Basic Understanding of OTC Arc Welding Machines

Nanotechnology Digital GMAW Machines (with Multi-Process Functionality)

Concept

- Dramatically improved performance by the exclusive Welbee LSI-ASIC chip - The first in the welding industry
- Advanced IT quality control and network capabilities
- Simple setting and high-speed control of welding conditions by pre-installed ideal welding modes for a wide variety of metals
- Tough structure with easy maintenance and durability
- Manufacturing considerations for the environment

Welbee

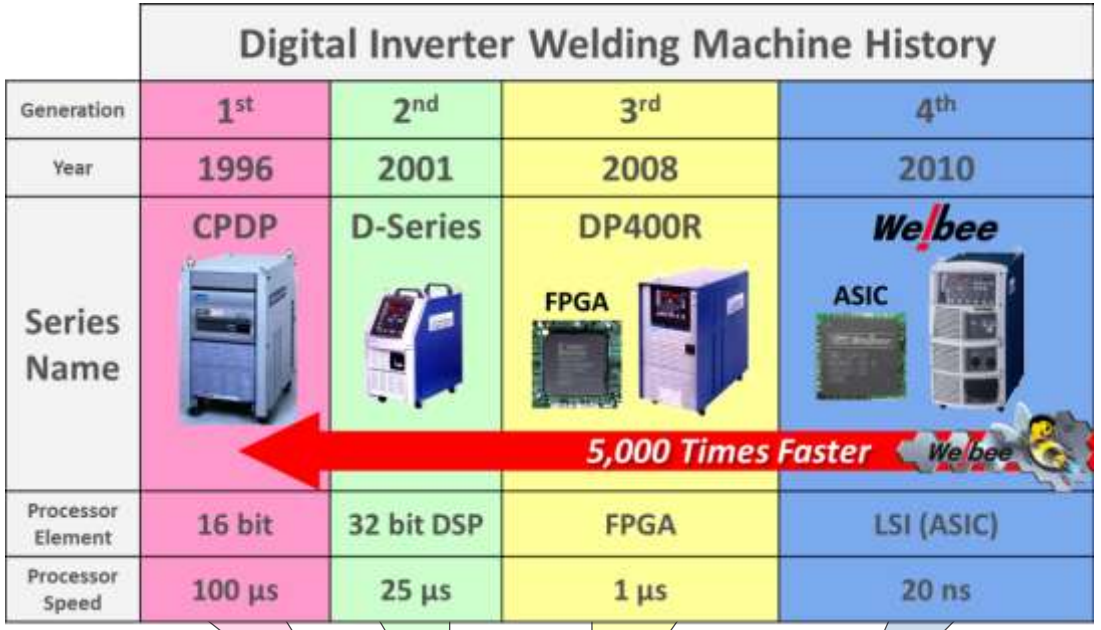
Welding's best electronic engine

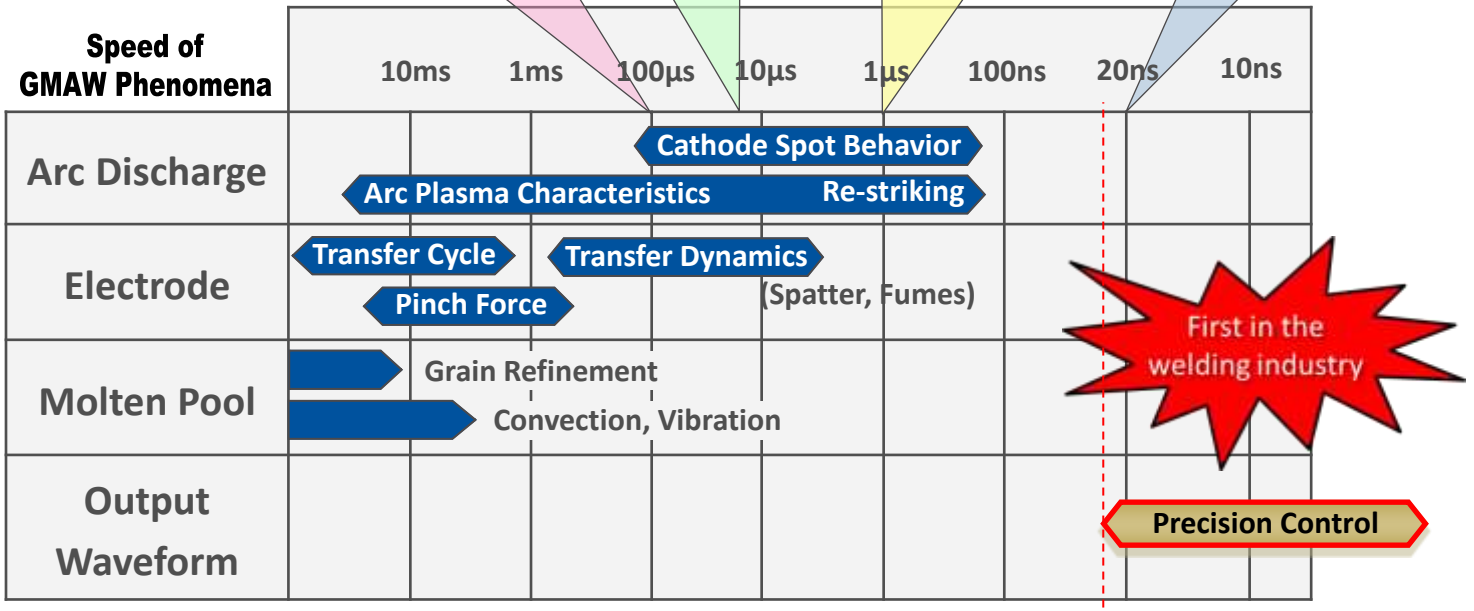
