

Tirth Agro Technology Pvt. Ltd.

Mobile Shredder related information



Name:- _____

Add:- _____

We are happy to present 'Training Handbook –Mobile Shredder' of Tirth Agro Technology Pvt. Ltd. (Shaktiman).

We have tried to give more all the relevant information like what is Mobile shredder? How do you run in the field, specifications, cleaning, repair, assembly and troubleshooting etc.

We hope you find this 'Training Handbook –Mobile shredder' very useful.

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1. Introduction

Tirth Agro Technology Pvt. Ltd. Has made 3 types of mobile shredders, such as

<p>1) Mobile Shredder (Forage Harvester)</p> 	<p>SMS is a Forage harvester ideal for fast cutting and shredding of forage. Shredded fodder can be collected in the hitched trolley with optional hydraulic chute which can help direct the flow. It's used for row crops like Maize/corn, Alfalfa and Napier Grass. It comes with a foldable frame for easy transportation and an inbuilt blade sharpening device.</p>
<p>2) Static Mobile Shredder (3-Point linkage attachment)</p> 	<p>Static Shredder is designed for cutting and shredding crops like maize, cotton, castor, chilly, sunflower stalks to clear the field. Shredded crop can be spread in the field and can get converted into organic manure for next crop. Shredded crop can be collected in the trolley using long chute and can be used as animal fodder or for other applications like bio-fuel, paper board, particle board etc. This machine can also be used in chopping of green fodder crops like Maize and Sorghum.</p>
<p>3) Mobile Shredder (Motor Driven)</p> 	<p>Shredder has been operated by motor. This machine most of used in dairy farm.</p>

1.1 Use of mobile shredder

Mobile Shredder (Forage Harvester) can operate with a 540/1000 RPM tractor with 45 HP and above HP which should have Dual Clutch PTO. The machine works in the offset position and can be folded and locked for the transport position making it easy, safe and comfortable to transport the machine between areas and for long distances in narrow roads. For running mobile shredders (3-point linkage attachment) with a 540 rpm tractor with 45 hp and above hp which should have dual clutch PTO. Mobile shredders (motor driven) machines do not require a tractor. It consists of 14 hP motor used in 5 inch pulley in motor and 4 inch pulley in machine.


1.2 Parts information




1 Main Frame

	To support the machine.
2	Primary Gear Box To attach a tractor with 540/1000 rpm.
3	Crop Guide To give correct path to the crop.
4	Disc Cutter To cut the crop.
5	Feeder Drum It works by holding the crop and sending it to the machine.
6	Fly-Wheel It has two types. (1) 6 blade flywheel (used in dry crops like cotton etc.) and (2) 12 blade flywheel (used in green crops such as maize etc.).
7	Flywheel Knives To cut small pieces of the crop.
8	Flywheel Palate For throwing the sliced crop far away.
9	Long Chute/Short Chute/Extra Long Chute To fill the sliced crop in a trolley.
10	Height adjusting wheel To support the machine and cut the crop from the ground height.
11	Grinding Wheel To sharpen the flywheel blade
12	Secondary Gear Box To power the drum and fly wheel gear box.
13	Flywheel Guard For safety of flywheel.
14	Frame upper cover Safety of flywheel and long / short / extra-long chute.

1.3 Technical Specifications



Mobile Shredder (Forage Harvester)



MODEL	SMS			
Overall height (mm)	2540 (folded) &3050 (unfolded)			
Overall Width (mm)	1320 (fold) &2555 (unfold)			
Overall Length (mm)	1340 (small), 3100 (long) &3400 (extra-long)			
Weight (kg / lb)	600 / 1323			
Working Width(mm)	900			
Tractor Power (HP / KW)	40+ & 34+ Dual Clutch			
3 point hitch	Category 2			
PTO (RPM)	540 (Default) / 1000 (Interchangeable)			
Number of rows	1			
Metal wheel / rubber tire (optional)	Metal 16" (405mm) or Rubber (16" × 6.5")			
Exhaust direction	60 Manual Adjustment Optional Hydraulic Exhaust			
Cutting knives (No.)	2			
Shredding knives (No.)	6 / 12 optional			
Shredding Capacity	Up to 10 tons / hour			
Shredding Range (mm)	up to 5			
Oil Grade	85 (W) 140/ (HP / EP 140)			
Oil Quantity in Primary gear box	2.5 Lit.			
Oil Quantity in Secondary gear box	7 Lit.			
Exhaust pipe - Chute dimension				
Types of Chute	Length (mm)	Width (mm)	Height (mm)	Weight (kg/lb)
small	465	590	500	16 / 35
long	575	1240	2240	48 / 106
Extra Long (Mechanical)	575	2835	2685	58 / 128
Extra Long (Hydraulic)	470	3250	2685	64 / 141
Extra Long ASEAN (Mechanical)	575	2390	2410	54 / 119
Extra Long ASEAN (Hydraulic)	470	2810	2410	59 / 130



