Document Version Control		
Document Number	Version Number	Release Date
WP0005	**6**	**01/04/2022**

Talon Underground Cast Corner Welding Procedure

Outline

This procedure provides a detailed outline of how to attach the Talon Cast Corners for a Continuous Lip Shroud system onto a bucket. For ease of use in a workshop environment shortened "basic procedure" (WP0003) has also been prepared. Currently, there are two locking systems for this kind of lip configuration, which are Lockjaw and Xpansion systems. The lip sizes available for Lockjaw are (is) 50mm. For Xpansion, there are two lip sizes available, 50mm and 70mm.

This procedure uses a Talon 50mm Underground Lockjaw Cast Corner to illustrate the procedure. However, note that this procedure also extends to Talon Xpansion Cast Corner of sizes 50mm and 70mm. For weldment of Talon Lockjaw Boss, refer to WP0003 procedure. For weldment of Talon Xpansion Boss, please refer to WP0012. These two welding procedures outline the critical information for the attachment of Talon Bosses that are essential for the installation of the Lip Shrouds. Please ensure a copy of this procedure is available for personnel who are tasked with welding Talon products.

Welding Safety

Welding, cutting and any allied process are a significant safety risk. Before undertaking any of these processes ensure that all precautions have been considered or implemented as per welding safety standards AS1674: 2007 or ANSI Z49.1: 2005 or equivalent globally recognized standard.

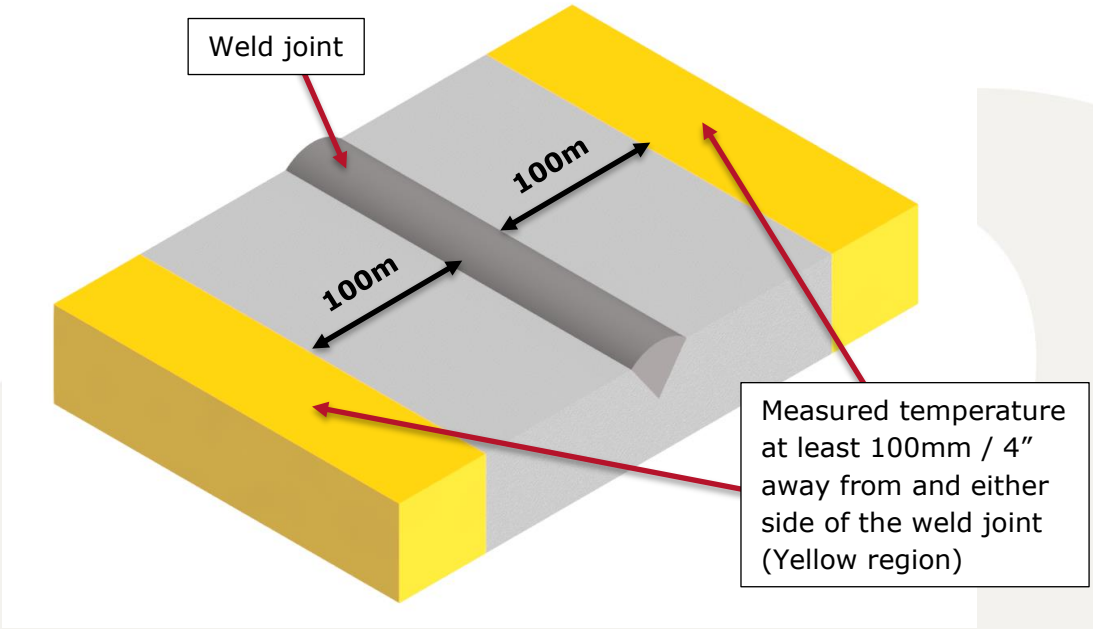
Of particular note please ensure the following is adhered to:

- Wear correct PPE including
  - Full sleeve non-flammable work wear. (No gaps)
  - Non-flammable welding gloves
  - Steel capped work boots
  - Safety glasses
  - Hearing protection
  - Full face welding shield
- Suitable ventilation is available for the person completing the operation.
- Welding is an electrical risk ensure the area where welding is to be conducted is not damp or wet.
- Welding is a fire risk ensure the area where welding is to be conducted is free of any thing flammable and that suitable fire extinguishers are easily available.
- If welding is to be conducted in an area where other people are working, ensure welding flash shields are utilized.
- Good general housekeeping to ensure the work area is safe and free of clutter.
- Ensure appropriate tags for your workplace and work environment are used.

Welding Process and Preheat Notice

Please ensure that you follow the Thermal Treatment (Preheat) procedure stated in this welding procedure. Preheat of the weld area prior to commencing welding will help ensure weld quality, reduce the occurrence of cracking and other problems that can result in costly rework. The weld area must be heated to 150°C, measured at least 100mm / 4" away from and either side of the weld joint and maintained between 150°C and 250°C throughout the welding process.

The warranty may be void on Talon Weld-On components if the specified process is not followed correctly.



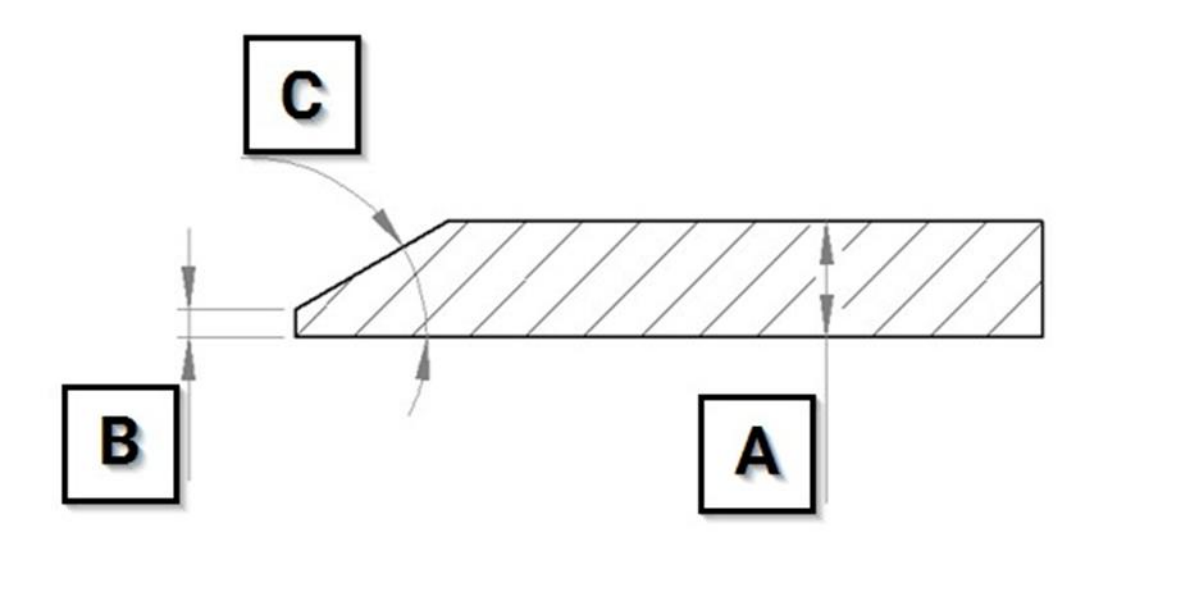
Section 1 – Talon Welding Setup

Weld Preparation

The surfaces to be welded must be good and free from scale, grease, paint, water, or any other contaminants. The heat from welding breaks down any hydrocarbons and moisture in the area and releases hydrogen. The hydrogen along with any remaining particulate matter can be absorbed in the weld and result in cracking, porosity, and inclusions.

