



Client Mining Operation SAG Mill



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Client	Client	
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Order Number		



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1. Scope:

Attend site and assess the condition and recommend action for the remediation of the gear and pinion of SAG Mill at Client's Mining operation.

Improve consistency of gear contact surfaces by removal of local high points which can cause load concentrations that can lead to surface fatigue damage. Introduce a roughened surface that provides refuge for lubricant and promotes lubricant adhesion.

Record gear condition using before and after using photographs and report on outcomes.

2. Summary:

Background:

Client's SAG mill at Mining operation has been in operation for a significant period of time. Gearinspec has carried out inspections on this gear since 2010. During this time – some deterioration had been noted, particularly between 2011 and 2013. The opportunity arose to hand finish the gear with the aim of improving gear contact, by removing local high spots of the gear and introduce a surface finish that is sympathetic to the adhesion of lubricant in an uncontained gear.

The gear appeared in good condition with no obvious features that would pose a risk to the long term operation of the machine.

Results:

Contact between the pinion and the gear was noted to be more pronounced on the non-drive end than the drive end. An area at the drive end was noted that was indicative of abrasive contaminant ingress that removed material from both pinion and gear in that area.

The hand finishing appears to have restored contact area on the gear; a pinion alignment adjustment was understood to be carried out before the mill was returned to service. This will further improve the load distribution across the teeth.



Notes on Preparation:

The gear was prepared by removing the gear cover and high pressure washing the gear. The gear was entirely cleaned of any remnant gear lubricant. This does make the job of remediation easier, however, cleanliness to that level is time consuming and not necessary.

A suggested method is as follows:

- Install an empty waste lubricant drum at the bottom of the gear guard.
- Have 100 ltrs of Diesel with a pump that can supply diesel at about 700 kPa or 100 PSI.
- Set the mill to inching and rotate the mill
- Use an appropriate nozzle to ensure that the gear is covered with diesel as the mill is rotated.
- Continue this process for approximately 1 hour at least.
- Observe the consistency of the lubricant that is on the gear – it should be becoming diluted.
- Once the lubricant is observed to become runny – check the waste grease drum at the bottom of the gear guard to see that it is not over full.
- Next do one of 2 things: Either
 - (a) Squirt diesel onto the gear at a higher pressure – using either a 2500 PSI pressure washer or a suitable lubricant pump to shift the diluted gear lubricant.
 - (b) Or continue the process with degreaser in place of the diesel and then pressure with water. If option B is taken, a new waste drum should be installed – otherwise use a vacuum truck to capture the oily water from the pressure washing.

Coating of a light hydrocarbon such as diesel or some remnant gear lubricant and prevents surface corrosion and scuffing of the gears when inching the mill.



3. PHOTOGRAPHS



Fig 1 Gear tooth cleaned before remedial work commenced (Drive end).



Fig 2 Centre section of the un-remediated gear tooth.



Fig 3 Non drive end of girth gear before remedial work.