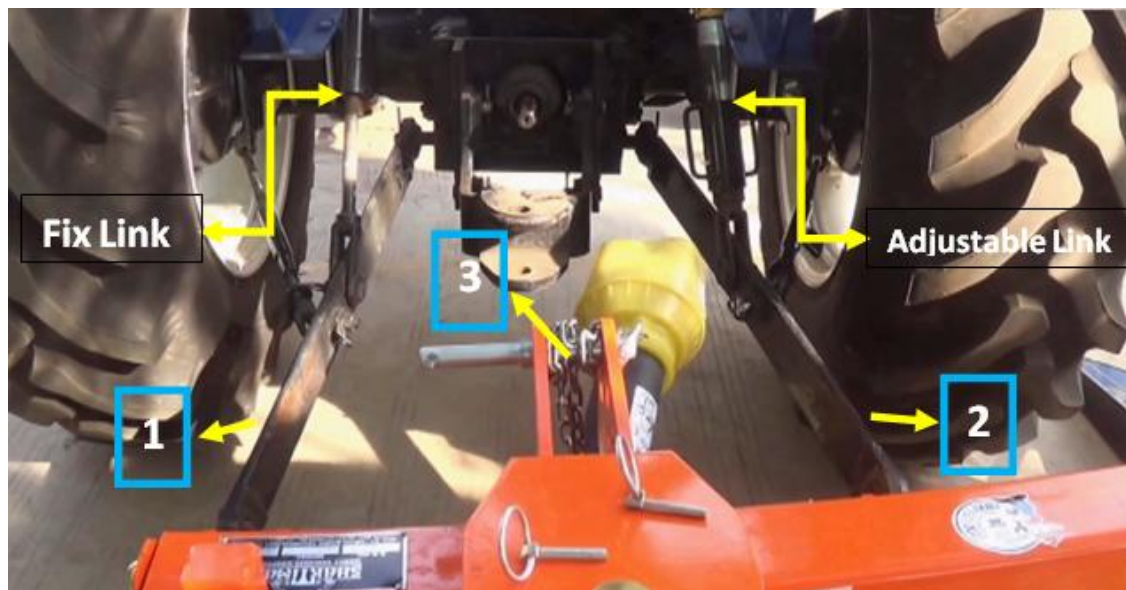
Static Mobile Shredder



Model	With small chute		With long chute	
Overall height (mm)	1920		2320	
Overall Width (mm)	1335		1335	
Overall Length (mm)	1340		2820	
Tractor Power (HP) & Power Transferred to PTO	35 & 30			
Three Point Hitch	Cat II			
PTO Input Speed (RPM)	540			
Weight (kg/lbs)	493 / 1085		506 / 1015	
Fly Wheel (@540 rpm)	1013			
Exhaust direction	60 Manual Adjustment Optional Hydraulic Exhaust			
Cutting knives (No.)	6 / 12			
Parking Stand (no.)	4			
Oil Grade	85 (W) 140/ (HP / EP 140)			
Oil Quantity in Secondary gear box	7 Lit.			
Exhaust Pipe - Chute Dimensions				
Chute Type	Length (mm)	Width (mm)	Height (mm)	Weight (kg / lbs)
Small	465	590	500	16 / 35
Long	575	1240	2240	48 / 106

2. Attaching and detaching the implement

2.1 How to connect a machine with a tractor?



Bring the tractor back and insert LH lower link (1) of the tractor to the corresponding hitch pin of the equipment and lock it with the help of linch pin. Similarly attach RH lower link (2) of the tractor to the corresponding hitch pin of the equipment. If required adjust height of lower link with the help of adjustable lift rod. Attach top link (3) of tractor to top hitch point of the equipment. Adjust length of top link if required to reach and align to the required hole on the top hitch point.

After connecting the machine, if any link rises when lifting from the hydraulic, the cutting will be more or less still. In such a situation, adjust the right link (2) of the tractor which will give depth uniform.

Machine side PTO which has shear bolts, Put it in the machine and make it Lock.



Outer tube and inner tube grooves match with each other and later slide together.

Put the tractor PTO the tractor side. Tie both sides of the PTO guards to the machine and tractor with safety chain.



After lifting the machine from hydraulic, if the machine is moving more than 2 inches to the right and left side, then the machine runs only one side will move and there is a possibility of breaking the PTO cross. That is why adjust the side swinging chain with the lower link.

2.2 How to set the length of the PTO shaft?

Keep both sides of the PTO parallel to each other. Keep in mind that both shafts are in a straight line.