Control processor developed specifically for arc welding

- Worlds first nanotechnology processor for arc welding machines
- Designed exclusively by and for OTC-DAIHEN
- More than 6 years and over $10 million to develop

Definitions:
LSI (Large Scale Integration)
ASIC (Application Specific Integrated Circuit)
FPGA (Field Programmable Gate Array)

Advantages of control speed with the Welbee LSI





5 GMAW Models with Multi-Process Capabilities

Primary Processes

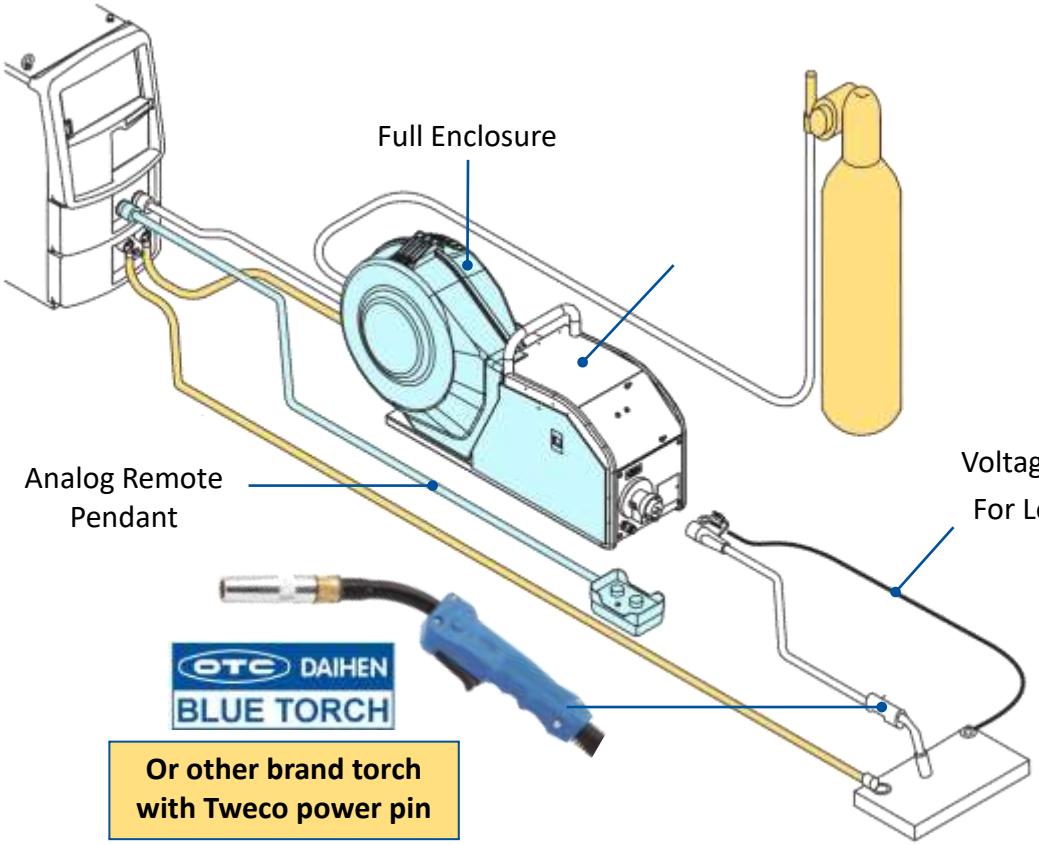
	M350	M500	P400	M350L	P500L
GMAW	●	●	●	●	●
High Speed Modes	●	●	●	●	●
GMAW Pulse			●		●
GMAW Wave Pulse			●		●
Ultra-Low Spatter				●	●

