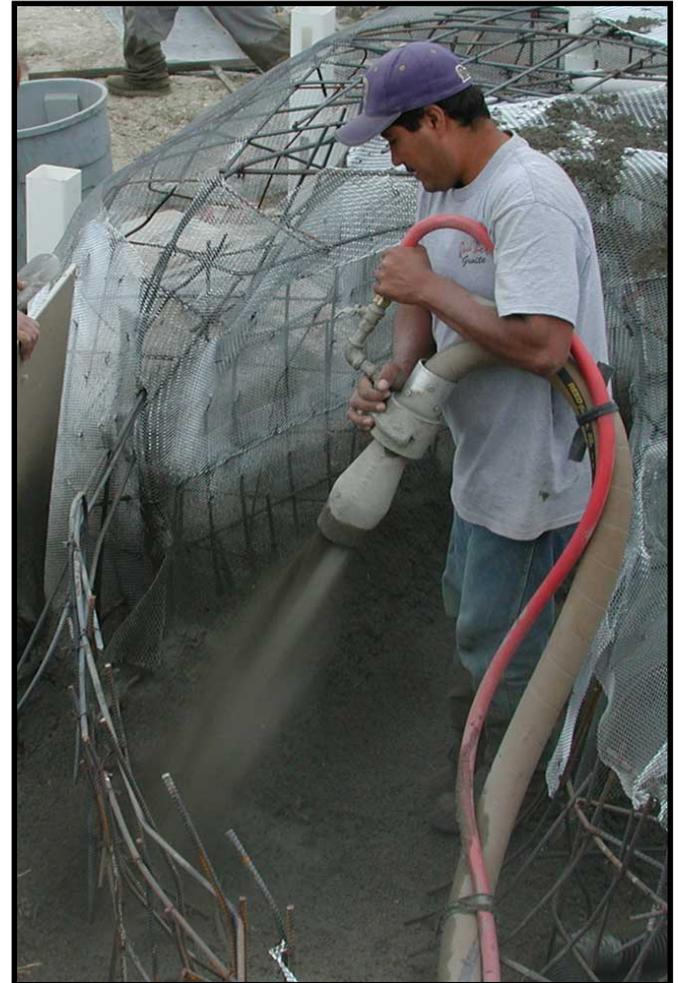


Figure 4-8. Typical dry-mix nozzle (paragraph A-2, ACI 1991c; copyright permission granted by ACI)

7. After all adjustments have been made - begin spraying.



# Trailer Mounted Concrete Pumps

**REED**



# MANY MODELS!!!

**REED**



**A Series: A30, A30HP, A40HP, Mine 30**

**\*diesel or electric drive, skid or trailer mounting\***



**B Series: B20, B20HP, B50, B50HP, B50HPS, B60, B60HP, B70, B70HPS**

**\*diesel or electric drive, skid or trailer mounting\***



**C Series: C50S, C50SS, C70S, C70SS, C90S**

**\*diesel or electric drive, skid or trailer mounting\***

# POWER!!! (diesel or electric motor)



## A Series:

Entry Level Pump / good power for price

Powered by 82hp Perkins Diesel  
(or electric motor)



## B Series:

Contractor-grade / Powerful / Well Built

Powered by 110h Cummins Diesel  
(or electric motor)



## C Series:

**EXTREMELY POWERFUL / VERYSPECIALIZED**

Powered by 160hp or 220hp Cummins Diesel  
(or electric motor)

# **PRESSURE!!! (main hydraulic determines pressure)**



**A30 – 903 psi**

**A30HP – 903 psi**

**A40HP – 1174 psi**

**B20 -1664 psi**

**B20HP – 2100 psi**



**B20HP-PP (very specialized, works with mixer)**

**B50/B50HP/B60/B60HP/B70 –**

**1361 psi, 1174 psi, 1000 psi**

**B50HPS/B70HPS – 1778 psi, 1305 psi**

**C50S – 1530 psi**

**C50SS – 2000 psi**



**C70S – 1125 psi**

**C70SS – 1469 psi**

**C90S –high pressure OR high volume setting!!**

## Common Markets/Applications (still evolving)



A30 – filling blocks with grout

A30HP – filling blocks with grout, shotcrete

A40HP – wide variety of applications

B20 – shotcrete ONLY (refractory, repair, 3D, etc)

B20HP – shotcrete ONLY (refractory, repair, 3D, etc)

B20HP-PP (very specialized, works with mixer)

B50/B50HP/B50HPS/B60/B60HP/B70/B70HPS –

6” material cylinders for shotcrete AND pumping

7” material cylinders for pumping ONLY (no shotcrete)

C50S/C50SS/C70S/C70SS/C90S

6” material cylinders for shotcrete AND pumping

7” material cylinders for pumping ONLY (no shotcrete)



