



# MASTERWELD

*The ultimate Welding Machine*

## MIG/MAG Special Functions

 **MASTERWELD**  
[www.masterweld.co.uk](http://www.masterweld.co.uk)



The Welders' Ultimate Choice 

MACHINES

CONSUMABLES

TORCHES

SAFETY

### THE NATURAL INCREASE OF PRODUCTIVITY



Pulse HS is a special function of MIG/MAG Pulse welding that is characterised by a very short and intense arc, which is considerably easier to handle for the welder than other high deposit welding processes.

#### WHAT ARE THE BENEFITS OF HSP?

- Higher welding speed (on average 35%) compared to Standard Pulse
- Higher deposition rate (Kg/h) of 15%
- Reduced heat input (35% lower) and less distortion
- Higher welding quality with superior mechanical and metallic properties
- Deeper penetration, lower risk of lack of fusion
- Lower production costs and depreciation

# MIG/MAG Special Functions

## HIGHER WELDING SPEED

High dynamics applied to the pulsation of HSP arc gives an extremely focused arc that increases the fluidity and precision of transfer as well as the wetting properties of the joints.

This allows the operator (or automatism) to proceed faster with the torch and a time saving of 35%.



**TEST Standard Pulse**



**TEST High Speed Pulse**



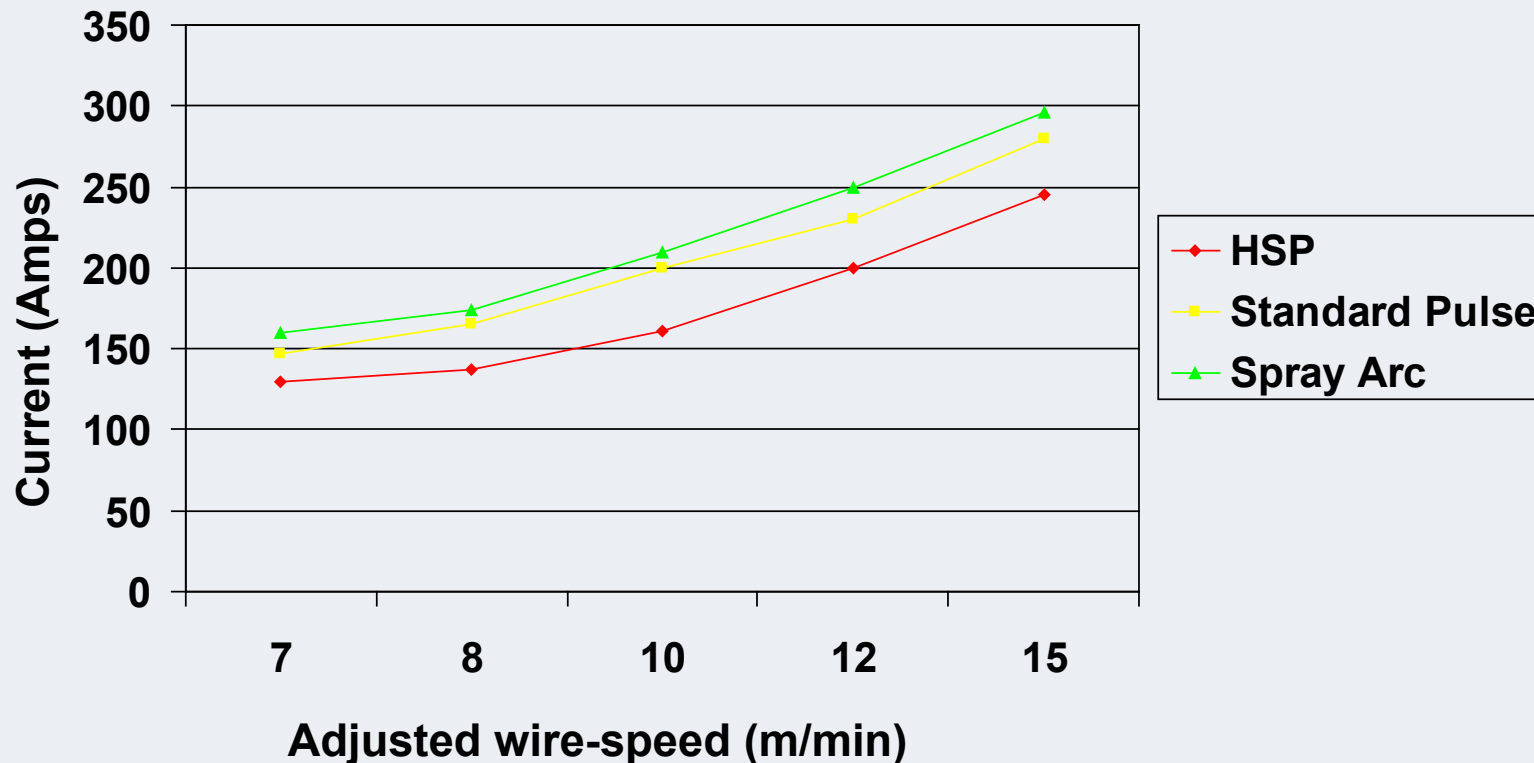
**Standard Pulse**  
**HSP**



## HIGHER DEPOSITION RATE

High dynamics applied to the pulse of HSP arc allows you to increase the wire's speed while keeping the same current value when welding in Standard Pulse. The increase of wire quantity in the pool increases consequently the weight of deposit in the unit of time (Kg/h).

### Current /wire-speed comparison graph



# MIG/MAG Special Functions



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## HIGHER DEPOSITION RATE

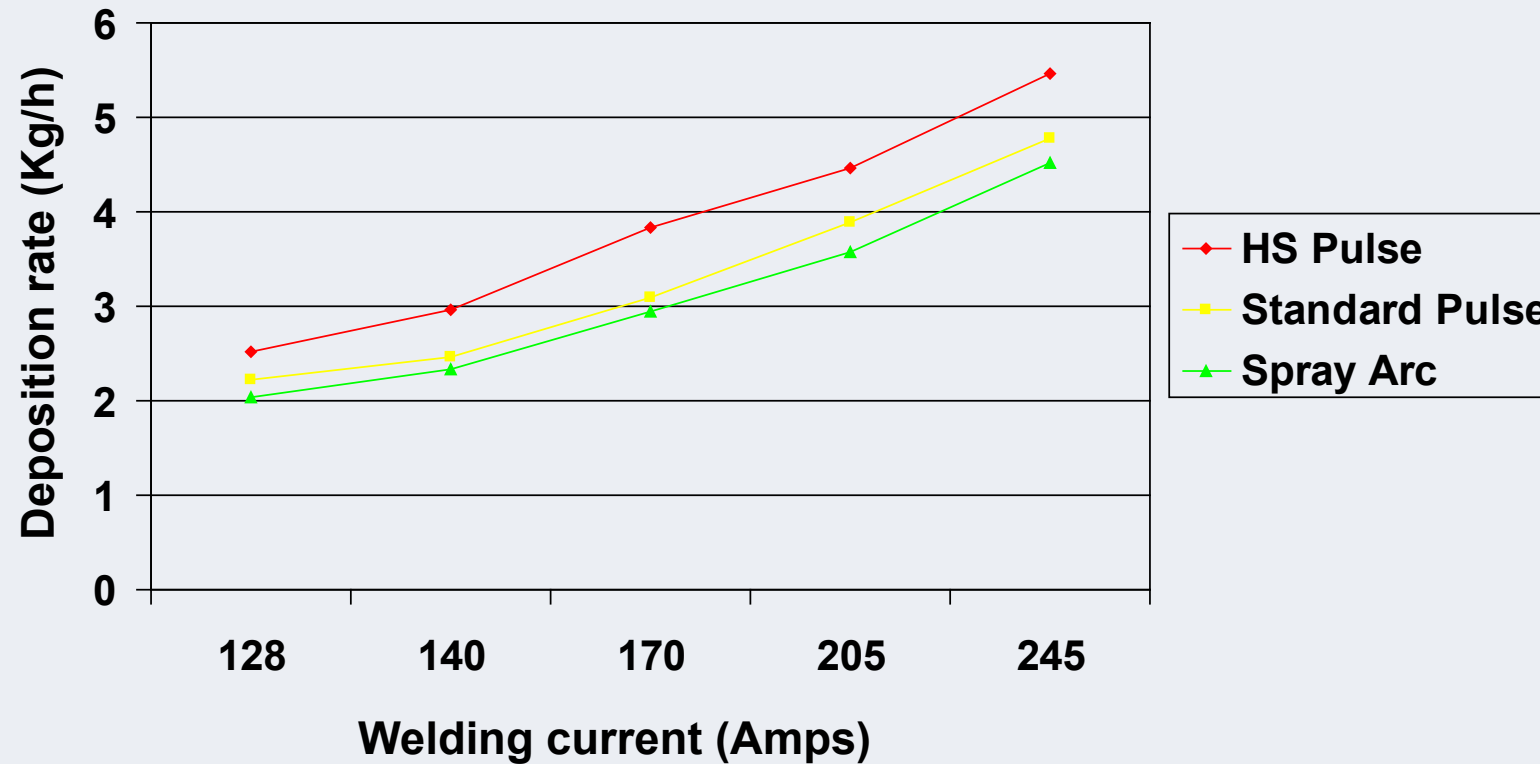
Tests made highlight deposition rate (Kg(h) obtained in fillet welding 10mm thickness in Spray Arc, Standard Pulse and HSP at same current value.

