North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

February 23, 2015

Mr. Tony Sanchez
VP Marketing and Sales
Viradys Medical Waste Solutions
1001 Thornblade Blvd
Greer, SC 29615

Re: Viradys Medical Waste Disinfection System

Dear Mr. Sanchez:

This is in response to your request for the approval of the Viradys Medical Waste Disinfection System for the treatment of regulated medical waste, as stated in your letter dated January 6, 2015. Regulated Medical Waste is defined in 15A NCAC 13B .1201(10) as blood and body fluids in individual containers in volumes greater than 20 ml, microbiological waste, and pathological waste.

The Division of Waste Management is authorized to approve alternative methods of treatment of regulated medical waste according to 15A NCAC 13B .1203(b).

According to documents and data submitted to the Division by Viradys, the Medical Waste Disinfection System employs shredding and infrared heat to treat the waste and render the waste unrecognizable.

In documents and test reports submitted to the Division by Viradys., the Medical Waste Disinfection System demonstrated effective treatment of microbial test agents.

This product is approved for the treatment of regulated medical waste provided the unit is installed, operated and maintained in a manner consistent with the manufacturer's specifications and recommendations as described in the Viradys Product Manual. Monitoring under conditions of full loading for effectiveness of treatment shall be performed no less than once per month or as often as is necessary to ensure effective treatment, through the use of biological indicators as described in the document "Testing Protocol for Viradys Disinfection Unit" provided by Viradys Medical Waste Solutions.

Sharps, dressings, bandages, gowns, gloves and similar items are not defined as regulated medical waste in North Carolina and do not require treatment before final disposal.

If the unit produces any liquid discharges, notification of this waste management practice shall be made to the wastewater/sanitary sewer authority where the unit is installed prior to any discharge.

This approval is valid until such time as it has been determined that this treatment technology for this waste type no longer meets the requirements of the rules for the regulation and treatment of medical waste.

Should you have any questions regarding this matter you may contact me at (919) 707-8245 or Bill Patrakis at (919) 707-8290.

Sincerely,

Ellen B. Lorscheider

Ellen B. Lorscheider
Solid Waste Section Chief

cc: Linda Culpepper, Director, Division of Waste Management
Bill Patrakis, Environmental Scientist

ATTENTION

THIS MANUAL IS TO BE DELIVERED TO THE FACILITY MANAGER IMMEDIATELY!

THE BACK OF THIS MANUAL CONTAINS THE VIRADYS WARRANTY REGISTRATION.

THIS REGISTRATION IS TO BE FILLED OUT AND RETURNED TO VIRADYS AT TIME OF SYSTEM INSTALL.

Shipping Info

Unpacking and Inspection

You should inspect your Medical Waste Disinfection System for possible shipping damage.

Thoroughly check the equipment for any damage that might have occurred in transit, such as broken or loose wiring and components, loose hardware and mounting screws, etc.

In the Event of Shipping Damage

According to the contract terms and conditions of the Carrier, the responsibility of the Shipper ends at the time and place of shipment.

Notify the transportation company's local agent if you discover damage.

Hold the damaged goods and packing material for the examining agent's inspection. Do not return any goods before the transportation company's inspection and authorization.

File a claim with the transportation company. Substantiate the claim by referring to the agent's report. A certified copy of our invoice is available upon request. The original Bill of Lading is attached to our original invoice. If the shipment was prepaid, write us for a receipted transportation bill.

Advise customer service regarding your wish for assistance and to obtain an RMA (return material authorization) number.

If the Shipment is Not Complete

Check the packing list as back-ordered items are noted on the packing list. You should have:

- Bill of lading
- Packing list
- Operating and Installation packet
- Electrical schematic and panel layout drawings
- Component instruction manuals

Re-inspect the container and packing material to see if you missed any smaller items during unpacking.

If the Shipment is Not Correct

If the shipment is not what you ordered, contact the parts and service department immediately at (888) 734-3783. Have the order number and item number available. Hold the items until you receive shipping instructions.

Returns

Do not return any damaged or incorrect items until you receive shipping instructions from the shipping department.

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Chapter 1: Safety

1-1 How to Use This Manual

Use this manual as a guide and reference for installing, operating, and maintaining your Medical Waste Disinfection System. The purpose is to assist you in applying efficient, proven techniques that enhance equipment productivity.

This manual covers only light corrective maintenance. No other maintenance should be undertaken without first contacting a service engineer.

The Functional Description section outlines models covered, standard features, and safety features. Additional sections within the manual provide instructions for installation, pre-operational procedures, operation, preventive maintenance, and corrective maintenance.

The Installation chapter includes required data for receiving, unpacking, inspecting, and setup of the shredder and disinfection chamber. We can also provide the assistance of a factory-trained technician to help train your operator(s) for a nominal charge. This section includes instructions, checks, and adjustments that should be followed before commencing with operation of the shredder. These instructions are intended to supplement standard shop procedures performed at shift, daily, and weekly intervals.

The Operation chapter includes a description of electrical and mechanical controls, in addition to information for operating the Medical Waste Disinfection System safely and efficiently.

The Maintenance chapter is intended to serve as a source of detailed assembly and disassembly instructions for those areas of the equipment requiring service. Preventive maintenance sections are included to ensure that your shredder provides excellent, long service.

The Troubleshooting chapter serves as a guide for identification of most common problems. Potential problems are listed, along with possible causes and related solutions.

The Appendix contains technical specifications, drawings, schematics, parts lists, and available options. A spare parts list with part numbers specific to your machine is provided with your shipping paperwork package. Refer to this section for a listing of spare parts for purchase. Have your serial number and model number ready when ordering.

Safety Symbols Used in this Manual

The following safety alert symbols are used to alert you to potential personal injury hazards. Obey all safety messages that follow these symbols to avoid possible injury or death.

DANGER! DANGER indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

WARNING! WARNING indicates a potentially hazardous situation or practice that, if not avoided, could result in death or serious injury.

CAUTION! CAUTION indicates a potentially hazardous situation or practice that, if not avoided, may result in minor or moderate injury or in property damage.

1-2 General Safety Regulations

This machine uses knives and extreme heat for the performance of its intended use. Consequently, it can be a dangerous machine to operate and maintain unless these safety regulations are followed.

These regulations should be read, understood and periodically reviewed by all personnel involved in any way with this machine.

Never operate or remove any machine components that are secured by wrench-type fasteners unless the motor is electrically locked out, the rotor is motionless and the disinfection chamber is cool to the touch.

Never operate the machine or jog the rotor unless the cutting chamber covers, discharge chute, or any guards or covers are in place and secure. Do not circumvent the safety interlocks.

Prior to clearing a jam or performing any maintenance, the motor should be turned off and electrically locked out. Be sure that the rotor has come to a stop. Ensure the disinfection chamber is cool. Hands must not be inserted into the machine to clear the jam.

Do not extend any part of the body into hopper openings or discharge area unless the motors are electrically locked out and the rotor and ram are motionless.

Never extend fingers through holes in screen. Be sure that the v-belts are properly aligned and that tension is at its prescribed value.

Extreme care should be taken to see that all bolts are properly tightened at all times. During the operation of the machine, rotor knife bolts may come loose. Although, fine threads are used on the cutter bolts vibration can easily loosen them, you should inspect the tightness of the bolts frequently.

This machine is designed for the shredding and disinfection of Regulated Medical Waste as defined by the United States Environmental Protection Agency and the US Medical Waste Tracking Act.. Do not feed any other materials into the machine. If in doubt contact Viradys with questions regarding the material you intend to introduce to the shredder. Ferrous and heavier Non-Ferrous Metals (replacement joints, e.g. hips, knees, shoulders, etc.) are examples of material that will cause severe damage to internal cutting chamber, rotor and screen components and will void the warranty.

1-3 Responsibility

These machines are constructed for maximum operator safety when used under standard operating conditions and when recommended instructions are followed in the maintenance and operation of the machine.

All personnel engaged in the use of the machine should become familiar with its operation as described in this manual.

Proper operation of the machine promotes safety for the operator and all workers in its vicinity.

Becoming familiar with materials, inspection, speed limitations, screens, and guard maintenance and total user responsibility will assist you in learning potential areas in need of observation for danger.

Each individual must take responsibility for observing the prescribed safety rules as outlined. All caution, warning and danger signs must be observed and obeyed. All actual or potential danger areas must be reported to your immediate supervisor.

1-4 Warnings and Precautions

The Medical Waste Disinfection system is comprised of two subsystems, a shredder and a disinfection chamber or oven. Both subsystems have their inherent warnings and precautions.

BIO HAZARD: This system is designed to disinfect active biological pathogens. As such, proper care must be maintained in servicing the system. Prior to servicing the system, proper disinfection procedures must be established and followed. Suggested disinfection procedures are described in Chapter 5, Maintenance

Our shredders are designed to provide safe and reliable operation when installed and operated within design specifications, following national and local safety codes.

To avoid possible personal injury or equipment damage when installing, operating, or maintaining this system, use good judgment and follow these safe practices:

LEARN AND OBEY your company's safety policy regarding shredding equipment.

MOVING OR LIFTING THE SYSTEM: Although our equipment is built and engineered for great ruggedness in operation, care must be taken when moving the machine along the floor or lifting it. Damage may occur to sheet metal covers, electrical cabinets, or small brackets if pressure is applied to them when moving. When lifting the system, be certain of total machine weight and the capability of the lifting equipment. (See the System Specification Sheets for machine weights and dimensions.)

SYSTEM LOCATION: Adequate area for routine maintenance should be provided in order to open the machine for knife, screen, conveyor and/or chamber service. Proper service area clearances also should

allow people who are working on the machine to be clearly visible to others, thereby reducing the potential safety hazards.

SAFE HOUSEKEEPING: The work area must be kept clean and uncluttered during periods of operation or maintenance. No hand tools or other metal objects should be left on or around the machine. Any tools or other metal objects that mistakenly fall into the hopper feed opening can cause severe damage to internal cutting chamber, rotor and screen components.

SAFETY GLASSES OR A FACE SHIELD MUST ALWAYS BE WORN when servicing or operating the machine. Although our machines are designed for the maximum in flyback control, caution must be used when operating near the hopper feed opening in order to guard against unexpected material and biological flyback.

EAR PROTECTION may be required when operating the machine during shredding of very hard or noisy materials. The Occupational Safety and Health Act of 1970 has established guidelines for Permissible Noise Exposures (OSHA 1910.95) that should be followed.

NEVER attempt to operate the shredder unless it is fully assembled with all guards and interlocks in place and functional.

OBSERVE all danger, warning, caution and safety labels on the equipment. Upon completion of any machine maintenance, be certain ALL SAFETY GUARDS AND COVERS are securely and properly fastened prior to resuming machine operation. All fasteners must be in place and properly tightened.

ANY SHORTCUTS MAY RESULT IN SERIOUS INJURY OR SEATH TO PERSONNEL OR DAMAGE TO EQUIPMENT.

NEVER wear any loose fitting clothes, neckties, or dangling items such as earrings, belts, or shoestrings. Jewelry, such as wristwatches, bracelets, or rings should NEVER be worn. Long hair must be tied back or placed in a tight fitting hairnet.