Preparation of the weld surfaces may be achieved by sand blasting, shot blasting, grinding, sanding, air carbon arc gouging, or a combination of any these processes. Should the air carbon arc gouging process be used, finish the surface by grinding to remove all carbon slag. Following any of these preparation processes ensure any dust or particulate matter is removed from the weld area to prevent porosity and inclusions.

Before fitting Talon Adaptors to the lip, ensure the lip profile has been cut correctly. The correct lip profile for Talon GET covered under this procedure is shown below. Please refer to the appropriate Lip Assembly Drawing for the lip plate dimensions.



System	Lip Thickness (mm)	Leading Edge (mm)	Ramp Angle (deg)
	A	**B**	**C**
Lockjaw	50	30	25
Xpansion	50	30	25
Xpansion	70	25	30

Tolerances

Lip Thickness	Standard Lip Plate Tolerance
Leading Edge	± 2mm
Ramp Angle	+ 0 deg / - 2 deg

Welding Process

Welding may be completed by any of the following processes:

- Gas Metal Arc Welding (GMAW)
- Flux-cored Arc Welding (FCAW)

A combination of GMAW or FCAW can be utilised.

The following table details **recommended** reference consumables:

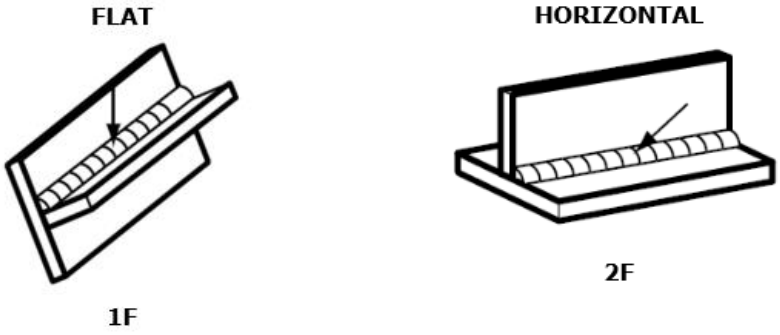
Process	AWS	AS/NZS	ISO	Shielding Gas	Polarity
GMAW	AWS A5.18 ER70S-4	2717.1: ES4-GC/M-W503AH		100% CO2 Ar + 10-15%CO2 Ar + 15-25%CO2	DC+
GMAW	AWS A5.18 ER70S-6	2717.1: ES6-GC/M-W503AH		100% CO2 Ar + 10-15%CO2 Ar + 15-25%CO2	DC+
FCAW-G	AWS A5.20 E71T-1 H8	17632-B: T49 2 T1 1 CAU H10		100% CO2 Ar + 20-25%CO2	DC+
FCAW-G	AWS A5.18 E70C-6M H4	17632-B: T49 4 T15 0 MAU H5		Ar + 20-25%CO2	DC+/-
FCAW-S	AWS A5.20 E70T-7	17632-B: T49 Z T7 0 NA		NR	DC-
FCAW-S	AWS A5.20 E71T-8	17632-B: T49 3 T8-1NA-H15		NR	DC-

Electrical Parameters

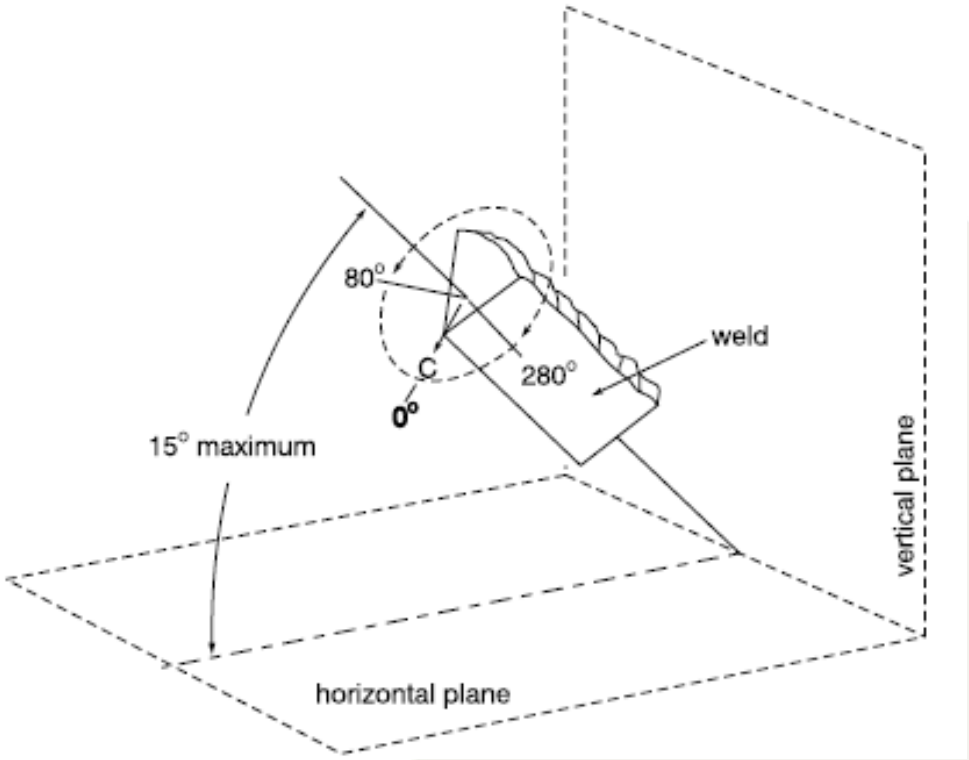
The person completing the weld should refer to the manufacturer's specifications to determine the optimal settings to complete the weld. Actual voltage, welding current and Electrode Stick Out (E.S.O.) used will depend on machine characteristics, plate thickness, run size, shielding gas and operator technique etc.

WELDING POSITION

Welding of Talon Cast Corner is recommended to be completed in the Flat 1F and Horizontal 2F position. The other positions can be welded but the process should be adjusted to suit the applicable weld wire and equipment to ensure good weld strength and integrity.