Spray Arc		Standard Pulse		HSP	
Wire diameter	1mm	Wire diameter	1mm	Wire diameter	1mm
Wire weight	6,0625 g/m	Wire weight	6,0625 g/m	Wire weight	6,0625 g/m
<b>Current</b>	<b>255A</b>	<b>Current</b>	<b>255A</b>	<b>Current</b>	<b>255A</b>
Voltage	30V	Voltage	30V	Voltage	30,5V
<b>Wire speed</b>	<b>12,4m/min</b>	<b>Wire speed</b>	<b>13,1m/min</b>	<b>Wire speed</b>	<b>15m/min</b>
Joint thickness	10mm	Joint thickness	10mm	Joint thickness	10mm
Joint length	20cm	Joint length	20cm	Joint length	20cm
Welding time	37sec	Welding time	37sec	Welding time	24sec
<b>Deposition rate</b>	<b>4,52Kg/h</b>	<b>Deposition rate</b>	<b>4,77Kg/h</b>	<b>Deposition rate</b>	<b>5,46Kg/h</b>



## HIGHER DEPOSITION RATE

Deposition rate(Kg/h) for each welding mode



# MIG/MAG Special Functions



## LOWER HEAT INPUT AND LESS DISTORTION

Previous tests data show the difference of the heat input.

**Formula Heat Input**

$$Q = \frac{\text{Voltage (V) x Current (A)}}{\text{speed (mm/min)}} \times 60 \text{ Welding}$$

### Heat Input Standard Pulse

Current: 255A

Voltage: 30,0V

Joint length: 20mm

Welding time: 37,0seconds

Welding speed: 320mm/min

**Q1=1,4344 (KJ/mm)**

### Heat Input High Speed Pulse

Current: 255A

Voltage: 30,5V

Joint length: 20mm

Welding time: 24 second

Welding speed: 500mm/min

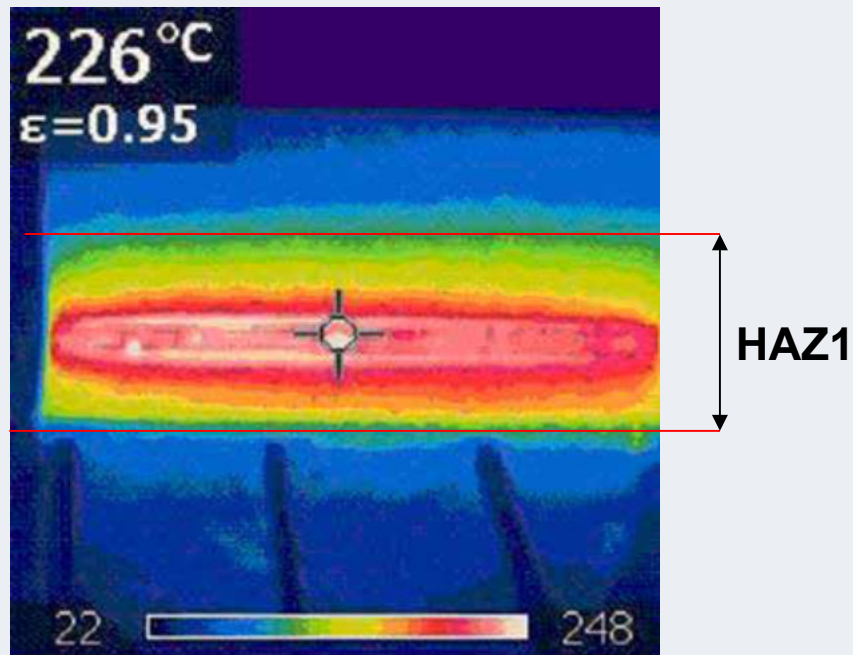
**Q1=0,9333 (KJ/mm)**

In HSP heat input is lower (35%) than Standard Pulse, so it is particularly suitable for high quality welding.



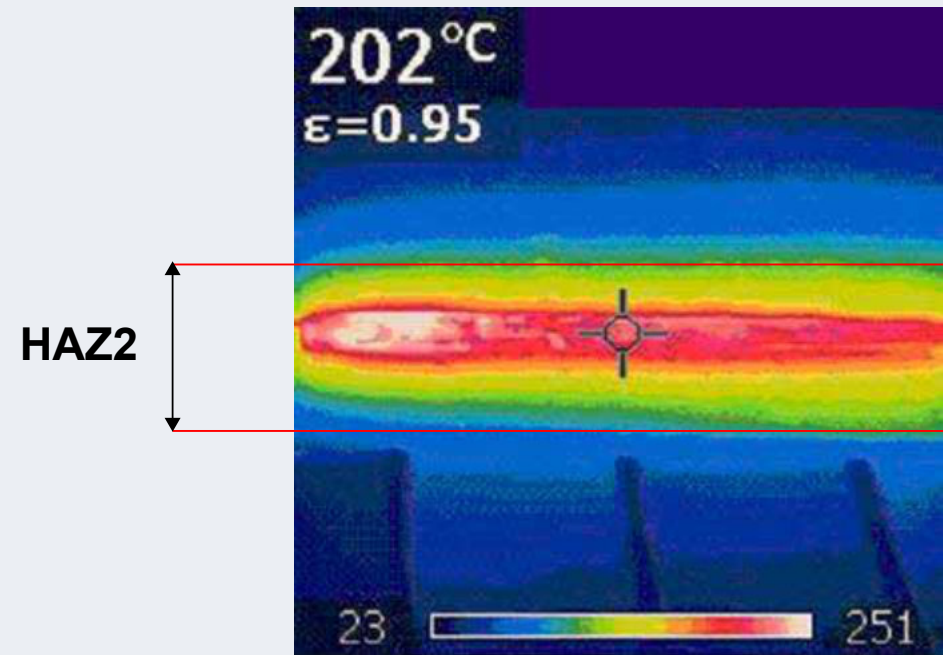
## LOWER HEAT INPUT AND LESS DISTORTION

Fillet welding 10mm  
Standard Pulse



Joint temperature at the end of  
welding (226°C)

Fillet welding 10mm  
HS Pulse



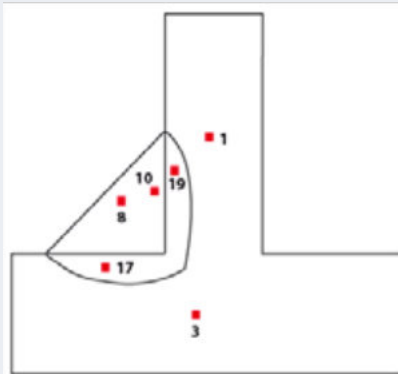
Joint temperature at the end of wel-  
ding (202°C)

When welding in **HSP**, **temperatures are lower** and the **Heat affected zone (HAZ)** is smaller. This means that mechanical and metallic joints' properties are considerably higher compared to **Standard Pulse** welding.

