



GREEN MACHINE

a greener planet in nothing flat



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Introduction

Flatproofed tires must be processed correctly to provide the customer with the maximum benefits of no flat tires, full tire life, consistent internal pressure, no rim slippage, improved safety, proper tire flex, cost savings, and retreadability.

The tire flatproofing process includes the following steps:

- Inspecting tires and wheels for defects
- Pre-stretching the tire carcass overnight
- Pumping material through the valve stem into the tire replacing all of the air
- Pressurizing the tire to the recommended inflation pressure
- Curing at the proper time and temperature to insure optimum filled tire performance

It is a precision process and should only be performed by an Arnco Certified Technician. Proper training and this Manual provide the necessary information to flatproof tires. This Manual is intended for use with the Green Machine Pumping System. As always, Arnco remains available to assist you with all aspects of your flatproofing business. **For any questions or problems, please call our Sales and Technical Center at (800) 821-4147.**



Disclaimer

This Green Machine Users Manual contains information pertaining to flatproofing tires with Arnco's manufactured products that have been installed through Arnco approved processing systems. This Manual contains information regarding the flatproofing process only, it does not contain other information which may be relevant with respect to the flatproofing process (for example, the tire manufacturer's specifications and information, workplace safety information, etc.). It is important that all flatproofing processors follow not only the safety procedures set forth in this Manual, but also standard safe operation and work conditions, and other safety procedures that may pertain to the facility in which the flatproofing is taking place, and the specific tire manufacturer's safety information.

Although this Manual has been developed for the purpose of instruction, the flatproofing processor must be properly trained in all phases of the job performance, which include, without limitation, installing Arnco products into the tire in a safe manner, the proper use and operation of the equipment and the proper maintenance of such equipment.

Arnco shall not be responsible for any injury or damage to persons or property in connection with the processing or use of Arnco's products. Further, Arnco shall not be responsible for any injury or damage to persons or property due to a customer's actions, the customer's disregard for the safety procedures set forth in this Manual or other safety procedures, the customer's failure to comply with the tire manufacturer's product guidelines, or due to a customer's failure to follow Arnco's instructions, verbal or written, pertaining to the flatproofing process.

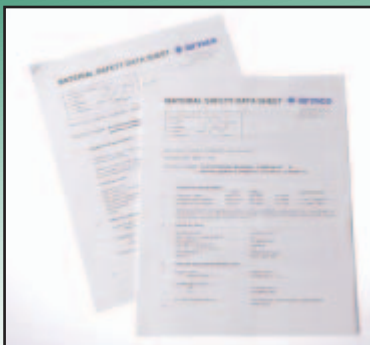
Arnco technical and sales staff make routine visits to its customers' locations for the purpose of reviewing processing locations. However, a customer should not rely on such visits as assurance that it has taken all safety and other precautions.

Arnco maintains a knowledgeable technical support staff who can assist Arnco customers with any questions or assistance that may be needed in connection with Arnco products. Further, Arnco maintains an inventory of parts, and written technical and safety data on its products.

Any questions regarding information contained in this Manual, Arnco products, or Arnco recommended equipment should be directed to the **Arnco Sales and Technical Center at (800) 821-4147.**

Technical Training

Training by Arnco's Technical Department is essential to any successful flatproofing operation. All flatproofing technicians need to go through Arnco's certification process which includes training films, demonstrations, hands-on practice and a short quiz. All certified technicians will receive a wall plaque and uniform patches.



3a



3b



3c

General Precautions

Safety should be your number one priority. In order to promote safety, Arco wants to emphasize the following:

Material Safety Data Sheets (MSDS) identify the properties of “A” side and “B” side products and the precautions that should be taken when handling them. Material Safety Data Sheets have been prepared in accordance with the U.S. Department of Labor and the Occupational Safety and Health Administration (OSHA) for each product. Please read them carefully. In accordance with Federal law, these must be available to all employees on-site. If you do not have a copy, call immediately to have one faxed and/or mailed. (photo 3a)

Operators must wear eye protection when using equipment. Gloves rated to withstand the chemical hazards are to be worn to prevent skin contact anytime a risk of exposure exists. (photo 3b) Exposure to fumes must be limited using methods of control including proper ventilation.

Use extreme care when disconnecting any material supply hoses. Be sure to release the pressure and loosen the couplings slowly before disconnecting completely.

To reduce the risk of serious injury from moving pump parts or the splashing of flatproofing products in the eyes, always disconnect the air supply from the pump and close the release-type ball valve on the air motor when servicing the air motor or cylinder displacement unit.

Spilled material must be cleaned promptly for easier clean up and to avoid falls. Cured urethane is extremely difficult to remove from concrete floors. Use a barrier such as cardboard or roofing felt in your flatproofing area to protect the floor and replace as needed. In case of a liquid spill, soak up the spilled material with an oil absorbent, such as sawdust or vermiculite. (photo 3c) Sweep it into a waste container and neutralize it with a decontamination solution (95% water, 3% ammonia, 2% detergent). Spilled solvent (isopropyl alcohol) is a fire hazard and should be cleaned up promptly. Smoking, grinding, or open flames should not be permitted in the work area. Be sure to handle spills, clean-up, and disposal in accordance with all federal, state and local regulations.

