

## **INSTALLATION, MAINTENANCE & SERVICE BULLETIN**

### **WELDING TO FKH AXLES (Mechanical and Air Suspensions)**

*FUWA K Hitch* Axle beam is made of low alloy-steel and formed with integral hot forming technology. Hence, it has better fatigue life and superior welding qualities. The round axles provide an uniform section modulus no matter how the beam is rotated.

Brake spiders are positioned and welded to exacting specification requirements at our factory. Ring Welding the spider directly to the axle beam provides a higher and more reliable brake attachment over bolt-one versions.

In welding suspension component parts to *Fuwa* trailer axle, extreme care must be exercised to obtain correct location and ensure the spring seat load bearing are parallel to each other. Any welding of additional attachments to the axle should be approved by *Fuwa* engineering department.

#### **Axle Beam Repair Welding**

In the interest of safety and preserving the service life of trailer axle assemblies, *Fuwa* recommends that trailer axle beam NOT be repair welded. Repair welding can detract from the structural integrity of an engineered component, particularly on heat-treated parts where the benefit of the processing may be nullified by the welding. Therefore, a new replacement beam should be installed as soon as possible.

#### **Preheating Requirements**

Absolutely no welding should be done on axles that are below room temperature, about 20°C. Before welding on suspension components or any other part onto the axle, the area of the attachment point should be warmed slowly to 200~250°C. Immediately after checking the temperature, the part(s) should be tack welded in place. Recheck the temperature, if below 180°C, reheat to 200~250°C and complete welding per welding introductions.

# INSTALLATION, MAINTENANCE & SERVICE BULLETIN

## ***How Welding Affects Axle Beam Material***

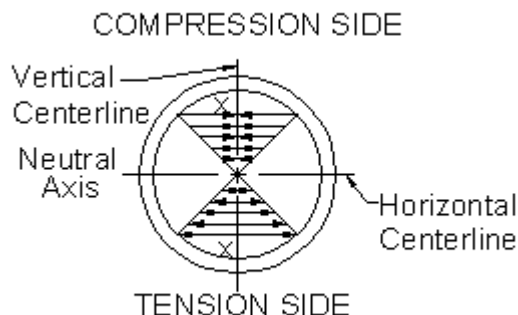
All welds made on the beam create, in effect, an extremely localized heat-treatment of the metal. The heat generated during the welding process can cause the material in the HAZ (heat affected zone) to become hardened or brittle. This effect can impart an undesirable characteristic to the normally ductile structure. This small-hardened area becomes the weakest part of the beam and therefore is the area most susceptible to failure. The axle beam is no stronger than its weakest section. As evident from below, the welds should be horizontal and as near as possible to the front and rear horizontal centerline of the axle beam. Always avoid welds that are circumferential in nature below the horizontal centerline.

## ***Welding Guide***

Fuwa supplies axles to customers in all stages of assembly from the beam with spindles only, to the complete axle assemblies. In the final analysis and with few exceptions, we have little or no control over later assembly of incomplete units by the trailer fabricator and, therefore, we cannot be responsible for warranty on improperly processed components.

## ***Stress of Axle Beams***

The man-loaded stresses on a beam are expressed as three primary stress zones. The compression stress zone (top side), the tension stress zone (bottom side), and the neutral stress zone (front and rear horizontal center line commonly referred to as the neutral axis). The below is a graphic representation of the degrees of stress in the wall of the tube when the beam is under load. The length of the arrows "x" represents the amount of stress at a given point. From this illustration, it is evident that the two opposite stresses diminish as the horizontal centerline of the beam is approached.



## INSTALLATION, MAINTENANCE & SERVICE BULLETIN

Figure 1 Degree of stresses on the axle beam

In addition, the torsional stress, imparted by braking action of the wheels, is taken into consideration in rating the axle capacity. An allowance of both stresses bending (beam load) and torsional is factored into the calculations to provide an acceptable design factor. The stresses are reapplied and reversed many times during normal axle beam life. For this reason, the beam material must have certain properties, such as impact strength, that permit it to absorb shock, to flex, and then to resume its original and normal, as manufactured condition.

It is necessary when welding to avoid the high stress areas on the tube top side (compression zone), and tube bottom side (tension zone). All welds should be made as close to the horizontal centerline as possible. When the axle tube is subjected to the heat from welding and then rapid cooling, the material adjacent to the weld loses its desirable ductile properties and becomes brittle. If this condition exists in the high stress areas under maximum load conditions, the life of the axle will be greatly reduced and premature fatigue failure can occur. Recommended locations for the welds are shown below.

