

## Gearbox Maintenance Report

|           |                                       |                      |                             |
|-----------|---------------------------------------|----------------------|-----------------------------|
| Customer: | Anhui Tongling Conch Cement Co., Ltd. | Maintenance Company: | Welter Nanjing works        |
| Contact:  |                                       | Contact:             | Qiu Chuntao / Shi Lihua     |
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| Date:     | April 27, 2022                        | Delivery Time:       |                             |

### A. Gearbox Parameters:

|             |        |                   |                  |              |         |
|-------------|--------|-------------------|------------------|--------------|---------|
| Model       | KMP710 | Serial Number     | 425-408-019-2-01 | Power        | 3298KW  |
| Speed Ratio | 39.67  | Total Weight (kg) |                  | Manufacturer | Flender |

### B. Description of Main Damages During Disassembly of the Gearbox:

1. One tooth of the umbrella gear shaft in the reducer is broken.
2. Severe wear on the inner tooth sleeve and the vertical shaft tooth surface, with individual teeth broken.
3. Wear on the sun gear ball crown, requiring a complete set replacement.
4. Serious wear on the hub hole of the vertical shaft, with a depth of about 5-6mm. Determined to be caused by previous hole repair, with dimensions exceeding tolerances, resulting in loose fit and inability to provide positioning and torque transmission functions.
5. Wear on the upper part of the planetary carrier pin hole and wear on the 251 bearing end face positioning surface.
6. Damage to the internal bearing snap ring of the planetary wheel, with individual rolling elements tilting. Breakage of the retaining frame, poor operating condition of the planetary carrier. There are traces of previous repairs and wear on the bearing adjustment ring and the planetary carrier.
7. Breakage of the M64 bolt on the grinding disc, requiring complete removal. After lifting the reducer grinding disc, all thrust pads are severely worn, with no traces of lubricating oil on the surface. It can be determined that the high-pressure lubrication system is blocked. The customer needs to check their own high-pressure oil supply system, such as checking whether the high-pressure pipe is blocked, pump pressure, and filter status, lubricating oil status, otherwise, the same problem may occur.

### C. Maintenance Content and Replacement Parts List

| No. | Item                    | Content | Material or brand | Unit   | Qty | Description of Old Part Damage or Wear       | Remark |
|-----|-------------------------|---------|-------------------|--------|-----|--|--------|
| 1   | High-Speed Shaft        | 100     | -                 | Pieces | 1   | Tooth breakage, replacement                  | -      |
| 2   | T-type Ring             | 114     | -                 | Pieces | 1   | End surface wear, replacement                |        |
| 3   | Fixed Distance Ring     | 115     | -                 | Pieces | 1   | End surface wear, replacement                |        |
| 4   | Bearing Adjustment Ring | 118     | -                 | Pieces | 1   | Old ring does not meet assembly requirements |        |
| 5   | Lock Nut Stop Gasket    | 110     | -                 | Pieces | 1   | Breakage, replacement                        |        |
| 6   | O-ring                  | 123     | -                 | meters | 3   | Aging, replacement                           |        |
| 7   | O-ring                  | 124     | -                 | meters | 3   | Aging, replacement                           |        |

