Document Version Control		
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WP0011	**2**	**01/04/2022**

Talon Cast Corner Adaptor Welding Procedure

Outline

This procedure provides the recommended guidelines for the installation and welding of Talon Cast Corner Adaptors. Some settings and consumables may vary dependant on environment and availability at the place of installation. Of critical importance is following correct Safety procedures and Thermal Treatment processes for both Talon Castings and bucket parent metal. Talon Castings are manufactured from quenched and tempered cast steel and so there is a high risk of cracking if the correct preheat and post-heat is NOT applied. 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.

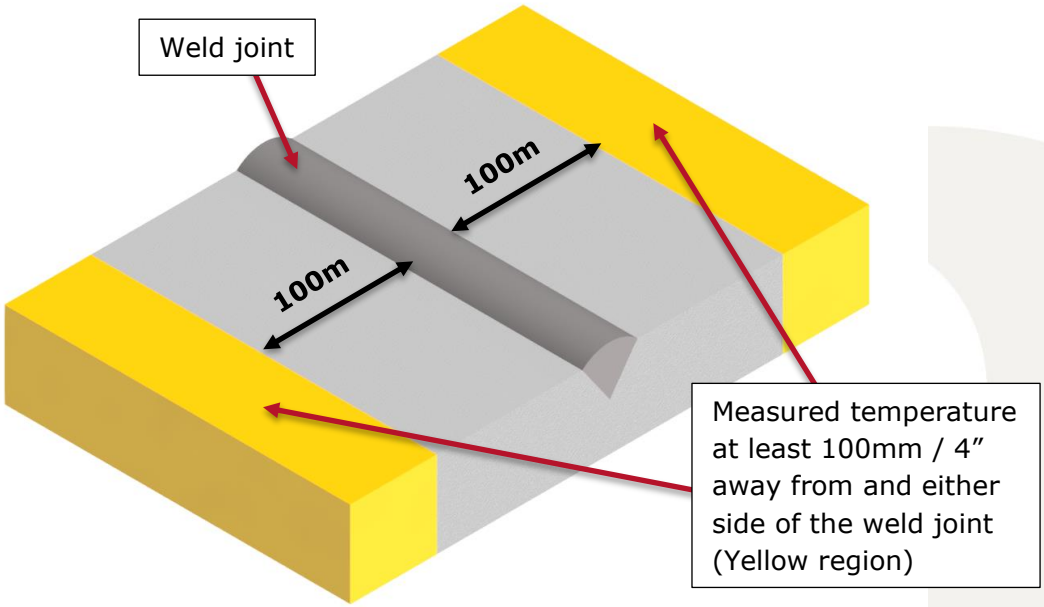
Of particular note please ensure the following is adhered to:

- Wear correct PPE including
  - Full sleeve non-flammable workwear. (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 to ensure the area where welding is to be conducted is not damp or wet.
- Welding is a fire risk to ensure the area where welding is to be conducted is free of anything 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.



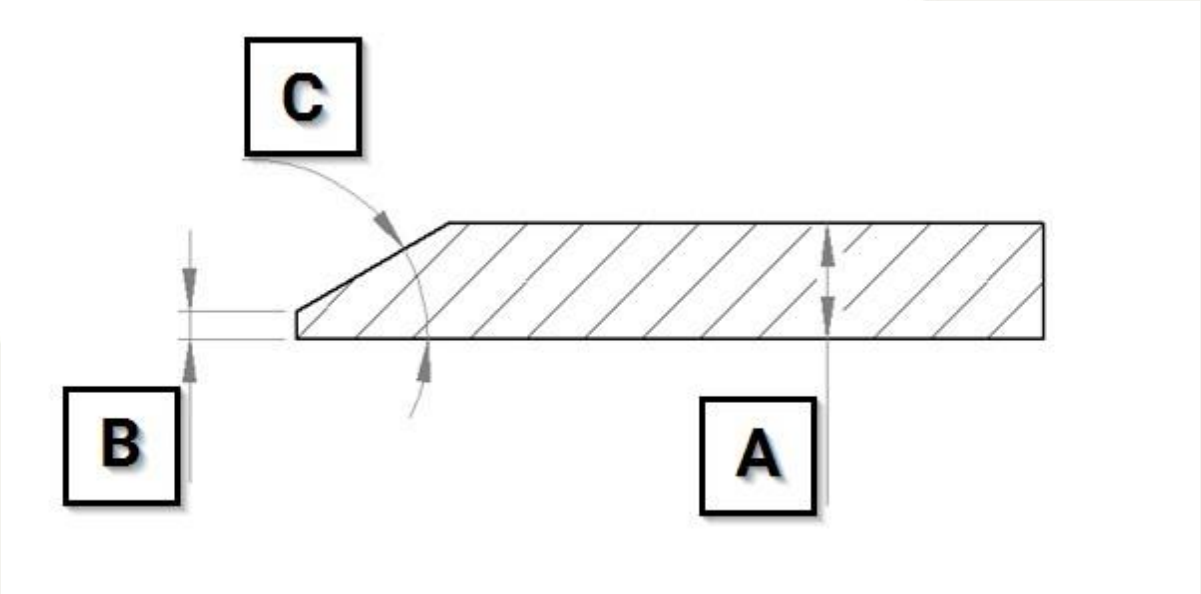
SECTION 1 – TALON WELDING SETUP

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 Cast Corner Adaptors, the bucket should be prepared to suit the approximate geometry of the Cast Corner Adaptor as follow:

