MILOP Design and Consulting Pty Ltd

Consulting, design, analysis and certification of construction equipment, concrete pumping plants, tower booms, elevating work platforms and other mechanical machinery.
ABN: 91 104 582 050

PO Box 3345, Wetherill Park, NSW 2164
p: (02) 9823 4818 ; fax: (02) 9823 8578
m: 0413 424 819; milop@tpg.com.au
www.milop.com.au

Wallace Concrete Pumping Pty Ltd
117 Russell Street
Emu Plains NSW 2750

Attn. Stephen Wallace

23/10/2017

RE: Inspection of Concrete Boom Pump, CCP20Z70 – Assessment of lifting lugs capacity
Report no: 1005/17, 23/10/2017

The inspection of the concrete boom pump CCP20ZX is carried out on 23/10/2017 in the yard of Wallace Concrete. The purpose of the inspection was to capture the conditions of the lifting lugs, take dimensions and calculate their capacity.
Two lifting lugs are welded to the front static outriggers box (it is part of the chassis) and two rear lugs are welded on the rear static box. Lugs on left side and right side of the truck are symmetric.
Calculation of the lugs capacity is performed on basis of following data:

- Tare weight of truck and concrete boom pump, refer to Rego Certificate 15.5 ton
  Truck ISUZU, model FXR, tare weight 6.0 ton, front axle 4.0 ton, rear axle 2.0 ton,
  Concrete boom pump weighs 9.5 ton.
  Total weight 15.5 ton, distance C/G from front axle is Xc/g = 2450 mm

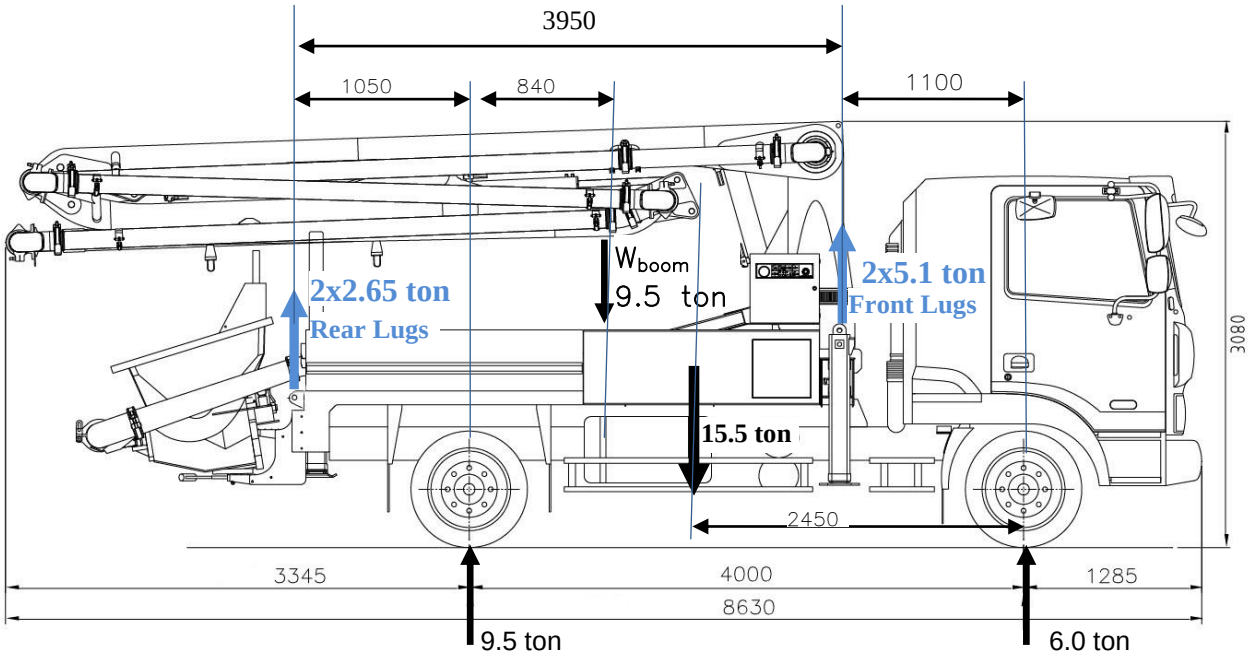


Fig. 1 Weights of the truck concrete boom pump KCP20ZX

The calculation is conducted to determine forces on the lifting lugs from overall weight. Dimensions of the truck and concrete boom pump are taken from the pump manufacturer and measurement on the site.
Vertical forces on the lugs are:

- Front lugs 2 x 5.1 ton
- Rear lugs 2 x 2.65 ton

  Front and rear lugs are shown on Fig 2 and Fig 3.

In the images Fig2 and Fig 3 is shown the front lug. The diameter of the hole is 35 mm, outside eye radius 45 mm, plate 16 mm thickness. Plate is welded, fillet weld 6 mm, 90 mm from both side and weld on the top 90 mm long.

