

# Lorch SpeedWaveXT

## Assignment

SpeedWaveXT is a synergistic waveform-controlled process control variant for MSG welding (ISO 857 process no. 13), which is particularly suitable for:

- welding aluminum applications (medium to thick sheets)

This is a U-I-controlled pulse process with cyclic symmetrical energy change at a constant wire feed speed.

## Advantages

- **Appearance, variability of seam surface**

Pulse arc welding with fine wave pattern in the seam surface

- **Automation / Manual welding**

Ideally suited for both applications

- **Materials**

Aluminum, CrNi

- **With suitable settings**

- the degassing of the melt can be improved (prevention of blowholes)
  - grain refinement can be achieved in the solidified material (reducing susceptibility to cracking)

- **Constant wire feed speed, therefore, no wear due to cyclical changes in wire feed**

## Working ranges

Material	Shielding gas	Wire diameter [mm]
AlMg 4.5 Mn	100Ar	1.0, 1.2, 1.6
	Ar/30He	1.2
AlMg 5	100Ar	1.2, 1.6
	100Ar Ar/30He	1.2, 1.6
CrNi ER 308	Ar/2.5CO <sub>2</sub>	1.0

- The working ranges depend on the respective power of the welding machine.
- The working ranges are continuously expanded and can be supplemented via firmware updates.

## Notes

### Setting

- Control parameters (primary setting value): wire feed speed
- Derived control parameters (predicted values): current, voltage, power
- Fine adjustment: arc length, dynamics, SpeedWave frequency, SpeedWave amplitude.

### Display values

- Set value wire feed speed (control parameter)
- Prognosis (arithmetic mean values) for current [A], voltage [V], and power [kW]
- Recommended sheet thickness for welding [mm]
- Actual values: current [A], voltage [V], wire feed speed [m/min] and effective electrical power output [kW]
- Actual values (during welding) and hold values (after welding)

### Tips for optimal results

- For the application, the SpeedPulseXT process type should first be set and checked.
- Then test whether activating the TWIN function with SpeedPulseXT and setting it to TWIN frequencies of 3Hz to 5Hz and 50% TWIN balance already produces favorable results.
- Then SpeedWaveXT should be tested with the same settings (starting at a SpeedWave frequency of 4 Hz) and a SpeedWave amplitude at which the arc fluctuations are still manageable. If necessary, the SpeedWave frequency and SpeedWave amplitude should be increased gradually.
- The effect of the settings must be checked on the workpiece (metallographically).
- The achievable effects of SpeedWaveXT are related to the excitation of the resonant natural frequencies of the molten pool and the time to solidification. There is an optimum setting, but this depends on the boundary conditions (different viscosities, molten pool geometries, and welding speeds).
- See also publications and application experience from OTC DAIHEN on the DC Wave-Pulse process type.

### Comparison

SpeedPulse XT + TWIN function		SpeedWaveXT
← Magnitude of the effects →		
lower	modulated Twin or Wave frequency	higher
more pronounced / coarser	wave pattern in the melt / seam surface	finer
extended	gap tolerance	smaller
coarser	grain refinement	finer
higher	tendency to crack during solidification	lower
higher	wear wire feed	lower
application-specific	improvement degassing of the melt (prevention of blowholes)	application-specific

### Note on acoustics

- The superimposition of the pulse frequency with the SpeedWave frequency produces a noise that many people find unpleasant. However, this is necessary to achieve the desired effects of SpeedWaveXT.

### Availability

- SpeedWaveXT is available for the iQS power source series.