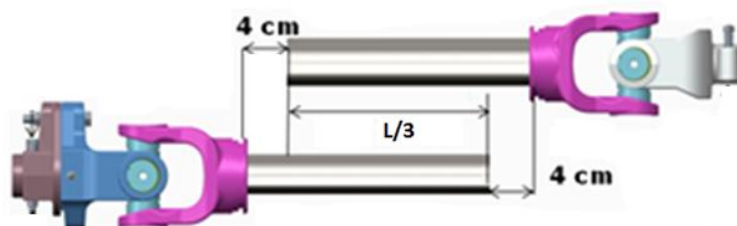


5 cm from the yoke end of the PTO. Make a mark at the distance. Transfer that mark to another part of the PTO.

The part shown in red will be cut with power hacks or hand hacks. Filing the burr over both the cut parts and remove it.



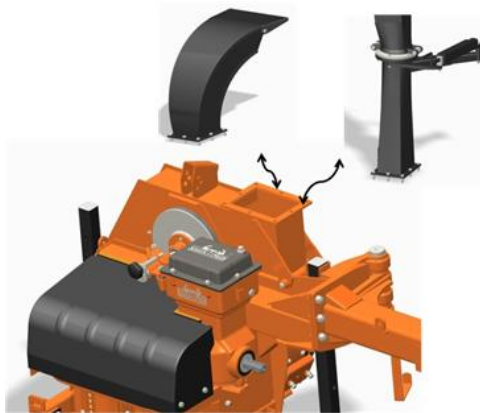
Which can easily put the inner tube in the outer tube. If you do not filling, then the inner tube will not go easily in the outer tube. About 2 cm from the free end of the plastic cover of the PTO, Have to be cut off. This has to be done with both the PTO. By doing this, both the PTO can be easily connected with each other.



2.3 Different type of exhaust pipe

Assembly of exhaust pipe small, exhaust pipe big, extra-long exhaust pipe mechanical, extra-long exhaust pipe hydraulic.

- Put the exhaust pipe on the machine with proper orientation as shown in the below picture.
- Fastened the chute with suitable nuts and bolts



- Small exhaust pipe cannot be rotated but other exhaust pipe can be rotated. Do the below process as described below for the orientation of the exhaust pipe.

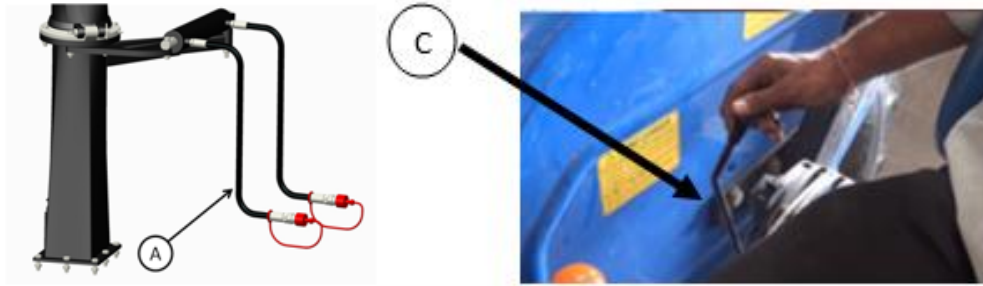
For the exhaust pipe big and extra-long exhaust pipe mechanical

- Rotate the handle (A) till the orientation of exhaust pipe has been reached to required position



For the extra-long exhaust pipe hydraulic

- The orientation will change by the tractor hydraulic system.
- Connect the hose pipe (A) to the tractor coupling point B
- Rotate the hydraulic lever (C) of the tractor to change the orientation of the exhaust pipe till it reached to the required position.



2.4 How to detach machine from tractor?

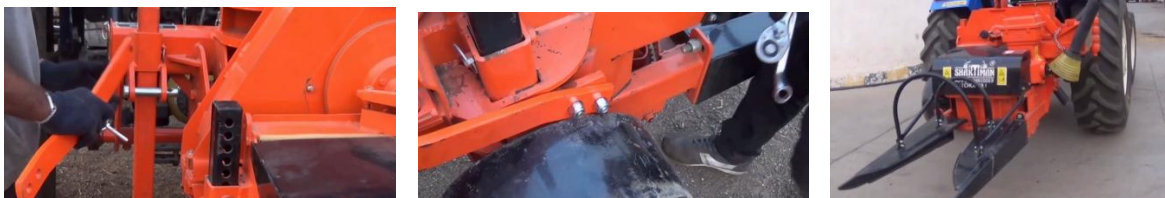
Detaching the machine from the tractor is the reverse process of attaching the machine. Place the equipment on the ground level, lower the stand and lock the stand so that the tool is straight after detaching from the tractor. Remove the propeller shaft, followed by the top link of the tractor, then the left lower link and the right lower link. Lower the depth wheel to ground position.

