DALMIA CEMENT (B) LIMITED – DALMIAPURAM MECHANCAL DEPARTMENT			
Issue No. 01	**Rev. No: 00**	**Effective Date: 01.04.2016**	**SOP/Mines/15**
Issued By: Maintenance in Charge		**Approved By: HOD (Mines)**	
SOP for change of Engine Main fan belt in Mines vehicles			

SCOPE : **C**hange of Engine Main fan belt in Mines vehicles

RESPONSIBILITY : Section Engineers

Accountability : Section Heads – Mechanical maintenance

PPE:

1. Safety goggles,
2. Safety helmet,
3. Safety shoe,
4. Cotton Gloves.

TOOLS:

1. Spanners set.
2. Lifting tools & tackles.
3. Special tools
4. Wooden sleepers

Hazard:

Risks associated:	**Mitigating Measures**
Fall from height,	Use of safety harness
Fall of tools;	Carry the tools in tool bags
Hit of Hammer in hand;	trained to be engaged
Slippery due to oil	wearing shoes and careful walk

1.0 Purpose:

Change of engine Main fan belt in Mines vehicles and keep the machine available to Deliver the intended performance level.

2.0 Inputs:

- Workshop
- Stores, spares & consumables
- OEM Manuals.
- Tools and Tackles

3.0 Process:

3.01 Safety Precautions during Repair/Maintenance of change of Engine Main fan belt in Mines vehicles

To ensure the safety of workers near the Mines machine, always sound the horn to warn them before starting the engine and moving the machine. Be particularly careful to check that the rear is clear before backing the machine.

- Exhaust gas is dangerous. While working inside, be particularly careful to have good ventilation.
- Use only the correct tools for maintenance and repair work.
- When carrying out difficult maintenance work, carrying them out carelessly can cause unexpected accidents.
- During Mines Machine maintenance work, do not allow any unauthorized person to stand near the machine.
- Do not allow any body other than the necessary workers to go near the machine while it is being inspected or maintained. Also be careful of people in the vicinity. It is necessary to exercise particular care when performing grinding or welding or when swinging a hammer.
- Before performing any maintenance work in the Mines machine, make sure that it is parked on a level ground, the ignition key is removed and all needed repairs are reported.
- Unless you have special instruction to the contrary, maintenance should always be carried out with the engine stopped. If maintenance is carried out (**Engine Main fan belt**) with engine running there must be two men present: one sitting in the operator's seat and the other one performing the maintenance. In such a case, never touch any moving part.

3.02 Trouble shooting:

Troubleshooting is a means of locating the source of trouble when problems occur so that repairs can be made.

4.0 Code of practice for Repair/Maintenance of the Mines Machine

4.01 For Change of Engine Main fan belt:

- For carrying out any Engine Main fan belt Maintenance work always wear safety gloves, goggles and helmet. Do not wear loose cloths.
- Keep all tools in good condition and learn the correct way to use them. Always don't use the repaired tools.
- Always keep the work area very clean and make sure that there is no unwanted material or oil on the work floor.
- Before starting any repair & maintenance work, Park the Mines Machine on hard level ground and release the internal pressure in hydraulic tank, in addition be sure to "PPC Lock in position"
- Remove all mud, oil and grease from steps or other place used to get on and off the Excavator. Always use the ladders or steps when getting on or off the Mines Machine. Never jump on or off the Mines Machine.
- When dismantling or assembling any Belt in Engine, prepare all necessary spares and tools advance to reduce breakdown time and increase availability of the machine

Release the tension on the belt.

- There are a few things to remember when releasing tension on a belt.
- The belt tensioner is spring-loaded and must be pivoted away from the drive belt. Pivoting in the wrong direction can result in damage to the belt tensioner.

- Lift belt tensioner to relieve tension in the belt, and remove the belt.
- Allow the belt tensioner to relax.
- The tensioner is just another pulley that the belt runs over, but only serves to keep tension on the belt and does not power any accessories.
- Some tensioners can be compressed by turning them with simple hand tools such as a wrench, and others may require a special tool. Usually twisting the pulley clockwise will compress the spring.
- V-belts do not have an automatic tensioner. They can be removed by adjusting the position of one of their pulleys to release tension.
- To loosen a pulley, turn it with a wrench or specialized tool. By convention, counter-clockwise will loosen the pulley
- Remove the belt. Once tension is released, the belt should slide off of the other pulleys easily.
- Check the pulleys
- Compare the new belt to the original
- Ensure that the belt tensioner supplies tension to the belt without being at a mechanical limit stop.
- When work is completed, install the Belt Guard and do the listed follow up steps. Refer to Belt Guard Removal/Installation in this section.
- Run the new belt
- Tighten the belt. Make sure that your belt has the proper amount of tension on it.
- For serpentine belts use the same tool you used above to compress the tensioner and turn it in the opposite direction (counter-clockwise) until the spring releases.
- If you are working with a V-belt design then you will need to tension the belt manually. Find the middle of the belt's longest stretch.

- Move that point from side to side and the belt should have 1⁄2 inch (1.3 cm) of movement in either direction. Any less and the belt is too tight, any more and it is too loose
- Step back and look at the belt.
- Check that the drive belt operates without unusual noises.

- When assembling or installing Belts in Engine always use the specified tightening torques. When installing protective parts such as guards or parts, which rotate at high speed, be particularly careful to check that they are installed correctly. If nuts, bolts, or other parts are not tightened to the specified torque, it will cause looseness, damage to the tightened parts; and this will cause failure of the machine, or problems with operation. Always pay careful attention when tightening parts.