Optional OTC accessories

Available from OTC distributors

Welbee

GMAW **Configuration**



Digital Remote Pendant

Secondary Processes

	M350	M500	P400	M350L	P500L
DC - TIG* (GTAW)	●	●	●	●	●
DC - Stick (SMAW)	●	●	●	●	●

*Scratch Start

Optional OTC accessories

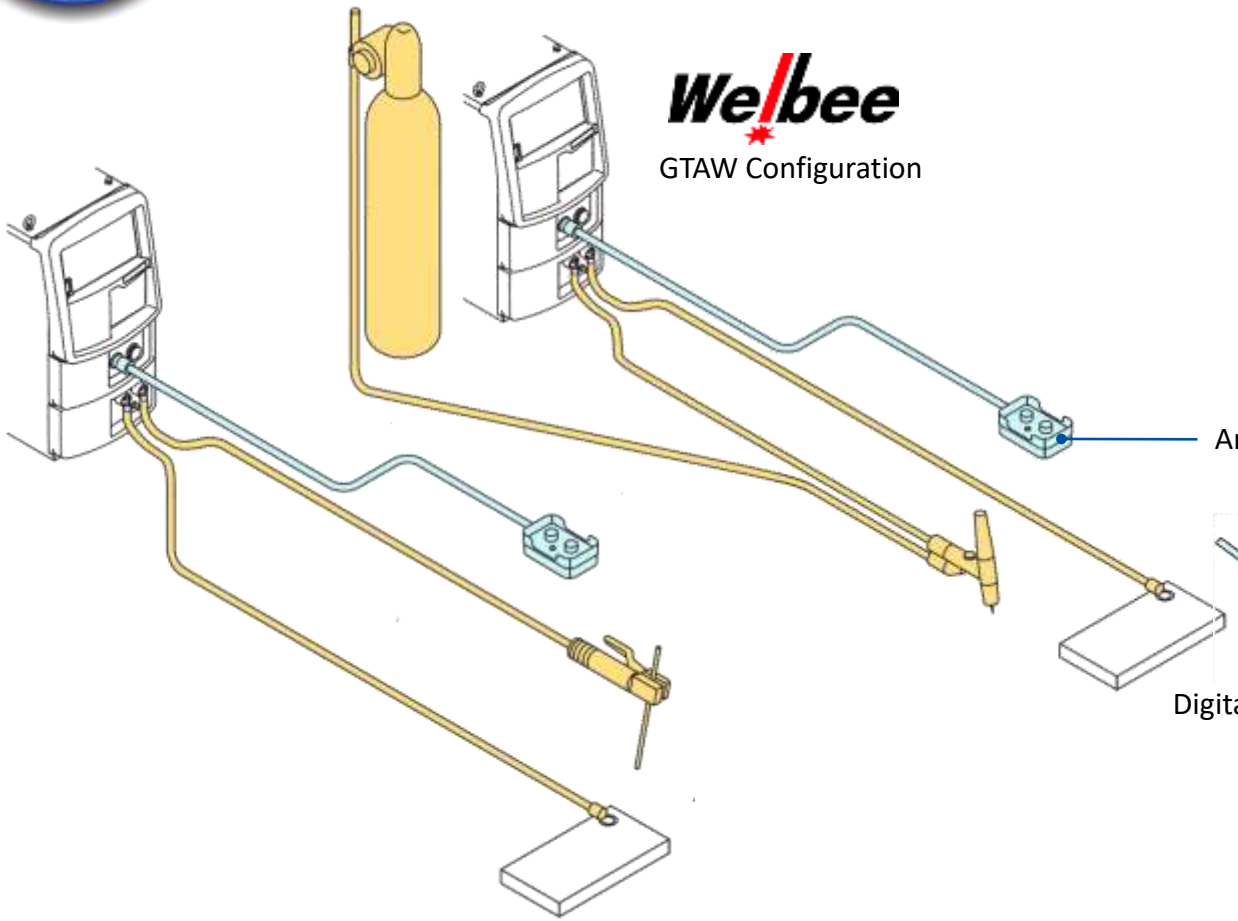
Available from OTC distributors

Welbee

GTAW Configuration

Welbee

SMAW Configuration



Standard Models with Advanced Features

Welbee P400

All around Pulse GMAW model available for welding of carbon steel, stainless steel, aluminum and a multitude of other alloys

Welbee M350

Standard model for high quality welding in any situation

Welbee M500

Heavy-Duty model for high quality welding from thick to thin materials
- Rated duty cycle: 100%

