

2021



The Von Arx VA 25s Walk-Behind Scarifier

Surface Grinding with Scarifiers

The Graco GrindLazer 630 Ride-On Scarifier



Participant Guide
Equipment Training
SMC Inc. Training Library

Rev. 1.2

PURPOSE

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Section One: Objectives and Introduction

Learning Objectives

During this workshop, you will:

1. Understand why scarifiers (grinders) are used and how they operate
2. Identify the main components of Von Arx and GrindLazer scarifiers
3. Realize the importance of safe operations
4. Comprehend the value of regular maintenance
5. Demonstrate learning by passing a written test

Introduction: What is Grinding?



Figure 1: Hand grinding a left-turn arrow (tape), to replace with epoxy, using the Von Arx VA25s scarifier.

At Safety Marking, Grinding is the removal of traffic control markings from road surfaces such as asphalt and concrete using high-speed steel grind heads with cutters (teeth) made of carbide and metal. There are three types of grinders: (1) push (2) sulkie driven ride-on models and (3) single-operator trucks requiring a Commercial Driver's License (CDL). The focus of this course is **scarifiers**, commonly referred to as Hand Grinders. At SMC all three types of machines are used on various surfaces including local roads, parkways, state and interstate highways, airport terminals and runways, bridges, and parking lots. Wherever there are colored marks indicating traffic control, we can be there grinding them away or etching them for different reasons. The reasons include, but are not limited to, changing a traffic pattern permanently, changing the shape, size, or color of a marking, a temporary lane change during construction, replacing old and worn markings, or replacing the type of marking from one substance to another, such as from paint to epoxy or thermoplastic. Grinding requires personal Protective Equipment (PPE) including safety glasses, dust masks and safety toe boots. Also, grinding requires the operator to be very attentive to detail, be very careful at all times, and be committed to maintaining the equipment for top performance.

Training Requirements

An SMC Qualified Trainer is required to train operators on these machines BEFORE operation is permitted. SMC Qualified Trainer =

- Minimum of 120 Operator hours logged on specific truck
- Completed Instructor Led Training (ILT) and passed written test (84%)
- Passed the Job Performance Measure (JPM) with Qualified JPM Administrator*
- Completed Level 1 Train-the-Trainer (T3) Program Courses:
 1. *Train-the-Trainer*
 2. *Giving Feedback*
 3. *Advanced Skills for the Practical Trainer*

*SMC Qualified Trainer in good standing administers the JPM



**Pro
Tip**

Record hours in your logbook for each piece of equipment you operate to ensure your training record is up to date.



Figure 2: Trainees in class at SMC HQ in Bridgeport.



Figure 3: Allowing the sweeper to keep pace so debris doesn't gather under the grinder.