# Common Markets/Applications for A Series



**A Series Jobsites – typically 100-250 feet of hose**

**A30/A30HP – less than 25mm stone**

**A40HP either small pea gravel for shotcrete or 25mm**





# Common Markets/Applications for B Series



**B Series Jobsites – typically 100-500 feet of hose**

**Medium to Larger Contractors – heavy-duty pumps**

**Concrete Cylinder Diameter determines type of work (4" shotcrete, 6" shotcrete & pumping, 7" pump only)**



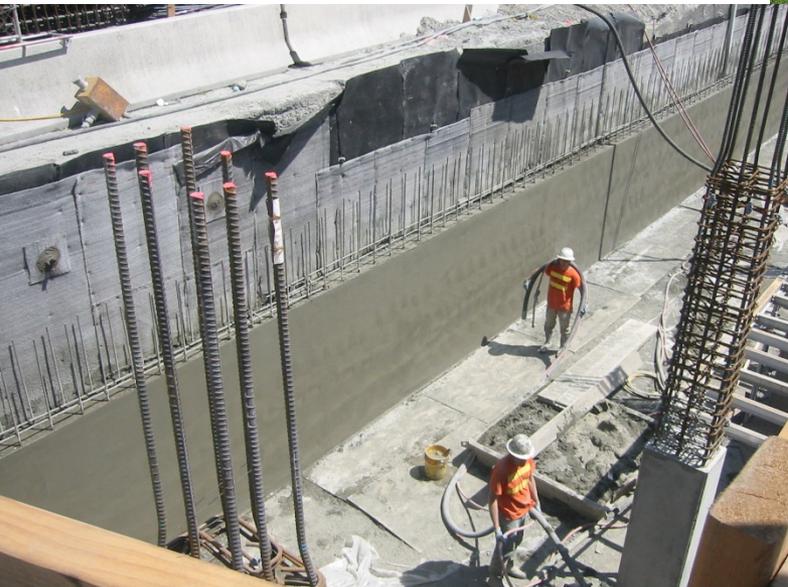
# Common Markets/Applications C Series



**C Series Jobsites – typically 200-1200 feet of pipe+hose**

**Extreme Volume Shotcrete + Mid-Rise Vertical Pumping**

**40+ storey vertical pumping (good price vs larger pumps)**



REED A Series (Rockmaster)					
Model		A30	A30 HP	"Mine 30"	A40 HP
Hydraulic Pump		<u>Gear Pump</u>	<u>Variable Displacement Pump</u>	<u>Variable Displacement Pump</u>	<u>Variable Displacement Pump</u>
Concrete Output	yd <sup>3</sup> /hr m <sup>3</sup> /hr	30 23	30 23	30 23	40 31
Concrete Pressure	psi bar	903 62	903 62	1172 81	1172 81
Horizontal Pumping Distance*	ft m	900* 274*	900* 274*	595* 181*	975* 297*
Vertical Pumping Distance*	ft m	350* 107*	350* 107*	244* 74*	400* 122*
Perkins Diesel Engine	hp kW	82 61	82 61	50hp (37kW) electric motor	82 61
Concrete Cylinders	in mm	5"x30" 127x762	5"x30" 127x762	6"x20.75" 152x527	6"x30" 152x762
Maximum Aggregate Size	in mm	1" 25	1" 25	1.5" 38	1.5" 38
Hydraulic Oil Capacity	gal liters	40 151	40 151	40 151	40 151
Fuel Capacity	gal liters	29 110	29 110	not applicable	29 110
	in	5"	5"	5"	5"

**REED B Series**

Model		<b>B20</b>	<b>B20HP</b>	<b>B50</b>	<b>B50HP</b>	<b>B50HPS</b>	<b>B60</b>	<b>B70</b>	<b>B70HPS</b>
Concrete Output	yd <sup>3</sup> /hr	20	20	50	50	50	60	70	70
	m <sup>3</sup> /hr	15	15	38	38	38	46	54	54
Concrete Pressure	psi	1664	2113	1361	1361	1778	1174	1000	1305
	bar	114	145	94	94	122	81	69	90
Hydraulic Pump Output	cc/rev	71	100	140	140	180	140	140	180
Horizontal Pumping Distance*	ft	1650*	2200*	1200*	1200*	1570*	950*	750*	1150*
	m	503*	670*	365*	365*	475*	290*	228*	350*
Vertical Pumping Distance*	ft	700*	875*	450*	450*	590*	375*	300*	390*
	m	213*	267*	137*	137*	180*	114*	91*	119*
Cummins Diesel Engine	hp	110	110	110	130	130	110	130	130
	kW	82	82	82	97	97	82	97	97
Concrete Cylinders	in	4"x36"	4"x36"	6"x36"	6"x36"	6"x42"	6"x36"	7"x36"	7"x42"
	mm	102x914	102x914	152x914	152x914	152x1067	152x914	178x914	178x1067
Maximum Aggregate Size	in	.75"	.75"	1.5"	1.5"	1.5"	1.5"	1.5"	1.5"
	mm	19	19	38	38	38	38	38	38
Hydraulic Oil Capacity	gal	52	52	52	52	52	52	52	52
	liters	197	197	197	197	197	197	197	197
Fuel Capacity	gal	24	24	24	24	24	24	24	24
	liters	91	91	91	91	91	91	91	91
Outlet Size	in	4"	4"	5"	5"	5"	5"	5"	5"
	mm	102	102	127	127	127	127	127	127
Hopper Height	in	42"	42"	42"	42"	45"	42"	45"	45"
	mm	1067	1067	1067	1067	1143	1067	1143	1143
Dimensions (B20/B20HP)	in mm	Length	Width	Height					
		161" 4089	69 " 1753	83 " 2108					
Dimensions (approx) (B50/B60/B70)	in mm	Length	Width	Height					
		177" 4496	74 " 1880	83 " 2108					

## REED C Series

Model		C50S	<u>C50SS</u>	C70S	C70SS	C90S	
						H.V.	H.P.
Concrete Output	yd <sup>3</sup> /hr	50	54	70	74	90	74
	m <sup>3</sup> /hr	38	41	54	56	69	56
Concrete Pressure	psi	1530	2000	1125	1469	896	1469
	bar	105	138	78	102	62	102
Hydraulic Pump (Closed-loop hydraulics)	cc/rev	125	180	125	180	180	
Horizontal Pumping Distance*	ft	1425*	2000*	1000*	1350*	1000*	1350*
	m	434*	610*	305*	411*	305*	411*
Vertical Pumping Distance*	ft	575*	800*	425*	550*	425*	550*
	m	175*	244*	130*	168*	130*	168*
Cummins Diesel Engine	hp	160	220	160	220	220	
	kW	119	164	119	164	164	
Concrete Cylinders	in	6"x42"	6"x42"	7"x42"	7"x42"	7"x42"	
	mm	152x1067	152x1067	178x1067	178x1067	178x1067	
Maximum Aggregate Size	in	1.5"	1.5"	1.5"	1.5"	1.5"	
	mm	38	38	38	38	38	
Hydraulic Oil Capacity	gal	60	60	60	60	60	
	liters	227	227	227	227	227	
Fuel Capacity	gal	39	39	39	39	39	
	liters	148	148	148	148	148	
Outlet Size	in	5"	5"	5"	5"	5"	
	mm	127	127	127	127	127	
Hopper Height	in	44"	44"	47"	47"	47"	
	mm	1118	1118	1194	1194	1194	
Dimensions (All C Series)	in	Length 184"	Width 71"	Height 83"			
	mm	4674	1803	2108			
(approx)Weight (with oil and fuel)	lbs	8260	8260	8600	8600	8750	
	kg	3755	3755	3899	3899	3977	