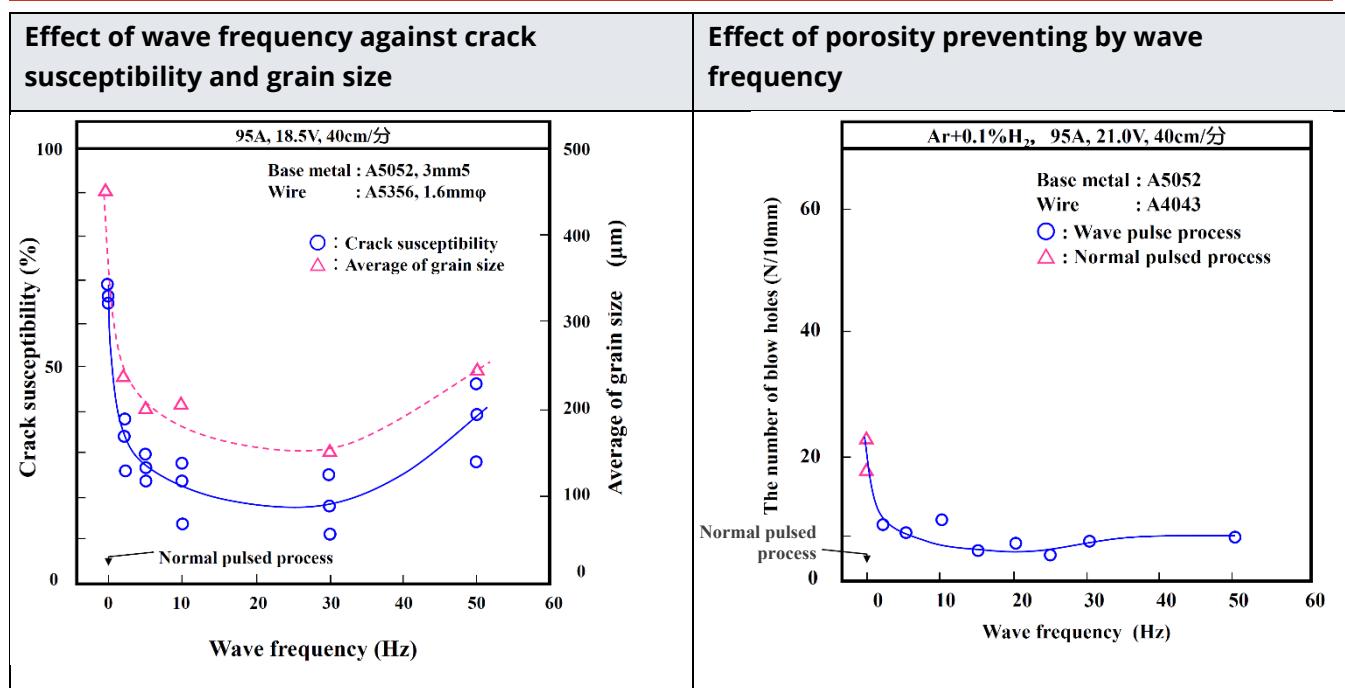
## Control technology

SpeedWaveXT is the U-I-controlled pulse arc process SpeedPulseXT with cyclically changing energy at constant wire feed.

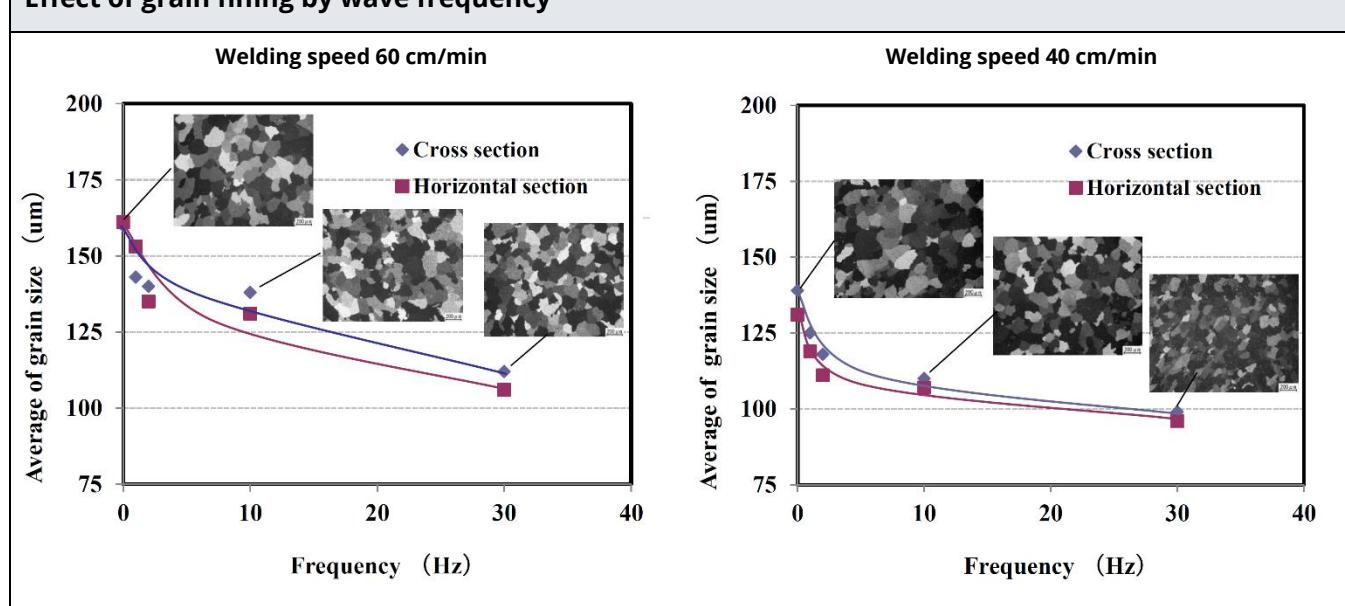
Its effects are similar to those of the DC Wave-Pulse process type from OTC DAIHEN.