For a chemical emergency (spill, leak, fire, exposure or accident): call Chemtrec - day or night - from the United States or Canada (800) 424-9300. Minor spills or leaks (less than five (5) gallons) can be cleaned up according to instructions in the MSDS.

CAUTION: The output pressure of the Green Machine can exceed the burst pressure for most tires. Therefore, extreme care must be taken to ensure the tire is not pressurized beyond the manufacturers’ recommendations.

Be sure to inspect all rims, lock rings, wheels and associated restraining bolts for structural defects prior to filling. While filling, use a safety cage, (photo 6a) or other OSHA approved restraining device to protect yourself.



4a

4b



Flatproofing equipment should never be left unattended while the pump is in operation. Please refer to other reference material, such as from the Tire Association of North America (TANA) and OSHA, on proper tire preparation and handling.

Material Precautions

Both the “A” and “B” side will absorb moisture. The “A” side (isocyanate) is especially sensitive and will solidify from the slightest exposure to moisture or humidity. When using drums, replace and tighten caps on all materials when not in use. A desiccant is required on the “A” side.

Material temperature should be at least 72° F (22° C) while processing. Cold materials become thick, which slows pumping and can result in inadequate mixing and poor/slow cure.

Safety Supplies

Signs - “No Smoking” signs should be posted due to the hazards presented by chemicals. (photo 4a)

Fire Extinguisher - Extinguishers should be within easy reach as isopropyl alcohol is flammable and poses a fire hazard. (photo 4a)

Industrial First Aid Kit - Kits should be properly stocked and readily accessible for emergencies.

Eye Protection - Eye protection is essential and should be worn at all times as liquids, pressurized air, and solvents can accidentally be splashed in the eyes. Personal protective equipment requirements are described in the MSDS.

Gloves - Natural rubber, latex or neoprene gloves should be used to reduce skin contact and potential irritation caused by sensitization to flatproofing materials. Personal protective equipment requirements are described in the MSDS.

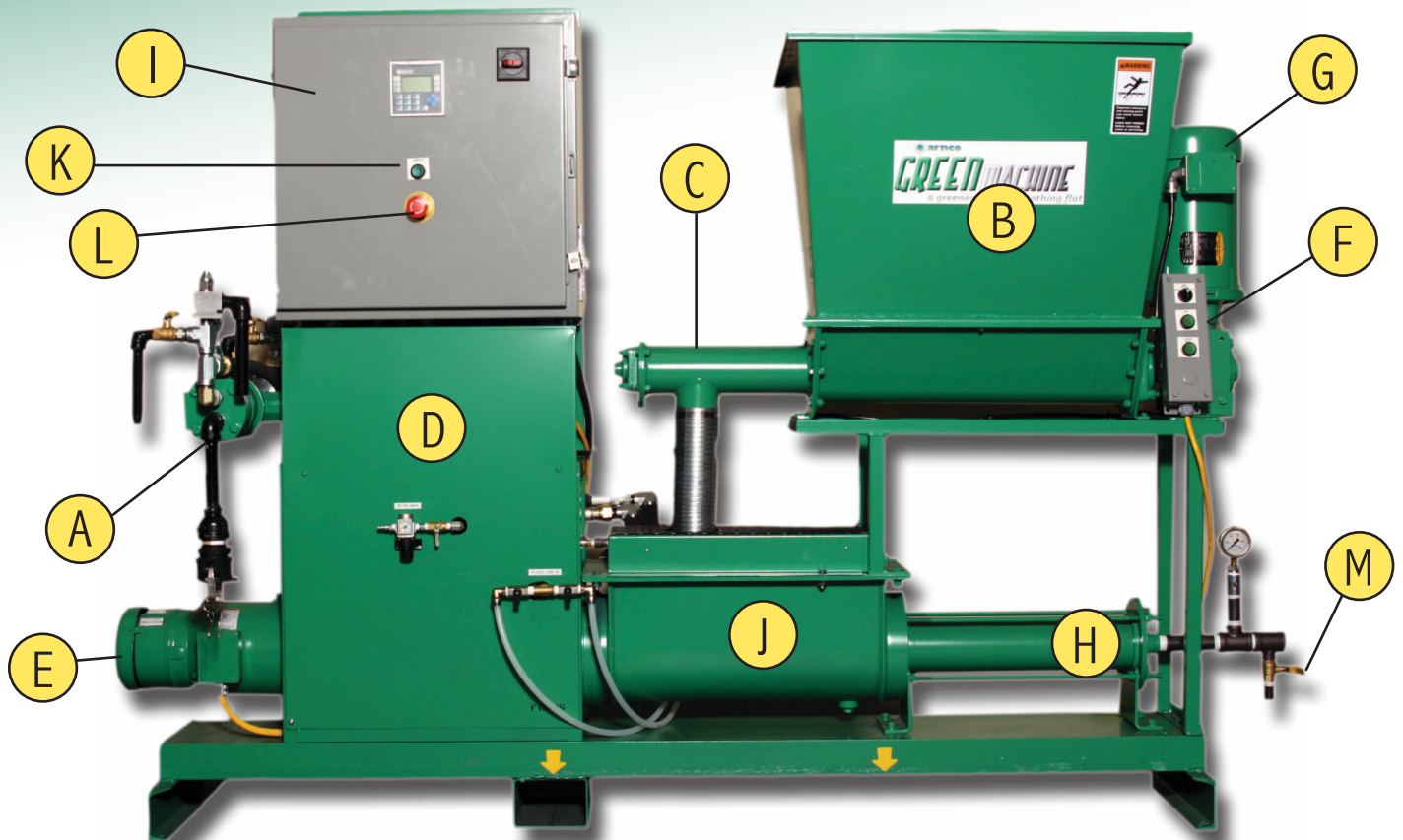
Tire Cage - Tires should be filled in a tire cage (photo 4b). Tires overpressurized with air or liquid can fail with explosive force. Cages are mandatory when working on wheels with split rim or lock ring assemblies. Position tires with the lock ring facing away from the operator and work area.

