

OUR REFERENCE : 22159 (MHP Job No.41089)

MHP Engineering Service Division



PREPARED BY: IAN DEZONIE

CLIENT:

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REPORT COMPLETED BY:

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OF

MHP ENGINEERING SERVICE DIVISION

(IFE UK ENGINEERING SERVICE PARTNER)

INTRODUCTION:

MHP Engineering Service is the Engineering Division within the Material Handling Products Limited Group who are the UK Engineering Service partner to iFE Bulk Handling Austria, & are located in Swadlincote, the East Midlands, England. In 2022 Engineering Service & Solutions took over the Engineering operations of Enigma Engineering Solutions who were the previous Engineering Service Partners of iFE & who provided engineering & technical coverage to IFE equipment users across the United Kingdom & Ireland.

WHO ARE THE MHP ENGINEERING SERVICE DIVISION?

The MHP Engineering Service Division specialize in providing a comprehensive range of planned & reactive mechanical engineering services & solutions to the Recycling & Quarrying industrial sectors, specifically with regards to industrial bulk handling equipment; Vibratory screening, feeding & ferrous & non-ferrous magnetic separation, or recovery equipment and processes.

MHP EngServ can provide both service or repair within its own workshop facilities or on the clients' site to maintain the highest standards set by your iFE equipment throughout its life.

MHP Engineering Service are a member of Material Handling Products Limited, founded in the late 1980's. MHP was one of the first companies to recognize the need for specialist expertise in long-standing problem areas of bulk handling, particularly screening, lining and spillage control. Phasing out involvement in the supply of conveyor belt and vulcanizing allowed their focus of activities to be concentrated solely on these more technically demanding areas.

MHP EngServ also provide annual Maintenance Contracts for several of the UK's largest recyclers based in the UK, with contracts that are tailored to suit their needs specific to suit the range of IFE and alternative equipment across the clients' site.

The MHP EngServ team have successfully tendered and won contracts throughout the UK in the supply and servicing of new Screening & Magnetic Separation equipment and processes. Our engineering representatives are active in the field in providing technical support, servicing, and monitoring of IFE's full range of equipment, installed across the breadth and width of the UK and Ireland.

ON SITE PROCEDURE:

Our procedures are all documented and available prior to us commencing work on the client's site. Due to the variety of machinery we service/repair, we have separate protocols and methods for conducting the work required. All documentation will be issued in advance of our arrival.

EQUIPEMENT INSPECTED:

IFE INP 400x1500/6 - FABRICATION No.: 41K121050-01/14269

ALL FINDINGS WERE DOCUMENTED IN ACCORDANCE WITH MATERIAL HANDLING PRODUCTS LIMITED
ISO9001 - 2015 QUALITY ASSURANCE PROCEDURE.

CERTIFICATE NUMBER: 4070-QMS

INSPECTION FINDINGS



Fig 1

On arrival of the ECS rotor to our works, we firstly proceeded to visually inspect the external condition of the rotor assembly prior to stripping. Observation of the drive end highspeed bearing housing assembly, missing was the housing end cover Flange/Adaptor. We also noticed a lack of grease in the bearing rolling elements that would not be consistent for a rotor in operation for over three years. This would indicate that the incorrect lubricating schedules have been adopted.



Fig 2

Visual observation of the non-drive side highspeed bearing housing & end cap shows signs of excessive heat presence and slight blistering of the paint work on the housing face. It also shows evidence of grease bleed from the lower position of the housing where the grease has liquidized due to the elevated temperatures experienced during its operation.

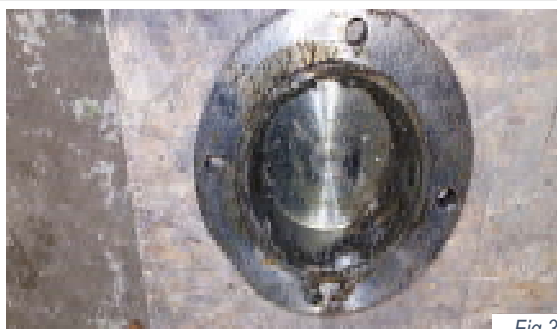


Fig 3

On removal of the non-drive side bearing end cap, we immediately could smell burnt grease & clearly see that the grease present in the end cap has become fluid & blacken from impurities generated from rolling element contaminants. Raised temperatures caused from the rolling element wear debris contaminating the grease over time that has not been purged from the bearing at routine greasing intervals during its operational life will cause this effect.