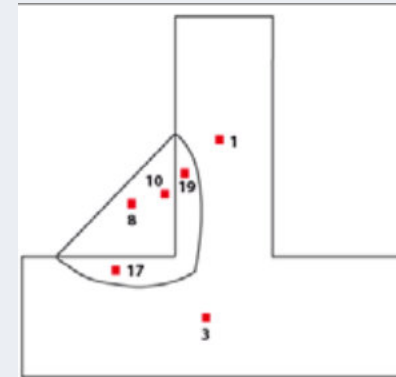


## SUPERIOR MECHANICAL PROPERTIES

**Standard Pulse**



**High Speed Pulse**



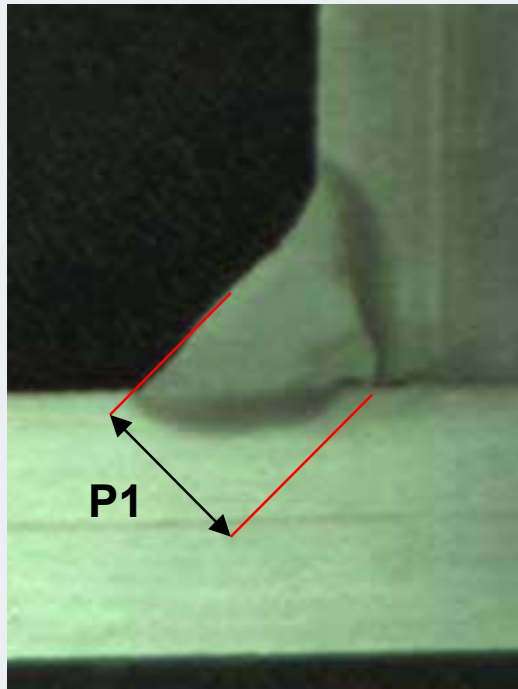
Measured hardness + Tensile strength			
Zone	Position	Hardness HV10	Tensile strength Mpa
Base Mat.	1	160	510
	3	159	495
Pure Deposit	8	236	770
	10	245	785
HAZ	17	309	995
	19	345	1125

Measured hardness + Tensile strength			
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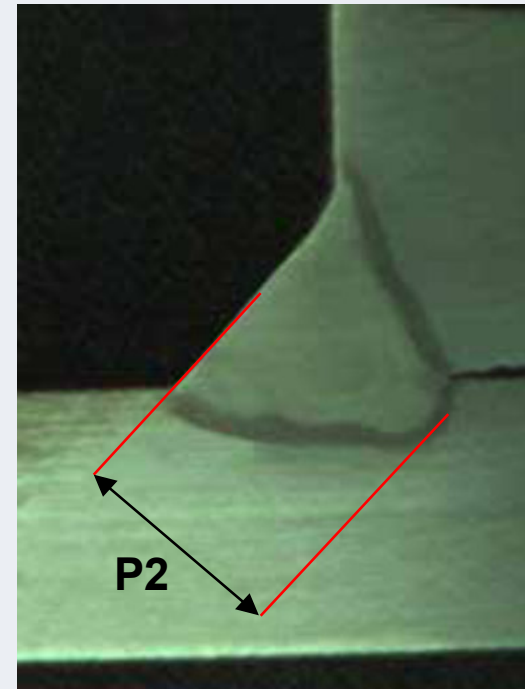
Conversion tables highlight that tensile strengths values in the Pure Deposit and Heat Affected Zone (HAZ) are much higher in Standard Pulse. This means that a higher heat input increased considerably tensile strengths. In HSP, hardness and tensile strengths are in line with the class of metal the base material belongs to, therefore the heat input is not influential in the welded material.

## DEEPER PENETRATION, LOWER RISK OF LACK OF FUSION

**Fillet weld 10mm thickness  
Standard Pulse**



**Fillet weld 10mm thickness  
HS Pulse**

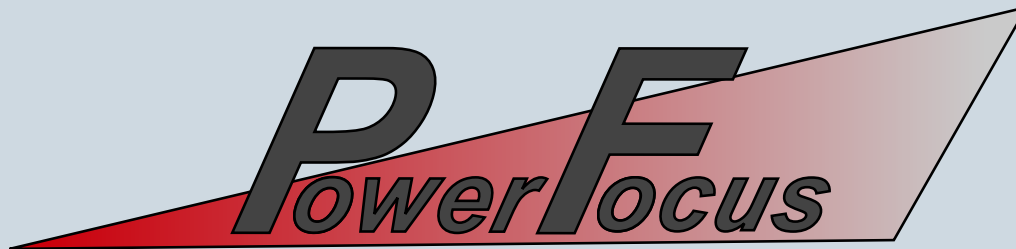


Penetration obtained in HSP (P2 is considerably higher compare to Standard Pulse (P1)).  
Moreover weld face is smoother thanks to the excellent wetting properties of the joints.

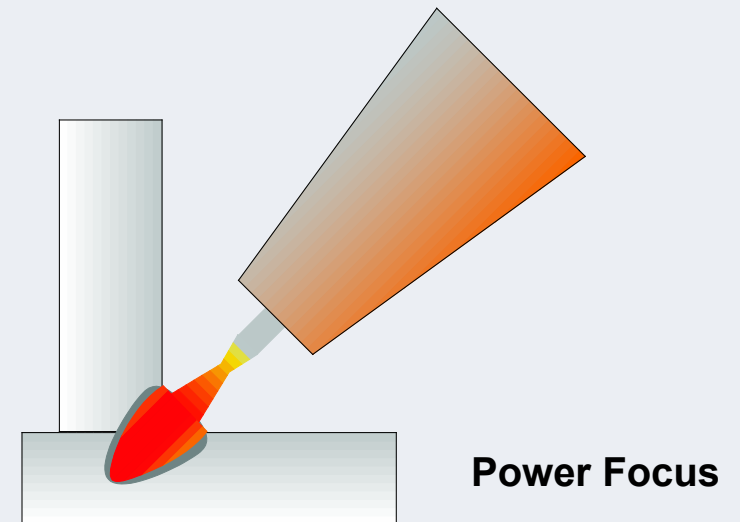
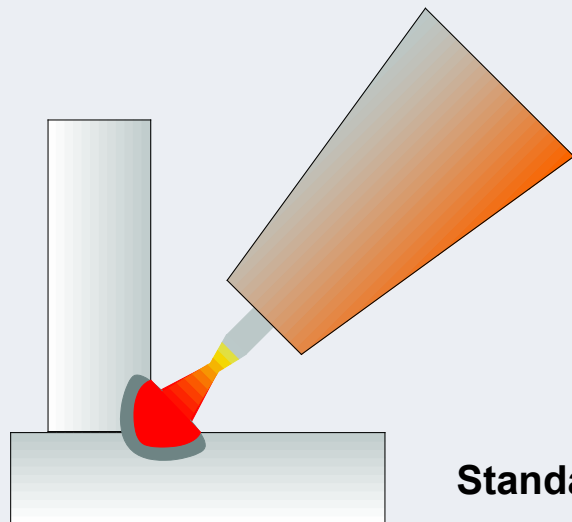
### LOWER PRODUCTION COSTS AND DEPRECIATION