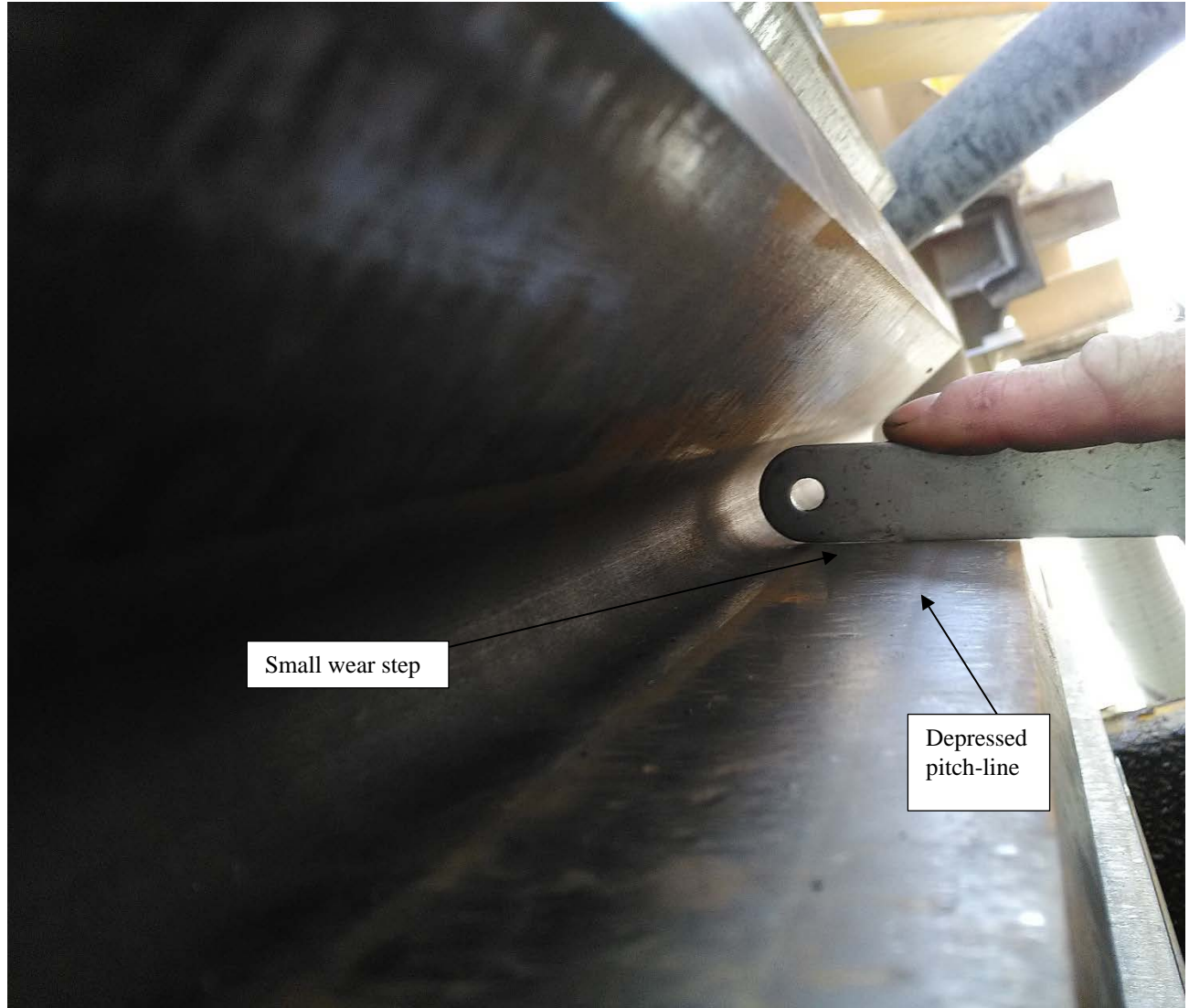


Fig 4 involute profile before hand finishing of the gear.