### ***Spring Seat Placement and Locations***

This section recommends welding locations on round and rectangular trailer axles.

**Bulletin No: KPM-001-0310**

**For Product Support call: 03 9369 000 / 07 3272 8322 / 08 9353 3655**  
**[www.khitch.com.au](http://www.khitch.com.au)**

# INSTALLATION, MAINTENANCE & SERVICE BULLETIN



## WARNING!

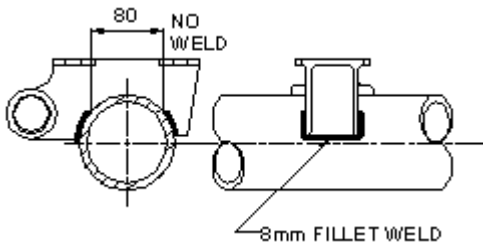
Improper weld placement will void the axle warranty and can result in reduced fatigue life of the trailer axle beam and cause serious personal injury.

Position axle seats at correct centers. (Must match hanger centres.) Center of each center bolt hole must be at top center of axle for overslung suspensions and bottom center for underslung suspensions. Axle seats must be flat and parallel with each other. Tacks weld the axle seats in position and recheck positioning before final welding.

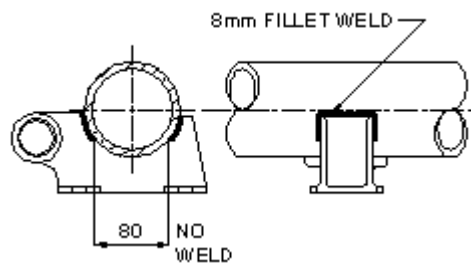
Weld axle seats to axle using low hydrogen electrodes or M.I.G. process, 8mm fillet weld, see diagrams below.

### Ø127mm Round Axle

#### Overslung

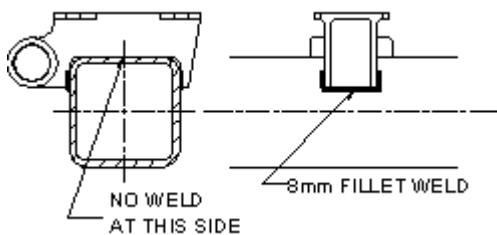


#### Underslung

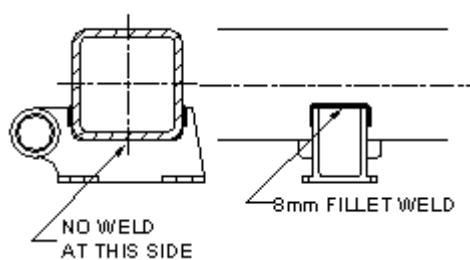


### 150x150mm Square Axle

#### Overslung



#### Underslung



## INSTALLATION, MAINTENANCE & SERVICE BULLETIN

KHITCH

### ***Torque Arm Assembly***

Assemble the adjustable torque arms to the same length as the fixed torque arms. Fit the fixed torque arms on the kerb side and the adjustable on the road side

Fit the end of the torque arm in the bracket and insert the bushes from each side, fit pin, washers and nut, ensuring that the torque arm is central in the bracket. Tighten torque arm pin self locking nuts to 290/350Nm.

- Note:
- a) On tandem and tri-axle suspensions the center and rear torque arms will be longer than those on the front axle.
  - b) On all underslung suspensions the adjustable torque arms must be installed with the clamp bolts to the top as shown.
  - c) Lubricate all tapered rubber bushes on the other surfaces with liquid soap solution (not detergent) when assembling into suspension castings.

### ***Final Assembly***

Assemble the springs to the axles ensuring that:

- i) On the front axle the springs hooked leaf end is to the rear of the axle, this is for all suspension.
- ii) On the rear axle the springs hooked leaf end is to the front the axle. This is for only tandem and tri-axle suspensions.

Tighten 'U' bolt hi-nuts evenly to a torque of 500/540Nm.

Fit the sub axle assemblies in to position and connect the torque arms to the front and equalizer hangers, making sure the spring hooked leaf ends fit into the equalizers. Insert spring retaining bolts into the equalizers and hangers.

Tighten torque arm locknuts to 290/350Nm.