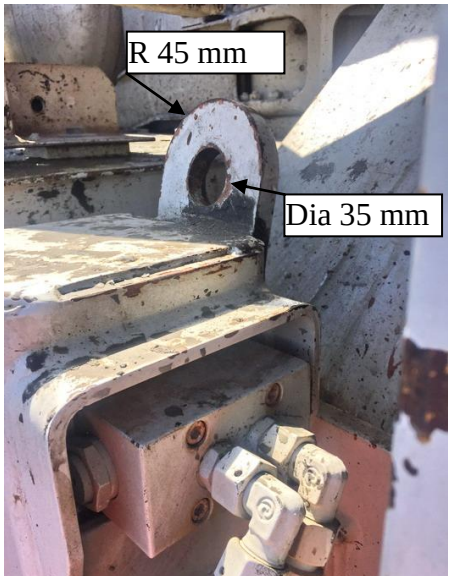


Fig. 2 Front lug

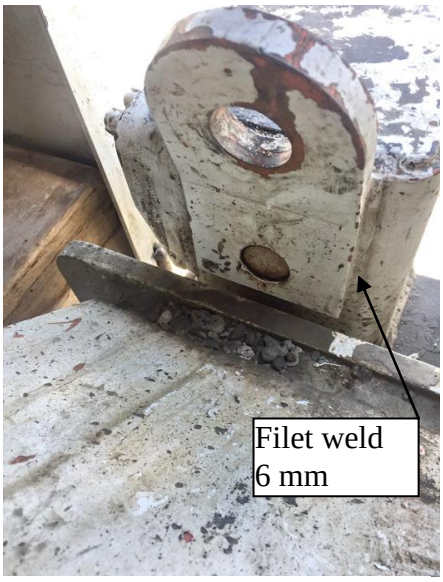
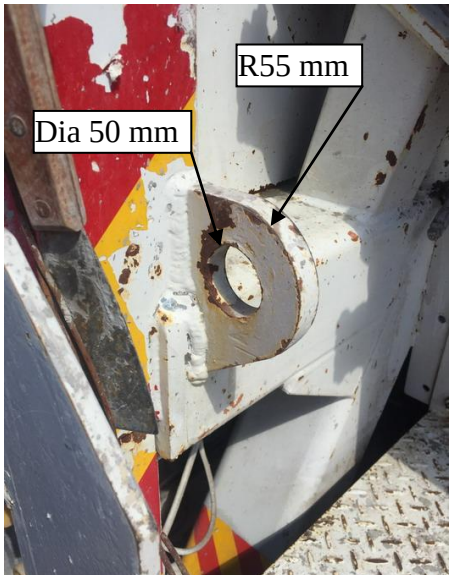


Fig. 3 Front lug- back view



The rear lug is plate 20 mm thick,
50 mm diameter of hole and 55 mm is radius of eye.
Lug weld is filet 10 mm, 120 mm from both side of plate.

Fig. 4 Rear lug

Lugs material is mild steel plate, Grade 250 MPa (Yield stress).

Criteria for calculations lugs capacity are based on Australian standards AS 4991-2004 - Lifting Devices and AS 1418.1-2002 - Cranes, hoists and winches, Part1: General requirement.
Designed lifting device for this sort of application should be capable to withstand a minimum design load of 1.5 times the capacity.
Dynamic load factor 1.3 is applied in accordance to AS1418.1.

Front Lugs:
The results of analysis show that the front lug does not have a sufficient factor of safety.
Its capacity cannot safely withstand required load. The lug eye capacity is under dimensioned for the total required design load of 10 ton (98.1 kN)
The lug weld is not big enough to withstand requested load as well.
It is recommended to replace existing front lugs with one which will provide a safe lifting of the concrete boom pump.
On the Fig 4 is shown proposed the new front lugs.

The new lug ensure safety factor 2.0 to yield stress and more than 3.2 for ultimate tensile stress.