Respirator - The tire filling process and clean up can produce fumes. Ventilation is required in work areas to prevent exposure to fumes. If adequate ventilation is not available, a respiratory protection program needs to be implemented. All cartridge/mask selections must be conducted by a qualified individual in accordance with written respiratory protection program. Refer to the MSDS.

Note: Compliance is unique at each pumping location and should be in accordance with all local, state and federal regulations.

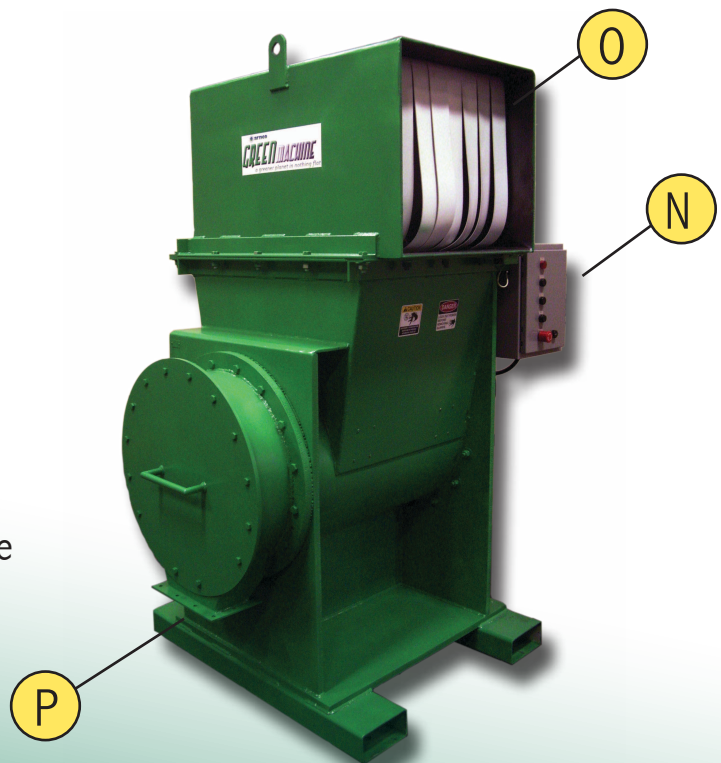
Legend

The Green Machine



- A Gear Pumps, Material
- B Hopper, Grind
- C Hopper, Chute
- D Front Kick Service Panel
- E Motor, Progressive Cavity, Mixer
- F Remote Control
- G Motor, Hopper
- H Progressive Cavity Pump
- I Control Panel
- J Mixing Well
- K Power Light
- L Emergency Shut Off
- M Sample/Pressure Release Ball Valve
- N Grinder Control Panel
- O Grinder Input
- P Grinder Output
- Q Cleanout Panel (New Grinder)

The Grinder



Control Panel Display and Panel Layout

Jobs Select Button: Press this button to enter the job select screen.