|    |                                    |                      |   |        |    |  |  |
|----|------------------------------------|----------------------|---|--------|----|--|--|
| 8  | Spacer Ring                        | 125                  | - | Pieces | 1  | End surface wear, needs repair   |  |
| 9  | Adjustment Pad                     | 128                  | - | Pieces | 2  | For adjustment   |  |
| 10 | O-ring                             | 132                  | - | meters | 1  | Aging, replacement   |  |
| 11 | O-ring                             | 136                  | - | meters | 4  | Aging, replacement   |  |
| 12 | Bearing                            | 29352E               | - | Pieces | 2  | Wear, replacement  |  |
| 13 | Bearing                            | 23260-MB-C3          | - | Pieces | 1  | Wear, replacement  |  |
| 14 | Bearing                            | NU344-E-TB-M1-C3     | - | Pieces | 1  | Wear, replacement  |  |
| 15 | Bearing                            | NU10/710-TB-N2-M1-C3 | - | Pieces | 1  | Wear, replacement  |  |
| 16 | Thrust Pad                         | 253                  | - | Pieces | 12 | Severe scratches, needs repair   |  |
| 17 | Bearing                            | 24164-BE-XL-C3       | - | Pieces | 3  | Retaining frame breakage, tilting of rolling elements, replacement needed          |  |
| 18 | Gear Sleeve                        | 390                  | - | Pieces | 1  | Severe wear, replacement needed  |  |
| 19 | Intermediate Shaft                 | 400                  | - | Pieces | 1  | Severe wear and tooth breakage, replacement needed                                 |  |
| 20 | Umbrella Gear                      | 402                  | - | Pieces | 1  | Replacement as a pair with 100   |  |
| 21 | Hub                                | 404                  | - | Pieces | 1  | Severe bearing wear, replacement recommended                                       |  |
| 22 | Umbrella Gear Bearing Sleeve       | 420                  | - | Pieces | 1  | Cracked, replacement needed  |  |
| 23 | Adjustment Pad                     | 428                  | - | Pieces | 2  | For adjustment, needs customizing  |  |
| 24 | Bearing                            | Z-514446.01.TR2      | - | Pieces | 1  | Wear, replacement  |  |
| 25 | Bearing                            | NU264-EX-M1-C3       | - | Pieces | 1  | Wear, replacement  |  |
| 26 | Sun Gear                           | 301                  | - | Pieces | 1  | Ball crown wear, replacement needed  |  |
| 27 | Teflon Pad                         | 318                  | - | Pieces | 1  | Wear, replacement needed   |  |
| 28 | Bearing Support                    | 256-251              | - | Pieces | 4  | Wear, replacement needed   |  |
| 29 | Bearing Limit Block                | 251                  | - | Pieces | 2  | Bearing race, needs addition   |  |
| 30 | Lock Nut Stop Piece                | 411                  | - | Pieces | 1  | Damaged, replacement needed  |  |
| 31 | Planetary Carrier                  | 200                  | - | Pieces | 1  | Bearing positioning surface wear, upper pin hole size deviation, can be used after |  |
| 32 | Planetary Wheel                    | 302                  | - | Pieces | 3  | Inner hole wear, cracks, replacement needed  |  |
| 33 | Planetary Wheel Bearing Adjustment | 314                  | - | Pieces | 3  | Wear, replacement needed   |  |
| 34 | Pin Shaft                          | 300                  | - | Pieces | 3  | Bearing position wear, replacement needed  |  |
| 35 | Planetary Wheel Bearing Snap Ring  | 363                  | - | Pieces | 3  | Damaged, replacement needed  |  |

|    |                              |                      |   |        |    |                                    |  |
|----|------------------------------|----------------------|---|--------|----|------------------------------------|--|
| 36 | Tile Seat Hex Bolt           | M16*110              | - | Pieces | 24 | Thread damage, replacement needed  |  |
| 37 | Output Flange M64 Bolt Hole  | M64                  | - | Pieces | 12 | Bolt misalignment, hole opening    |  |
| 38 | High-Pressure Oil Pipe Joint | M18*1.5 H-type Joint | - | Pieces | 6  | Missing, supplementary for testing |  |
| 39 | Breather Valve               | 54                   | - | Pieces | 1  | Missing, supplementary             |  |
| 40 | Hex Bolt                     | 281                  | - | Pieces | 18 | Thread damage, replacement needed  |  |
| 41 | O-ring                       | 286                  | - | meters | 5  | Aging, replacement                 |  |

#### Other Repair Contents:

|   |   |
|---|---|
| 1 | Disassembly of all components and bearings.   |
| 2 | PT testing for all gear components and bearing positions.   |
| 3 | Cleaning of all components.   |
| 4 | Measurement of all suspected dimensions, worn bearing positions, holes, etc.                          |
| 5 | Processing and repairing or replacing damaged components.   |
| 6 | Assembly of the gearbox according to the technical parameters and standards of the gear manufacturer. |
|   |   |
|   |   |

