**SOP FOR**

**1.0 Purpose : -** Safe Maintenance of Four roll crusher for Optimum performance.

2.0 **Scope**: Sinter plant.

3.0 **Responsibility : -**Engineer In charge and workmen on the job

4.0 **Procedure** : **Maintenance Of Four roll crusher**

**PPEs to be used**

Helmet, Safety shoes, hand gloves, Dust mask and safety goggle.

Work No 1  :  Roller hard facing & turning.

Work No 2 : Roller / Bearings replacement.

Work No 3  :  Drive Belt replacement.

Work No 4 :  Spring replacement.

Work No 5 : HARD FACING OF FOUR ROLL CRUSHER TOP ROLLER (FRC

**Aspect - impact**

Dust Generation Resource Depletion

Scrap generation Air pollution

**Hazards identified -**

**Mechanical hazard**

1.      Trapping between Rotor and crusher body

2.      Fall of material

3.      Accident due to improper shutdown

4.     Flying of Chips during hammering**.**

5.      Failure of sling, chain pulley block, improper hook welding

6.      Fall of a person.

**Electrical hazard**

1. Electrical shock in welding
2. Accident related to taking improper shutdown (shutdown of both drives not taken)

**Procedure –**

**Work No 1 :** Roller turning**.**

1. Take work permit from the shift Superintendent / production in charge and obtain the shutdown clearance from Electrical Department with LOTO
2. Clean the area surrounding to four rollcrusher. Remove the belt and pulley guards.
3. Remove the drive belts after releasing counter weight. Care to be taken to avoid trapping of hands between pulley and belt.
4. Remove the protective covers of four rollcrusher.
5. Fix turning device on the machine frame with the help of 2 tonne chain block.
6. Fix the chain on the chain wheel of top 2 rollers and to the bottom roller required to be turned and ensure guarding for chain.
7. Maintain the chain tension accordingly by adjusting top and bottom roller
8. Check freeness of chain wheel by taking trial run of rollers without turning tool contact. Rest the turning device in the desired position to turn the bottom roller.
9. Turn the roller till uniform surface finish is achieved with thread.
10. After completion of turning remove the turning device with chain block fix back belt and tension the counter weight
11. Remove the chain from the chain wheel.
12. Close the belt guarding, bolt and lock.
13. Clear electrical shut down, take trial.
14. Follow housekeeping procedure as per instruction specified by WI/MAINT/91
15. Hand over to operation.

**Work No 2** : **Replacement of Roller**

Take work permit from the shift Superintendent / production in charge and obtain the shutdown clearance from Electrical Department with LOTO

1. Clean the area surrounding four rollcrusher.
2. Remove the drive belts after releasing counter weight. Care to be taken to avoid trapping of hands between pulley and belt. Remove the coupling guard and then decouple the same. Remove the protective covers / safety guards of four rollcrusher. Open the spring assembly, support bolts and nut.
3. Use 2 chain blocks of 5Tcapacity to pull and lift the roller outside the supporting frame
4. Remove the roller outside the building with the help of a hydra.
5. Using 2 chain blocks of 5T capacity position the new roller in the supporting frame
6. .Fix back the spring assembly along with support bolts and nut.
7. Lubricate the bearings with recommended grease.
8. Fix drive belt. Check freeness of roller and tensioning by adjusting counterweight.
9. Do the alignment of the drive coupling & couple the same and fix the coupling guard.
10. Fix back protective covers / safety guard stand & bolt it.
11. Follow housekeeping procedure as per instruction specified by WI/MAINT/91
12. Clear work permit and electrical shut down, take trial
13. Hand over to operation.

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**Work No 3** :  **Replacement of Drive Belt**

1. Take work permit from the shift Superintendent / production in charge and obtain the shutdown clearance from Electrical Department with LOTO
2. Open the belt guard
3. Remove the belt tensioning pulley counterweights provided & release belt tension. Take care of hand trapping hazard between pulley and belt

Tension puley



Driven pulley of top roller.

Drive pulley of bottom roller.

Driven pulley of bottom roller.

Tension pulley.

Drive belt.

1. Remove & replace the belt.
2. Adjust the counter weight to tension the belt.
3. Close the belt guarding, .
4. Clear electrical shut down, take trial.
5. Hand over to operation.

**Work No 4** :  Replacement of **Spring**

1. Take work permit from the shift Superintendent / production in charge and obtain the shutdown clearance from Electrical Department with LOTO
2. Loosen & remove the nuts of spring tensioning.

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Spring tensioning cap

Spring

1. Remove cap & spring with proper care, to avoid falling the same on leg.
2. Check the spring mounting seat & cap for wear out.
3. Replace the spring.
4. Fix nuts & lock it properly.
5. Clear electrical shut down, take trial.
6. Hand over to operation.

**Work No 5** :  **HARD FACING OF FOUR ROLL CRUSHER TOP ROLLER(FRC).**

1. Ensure that top feed end rod gate in closed condition.
2. Take work permit from the shift Superintendent / production in charge and obtain the shutdown clearance from Electrical Department of vibro feeder & .four Roll Crusher with LOTO.
3. Open FRC manual door for cleaning the drum thoroughly.
4. Scrapers to be removed out for easy rotation/cleaning purpose.
5. Provide direct earthing to FRC.
6. If worn out is more than 3 mm then hardface with electrode ABRATEC, 6710, 4mm in .chequered pattern throughout the drum.
7. Close FRC manual door.
8. Clear the shutdown/work permit of vibrofeeder & four Roll Crusher from Electrical Department .
9. Take trial of FRC with noload/load.
10. If found ok then handover it to operation.

**DO:**

* Wear all PPE'S while working, Ensure the usage of dust mask and safety goggles in dusty areas.
* Use proper tools.
* Study any usage of cut material for re usage so as the wastage will be minimum.
* Clear all debris of oil, grease and other rubber and metal scrap.
* Ensure guards in place and bolted.

**Reference: - SP-44**

**Amendement Record**

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| **Date** | **Manual Section Ref. & Para** | **Brief details of Revision** | **New Rev.** |
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| **Prepared By:**  Associate Manager- Sinter Plant Mechanical | **Reviewed & Issued By:**  Management Representative | **Approved By:**  **Manager- Mechanical PID2** |
| **Signature:** | **Signature:** | **Signature:** |
| **Review Date: 18.05.2022** | **Review Date: 18.05.2022** | **Review Date: 18.05.2022** |