NEVER lean against or rest hands or feet on the system when it is in operation or open for maintenance.

NEVER stand on the shredder when it is in operation.

NEVER stand on the disinfection unit.

NEVER touch the disinfection unit when it is in operation.

ROTATION OF MOTORS: The correct rotating direction for the shredder motor is clearly marked on the machine. Always check for proper rotation of motors. Incorrect rotation direction can cause severe damage.

ELECTRICAL GROUNDING: All electrical equipment on the shredder must be grounded in accordance to all local codes and Article 250 of the National Electric Code.

ALWAYS DISCONNECT AND LOCKOUT the main electrical power to the System before performing any service.

SAFETY INTERLOCKS MUST NOT BE BYPASSED. The mechanical and electrical safety interlocks ensure the safety of personnel. They should never be tampered with or removed for ANY reason. A certified and qualified mechanic should make frequent checks for proper operation.

NEVER modify the machine configuration or any individual component without written notice from the factory.

Remaining Risks

The machine is constructed so that you are able to operate it safely. Non- avoidable dangers are prevented as greatly as possible by the protective devices. Remaining risks always exist. Please be aware of the risks described below as this will help operators/staff avoid accidents. To further avoid danger, please adhere to all advice provided in the operational manual.

Type of Danger	Activity	Possible Consequences	Preventable Measures
Crushing due to heavy parts falling down or over.	Unloading/transporting the machine and/or components.	Serious injury.	•Wear personal protective gear and follow the instructions provided in the operational manual.
Cutting caused by sharp knives--even when the rotor is stationary.	Knife replacement, knife setting, knife sharpening, and other maintenance.	Serious injury--particularly to the hands and fingers.	•Wear personal protective gear and follow the instructions provided in the operational manual.
Crushing when opening/closing the doors on front side of machine.	Maintenance.	Serious injury.	•Ensure no persons are in the danger area while closing the door.
Tripping over cables and other surrounding objects.	All activities.	Serious injury.	•Lay cables in accordance with regulations. •Keep workstation clean and tidy.

Type of Danger	Activity	Possible Consequences	Preventable Measures
Crushing, cutting, amputation caused by run-down of the rotor.	Maintenance.	Serious injury or death.	•The maintenance doors must always be tightly locked during operation. •DO NOT make the run-down safety devices ineffective by using technical aids or other manipulations. •NEVER use hands to check if the rotor has stopped.
Direct/indirect contact with live parts in terminal box.	Maintenance; start-up.	Serious injury or death.	•Only trained electricians may carry out work on the electrical equipment. •If work is necessary on parts that could conduct dangerous voltage, a second person should be present to break the power supply in case of an emergency. •Only use original safety fuses with stipulated intensity of current. •Faulty electrical components must be replaced immediately. •If faults occur in electrical energy supply, switch the machine OFF immediately. •The terminal box must be locked during operation. Before opening the terminal box turn the main switch to 0.
Failure of the Emergency Stop Function.	All activities.	Serious injury or death.	•There must be a guarantee that the machine will be stopped immediately upon failure of an Emergency Stop button.
Fire/explosion caused by throwing dangerous objects (i.e. spray cans) into the shredder.	Shredding.	Serious injury or death.	•Only shred material that corresponds to the agreed customer-specific specifications. Fire detection/suppression systems are available for this machine.

Type of Danger	Activity	Possible Consequences	Preventable Measures
Damage to hearing.	All activities.	Diminished hearing, headaches, impaired balance, deterioration of concentration.	•Reduce noise levels by taking suitable measures and wear ear protection.
Unstable machine due to vibration.	All activities.	Serious injury.	•Install the machine according to the instructions in the operational manual.
Loose cutter/bed knife mountings due to vibration.	All activities.	Serious injury.	•Check the cutter/bed knife mountings regularly.
Inhalation of grinding dust.	All activities.	Respirator disease, etc.	•Mount a suitable air suction device. DO NOT blow out grinding dust when cleaning the machine.
Crushing, cutting, amputation caused by manipulation of protective devices.	All activities.	Serious injury or death.	•Never make the protective devices ineffective; check the devices regularly for proper function.

We have long recognized the importance of safety and have designed and manufactured our equipment with operator safety as a prime consideration. We expect you, as a user, to abide by the foregoing recommendations in order to make operator safety a reality.

Chapter 2: Functional Description

2-1 Models Covered in This Manual

This manual provides operation, installation, and maintenance instructions for the 30” Dump & Run Shredders and 4 zone disinfection chamber.

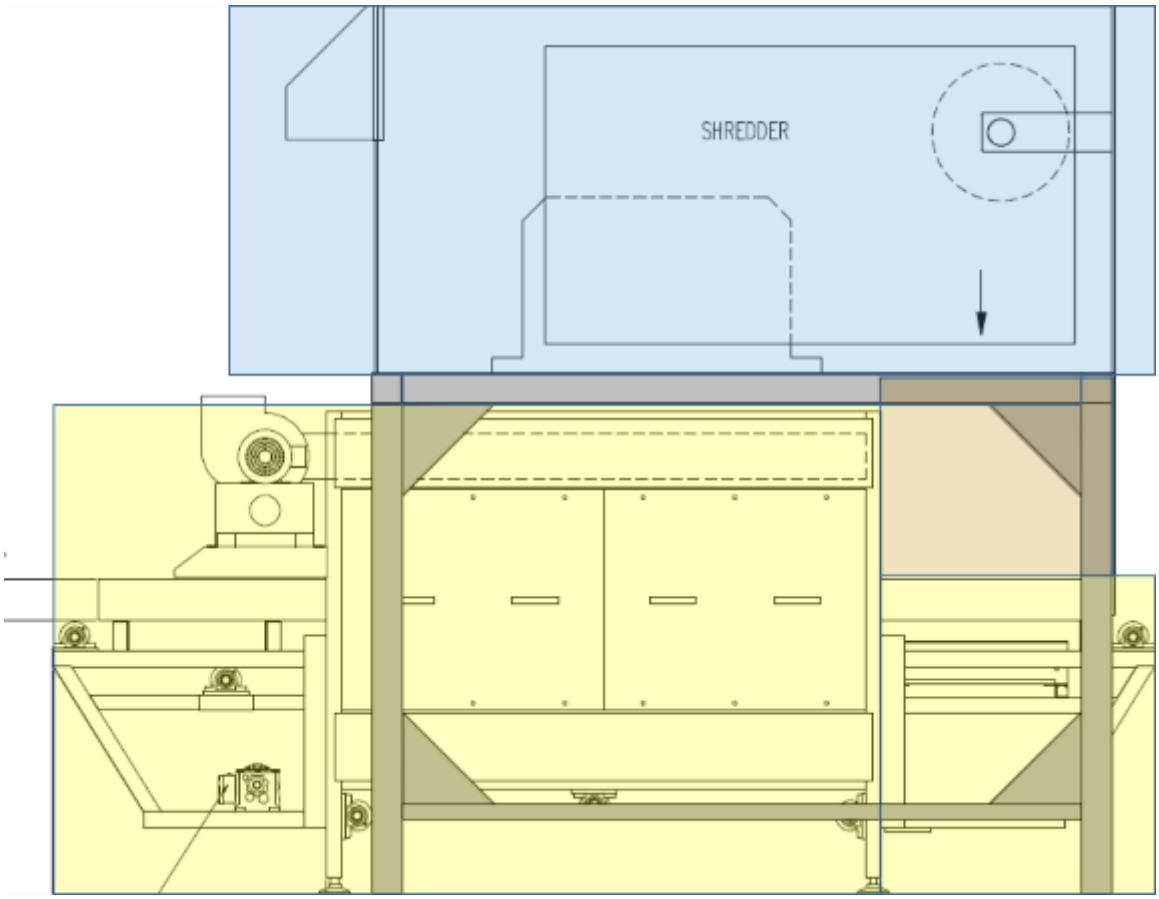
Performance Specifications	
System	
Voltage (V/PH/Hz)	480/3/60
Dimension (LxWxH)	144 x 60 x 117 inches
Weight	6,700 lbs.
Shredder	
Drive HP	30 HP
Rotor Diameter	12”
Rotor Width	30”
RPM	80 rpm
# of Cutting Disks	38
Sizing Screen Opening	½”
Hopper Opening (AxB)	60” x 30”
Charge Opening (CxD)	40” x 30”
Hopper Volume (Yds)	1.5 yds
Disinfection Chamber	
Heating Zones	4
Heating Elements	15
Chamber Length	108”
Max Throughput	6 yds/day

Viradys
Medical Waste Solutions

1. Hydraulic cylinder driven RAM provides precision feed of scrap to cutting rotor. PLC controls continuously adjust different load variables to maximize processing efficiency.
2. FLUID COUPLINGS available for soft, cushioned starts, mechanical protection and lower energy consumption (not shown).
3. Oversized Class 3, shaft-mounted, speed reduction GEARBOX rated with a 4:1 service factor.
4. External mounted, heavy duty, self-aligning spherical ROLLER BEARINGS support the rotor.
5. Solid steel CUTTING ROTOR is CNC machined and has a Limited Lifetime Warranty. Several sizes are available depending on the application.

Renegade shown with all guards and covers removed.

6. Attached to the cutting rotor are replaceable, precision fit, CNC machined KNIVES. They are heat treated for durability and designed to be rotated up to six times before replacement.
7. SCREEN can be sized from 3/8" to 8" for consistent particle sized in a single pass.
8. Large customizable HOPPERS with 2 to 14 cubic yard capacities (not shown).
9. TONGUE & GROOVE AR400 FLOOR standard on all models.
10. TOUCH SCREEN available .



2-2 General Description & Typical Features

The Dump & Run shredder is designed for processing Regulated Medical Waste including sharps, plastic, rubber, and paper materials. The shredder as configured reduces material to approximately 0.25 inches (10 mm). The shredder can average 150% of its stated throughputs without heavy power consumption loads (typically seen when using a granulator alone).

In-feed Hopper

The Medical Waste is feed to an in-feed hopper which stages waste for shredding. The Medical waste can be presented to the Hopper using many methods. Typical in-feed options include manual in-feed of the shredding material directly into the hopper with or the use of an additional in-feed device (i.e. conveyor belt).

Screen
Shredded material feed through a ½” screen which ensures the waste size.

Rotor and Knives
The material is ground between the knives assembled on the rotor and the bed knives, which are mounted in a fixed position on the machine’s lower section.

All rotors are equipped with round knives intersecting with scalloped counter knives; these knives make light work of the heaviest pieces. These round knives are indexable 4 to 6 times. The scalloped counter knives have identical edges on each side allowing them to be flipped 1 time for use on alternate side.

The design of the rotor has a significant influence on the quality of the grinding process and its results. The rotor construction, the type of knife mounting, and the number of knives have all been exactly matched to the allocated tasks of the machine.

The rotor is accessible after opening the rotor door. The rotor is arranged on roller bearings, which are located outside the cutting chamber. Gearbox is attached to the rotor axis and rotational energy is derived from an electric motor. The electric motor is connected to the gearbox either directly or with pulley driven belt drive.