2.5 How to fold a machine?

When running the machine on a public road or highway, then the machine is very important to fold. Open the three bolts in the main frame with a spanner and keep them in a safe place.



After lifting the machine with the help of hydraulic, separate both sides of the intermediate PTO shaft and put it back in the gear box and fold the machine. Fasten the PTO shaft to the secondary gear box with a safety chain. Put locking plate and nut bolt in the machine and tighten it with the spanner. Now the machine can be easily transported from one place to another.



When transporting the equipment on a smooth surface road, do not operate the tractor at more than 15 km/hr (9 mph). Reduce speed considerably when travelling over uneven ground or on slope. Make sure that there is no one near the equipment.

2.6 How to Unfold a Machine?

Open the locking plate, nut-bolt with a spanner in the machine and keep it in a safe place. Put the machine down with tractor hydraulics. Open safety chain from the machine, both PTO shafts the outer tube and inner tube grooves match and Slide both PTO shafts. Then press the push pins of both PTO shafts and make them secure and tie them with safety chain. Then attach three nut bolts to the main frame, tie safety chain it in and lift the stand attached in the machine.



2.7 Field operation

The horsepower (hP) of the tractor is used according to the model of the machine. The process of running a tractor with a machine is given below.

- 1) Both gears of the tractor must be in neutral position.
- 2) Press the clutch pedal completely.
- 3) Start a tractor.
- 4) Drive the machine in the first or second low gear.
- 5) Engage the PTO gear.
- 6) Increase engine rpm with accelerator lever. Keep increasing until the needle of RPM reaches 540RPM.



- 7) Put down the machine slowly with the help of position lever.
- 8) Release the clutch slowly. Now your machine is ready to run in the farm
- 9) The machine has to turn with the tractor or take it back, then the machine has to lift the machine 0.5 feet which can avoid any type of problem in the machine.

2.8 Spanner set required for mobile shredders

Spanner Name	Quantity
8 mm Allen key	1
11 Fix	1
12 Ring Fix	1
13 Ring Fix	1
16 Ring Fix	1
16 Box	1
17 Ring Fix	1
18 Ring Fix	1
19 Ring Fix	1
19 Box	1
22 Ring Fix	1
24 Ring Fix	1

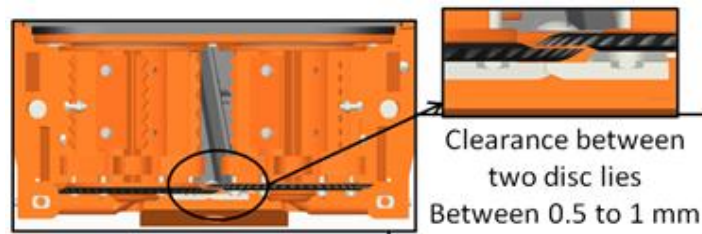
Spanner Name	Quantity
24 Box	1
36 Ring Fix	1
36 Box	1
50 Box	1
Pointer rod	1
Filler gauge	1
Dowel Pin 5mm	1
Iron hammer	1
Plastic hammer	1
Inner Circlip Pliers	1
Outer Circlip Pliers	1

3. Settings in Mobile shredder

3.1 A gap between two disc cutters

There should be a 1 mm gap between the two disc cutters. Gap can be checked with filler gauge. If there is more than 1 mm gap, then the cutting will be thicker and if there is less than 1 mm gap then there are chances of two disc cutters blades rubbing together. Follow the procedure given below for the gap setting.

- Open gear box guard with Spanner to set gap.
- Open the two castle nut above the left drum with the spanner.
- Rotating the threaded guided pin anticlockwise will reduce the gap and rotate the clockwise will result in greater gap.
- Tighten the two castles above the left drum and the gear box guard with the spanner.



3.2 Sliding arm spring adjustment

There should be a 3 to 5 mm gap between the plain drum and the toothed drum. If the gap is less then both the drums can collide. If the gap is high then the material will be more so that the flywheel will get stuck around the shaft and this causes the sliding arm's spring tension to be lower. Follow the procedure given below for setting the sliding arm.

- Open the upper cover frame and flywheel guard with the spanner.
- Open the gear box guard with the spanner.
- The spring tension of the sliding arm has to be checked daily.
- If the gap is less than 3 mm, then add extra rubber bush to the sliding arm.

- Tighten the 2 nuts in front of the spring tension plate with the spanner so that the sliding arm has shaken
- Draw a 150 kg spring balance in the sliding arm. The sliding arm should move after reaching 100 kg. If not move, then two nuts in front of the spring will have to be tightened with the spanner.



3.3 Casting Wheel Height Adjustment

There are two types of casting wheels. The casting wheel in the cotton appears on the outside side of the machine and in the maize, the tractor has the inside side of the machine as shown in the photo below.