F1 - System Start

F2 - System Stop

Numeric Keypad



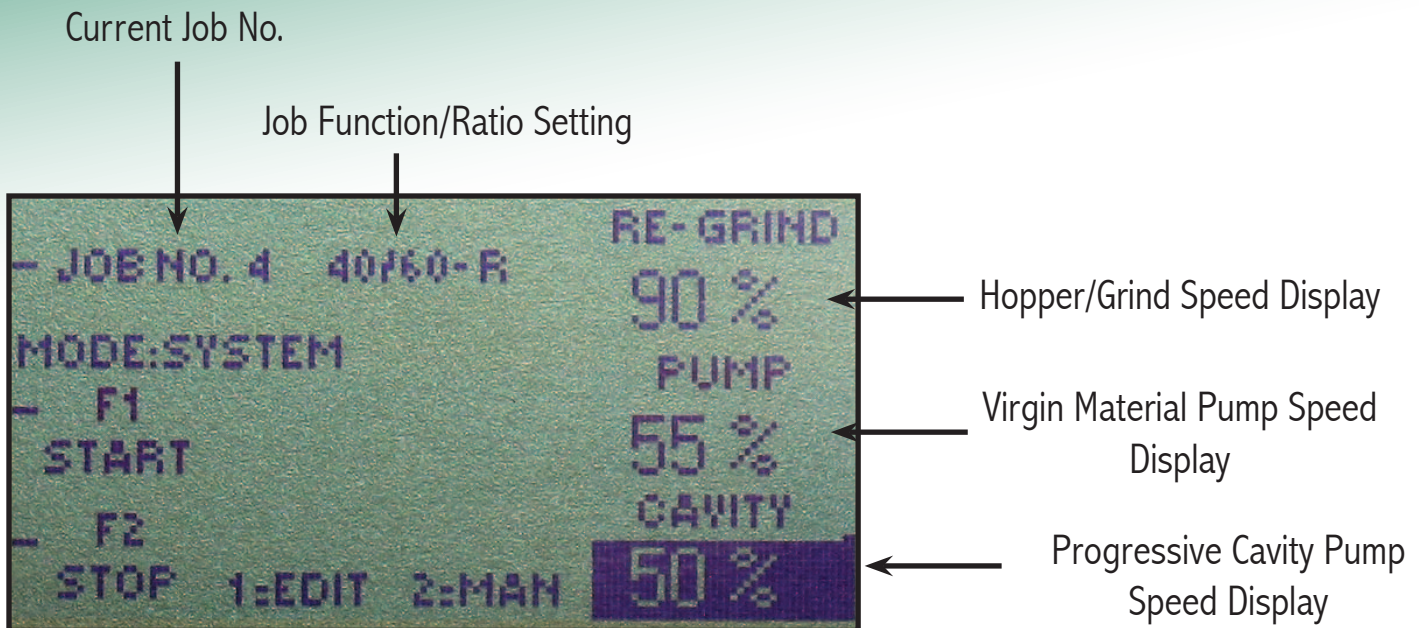
Escape Button: Pressing this key return to previous screen and locks in selected job.

No Function Assigned

Enter Key: Locks in Progressive Cavity Pump Speed. Set Speed Using Numeric Keypad

Up/Down Keys
Left/Right Keys Not Used

Control Panel Display and Panel Layout (cont.)



Job No. — Function/Ratio

Grind (G)

- 1 - 65/35 G — 65% (G) 35% Virgin
- 2 - 50/50 G — 50% (G) 50% Virgin

Crumb Rubber (R)

- 3 - 30/70 R — 30% (R) 70% Virgin
- 4 - 40/60 R — 40% (R) 60% Virgin
- 5 - 50/50 R — 50% (R) 50% Virgin

High Volume (HV)*

- 6 - 65/35 High Volume Grind
- 7 - 50/50 High Volume Grind

* Requires special equipment to pump at high volume. Contact Arnco Rep before using Job No. 6 or 7

- 8 - 100% Virgin
- 9 - Flush

Diagnostic Modes/Functions:

- 10 - Hopper
- 11 - Liquid
- 12 - Progressive Cavity Pump

NOTE: Progressive Cavity speed is highlighted to indicate it is adjustable during operation. Use the Numeric Keypad to enter the desired speed. Press the Enter Key to input the new speed setting.

System Remote

The GreenMachine is equipped with a wired remote that allows the operator to perform some basic functions without using the control panel. In addition to the basic starting and stopping, the remote can be utilized to aid in the startup and cleanup routines. The remote consists of two momentary buttons labeled “Jog” and “System Reset” and a 3 position mode switch which allows the operator to select between System, Jog All and the Jog P.C. mode. Job numbers and progressive Cavity speed must be changed using the control panel.

SYSTEM: Set this position to run the GreenMachine in the normal mode. Pressing the “System Rest” button starts the GreenMachine and will run the job number currently displayed on the control panel. To stop the GreenMachine using the remote move the mode switch to “Jog All”. ***Note: In order for the F1 and F2 keys on the main control panel to function the remote switch must be in the “System” position.***

JOG ALL: Use this position to pressurize the tire. When the switch is placed in the “Jog All” position, press and hold the “Jog” button to run the material pumps, Grinder and P.C. pump. The speed and grind ratio is preset to 50/50. Release the “Jog” button to stop. The 50/50 mix is less viscous and allows easier insertion of air/ water valve cores after the tire has been pressurized.