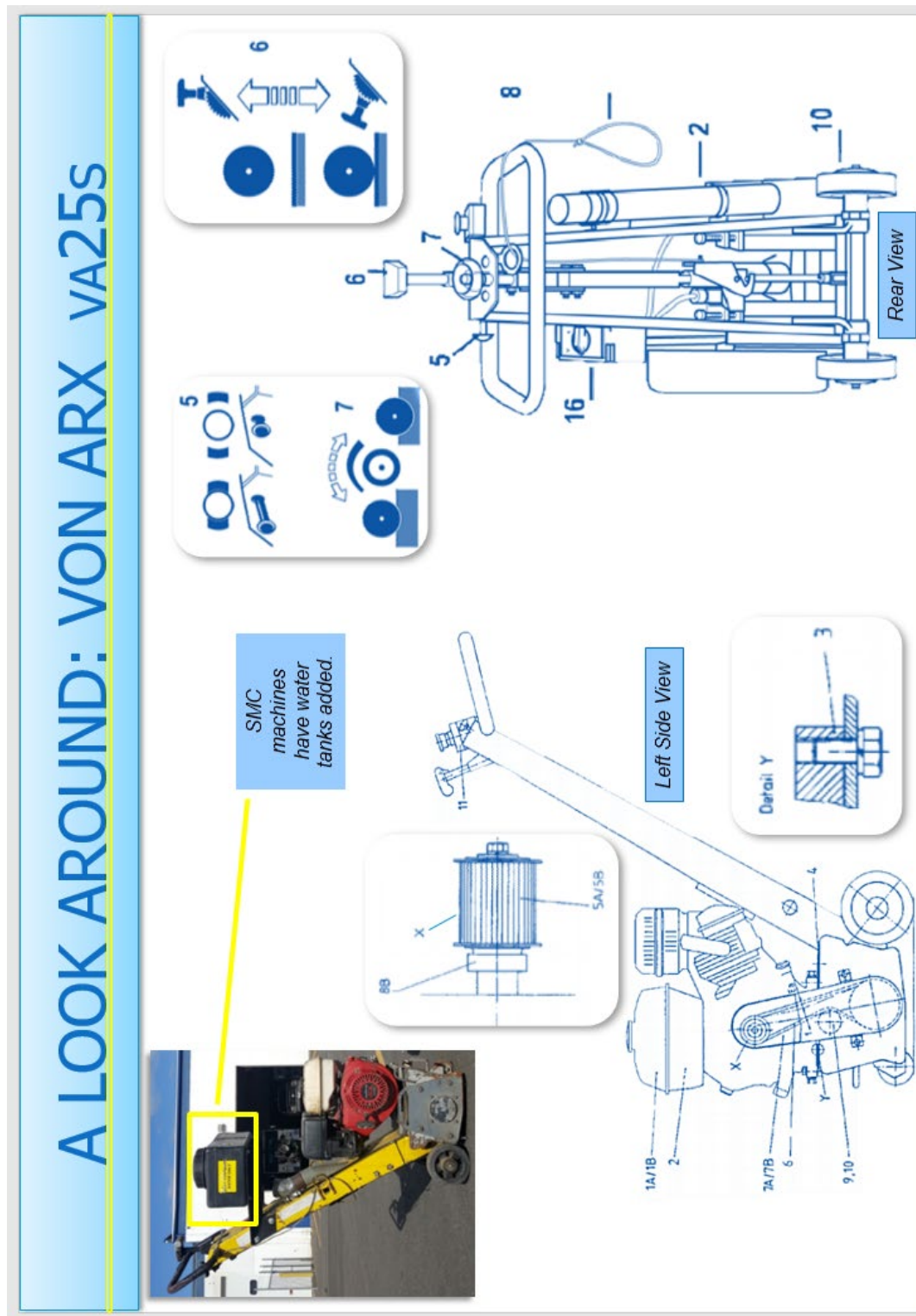
**Pro
Tip**

Use the Training portal at the SMC Intranet for training resources and just-in-time video learning.

Key Points

1. **Scarifiers** are gas-powered surface grinders with cutters (teeth) rotating at high RPMs
7. Operators **MUST** be fully trained and qualified
8. One of SMC's most commonly used machines
9. Used to remove all types of pavement markings
10. Generally used to remove handwork, e.g. stop bars, crosswalks, ONLY's, and arrows
11. Also used to prep existing markings to receive a fresh application
12. SMC uses walk and ride-on models
13. SMC uses water to minimize silica dust in accordance with **OSHA's Silica Standard**