Follow the procedure given below to set the casting wheel height adjustment.

- With the help of tractor hydraulic, lift the machine and lock the position lever.
- Engage the parking brake, the machine comes down slowly in this way set the response valve and stop the tractor, take out the key and put it in the pocket.
- Remove lock pin from the casting wheel and the casting wheel will fall down.
- Unlock the position lever and lower the machine through the hydraulic so that the hole is aligned and insert the lock pin.



3.4 C-Blade and Flywheel Blade gap adjustment

There should be a gap of 1 mm between the C-blade and the flywheel blade. Gap should be checked with filler gauge. If there is less than 1 mm gap, then the C-blade and flywheel blade are likely to collide and if there is more than 1 mm gap then the cutting will become thicker. Follow the procedure given below for setting C-blade and flywheel blade gap.

- Open the nuts in the flywheel guard with the spanner.
- Check 1 mm gap with the help of filler gauge. If the gap is less then the filler gauge will not move between the blades and if the gap is more than 1 mm, then remove the linch pin and tighten the castle nut to 1 mm gap. Then the position of the washer will be like the photo below.



- If you do not get 1mm gap even after tightened the castle nut, then remove the linch pin, castle nut, flywheel and flywheel key.
- There are 3 washers above the flywheel shaft. 2 conical washers and 1 plane washer.
- First Plain washer and then 2 conical washers insert above the flywheel shaft as shown below. Then put the flywheel key, flywheel, castle nut and insert a linch pin.
- Now again check 1 mm gap with help of filler gauge.



- If you do not get 1 mm gap even after doing this, then remove the linch pin, castle nut, flywheel and flywheel key.

- Just loose the 5 nut bolts in the C blade and pull the C blade slightly out of the frame. The scraper blade should not move when pulling the C blade out. Keep in mind that with the help of scale, C blade should be come out from every side.
- Put the scale in three different places and check that it has come out completely. Tighten the 5 nut bolts of the C blade with the spanner and then put the flywheel key, flywheel, castle nut and linch pin above the fly wheel shaft. Check 1mm gap with filler gauge.

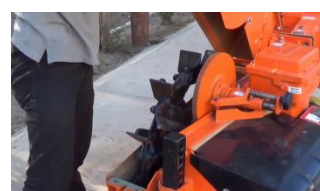
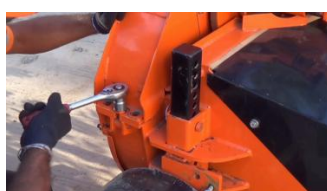
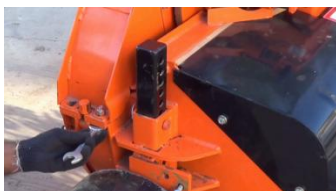


- If the C blade is broken or worn, then the C blade must be replaced immediately and a new C blade is to be installed.
- Tighten the nuts in the flywheel guards with the help of spanner.

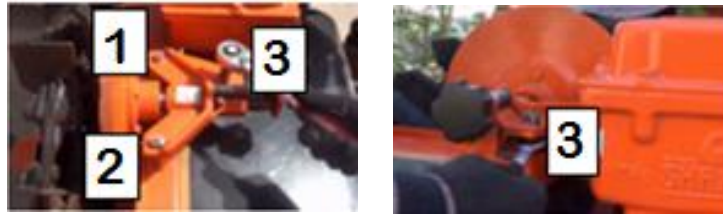


3.5 Sharpen the flywheel blade

- Open the 2 nut bolts and 1 hexagonal nut in the flywheel guard with a spanner.



- **Condition-1**
- The flywheel blade must be perpendicular to the grinding wheel. If the flywheel blade touches top side the grinding wheel but bottom side has gap, follow the procedure below to straighten the grinding wheel.



- Loose the 3 nuts above the grinding wheel.
- Loose the nut under the number 3 nut and keep tightening the top nut. Tighten until the flywheel blade and grinding wheel are straight.
- Tighten the 3 nuts above the grinding wheel.