Ram

The ram provides force necessary to introduce shredding materials to the cutting rotor. The ram is moved by pressure from hydraulic cylinder. The ram action is controlled by PLC logic. The ram uses spring-loaded and/or adjustable jam bolt wipers on all sides to contain shredded materials inside the cutting chamber. Some models are tongue and groove floor design and only have spring-loaded wipers on the sides of the ram.

Drive

The drive consists of either a belt-connected pulley mounted to parallel shafted gearbox or a direct driven right-angle gearbox.

Hydraulic Power Unit

The hydraulic power unit provides hydraulic pressure, velocity, and directional control to the hydraulic cylinder(s) that control the ram action. A typical hydraulic power unit consists of electrical motor, hydraulic pump(s), directional solenoid valve(s), return filter, temperature/level switch, and pressure transducer.

Hydraulic System Pressure Gauge
Monitors Ram Pressure that is controlled by the pressure switch and the PLC.

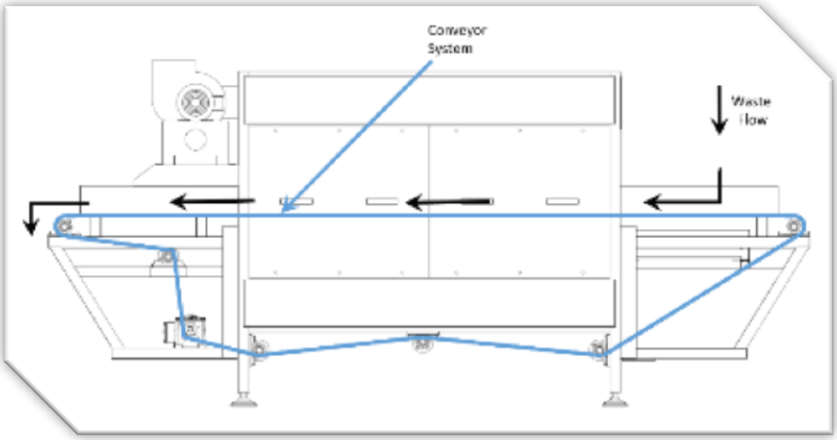
Oil Filter Service Gauge
When the needle positions itself in the yellow area of the gauge, it is time to change the oil filter.

Disinfection Chamber/Oven

The Disinfection Chamber/Oven accepts the shredded waste from the knives. The waste is adjusted to approximately ½" of depth and sent, via conveyor, through an over for disinfection. Heat is applied to the waste for a prolonged period of time to ensure the bio waste is treated to specified disinfection rate

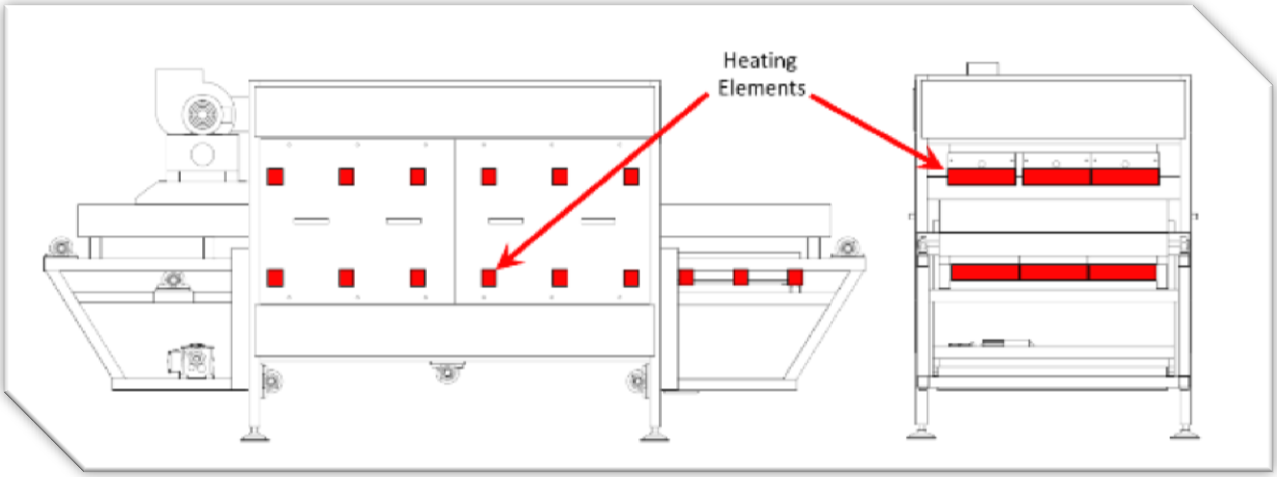
Oven Conveyor System

The Oven Conveyor System moves the waste from the shredder subsystem through the heated treatment. The conveyor is comprised of a serpentine belt, five pulleys, one tensioning pulley and a conveyor drive motor. The galvanized belt is approximately 26' long and 3' wide. The cells within the belt are approximately 1" x ½" and a depth of approximately ½". The conveyor system runs through the chamber and returns under the heating elements.



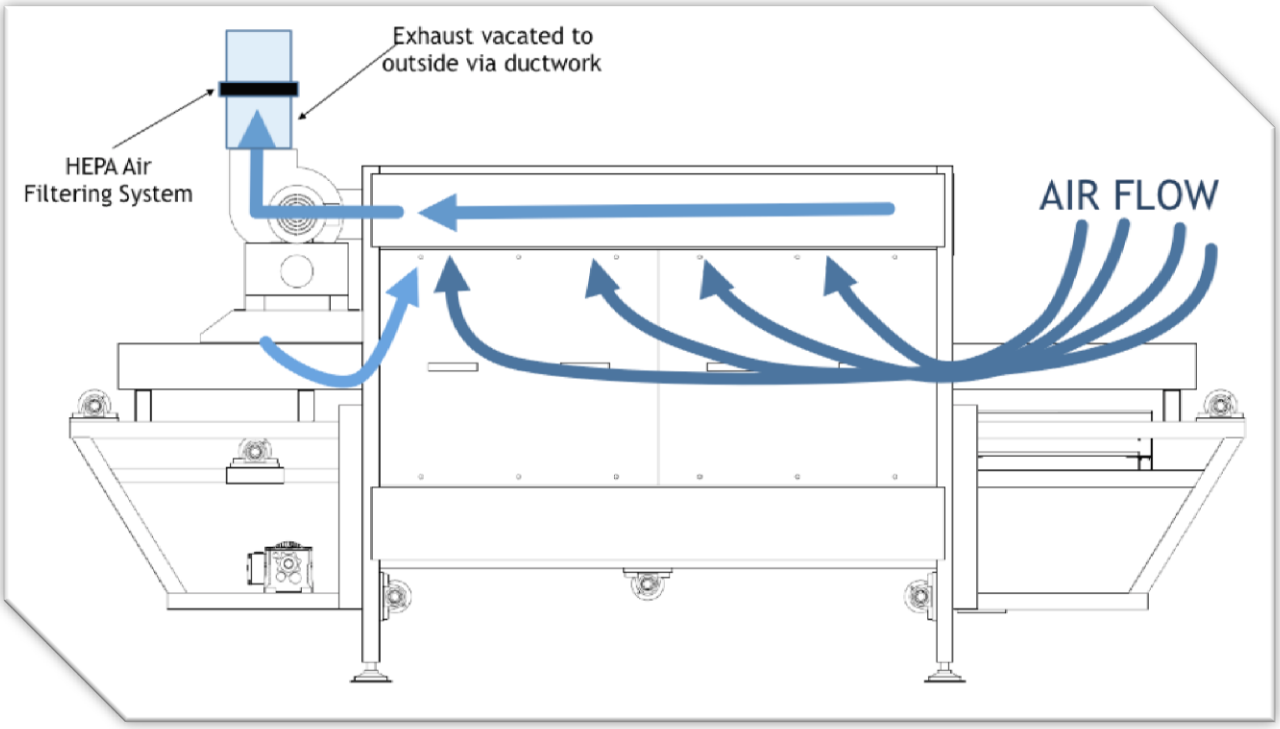
Heating Elements

There are 15 Infrared heating elements that provide energy to disinfect shredded medical waste. The waste is moved through the heated chamber by the conveyor system discussed, above



Air Flow/Exhaust

Air is pulled into the system and vacated into the outside through a filtered exhaust system. The Medical Waste, as it is in the process of disinfection, may provide odor that can be considered, unpleasant. The Air Flow/Exhaust system is designed to reduce odors to the immediate surrounds. The ventilation system is designed to include an HEPA filter to ensure any airborne particles will be captured within the system.



Control Panel

The control panel provides logic control for the main rotor motor, hydraulic system, conveyors and heating systems. The various input sensors and limit switches from the disinfection oven, shredder and hydraulic power unit provide feedback to the programmable logic controller (PLC) thus producing machine functionality. Wiring from the control panel will connect to the main rotor motor, main machine junction box, oven power junction box, oven control power box and hydraulic power unit junction box. A typical control panel consists of a main disconnect, and emergency stop push button; further details of functioning components can be found in the appendix of this manual or within electrical schematics provided with the shredder at the time of shipment.

2-3 Safety Features

Protective Devices
The machine must never be operated without the following protective devices or with faulty or manipulated protective devices.

Rotor/Screen door safety device
The shredder must only be operated if the rotor door(s) are closed and bolted shut.

Hopper
The input opening of the machine is elongated with an in-feed hopper. The hopper is bolted in place and must be installed at all times for safe operation of the machine.

Splash Guard
The input opening of the machine is provided with a splash guard to prevent fly-out in case the ground material is introduced directly in the feed hopper.

Safety Markings
Safety markings are attached to the machine. If one of these markings becomes detached or is no longer recognizable, the marking must be replaced. New markings can be ordered from the manufacturer; please contact customer service.

Emergency Stop Button
The machine must only be operated with the installed Emergency Stop buttons. One Emergency Stop button must be mounted onto the control cabinet, user interface panel and a second onto the shredding material in-feed.

In case of an emergency, immediately press one of the Emergency Stop buttons.

CAUTION! The Emergency Stop button must be activated in all situations in which injury or damage could result!

Re-Operation

1. Eliminate the cause of the emergency stop.
2. Unlock the Emergency Stop button.
3. Acknowledge fault.
4. The machine is ready for re-operation.

Personal Protective Gear

The following protective gear must be worn when carrying out the outlined tasks. Use breathing equipment before inhaling substances that may be harmful to your health if necessary.

Task	Safety Helmet	Safety Boots	Safety Gloves	Safety Mask/Goggles	Ear Muffs
Unloading machine	X	X	X		
Connecting machine		X			
Operation.		X	X	X	X
Cleaning.		X	X	X	
Maintenance of bearings		X			
Maintenance of gearbox motor		X			
Maintenance of cutters/bed knives		X	X	X	
Maintenance of conveyor		X	X	X	
Maintenance of heating chamber		X	X	X	
Knife sharpening		X	X	X	X
Oven Elements		X	X	X	
Oven Conveyor		X	X	X	

Chapter 3: Installation

The following listed installation information should be observed as closely as possible to ensure proper machine operation.