Deviation from the Flat or Horizontal position is permissible as shown in figure below as typically described in welding standard AWSD1.1, Structural Welding--Steel, Figure 4.2 "Positions of Fillet Welds".



The longitudinal axis of the weld may be inclined no more than 15° with respect to the horizontal plan. The center of the weld face "C" must lie within the rotational limits of 80° to 280° as shown.

Thermal Treatment

It is important to preheat the work piece prior to commencing welding and ensure the components are maintained within the acceptable interpass temperature range during welding. Preheat is the heating of a work piece prior to being welded, flame cut, or air carbon arc gouged. Heat can be applied though several methods such as propane or butane gas flame burners or torches and magnetic induction.

As welding, flame cutting and air carbon arc gouging use a high temperature heat source to melt the base metal, a high temperature in a small localized area is created along with a large temperature differential to the rest of the work piece. This causes high stresses, hardened areas, deformation, and a very small area for hydrogen gases to be released from the steel. Preheat reduces the temperature differential and so lowers the risk of weld cracking, maximum hardness of the heat affected zone, lessens distortion, and releases hydrogen from the steel prior to welding.

Maintaining the correct interpass temperature is important to hold the reduced temperature differential gained from preheating and to ensure the work piece does not get too hot. Allowing the steel to become too hot will temper the steel and soften it, reducing its hard-wearing properties.

When preheating with burners and torches it is most effective to heat the work piece from below. This allows the heat to soak up though the body of the work piece. Using insulating heat blankets on the topside of the work piece will improve and speed up the process, allowing the dispersion and retention of the heat that has been input.

Temperature should be measured using an infrared thermometer or temperature indicating crayon at least 100mm / 4” away from and either side of the weld joint. Best practice is to measure the temperature on the top side as heat is applied to the bottom side, this will ensure a complete preheat though the thickness of the work piece. Prior to any welding, flame cutting and air carbon arc gouging on Talon components and steel bodies the following preheat and interpass temperatures must be reached and maintained.

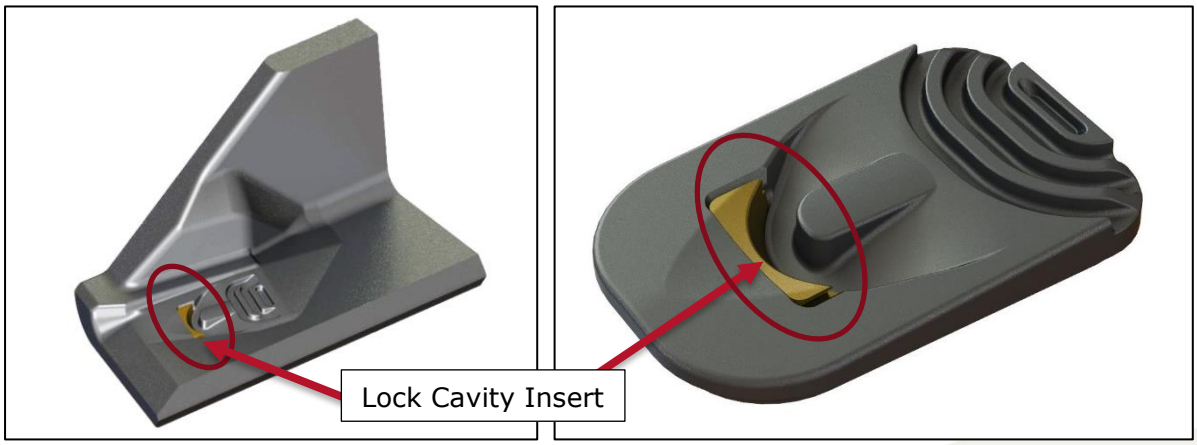
Material	Thickness	Min Preheat Temp	Max Interpass Temp
Talon GET Castings	All Weld-on Castings	150°C / 300°F	260°C / 500°F
ASTM A514 Steels	Greater than 63mm / 2-1/2"	120°C / 250°F	260°C / 500°F
400-450 BHN Abrasion Resistant Steel	Greater than 63mm / 2-1/2"	150°C / 300°F	260°C / 500°F

Notes:

- If the ambient humidity is high and or the temperature is below 4°C / 40°F, the tabulated thermal treatment temperature should be increased by 27°C / 80°F. At no time should any material type or thickness be welded when the temperature of the steel is at or below 4°C / 40°F. This includes tack or spot welds or any allied process. Preheat must be applied as specified.
- All material within 100mm / 4" of the weld zone must be within the specified temperature.
- Cool weld slowly. Do not allow drafts or cool ambient temperatures to cool the parts or assembly. Cool down rate should not exceed 55°C / 130°F, per hour. Use thermal blankets if required.
- If the ambient temperature is at or below 4°C / 40°F the part must be covered with a thermal blanket to insure the cool down rate above. Alternatively, the entire part maybe post-heated to 150 - 200°C / 300 - 400°F for four hours and then maybe air cooled.

Lock Cavity Inserts (Lockjaw Only)