Fig 4

Removal of the Non-Drive High Speed Bearing cover exposed a fluid and heavily contaminated grease choking the rolling elements. This will over time restrict the expelling of rolling element wear debris from the bearing that will elevate the bearing temperature to a level where the grease begins to breakdown. At this temperature level the oil will separate from the other grease constituents (Soap) creating a very wet & fluid consistency. Humidity will also increase in the bearing causing emulsification.

INSPECTION FINDINGS



Fig 5

Due to the heat generated by the contamination of the bearing assemblies, the distance end setting plate fixing screws have become sweated into place & have both had to have the countersunk heads drilled to release the distance plate from the shaft end.



Fig 6

Examination of the Non-Drive side high & slow speed bearing housing assembly clearly shows it is fully choked with wet fluid & heavily contaminated grease which has blown past the internal fitted rotary seals. We have also found several of the spherical rollers have dropped out of their retaining cage due to wear & areas of emulsified grease from elevated temperatures. We also have signs of corrosion to the inward facing bearing surface caused from increased moisture.

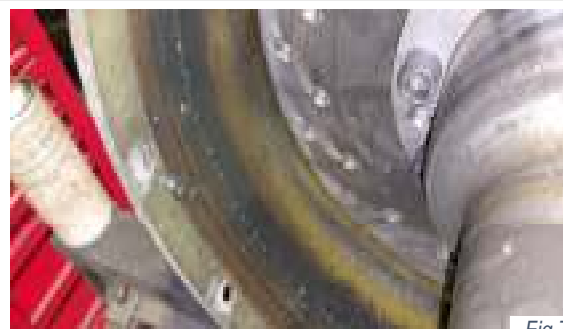


Fig 7

Removal of the Non-Drive side high & slow speed bearing housing assemblies exposed the internal condition of the Rotor cover end & magnet system. It was clearly noticeable that contaminated wet fluid grease & rolling element wear debris has entered the cover after being forced past the rear internal rotary seals & deposited itself around the inner diameter.



Fig 8

After thoroughly cleaning the bearing & seal journal diameters of the rotor shaft non-Drive end we found that the bearing journal was undersize from bearing movement and the seal journal diameter has worn below the recommended minimum standard from the effect of contaminated grease & debris passing under the sealing lip creating a grinding paste that has left an uneven & under size surface. Elevated temperatures have worsened the effect overtime.

INSPECTION FINDINGS



Fig 9

Inspection of the Drive side High Speed Bearing end showed minimal levels of grease present in the spherical bearing rolling elements. This is in-consistent with a bearing being correctly greased over a three-year operational period. Most of the grease lubrication in the bearing assembly has filled the rear of the Highspeed bearing, housing causing the rotary seal lip to lift, allowing for the grease to escape.



Fig 10

Removal of the Drive side high and slow speed bearing housing assembly's exposes the liquified state of the blacken & contaminated grease which once by-passing under the rear inner rotary seal lip the grease has then been expelled into the fibreglass cover, similar to the Non-Drive side.



Fig 11

After thoroughly cleaning the bearing & seal journal diameters of the rotor shaft Drive end we found that the bearing journal was undersize from bearing movement and the seal journal diameter has worn below the recommended minimum standard from the effect of contaminated grease & debris passing under the sealing lip creating a grinding paste that has left an uneven & under size surface. Elevated temperatures have worsened the effect overtime.



Fig 12

Drive highspeed bearing housing show signs that the slow speed bearing has been spinning on the spigot journal and grooved the bearing area below the acceptable level of contact.

The large seal journal preceding the spigot diameter is also deeply grooved from elevated temperatures and contaminated dried out grease being in contact with the running seal journal & acting as a cutting paste.

INSPECTION FINDINGS



Fig 13

Non-Drive highspeed bearing housing show signs that the slow speed bearing has been spinning on the spigot journal and grooved the bearing area below the acceptable level of contact.