Section Two: A Look at the Machines



Von Arx VA25s: Component List

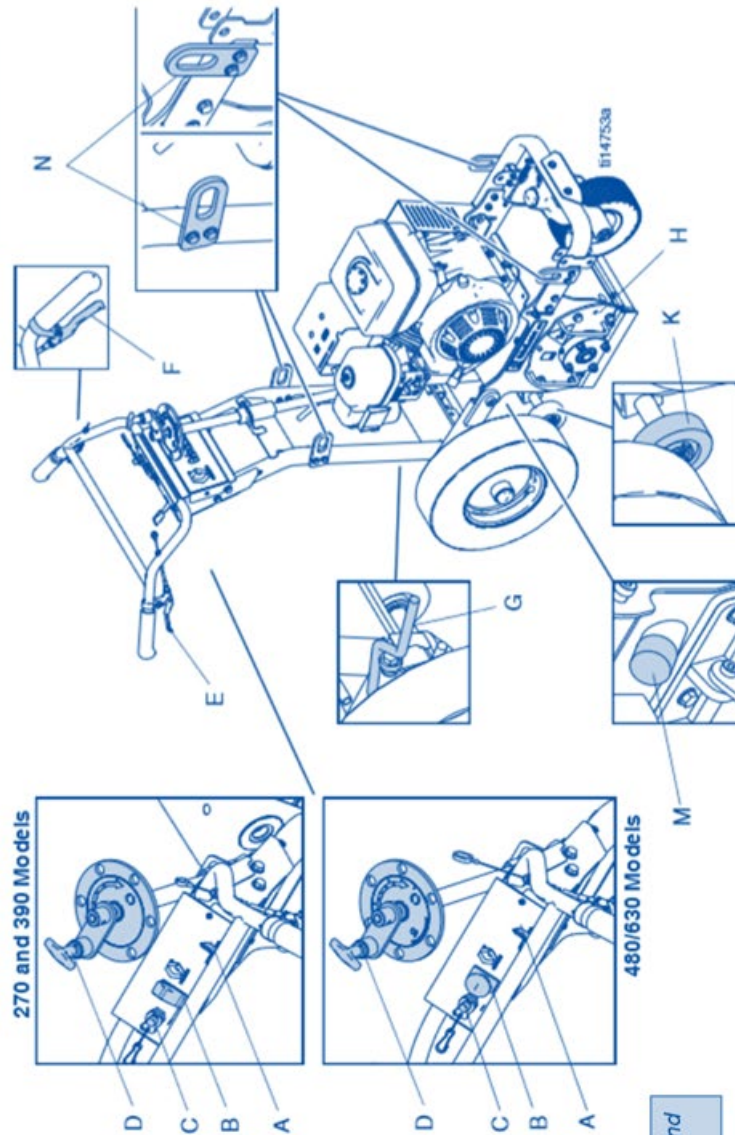
Component	Description
1a. Drive Motor	Two drive types not interchangeable. • Electric motor • Gasoline engine (SMC)
2. Gas Tank	Rear view: Not used by SMC – we use water for dust suppression. Side view: gas tank
3. Engine Mounting Plate	Engine mounting plate -- Detail 'Y' front
4. Engine Mounting Plate	Engine mounting plate, rear
5. Parking Brake / Pulley	Rear View: Blocks the support wheel. PULLED OUT: Wheel blocked PUSHED IN: Wheel freely mobile Side View: Toothed pulley
6. Adjusting Lever / Belt	Rear view: Fast adjustment to lift and lower the tool drum. TOP: Transport position BOTTOM: Working position Side View: Toothed belt
7. Depth Adjustment / Guard	Rear View: Hand wheel to adjust the working depth. Mechanical depth adjustment with automatic depth stop adjustment. LEFT - shallow working depth, fast advance RIGHT - greater working depth, slow advance Side View: Belt Guard
8. Steering Rod / Spacer	Rear View: Retaining handle to steer Side View: Spacer ring
9. Fatigue Protection / Tensioning Roller	Rear View: Secure to the machine operator's wrist. Automatically interrupts; the machine goes into the parking mode and the parking brake is applied. Side View: Belt tensioning roller
10. Supporting Wheels / Bracket	Rear view: Two fixed wheels to be advanced and run back on track. Side view: Fastening bracket
11. Belt Guard	Safety device
12. Guide Wheel	Fixed roller (as for 10)
13. Transport Hooks	Fixing points for crane.
14. Tool Drum	
15. Mains Plug	CEE plug 16A/380V/50Hz
16. Motor Switch	0=OFF, Y=Star circuit (set to Y 10 sec. after switching on) Delta circuit=Operating position

A LOOK AROUND: GRACO GRINDLAZER



The Graco Models 390 and 630 are virtually the same, **HOWEVER** the 630 is much more powerful and must be connected to a sulkie to operate. The 630 is a 21 HP reverse up-cut machine.

Right Side View –
component list on next slide



SMC uses the 390 walk-behind
and 630 ride-on models

Graco GrindLazer: Component List

Component	Description
A Engine Throttle Lever	Adjusts engine speed.
B Engine Stop Switch	Supplies power to Engine
C Emergency Shut-Off	Clamps onto the operator and shuts engine off if cord is disconnected during operation.
D Drum Adjustment Dial	Sets depth of drum cut.
E Drum Engage Lever	When lever is engaged, handle bars can be pushed down to raise the cutting drum off of surface and locked into UP position. Once drum is locked in UP position, GrindLazer can be moved around without drum touching surface.
F Front Wheel Lock Lever	Front wheel is usually locked to guide GrindLazer in a straight line. When lever is engaged, front wheel becomes unlocked and can turn freely.
G Rear Wheel Parking Brake	Prevents rear wheel from moving.
H Drum Access Panel	Removable plate that allows access to replace cutting drum.
K Depth Control Wheels	Levels cutting drum.
M Vacuum Port	Not used by SMC – we use water for dust suppression.
N Lift Points	Reinforced points used for lifting GrindLazer during transportation or repair.