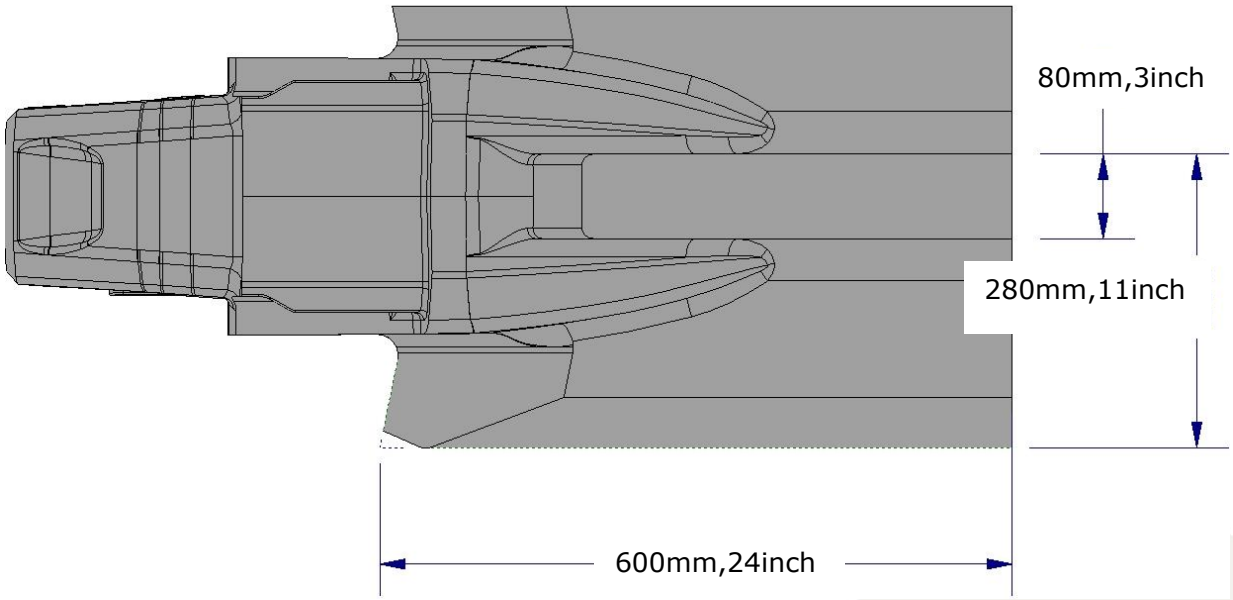


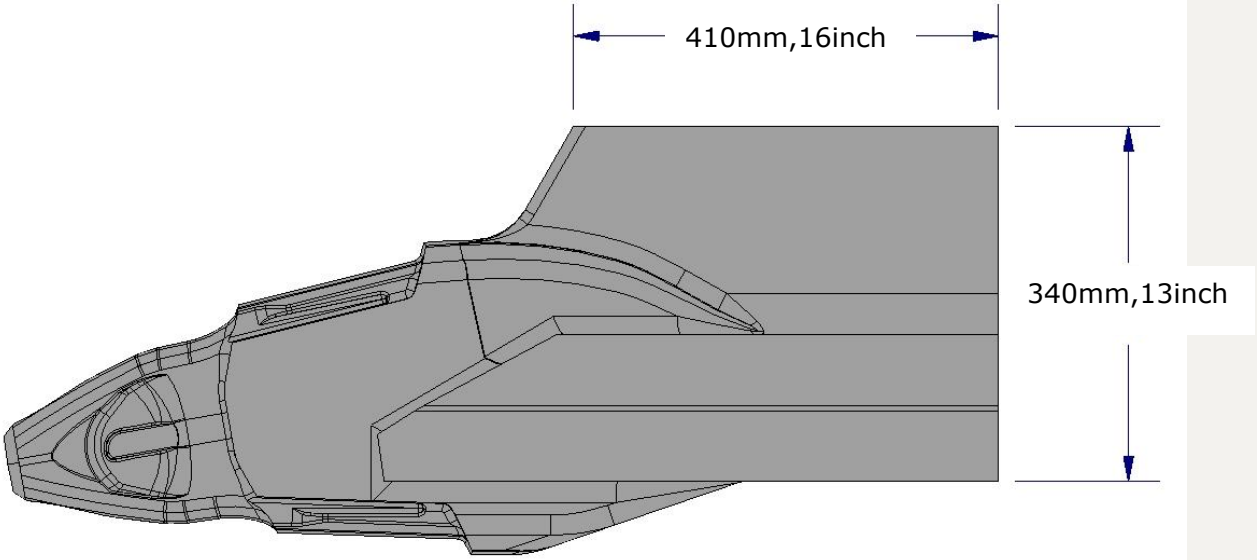
Lip Thickness (mm)	Leading Edge (mm)	Ramp Angle (deg)
A	**B**	**C**
120	42	30
140	45	30