Based on a selectable combination of material, wire, and gas and the specified wire feed speed, all other necessary parameters are loaded from a database. The process settings can be individually adjusted by the user within reasonable limits.

## Reference DC Wave-Pulse of OTC DAIHEN



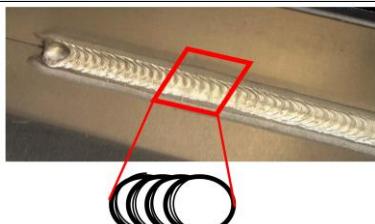
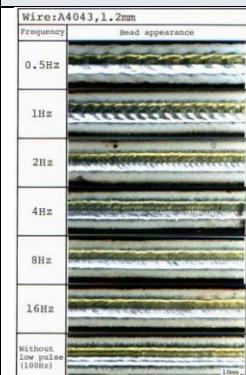
## Effect of grain fining by wave frequency



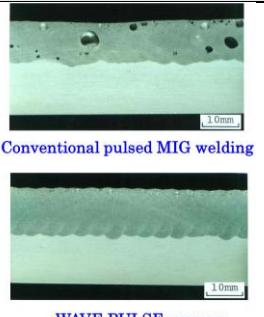
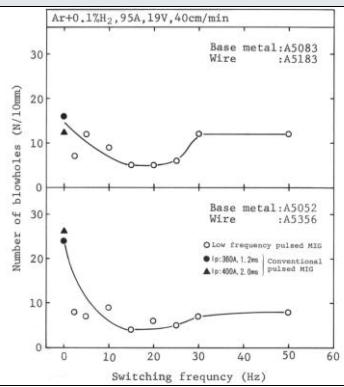
## Features of WAVE PULSE process

- Improvement of bead appearance.
- Improvement of gap tolerance and wire misalignments.
- Grain refinement of weld metal.
- Improvement of solidification susceptibility.
- Blowhole reduction effect.

### Improvement of bead appearance.

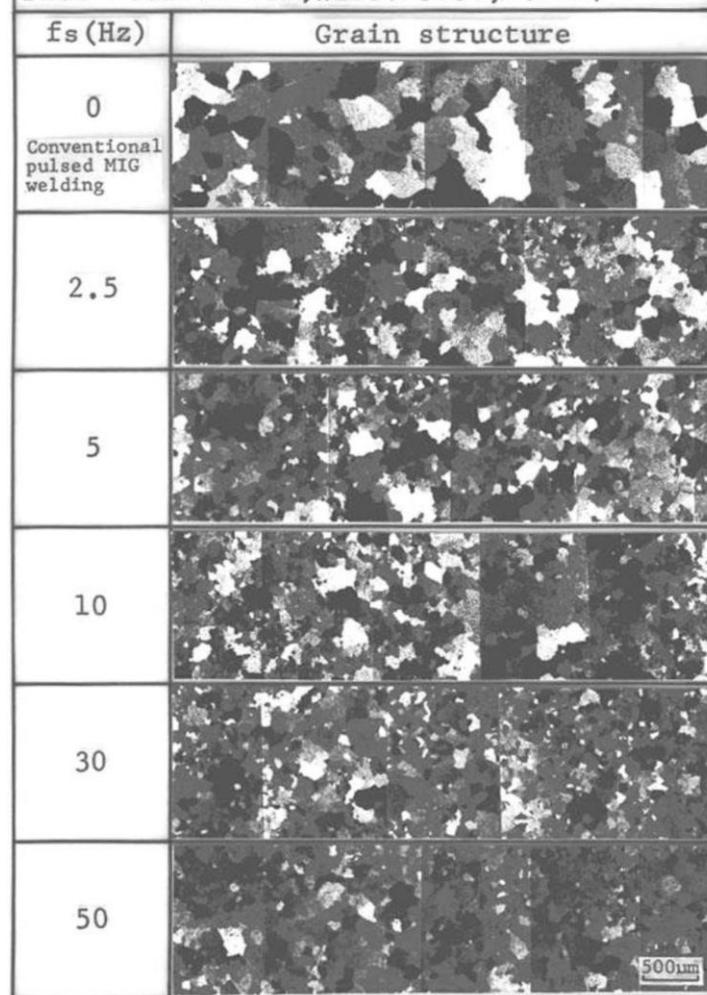


### Inhibition effect of porosity generation 1



### Grain refinement of weld metal

Base metal:A5052,Wire:A5356,1.6mm $\phi$



## Seam Appearance



*Aluminium fillet weld*



*Stainless steel fillet weld*