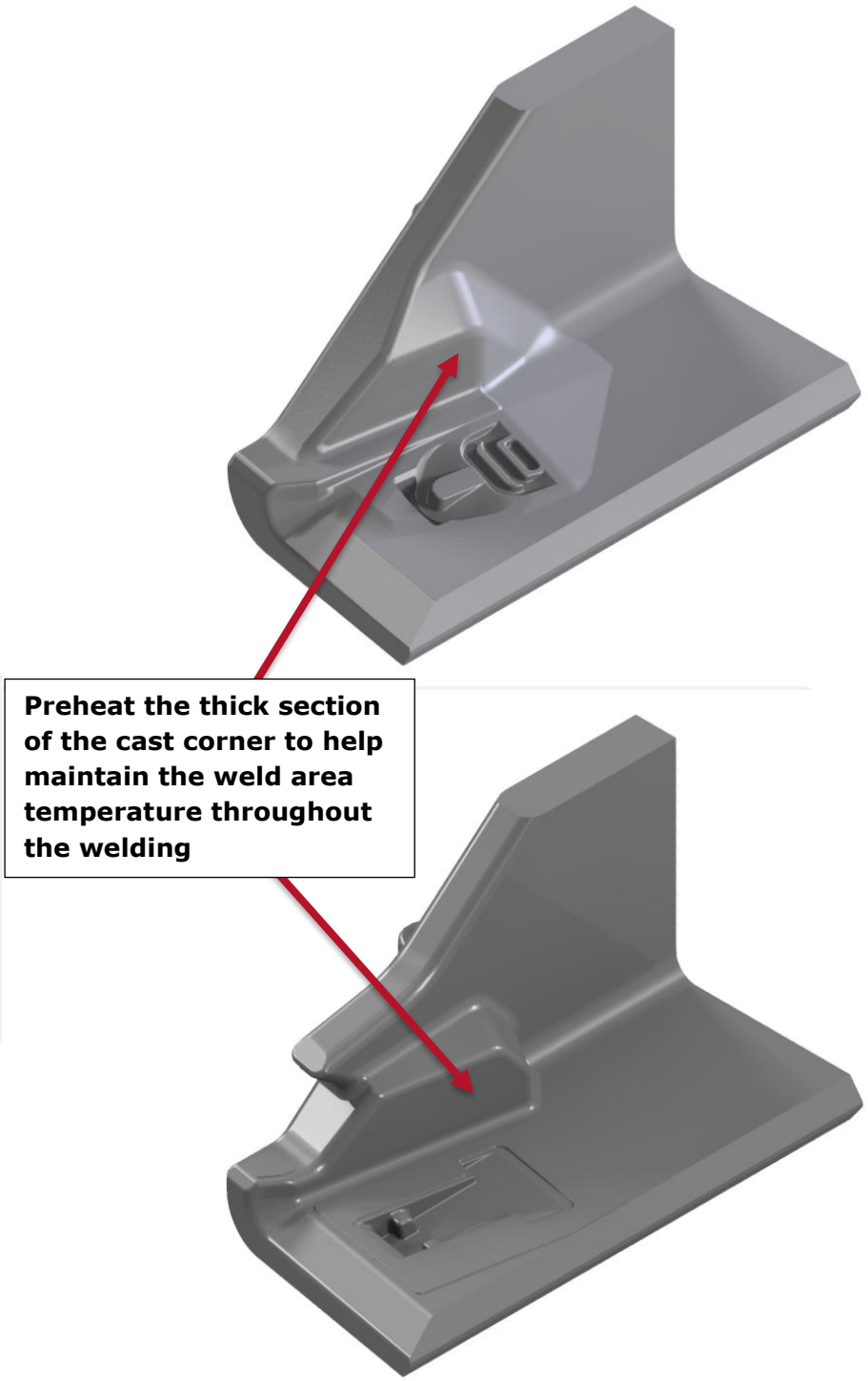
Talon Lockjaw Adaptors and Lockjaw Bosses come supplied with a Lock Cavity Insert installed in the lock engagement area. The purpose of the Lock Cavity Insert is to enable the replacement of the lock bearing face if overtime the surface becomes compressed.



The Lock Cavity Insert is a hardened steel approximately 550 HB. As such to preserve the parts integrity the inserts must be removed prior to any heating or welding processes. Store the inserts in a safe location so that they can be reinstalled after the lip has cooled below 80°C (176°F).

Cast Corner (Lockjaw and Xpansion Lock)

Due to the geometry of the Talon Cast Corner, the large section in the lower corner of Cast Corner may cause a heat sink soaking the heat away from the welds. As such, this this should be accounted for in the amount of preheat applied.



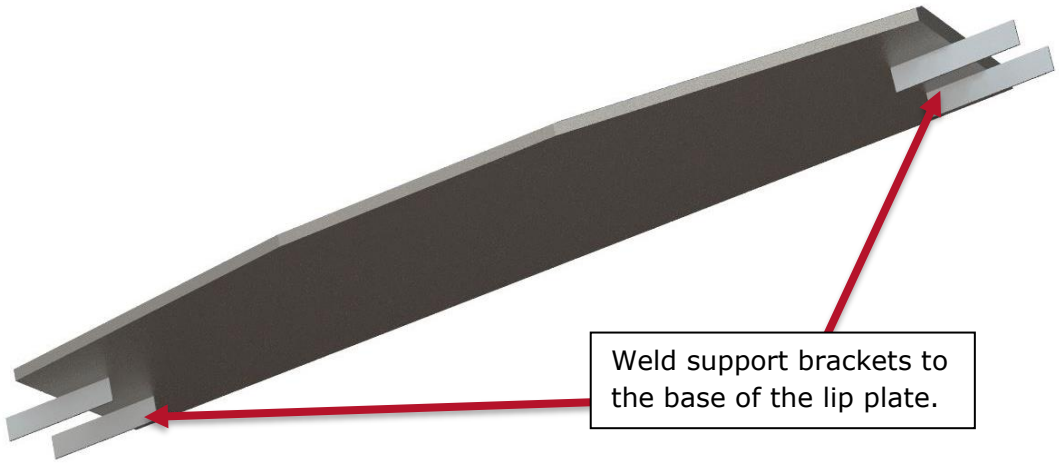
Section 2 – Talon Adaptor (Cast Corner) Welding Process

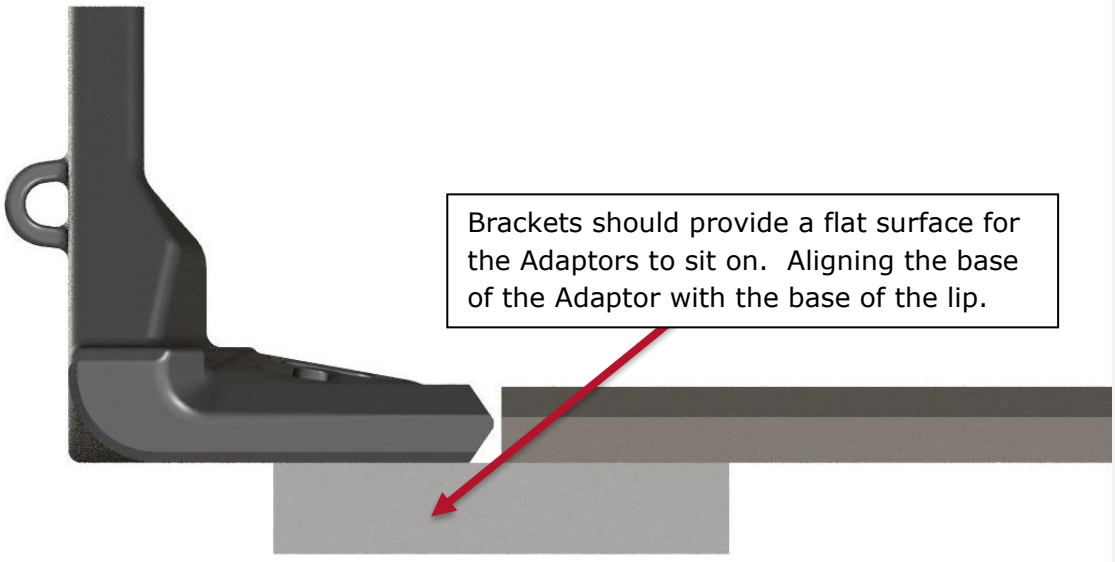
The sequence of steps laid out in this section is identical on both Talon Lockjaw and Xpansion Adaptors. This means that this section will also apply equally to Talon Xpansion Adaptors. This section will use a Talon 50mm Underground Lockjaw Cast Corner Adaptor to demonstrate the Talon Adaptor welding process.