Tolerances

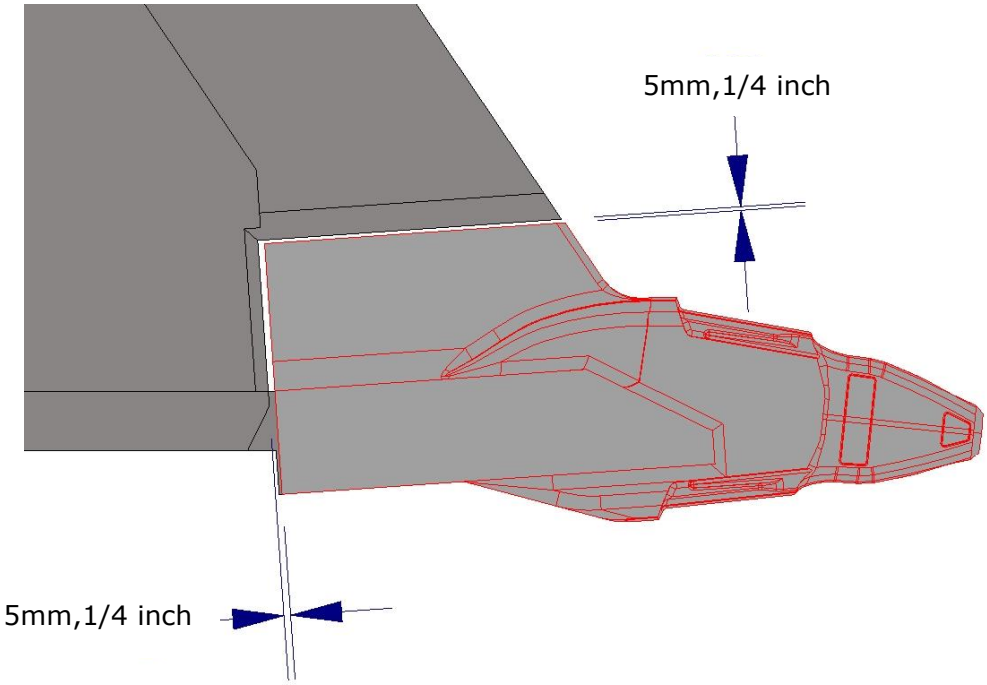
Lip Thickness	Standard Lip Plate Tolerance
Leading Edge	± 2mm
Ramp Angle	+ 0 deg / - 2 deg

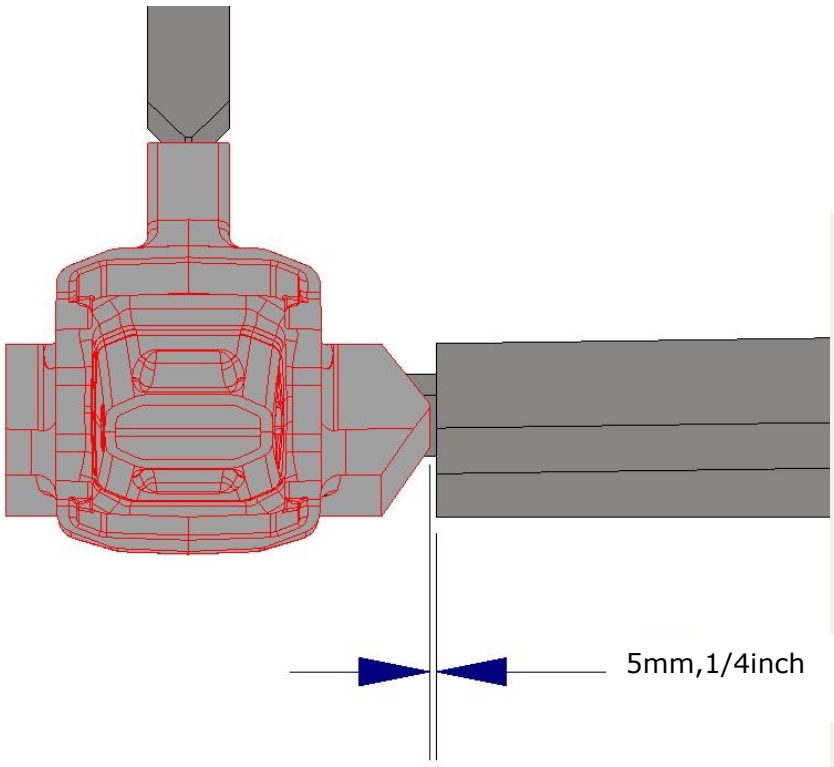
Basic dimension of the talon cast corners are as follows:



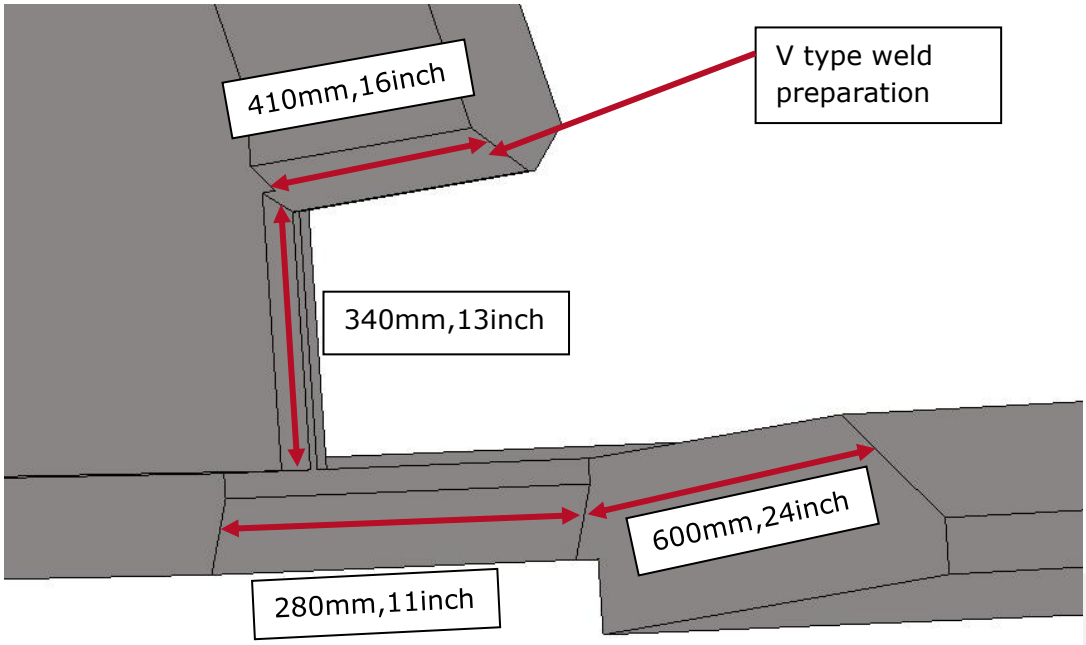


Remove the corner segment of the bucket to suit the approximate dimension of the Cast Corner Adaptor as detailed above. Allow approximately 5mm(1/4 inch) clearance for a welding root gap.

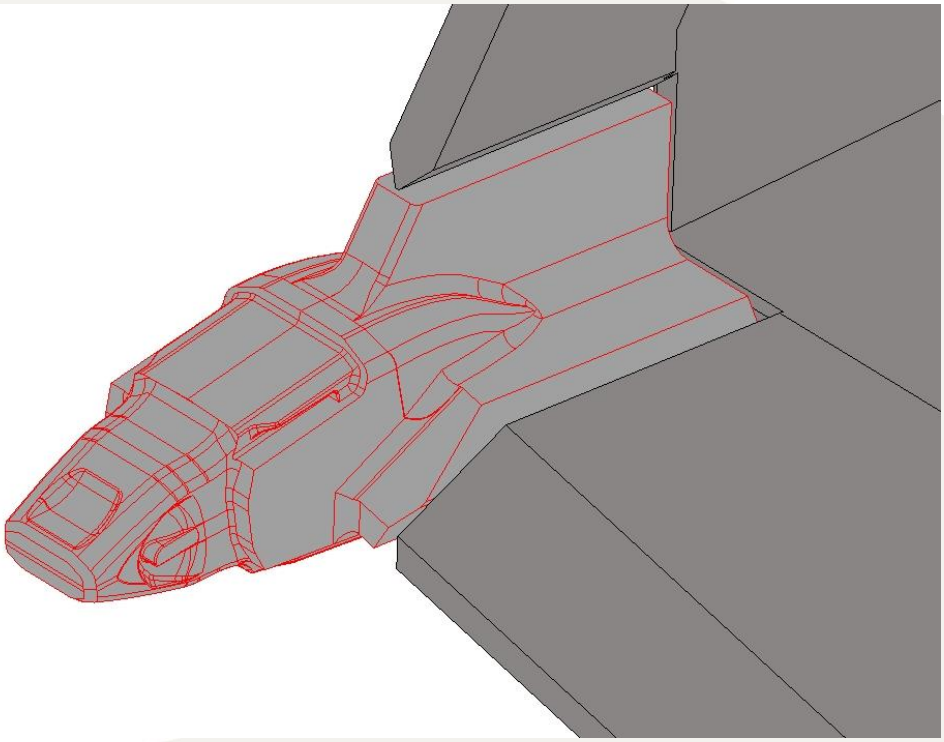




Profile the bucket wall and the bucket floor to allow for a V type weld preparation. The following images show a representation of the outcome of the bucket corner



Cast Corner Adaptor can be positioned in the bucket corner as follows.



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:

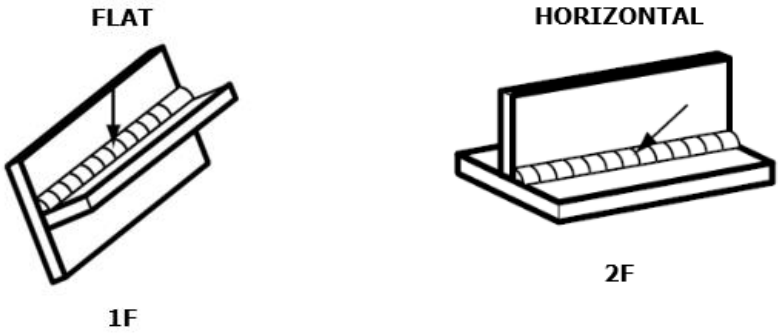
Process	AWS	AS/NZS	ISO	Shielding Gas	Polarity
GMAW	AWS A5.18 ER70S-4	2717.1: ES4-GC/M-W503AH		100% CO2 Ar + 10-15%CO2 Ar + 15-25%CO2	DC+
GMAW	AWS A5.18 ER70S-6	2717.1: ES6-GC/M-W503AH		100% CO2 Ar + 10-15%CO2 Ar + 15-25%CO2	DC+
FCAW-G	AWS A5.20 E71T-1 H8	17632-B: T49 2 T1 1 CAU H10		100% CO2 Ar + 20-25%CO2	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

