

The logo for HSL High Speed Line. It features the letters "HSL" in a large, bold, sans-serif font. The "H" and "S" are black, while the "L" is red. To the left of the "H" is a red graphic element consisting of multiple horizontal lines of varying lengths, creating a sense of motion or speed. Below "HSL" are the words "HIGH SPEED LINE" in a smaller, bold, sans-serif font. "HIGH SPEED" is black, and "LINE" is red.

**HSL**  
**HIGH SPEED LINE**



# The natural increase of productivity



# The natural increase of productivity



**Pulse HS** is a special function of **MIG/MAG Pulse welding**, characterized by a very short and intense arc, **EASY** to manage by the welder.

**Pulse HS** compared to other high deposit welding processes, supplies an easy-handle arc without extra stress.

**Pulse HS** allows to:

- Increase considerably execution speed (**on average 35%**) compare to **Standard Pulse**.
- Increase deposition rate (Kg/h) of **15%**.
- Deeper penetration, lower risk of lack of fusion and deformations.
- Reduce heat input (**35% lower**) better welding quality with mechanical and metallic properties.

**Pulse HS stands for:**

- 1. Higher execution speed**
- 2. Higher deposition rate**
- 3. Lower heat input and less plastic deformation**
- 4. Better mechanical properties**
- 5. Higher penetration, lower risk of lack of fusion**
- 6. Lower production costs and depreciation**

# 1. Higher execution speed

High dynamics applied to the pulsation of **HS Pulse arc** gives an extremely and focused arc that increases the fluidity and pression of transfer as well as the wettability of joints.