#### D. Photos of Damaged Components

High-Speed Shaft 100 - Tooth surface breakage



114-T-type Ring - End surface wear, replacement needed



115-Fixed Distance Ring - End surface wear, replacement needed

118-Bearing Adjustment Ring - Wear, replacement needed



110-Lock Nut Stop Gasket



123 O-ring - Aging, replacement



124 - O-ring - Aging, replacement



125 Spacer Ring - End surface wear, needs repair before use



128 Adjustment Pad - For adjusting bevel gears



132-O-ring





136 - O-ring - Aging, replacement



150 Bearing - Wear, scratches



151 Bearing - Foreign object entry, needs dismantling, replacement needed



152 Bearing - Wear, scratches

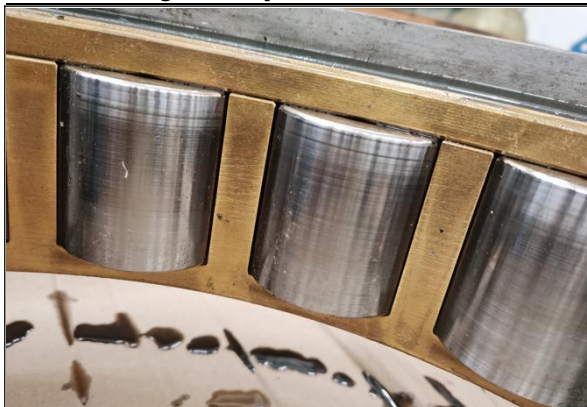


251 Bearing - Obvious scratches on rolling elements



253 Thrust Pad - Severe wear, needs casting repair





350 Planetary Wheel Bearing - Retaining frame breakage, tilting of rolling elements



390 Gear Sleeve - Severe wear, tooth breakage



400 Intermediate Shaft - Severe wear, tooth breakage



402 Bevel Gear - Replacement paired with 100



404 Hub - Severe repair marks on the hole, significant internal hole damage, depth about 5-6mm



404 Hub - Inner hole designed tolerance is 385H7 (0/+0.057), actual size is (385.22/385.80), serious out-of-roundness. The 400 vertical shaft design size is 385.2/385.24. Continued use without interference will affect alignment and torque transmission, thus affecting bevel gear engagement.



420 Bevel Gear Bearing Sleeve - Bolt crack



420 Bevel Gear Bearing Sleeve - Bolt crack



428 Adjustment Pad - Adjustment for bevel gear engagement, needs customization

450 Bearing - Foreign object entry, wear, Replacement



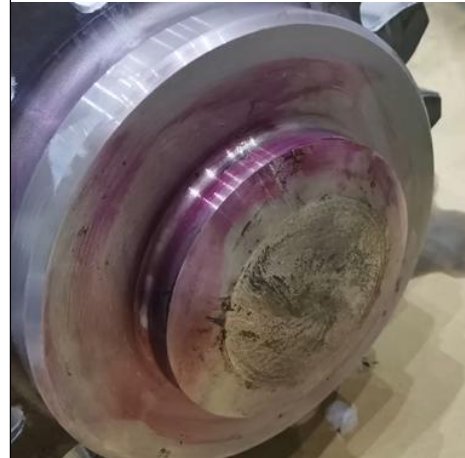
needed.



451 Bearing - Scratches, foreign object entry



301 Sun Gear - Ball crown wear, replacement needed



318 Teflon Pad



256-251 Bearing Support Block - Severe wear, bearing race, new design has a flange fixing the bearing as a whole through four support