3-1 Lifting and Moving

The machine must be handled with care whenever being moved. This is to prevent damage to any part of the machine. There are two parts to the machine, the Shredder Subsystem and the Disinfection Oven Subsystem. Moving of the machine must be done in stages. The Disinfection Oven Subsystem "slides" into the Shredder Subsystem and is connected to the Shredder superstructure via screws, wiring and the connecting waste shoot. Once separated, each machine is provided with lifting lugs that should be used whenever the machine is being moved. It is recommended that the machine be lifted with extreme care and only in this manner.

3-2 Foundation

The machine must be secured to a firm foundation that is flat. This foundation must be of a material that will provide a firm rigid support for the machine.

3-3 Leveling and Securing

The machine should be positioned in a net level condition. It should be secured to the foundation through the holes provided in the base using 5/8" lag bolts. Fastening should be secure enough to prevent machine movement during operation. Shim machine to ensure that base is not in a strained condition.

The Shredder Subsystem should have a slight down tilt (1-2o) with the ram being slightly elevated vs. the rotor and knives. The disinfection oven should also have a slight down tilt (1-2o), with the waste output lower than the shredder input.

A 1/8" to 1/4" thick rubber strip may be used between foundation and machine base to reduce vibration.

3-4 Electrical Installation

All electrical installation should conform to local, state and federal regulations and should be performed by qualified personnel. All electrical wiring should be of sufficient size to ensure adequate power supply without a power drop. The electrical control panel should be located as close to the main drive motor as is feasible. This will ensure a minimum voltage drop. The control panel should be installed in a well-ventilated area protected from the elements, free of dust and the direct rays of the sun.

Before applying power on a permanent basis check the following:

1. Direction of rotation of main motor
2. Direction of rotation of hydraulic pump motor

It is strongly recommended that power be applied to the machine only after pre-startup tests are performed by Viradys service representatives.

3-5 General Installation Information

The machine should be located in an area that is protected from the elements. The machine is normally delivered containing lubricants with minimum operating temperatures

Reservoir oil temperature must be maintained at a minimum of 50 degrees Fahrenheit during idle hours.

- Use a cold weather grade of hydraulic fluid. (Refer to "Hydraulic Oil Specifications")
- At initial start up dry cycle shredder several times to warm up the cylinder seals.
- When temperature is below 0 degrees Fahrenheit, it is recommended that system pressure be reduced by 15 percent.
- We do not recommend the operating of the shredder at temperatures below minus 20 degrees Fahrenheit.

If special requirements exist below these temperatures, contact Viradys. Optional heating element is available for the hydraulic system. The machine should be located in an area that will provide adequate accessibility for maintenance.

Before starting machine rotate rotor slowly by hand to insure clearance between rotor, counter-knife, knives and screen. Check oil in gearbox and hydraulic reservoir. These units are filled with specified fluid; refer to the maintenance section before adding any fluid to these units. Before adding fluid insure that fluid and reservoir are clean.

Before operating machine, cycle the hydraulic pump several times for a short duration to insure pump has fluid available. After establishing that hydraulic pump is providing pressure, cycle the hydraulic cylinders without load several times to insure proper operation. Check Hydraulic reservoir after each cycle. When hydraulic system is operating properly it should cycle through all functions without hesitation.

Run machine approximately 30 minutes empty and then feed material slowly to the hopper until a full load is established.

After two (2) hours of operation, then after every fifty (50) hours of operation check for loose bolts and screws as well as belt tension. Tighten all loose bolts, screws and retighten belt if necessary.

Chapter 4: Machine Operation

4-1 General Operating Description

The machine is designed to disinfect Regulated Medical Waste in a two-step process. The first is to open the Red Bag Medical Waste and then shred the waste into a size that will render the medical contents mostly unrecognizable and in a size/form compatible for the disinfection process, which is the second step.

The Shredder is designed to reduce a variety of RMW materials to various sizes by the action of a rotor containing specially designed cutters, passing through counter-knives, with the ultimate chip size controlled by screen opening size. The process is summarized as follows.

The main drive motor, in conjunction with a V-belt/direct right-angle drive, transmits rotation to the gearbox. The gearbox in turn drives the rotor. The product is pushed to the rotor by a hydraulically operated ram.

The functions of the machine are directed by a programmable logic controller (PLC), which receives input from a hydraulic pressure transducer, main drive motor current, ram position sensors and external interlock. These elements combine to cause the machine to operate or stop for personal safety or machine protection.

The material feeding mechanism will push as much material as the rotor can size reduce. When the rotor torque requirement causes the main drive motor load to reach programmable maximum amperage, the feed mechanism stops or reverses and resumes pushing forward when the motor load drops below programmed level.

The rotor is always turning in a forward direction during normal operation. The motor amperage is being monitored using an analog input to the PLC. The amperage can reach either minor or major faults.

Minor faults are reached when the rotor amperage is at or near full load amps. The full load amperage is programmed using a percent (%) of load parameter. Actions on minor fault are programmed for a ram hold or ram reversal. The ram reversal is either time based or until current is under programmed limit. The ram hold is held until the amperage is under the programmed limit.

Major faults are reached when the rotor significantly over amps the full load. This is normally set at 140 – 150 % of load. Actions on major faults result in either a reversal procedure or an E-Stop. The other major fault for the rotor is over torque. This would normally only happen from a sudden shock stoppage such as tramp metal in the processing stream. This results in an e-stop to the system. The machine should be inspected for damage and cause of the over torque before resuming operation. Contact Viradys for field service consultation.

The ram force & hydraulic system pressure is being controlled by a pressure transducer on forward strokes. This transducer is controlling the shift from high speed to low speed (on 2 speed machines only), when to start and stop the ram and major and minor faults.

Major faults for the hydraulic system are low oil, high oil temperature or motor current overloads. All of these actions result in a system shutdown. These are discreet inputs to the PLC. The electrical diagram will show the inputs involved in these major faults. The red OVERLOAD light of this control panel will show their status.

The ram direction is controlled as well by two limit switches, one for full forward and one for full back. The ram changes direction when either of these switches is met. The reverse speed is at full rate.

4-2 Material to be processed

Material to be size reduced can vary in size and types. Consideration should be given to the hardness and consistency of the material. Metal parts (e.g. titanium joints – hips, shoulders, etc.) should not be allowed into the hopper at any time. Surgical scalpels, needles and sharps are acceptable. The size and output of the product is determined by the use of a screen. Screen size of ½" has been chosen for this application.

4-3 Start-up procedure

After performing the inspections called for in the installation and maintenance sections, machine is ready for operation. All other start up requirements are controlled by the PLC and main control panel. Starting procedure is as follows:

1. Make sure emergency stop buttons are off
2. Press cycle start

4-4 Shut-down procedure

It is suggested that the machine not be turned off with the rotor under load. This could prevent a smooth restart. All other requirements are controlled by the PLC and main control panel. Press the cycle stop button; the machine will shutdown at the end of the current cycle. If emergency conditions exist, press any of the E- Stop buttons.

4-5 Operator Panel

4-5-1 Push Button Controls

POWER ON – When 3 phase power is on at the main control cabinet, the POWER ON light will illuminate.

OVERLOAD – When any of the three motors (Main motor, Hydraulic motor, Auger and/or Conveyor motor) have tripped, the OVERLOAD light will illuminate. Motors must be reset inside the main control panel.

SAFETY FAILURE – The shredder monitors emergency stops and safety relay circuits. With any E-Stop actuation or with any motor trip, the SAFETY FAILURE light will illuminate.

WATER/DISINFECTENT MIST -In the ON Position an installed mist system will produce a light mist to help disinfect the system prior to maintenance.

RAM FWD / REV – The ram operates in auto-mode by default. While in automode, this button is inoperable. However, it may be necessary at times to operate the ram manually while performing maintenance checks and service.

SHREDDER STOP must be pressed twice for the ram to be set to manual-mode. Once in manual-mode, the RAM FWD/REV button is functional.

EMERGENCY STOP (E-STOP) – When the EMERGENCY STOP button is pressed, all running components of the shredder will stop. Note: POWER WILL STILL BE ACTIVE TO THE MACHINE

SHREDDER START / STOP / RESET – Once the shredder is powered up, pressing START will place the shredder in auto-mode – the ram, rotor and auger/conveyor will start. NOTE: At first the ram will retract and the rotor will reverse momentarily. Then the rotor will stop and begin to rotate in the forward direction. Pressing STOP/RESET once will stop the ram, rotor and auger/conveyor. If the shredder has been stopped due to an overload or EStop, the STOP/RESET button must be pressed twice before the START button will be operable again.

STROBE and HORN – The strobe will illuminate and the horn will sound for 15 seconds when the SHREDDER START button is pressed. The strobe will continue to illuminate as long as the shredder is running.

4-5-2 Periodic Maintenance

2-13 Maintenance Check List

Object		1st Time after ...Hours of operation	Freq after... Hours of operation
Check condition of knives, turn or exchange if necessary		40	40
Check oil level of hydraulic system, add oil if necessary		2	40
Check oil level of gear box, add oil if necessary		2	40
Check oil level of fluid coupling refill if necessary		2	200
Control hydraulic pipes, hoses & fittings for leakage		2	40

Maintenance Check list, continued...

Object		1st Time after ...Hours of operation	Freq after... Hours of operation
Check area under the hydraulic ram & remove waste material		40	40
Grease rotor bearings with the app. 35g lithium grease		100	100
Check belt drive		4-5	100
Check all hydraulic pipes, hoses & fittings for corrosion, cracks & leakage, exchange if necessary		40	**2000 or exchange at latest after 6 years**
Condition of screen		200	200
Seal on back wall		200	200
Seal on ram front		200	200
Sides of ram		200	200
Condition of counter knife, exchange if necessary		200	200
All screws to be tight		200	200
Exchange hydraulic oil (AW-32)			**2000 or at latest annually**
Exchange filter-ALWAYS CHANGE WHEN OIL IS CHANGED		150	2000
Exchange all hoses of hydraulic system			**12000 or exchange at latest after 6 yrs**
Check seals of hydraulic cylinders, replace if necessary			2000

4-5-3 Conveyor Controls

Internal conveyor controls (part of disinfection chamber) are automatic and will turn on/off via PLC interaction, unless, as stated above, for emergency stoppages, etc.

External in-feed and discharge conveyor controls are optional. Please refer to the electrical schematics for those machines equipped with optional conveyor controls.

Chapter 5: Maintenance

5-1 Preventative maintenance

To insure a trouble free operation of the machine the following recommendation are important:

- Replace any damaged parts as quickly as possible. This will reduce possibility of more severe damages.
- Check for loose screws, bolts, hydraulic connection etc. on a regular 50hour operational interval. Correct any problems that are discovered immediately.
- Check hydraulic fluid level daily. Check other component functions as outlined in Chapter 4.
- Rotate or replace indexable cutters located on rotor whenever cutting results are poor. Torque bolts to proper torque according to torque value found in the appendix. Rotate rotor by hand to ensure proper clearance to counter knife before start-up.
- Replace/rotate/sharpen counter-knives whenever cutting results are poor.
- Rotate rotor by hand and adjust rotor to proper clearance before applying power. Be sure counter-knife retaining bolts are tightened to proper torque according to torque value found in the appendix. Refer to adjustment information for proper alignment.
- To insure proper cooling of motors and machine components make sure machine is free of dust at all times. Clean on a regular basis.
- Check on daily basis for unrestricted airflow on hydraulic oil cooler.
- If machine has air cooler on hydraulic package, remove front cover and clean with compressed air from backside of cooler to remove foreign material, whenever conditions indicate need.