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



**TEST Standard Pulse**



**TEST HS Pulse**



Standard Pulse

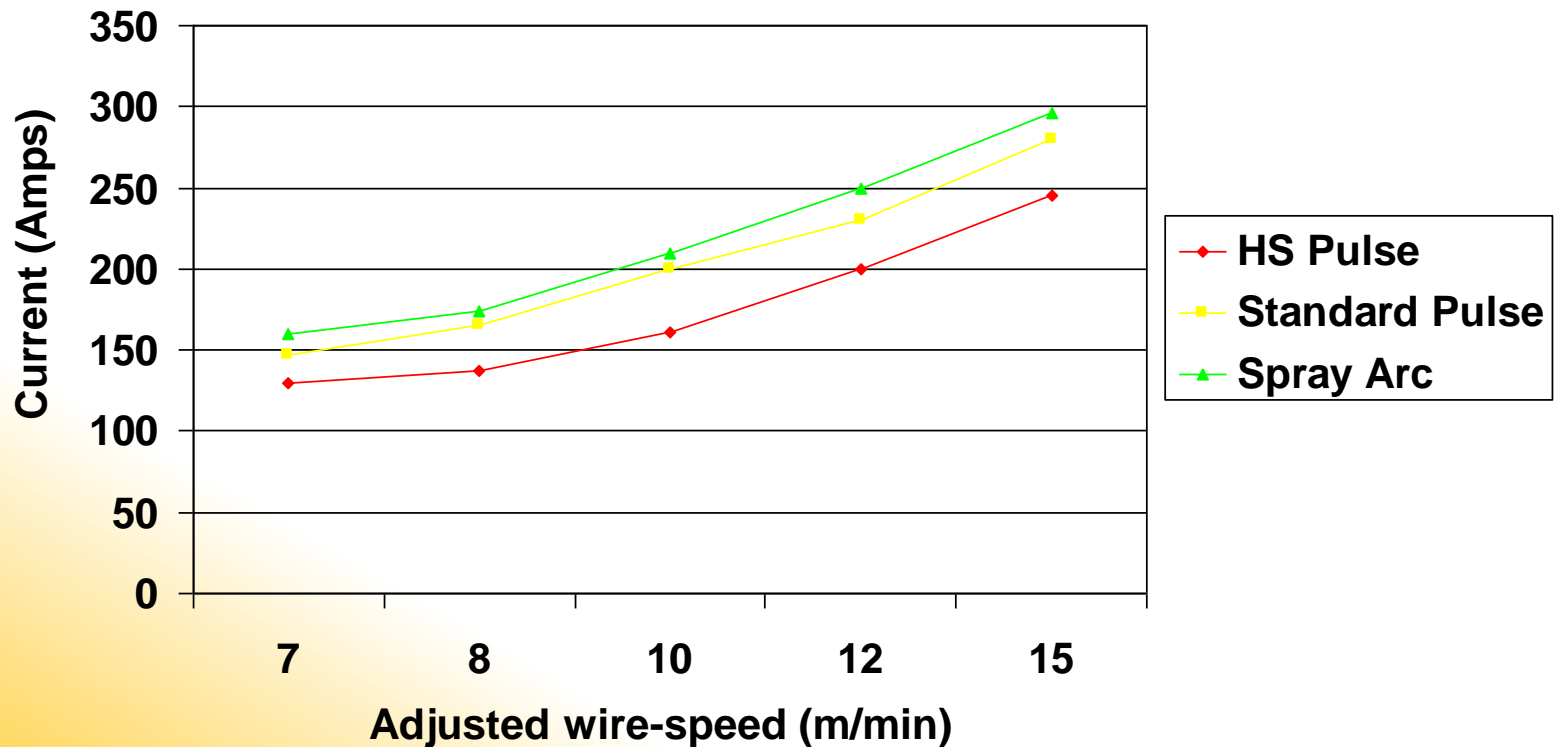


HSLine Pulse

**Welding made in 24 seconds**

High dynamics applied to the pulse of **Pulse HS arc** allows to increase wire's speed while keeping 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