Advanced Ultra-Low Spatter Models

Welbee P500L

The ultimate high-end Pulse GMAW machine with ultra-low spatter modes achieving optimum performance on carbon steel, stainless steel, aluminum and a multitude of other alloys

Welbee M350L

Ultra-low spatter providing high productivity for carbon steel and stainless steel
- Up to 80% reduction in spatter compared to our previous models

Reduce Cost by Virtually Eliminating Spatter!

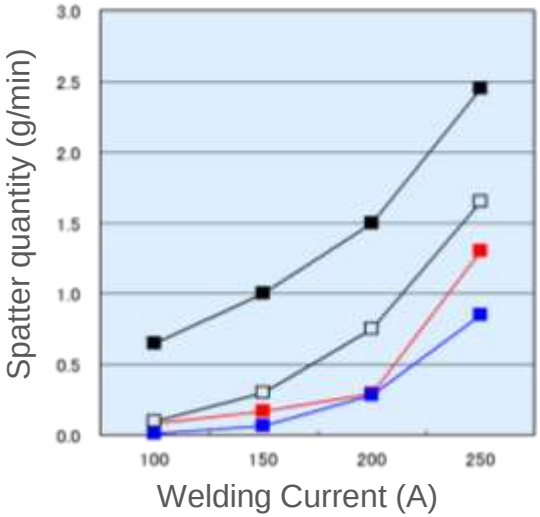
Welbee P500L Welbee M350L

Ultra-Low Spatter Models

- Significant spatter reduction when using mixed gas or 100% CO2 minimizes cost of post-weld cleanup

Incredible Spatter Reduction with the CBT- EX Low Spatter Mode

CBT- EX Controlled Bridge Transfer (Expanded)