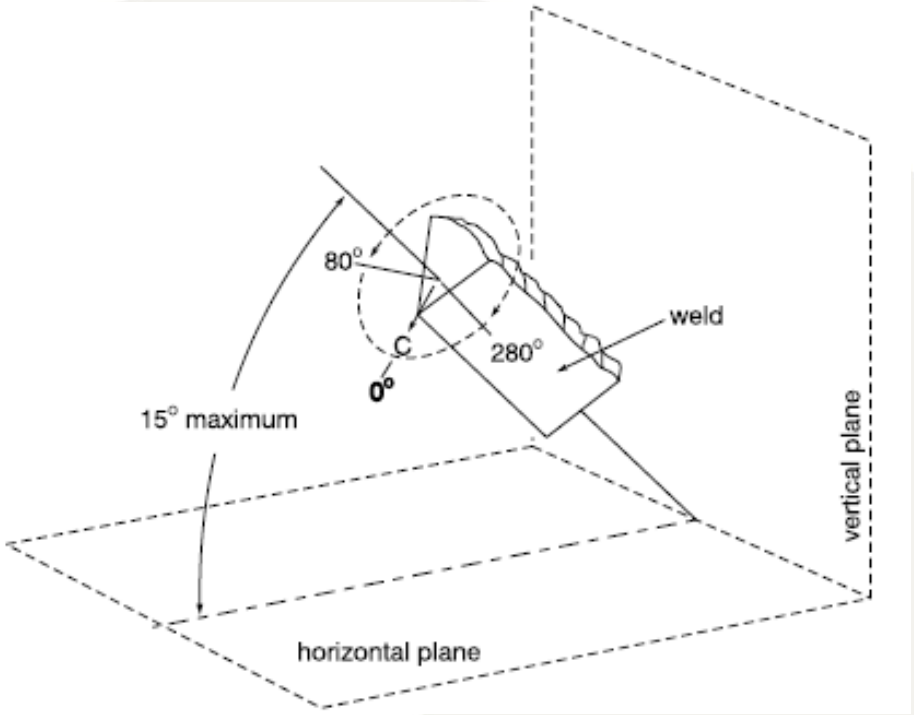
The person completing the weld should refer to the manufacturer's specifications to determine the optimal settings to complete the weld. Actual voltage, welding current and Electrode Stick Out (E.S.O.) used will depend on machine characteristics, plate thickness, run size, shielding gas and operator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

Welding Position

Welding of Talon Cast Corner Adaptor is recommended and shall 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 plane. The centre 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 workpiece prior to commencing welding and ensure the components are maintained within the acceptable interpass temperature range during welding. Preheat is the heating of a workpiece prior to being welded, flame cut or air carbon arc gouged. Heat can be applied through 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 workpiece. 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, the 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 workpiece does not get too hot. Allowing the steel to become too hot will temper the steel and soften it, reducing its hardwearing properties.

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

The 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. The 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 through the thickness of the workpiece. 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

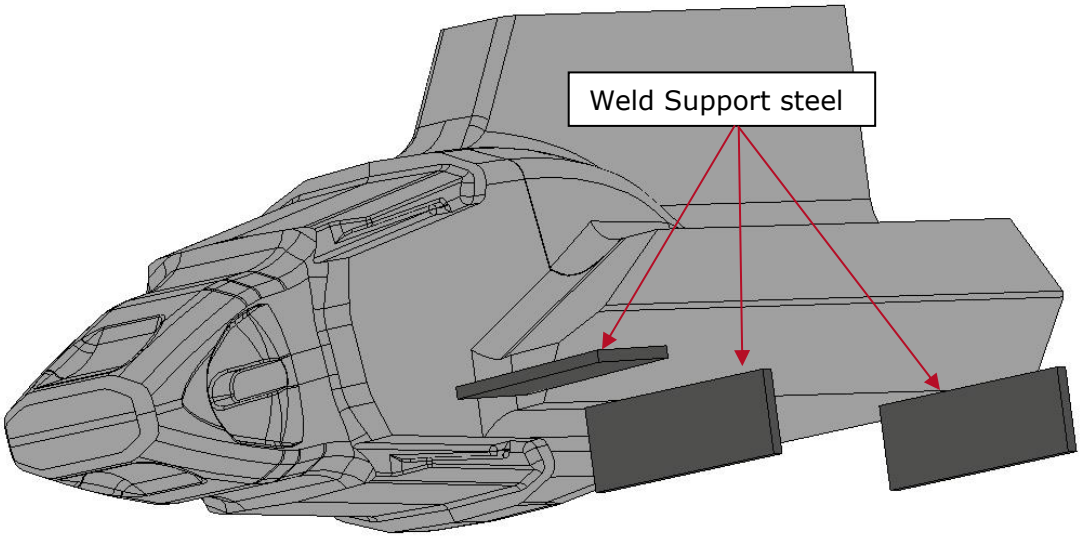
Notes:

- 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.