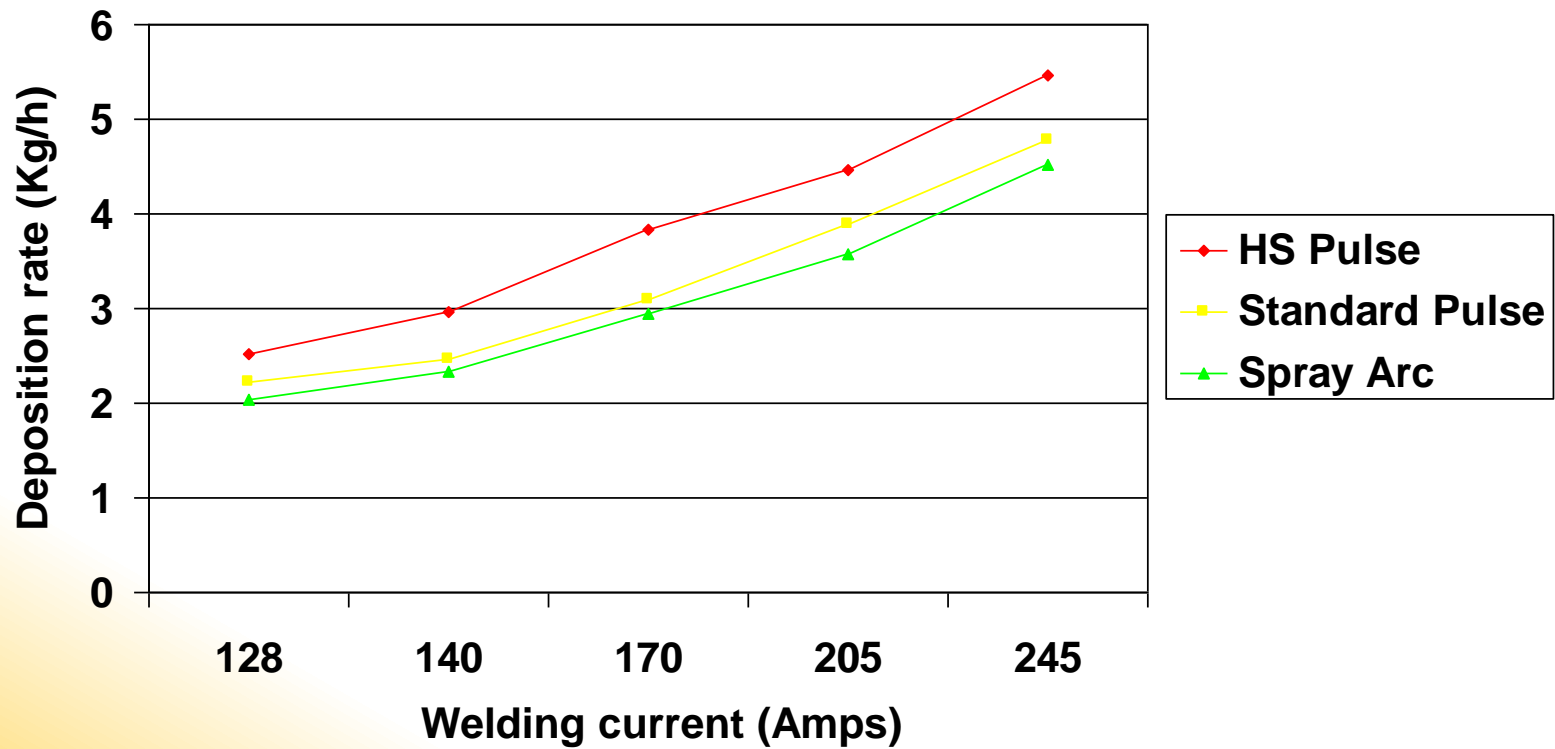
## 2. Higher deposition rate

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

Spray Arc		Standard Pulse		HS Pulse	
Wire diameter	1,0 mm	Wire diameter	1,0 mm	Wire diameter	1,0 mm
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 lenght	20cm	Joint lenght	20cm	Joint lenght	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>



Deposition rate(Kg/h) for each welding mode



### 3. Lower heat input and less plastic deformation

Previous tests data show the difference of the heat input.

**Formula Heat Input**

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

**Heat Input Standard Pulse**

Current: 255A  
Voltage: 30,0V  
Joint length: 20,0cm  
Welding time: 37,0sec  
Speed: 320mm/min

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

**Heat Input Pulse HS**

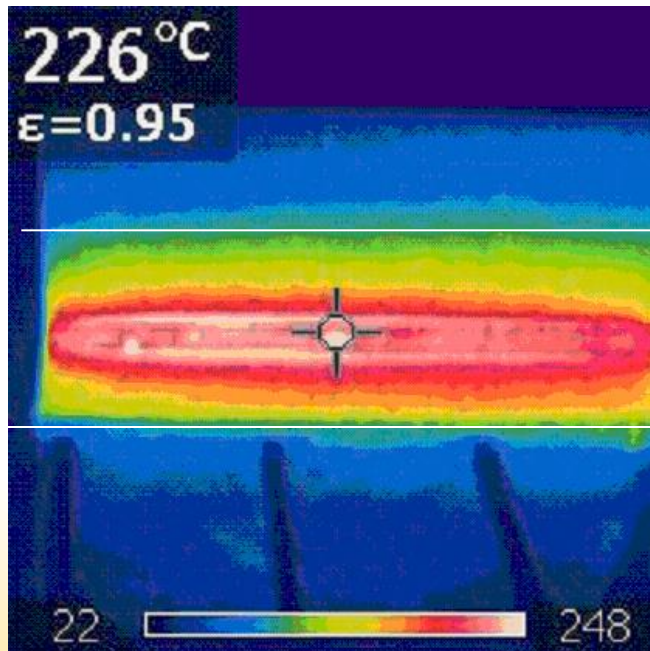
Current: 255A  
Voltage: 30,5V  
Joint length: 20,0cm  
Welding time: 24,0sec  
Speed: 500mm/min

**Q2=0,9333 (KJ/mm)**

In **Pulse HS** heat input is lower (**35%**) than **Standard Pulse**.  
**Pulse HS** is particularly suitable for high quality welding.

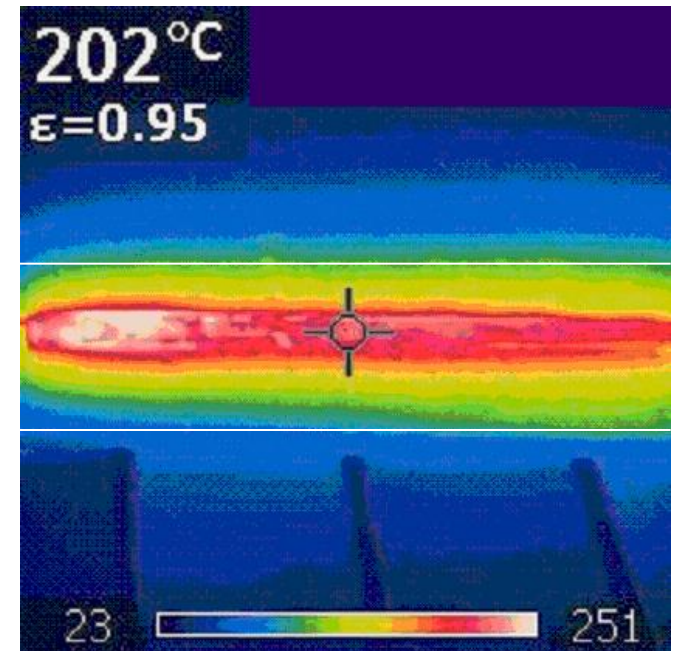
### 3. Lower heat input and less plastic deformation