- Time saved in 1 hour of welding (arc on) = 21 min
- Time saved in 8 hours of welding = 2hr 48 min
- Average hourly labour cost = £17.50
- Average monthly labour cost (172 hours) = £3015
- Monthly time savings = 60.2hr
- Monthly cost savings = £1055
- Yearly cost savings = £12660

## THE SOLUTION THAT ALLOWS HIGHER PRODUCTIVITY



The difference between Standard Mig/Mag welding and Power Focus is to be found on the concentration and precision of the arc. The concentration on the Power Focus mode allows to focalize the high arc temperature precisely on the middle of the deposition, avoiding overheating on the weld edges.

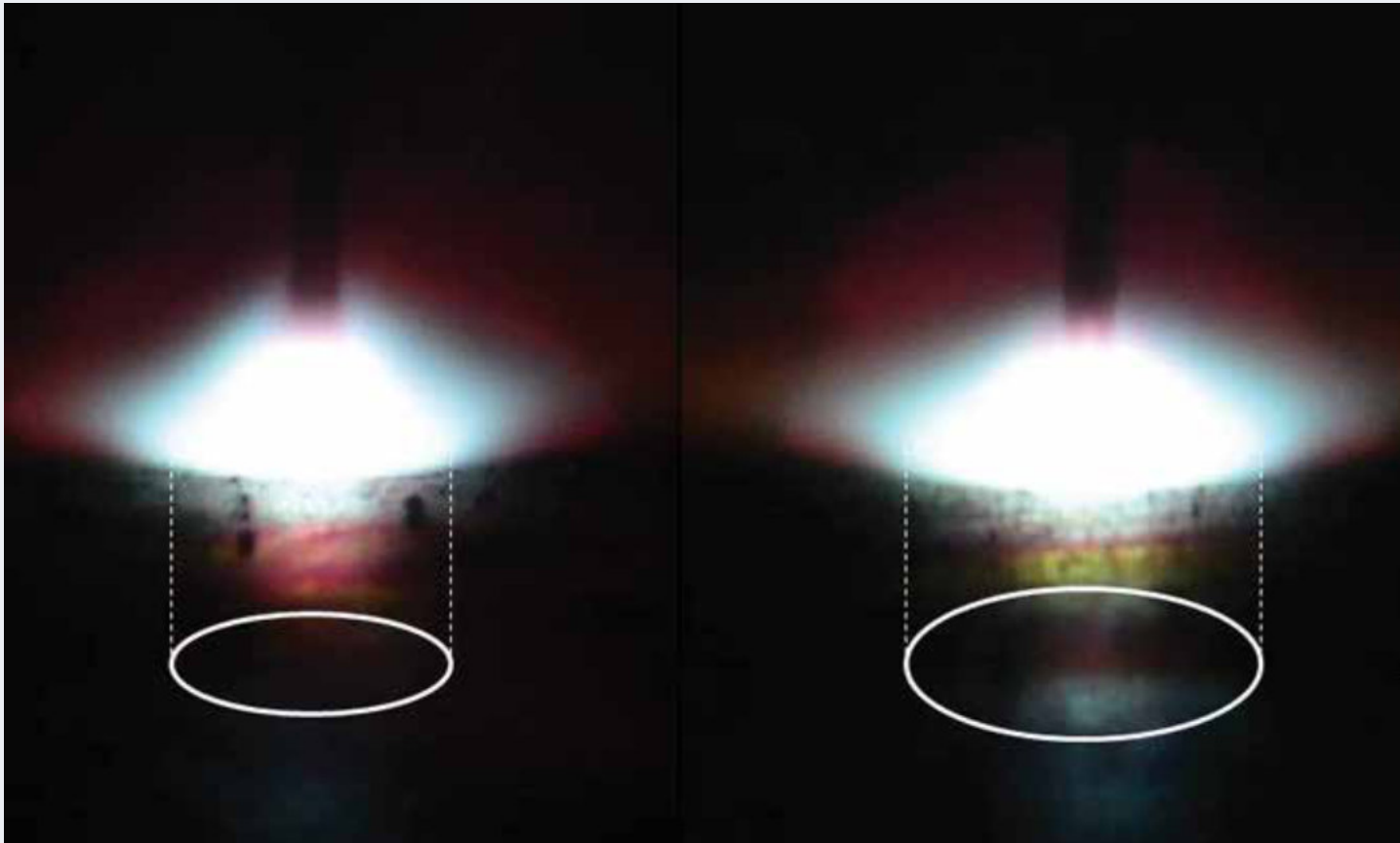


The heat affected zone (HAZ) is less expansive when in Power Focus mode

## ARC DIFFERENCES

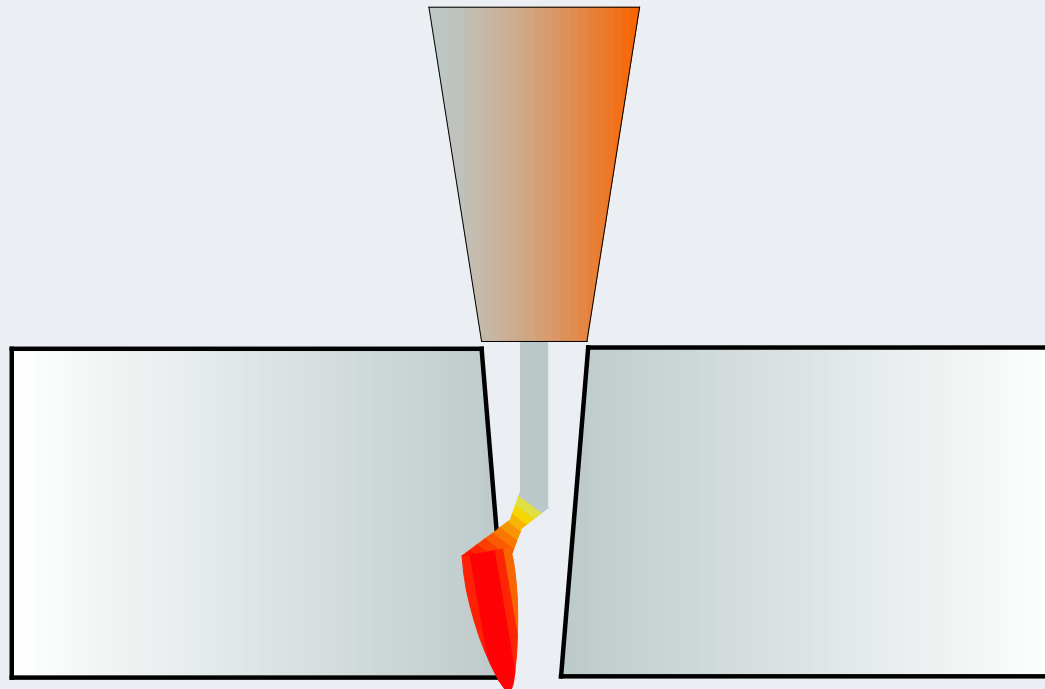
**Power Focus ARC**

**Standard ARC**



## SPECIFICATIONS OF STANDARD ARC

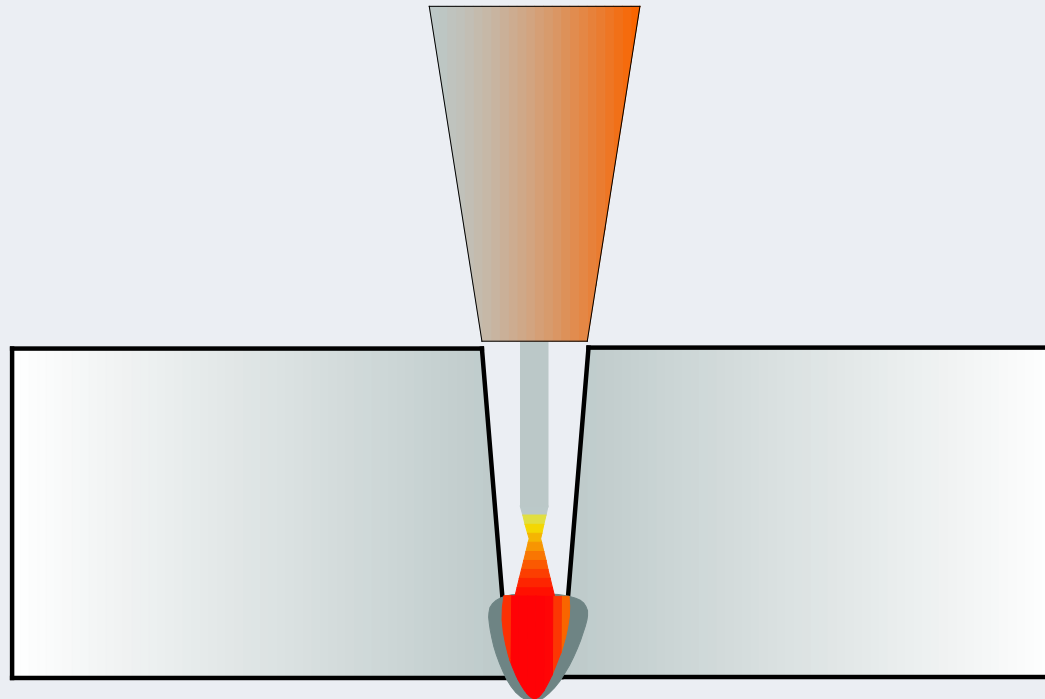
