***KOMBIMATEC MACHINES LTD.***
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Directors: David Parsons, Adam Jones, Sean Mackey
Registered Number: 1849846 Vat No. GB764083227

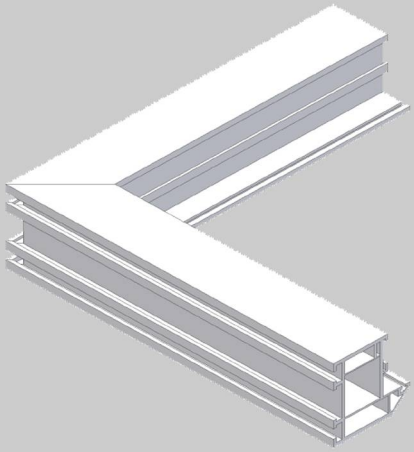
# Kombimatec Machines Ltd.

## Glossary of Terms:

### *Joint Types*

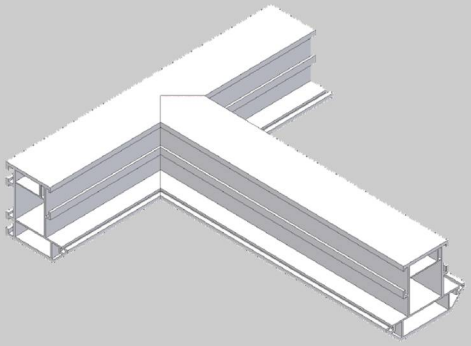
### *Corner Joint*

See Figure 1 of a typical welded outer frame corner joint.



### *Transom Joint*

See Figure 2 of a typical welded Transom joint using outer frame and transom profile.



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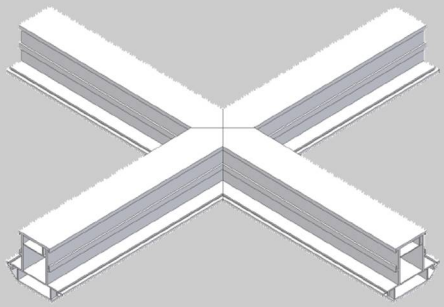
## *Cruciform / Crucifix / Cross Joint*

See Figure 3 of a typical welded Cruciform (or Cross) joint using pieces of transom profile.



## *An All Welded Window*

This means that every joint in a Vinyl/PVC window sash, frame and door has been joined through pvc welding. Good welds create a bond which is stronger than the material itself. A break test should result in the joint splitting away from the weld seam. (i.e. the profile breaks - not the weld)

In all-welded window production, the transom and cruciform joints are welded together. To achieve this the outer frame profile usually has a notch cut along its length at 45 degrees (often called a vee ('V') notch), whilst the transom piece is cut with an arrow head (to marry with the vee notch). The AVN4 and DGS450 machines are typically used during this stage of fabrication.

See Figure 4. showing the profile pieces of a transom joint - pre-welded.

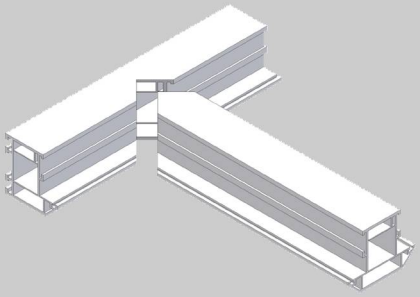


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Figure 5. shows the same transom joint post welding. The HDV series of welders, starting with the 1HDV/140 are used to weld this type of joint.