Fillet welding 10,0mm  
Standard Pulse



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

Fillet welding 10,0mm  
HS Pulse

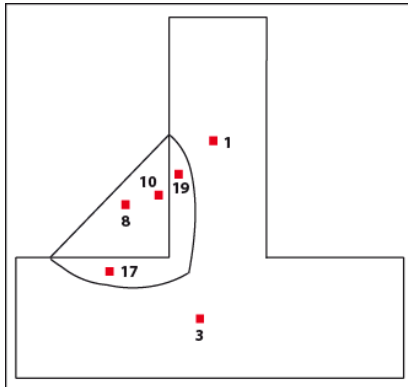


Joint temperature at the end of welding (202°C)

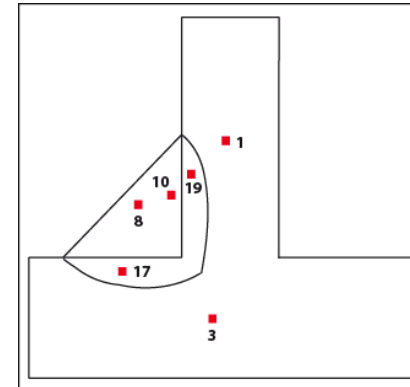
Heat  
affected  
zone  
HAZ

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

### Standard Pulse



### HS 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

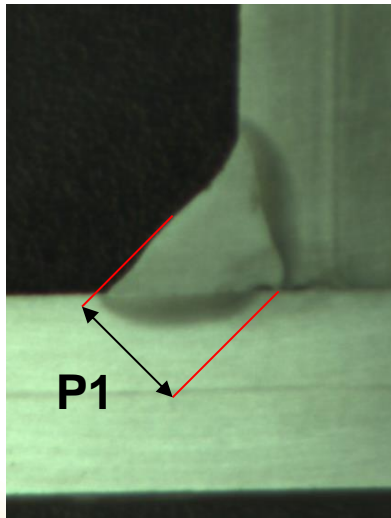
Measured hardness + Tensile strength			
Zone	Position	Hardness HV10	Tensile strength Mpa
Base Mat.	1	157	510
	3	156	510
Pure Deposit	8	206	675
	10	203	660
HAZ	17	181	595
	19	170	545

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 **HS Pulse**, hardness and tensile strengths are in line with the class of metal the base material belongs to, therefore the heat input is non influential in the welded material.

## 5. Higher penetration, lower risk of lack of fusion

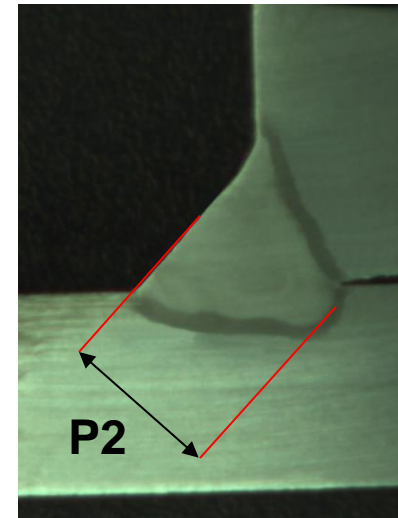
Fillet weld 10,0mm thickness

Standard Pulse



Fillet weld 10,0mm thickness

HS Pulse



Penetration obtained in **HS Pulse** (P2) is considerably higher compared to **Standard Pulse** (P1).  
Moreover weld face is smoother thanks to the excellent joints' wettability.

**3 X 400Vac**



**MicroPulse 302 MFK**



**Pioneer 321MKS**



**Pioneer 321MSR**

**3 X 400Vac**



**Power Pulse 402 - 502**



**Power Pulse 402T - 502T**



**Power Pulse 402AC/DC - 502AC/DC**





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