# ***Concrete Pump***

## **Technical Summary**

# Concrete Pump / Shotcrete Pump

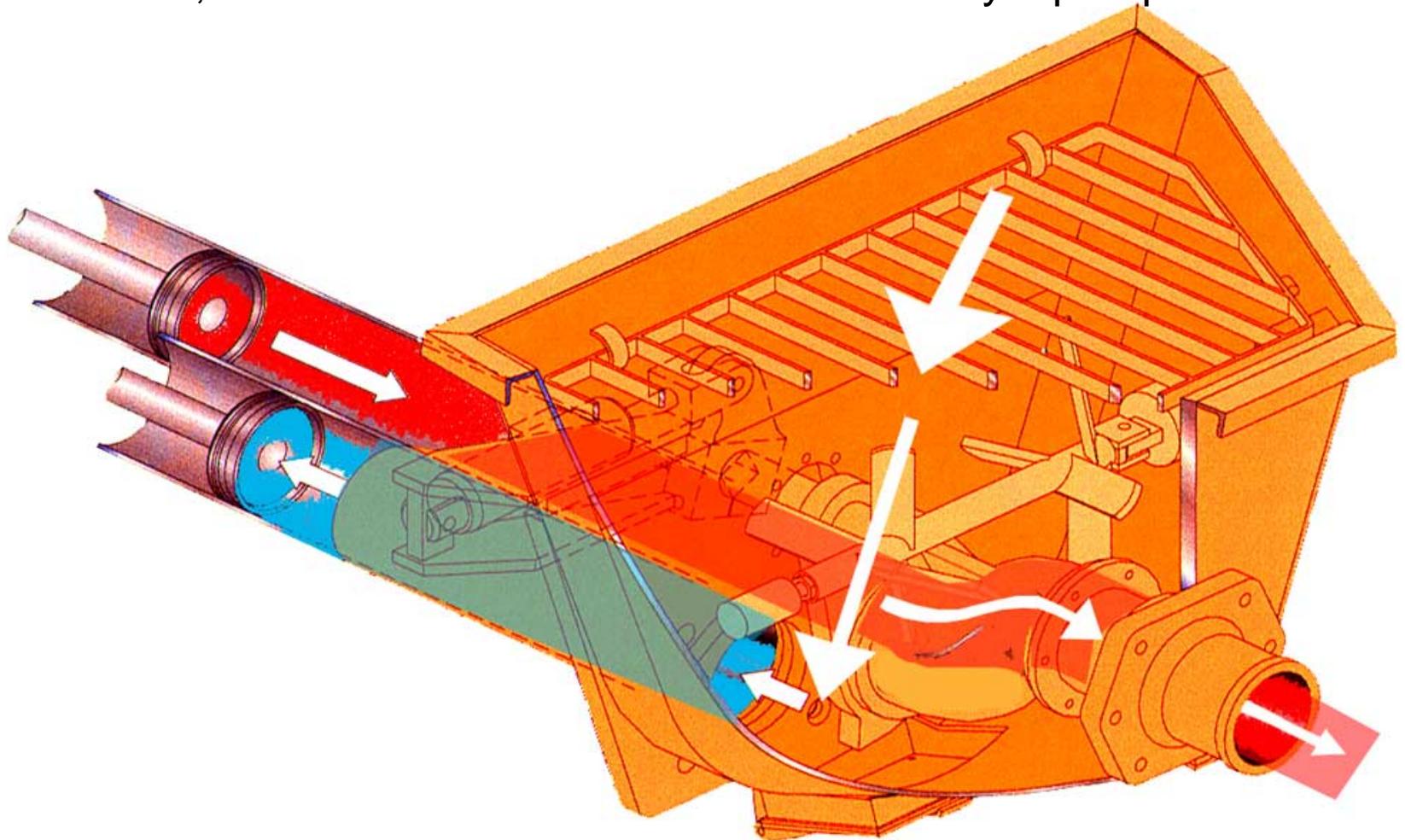


Wet-Process Shotcrete  
(just called “Shotcrete”)

Concrete Pump

**Question: Which concrete pumps are suitable for shotcrete?**

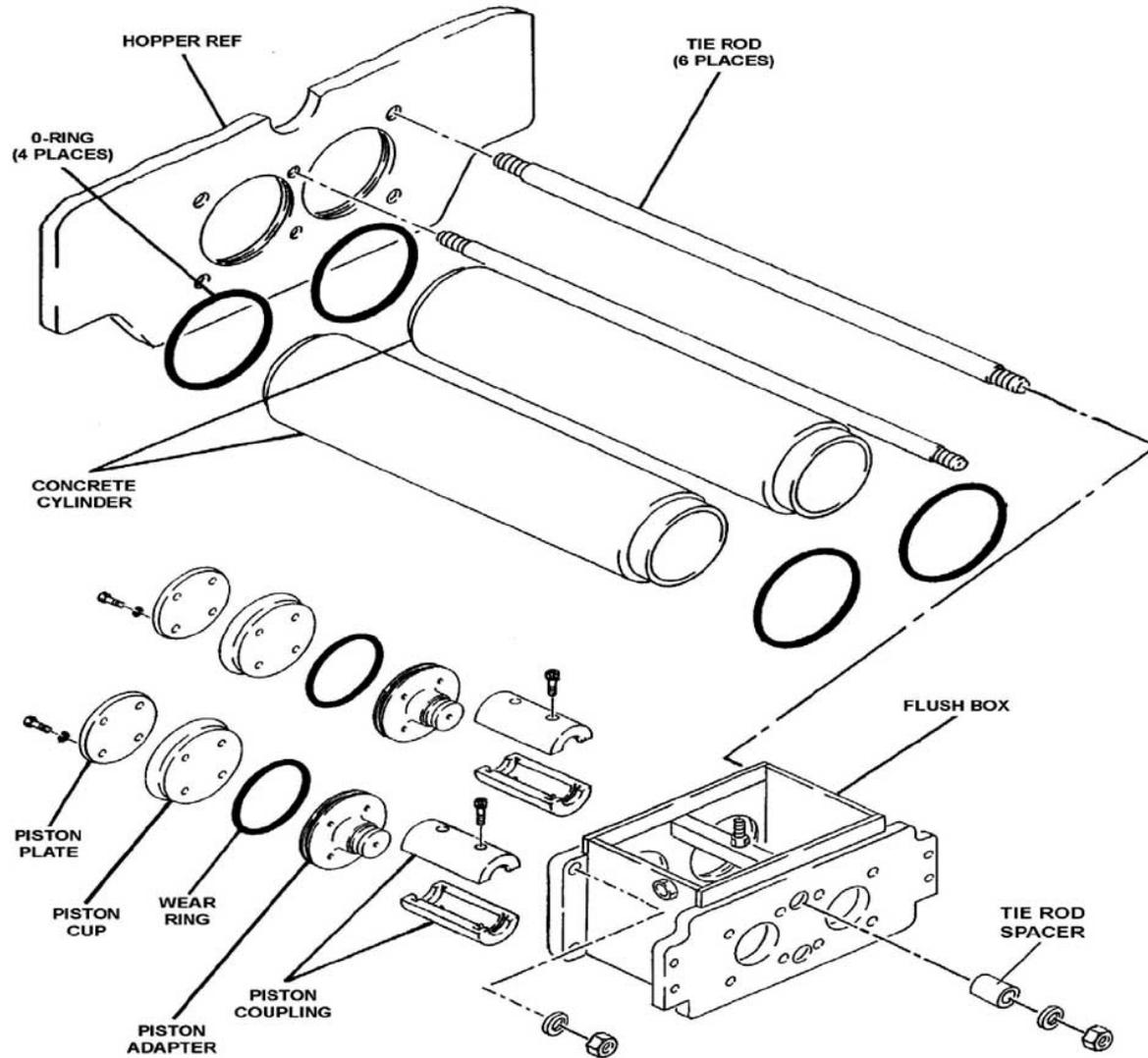
The Swing-tube or “S-tube” concrete pump design is ideal for shotcrete pumps because it is capable of maintaining high concrete pressures required with pushing “stiff” low-slump shotcrete mixes. Also, the valve can reverse at any point in the stroke, so it is much safer than a ball-valve style pump.