5-2 Fire Prevention

- Keep fire extinguishers accessible at all times. Use the extinguisher recommended for the material being shredded. It should be safe for use on electrical fires.
- Never smoke close to combustible material.
- Clean the area before welding or other activities, which may make sparks. Observe the area for at least six hours after such activity.
- Keep tank and motor areas clear of oil, dust or paper accumulations.

5-3 Lock out / Tag Out

There is one main disconnect located at the control panel. This disconnect controls all normal functions of the machine. Make sure to follow all lock out / tag out procedures while maintaining, servicing or cleaning the shredder. Be sure to also lock out / tag out any additional machinery that has been installed to work in conjunction with this machine (i.e. conveyors, blowers, dumpers, etc.…) while performing maintenance, service or cleaning tasks.

5-4 Rotor Assembly

It is the user's responsibility to maintain the rotor and components secured preventing excessive wear or neglect.

The rotor surface should be routinely inspected for gouges or indentations caused by tramped metal impacts. The roller bearings at each end of the rotor should be inspected regularly and maintained accordingly. The gearbox mounted on the drive-side of the machine should be maintained accordingly. Knives and tool holders should be maintained and replaced as necessary; the rotor should never be allowed to run with tool holders and cutters missing from any intended pocket.

Rotor knives should maintain a .030 +/- .010 gap from counter knife. Fine adjustments can be made by adjusting the jack bolts at the externally mounted pillow block bearings. AFTER ADJUSTMENT IT IS IMPORTANT TO ROTATE THE ROTOR BY HAND TO ENSURE CLEARANCE.

5-5 Knives (also referred to as Cutters)

Periodically, knives need replacement or rotation due to wear or damage.

WORN KNIVES WILL SIGNIFICANTLY IMPACT THE PERFORMANCE OF THE SHREDDER

Whenever knives require replacement or rotation due to wear or damage the following procedure must be followed.

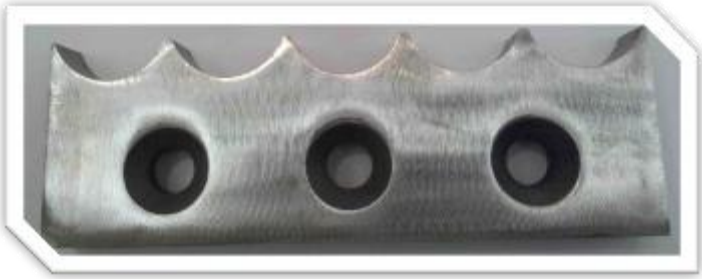
Knife holders are attached to the rotor shaft using a socket head cap screw (SHCS). It is advised to rotate or replace all cutters at the same time. It is advised to replace knife bolt at the time of cutter replacement. (NOTE: Ensure only one operator is responsible for rotation of the rotor shaft while maintenance is being performed on the knives to prevent pinching/cutting accidents).

REQUIRED TOOLS:

- Viradys Knife Holder Puller (Available through Viradys Parts and Service Dept.)
- Vice grip chain wrench
- 5/32 Allen wrench
- Removable thread locker

1. Follow all "lock out" procedures to insure machinery cannot be operated while making repairs.
2. To gain access to knives, open the rotor doors or provide safe access inside the hopper.
3. Loosen and remove existing holder screws. Install holder puller and remove one holder at a time.
4. ROTATE or REPLACE Knives as Necessary:
   - Apply chain wrench around knife ONLY and insert Allen wrench into knife bolt
   - Equally turn both counter-clockwise to loosen (slight heat may need to be applied)
   - Rotate or Replace knives ensuring to apply removable thread locker to the bolt (flat head cap screw)
5. Thoroughly clean mounting areas with suitable wire wheel or air pressure brush to insure all foreign material is removed. Visually inspect area for nicks and flatness of the holder mounting area. If rotating existing knives, be sure to clean sides of holder before rotating. (Note: The bottom mating area of the knife holder must support the complete area of knife insert.)
6. Install knife holder into pocket on rotor assembly torque at 50 ft./lb. Firmly seat holder in pocket using a hammer being careful not to strike the knife surface as pieces may chip and project causing potential harm.
7. Tighten holder bolts (socket head cap screw) to proper torque ensuring application of removable thread locker. (NOTE: Bolt torque chart located in the appendix) (Viradys recommends using a marking device to confirm that the proper torque has been applied to every knife.)
8. Rotate the rotor assembly checking for interference.

5-6 Counter Knives



Whenever counter knives require rotation or replacement due to wear or damage the following procedure must be followed.

Counter knives are attached to the anvil using multiple flat head cap screws. Counter knives may be rotated once. It is advised to rotate or replace all counter knives at the same time. It is advised to replace mounting bolts at the time of counter knife replacement. (NOTE: Ensure only one operator is responsible for rotation of the rotor shaft while maintenance is being performed on the counter knives to prevent pinching/cutting accidents)

Flat Reversible Counter Knives

1. Follow all "lock out" procedures to insure machinery cannot be operated while making repairs.
2. To gain access to counter knives provide safe access inside the hopper.
3. Use a cordless drill to drill out debris from bolts is advised. This will allow for proper Allen fitting. Operator needs to be careful not to damage inside threads.
4. Thoroughly clean mounting areas and counter knife seats with suitable wire wheel or air pressure to insure all foreign material is removed. Visually inspect area for nicks and flatness of counter knife mounting area.
6. Mount counter knives in proper locations using removable thread locker.
7. Rotate the rotor through two full turns to ensure proper knife clearance. Some adjustment may be necessary.
8. Tighten mounting bolts to proper torque. (NOTE: Bolt torque chart located in the appendix) (Viradys recommends using a marking device to confirm that the proper torque has been applied to every knife.)

5-7 Bearings

The two main pillow block bearings are located at each end of the rotor shaft and are used to support and locate the rotor shaft. The rotor is positioned in relation to counter knives at machine assembly and the bearings are positioned to maintain this location. Both bearings are floating allowing end-to-end movement due to heat growth. If rotor removal is required, you should consult Viradys service for resetting the bearings on the rotor.

The two main pillow block bearings were packed with grease at machine assembly. They should be lubricated on a regular basis. The recommended cycle to grease these bearings is every 50 hours of operation. Do not over grease. Shell Albida 220 Synthetic Lithium Complex grease or equivalent should be used.
(Refer to manufacturer's manual provided)

Rotor knives should maintain a .030 +/- .010 gap from counter knife. Fine adjustments can be made by adjusting the jack bolts at the externally mounted pillow block bearings. AFTER ADJUSTMENT IT IS IMPORTANT TO ROTATE THE ROTOR BY HAND TO ENSURE CLEARANCE.

5-8 Screen

A screen is used to regulate particle size of material being processed. It is recommended that the screen condition and mounting should be inspected once a week for tightness, damage, and deformation. When replacement or removal is required the following procedure should be followed:

1. Follow all "Lock Out" procedures to insure machine cannot be operated while procedure is performed.
2. Remove mounting bolts that secure screen to machine.
3. Remove screen from discharge area.
4. Inspect mounting holes to insure threaded hole is clean from debris and foreign materials and threads are not damaged.
5. Install and locate screen to machine using suitable pry bar or lifting devise. Install mounting bolts and washers.
6. Locate screen in such a position as to insure no interference with rotor assembly is present.

7. Tighten mounting bolts to proper torque starting at center of screen working outward. (NOTE: Bolt torque chart located in the appendix)
8. Rotate rotor assembly 2 full rotations by hand to insure there is no interference before restarting machine.

5-9 Gear Box

The gear box is mounted on the rotor shaft and power from main motor is transmitted by either a banded V-belt or direct drive right-angle system. The function of the gear box is to reduce the drive motor RPM to the correct RPM for the rotor. The gear box contains a filler plug, pressure vent, and dip stick.

The gearbox was filled with oil at machine assembly. The oil level in the gearbox should be checked on a regular basis. Refill gearbox oil as necessary according to the manufacturer's

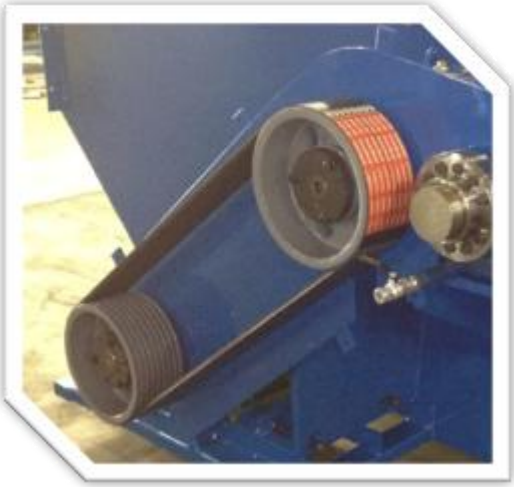
recommendations for volume and type. Do not overfill the gearbox with oil. Refer to the included gearbox manufacturer's maintenance manual that was provided with this manual.

5-10 V-Belt Drive

Most machines are equipped with a parallel shaft gearbox. This parallel drive system utilizes two sheaves coupled together with a V-Belt to transmit motor power to the gearbox.

One of the most important requirements in a V-belt drive system is belt tension. If the tension is less than recommended the drive will not deliver proper torque because of slippage and therefore shorten belt life. If the tension is more than recommended it will also shorten belt life and cause premature bearing failure.

The belts should be checked on a regular basis. When new V-belts are installed on a drive the initial tension will drop rapidly during the first few hours. Check tension frequently during the first 24 hours of operation. After this initial time the recommended cycle to check belt tension is every 1000 hours of operation. Viradys recommends the use of an accurate belt tension measurement device. (NOTE: Gates sells a belt sonic tension meter that works well in this application)



The belts used on this machine are banded 5V Predator (Kevlar) belts. Shredders over 125HP have two belts. Kevlar belts tension at a higher value than traditional rubber belts providing less slipping and slapping while providing more torque transmission. Special care must be taken to prevent over tension of these belts. The slapping of belts against the drive guard or other obstruction can cause V-Belt noise. Check for an improperly installed guard, loose belts or excessive vibration. Squealing of belts when a drive is started or while it is running is usually caused by a poorly tensioned drive and/or by a build-up of foreign material in the

sheave grooves. But it can also be caused by oil or grease between the belt and the sheave groove.

Under no circumstances is the use of belt dressing recommended on a Vbelt. The remedial effect is only temporary. It is much better to keep the belts and grooves of the drive clean. Dirt and grease reduce belt life. Belts should be wiped with a dry cloth occasionally to remove any build-up of foreign material. If the belts have been splattered with grease and/ or oil, clean them with methyl chloroform or soap and water. Flammable cleaners such as gasoline are to be avoided as a matter of safety.

Keep all sheave grooves smooth and uniform. Burrs and rough spots along the sheave rim can damage belts. Dust, oil and other foreign matter can lead to pitting and rust and should be avoided as much as possible. The belt's wedging action is reduced and it loses its gripping power. A shiny groove bottom indicates that the sheave, the belt or both are badly worn and the belt is bottoming in the groove. Badly worn grooves cause one or more belts to ride lower that the rest and the effect is the same as with mismatched belts.