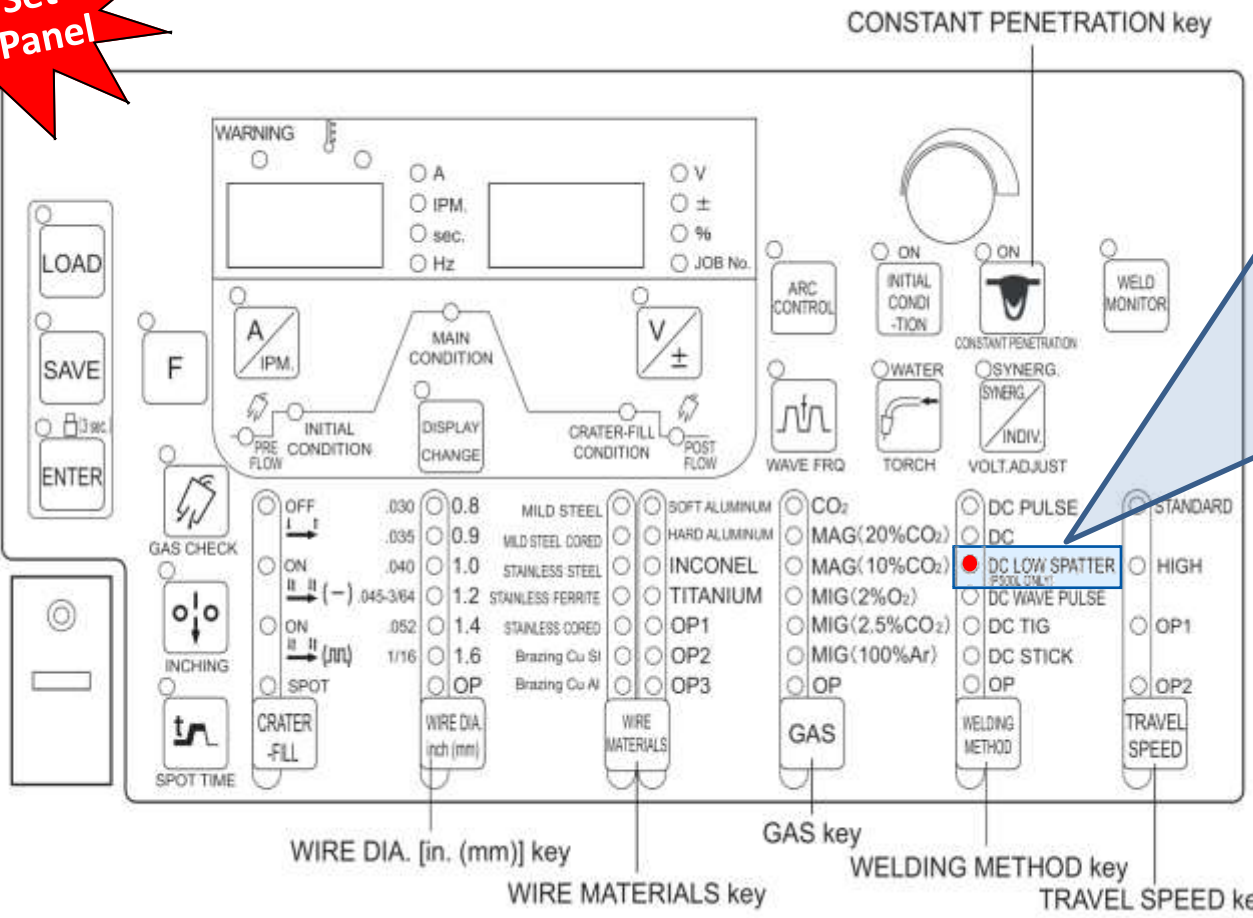


- Up to 60% reduction at 200A using 80% Argon / 20% CO_2
- Up to 80% reduction at 200A using pure CO_2

■ OTC DM-350 (CO_2)
□ OTC DM-350 (Ar / CO_2)
■ OTC M350L & P500L (CO_2)
■ OTC M350L & P500L (Ar / CO_2)

Welbee P500L Example

"Easy Set" Front Panel



The Highest Performance on Any Metal

Welbee P500L Welbee P400

DC Pulse GMAW Models

- Optimum Pulse waveform control based on the welding method, wire type, wire diameter, and shielding gas ensures the fastest spatter-free results

- Constant Penetration function ensures consistent penetration even when tip-to-work distance fluctuates