Welding Sequence

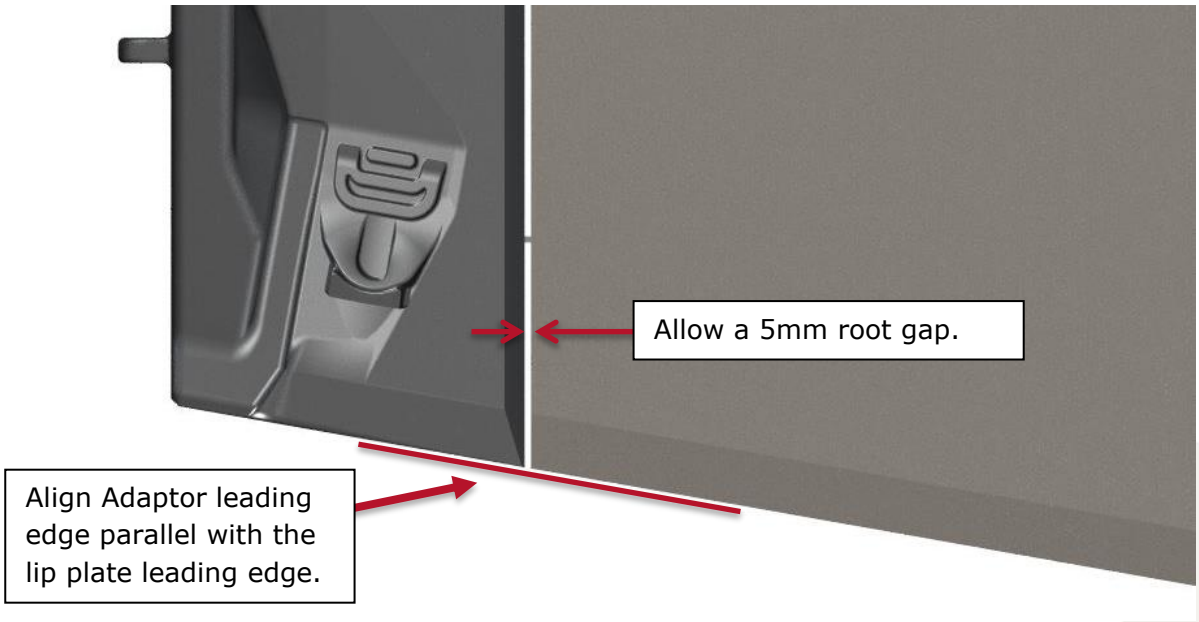
Prepare lip plate as required to suit your relevant Lip Assembly Drawing. Trim the rear of your Talon Adaptors to suit the side length of the lip plate. Note this dimension is also referenced on the Lip Assembly Drawing.

Weld support brackets to the base of the lip plate to provide a flat surface for the Adaptors to sit on. The bracket should also align the base of the Adaptor parallel with the base of the lip plate.