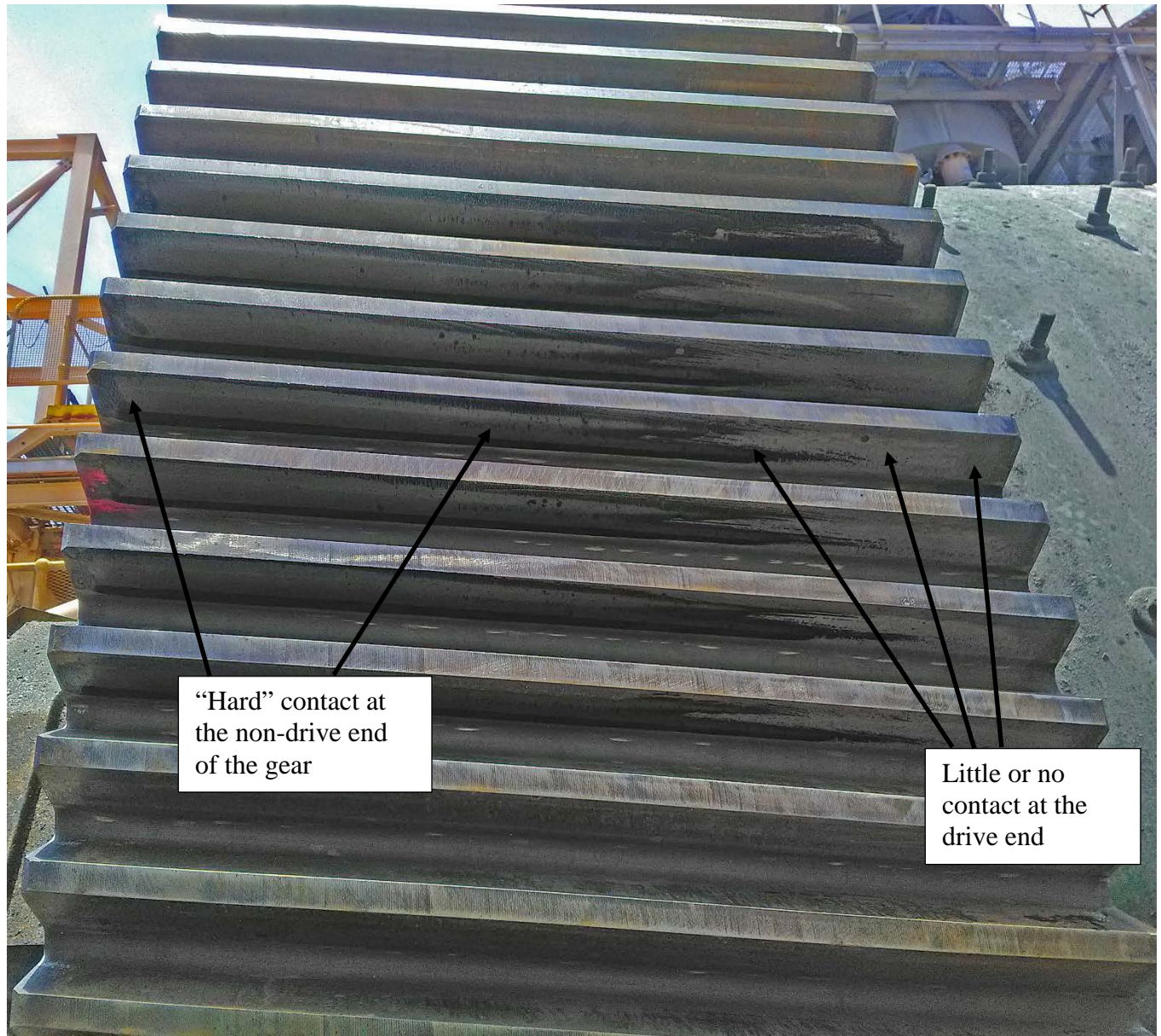


Fig 5 - Contact **before** hand finishing the contact obviously tends toward the non drive end with a transition about 2/3 of the way across evidenced by the remnant bearing blue and the area at the drive end which shows no blue is because the clearance is too great to leave any blue on the gear surface.



Fig 6 Dive end contact flank **after** hand finishing.

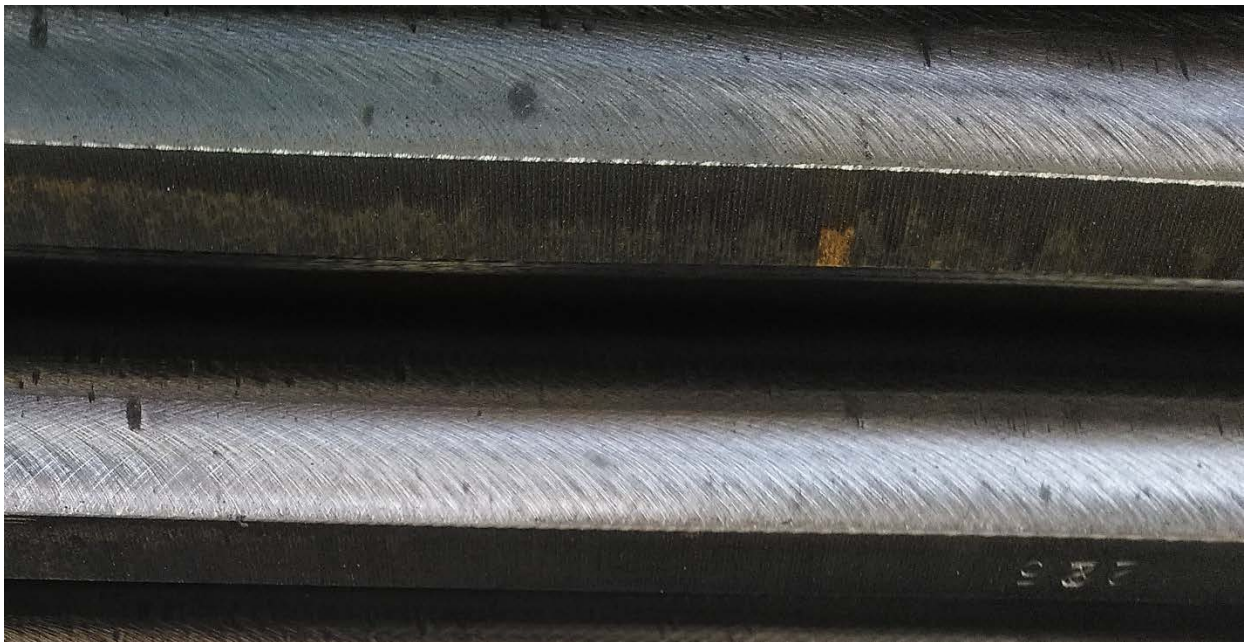


Fig 7 Centre region contact flank **after** hand finishing.



Fig 8: tooth 225 non drive end after finishing



Fig 9: View of profile after finishing – some of the wear step has been taken down.



Fig 10: Contact after finishing showing relatively even contact across the tooth the drive end is on the left side of the picture. The contractor will to make some pinion adjustments after the trunnion bearing change.