The large seal journal preceding the spigot diameter is also slightly grooved from elevated temperatures and contaminated from the effect of contaminated pressurized grease & debris passing under the sealing lip.



Fig 14

The Drive side slow speed bearing is heavily filled with blacken liquefied contaminated grease which has choked the rolling elements and would have further elevated running temperatures in operation.

The slow speed bearing shows clear signs of spinning in the bore which marries with the damage to the slow speed spigot journal damage in fig 12.



Fig 15

The Non-Drive side slow speed bearing is heavily filled with blacken liquefied contaminated grease which has choked the rolling elements and would have further elevated running temperatures in operation.

The slow speed bearing shows clear signs of spinning in the bore which marries with the damage to the slow speed spigot journal damage in fig 13.



Fig 16

The Rotor fiber glass cover was thoroughly examined internal & external. Internally, grease has discolored the fiberglass cover at both ends and etched itself into the fiberglass fibers. A further inspection of the internal structure found the cover intact without holes. On the external cover surface, we noticed signs of wear, ferrous impregnation in the outer surface & minimum impact damage. Therefore, the fiberglass cover will require attention to make it acceptable for reuse.

INSPECTION FINDINGS



Examination of the core magnet system found the assembly intact, with no signs of damage to the magnet surface or separation of the core shells which would expose the inner magnet core.

The magnet was gauss tested and found to be at an acceptable level for continuous service.

CONCLUSIONS

It is the opinion of the MHP EngServ Engineer, following their observational investigation of the INP 400x1500/6 ECS Rotor that it displays all symptoms that are indicative of bearing wear & damage from lubrication contamination caused from the build-up of debris in the bearing rolling elements not being expelled sufficiently overtime. This is clearly noticeable from the above inspection photos taken during the strip & report of your unit. It is therefore important that the OEM recommended lubrication type, schedule & correct fill quantity of grease for the specific operating period, is routinely adhered to, especially when extended operating hours are the norm & in our opinion this has not been followed.

At the same time, it is important that the client implements additional periodical checks that will highlight in advance, differences in the condition of the grease lubrication, colour, smell, fluidity & viscosity, so corrective action can be taken earlier to prolong the operating life of the bearings & again, evidence is that this has not been carried out. A failure to remove excess grease in the housing end cover has restricted the ejection of bearing wear debris from the rolling elements & contact surfaces that has elevated the internal operating temperatures causing damage to the contact surfaces reducing bearing life and increasing the risk of bearing failure.

With aging of your IFE equipment comes an increased responsibility to ensure a regular program of equipment welfare is adopted and maintained and that proactive inspections are carried out on all IFE equipment to ensure the obvious signs are picked up before it reaches the level we now find with this equipment.

MHP ENGSERV RECOMMENDATIONS

Upon completing our inspection of your equipment, we have listed below recommendations for rectifying any issues found.

RECOMMENDATIONS:

ENGserv ACTION

1. Remove embedded grease from both internal ends, remove impregnated ferrous fractions from Fibre Glass Cover outside surface, polish and clean ready for reuse.
2. Replace all Highspeed & Slow speed bearing housings & flanges with New
3. Remove and Replace Rotor Drive shaft with New
4. Replace rotor shaft Clamping elements both ends
5. Replace all Highspeed & Slow speed bearings
6. Replace all Housing internal rotary seals
7. Rebalance rotor to G6.3 Grade
8. Fully rebuild ECS magnetic rotor
9. Manually rotate and inspect
10. Ensure equipment is inspected as per MHP EngServ/IFE guidelines. EIOP-2022

Important Note: The actions indicated by MHP EngServ are for a **full refurbishment** of your ECS Rotor and will receive MHP EngServ's standard Guarantee or Warranty for any parts supplied & fitted (Excluding Rolling Bearings) by a MHP EngServ personnel for the operation of the clients rotor, but subject to the client ensuring the correct procedure of installation is adhered to and the correct procedure for maintenance of your equipment is followed as described within your IFE equipment manual or MHP EngServ's METHOD SHEET: ECS/EIOP-2022 – C

Finally, thank you for using the services of MHP EngServ that is available to IFE equipment users and we hope you consider our recommendations listed above to provide you with piece of mind for your future equipment operation.

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