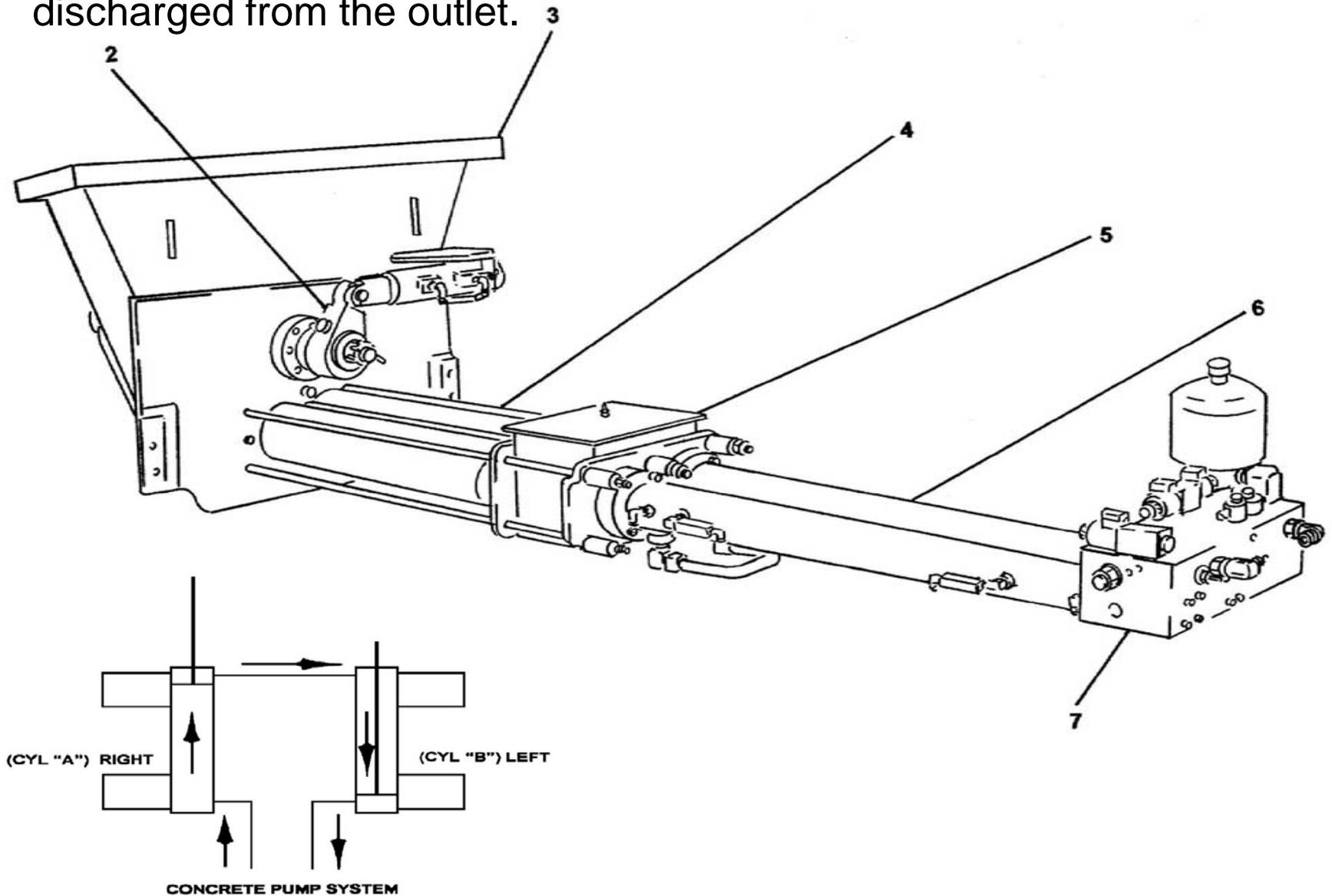
Material is gravity-fed into the empty concrete material cylinder.