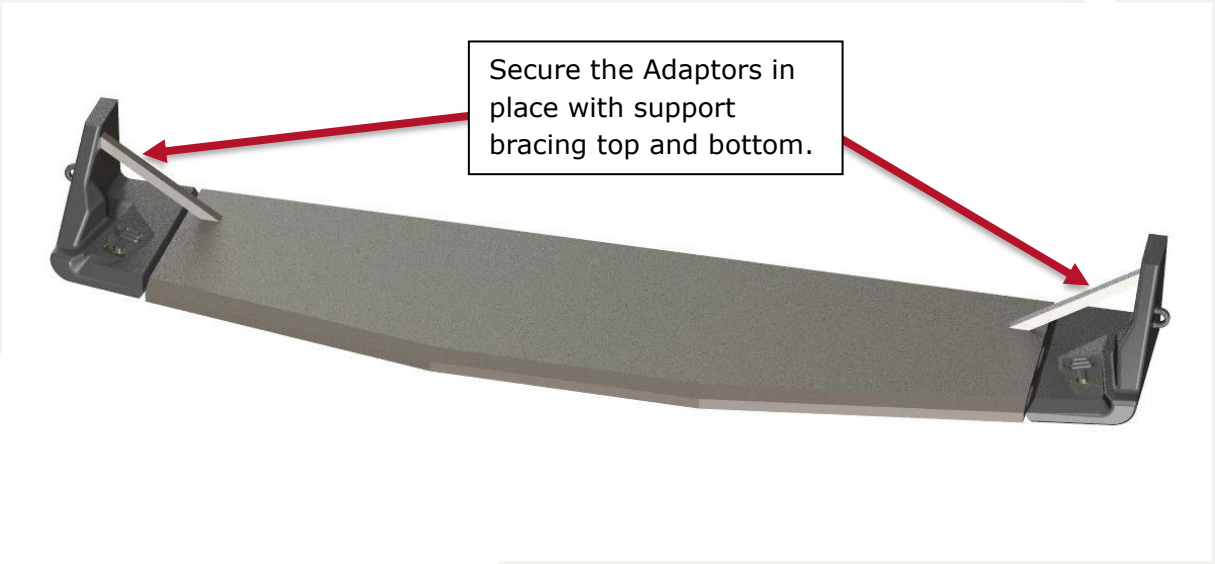




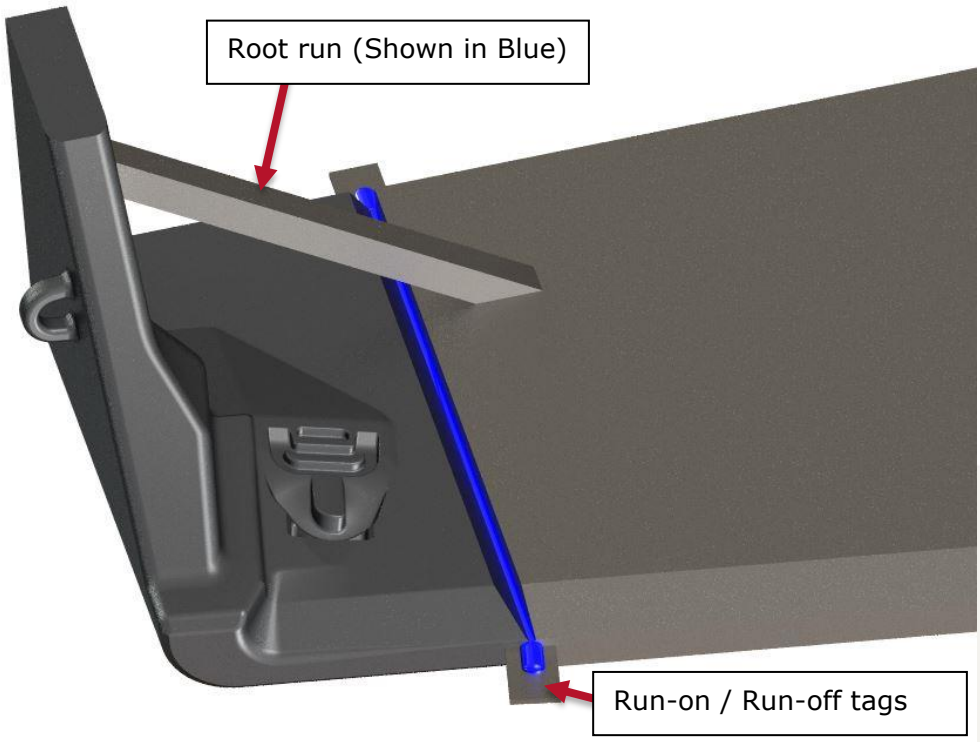
Position the Adaptor on the support bracket such that the leading edge of the Adaptor is parallel with the leading edge of the lip plate. Allow for a 5mm root gap between the Adaptor and the side of the lip plate to enable a full penetration weld.



With the Adaptor in the correct position secure the Adaptor in position by welding a support brace on the top side of the Adaptor and lip plate and welding the Adaptor to the support brackets on the base of the Adaptor.

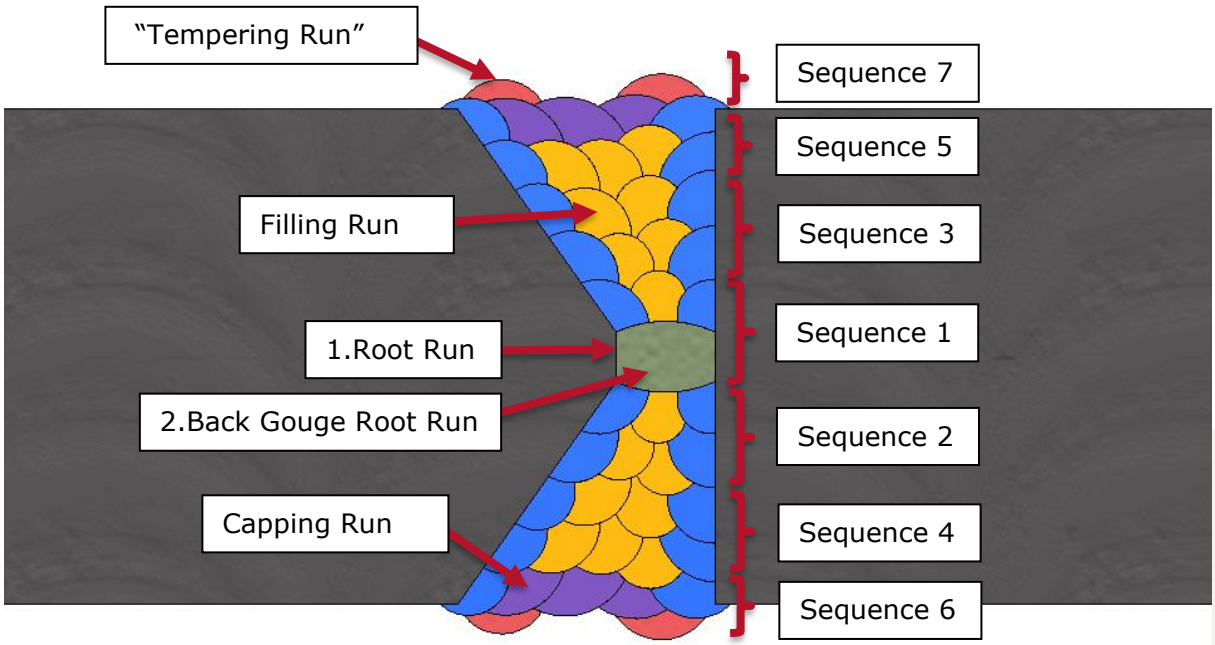


Now the Adaptors are secured in the correct position. Preheat the lip plate, attach run-on and run-off tags to the assembly and complete the root run for both Adaptors.



Maintaining the correct preheat and inter-pass heat. Build up the weld alternating between left and right Adaptors and top and bottom sides of the lip. This is to allow for the distribution of heat into the lip and minimize risk of distortion in the lip plate.

Depending on your electrode size and weld metal deposition rate fill the weld preparation with a minimum of one filling run and one capping run per side. The following image shows the recommended weld profile.



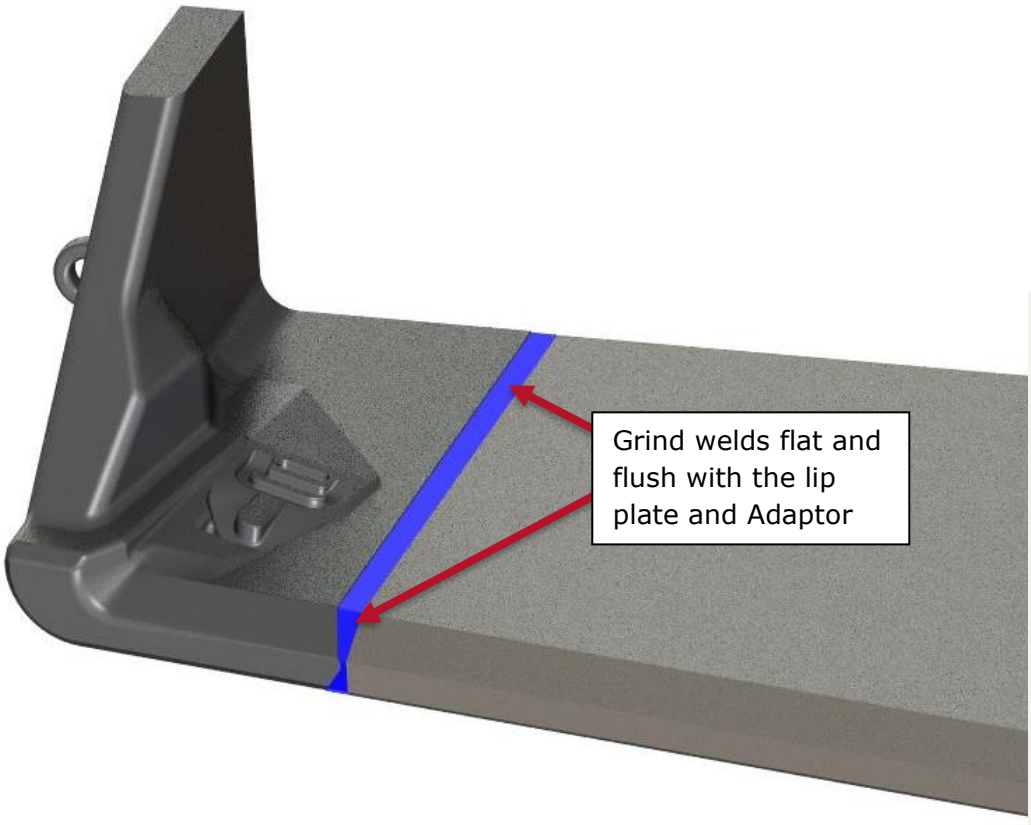
1. Firstly, start the weld with root run (in Green) then possibly one layer of filling depending on your weld wire/ electrode size and type.
2. Then back gouging on another side. Back gouging can ensure full penetration of the weld. Then fill with weld.
3. After each layer of the weld is completely filled, flip the part to another side for the welding. The layers of welding should be alternated sides as it is built up. Approximately demonstrated by the sequence order in the image above.
4. Finish the weld joint by capping run (in Purple).
5. Lastly, additional "Tempering Runs" (in Red) are to be welded on top of the cap on each side of the joint. Preferably these runs will be deposited entirely on the capping runs and not contact the parent metal.