Check alignment of drive. Sheaves that are not aligned properly cause excessive belt and sheave wear. When the shafts are not parallel, belts on one side are drawn tighter and pull more than their share of the load. These overloaded belts wear out faster, reducing the service life of the entire set. If the misalignment is between the sheaves, the belts will enter and leave the grooves at an angle, causing excessive cover and sheave wear and premature failure.

The following procedure should be used when tensioning or replacing belts.

1. Follow all "Lock Out" - "Tag Out" procedure to insure machinery cannot be operated, before maintenance is performed.
2. Open or remove belt guard cover to gain access to belts
3. Loosen locking nuts on jack bolts
4. Adjust belt leaving ¾” play
5. Re-tighten nuts on the jack bolts
6. Re-install belt guard access cover before restarting machine

5-11 Direct Right-angle Drive (optional)

Some machines may be equipped with a right-angle direct drive gear box in place of the V-Belt drive. The direct drive system utilizes a flexible coupling between the motor and gearbox input shaft with an over-torque limiting clutch on the motor side. This arrangement allows torque to transmit below the clutch setting while allowing enough torque to shred material effectively. The clutch torque setting has been factory set.

(NOTE: The adjustment to the clutch spring compression must not be changed as it may result in drive system failure and voided warranty. This unit is factory calibrated and severe damage could result if unit is adjusted improperly. If it is felt that adjustment is necessary, contact Viradys.)

The coupling was packed with grease at machine assembly. The grease should be checked on a regular basis. Replace grease as necessary according to the manufacturer's recommendations for volume and type. Do not overfill the coupling with grease. Refer to the included clutch manufacturer's maintenance manual that was provided with this manual.

The following procedure should be used when checking the coupling and clutch.

1. Follow all "Lock Out" - "Tag Out" procedure to insure machinery cannot be operated, before maintenance is performed.
2. Open or remove clutch guard cover to gain access to coupling
3. Remove bolts on coupling cover
4. Inspect for cracks or tears in the flexible coupling; replace as necessary
5. Re-place coupling cover bolts
6. Inspect over-torque clutch for loose bolts or nuts; tighten as necessary (do not adjust spring compression value without consulting Viradys)
7. Re-install clutch guard cover before restarting machine

5-12 Fluid Coupling (optional)

The fluid coupling is mounted on the main drive motor shaft and is designed to provide a smooth even start when the motor is started. It provides rotating force through a belt to the gear box that drives the rotor.

The gearbox was filled with oil at machine assembly. The oil level in the gearbox should be checked on a regular basis. Refill gearbox oil as necessary according to the manufacturer's recommendations for volume and type. Do not overfill the gearbox with oil. Refer to the included gearbox manufacturer's maintenance manual that was provided with this manual.

The fluid coupling is filled with oil at the machine manufacturer. The oil level in the fluid coupling should be checked on a regular basis. Fluid coupling oil should be checked after every 6 months of operation (fluid should be cold while performing check). Fluid coupling

oil should be replaced after every 4000 hours of service. Refill fluid coupling oil as necessary according to the manufacturer's recommendations. Do not overfill the fluid coupling with oil. Refer to the fluid coupling manufacturer's maintenance manual that was provided with this manual.

The filling procedure is given here to provide the user with the knowledge of the design of the coupling. Because the fluid level affects the performance of the coupling, a correct filling procedure is necessary.

1. Follow all "Lock Out" - "Tag Out" procedure to insure machinery cannot be operated before maintenance is performed.
2. Open or remove belt guard cover to gain access to fluid coupling
3. Turn the coupling so the "x" mark, which is cast into the housing, is at the top (maximum filling) position. This will ensure the filler plug is in the correct angular position.
4. Fill the coupling with oil until it overflows out of the filler hole. During filling, rock the coupling gently on its axis to ensure all excess air is vented.
5. Different filling levels (X-1-2-3-4) can be selected at the user's discretion to obtain different performances from the coupling. With "x" position fill (maximum) the fluid coupling will operate with minimum slippage and maximum efficiency. By decreasing the oil filling level (X-1-2-3-4), slippage increases and maximum torque decreases. High values of slip decrease the unit's efficiency and will cause the oil to overheat.
6. Re-install the thermal fuse filler plug into the filler hole
7. Re-install belt guard access cover before restarting machine

Oil Temperature increases as the unit is used. The unit is equipped with a 250 deg. F fusible plug. If the fusible plug blows at regular intervals in normal service, check the following listed possible causes for correction. The following can cause high oil operating temperature:

- Insufficient oil level
- Absorbed power is higher than the motor rated power
- High ambient temperature
- Too frequent starts
- Long starting time
- Inadequate air ventilation to allow cooling of the coupling:
- If coupling is operated in a restricted space, adequate ventilation apertures should be provided.

5-13 Main Rotor Motor

The motor is mounted to either the frame of the shredder or the swingbase of the right-angle drive system. Motor torque is transmitted either by a banded V-belt or direct drive right-angle system. Clean debris from around drive motors on regular basis. Inspect motor mounting for cracks or visual damage on regular basis. The motor contains grease fittings for bearing lubrication.

The motor was filled with grease at motor manufacturer. The grease level in the motor is sufficient for many years of lubrication under normal use. The time period between lubrication can vary depending on the ambient temperature and type of service. Grease the motor bearings as necessary according to the manufacturer's recommendations for volume and type. Do not over grease the motor bearings.

5-14 Ram Wipers

The ram is used to push product in the cutting chamber to the rotor for shredding. The ram assembly consists of frame, guide rail assembly, wipers and faceplate. These components are made of UHMW and are used to support, align, and seal the ram feed mechanism. Some machines come equipped with a tongue and groove ram. This eliminates the upper and lower UHMW wipers.

Wipers are used to seal the cutting chamber. Wipers consist of 1 lower (Ram Face Wiper), 2 sides (Ram Side Wipers), and 1 upper (Ram Top Wiper).

On the Ram Side and Ram Face (lower) wipers springs are used to keep pressure on wipers against the floor and sidewall.

The wiper on the top of the ram plate uses adjustable bolts to keep pressure applied. It is recommended to inspect wipers on a monthly basis. Replacement will be necessary when 5/8" to 3/4" of wear is present.

The following procedure should be used when inspecting or replacing ram wipers.

1. Follow all "Lock Out" procedures to insure machine cannot be operated while making repair.
2. Replace ram face wipers
   To gain access to ram face wipers provide safe access inside the hopper.
   a. Remove ram face plate hex bolts and ram face plate (two socket head screws remain in place to capture spacer plates and guide faceplate re-assembly)
   b. Remove lower wipers, side wipers and springs
   c. Clean the wiper pocket from all debris and contamination
   d. Replace springs and wipers at the same time
   e. Replace ram faceplate and hex bolts. Align plate as necessary preventing interference with the chamber floor and walls.
   f. Tighten ram faceplate bolts to proper torque (NOTE: Bolt torque chart located in the appendix)
3. Replace ram top wiper
   a. To gain access to ram top wiper remove frame cover plates above ram
   b. Once frame cover is removed, remove 4 ½" bolts to remove wiper cover plate.
   c. Remove top wiper and adjust hold down bolts for the wiper on top of the ram back to original factory location.
   d. Clean the wiper pocket of all debris and contamination
   e. Replace wiper and adjust ¼"x 20 bolts.
   f. Replace wiper cover plate. Align plate as necessary preventing interference with the ram top
   g. Tighten wiper cover plate bolts to proper torque (NOTE: Bolt torque chart located in the appendix)
4. Replace frame cover plates above ram before restarting machine

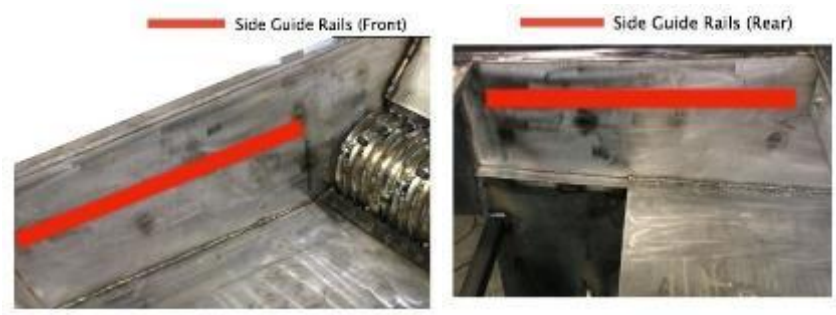
5-15 Ram Guide Rails and Ram Bottom Guides

The ram has adjustable rails that are placed horizontally on both sides of the ram. These limit side-to-side movement of the ram assembly. There are adjustment bolts in place to keep the rails pushed out tight to the sidewalls. They are generally considered worn when approximately 1/8" from original specs and should be replaced. Inspect for wear on monthly basis.

On the bottom of each side of the ram, there are guides that aid in smooth ram travel. They are generally considered worn when approximately 1/4” from original specs and should be replaced. Inspect for wear on monthly basis.

Failure to adjust ram guide rails at regular intervals could result in hydraulic cylinder failure, hydraulic cylinder mounting trunion failure or premature guide rail and wiper wear/failure.

Side Guide Rails



The guide rails are made from UHMW plastic. There are 2 guides in the main chamber and 2 in the rear under the frame cover. They are generally considered worn when approximately 1/8” from original specs and should be replaced. Inspect for wear on monthly basis. The following procedure should be used when inspecting or replacing guide rails.

1. Follow all "Lock Out" procedures to insure machine cannot be operated while making repair.
2. Empty machine of all product
3. Manually move ram to full forward position
4. Remove all mounting bolts holding side rails in position
5. Remove and replace portion of side rail located furthest from rotor. The new guide rail should be flush with the vertical plane of the side rails.
6. Drill new locating holes for mounting bolts using a 1/2” drill bit
7. Replace bolts in only the portion of rail replaced
8. Turn on machine and manually move ram to full back position
9. Follow all "Lock Out" procedures to insure machine cannot be operated while continuing to make repair
10. Remove and replace portion of side rail located nearest to rotor. The new guide rail should be flush with the recently replaced rail
11. Drill new locating holes for mounting bolts using a 1/2” drill bit
12. Replace remaining bolts
13. Replace frame cover plates above ram before restarting machine

5-16 Hydraulic System

The hydraulic system consists of a dual main pump, drive motor, hydraulic cylinder, reservoir and related control valves. It is used to control the feed ram of the machine. The programmable controller in the main electrical control panel controls the operation of the system. The auxiliary pump is control by a separate control panel located on side of main panel.

5-16-1 Power Unit

The hydraulics power system employs a high quality return oil filter. The filter has an indicator that changes color when it is time to be changed. When the needle positions itself in the yellow area of the gauge, it is time to change the oil filter. Check filter every 30 days.

Inspect breather filter and replace when required. If machine is operated in extreme temperature conditions, adding an oil heater or oil cooler may be required.

The hydraulic power unit was filled with AW32 hydraulic oil at machine assembly. The oil level in the tank should be checked on a regular basis. Refill hydraulic oil as necessary with this oil or equivalent. Do not overfill the hydraulic tank with oil.