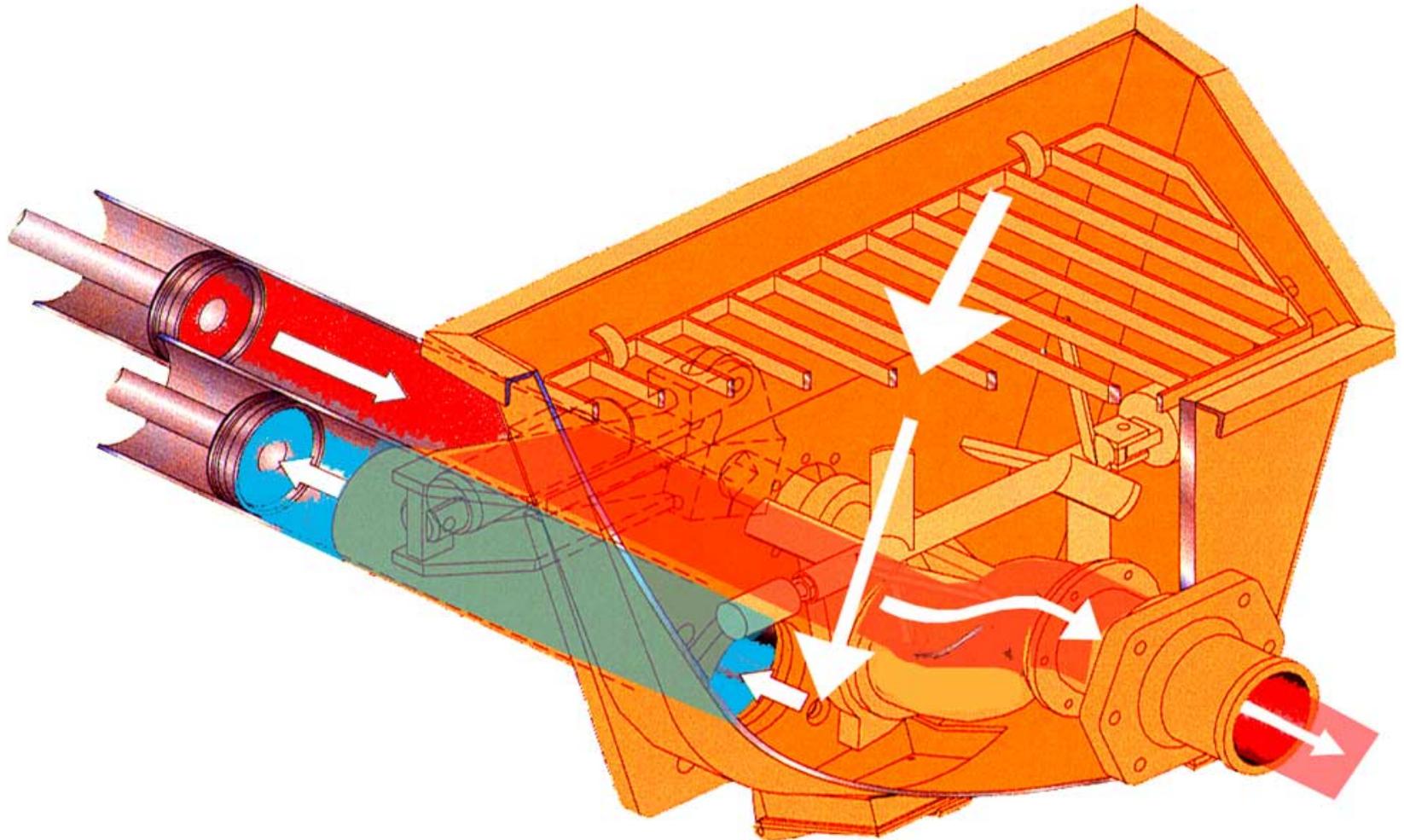
The cylinder quickly fills with the wet shotcrete mix.



A hydraulic cylinder pushes the material cylinder full of concrete back toward the hopper, where it goes into the swing tube and is then discharged from the outlet.

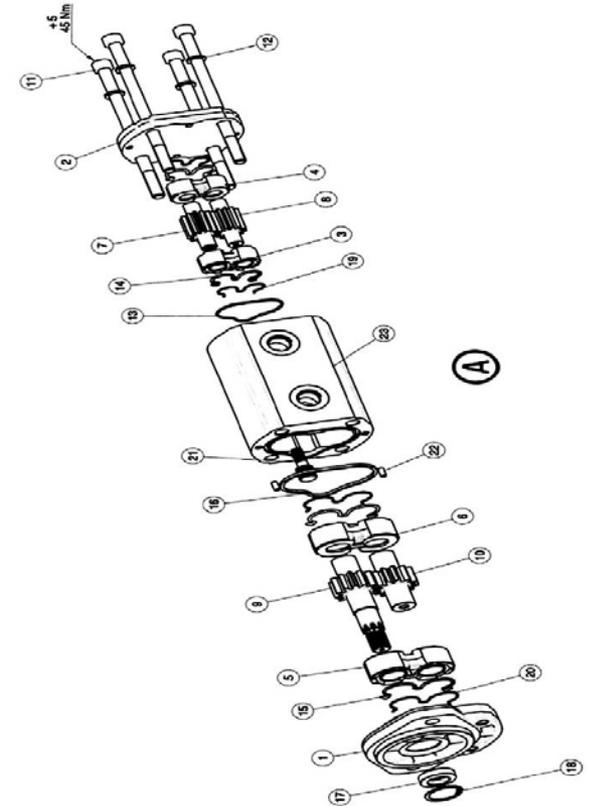
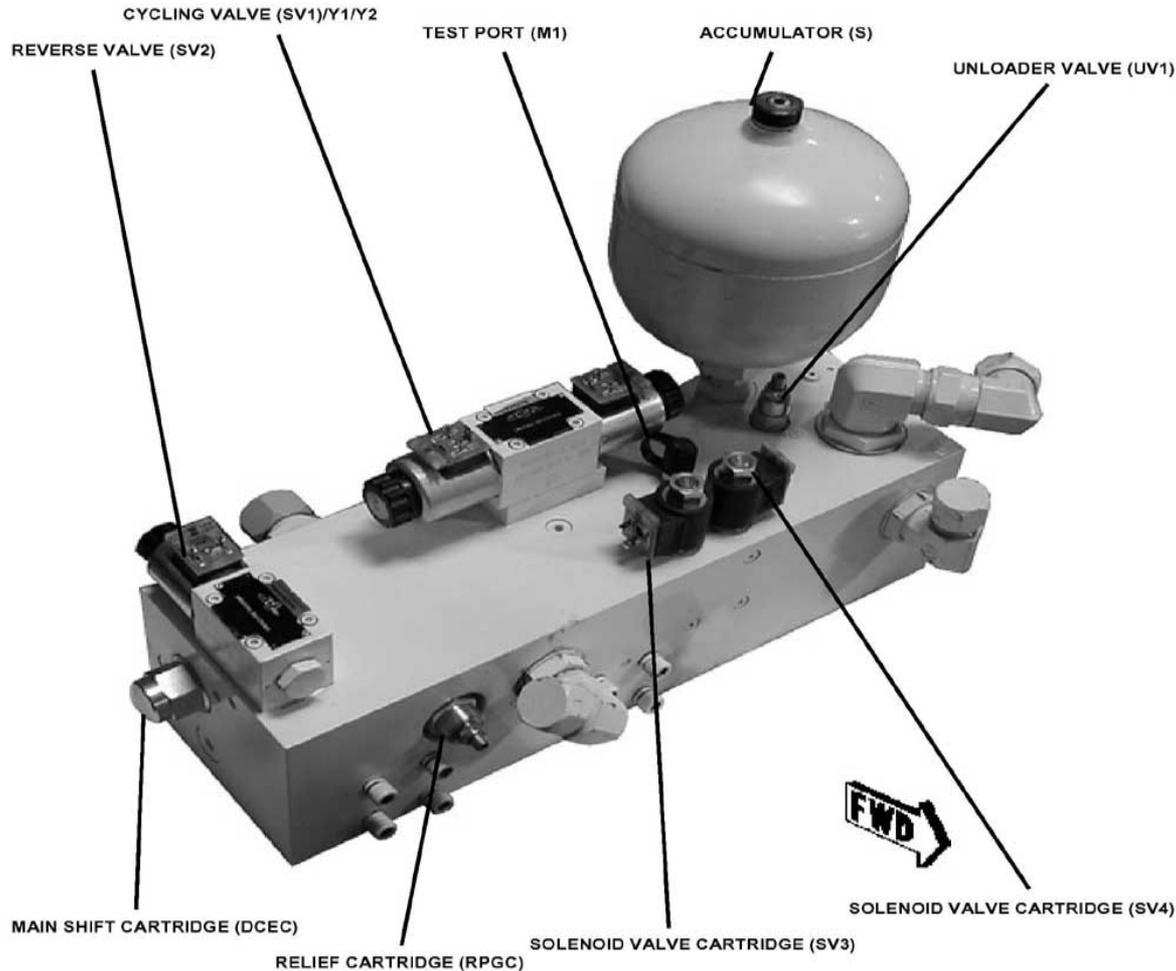