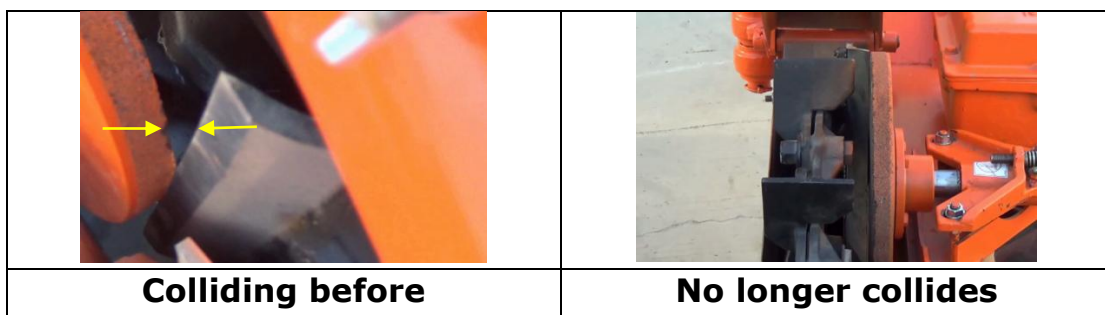
➤ **Condition-2**

- If the flywheel blade gaps top side of the grinding wheel but the bottom side gap touches, follow the procedure below to straighten the grinding wheel.
- Loose the 3 nuts above the grinding wheel.
- Tighten the nut below the number 3 nut and keep on loose the top nut. Keep doing this until the flywheel blade and the grinding wheel are straight.
- Tighten the 3 nuts above the grinding wheel.



➤ **Condition-3**

- If the flywheel blade does not allow the grinding wheel to rotate. That is, the flywheel blade is hitting the grinding wheel. Follow the procedure described below to make the flywheel blade rotate properly.
- Loose the 3 nuts above the grinding wheel.
- Set the grinding wheel in such a way that the flywheel blade touches completely and the flywheel blade does not hit the grinding wheel.
- Tighten the nut under the number 3 nut as well.
- After setting, tighten the nuts on the grinding wheel with the spanner.



- Tighten the spanner by binding all the nuts and bolts to the frame upper cover.
- Loose the wing nut above the upper frame cover and open the window in anti-clockwise direction



- Now drive the tractor PTO in the ideal and slowly turn the knob of the grinding wheel in clockwise direction. The flywheel blade will slowly come into contact with the grinding wheel. Due to which the flywheel blade will start to rub. Whenever you are sharpening the

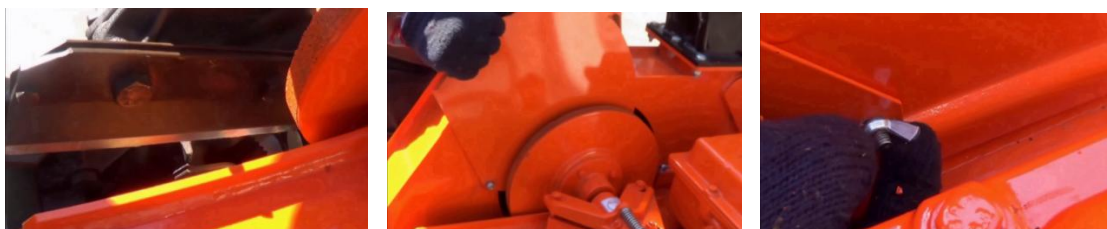
blade, stand between the machine and the tractor. As shown in the photo.



- Never have to stand on the left side of mobile shredder while grinding. This is because the ground grinding wheel is rotating anti clockwise. If the grinding wheel breaks at that time, then the grinding wheel will fall to the left and you feel any injury. Also keep in mind that hexagonal drums are also rotating while rotating the grinding wheel. So your feet have to be keep away because if you are wearing loose clothes then you can get stuck in the drum.



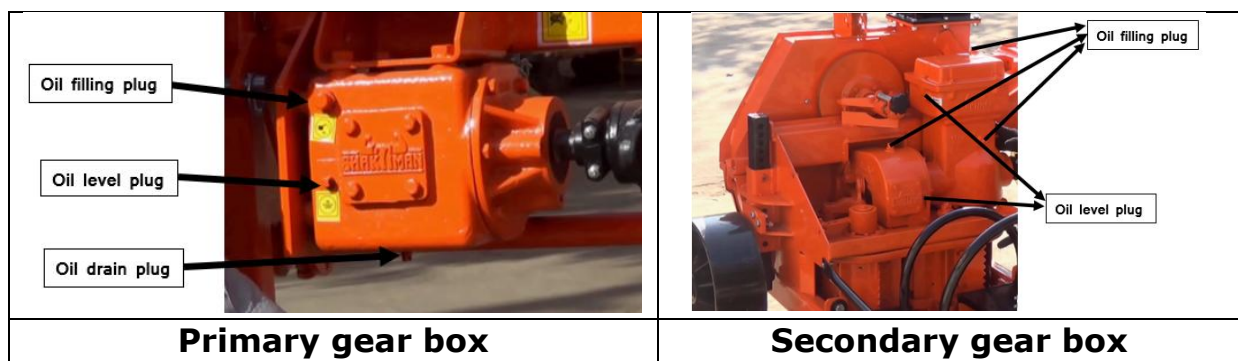
- You can see in the photo below that the edge of the flywheel blade is completely sharp. If the edge of the flywheel blade does not sharp, repeat the grinding. Once the grinding is done, turn the grinding wheel back and tighten the wing nut, binding the frame upper cover window.