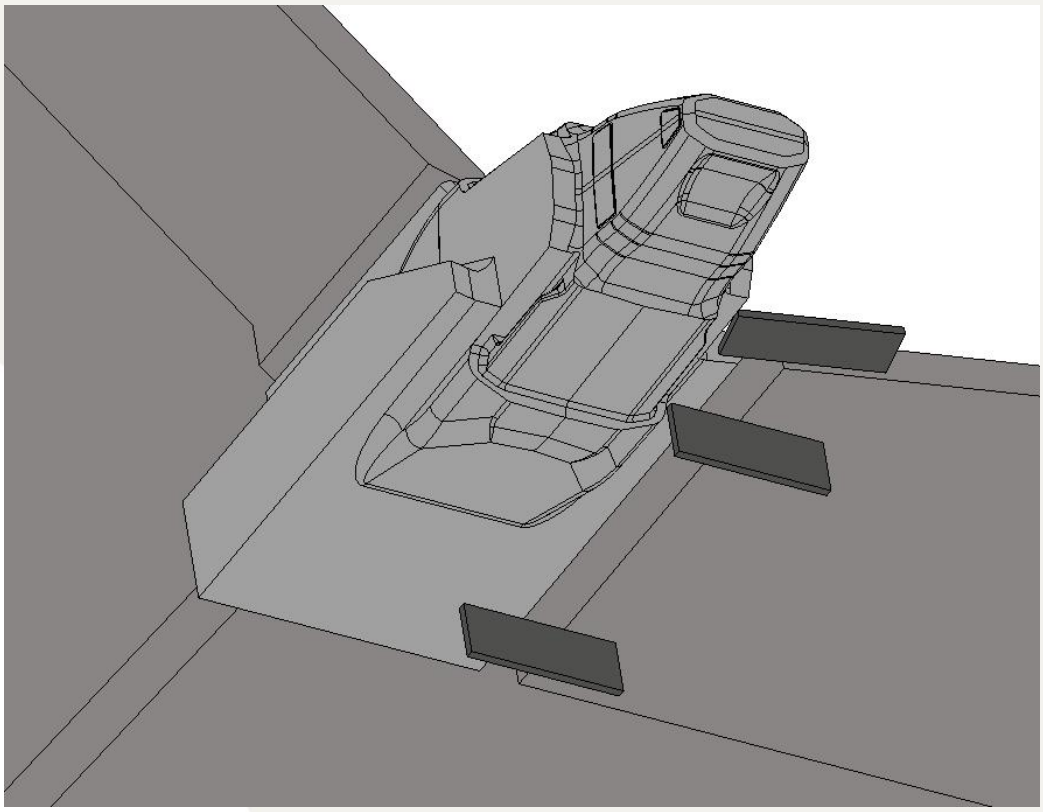
Section 2 – Talon Cast Corner Adaptor Welding Process

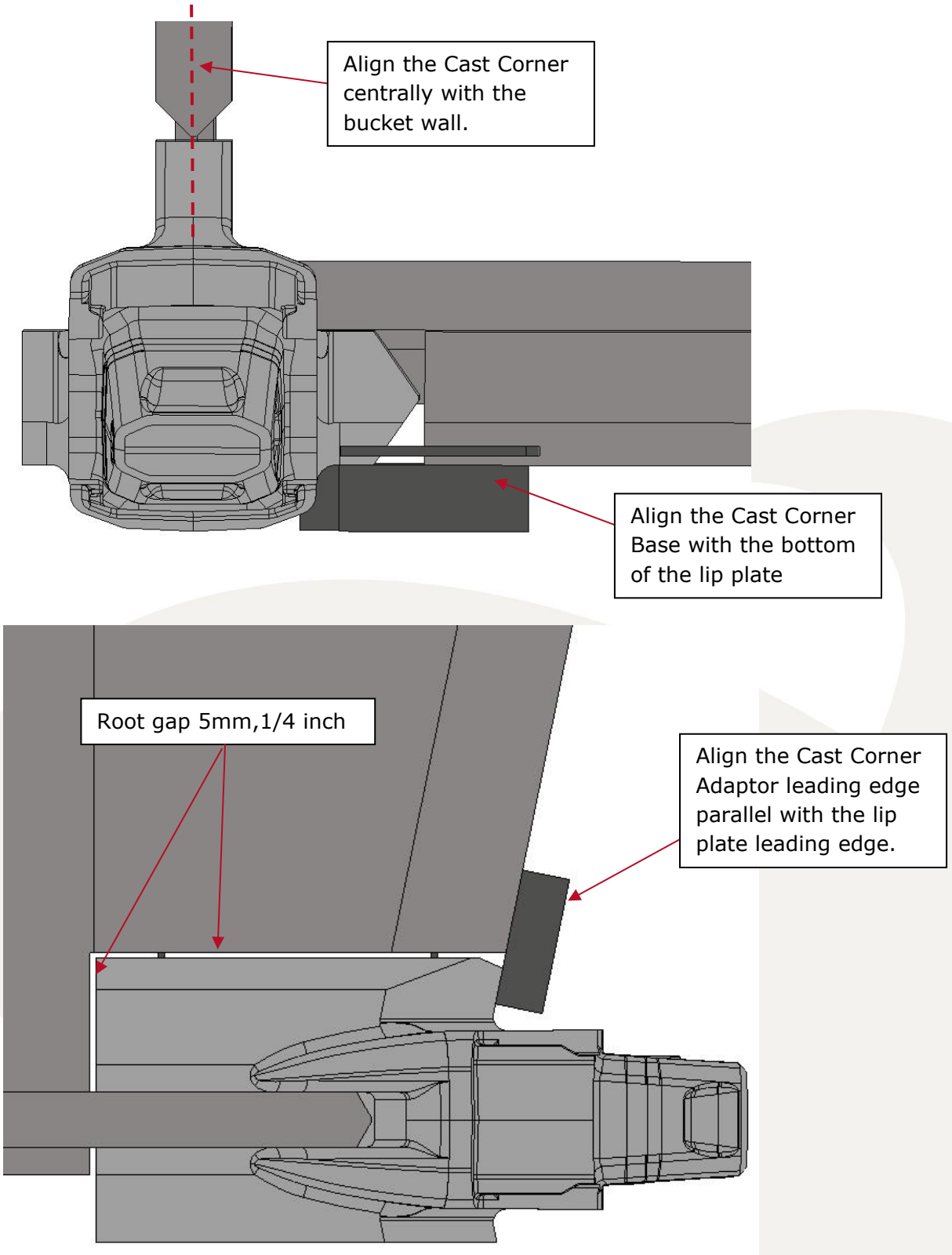
Position Cast Corner Adaptor

Tack weld straight segments of steel to the Cast Corner Adaptor base and leading edge.