JOG P.C.: Placing the system switch in the “Jog P.C. position runs the P.C. pump only. This can be helpful if the mixing well level is to high and needs to be lowered. Press and hold the “Jog” button to start the pump, release the button to stop the pump when the desired amount of material is reached. This setting is also used during the flush procedure to empty the mixing well of all mixed material and flushing agents.



Start Up

1. Turn on the main power switch. Confirm the power light is on.
2. Check the level of the filler/grind in the hopper, add filler if needed.
3. Check the solvent levels. (G-Flush, IPA, BioSolv) Refill solvent levels if needed.
4. Open the ball valves on the A and B side totes.
5. From the main control panel, select the job number you plan to run.
6. On the system remote confirm the “Mode select switch” is set to the “system” setting.
7. Complete the assembly of the dispensing hose by attaching the fluid gun and pressure gauge. You will need two 5-gallon pails during operation. One pail for priming the system on initial startup, and one pail for clean-up. Lining the pails with a trash bag will make disposal and reclaiming material easier.
8. The Green Machine needs to be primed before tires can be filled. To prime the Green Machine, place the fluid gun over a waste container (5-gal. pail) and press the F1 key on the main control panel.
9. Run material into the pail. About half a pail should be sufficient for priming. Press F2 on the main control panel to stop the Green Machine.

Processing

During the flatproofing process it is your responsibility to monitor the material levels and adjust the progressive cavity pump as needed to prevent overflow from the mixing well. All speed adjustments for the progressive cavity pump are performed on the system control panel. Only the progressive cavity pump speed can be changed during operation. All other functions and filler ratios are selected by the job number. To adjust the progressive cavity pump speed when flatproofing a tire, press the enter key on the main control panel. The cavity speed percentage number will be highlighted. Enter the new value using the numeric key pad on the main control panel. Press the enter key to lock in the new speed value. Monitor the mixing well after the new speed values have been entered. Readjust the cavity speed if needed. Gradual adjustments are recommended.

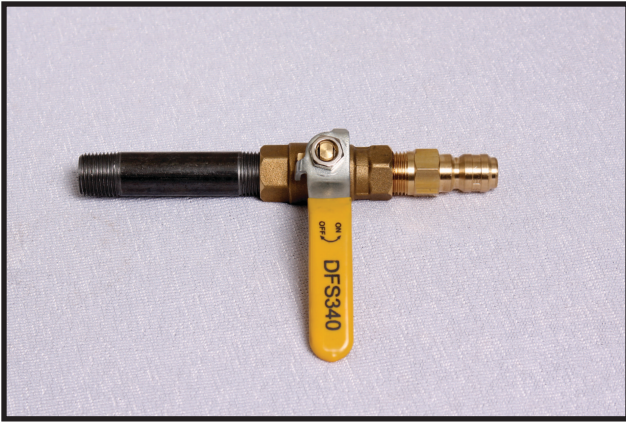
Smoking is not allowed in the processing and curing areas. Highly flammable solvents should not be exposed to high heat or sources of open flames. Proper Safety devices must be available to all those qualified to operate this equipment.

Shut Down

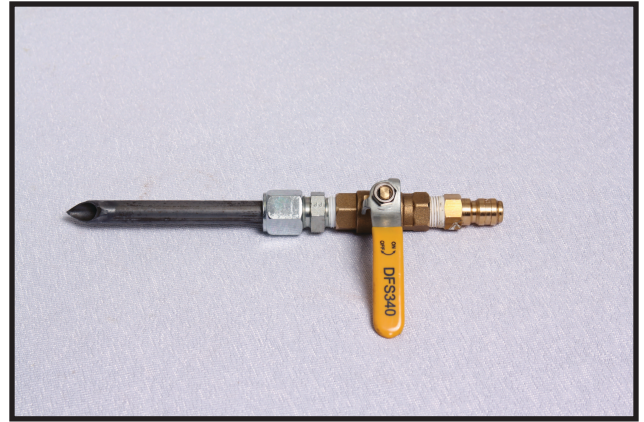
1. On the system remote change the mode select switch to “JOG” PC.
2. Place the fluid gun over an empty lined 5 gallon pail.
3. Press and hold the “JOG” button. This will run the cavity pump only removing the virgin and mixed flatproofing material from the mixing well, progressive cavity pump and the dispensing hose. Release the “JOG” button when the material has been purged.
4. Run ten pumps of grease using the grease gun through the grease fitting located on the line pressure gauge.
5. On the main control panel, change the job setting to number 9. Flush mode runs the progressive cavity pump and the grind hopper at a low setting.
6. Turn on ball valve for the IPA and run for approximately 5 seconds. Turn off IPA and turn on G-Flush and run for 15 - 20 seconds.
7. Purge pressure release ball-valve during flush process
8. Be sure to leave adequate flush material in mixing well and hoses to prevent product from setting up.