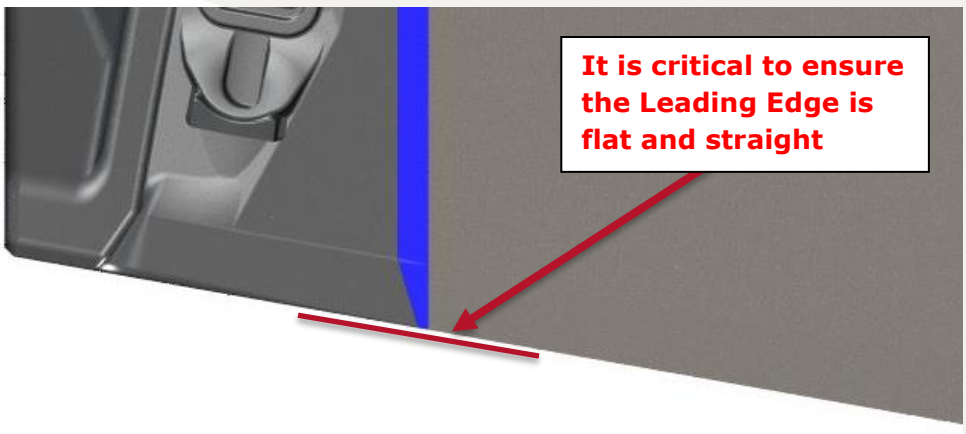
For improved weld performance and to reduce the risk of possible cracking, the first runs (in Blue) of each layer are to be deposited on each side of the joint onto the parent metal and continue the filling run (in Yellow) of the same layer.

Weld Finishing

Following the completion of the welds for the Adaptors on both sides of the lip, cut off the support bracing. Grind the weld surface flat and flush with the lip and Adaptor profile. The final result must be a smooth and flat transition from the lip plate to the Adaptor surfaces.

NOTE: It is critical that the leading edge of the lip plate is a flat and straight surface.





It is recommended that all finished welds are inspected for cracks using either MPI or Dye Penetrant Inspection. It is preferable to use the MPI process. Any cracks detected must be completely gouged out and filled with weld. Finish the repair with grinding and gauge inspection as detailed above and re-inspect for cracks.

Section 3 – Talon Boss Welding Process

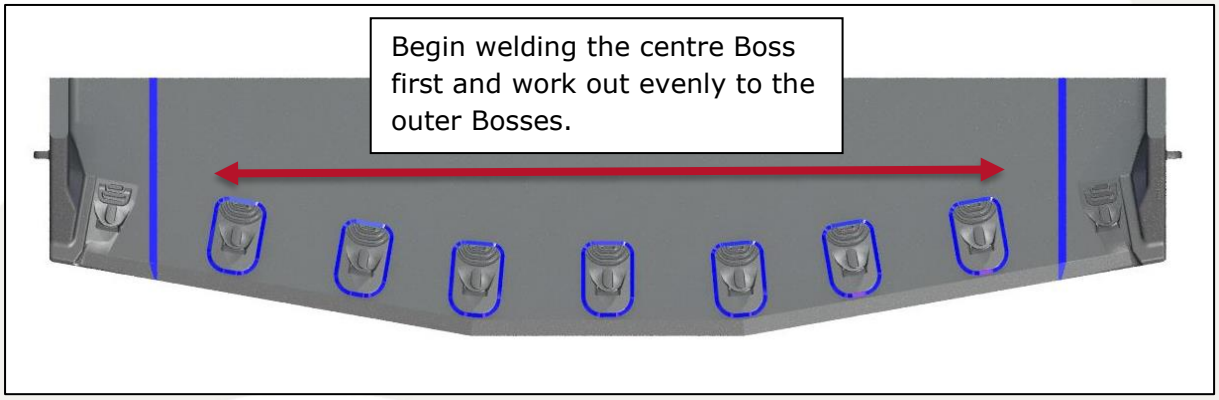
Following completion of welding process of the Talon Adaptors, refer to the correct welding procedure for subsequent welding of Talon Bosses.

	Lockjaw	Xpansion
Welding Procedure	WP0003	WP0012

Mark out on the lip plate the required locations of the Talon Bosses as per your Lip Assembly Drawing. Use the appropriate Talon setup gauges listed in the relevant welding procedure to position the boss at the required setback from the lip leading edge.

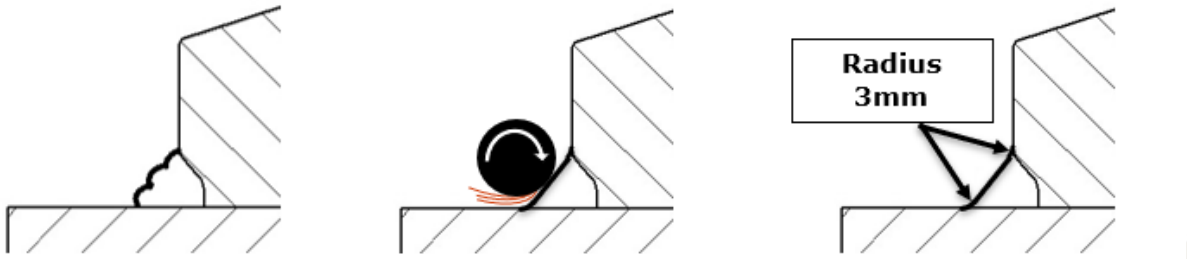
Once Talon Bosses are secured with the Talon setup gauge, preheat the lip plate and bosses as required. Tack weld, then complete the weld as detailed in the relevant welding procedure. Ensure 2 or more weld passes are used to complete the full-size fillet weld.