The Swing-tube or “S-tube” swings from side to side – and is constantly being fed with a cylinder filled with concrete. The tube moves from side to side extremely quickly.

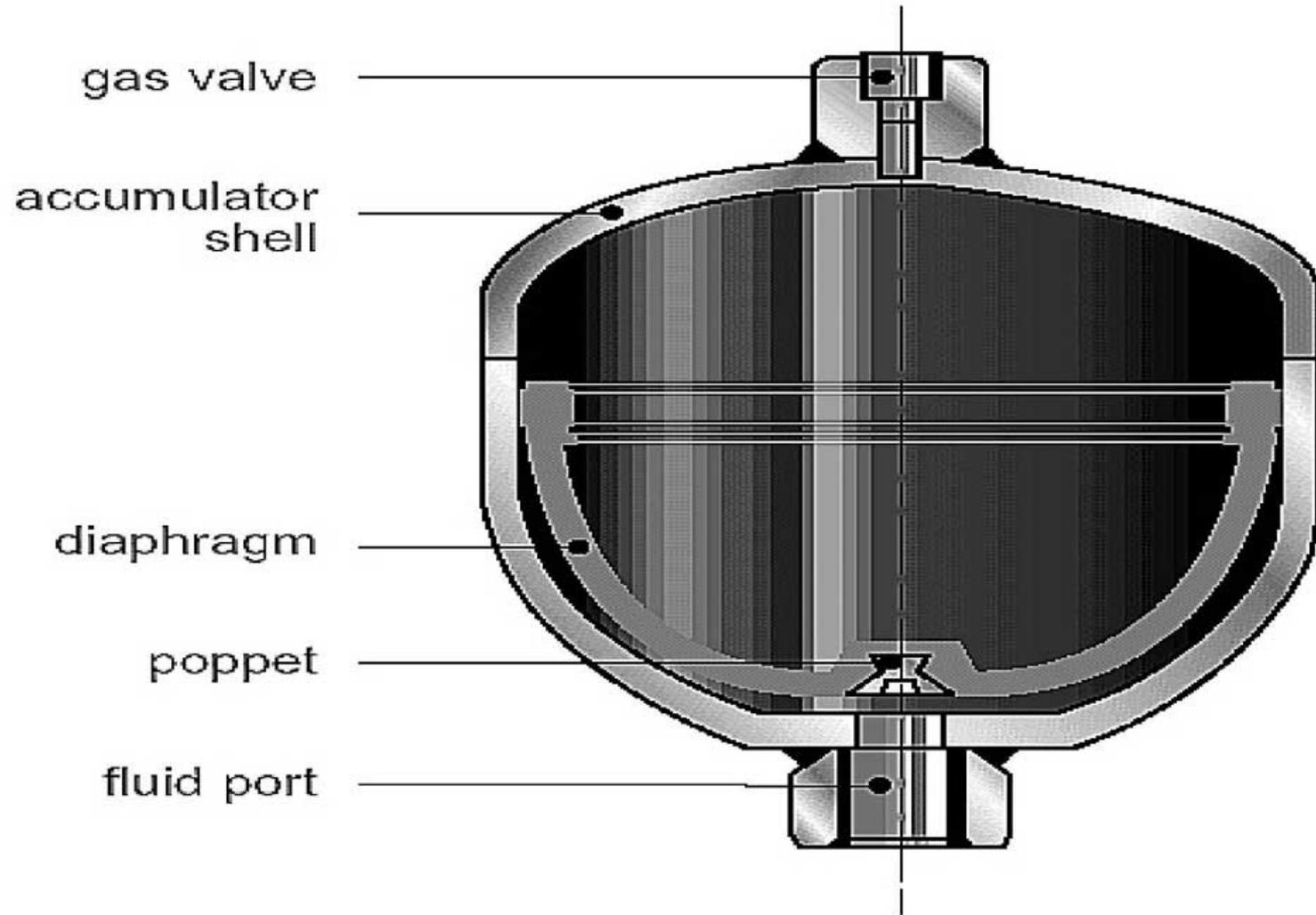




A hydraulic block controls the 2 hydraulic circuits - #1 is swing-tube shifting, #2 is concrete cylinder shifting. They move in perfect harmony for smooth pumping.



A large accumulator quickly switches the swing tube from one cylinder to the other, so there is very little pulsation or “kick”.



The wet material goes through the swing tube and the outlet where it is pushed through reducers, hoses, and the nozzle.



Pumps offer different horsepower and concrete pressure combinations for different shotcrete applications.



### A-SERIES:

<b>A30</b>	<b>903 PSI</b>	<b>2200 RPM</b>
<b>A30HP</b>	<b>903 PSI</b>	<b>1750 RPM</b>
<b>A40HP</b>	<b>1172 PSI</b>	<b>1900 RPM</b>



### B-SERIES: 1750 RPM

<b>B20</b>	<b>1664 PSI</b>	
<b>B20HP</b>	<b>2113 PSI</b>	
<b>B50</b>	<b>1361 PSI</b>	
<b>B50HP</b>	<b>1361 PSI</b>	<b>130HP</b>
<b>B60</b>	<b>1174 PSI</b>	
<b>B70</b>	<b>1000 PSI</b>	<b>130HP</b>



### C-SERIES: 1800 RPM

<b>C50S</b>	<b>1640 PSI</b>	
<b>C50SS</b>	<b>2000 PSI</b>	
<b>C70S</b>	<b>1125 PSI</b>	
<b>C70SS</b>	<b>1469 PSI</b>	
<b>C90</b>	<b>896/1469 PSI</b>	