4. Lubrication and maintenance

4.1 Checking oil level in primary and secondary gear boxes

The primary gear box and secondary gear box are required to check the oil level every week. Open the oil level plug with a spanner to check. If the oil starts to come out of the level plug, then the oil level is correct and if the oil does not come out, then open the oil filling plug from the spanner and fill the oil through a funnel. Keep filling the oil till the oil comes from the level plug. Then tighten the oil filling plug and the level plug to the spanner.



4.2 Oil filling in primary gear box

The primary gear box has a capacity of 2.5 litre of oil and the grade of the oil is 85 (W) 140 (HP/EP 180). After every 50 hours, the old oil will have to be removed from the drain plug of the primary gear box and will be filled with new oil. After every 200 hours, the old oil drain from the gear box and will be filled with the new oil. Follow the procedure given below to drain the oil and fill the new oil.

- Remove the drain plug by the spanner and fill the oil in a tray. After removing the old oil, tighten the drain plug by the spanner.
- Open the level plug and the oil fill plug by a spanner. Then fill the oil in the gear box through a funnel.
- Keep filling the oil until the oil comes from the level plug. Then tighten the level plug and oil filling plug by the spanner.



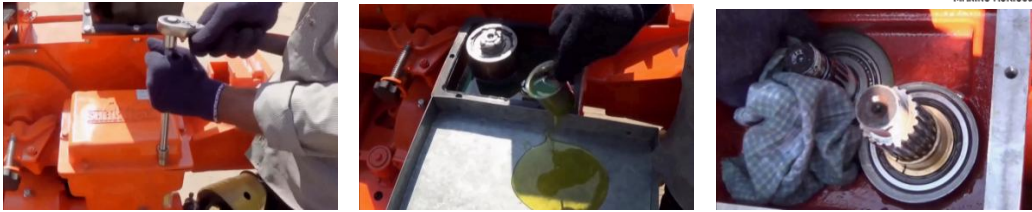
4.3 Oil filling in secondary gearbox

The secondary gear box has two combined gear box. 1.Main gear box 2.Fly wheel gear box. The secondary gear box has a total 7litres oil, in which the aluminium part of the main gear box has a capacity of 2 litres oil and the flywheel gear box has a capacity of 5 litres oil and the grade of oil is 85 W140 (HP/EP140).



After every 50 hours, the old drain oil from the primary gear box of the machine, will have to be filled with a new oil and then after every 200 hours, the old oil drain from the gear box will be filled with the new oil. Follow the procedure to remove the oil from the main gear box and flywheel gear box and to fill the new oil has given below.

- 1.Main gear box
- To remove oil from the main gear box, the top part has to be opened with a spanner and take out oil with steel cup and fill the oil in a tray.
- Both gears have to be removed to completely eject the oil. First remove the cotter pin and open the castle nut. The remaining oil has to be cleaned with a dry cloth.



- Put both gears back to the same place. Then fasten the bolt to the spanner by covering it.

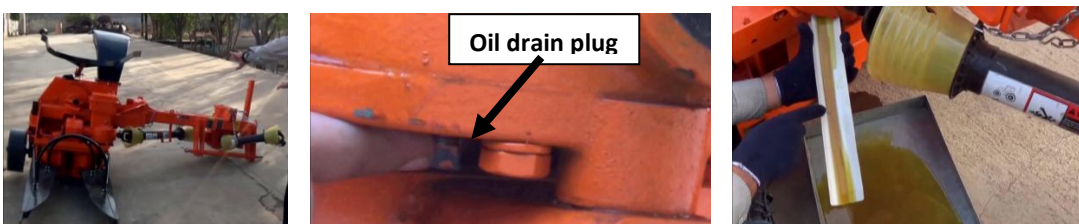


- Open the oil level plug by the spanner. The top part of the main gear box contains 2.5 liters of oil. Open the breather cape and fill the oil with a funnel. Keep filling the oil till the oil comes from level plug. Then tighten the level plug and the breather cape by the Spanner.

- 2. Flywheel gear box and main gear box



- Tilt the machine to remove oil from both sides of the gear box as shown in photo. Remove the drain plug from the spanner and fill the old oil in a tray. After removing the old oil, tighten the drain plug with the spanner and straighten the machine.



