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Inspection and Assessment of DVA Lifts

Executive Summary

Department for Infrastructure

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Background

WYG Engineering (NI) Ltd. were commissioned by the Department for Infrastructure (DFI) on Friday 31st January 2020, to undertake an inspection and assessment of DVA lifts across all 15 MOT centres in Northern Ireland.

Inspections were carried out by Stephen Alford (WYG Director) CEng FStructE MIEI, Keith Morrison (WYG Associate Director) CEng MStructE MIEI, and John McConville (WYG Associate) CEng MStructE.

53no. 'MAHA DUO +1 Irland (DVA)' scissor lifts manufactured between 2011-2012 were installed throughout all MOT centres. Two new 'MAHA DUO CM 4.2 U' lifts have recently been installed, one in Newbuildings and one in Boucher Road. All 53 original lifts were inspected across the 15 MOT test centres between the 3rd – 6th February 2020 (The two new lifts have not been inspected).

Key Observations

The following observations were made:

1. - Cracking was observed in most of the welds securing each boss to the inner face of the rectangular hollow section (RHS) steel scissor legs.
2. - In some instances, the cracking described in point 1 was observed to propagate into the underside of the RHS scissor legs. It was not possible to quantify the number of legs affected due to the presence of steel plates noted in point 4.
3. - In some instances (30-40% of lifts), remedial welding has been undertaken around the boss, presumably as an attempt to cease the propagation of the cracking noted in points 1 and 2.
4. - In many instances, remedial works in the form of steel plates have been welded to the outer face and underside of the outer RHS scissor legs around the pivot. Where present,

these plates prevented the inspection of the underside of the RHS legs and the potential presence of cracking as outlined in point 2.

5. - At Boucher Road the new lift (Lift 5c) was in operation, while in lane 2 (Lift 2a) the original lift was still in operation. WYG understand that Lift 2a has undertaken fewer lifting cycles as it is sited at the end of the HGV lane.
6. - At Newbuildings the new lift (Lift 4b) was installed but not yet in operation.
7. - At Lisburn, two of the original lifts (5Aa and 5Ba), sited in the Vehicle Identity Check (VIC) lanes, were in operation. WYG understand that these lifts have undertaken considerably fewer lifting cycles due to the frequency of the VIC testing. Neither lift appeared to exhibit any of the defects outlined in points 1-4.

Discussion

WYG believe that the defects outlined in points 1 and 2 are as a result of fatigue. WYG understand that the lifts have undertaken approximately 20,000 lifting cycles annually, which equates to approximately 150,000-160,000 cycles since their installation in 2011/2012. MAHA DUO operating instructions state:

"In its standard version, this product is designed for 22,000 load cycles based on EN 1493. The maximum period of normal use in relation to the possible product life expectancy shall be evaluated and scheduled by a qualified person during the annual safety inspection."

WYG are aware that the lifts supplied to DVA are non-standard, due to the inclusion of shaker plates, however we are unaware if MAHA have taken this into account within the lift design process, or if this impacts the product design load cycles. Nonetheless, based on the information available, the lifts have clearly undertaken significantly more than the 22,000 design load cycles. It should be noted that the lifts have a possible product life expectancy greater than 22,000 load cycles, however it is subject to annual evaluation. We understand inspections have been undertaken every six months by both MAHA and an independent inspector, which complies with the manufacturer's guidelines noted above.

WYG would recommend that all lifts exhibiting signs of fatigue are taken out of service and replaced. We would not advocate any short-term localised repairs due to the presence of fatigue in the scissor legs around the pivot. Consideration could however be given to replacement of the scissor legs, bearing bushes and pivots to bring the lifts temporarily back into service until new lifts are available. This is subject to all other parts of the scissor lifts

being inspected, evaluated and certified by MAHA and an independent inspector as safe to use.

The new lifts at Boucher Road and Newbuildings can be used subject to commissioning by MAHA and inspections being undertaken in line with their recommendations.

The existing lift 2a at Boucher Road and lifts 5Aa and 5Ba at Lisburn (VIC lanes) exhibited no apparent signs of fatigue around the boss and underside of the RHS scissor legs. Whilst likely to have exceeded the 22,000 design load cycles these lifts could remain operational subject to inspection, evaluation and certification by MAHA and an independent inspector that the lifts are still within their product life expectancy as outlined in the MAHA DUO operating instructions. Consideration should be given to scheduling these lifts for replacement alongside the others, given they are likely to have exceeded their design load cycles.

Recommendations

1. - Lifts exhibiting signs of fatigue are considered to be beyond their possible product life expectancy and should be replaced. No lift exhibiting signs of fatigue should be used.
2. - Short term localised repairs to the scissor legs are not recommended due to presence of fatigue in the scissor legs around the pivot.
3. - Consideration could be given to replacement of the scissor legs, bearing bushes and pivots to bring the lifts temporarily back into service until new lifts are available. This is subject to all replacement parts being supplied, fitted and warranted by MAHA, and all other parts of the scissor lifts being inspected, evaluated and certified by MAHA and an independent inspector as safe to use.