# ***Concrete Pump***

**Operation with Shotcrete**

# Typical wet-process shotcrete jobsite setup.

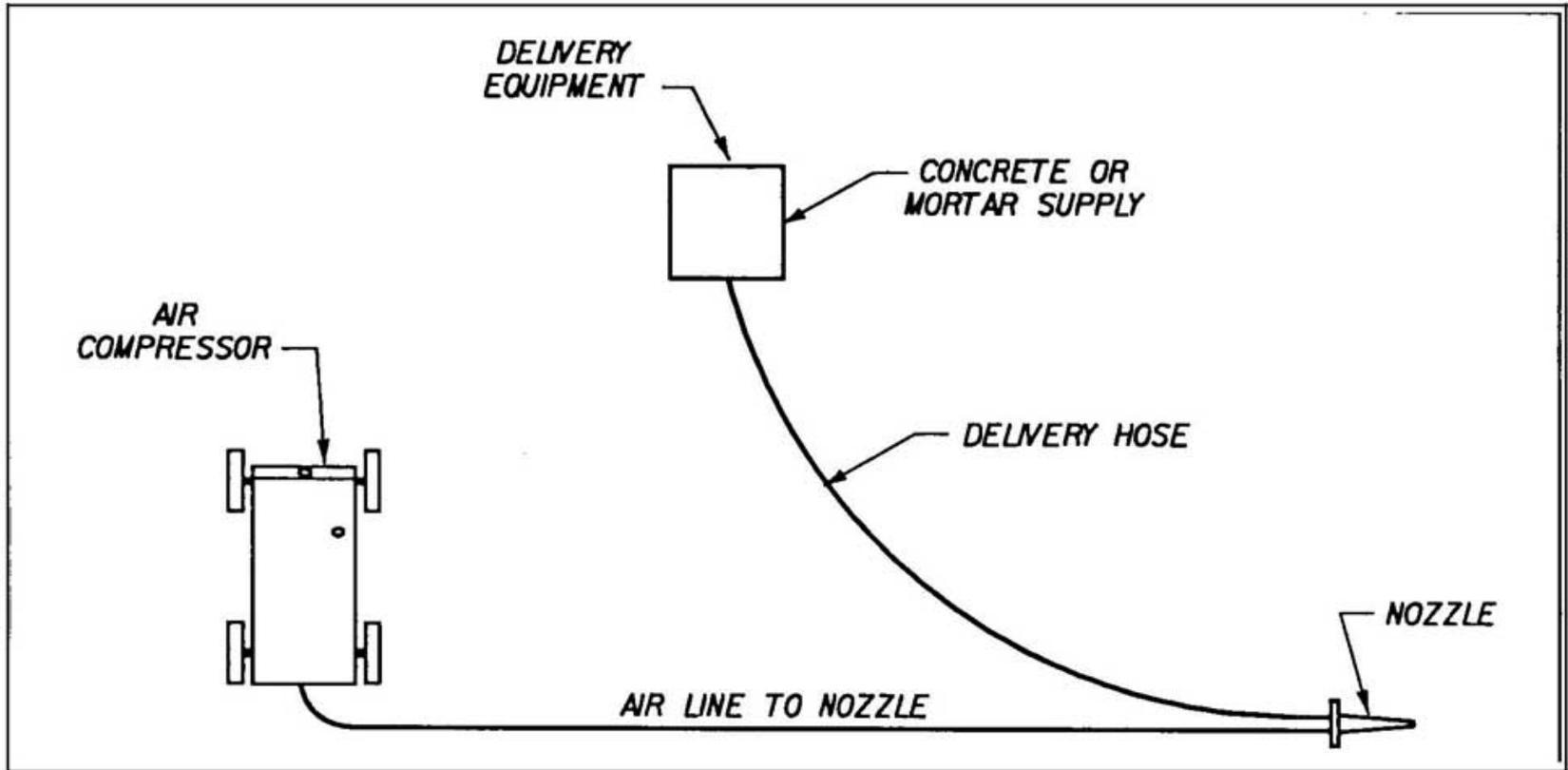


Figure 4-7. Typical plant layout for wet-mix positive displacement equipment

# Wet Shotcrete uses a 185-210 cfm air compressor



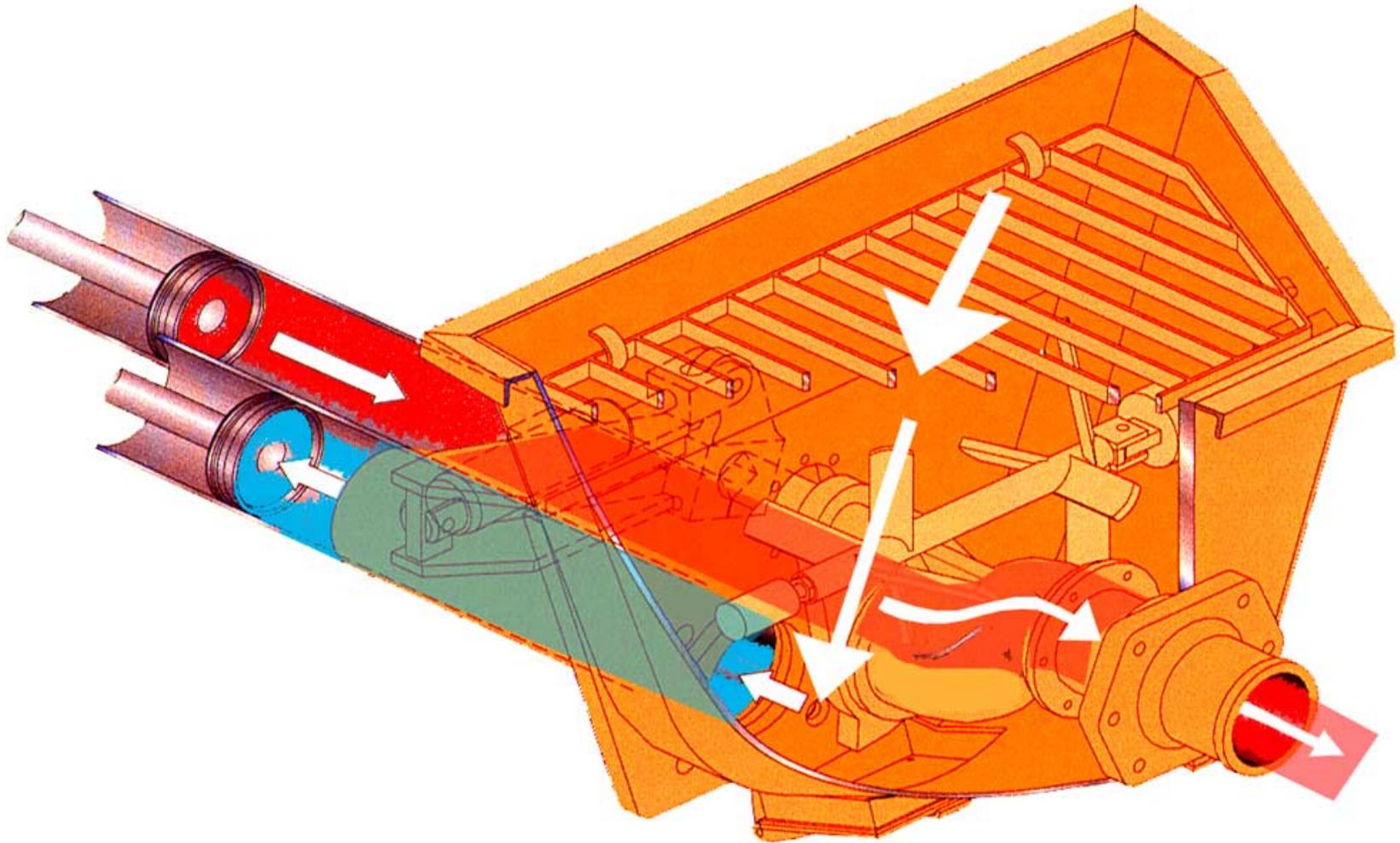
**Wet Shotcrete Nozzle** – Air from a 185cfm – 210 cfm compressor is added to the wet concrete flowing through the hose to give it velocity so it will spray against the wall. If this nozzle is not used, the concrete simply comes out in a stream.