Before operating machine during initial start-up, cycle the hydraulic pump several times for a short duration to insure pump has fluid available. After establishing that hydraulic pump is providing pressure, cycle the hydraulic cylinders without load several times to insure proper operation. Recheck hydraulic reservoir after first 30 minutes of operation.

Electric motors should be greased as shown in the table below (see diagram below).

- Over or under greasing is harmful and may cause damage to the motors.
- Grease types should never be combined. Only lithium based grease may be used.
- The motor manufacturer's recommended type of grease is Esso Polyrex®EM

MOTOR HORSEPOWER	INTERVAL	AMOUNT OF GREASE
15 - 20	20,000 hours	13 grams
30	20,000 hours	18 grams
50	20,000 hours	21 grams
75	9,700 hours	27 grams

5-16-2 Cylinder(s)

Visually inspect following items frequently:

- Inspect all lines and fittings for leakage
- Inspect rod end of cylinder for leakage at packing cap seals. □ Inspect support eyes for wear
- Inspect clevis pin and snap rings.
- Inspect clevis for cracks and looseness, Replace all loose or worn parts immediately.
- Visually inspect all fittings and hoses and components for leakage on a daily basis. Replace or repair all defective items immediately.
- Keep areas around motor and hydraulic unit clean of debris, foreign materials on a daily basis.

5-17 Hydraulic Oil Specifications

Hydraulic fluid supplied should be a high-grade industrial oil, non-foaming, non-detergent with a rating of 150 to 200 SSU at 100 degrees F. An anti-wear component is recommended for severe duty applications to obtain maximum life from the hydraulic equipment.

Fill reservoir until oil level reaches the high mark on the site gauge. Oil level may drop slightly after first operation. This is due to voids in the cylinder and valves. Fill the reservoir again, if necessary.

- Consult Viradys if another oil type other than listed below is requested.

- Viradys recommends Texaco Rando HD-46 or Mobil DTE-25 for warm weather and indoor heated building applications.

- Viradys recommends Texaco Rando HD-32 or Mobil DTE-24 for cold weather and unheated indoor applications.

- Oil interchangeability list:

	Cold Weather	Warm Weather
Texaco	Rando HD-32	Rando HD-46
Arco	Duro AW-32	Duro AW-46
Exxon	Nuto H32	Nuto H46
Gulf	Harmony AW-32	Harmony AW-36
Mobil	DTE-24	DTE-25
Shell	Tellus 32	Tellus 46
Sun	Sunvis 832	Sunvis 846
Castrol	Tribol 943/32-AW	Tribol 943/46-AW

5-18 Control Panel

The shredder control panel includes various electrical components to control the normal operation functions of the shredder. Electrical schematics, layout diagrams and parts lists were supplied with this manual and inside the electrical enclosure at the time of shipment.

The brain of the panel is the Allen-Bradley Micrologix 1500 Programmable Logic Controller (PLC) with additional analog input card and optional additional input/output card. The relay output contacts of this PLC are protected by isolation relays where solenoids and contactors are controlled. The input contacts are 24vdc and derive from various sensors, relay contacts and switches.

The analog input receives 24vdc scaled inputs from a pressure transducer and current transducer providing the necessary signal to trigger machine operating responses. (These 24vdc analog sources should be carried in shielded cable separate from 460vac and 115vac wiring)

The high-voltage wiring is fused at the main disconnect and additional branch fuses for the smaller amperage devices; all fusing provided via resettable circuit breakers. The high-amperage wiring for the main rotor motor passes through a soft-starter device (OPTIONAL) and reversing contactor set before exiting the cabinet to the motor. The main control panel breaker provides line protection for this high- amperage wiring and the soft-starter provides overload protection for the motor. The low-amperage wiring for the smaller hydraulic motor passes through a circuit breaker and optional starter/overload combination device before exiting the cabinet to the hydraulic motor.

The low-voltage wiring is stepped down from the 3-phase service and fused with circuit breaker. The PLC and optional soft starter are powered from line source and the remaining inputs/outputs for the machine are derived after series of multiple E- Stop buttons.

Chapter 6: Troubleshooting

6-1 Introduction

The utmost in safety precautions should be observed at all times when working on or around the machine and the electrical components. All normal trouble- shooting must be accomplished with the power off, line fuses removed, and with the machine tagged as out of service.

The use of good quality test equipment cannot be over-emphasized when troubleshooting is indicated. Use a good ammeter that can measure at least twice the AC and DC current that can be encountered for the machine. Be sure that the voltmeter has at least minimum impedance of 5,000 OHMS-per-volt on AC and 20,000 OHMS-per-volt on DC scales. Popular combination meters, VOM and VTVM can be selected to provide the necessary functions.

Before making haphazard substitutions and repairs when defective electrical components are malfunctioning, we recommend that you check the associated circuitry and assemblies for other defective devices. It is common to replace the obviously damaged component without actually locating the real cause of the trouble. Such hasty substitutions will only destroy the new component. Refer to wiring diagrams and schematics.

Locating mechanical problems, should they occur, is relatively straightforward. When necessary, refer to the parts catalog section.

Problem	Possible Cause	Possible Remedy
Overheating grinding material.	1. See first five causes for "Machine blocks or switches itself off" 2. Knives worn. 3. Insufficient cooling.	1. See first five causes for "Machine blocks or switches itself off" 2. Rotate knives 3. Fit rotor cooling. (Optional)
Unusual vibrations.	1. Bearing damage. 2. Anti-vibration pads defective.	1. Check bearings and replace if needed. 2. Check mounting pads and renew if needed.
Extreme cutter wear.	1. Bearing damage. 2. Knife finish. 3. Wrong cutting gap. 4. Foreign matter.	1. Check bearings and replace if needed. 2. Check knife and sharpen/replace if needed. 3. Check cutting gap and set according the instructions in this manual. 4. Fit feed device with metal detector.

Problem	Possible Cause	Possible Remedy
Bearings too hot.	1. Too much grease. 2. Rubbing on housing sealing ring. 3. Bearing damage. 4. No grease in bearing.	1. Reduce amount of grease. 2. Check sealing ring, oil or replace. 3. Check bearings and replace if needed. 4. Lubricate bearing.
Cutting gap alters during operation.	1. Knife mounting screws not tight. 2. Screw fatigue. 3. Washers are deformed. 4. Knife holder surface is deformed. 5. Support surfaces are dirty. 6. Threads in housing are worn. 7. Bearing mounts loose	1. Re-tighten using torque wrench in accordance with this manual. 2. Fit new screws. 3. Insert new washers. 4. Insert new knife holders. 5. Clean and re-dust surfaces. 6. Fit new brushes in housing. 7. Tighten mount bolts
Shredder does not start.	1. Main and control fuses. 2. Feed device not connected. 3. Material jam. 4. Motor protection switches are off.	1. Replace fuse. 2. Switch ON in sequence. 3. Empty shredder before switching ON. 4. Check motor relay for correct setting and increase if needed.
Shredder blocks when under load.	1. Feed starts too early. 2. Fuse is defective. 3. Motor fuse switches off - red indicator.	1. Start feed only after soft-starter startup ramp. 2. Replace fuse; Fit larger fuse - only after consulting customer service. 3. Reduce feed quantity; Correct setting; Replace fuse.
Frequent switching OFF of grinding material in- feed device.	1. Current relay switches off.	1. Correct setting.
Overheating grinding material.	1. See first five causes for “Machine blocks or switches itself off” 2. Knives worn. 3. Insufficient cooling.	4. See first five causes for “Machine blocks or switches itself off” 5. Rotate knives 6. Fit rotor cooling. (Optional)
Unusual vibrations.	3. Bearing damage. 4. Anti-vibration pads defective.	3. Check bearings and replace if needed. 4. Check mounting pads and renew if needed.
Extreme cutter wear.	1. Bearing damage. 2. Knife finish. 5. Wrong cutting gap. 6. Foreign matter.	5. Check bearings and replace if needed. 6. Check knife and sharpen/replace if needed. 7. Check cutting gap and set according the instructions in this manual. 8. Fit feed device with metal detector.

Problem	Possible Cause	Possible Remedy
Bearings too hot.	5. Too much grease. 6. Rubbing on housing sealing ring. 7. Bearing damage. 8. No grease in bearing.	5. Reduce amount of grease. 6. Check sealing ring, oil or replace. 7. Check bearings and replace if needed. 8. Lubricate bearing.
Cutting gap alters during operation.	8. Knife mounting screws not tight. 9. Screw fatigue. 10. Washers are deformed. 11. Knife holder surface is deformed. 12. Support surfaces are dirty. 13. Threads in housing are worn. 14. Bearing mounts loose	8. Re-tighten using torque wrench in accordance with this manual. 9. Fit new screws. 10. Insert new washers. 11. Insert new knife holders. 12. Clean and re-dust surfaces. 13. Fit new brushes in housing. 14. Tighten mount bolts
Shredder does not start.	5. Main and control fuses. 6. Feed device not connected. 7. Material jam. 8. Motor protection switches are off.	5. Replace fuse. 6. Switch ON in sequence. 7. Empty shredder before switching ON. 8. Check motor relay for correct setting and increase if needed.
Shredder blocks when under load.	4. Feed starts too early. 5. Fuse is defective. 6. Motor fuse switches off - red indicator.	4. Start feed only after soft-starter startup ramp. 5. Replace fuse; Fit larger fuse - only after consulting customer service. 6. Reduce feed quantity; Correct setting; Replace fuse.
Frequent switching OFF of grinding material in- feed device.	1. Current relay switches off.	1. Correct setting.

Chapter 7: Appendix

7-1 Warranty

Manufacturer's Limited Warranty Viradys

(Rev. Dec 2014)

All Warranty Information contained herein is in reference to the Viradys SHREDDER designed and engineered by Viradys Medical Waste Solutions and its contracted manufacturer Recycling Equipment, Inc. and herein referred to as "Viradys".

1-YEAR MFG WARRANTY

Viradys warranties parts (non-tooling parts) and labor for a period of one (1) year.

Viradys warranties the frame for the lifetime of the shredder

All Viradys manufactured shredders are warranted by Viradys to be free from defective parts or defective workmanship. The warranty coverage is based on a 2,080-hour year (eight hours of operation per day, five days per week, fifty-two weeks per year)

The Warranty Registration provided to the purchaser must be completed and returned to Viradys within twenty-one (21) days of shipment. If the equipment warranty is not registered, the warranty period shall be considered to begin on the date of shipment.

In the event of a defect in parts or workmanship on parts manufactured by Viradys, Viradys will repair or replace at its discretion the defective parts or workmanship. It is the buyer's responsibility to ship defective parts to Viradys in Newton, NC via an insured and prepaid freight service. Viradys will provide parts that are repaired or replaced under this warranty F.O.B. Newton, NC.

THIS PARTS AND LABOR WARRANTY DOES NOT INCLUDE WEAR PARTS SUCH AS TOOLING
(Knives/Counter knives)

Viradys may provide a field service engineer to provide warranty service within the warranty period. A buyer requesting a field service engineer must make the request to Viradys directly. Viradys will determine whether a field service engineer is required and will determine the scope of service activities that are to be provided under warranty. The following activities are not warranty service:

1. Installing parts required or replaced under warranty past the first 2,080 hours;
2. Completing normal maintenance activities;
3. Making adjustments to the shredder;
4. Providing instructions on using the shredder or associated equipment; and
5. Acting as a replacement for plant maintenance personnel.