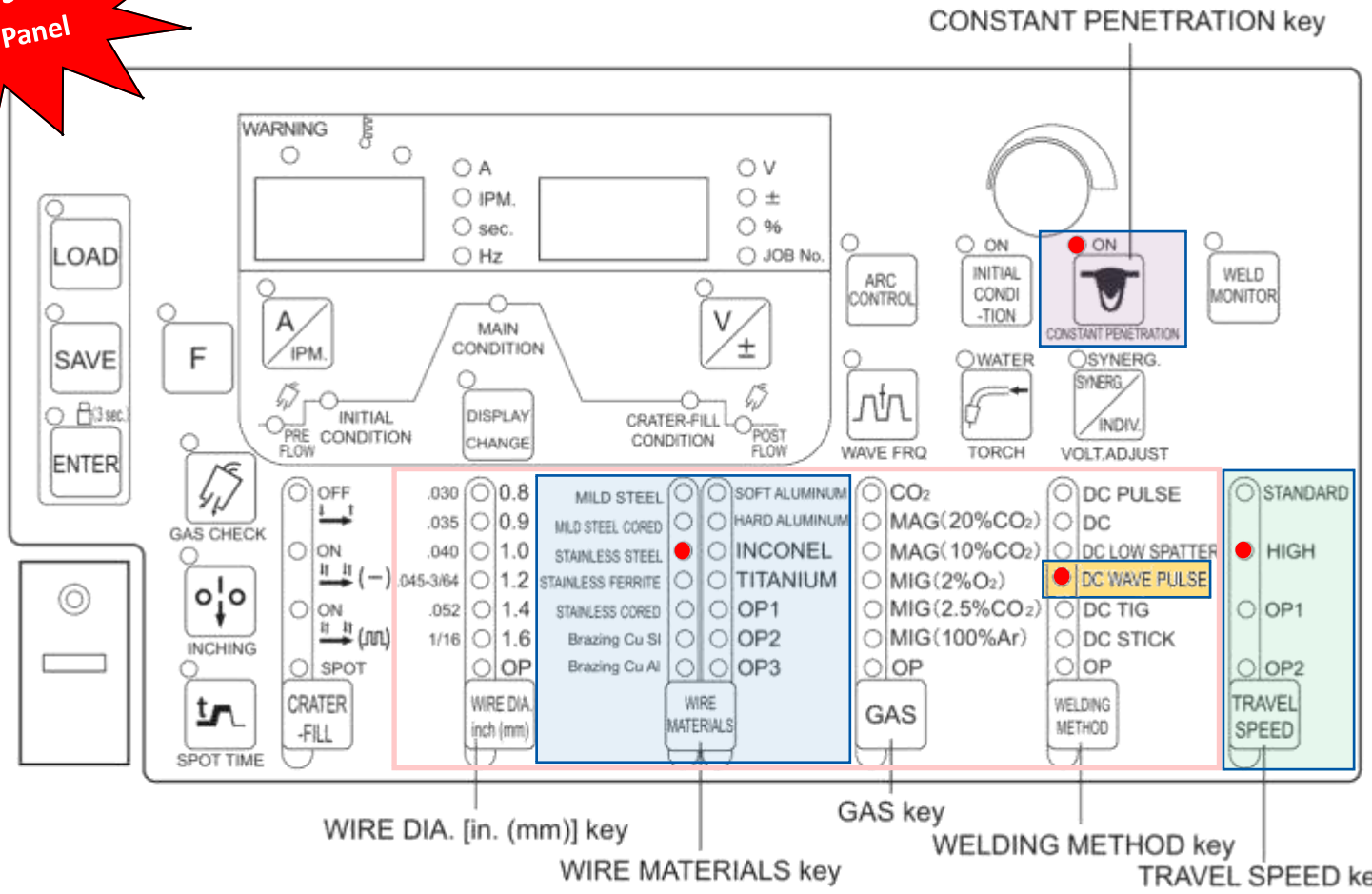
- A multitude of pre-set Pulse modes for a wide variety of metals
- Optional modes can be developed for virtually any alloy

- Originally develop in 1982 by OTC—DAIHEN, Wave Pulse has been enhanced to offer a multitude of additional benefits

- High speed and extended cable modes provide increased arc stability resulting in flatter welds with less spatter

"Easy Set" Front Panel

Welbee P500L Example



DC Pulse GMAW Benefits for Aluminum

Welbee P500L Welbee P400

DC Pulse GMAW

- Significantly reduces the dust-like spatter which is problematic in GMAW welding of some aluminum alloys
- Superior feeding ability of even soft aluminum wires with OTC's 13ft. Aluminum torch (non-push/pull, less maintenance)
- Easy adaptability with push-pull systems for extended reach

DC Wave Pulse GMAW (Superimposed Low Frequency Pulsed Current)

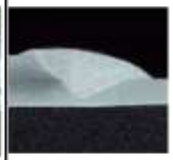
- Achieve a TIG-like bead appearance with GMAW travel speed using the patented Wave Pulse Process
- Tailor the Wave Pulse Frequency to create the desired weld ripple pattern