Wet shotcrete is a very difficult material to spray because the slump is very low – it is “sticky” and does not flow easily.



B20HP – “straight through” 4”x4” material cylinders/S-Tube is the preferred configuration of all refractory companies



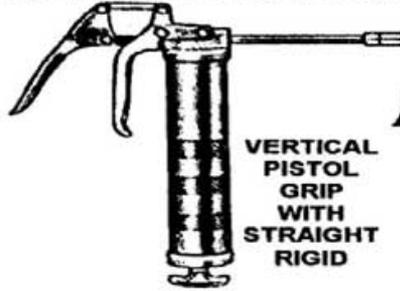
It is **EXTREMELY** important to clean all of the concrete out of the hopper and cylinders after each job to avoid buildup.



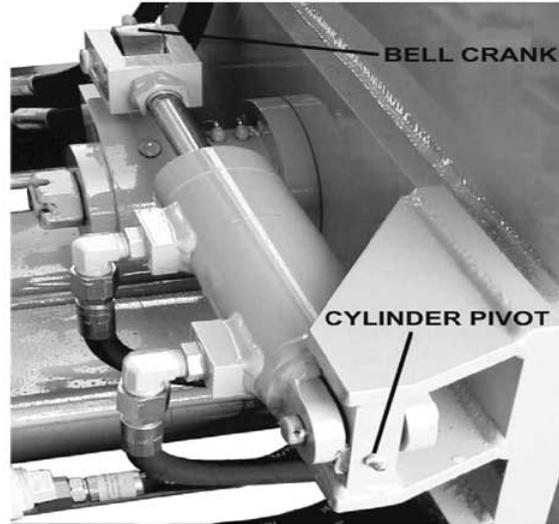
It is also extremely important that all of the lubrication points are greased to extend the life of all parts of the machine.

## LUBRICATION POINTS

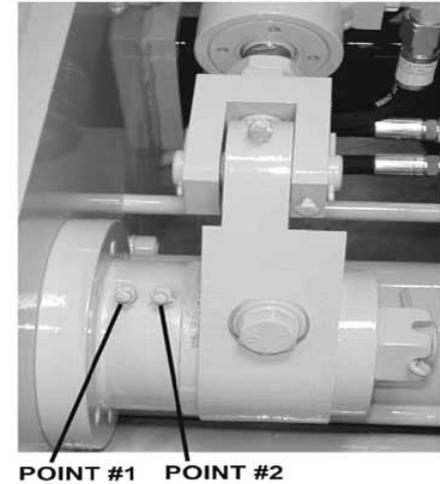
**GENERAL PURPOSE GREASE**



**SWING TUBE SHIFT MECHANISM**



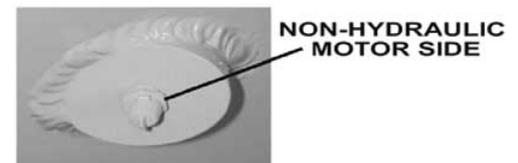
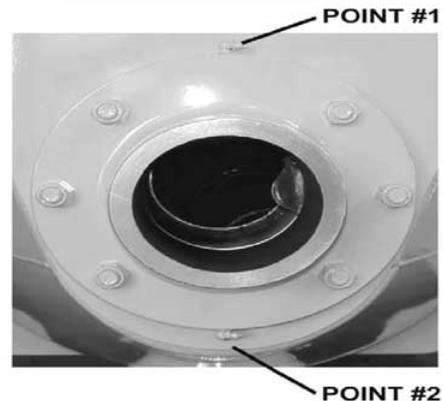
**SWING TUBE FLANGE BEARING**



**AGITATOR / REMIXER**



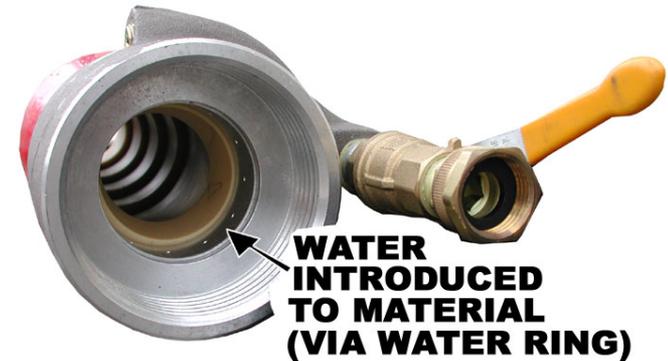
**SWING TUBE OUTLET**



# Dry and Wet Mix Shotcrete Nozzles



**Dry Shotcrete (Gunite) Nozzle** – Air from a 365 cfm to 900 cfm compressor conveys the dry material through the hose (it floats in the quickly moving air). Water is added at the nozzle.



**Wet Shotcrete Nozzle** – Air from a 185 cfm compressor is added to the wet concrete to give it velocity so it will spray against the wall

**Questions or comments?**