

Excavator Thrust Plate Wear Issues and How to Alleviate them with Enhanced Performance Parts

1.0 Common Issue with Bucket-Stick Arrangements in Excavators

A known issue with the 25-80 tonne excavators that run on a bush and thrust plate arrangement in the bucket and stick area is premature failure of the thrust plate. Through metallurgical analysis, Geographe discovered that the OEM thrust plates were manufactured out of relatively soft material.

In those excavator arrangement, thrust plate wear eventually causes damage and wear to cap screw bolt heads, resulting in difficulty in removing the thrust plates when change out are required. The problem was the bolt heads used to secure the thrust plate became worn, causing dislodgement of the thrust plate and significant damage to bucket-stick mounting faces.

To work around this, the thrust plates are often welded into position to reduce the risk of dislodgement, creating additional work, and requiring hot work permits. Welding directly to the machine also has the potential to compromise frame integrity.

To bring the excavator bucket bore back to OEM specification, a boiler maker and liner borer are required to weld, build, and reface the mounting surface. Geographe observed the machine was sometimes returned to service without correct maintenance procedures being followed for reasons such as machine location, specific maintenance team availability, and machine uptime requirements, which caused excessive stick-bucket tolerance.

Increased tolerance can create additional movement which accelerates wear in the bush, pins and thrust plate arrangement, and can promote unfavorable wear patterns such as ovality in the bushes. In extreme cases, this can also occur in the bores.

Maintenance teams have been known to replace the bucket entirely and send the damaged bucket offsite for repair. This approach is unlikely to align with the expected asset life, and causes increased demand for rotatable spare programs, in turn increasing the total cost of ownership.

2.0 Collaboration to Create Enhanced Performance Part

In 2010, Geographe worked with HWE/Leighton to create a one-piece enhanced performance (EP) unit named the Top Hat Bush to eliminate premature failure of the thrust plate.

The Top Hat Bush combines a thrust plate and bush together as a single component and is manufactured from a single piece of material for integral strength and durability. It shares the same material and gas carburization heat treatment processes as the standalone bush, which gives the entire component a 2 mm case depth at 58-63HRC, resulting in the stick-to-bucket tolerance remaining at OEM specification for longer. The EP Top Hat Bush has grease grooves and cross hatching within the bore for superior lubrication (see Figure 1).



Figure 1. Grease grooves and a cross hatching within the pore of the Top Hat Bush enhanced performance part.

HWE/Leighton have reported significantly longer component life versus the standard OEM arrangement and eliminated the need to weld thrust plates into position or gouge them out upon removal, resulting in large labour savings.

Moreover, when fitting or removing, it does not require any modifications to the machine or other components.

In summary, the key improvement factors noted by users of the enhanced performance part included:

- Increased ease of fitment, reduced time, and associated labour costs.
- No hot work is required, reducing high-risk work and machine downtime associated with gouging, welding, and line boring.
- Part is significantly stronger due to being manufactured from one piece of material meaning it is not prone to movement under load.

3.0 Operator Feedback

“Since 2010 HWE/Leighton have been using a top hat bush system developed in conjunction with Geographe. The engineering team designed the system specifically to eliminate the need for thrust washers in the top bucket bores of their specific excavators. Cross hatching has also been added to the bores of the bottom bucket bushes. We are very pleased with the result and have adopted it as part of our maintenance routine to date.”

“The construction of the Top Hat bush means we never need to repair the stick face again. This has resulted in a better maintenance practice for our site.”

Rio Tinto Pillbara Iron - “For us, machine up time is a priority. Once the thrust plates fall, we would normally swap out to a spare bucket to keep the machine running. The downside to this is some of our buckets were only achieving 60-70% of life before being sent to an offsite repairer.

Tier 1 Mining Company – “With the Geographe Top Hat bushes, we are now looking to extend our bucket change out period by an additional 2000-4000 hours.”



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