Position the Cast Corner Adaptor in the bucket using the straight segment of steel to align the Adaptor to the bottom of the bucket lip plate and the leading edge of the bucket lip. Align the wall segment of the adaptor centrally with the bucket wall

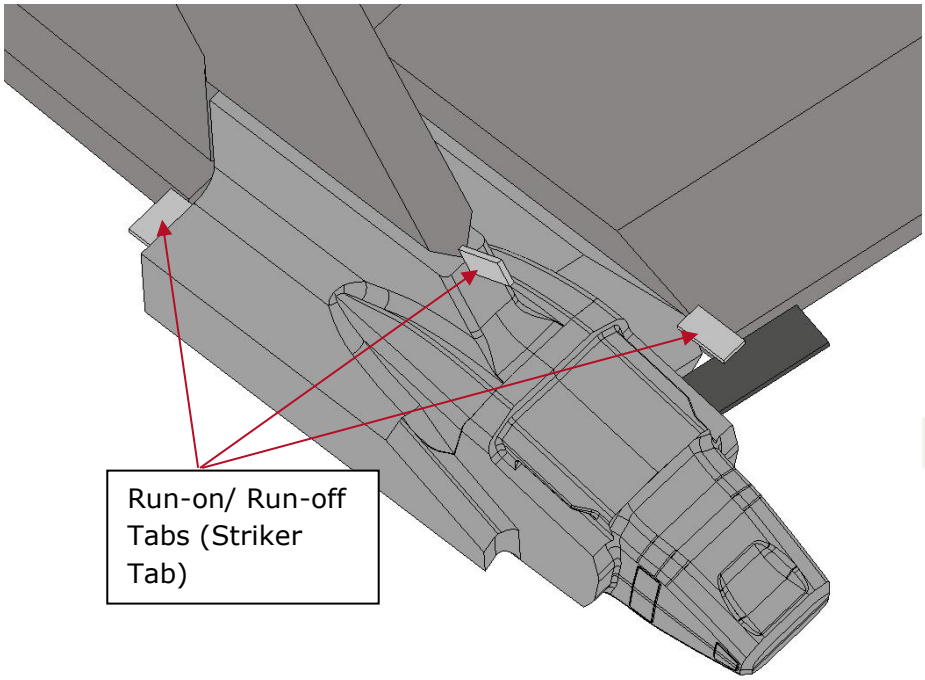




Fix the Talon GET Cast Corner Adaptor in place with tack welds no longer than 25mm / 1".

Pre-Welding

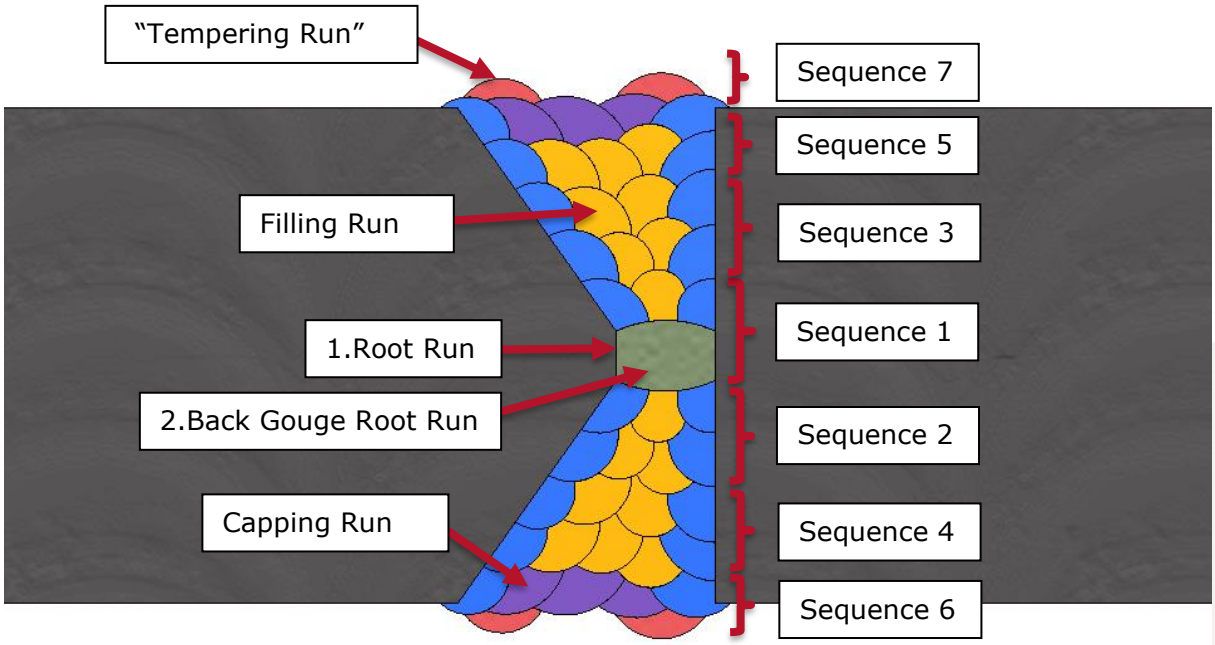
Ensure Cast Corner and Bucket segment has been sufficiently preheated as per details in the Thermal Treatment section of this procedure. Attach Run-on/ Run-off (Striker Tab) Tabs to the weld ends.