Begin Welding the Talon Bosses to the lip beginning with the bosses located in the centre of the lip and work out to the bosses located near the edges.



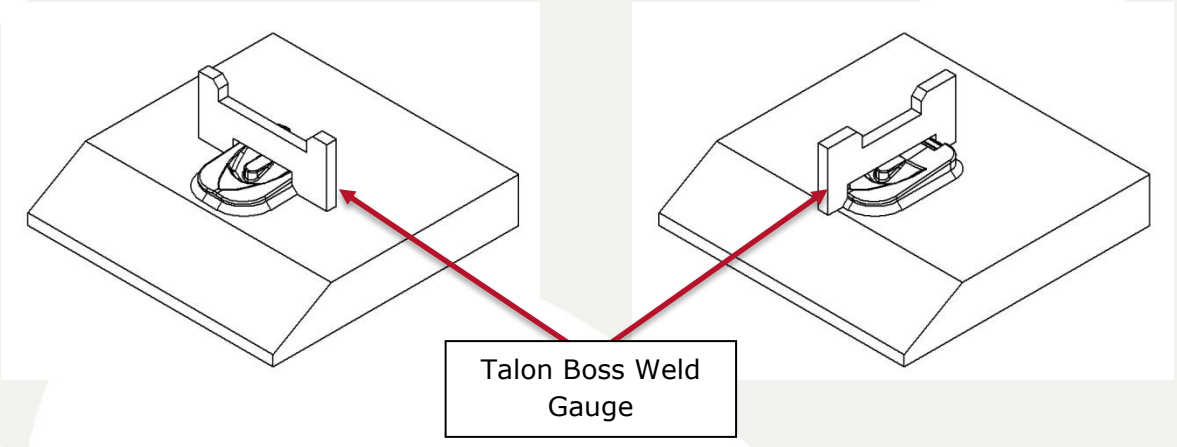
Weld Finishing

The surface of all boss welds shall be ground smooth, such that the surface of the welds become a smooth surface free of any roughness or ripples associated with fresh welds. The toes of the weld shall transition to the lip and Talon Boss smoothly, such that the transition exhibits a minimum of a 3mm / 1/8" radius. Although various methods of grinding maybe used to remove the bulk of the weld roughness. Grinding shall be finished such that any remaining grinding markings are all perpendicular to the weld.



Weld Before Grinding **Weld During Grinding** **Weld After Grinding**

Inspect finished weld size using the relevant Talon Boss Weld Gauge. This gauge is a simple GO / NO-GO gauge. The gauge should be able to pass easily over the welded Talon Boss while maintaining contact with the lip surface. If the gauges interfere with the weld surface continue to grind the weld until the gauge can pass over the Boss.



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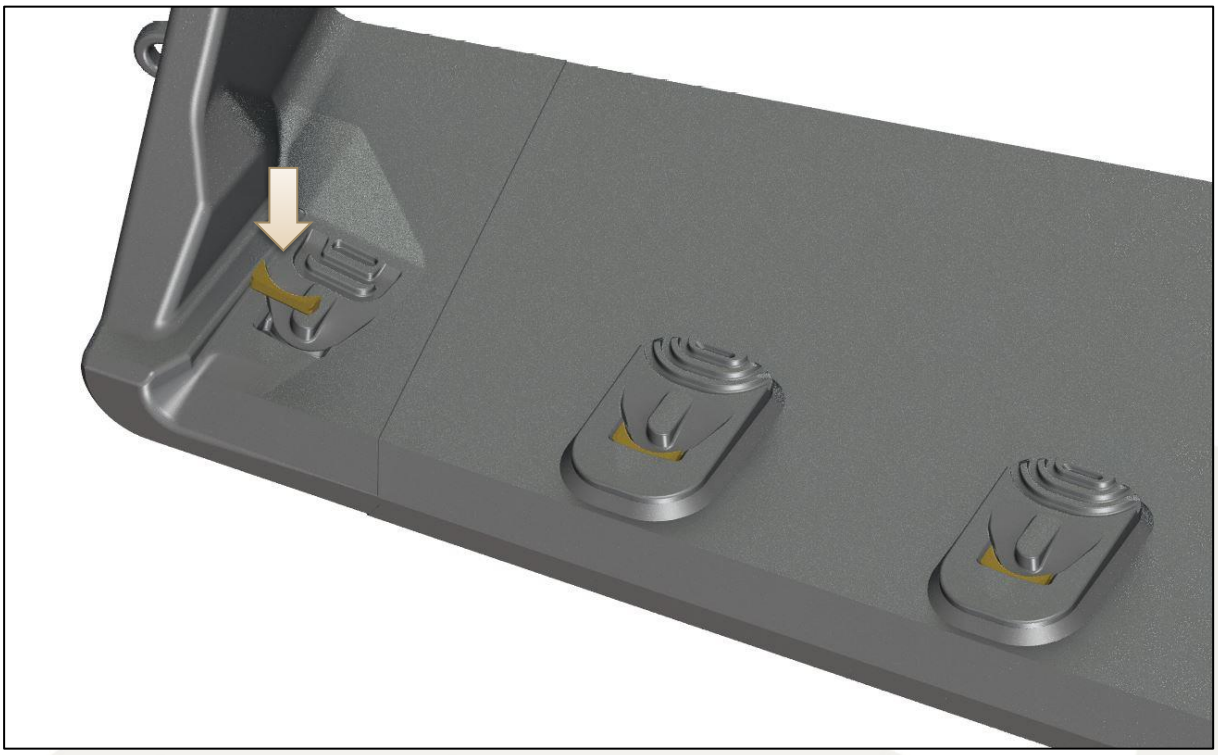
For Lockjaw Adaptors and Bosses Only

Following completion of all welding processes, the lip must cool down **below 80°C (176°F)** before fitting the Lock Cavity Insert back into the Boss and Adaptor.



The Lock Cavity Insert is **NOT** a push fit. Use a Loctite or equivalent metal bonding product to retain the Insert within the Boss.

The Lock Cavity Insert is a replaceable item. Should any Inserts be lost please contact your nearest Talon dealer to purchase replacements.

Change Register

Rev	Date	Changes from previous version
0	15/10/2014	Original Issue
1	01/07/2016	Lip profile image updated.
2	03/11/2016	Root gap adjusted from 7.5mm to 5mm
3	13/10/2017	Lock cavity Inserts and new setup gauges added
4	15/06/2021	Xpansion cast corner adaptors included and some sections for boss removed
5	23/12/2021	Added welding process and preheat disclaimer and a section highlighting the cast corner geometry, updated welding sequence
6	01/04/2022	Update welding process and electrical parameter