Section Three: Pre-Trip and Inspection



Figure 4: Von Arx scarifiers sit ready for use after servicing.



**Pro
Tip**

The machines require oil checks and inspection after every use.

Von Arx and Graco Scarifiers

See Video @ Von Arx Demo

See Video @ GrindLazer Demo

Never Tilt Von-Arx Machine Backwards

1. NEVER tilt machine back onto the handle
14. Oil will flow into the cylinder head and damage the motor
15. ALWAYS tilt the machine forward when necessary to look under



Checklist for Grinding

1. Cones >> hand grinding MUST be done in a proper Work Zone
16. Grinders with correct cutters >> Carbide are the best for all-purpose use
17. Blower
18. Gas for grinder engines and blowers
19. Broom, shovel, large trash barrels
20. Required PPE >> dust mask and eyewear
21. Water for dust control tanks
22. Grinder water port clear – verify proper flow

Cutters

1. SMC uses three types of cutters.
23. Each cutter is for different work.
24. It's VERY important to use cutters for correct application.
25. The different types of cutters are 'Paint', 'Carbide', and 'Tape'.



Cutter Care

1. CHECK HEADS before leaving the shop
2. Ensure cutters are in good condition
3. Ensure you have the right machine for the job
 - Paint Cutters for paint removal or epoxy etching
 - Carbide Cutters for Epoxy, Thermo, thick paint, and etching
 - Tape Cutters for Tape, Epoxy, Thermo or thick paint removal
 - ❖ Carbide teeth are the best for 'ALL AROUND' use

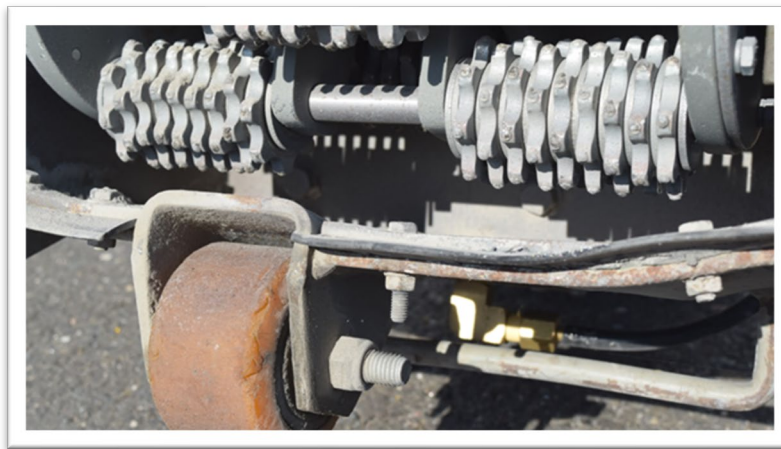


Figure 5: Carbide cutters mounted on Von Arx VA 25s - orange guide wheel forefront.

Cutter Inspection

1. Paint Cutters are worn when they look like washers or show flat spots.
2. Carbide and Tape Cutters are worn when diagonal play increases on the shaft.
3. Also, carbide tips are considered worn when they begin breaking off.
4. Damage to machine can occur if operating with worn out cutter teeth.

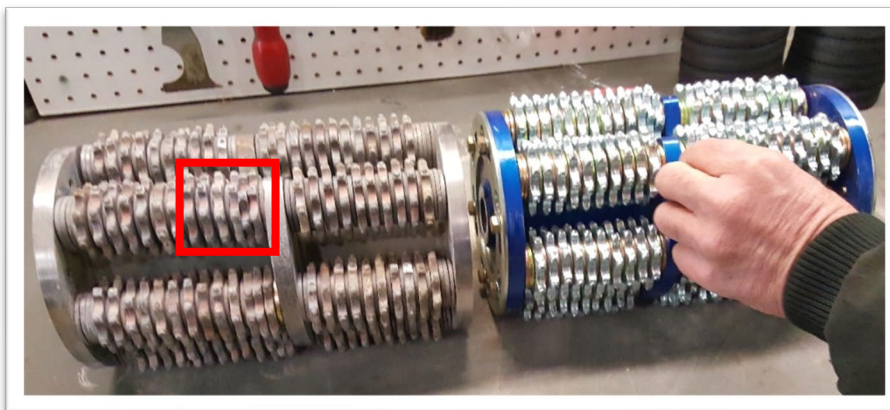


Figure 6: Comparison of head with damaged teeth (red) and brand-new head (r). Uneven wear can break shafts and damage roads. There should be no horizontal play on shaft, no flat spots on cutters and washers should be snug.