In case of butt weld, if the plates caulker presents narrow angles, the standard arc has the tendency to get out from the caulker and to focus only on one of the two plate corners. In this situation, it is normally necessary to increase the caulker's angle degree (during the preparation) with consequent need of more filling passes.





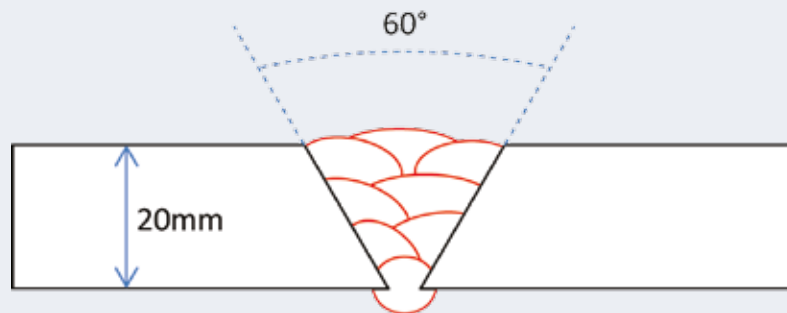
## POWER FOCUS SPECIFICATIONS

On the butt welding applications the Power Focus Arc keeps on staying concentrated in the exact middle of the caulkers, so that full penetration is granted. In this way, it is possible to work on very narrow caulkers, which demands less mechanical preparation and of course, also less filling passes.

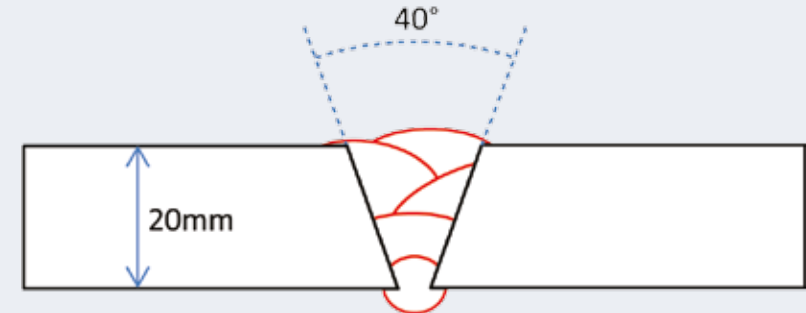


## DIFFERENCE IN JOINT GEOMETRY

**Joint Geometry with  
Standard Arc**



**Joint Geometry with  
Power Focus**

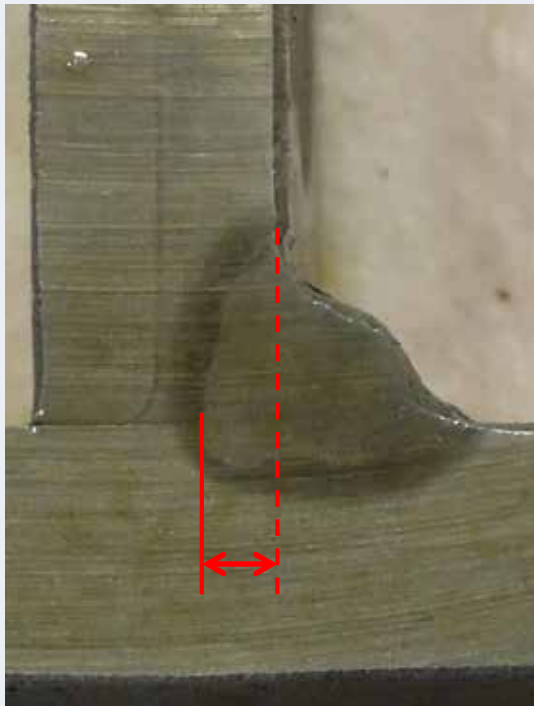


**Use 40% less volume to fill!**

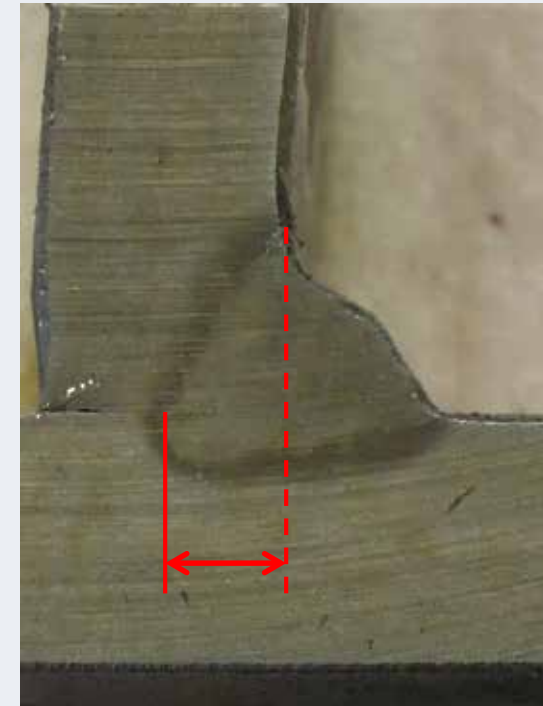
**Power Focus provides a stable arc even with stick-out very long (50mm)**