Wheel and Valve Stem Filling Options

Air-water valve stems should be the first choice when filling tires. Standard Shrader valve stems should never be used and will result in an obstruction. Other options are to use the ball-valve injector to fill through the tire or to remove the valve stem altogether and use the ball-valve stem adapter. The injector or adapter must be left in place until the tire has cured. Once cured, the ball valve adapters or injectors can be removed and drilled out for later reuse. You will need one injector or adapter for each tire you fill.



Ball Valve Stem Adapter Part #

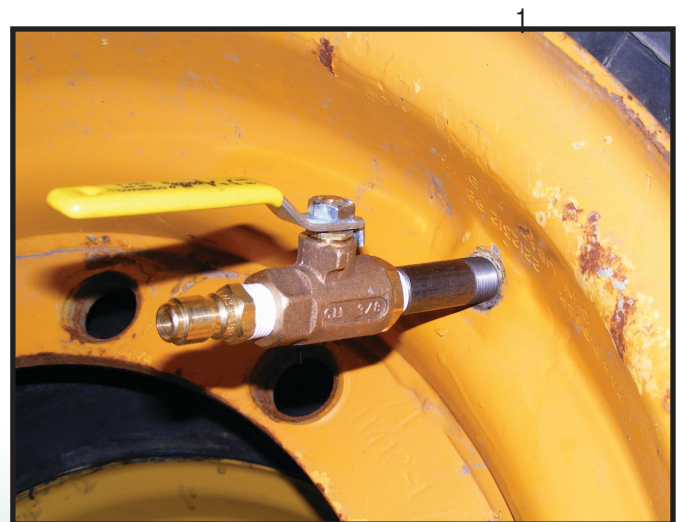


Ball Valve Tire Injector Part #

To replace standard shrader valves, remove the entire valve stem from the wheel. This should be done prior to mounting the tire. Run a 3/8 inch 18 TPI (NPT) tap into the valve stem mounting hole. Remove the tap and screw the threaded pipe end into the wheel to check for proper threading then remove the pipe. Mount the tire on the wheel. Fill the tire using the ball-valve stem adapter. After the tire has been filled and pressurized, close the ball-valve. After 24 to 48 hours, remove the ball-valve stem adapter and insert a 3/8 inch 18 TPI plug. This will protect the adapted threads during service. At the end of the service life, the plug can be removed and the tire can be filled again with the Green Machine or a standard Shrader valve or air-water valve can be reinserted for pneumatic use.



After the valve stem port has been enlarged, run the 3/8 inch tap into the hole to cut the threads.



Screw the ball-valve stem adapter into the stem port. Open and close the ball-valve handle to check for proper clearance.

Grinder Operation

The grinder was designed to process used urethane (flatproofing) only. Do not attempt to grind tires, retread components, natural or synthetic rubbers. Use of unapproved materials will void the warranty and possibly damage the equipment. Used urethane must be cut into pieces no larger than 16 inches in length and no thicker than 8 inches. Football size chunks are ideal. The urethane must be scanned prior to grinding with the metal detector. All debris especially metal must be removed from chunks selected for grinding. Keep in mind that other debris such as wood or plastic may be imbedded in the urethane. These chunks should be discarded. It is not worth the risk.

The amount of used urethane that you can grind per hour will vary and is based on the actual hardness of the used urethane. Typical results are 1000 pounds of grind per hour. Medium to harder urethanes work best. Soft durometer materials such as SuperFlex can be processed but should be mixed in a ratio of 1 to 4 with harder durometer materials. Example; 1 chunk of SuperFlex with 4 chunks of harder material. If SuperFlex is all you have then only attempt to grind 2 pieces at a time to avoid overfeeding. For medium and harder urethanes, place an empty receiving pail under the chute then start the grinder. Load the hopper with no more than 6 chunks of material. Thereafter, allow 20 to 30 seconds between each additional chunk. When the receiving pail is full of grind, shut off the grinder and empty the pail. Resume grinding with an empty pail. It is recommended to prepare a bin where you can store the grind for later use in the GreenMachine. Do not attempt to operate the grinder and the GreenMachine at the same time. Your attention should be directed at monitoring the GreenMachine's progress and the tire you are flatproofing!

When the grinder is overloaded with material the electric motor may stall or the electric breaker may trip. If the electric motor stalls, immediately stop the grinder. Reverse the direction of the grinder by pressing the reverse button on the control panel. Run the grinder in the reverse direction for about 20 seconds then press the stop button.

Press the forward button on the control panel to resume grinding. Never change the rotation directions without first bringing the grinder to a complete stop. If the electric breaker has tripped, reset the breaker then follow the procedure above.

