BALL MILL TRUNION GRINDING

A. Break down observed:

1. Trunion journal got worn-out due to damage of seal and ingress of raw material in the trunnion bearing, leads to damage of the trunnion journal surface.
2. Thickness of trunnion reduced considerably beyond repairs at four positions along the circumference.

B. M/s ALLAN SMITH has studied the root cause and repaired as:

1. Removal of worn-out surface, circumferentially at the damaged area using minimum heat input.
2. Care taken to ensure minimum distortion of the journal during the repairs (cutting and welding).
3. Preparation of "V" groove at the 4 positions.
4. Fabrication of 60 mm thick ring of 500 mm width and diameter 1628 mm.
5. Machining of ring on the outside to ensure the circularity and required surface finish.
6. Window cut damaged portion of the ring and refurbish on the trunnion.
7. During the patch, it is ensured to maintain the straightness throughout the length.
8. Upon conforming straightness, suitably weld to avoid "out of roundness".
9. After completion of the weld, following parameter were checked:
    a. Total Indicated run-out at three positions found 2.5 mm radially.
    b. Surface straight ness 1.3 mm low at end portion and 1.2 mm high at the center.
10. Above deviations occurs due to welding distortion.

C. Trunion Grinding:

1. ASEPL had especially developed precision grinding machine for similar grinding assignments.
2. Grinding machine installed at appropriate positions, parallel to the rotating axes at an angle @ 40 ^{o}.
3. Mill rpm in inching drive is 0.3, increases to 1 and maintain @1 rpm for the grinding.
4. Suitably select grinding stone specification and depth of the grinding executed at every phase.
5. Material removal on the trunnion is 3.5 mm radially.
6. Final reading as out of roundness +/-0.35
    a. Straightness throughout length +/-0.7 TO +/- 1.0
    b. Surface finish up to 25 micron I.e. 30 to 35 rms value.

D. Blue matching of bearing liner:

1. After completion of the grinding:
    - bearing liner scrapping carried out to blue match the trunnion surface.
2. The blue match contact pattern taken as:
    - 100% at center along the length and width 300mm Rest of the portion is non-contact.
    - Bearing clearance, radial of 0.35 to 1.7mm, gradually increase as per the standard.

E. Result *(*During trial run, a*fter the correction):*

1. Mill lift observed 0.3mm whereas earlier recorded was 0.1mm, under the similar conditions.
2. Mill operates on auxiliary 0.3 rpm for 10 hrs, no temperature rise observed in journal bearings.
3. Mill taken on full rpm for 4 hours, observed operates in normal *(no abnormalities observed).*
4. Finally mill charged with 70% grinding media and started, runs smoothly with normal feed.
5. Further grinding media charged gradually up to 100% and observed mill operates normal.

F. Conclusion:

a. Time required for the above assignment is 30 days and the time break up is as:

- Forming, weld repairing: 15 days
- Grinding and blue matching: 11 days
- Mill alignment measurement and corrections: 02 days
- Box up: 02 days

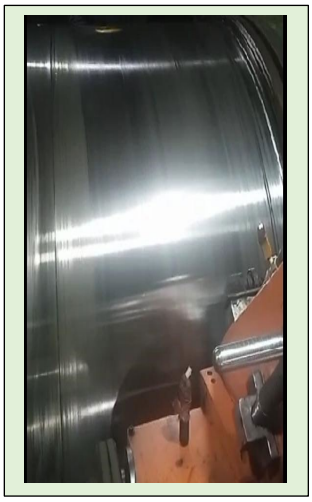
b. Delivery period of new trunion assembly is approx. 6 month, and above activities result in saving of 5 months production loss of client.

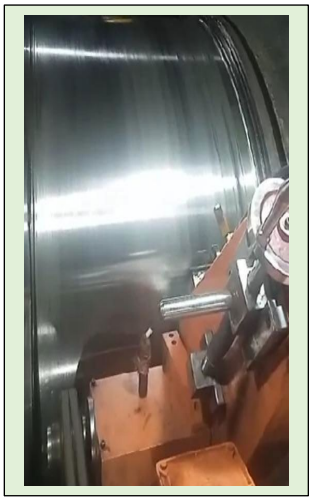
G. Machine and tools deployed:

a. Specially designed grinding machine for the trunnion grinding.
b. Bearing scrappers.
c. Laser Alignment measurement instruments.
d. shims for alignment of various thickness.
e. Prussian blue.
f. Hydra, sling, D-shackles, etc.

H. PHOTO DOCUMENTATION:

TRUNION SURFACE BEFORE





TRUNION SURFACE AFTER GRINDING