## PENETRATION BY POWER FOCUS

**Standard Arc**



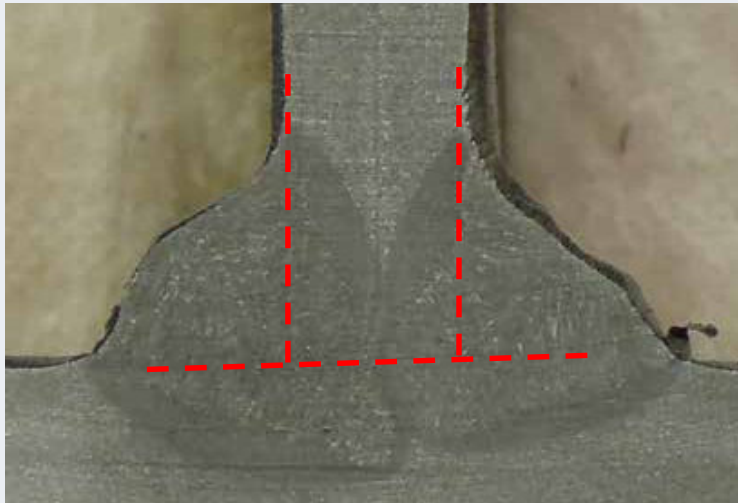
**Power Focus Arc**



The difference, as well as in the size of the penetration, is also in the extent of the heat affected zone (HAZ). It is less because the execution speed with the Power Focus is higher.

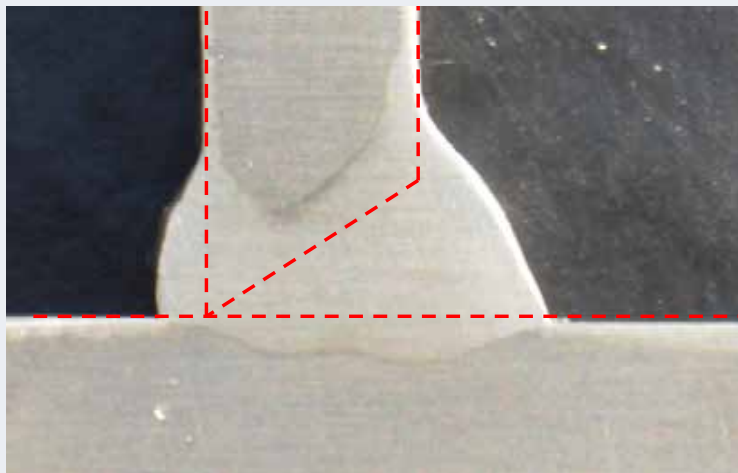
## PENETRATION BY POWER FOCUS

### WELD ON BOTH SIDES



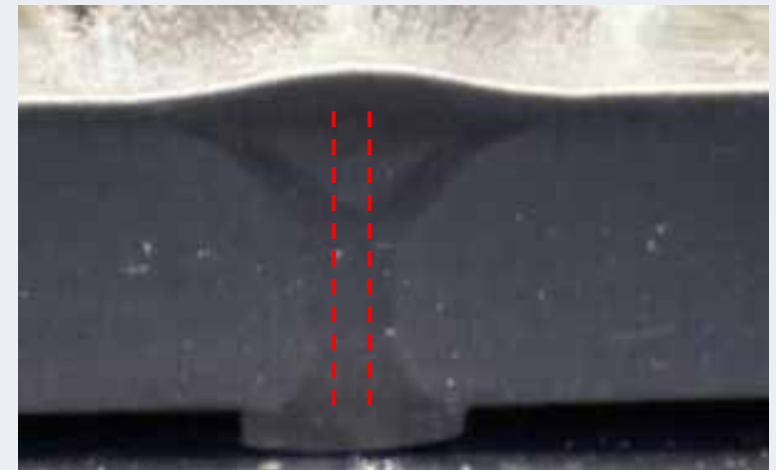
Penetration by Power Focus on a T joint (10 mm thickness), when welded on the two sides, it comes up to intersect crossing.

### FILLET WELD



Thickness 8mm  
Angle 30°  
No gap

### BUTT JOINT



Thickness 10mm 1  
Layer  
Gap 2mm  
Ceramic backing support

### THE SOLUTION FOR ROOT PASS IN MIG WELDING

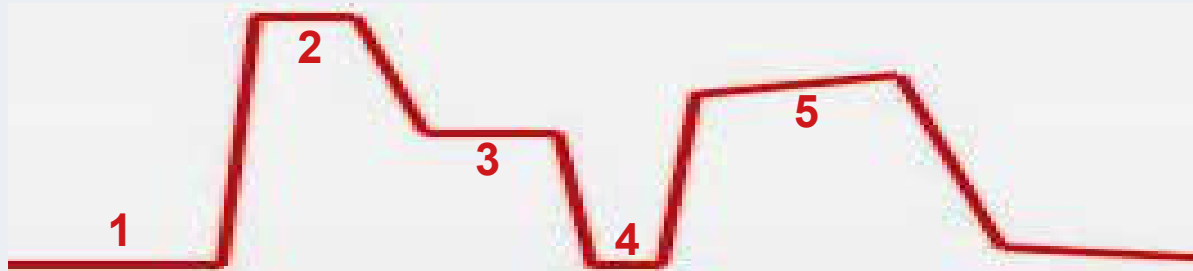


#### Features of Power Root:

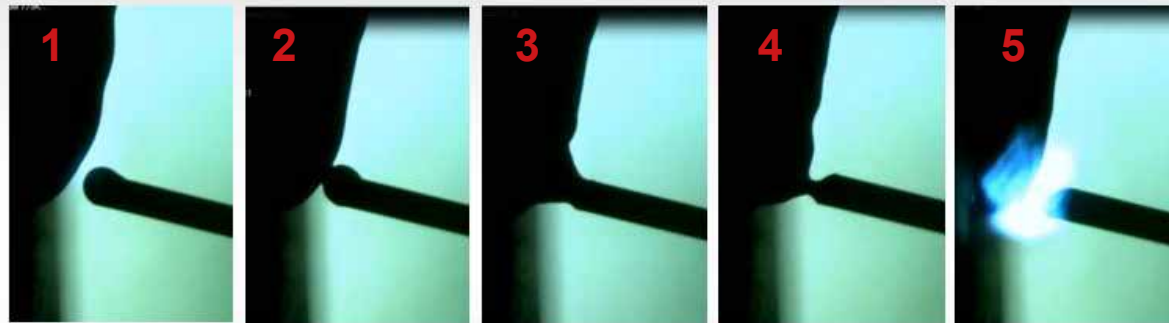
- Optimised root pass welding
- Vertical down in sound weld quality
- Better modelability
- 'Cold' droplet transfer
- Thinsheet welding

## THE POWER ROOT CONCEPT

Power Root is an optimized short arc welding process with a cold droplet transfer. It allows unique weld quality for root pass welding.