Before commencing any welding process ensure lip area is clean and free of debris.

Welding Sequence

Talon Cast Corner Adaptors must be welded to the bucket using full penetration welds. It is recommended to follow the basic sequence detailed below. Note exact order of weld runs may vary depending on the ability to safely manoeuvre and position the bucket and Cast Corner Adaptor for welding.



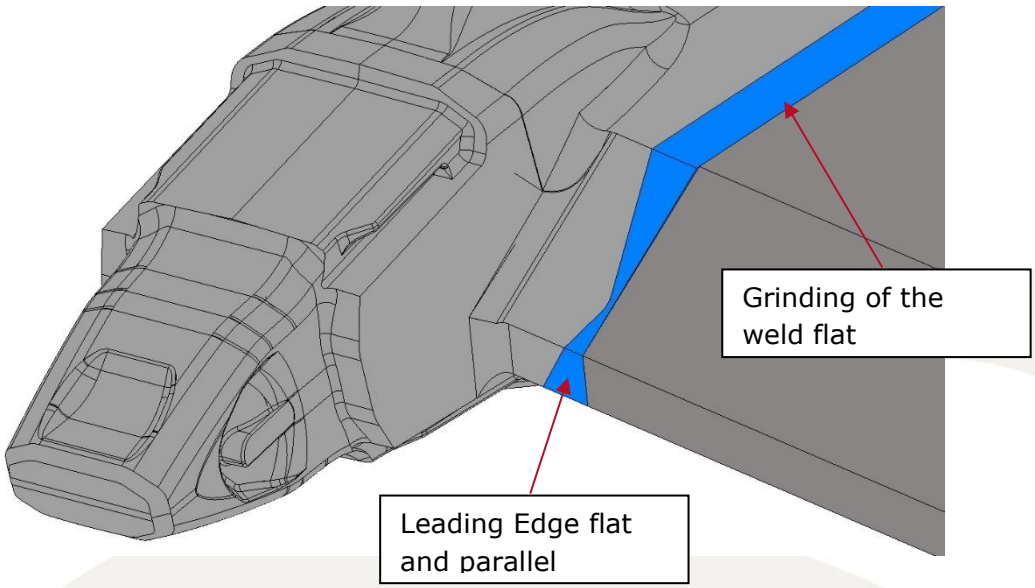
1. Firstly, start the weld with root run (in Green) then possibly one layer of filling depending on your weld wire/ electrode size and type.
2. Next, back gouging on another side. Back gouging can ensure full penetration of the weld. Then fill with weld.
3. After each layer of the weld is completely 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.

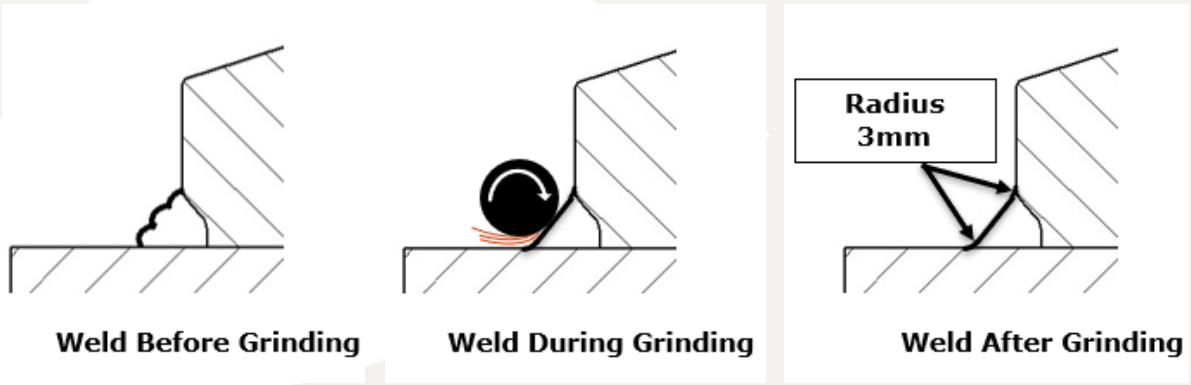
Weld Finishing

Following the completion of the welds for the Cast Corner Adaptors on the lip, cut off the support bracing. Grind the weld surface flat and flush with the lip and Adaptor profile. The final results 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.



For weld areas which exhibit a fillet weld, such as the join between the rear of the Adaptor and the base of the bucket floor. The surface of the welds shall be ground smooth, such that the surface of the welds is free of any roughness or ripples associated with fresh welds. The toes of the weld shall transition to the parent metal smoothly, such that the transition exhibits a minimum of a 3mm / 1/8" radius. Although various methods of grinding may be 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.



The end of the weld must be tapered and smooth prevent a stress riser at a change in restraint or profile location.

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 as detailed above and re-inspect for cracks.

CHANGE REGISTER

Rev	Date	Changes from the previous version
0	17/04/2020	Original Issue
1	23/12/2021	Added welding process and preheat disclaimer and updated welding sequence
2	01/04/2022	Update welding process, electrical parameter and welding finishing