Wave Pulse Frequency 2.5 Hz

Wave Pulse Frequency 3.5 Hz

Gap Tolerance

Wave Pulse tolerates gaps by exceptional control of heat input

	Standard Pulse		Wave Pulse	
Gap	Bead Appearance	Cross Section	Bead Appearance	Cross Section
0.5 mm				
1.5 mm				
2.0 mm				

Welding current: 85 A
Welding voltage: 17 V
Sheet thickness: 2.0 mm
Wave frequency: 3 Hz
Wire diameter: 3/64 in
Welding speed: 20 imp

Welding current: 120 A
Welding voltage: 16 V
Sheet thickness: 3.0 mm
Wave frequency: 2.5 Hz
Wire diameter: 3/64 in
Welding speed: 20 imp

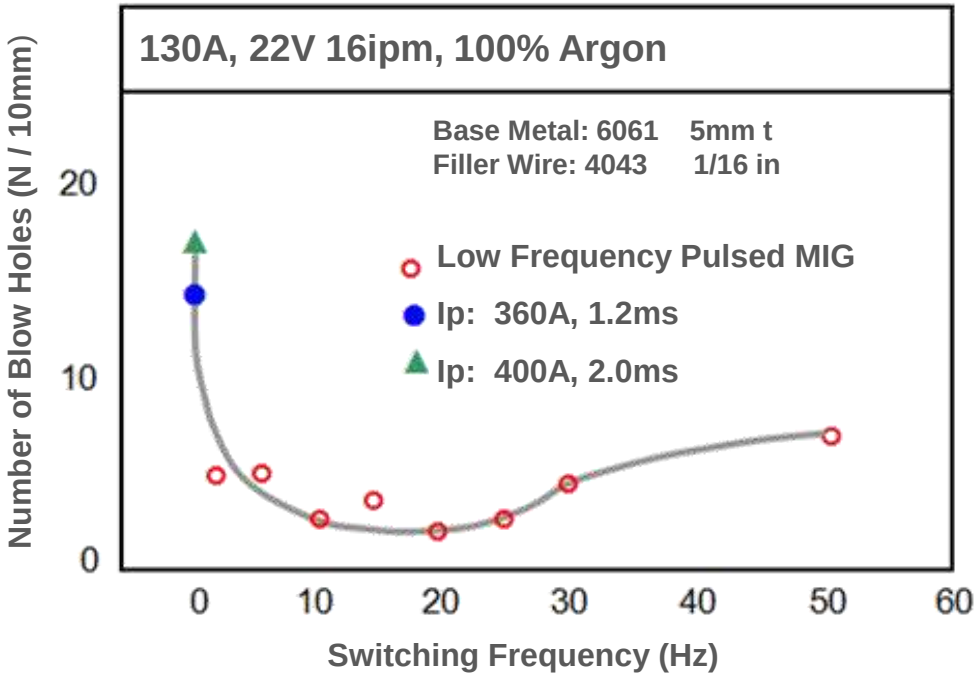
Metallurgical Benefits of Wave Pulse for Aluminum

Effect on Blow Holes (Porosity)

Wave Pulse frequency has a profound effect on reducing porosity, or blowholes, due to its de-gassing effect created by agitating the weld puddle at low frequencies.

Conventional Pulse MIG Welding

Low Frequency Pulsed MIG Welding

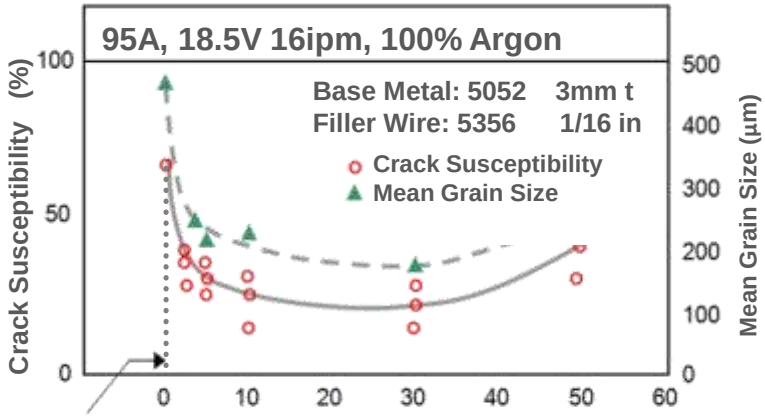


Effect on Crack Susceptibility (Grain Size)

As well as the benefits achieved in bead appearance and reduction of blowholes, low frequency pulsing offers a significant reduction in grain structure size. This is proven to be very effective in reducing crack susceptibility, especially in aluminum alloys.