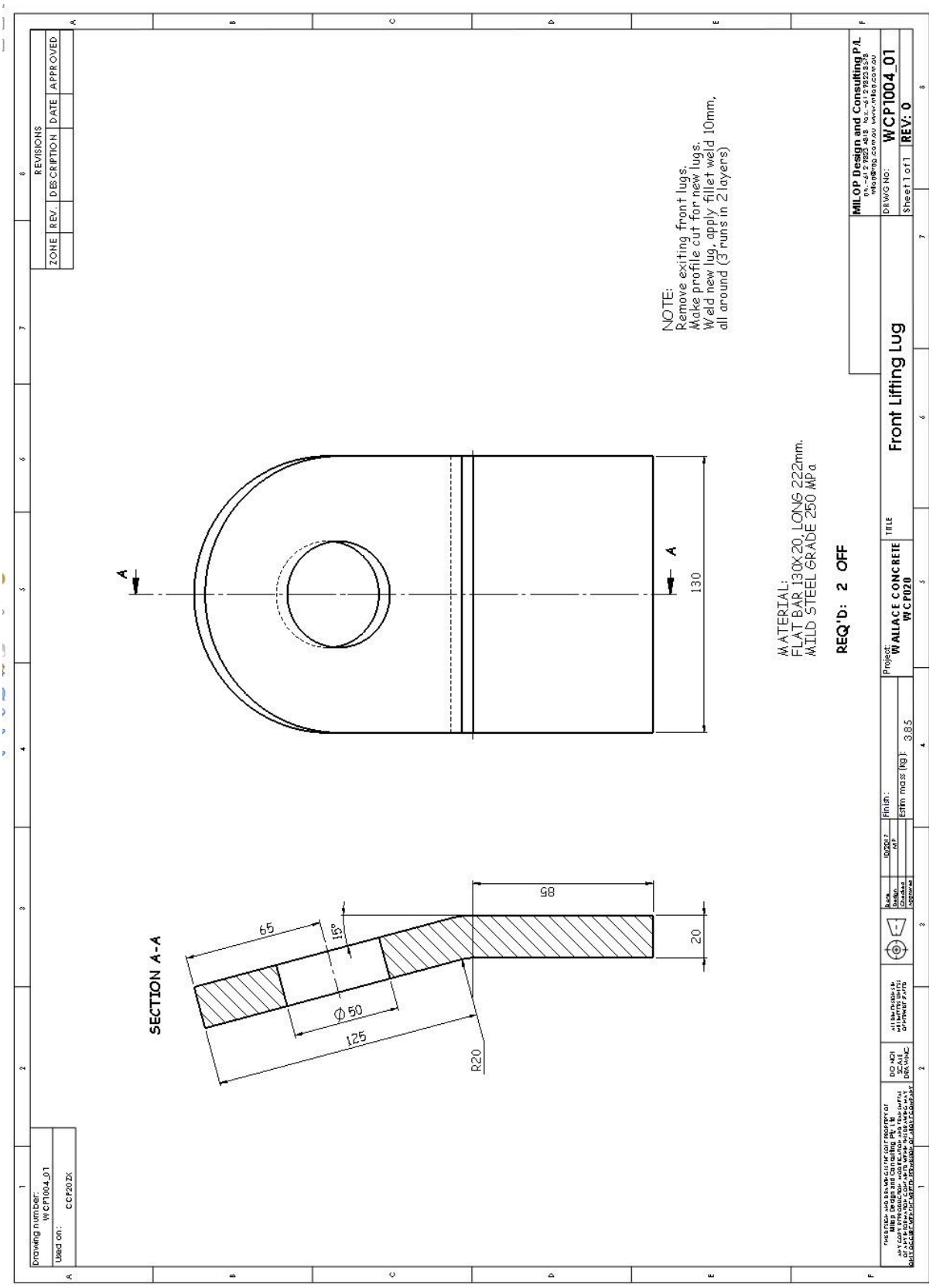
Rear Lugs.
Analysis for the rear lug are conducted for design load of 5.2 ton (51 kN)
The rear lugs can safely support required load with factor of safety 2.8 to yield stress and more then 4.5 for ultimate tensile strength.

If more information is required please contact undersigned.

Michael Podinic, BScME, MIEAust

*****) Michael Podinic, professional engineer, member of The Institution of Engineers Australia, mno 1047610, more than 25 years experience in development, design, analysis and certification of construction machinery, concrete pumping equipment, tower cranes, mobile drilling rigs, lifting hoists, elevating work platforms , construction formwork and other mechanical machinery.

Fig. 4 Proposed Front Lug



ANEX to Report no. 1005/17 from 23/10/2017

The existing front lugs are replaced by new lugs in accordance to recommendations given in the report. The new lugs, welded to outriggers front legs, are dimensionally in accordance to the drawing. Welding is done in accordance to required procedure and good engineering practice.

Fig. 6 The new front lug on left side

Fig. 7 The new front lug on right side

On the Fig 6 and Fig 7 are shown new lugs on the front left and right side.
Capacity of the lifting lugs is calculated refer to design load in accordance to AS1418.1-2202 – Cranes, hoist and winches. In design load is included dynamic factor 1.3. Factor of safety is in accordance to AS4991-2004 – Lifting devices and it is for front lugs 3.2 and for rear lugs 4.5.

On the base of the inspection the concrete boom pump's lifting lugs and connection brackets of the pump chassis and truck rails, performed calculations, carried out replacement and welding of the front lugs I certify there are no reason why above lugs should not be used for lifting this concrete boom pump.

If more information is required please contact undersigned.

27/10/2017

Michael Podinic, BScME, MIEAust

*****) Michael Podinic, professional engineer, member of The Institution of Engineers Australia, mno 1047610, more than 25 years experience in development, design, analysis and certification of construction machinery, concrete pumping equipment, tower cranes, mobile drilling rigs, lifting hoists, elevating work platforms , construction formwork and other mechanical machinery.