Viradys's warranty does not cover the following costs associated with warranty service:

1. Shipping or handling charges on parts sent from buyer to Viradys;
2. Shipping costs for the delivery of parts repaired or replaced under warranty to the customer;
3. Special handling charges to expedite the delivery of parts repaired or replaced under warranty to the customer; and
4. After the first 2,080 hours, Labor or other costs incurred by the buyer to install parts repaired or replaced under warranty.

THIS WARRANTY DOES NOT APPLY TO ANY DEFECTS CAUSED BY NEGLIGENCE, MISUSE, MODIFICATIONS, ALTERATIONS, WATER DAMAGE OR ACCIDENTS BY PURCHASER OR THIRD PARTIES. WARRANTY EXTENDS ONLY TO THE ORIGINAL CONSUMER AND IS NON-TRANSFERABLE.

VIRADYS RESERVES THE RIGHT TO VOID THE WARRANTY IF THE PROVIDED WARRANTY REGISTRATION WAS NOT FULLY COMPLETED AND/OR NOT RETURNED TO VIRADYS WITHIN TWENTY-ONE (21) DAYS OF SHIPMENT.

VIRADYS RESERVES THE RIGHT TO DETERMINE IF PART(S) ARE GENUINE AND/OR DEFECTIVE. THIS WARRANTY DOES NOT APPLY TO ANY PART THAT HAS BEEN ALTERED OR REPAIRED BY ANY PERSON NOT AUTHORIZED BY Viradys, OR WHICH HAS BEEN SUBJECTED TO MISUSE, NEGLECT OR ACCIDENT, OR BY ANY OTHER CAUSE BEYOND THE CONTROL OF THE MANUFACTURER.

LIMITATION OF LIABILITY – VIRADYS WILL IN NO EVENT BE RESPONSIBLE FOR ANY CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOST PROFITS, LOST SALES, INCREASED FREIGHT OR SHIPPING COSTS, INCREASED HANDLING COSTS OR LOST PRODUCTION TIME ARISING FROM THE PERFORMANCE, OR FAILURE OF PERFORMANCE, OF THE SHREDDER.

VIRADYS EXPRESS WARRANTY, AS STATED AND LIMITED ABOVE, IS IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED.

VIRADYS PROVIDES NO WARRANTIES THAT EXTEND BEYOND THE WARRANTY STATED ABOVE. THERE IS NO EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY NOR OF FITNESS FOR A PARTICULAR PURPOSE.

7-2 Warranty Procedures

To request a warranty repair:

- All warranty repairs must be administered through Viradys Customer Support. Failure to contact Customer Support before performing repairs may result in the denial of your warranty claim and may void the warranty on your machine.
- Contact Customer Support by phone, fax, or e-mail, as soon as possible after identifying any defect, malfunction, or nonconformity.
- Please provide the following information when contacting Customer Support for service: Customer name / Store number, Model Number, Serial Number, Shipping Address, Billing Address, and a description of the defect, malfunction, or nonconformity.
- A Customer Support representative will open a service order and dispatch a Factory Authorized Service Technician to assess the repairs at the machine location within 24 hours.
- The service technician will make repairs or order any necessary parts to correct the defect, malfunction, or nonconformity. Parts will be delivered to the Service Technician or to the customer's shipping address, at the discretion of the Customer Support representative.
- The service technician will correct the defect, malfunction, or nonconformity to the customer's satisfaction. Any parts or components that have been diagnosed as defective will be returned to be evaluated by Viradys Quality or Engineering Department personnel, or the vendor who supplied the part, as determined by Viradys Customer Support.
- The warranty claim will be denied if any parts are found to be defective as the result of damage or neglect on the customer's part. In this case the customer will be notified and invoiced for the repair.

7-3 Technical Assistance

Parts & Service Department
Call toll-free 8am–5pm EST (888) 734-3783 or call (704) 325-3535, Fax (704) 325-3537. The Viradys customer service group will provide your company with genuine OEM quality parts manufactured to engineering design specifications, which will maximize your equipment's performance and efficiency. To assist in expediting your phone or fax order, please have the model and serial number of your unit when you contact us. A customer replacement parts list is included in this manual for your convenience. Viradys welcomes inquiries on all your parts needs and is dedicated to providing excellent customer service.

Sales Department
Call (864) 630 9656 Monday–Friday, 8am–5pm EST. Our products are sold by a worldwide network of independent sales representatives. Contact our Sales Department for the name of the sales representative nearest you.

Contract Department
Call +1 (864) 630 9660 Monday–Friday, 8am–5pm EST Let us install your system. The Contract Department offers any or all of these services: project planning; system packages including drawings; equipment, labor, and construction materials; and union or non-union installations

7-4 Parts List

S/N LD36602223

Description	QTY		Description	QTY
Rotor	1		Ram	1
Knife	32		Wiper - Ram Bottom	1
Bolt – Knife (Flat Head Cap Screw)	32		Wiper - Ram Side	2
Knife Holder	32		Wiper - Ram Top	1

Bolt - Knife Holder (Socket Head Cap Screw)	64		Spring (Ram Wiper)	N/A
			Plate - Ram Face	1
Counterknife (4 Scallop)	N/A			
Counterknife (5 Scallop)	1		Hydraulic Cylinder	1
Counterknife (6 Scallop)	3		Pin	1
			Plate - Pin Capture	1
Screen	1		Trunion	1
			Proximity Switch - Ram	2
Bearing - Drive Side	1		Bracket - Ram Proximity Switch	N/A
Bearing - Non-drive side	1		Hydraulic Hoses (25 ft. long)	2
Gearbox	1		PLC	1
Sheave - Gearbox	1		Emergency Stop Switch	1
Sheave - Motor	1		Electrical Panel Disconnect	1
Main Motor (Rotor)	1		Hydraulic Motor (Main)	1
Belt	1		Hydraulic Motor (Secondary)	N/A
Belt Guard Frame	1		Hydraulic Pump	1
Belt Guard Cover	1		Directional Valve	1
			Pressure Switch	1
Frame	1		Oil Filter (10 Micron)	1
Hopper	1		Overload	1
Cover - Ram Top	1		Motor Starter	1
Rotor Chamber Door	1		Relay	1
			Current Monitor	1
			Push Button Switch (2 Way)	1
			Red Overload or Safety Circuit Light	1
			White Power On Light	1
			Strobe and Horn	1

7-5 Hydraulic Schematic

The hydraulic schematic for the shredder was supplied inside the main control cabinet at the time of shipment and with this manual.

7-6 Electrical Schematic

The electrical schematic for the shredder was supplied inside the main control cabinet at the time of shipment and with this manual.

7-7 Bolt Torque Chart

Grade 8 - Zinc Plated				
Dia	Coarse		Fine Thread	
1/4	T2h0ra1d1 ft-e	lbs	28	13 ft-lbs
5/16	18	22	24	24
3/8	16	39	24	45
7/16	14	63	20	70
1/2	13	96	20	108
5/8	11	191	18	216
3/4	10	339	16	378
7/8	9	545	14	602
1	8	818	14	918
1-1/8	7	966	12	1083
1-1/4	7	1363	12	1509
1-3/8	6	1787	12	2034
1-1/2	6	2371	17	2668
Socket Head Cap Screw - Plain				
Dia	Coarse		Fine Thread	
1/4	T2h0ra1d4 ft-e	lbs	28	16 ft-lbs
5/16	18	29	24	32
3/8	16	51	24	58
7/16	14	81	20	91
1/2	13	124	20	140
5/8	11	238	18	270
3/4	10	423	16	472
7/8	9	682	14	752
1	8	1022	14	1147

Metric Grade 10.9 -

	Coarse		Fine	Plain
Dia				Thread
M6	1	11		
M7	1	18		
M8	1.25	27	1	
M10	1.5	53	1.25	
M12	1.75	93	1.25	
M14	2	148	1.5	
M16	2	230	1.5	
M18	2.5	318	1.5	
M20	2.5	449	1.5	
M22	2.5	613	1.5	
M24	3	777	2	
M27	3	1139	2	
M30	3.5	1544	2	
M33	3.5	2101	2	
M36	4	2700	3	

NOTE: For Stainless Steel Hardware Torque, 30% Less Than Figure Shown in Above Charts

NOTE: Coat All Hardware With Supplied Rust Inhibitor Once Per Month

Re-Order: McMaster-Carr Part #10245K52

Viradys
Medical Waste Solutions

1001Thornblade Blvd
Greer, SC 29650
864-630-9656
www.viradys.com

Testing Protocol for
Viradys Disinfection Unit
(VDU)

Testing of the Viradys Disinfection Unit (VDU) is a four-step process:
1) obtain Biological Indicators (BI),
2) BI Strip Exposure,
3) BI Evaluation,
4) Post Test Results, which should be performed periodically per the recommendations of local authorities and your corporate Chief Infection Officer to ensure the VDU is operating properly.

Biological Indicator
Testing is performed with Biological Indicators (BI) strip. It is important to utilize the BI strip designed for the proper disinfection method. For the VDU, a Dry Heat BI (*Bacillus atrophaeus*) strip is required. The BI strip must be designed to provide disinfection verification to 6Log10 (or 1 part in 1,000,000).

There are several companies that supply the above Biological Indicator strip. Viradys does not recommend a particular brand however we have used Mesa Labs BI Strips for all of our testing.

Spore	*B. atrophaeus*
Incubation	7 Days at 30-35°C
Population	10^6
Reorder #	SGMG/6
URL	http://biologicalindicators.mesalabs.com/mesastrip/

BI Strip Exposure
Testing of the machine is straightforward. A BI strip is place within the waste stream by placing it on the conveyor, as it is entering the oven. The BI strip will then mix with the waste and be processed along with the waste. Multiple BI strips can be introduced across the unit to ensure there are no variations in treatment across the unit.

When the BI strips appear again on the conveyor, the waste has been disinfected. Gather the BI strips out of the disinfected waste stream.

BI Evaluation
Once the BI strips are exposed and gathered, they need to be marked for unique identification. The exposed BI strips and two unexposed BI strip are to be cultured to see if there is any growth.

The BI strips can be processed internally if a lab is available. The BIs strips are cultured in Tryptic Soy Broth (TSB) media and placed in the incubator at 30-35ºC for seven days. The units will be monitored for growth or no growth. Two unexposed indicators will also be cultured as positive controls. One or more tubes of the same lot of culture medium will be incubated to serve as a negative control.

If a lab is not available, then it should be sent out for processing. Several labs are able to process the BI strips.

Again, Viradys does not recommend a particular lab. We employ Mesa Laboratories Inc., Bozeman Manufacturing Facility, 10 Evergreen Dr., Bozeman, MT 59715, (406) 585-9535 for the processing of their strips.

Post Test Results

Written and electronic results should be retained per the regulatory and company procedures. The results will provide trend analysis and audit verification.

If any tests fail, it is necessary to contact Viradys at (864) 881-1838 for immediate analysis or VDU repair.