

CMEIG Engineering Position Paper

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Fitment of lifting lugs to excavator / wheel loader buckets

Contractors often use excavators and wheel loaders for the lifting of freely suspended loads on the job site. To achieve this they either request or install lifting lugs to the inside or outside of buckets as shown in Figure 1. These lugs are intended to serve a simple process of lifting light loads on site without having to dismantle the bucket or use a mobile crane.



Figure 1 Typical lugs welded to the external side of the bucket.

CMEIG and its members are concerned with the use of these lugs as they pose a safety hazard. This position paper outlines why contractors should stop this practice.

The primary reasons that make buckets not suitable for the mounting a lifting lug include:

- Buckets are recognised as a consumable item and as a result, the structural integrity of the bucket is reduced as it wears. Bucket wear is a known design consideration that occurs in all circumstances. Thus when a designer certifies a bucket and lifting lug, they calculate the lugs rated load with an appropriate safety factor. As the bucket wears, this safety factor will reduce to an unknown amount over an unknown time period leaving the operator or owner with a degree of risk that the lug may fail during lifting without warning.
- The majority of buckets are manufactured from a combination of different materials, including high strength quenched and tempered martensitic steels. Due to the variability of materials, and lack of controlled welding procedures, welding practices when installing wear liners or during general repairs

are prone to welding induced defects including hydrogen cracking. These defects could lead to serious structural degradation of the bucket.

Welding is common practice on buckets and is not common practice on crane booms, ROPS or other safety related structural items without strict welding procedures.

Therefore, a lifting lug and its attachment point should be treated like any other crane or structural item.

- Buckets are prone to abuse by operators, unlike traditional lifting structures, where damage would require approved repair and recertification.

Other reasons that may impact on safety when mounting a lifting lug on a bucket include:

- Visibility of the operator can be compromised during lifting operations.
- There is a possibility of dislodgement of the load or equipment damage due to slings / chains coming into contact with cutting edges.
- There is a possibility of damage to the lifting lugs during digging operations. This could lead to premature failure.
- There is a possibility of material becoming stuck to the interior of the bucket as a result of digging operations, leading to significant reductions in SWL's that are unlikely to be accounted for in the design calculations.
- It is difficult to ensure that the operator will not use a bucket fitted with a lifting lug in conjunction with a quickhitch. Although this in itself already constitutes a breach of AS 2550.1 Appendix I (f), it becomes an even more dangerous situation if the operator does not utilize the safety pin on the quickhitch. Dislodgement of loads lifted by excavators via a bucket and/or quickhitch combination has caused fatalities in the industry in the past.

It is also brought to the attention of operators that it is a breach of OH&S legislation to fit lifting lugs to buckets without ensuring compliance to the requirements of AS 1418.8 (for loads less than 1 tonne) and AS 1418.5 (for loads greater than 1 tonne). Often lifting lugs are fitted to buckets and used without ensuring compliance to these standards.

Most excavator quickhitch manufacturers include a lifting lug in their design and jib boom attachments are also available for wheel loaders. They have both been designed for lifting freely suspended loads. As long as the guidelines are followed in AS1418.8 (for loads less than 1 tonne) these devices may be used whenever lifting loads.

Let's make this industry safe and use the right equipment for the operation!

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