If reversing the grinder rotation fails to free the rotors then excess material in the hopper will need to be cleaned out manually. Turn off the electric power at the service disconnect and place a lockout tag on the panel. Remove the bolts securing the hood to the hopper. Use a forklift and a chain or heavy duty strap to remove the hood using the eyehooks located on the top. Care should be taken with the exposed rotor blades as they are very sharp. With the hood off, remove the larger pieces of material first. Smaller pieces and grind can then be scooped out. Once you have removed most of the material in the hopper, carefully try to rotate the rotor. Gloves should be worn when turning the rotors. Once the rotors can be turned by hand, replace the hood and restore the electric power. Lightly load the hopper with material and continue grinding. Discontinue use if any metal to metal noise can be heard from the hopper. NOTE: The grinder will not operate with the hood removed

Grinder Maintenance

6 months

Lubricate the rotor bearings with two shots of synthetic grease. Do not over lubricate. Check oil in gearbox. Top off when needed. Change the gearbox oil every three years

Annually

Lubricate the bearings on the electric motor get two shots of grease. Use Shell Omala 460 oil or equivalent.

Green Machine Maintenance

Weekly

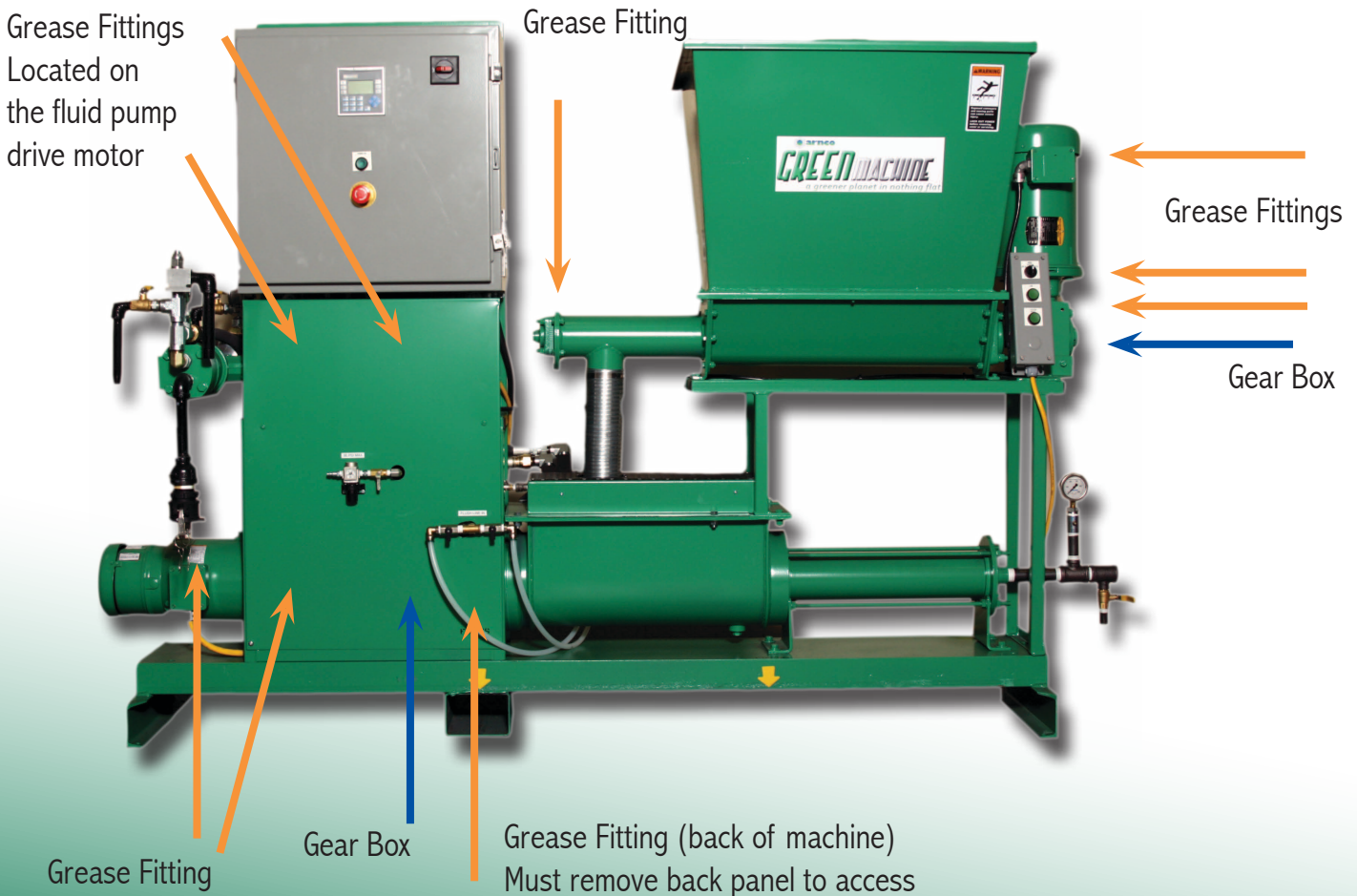
Take apart check valves soak and clean. Manually clean mixing well.