**Current behaviour**

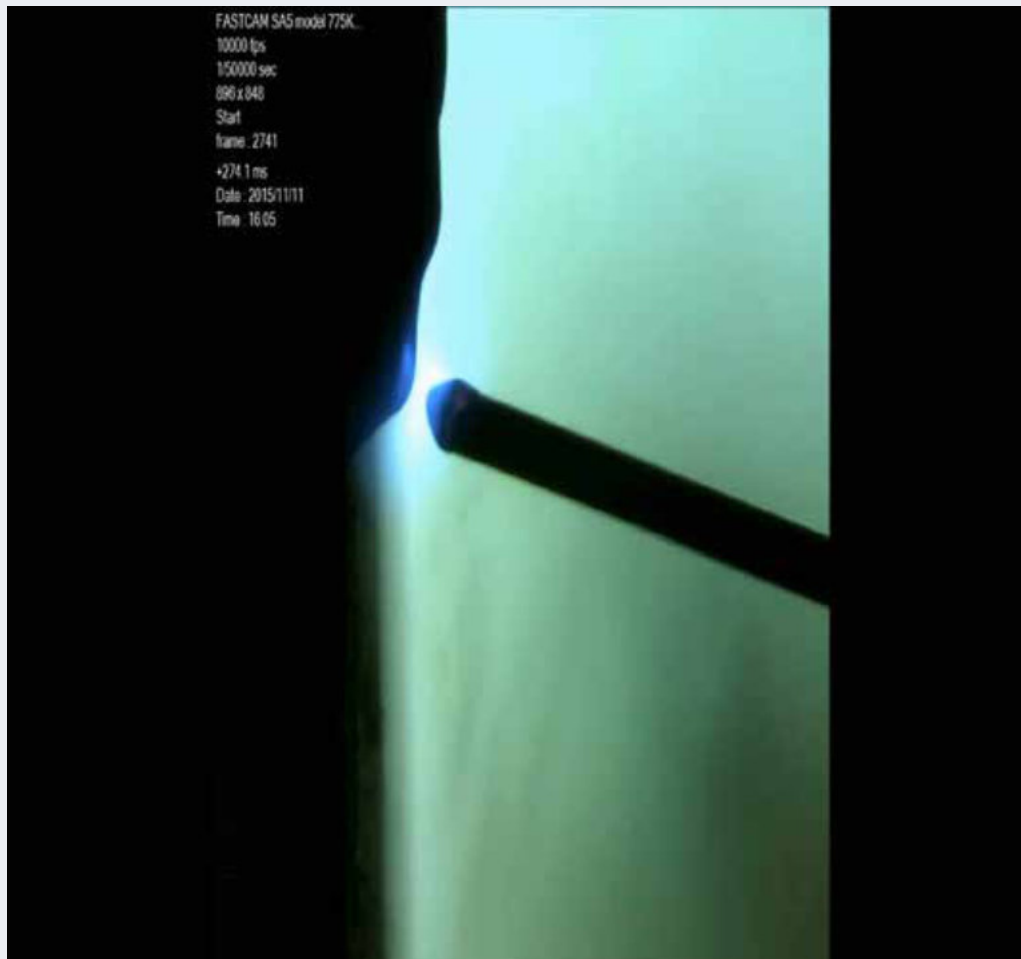


**Drop behaviour**

- 1: A smooth ball is formed on the tip of the wire (base current)
- 2: When the wire reaches shortcut, the current increases for a short cycle
- 3: Controlled reduction of the amperage to optimise the pinch - effect
- 4: 'Cold' droplet transfer
- 5: Reignition of the arc



## OPTIMISED WELD RESULTS



Power Root reduces the danger of root concavity:

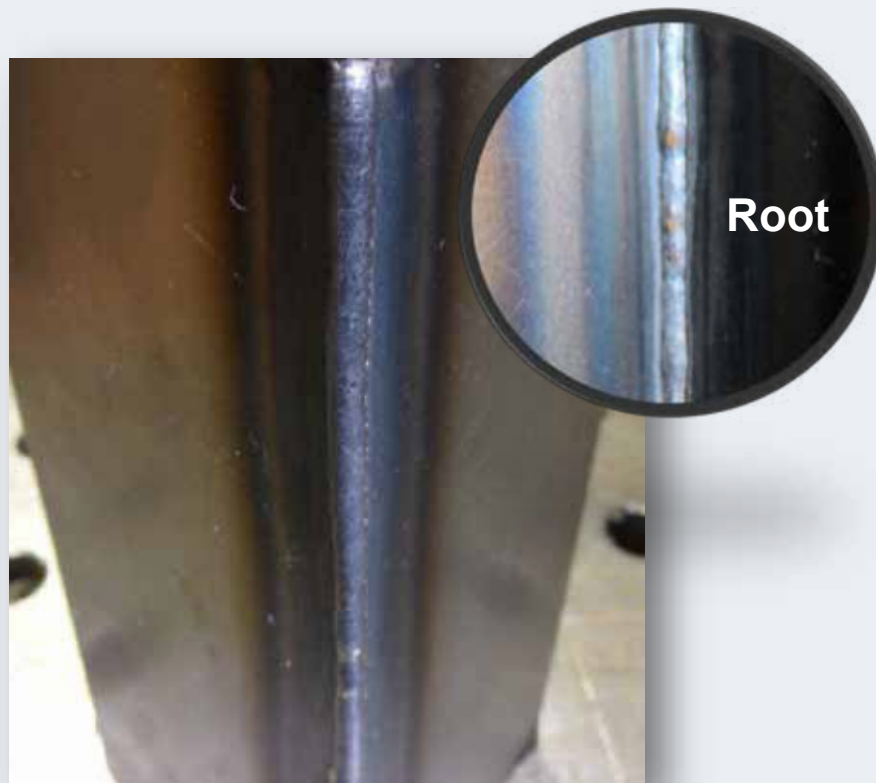
- The weld puddle is oscillating.
- This provides a good root penetration.
- Convex (positive) root even in constrained weld positions.

### Main benefits:

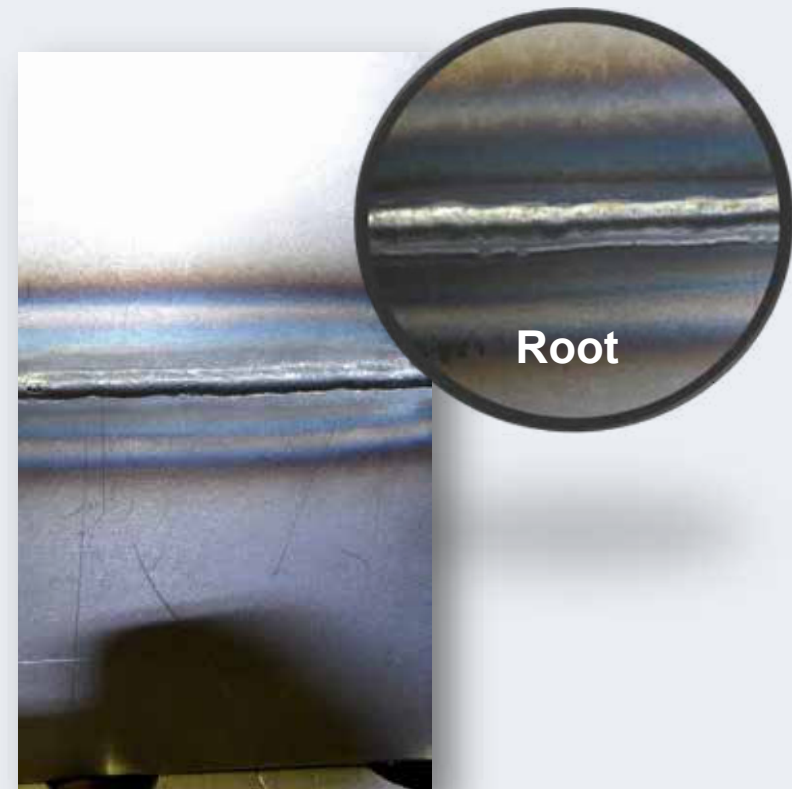
- Wide weld gaps possible/safe on irregular preparation
- Vertical down welding (PG)
- Overhead welding (PE)
- Root pass welding for pipes

## THINSHEET

The low heat input allows weldments on thinsheet without time consuming changes of the welding wire diameter.