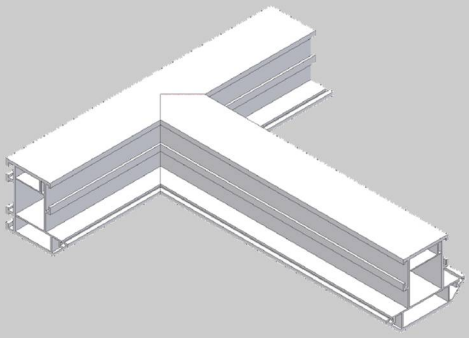
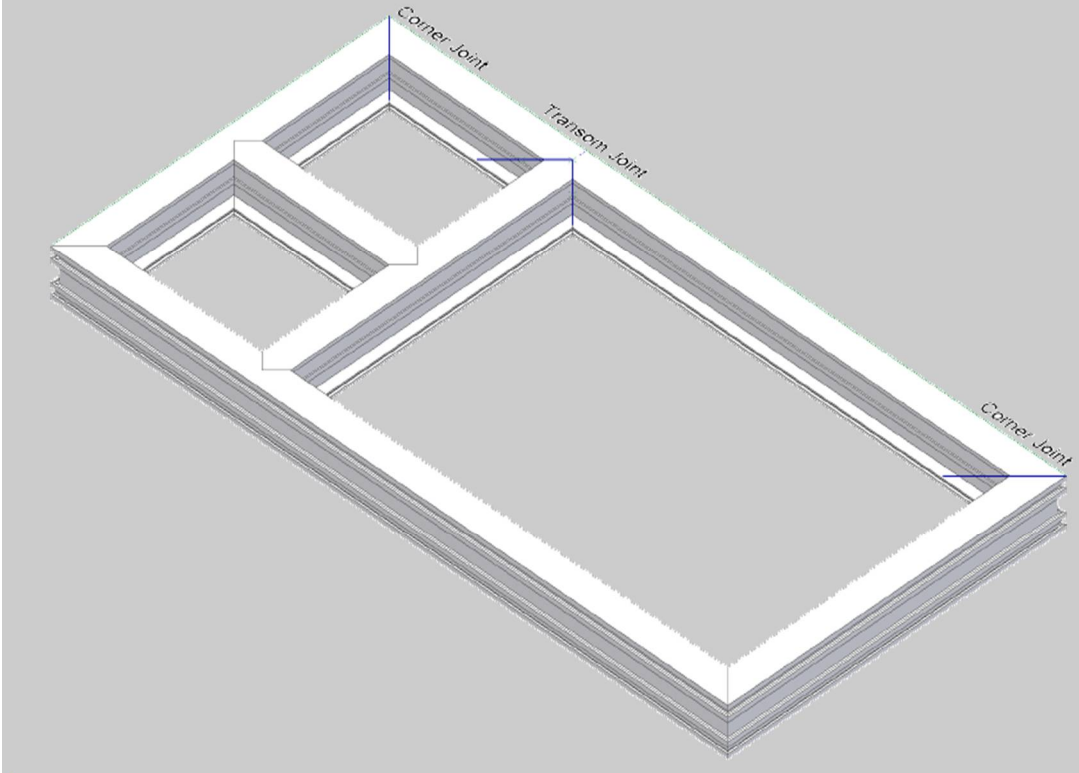


Figure 6. Shows a fully welded window with two corners and a transom labelled.



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## *A Part Welded Window*

This means that all corners in a Vinyl/PVC window sash, frame and door have been joined through pvc welding while transom, mullion and cruciform joints have been mechanically joined with a screw and fixture. Mechanical joints generally require the inside shape of the frame to be milled into the end of the transom or mullion in order for the part to 'fit' inside the window.

Figure 7. Shows the transom part with end milling feature to enable it to fit inside the outer frame. An AFV360-10 End miller is used for this operation.

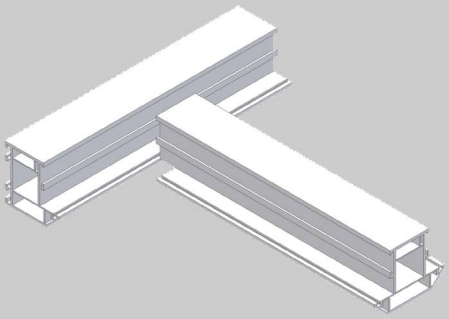
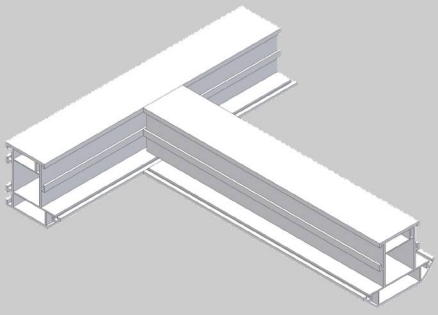


Figure 8. shows the completed mechanical joints after screw fixing.



## *A Mech Welded Window*

This is where the joint is part welded allowing the show faces to appear seamless and resemble a traditional timber window joint. In wood working terms this can be referred to as a lap joint.