6 months

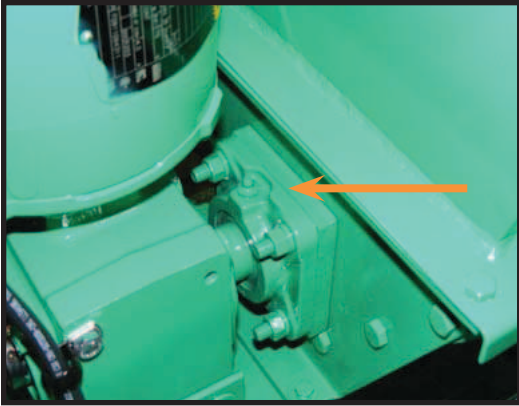
Check gear boxes and refill if needed. Clean the air filter on the control panel chassis with compressed air.

Annually

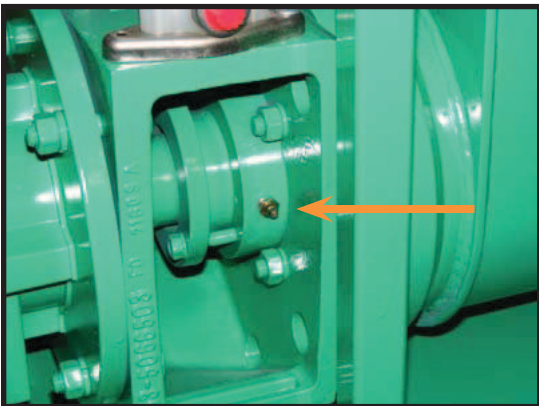
Locations are identified in the image below. Grease fittings get 4 shots of grease each year. Use Shell Omala 460 or equivalent. Change the gearbox oil every three (3) Years. Use a high quality synthetic grease for all fittings.



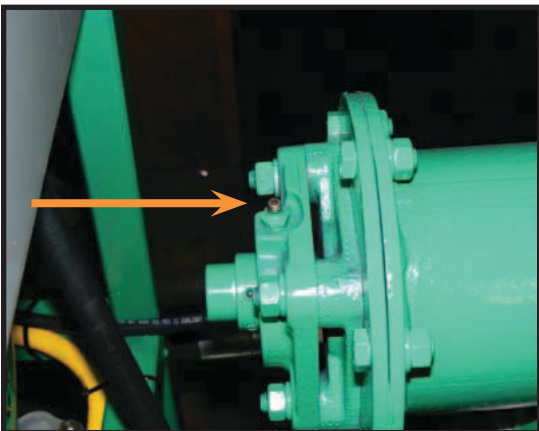
Green Machine Maintenance (cont.)



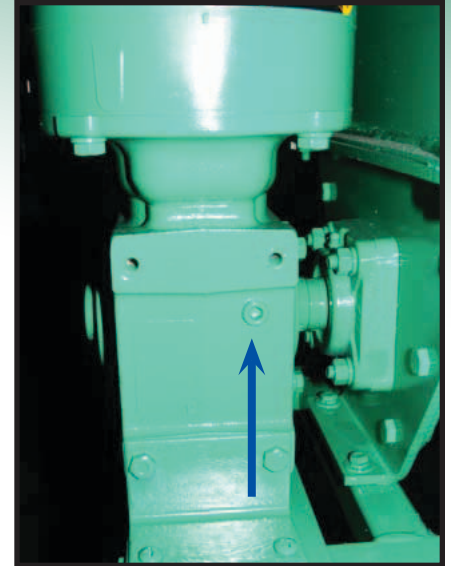
Hopper Auger Bearing
Location: Auger gear box



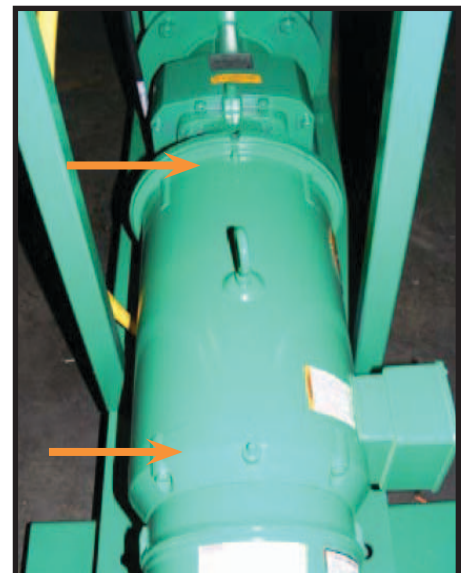
Progressive Cavity Mixer Drive Shaft
Location: Back of the unit under the flush pump



Hopper Auger
Location: Directly above the hopper chute on the end of the auger



Auger Gear Box
Location: Under the auger drive motor



Progressive Cavity Mixer Motor
Location: Directly under the control panel chassis



Progressive Cavity Mixer Gear Box
Location: Between the progressive cavity motor and the mixing well



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