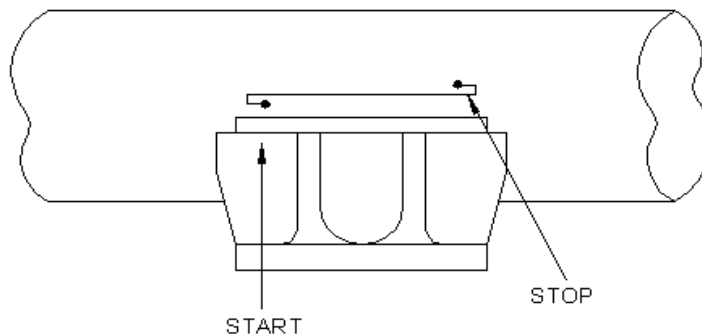
# INSTALLATION, MAINTENANCE & SERVICE BULLETIN

## *Weld Placement Recommendation For Welding Spring Seats*

<b>METHOD FOR WELDING CARBON &amp; LOW ALLOY STEEL</b>	<b>AWS* ELECTRODE CLASSIFICATION</b>	<b>AWS SPEC.</b>
Shielded Metal Arc	E70XX	A5.1, A5.5
Gas Metal Arc	ER70S-X	A5.18
Gas Tungsten Arc	ER70S-X	A5.18
Flux Cored Arc	E70T-X	A5.20

\***AWS** = American Welding Society

1. The welding rod must generate an all weld metal tension test of 70,000 psi. Normal methods and electrodes, which equal this requirement, are shown above. To obtain the best fusion and strongest weld, the voltage and current recommended by the electrode manufacturer.
2. The maximum weld bead size allowed, regardless of whether this bead size is achieved in a single or a multiple pass, is 9.5mm on rectangular axles and 12.7mm on round axles.
3. Excessive welding to the axle should be avoided. Fitting the attaching parts as close as possible to the axle will help to avoid excess welding. Deposit the required amount of metal with the least number of passes. When multiple passes are required thoroughly clean the weld between passes to remove any slag.
4. Weld initiation and termination should be performed as shown below.



## INSTALLATION, MAINTENANCE & SERVICE BULLETIN

A. The weld arc should not be started at the end of bead. Instead, the electrode should be started away from the end of the bead and moved as shown.

B. The weld arc should not be finished at the end of the bead. Instead, the electrode should be finished away from the end of the bead as shown. Any craters that remain should be filled during this movement.

In both cases, the intention of this guidance is to ensure that the stress risers, which occur when either starting or stopping a weld, are located away from the ends of the weld.

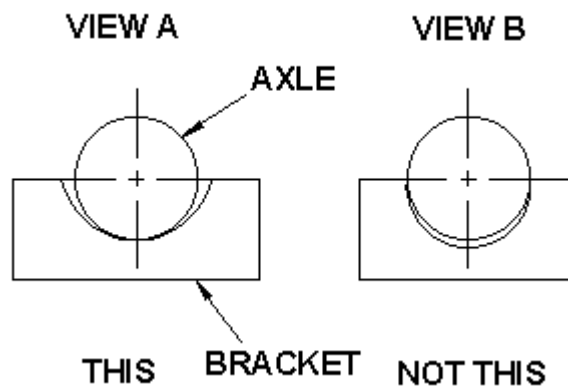
5. Do not test the weld arc on any part of the main axle beam. This can cause a material change, which can lead to a small crack that may eventually grow and effect the fatigue life of the axle.

**CAUTION!** Do not connect the ground cable to any point on the axle assembly that will put a wheel bearing between the ground cable and weld area. If a wheel bearing is located between the ground cable and weld, the bearing will be damaged by electric arcing.

6. Electrical grounding of the axle should be done at one of the parts attached to the axle such as the air chamber brackets, camshaft support brackets or the brake spider. Connections should be tight and clean.
7. The area to be welded must be free of grease, dirt or other contaminants that might affect the quality of the welds.

## INSTALLATION, MAINTENANCE & SERVICE BULLETIN

8. Brackets that wrap around the axle should touch the axle as shown in view A in the figure below. With this type of fit, loads on the bracket are transferred directly to the axle. If a gap exists between the axle and the bracket as shown in view B in the figure below, these loads are transferred to axle through the weld. This may overstress and crack the weld.



9. When a bracket is attached to an axle with U-bolts and a weld, tighten the U-bolts whenever possible to the specifications of the manufacturer before welding. This ensures that the loads on the bracket are not transferred in the weld.
10. Distortion and residual stresses that happen when welding parties to the axle can be minimized by tack welding those parts to the axle before applying the final welds. Be sure to thoroughly clean the slag from the tack welds before applying the final welds.