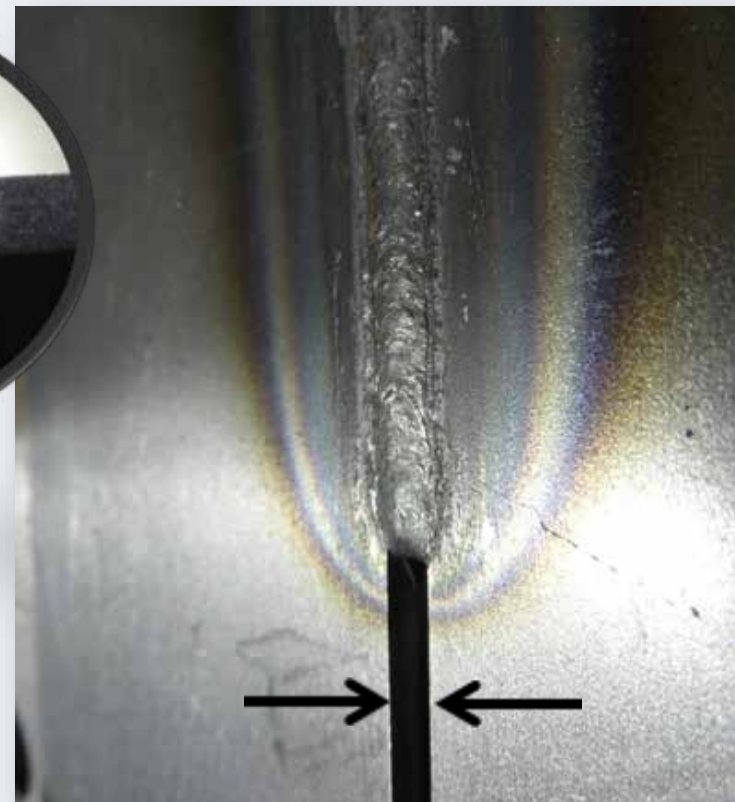
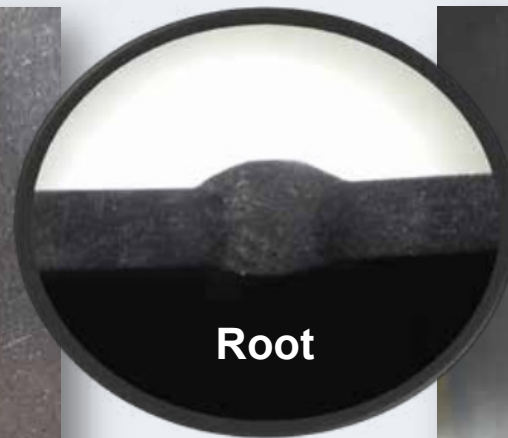
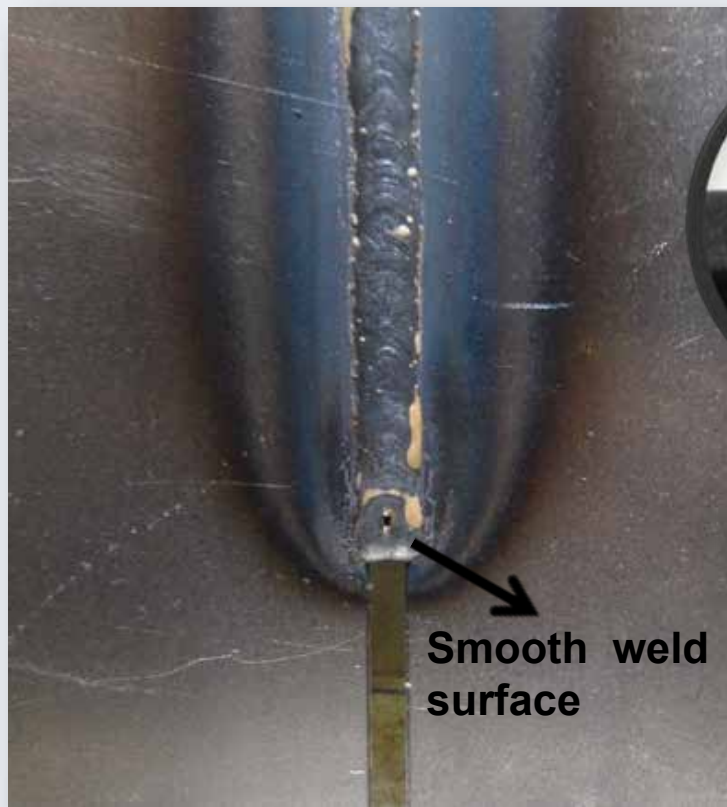
Joint: Cornerweld Thickness:  
1,0mm Position: vertical  
down Ø wire: 1,0mm



Joint: Butt joint  
Thickness: 0,6mm  
Position: PC  
Ø wire: 1,0mm

## GAP BRIDGING

The cold droplet transfer provides process stable welding even with wide gaps. The modelability is significant improved. The weld puddle is smooth, combined with a high viscosity.

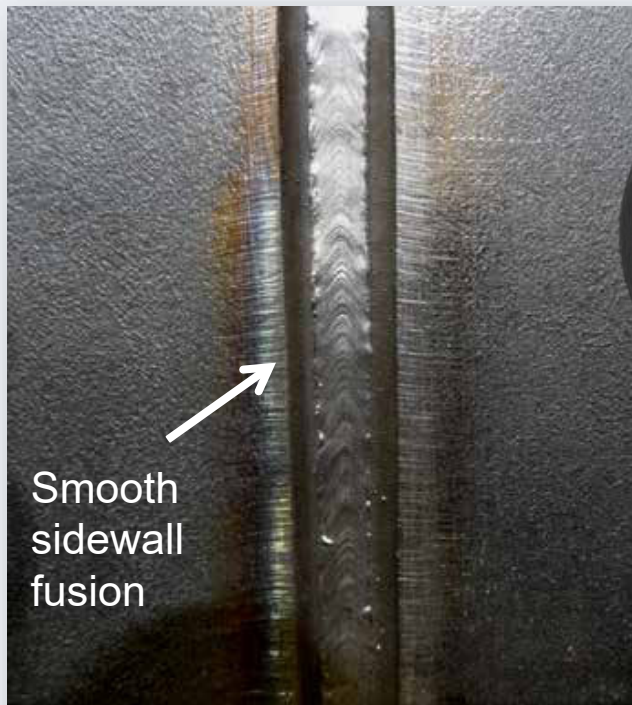


Joint: Butt joint Thickness:  
2,0mm Position: vertical  
down Ø wire: 1,0mm

## V-GROOVE / PIPE WELDS

The optimised short arc cycle guarantees a high arc pressure – even in constrained positions. No matter if vertical down or overhead welding, the root pass quality will be assured.

Root pass welding with up to 4 times higher welding speed compared to vertical up.



Joint: Butt joint  
Thickness: 10,0mm angle 60°  
Position: vertical down  
Ø wire: 1,0mm

**Perfect Root on back side**





# MASTERWELD

*The ultimate Welding Machine*

Masterweld Equipment represents a collection of unique technology in Welding Machines and Welding Torches that are strictly manufactured in the EU to EN 60974-1, EN 60974-5 and EN 60974-10, representing the highest quality and technological excellence.

In today's harsh manufacturing environment, productivity is paramount, and investing in the right Welding Plant is key to manufacturing success.

Masterweld TIG Welding Machines, MIG Welding Equipment, and Arc Welding Inverters, over the years have established a reputation for being extremely reliable, easy to use interface, and unbeatable arc characteristic for the most demanding welding environments.

**Masterweld - The Welders' Ultimate Choice**

Distributor

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