Dust Control

26. Fill water tank for dust control
27. Open ball valve on water hose
28. Check that water lines are clear and water flows from
29. port at back of grind head

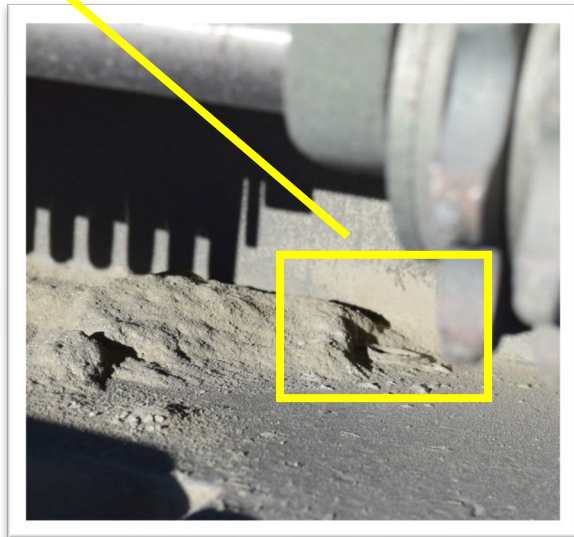


Figure 7: Dust suppression water port on Von Arx va 25s



Figure 8: Water tank retrofitted on the Von Arx va 25s



9. Water deposits can clog the valve and prevent flow from the port.



Section Four: Standard Operating Procedure

Pressure and Surface Damage

1. Too much down pressure is the biggest problem we have with hand grinders
2. It damages the cutters, shafts, and heads
3. Machines must be properly operated to work efficiently with minimum wear

See video – *Operating the Von Arx VA25s*



Operating Procedure (1) - Von Arx va25s

1. Start Machine.
2. Head must be in full UP position.
3. Black handle, (coarse adjustment), all the way back.
4. Black dial (fine adjustment), turned fully counterclockwise.
5. Cutters should not touch the ground when head is in UP position or you'll damage road surface.



Figure 10: Course and Find adjustments on the Von Arx va25s

Operating Procedure (2)

1. ON/OFF (Kill switch) must be UP (ON position).
2. On some machines, the kill switch cord must be attached to the switch to start.
3. Choke ON
4. Fuel lever OPEN
5. Pull cord to START engine. NEVER TILT MACHINE BACK WHILE STARTING. DO NOT LET GO OF CORD AFTER STARTING. This will damage the cord. Hold on to cord while it recoils.

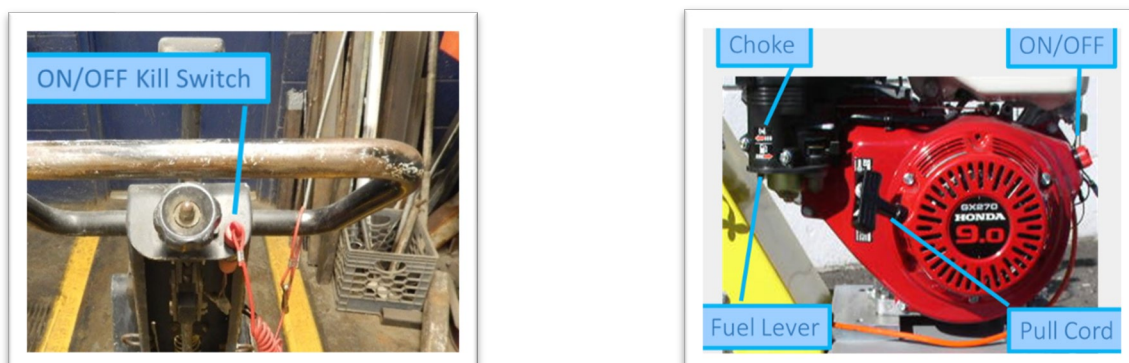


Figure 11: Close-up of Von Arx va25s

Operating Procedure (3)

1. Open ball valve on water tank and run grinder over area to be scarred.
2. Wet surface enough to control dust.
3. Close ball valve and grind.
4. Repeat application of water if dust appears.
5. Control the dust without making muck of the grinding debris.
6. Per OSHA Silica Standard Table 1, Water Suppression of dust is one of the two methods approved for dust control.