blocks

251 Bearing Limit Block - Not in the old design, bearing race, needs addition

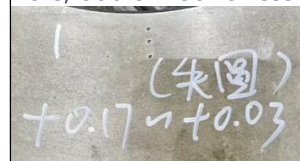


411 Lock Nut Stop Piece - Deformed, needs to be newly made



200 Planetary Carrier - Previous wear at the bottom, repair marks

200 Planetary Carrier - Wear on the upper pin hole, out-of-roundness



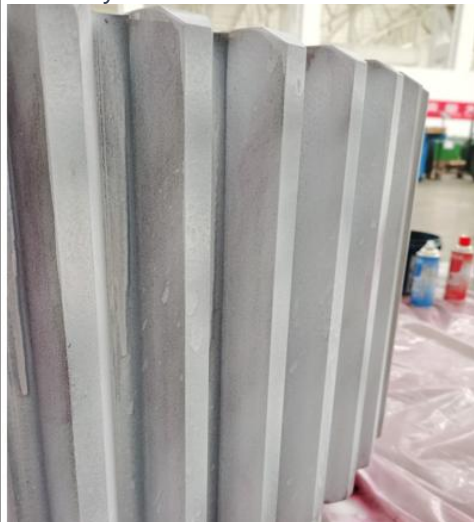




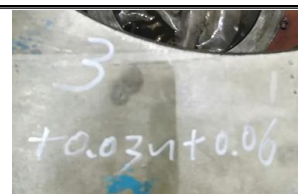
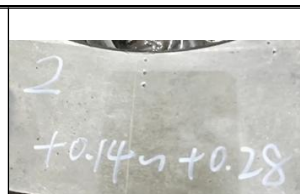
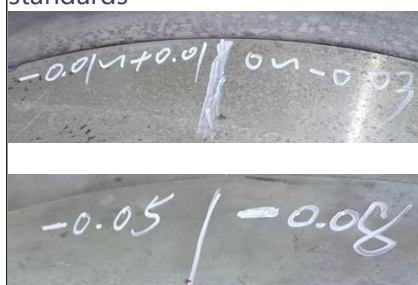
200 Planetary Carrier - Wear at the end of the 251 bearing position, needs machining and adding a locking pin



Planetary Wheel Tooth Surface - Normal wear



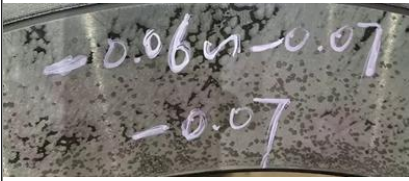
All three Planetary Wheels - Inner hole sizes exceed design standards



One of the Planetary Wheels - Inner hole crack, unusable

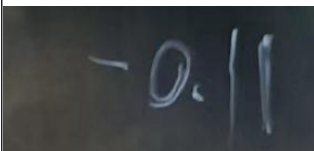


314 Planetary Wheel Bearing Adjustment Ring - Wear, needs remanufacturing



300 Pin Shaft - One of the pin shafts looks different from the other two, indicating previous replacement. Bearing position wear, corrosion, measured bearing position is  $-0.08/-0.11$ , standard tolerance is  $0/-0.036\mu\text{m}$ . Exceeded tolerance, needs replacement.

363 Planetary Wheel Bearing Snap Ring - Opening rupture



Loose and damaged hex bolt inside the tile seat, needs replacement

M64 bolt hole on the output flange - Customer cut due to inability to dismantle properly, needs machining or misalignment opening





Missing 5 high-pressure oil pipe joints



Missing 54 breather valve, needs replacement



Hex bolt M281 - Thread damage



Internal inspection of the 451 bearing hole in the gearbox is intact. After PT testing, no cracks were found in the internal gear ring of the gearbox, continue use.



The gearbox arrived at the factory with a coupling.



**E. Confirmation from Party A's Regarding the Gearbox Replacement Content:**

1. *Note:* The gearbox maintenance report is provided by the maintenance manufacturer and confirmed by Party A. If any component is missing from the old gearbox returned by Party A before repairs, Party A cannot request the return of that component after the gearbox is repaired.
2. In the physical inspection photos of damaged components, the photos must show the date of capture. The following are mandatory photos:
  - a. Overall appearance of the gearbox after opening, focusing on the nameplate location (mention the reason if the gearbox lacks a nameplate);
  - b. Overall view of the gearbox internals after opening, focusing on the overall condition of internal gears;
  - c. Damaged components that need to be photographed include, but are not limited to, gears, shafts, casings, planetary carriers, bearings, overrunning clutches, clutches, locking plates, auxiliary transmissions. Multiple angles may be necessary;
  - d. The photo sequence number must correspond to the spare part number in the maintenance content, and multiple photos can be provided for each damaged component.