- When removing components are careful not to brake or damage the wiring. Damaged wiring may cause electrical fires.

Immediately after the engine is stopped, the coolant is at a high temperature and the radiator is under high internal pressure. If the cap is removed to drain the coolant in this condition, there is a hazard of burns. Wait for the temperature to go down, and then turn the cap slowly to release the pressure before removing it. When standing up or leaving the operator's seat, set the safety lock lever to the LOCK position. There is danger of touching the fan if the undercover is left removed. Never enters behind the machine when the engine is run

5.01 Inspect machine

- Inspect machine carefully each day by walking around it before starting.
- Keep all guards and shields in good condition and properly installed.
- Fix damage and replace worn or broken parts immediately.

- Pay special attention to hydraulic hoses

5.02 Never search for leaks with your hands

- Use a piece of cardboard to find location of escaping fluid.
- Stop engine and relieve pressure before disconnecting lines or working on Cooling system.

5.03 Clean Machine Regularly

- Keep trash, debris, grease and oil from accumulating in engine /Hydraulic compartment, around fuel lines, hydraulic lines
- Never store oily rags or flammable materials inside a machine compartment.

5.04 Maintain Belt

- Physically check belts
- Parts operate and are in good condition. (e.g. check belt material is not frayed)

5.05 Start only from operator's seat

- Avoid unexpected machine movement.
- Start engine only while sitting in operator's seat.
- Ensure all controls and working tools are in proper position for a parked machine.
- Never attempt to start engine from the ground.
- Do not attempt to start engine by shorting across the starter solenoid terminals.

5.06 Park and Prepare for service safely

- Warn others of service work.
- Always park and prepare machine for service or repair properly
- Park machine on a level surface and lower equipment to the ground.
- Place transmission control in neutral and park brake lever in 'On' position. Stop engine and remove key.
- Attach a "Do Not Operate" tag in an obvious place in the operator's station. Securely support machine or attachment before working under it.
- Do not support machine with cinder blocks pr wooden pieces that may crumble or crush.

- Do not support machine with single jack or other devices that may slip out of place. Understand service procedures before beginning repairs. Keep service areas clean and dry. Use two people whenever the engine must be running for service work.

Environmental Aspects: Refer the Aspect Register
Safety Risks: Refer the Risk Register

Emergency Shut- off:

1. If body injury is there, First aid will be given and inform to the Safety department or Call Emergency number Maintenance Eng. /HOD

Records/Annexure:

1. Refer Line clearance certificates.
2. JSA as enclosed below.

Job Safety Analysis	Job: Maintenance and repair of Excavator	Date: 01.11.14	Analysis by:	Reviewed by:
Title of employee doing job: Mechanic/Helper	Supervisor: HEMM Foreman/shift in charge/ Mechanical Engineer	Department: Mines	Section:	Approved by:
Required/recommended PPE: **Safety shoes, goggles, ear plug, Gloves, Safety Helmet, Safety Belt, Nose mask**				
Sequence of Basic Job Steps	**Potential Hazards**	**Recommended Safe Job Procedure**	**What Could Go Wrong**	**Corrective Action**
Check the workspace and walkways	Slip/Trip	Workspace should be clean & free from obstructions	Falling on the machines	Good House Keeping
Ensure all guards and safety shields are in position	Contact with rotating parts	Guards and Safety shields should be in position	Physical injury	Ensure all Guards and Safety shields should be in position
Ensure that the working tools are in good condition	Slip/Trip or break	Ensure that the working tools are in good condition	Physical injury	Before start of work ,ensure that the working tools are in good condition

Ensure that the machine is in level and firm ground	Slip/Skid	Place the machine in level and firm ground	Physical injury	Before start of work ,ensure that machine in level and firm ground
Ensure that "PPC joy stick is in Locked condition" if it is required to check the engine while running	Accidental Functioning of machine	Keep "PPC joy stick is in Locked condition	Physical injury due to accidental Functioning of machine	Before start of work ,ensure that "PPC joy stick is in Locked condition
To Remove/ change Belt/ slowly to relieve the Tensioner	High tension belt/ Tensioner May hit	Remove Belt/Tensioner slowly/Allow the Tension to release	Physical injury	Ensure that Belts/Tensioner are loosening slowly To allow tension release
When lifting heavy components, use a hoist or crane,	Slip/Skid	For lifting heavy components, use a hoist or crane,	Physical injury/Machine Damage	Before start of work ,ensure that the working tools are in good condition

Job Safety Analysis	Job: Preventive maintenance	Date: 01.06.2015	Analysis by: Section Engineer	Reviewed by: Section Head
Title of employee doing job:	Supervisor: Sec.Engr	Department: Mechanical	Section: All equipments	Approved by: Department Head

SOP for change of Engine Main fan belt in Mines vehicles

Req'd/recommended PPE:

Sequence of Basic Job Steps	Potential Hazards	Recommended Safe Job Procedure	What Could Go Wrong	Corrective Action
Working at Height	Fall from height	Follow work at height SOP	Not following procedure	Ensure SOP is followed before work is started
Using lifting tools & tackles	Fall from height/ hit injury to body parts	Ensure certified tools & tackles are used. Don't over load	Overloading	Ensure lifting tools are nor overloaded
Usage of hand tools	Injury to fingers / hands	Follow SOP for safe usage of hand tools	Not following SOP	Ensure right tools are used right job in right method
Handling the Coolant	Slippery of persons	Collect the Coolant in a bucket to avoid the spillage	Not following the system	Ensure the Coolant to be collected in the buckets and later it is to poured in the old Coolant barrels