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### *Burnoff or Melt Loss*

Burn-off is an industry term meaning the reduction of pvc material at both ends of a profile piece as a result of pvc welding. Normally this is between 5mm and 6mm. (ie: 2.5mm or 3mm from both ends). From a machine perspective the actual burn off, mechanically speaking, is measured perpendicular to the weld seam. There are specific techniques which measure the reduction in each direction and on each surface of the profile.

### *Weld Bead limitation*

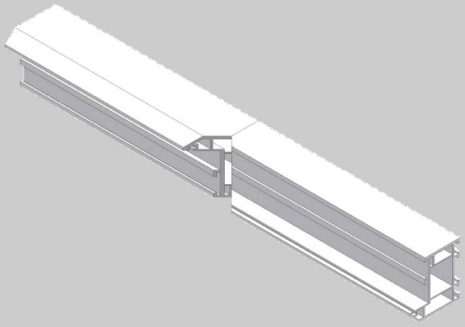
Sometimes called weld seam limitation or knife gap - this represents the setting of the top and bottom knives on a welder which pinch the sprue during the weld process so that a controlled weld seam is created and ready for cleaning. A 2mm or 0.2mm knife gap is most common and are usually set during the machines construction.

### *Reverse Butt Welding*

This type of welding is required when making an All-welded internally glazed window. To create the necessary transom joints certain frame and transom (or mullion) profiles must be square cut (instead of a 45 degree mitre) at both ends and welded end on end to each other. This is called reverse butt or straight welding.

To perform this process a welder capable of reverse butt welding is required, like the EKS432 and 1HD/02 models. Fences are set in line with each other (i.e. at a 180 degree angle). As we are now welding across the heater plate as opposed to 45 degree (hypotenuse), the burn-off or melt loss on a 6mm machine is now 2.1mm from both ends (i.e. 4.2mm total loss).

Figure 9. Shows a typical reverse butt weld using outer frame section. A Vee notch has been cut central to the weld seam:



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### *Cruciform or Cross Welding*

A mullion profile running across the middle of a frame and a transom profile running down the centre will meet in the middle and create a cross or cruciform joint. To fabricate this joint there are three methods; mechanical, traditional and all-in-one cross welding.
Mechanical means that either the transom or mullion section is cut in half and its ends are milled to fit the shape if the inside of the frame for screw fixing this joint together.
Traditional means the mullion is Vee notched using an AVN4 saw, then welded to make a T joint using a combination head welder like the 1HDV to 4HDV series. A second Vee notch is created on the opposite side of the first and a second transom piece is welding here to complete the cross shape.

### *Benefits of Cruciform or Cross Welding*

All-in-one Cross Welding means that four pieces of profile are arrow headed, placed into a Cross Welder, like the 1HDX and welded together simultaneously. This new method is ***significantly quicker*** than the traditional one and, as there are ***fewer processes***, fewer tolerances can build resulting in ***more consistently square welds*** which in turn provides in a more aesthetically pleasing finish.

### *Sprue (or flash)*

Sometimes called flash - this is the left over material or waste created during the weld process. The sprue or flash will be removed for functional as well as aesthetic reasons using manual, automatic and/or cnc cleaning machines. Like the EV443/30, EV443CNC, EV470and EV475 models.

### *Consumables*

This includes items like groove knives, ovolo knives, drill/router bits, saw blades, teflon, cutting fluid, grease, oil, lubricant, refuse sacks, which by their nature will be consumed or wear over time and require replacement to ensure your equipment performs to its optimum.

### *Front Line Spares*

These normally include items of electronics which are considered useful to have on the shelf in case of emergency. Like a mini repair kit these items can be used for speedy faulty diagnosis and therefore help reduce downtime on machinery.

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### *PLC Unit*

Stands for 'Programmable Logic Control' Unit - which represents the industrial computer unit found inside most modern machines.

### *HMI Unit*

Stands for Human - Machine - Interface and refers to the display screen which operators use to enter and view data relating to the machine in question.  Some HMIs are just display terminals, others store machine data, and combined units can have a plc built-in

### *CNC Control*

Stands for Computer Numerical Control - The usually refers to machines with a moving head or axis that can be programmed and positioned electronically via a HMI to a high level of accuracy.