See [Water for Dust Suppression video](#)

Operating Procedure (4)

1. TO GRIND: lower head with Coarse Adjustment until cutter teeth are just touching the road surface >> lock head. Turn black dial (fine adjustment) in a clockwise direction until desired operating depth is reached.
2. Always keep machine moving when head is down.
3. Caution: **DO NOT** operate with head in full down position. This will damage the machine and the road.
4. Machines need daily servicing when used. For proper operation, the machines require oil checks and inspection after every use.
5. Avoid flattening cutters by reducing down pressure

Graco GrindLazer: 390 & 630 Models

1. The Graco GrindLazer 390 is a 13 HP Forward Cutting walk-behind machine.
2. The Graco GrindLazer 630 is a 21 HP Reverse Up-Cut machine that is **ONLY** operates with a LineDriver.
3. A safety switch on the 630 hitch prevents starting without a LineDriver attached.

See Operating video – Graco 630 Ride-On model



GrindLazer Pre-Trip

1. Perform all standard Pre-Trip inspections and procedures before using any GRINDLAZER. Make sure you are familiar with all controls before operating.
2. Always make sure water tank for dust control is full and test water application system **BEFORE** loading for a job,
3. Do not use if dust control system does not work.
4. **The only way to check cutters and drum is to remove the drum from the machine.**

GrindLazer SOP

Engage Rear Wheel Brake to prevent Grinder from moving. Attach LineDriver to GrindLazer if using 630 Model.

1. Rotate Drum to UP position by turning adjustment handle counterclockwise.
2. Push down on handlebars until drum is locked in UP position.
3. Make sure Engine Stop Switch is in UP position on 630 Model.
4. Start Engine
5. Fuel Valve Open
6. Choke ON
7. Engine Power Switch ON
8. Pull Starter Cord
9. After engine starts, Choke OFF
10. Set Throttle to Full
11. Release Rear Wheel Brake and LineDriver Brake.
12. Push down on handle bars, pull engagement lever, and lower drum into DOWN position.
13. Rotate Drum Adjustment Dial Clockwise until drum comes into contact with surface and desired depth is reached. DO NOT over adjust, this may cause damage to the road surface.



Note: Several test passes may be needed to dial-in desired cutting depth.

On the Job

1. As with all equipment, safety should always be TOP priority.
2. Dust masks, safety glasses, and ear protection should always be worn.
3. Our machines carry water tanks for dust control reduces silica exposure.
4. All work should also be done within a proper Work Zone set up.

Section 5: Maintenance and Service

Daily Maintenance

Each time the machine is used, inspect the following:

1. Engine Oil
2. All buttons, switches and the emergency release assembly
3. Heads >> look for loose, worn cutters and broken shafts
4. Drum for cracks
5. Pull Cord >> slowly pull out entire cord and look for frayed threads
6. Belt tension >> machine must be turned OFF and engine cool
7. Fill DUST CONTROL water tank
8. If you keep grinders on your truck, unload weekly for service and check daily for oil levels

RED TAG machines not operating safely and effectively



If Machine Needs Service

1. Get a red tag from the shop
2. Complete all the fields in pen
3. Provide detailed information
4. Print your name on tag
5. Attach tag to machine with wire twist



The 'Do Nots'

DO NOT:

1. Leave yard without inspecting heads and cutters
2. Leave yard without starting machine
3. Allow rip cord to 'whip' back after starting
4. Run with heads too low and damage heads and machine
5. Clock-out before servicing machine after use

Operator Cautions

WARNINGS

VERY IMPORTANT: the goal in grinding is to remove the existing markings 100% without damaging the road.