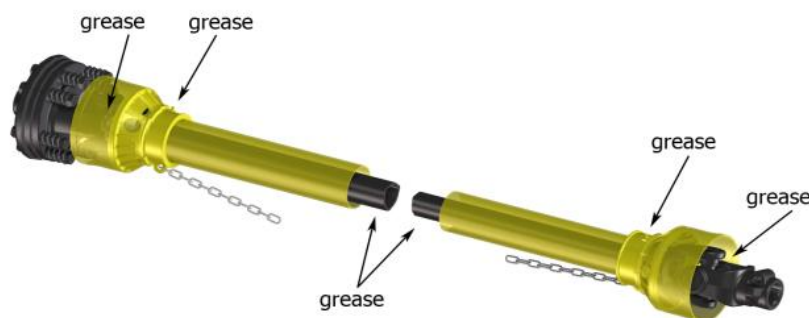
- Open the level plug of the flywheel gear box and the air breather plug (oil filling plug) of the main gear box with a spanner. Then fill the oil in the gear box through a funnel.



- Keep in mind that Don't pouring oil in the flywheel gear box gear, because if you fill 5 litres of oil in the flywheel gear box, then the oil will start to be come out from the level plug. So you will understand that the oil is full in the gear box. But the oil will not go in the main gear box. Because there is a bearing between the two gear boxes, the oil will move slowly. So fill 5 litre oil in the gear box through the funnel by opening the air breather plug of the main gear box with a spanner.
- Keep filling the oil till the oil will starts from the level plug. Then tighten the level plug and the air breather plug by the Spanner.
- The covers above the secondary gear box tighten the bolt by the spanner.

4.4 PTO Greasing

Keep in mind that whenever the machine is running, never applies oil and grease. The crosses given in both shafts of the PTO are to be greased with greasing gun after every 6 hours. The grease nipple should be cleaned with a cloth before greasing so that the garbage does not go inside while greasing. While greasing with greasing gun, grease should be taken out from all four cups of the cross. If Greece is not getting out then you have to contact your nearest dealership.

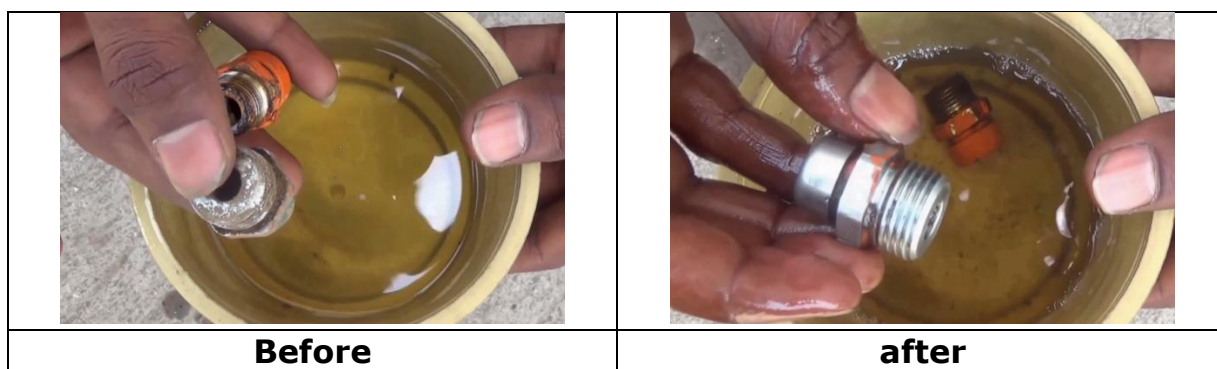


4.5 Maintenance schedule

S.N	ACTIVITIES	Every 8 hr	Every 50 hr	Every 200 hr
1	Check & tight all bolts & nuts of flywheel Blades, guides, disc cutters.	√		
2	Grease all crosses of drive shafts & ensure the grease is coming out of all four cups	√		
3	Check tension of sliding arm spring	√		
4	Clean the Flywheel	√		
5	Clean Secondary Gear Box area	√		
6	Check Gear Box oil level & top up if Necessary		√	
7	Clean and coat the inner tube of the drive shaft with a light film of grease		√	
8	Fly Wheel blade sharpening by Grinding wheel		√	
9	Check all bolts and nuts			√
10	Remove flywheel from shaft & clean completely		√	
11	Drain both gear box oil, flush out & refill with oil grade 85 W140 (HP / EP140)			√

4.6 Clean Air breather

Soil and dust accumulate in the air breather after the machine is run continuously in the field. So that after every 2-3 days it is necessary to clean the air breather. Open the air breather by the spanner and will have to be cleaned by sprinkling with diesel. After that tighten the air breather by spanner.



4.7 Storage & Maintenance

Before storing the machine, keep in mind that there is no fertilizer, garbage or soil in the machine. If it has dirty, clean it with a dry cloth so that there is no rust. If the nuts and bolts are loose, then tighten it with the spanner of all the parts. Grease the input shaft of both gear boxes so that there is no rust on it. After doing this, keep the machine in a clean place where no water falls and cover the machine with plastic sheets.