1. DAMAGE TO THE ROAD IS UNACCEPTABLE
2. Professional grinding requires constant adjustment by the operator
3. Use EXTREME CAUTION:
 - A. **When maneuvering the scarifier >> machine weight is more than 230 lbs. and drum rotates at 3300 rpm**
 - B. With tools, clothing, hair, loose or hanging objects around cutting heads and drive belts **they can be lethal if you make contact when they are moving**

When grinding:

1. Always set a cone pattern.
2. Face traffic, whenever possible.
3. Wear your recommended PPE to protect your health.
4. Look frequently at your work and glance around at your surroundings for traffic.
5. Use water to control dust.
6. Cover the surface being ground with just enough water to suppress the dust.
7. Wetting of the surface should be repeated as needed to minimize dust.
8. This reduces worker exposure to Silica and complies with the OSHA Silica Standard.
9. When checking carbide and tape cutters for wear, check for excessive diagonal play and missing washers between cutters.



10. When checking heads, make sure ON/OFF switch is OFF. This will prevent machine from accidentally starting while rotating heads.
11. If swapping tape heads, there is a correct rotation (teeth first). Note the direction of rotation and match the rotation with the new head.
12. If removing with a tape grinder and the road surface shows signs of damage, finish the job with a paint grinder.
13. Encourage the sweeper to work with you and keep pace to prevent debris build-up.
14. Always clean wheels of excessive buildup. Buildup on wheels can cause uneven grinding and damage the road.
15. The KILL SWITCH cord >> in case of emergency while operating grinders, pull this cord which releases the head to the upright position and stops contact with road surface.

Securing and Servicing

1. On rack body trucks, wrap the straps around a vertical rail to prevent the grinders from sliding during transport.
2. In box vans, handles go against side of box and get strapped tight.
3. No matter what vehicle is used for transport, grinders should always be secured engine out, head down, and strapped tight to prevent damage to the machine.



Section Six: Troubleshooting

Won't start:

1. Check ON/OFF switch.
2. Check that fuel tank is full.
3. Check fuel ON/OFF lever.
4. Check that emergency stop E-clip is attached properly on back of machine.
5. Check that KILL switch is attached on Black machines.
6. Check oil: engine has low oil indicator that shuts down engine.
7. Pull cord won't pull, bearings may be frozen. This can't be fixed on the road.

Won't grind:

1. Check that the emergency 'E'-clip is properly attached on back of machine. The emergency feature of this mechanism is to prevent the head from touching the ground when detached.
2. Check belt, grinding head won't turn if belt is broken. Belt may be replaced by removing the cover plate loosening the tensioning pulley, installed, and tightened with the tensioning pulley.
3. To change belts you will need a ½ inch socket, and a ¾ inch socket to remove the belt shroud and adjust the belt tensioner.

Broken Shaft / Damaged Head:

1. In the event of a broken shaft, damaged head, or even a broken belt it may be necessary to change heads.
2. To change heads:
 - a. Remove the four nuts on the cover plate. This requires an 11/16" socket.
 - b. Slide the head off the hex drive shaft.
 - c. Install the new head on the hex drive shaft. If replacing a head with tape cutters, make sure they are installed for the correct rotation.

Section Seven: What Successful Operators Do

- 1. Think of safety and how to prevent what can go wrong.**
- 2. Complete daily maintenance before and after the shift.**
- 3. Work as role models for everyone around them.**
- 4. Teach others the correct way to do things.**
- 5. Treat the equipment as if they owned it.**
- 6. Represent SMC in the best light all the time.**
- 7. Communicate when questions arise.**
- 8. Ask for clear directions and give them.**
- 9. Hold other Operators accountable for great teamwork.**
- 10. Speak up when colleagues are not safe.**

Section Eight: A Personal Action Plan

I know where I'm starting from. I know I am already good at these things, and I can do them more often:

I can learn this, I am learning this, and I am doing what I can at this stage as well. I have already learned:

I will start with small steps, especially in areas that are difficult for me. My short-term goals for improvement are:

I promise to congratulate and reward myself every time I do something, no matter how small, to maintain and improve my skills. My rewards will be:

I'm setting myself up for success by choosing long-range goals to work for gradually. My long-term goals for success are as follows:

Recommended Reading List

Crucial Conversations, Tools for Talking When Stakes Are High, by Kerry Patterson, Joseph Grenny, Ron McMillan, Al Switzer, McGraw Hill, 2002.

Test to be taken at end of training

Pass with minimum score of 85%