Base Metal: A5052 Wire: A5356-1/16 in.

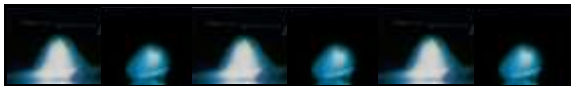
Freq.	Grain Structure	Freq.	Grain Structure
0 Hz Conventional Pulse MIG		10 Hz	
2.5 Hz		30 Hz	
5 Hz		50 Hz	



Conventional Pulsed MIG
(f = 115 Hz)

How it works

Pulsed welding current modulates the weld pool

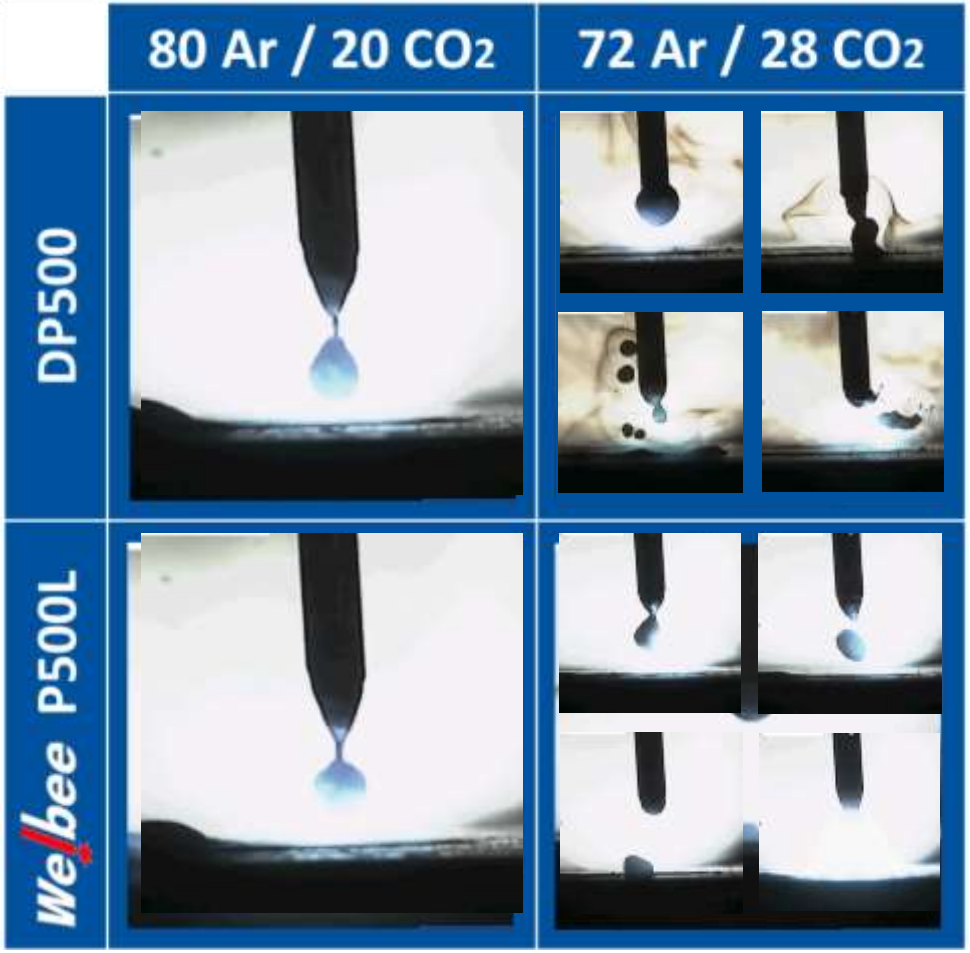


Pulsed wire feeding modulates the weld pool

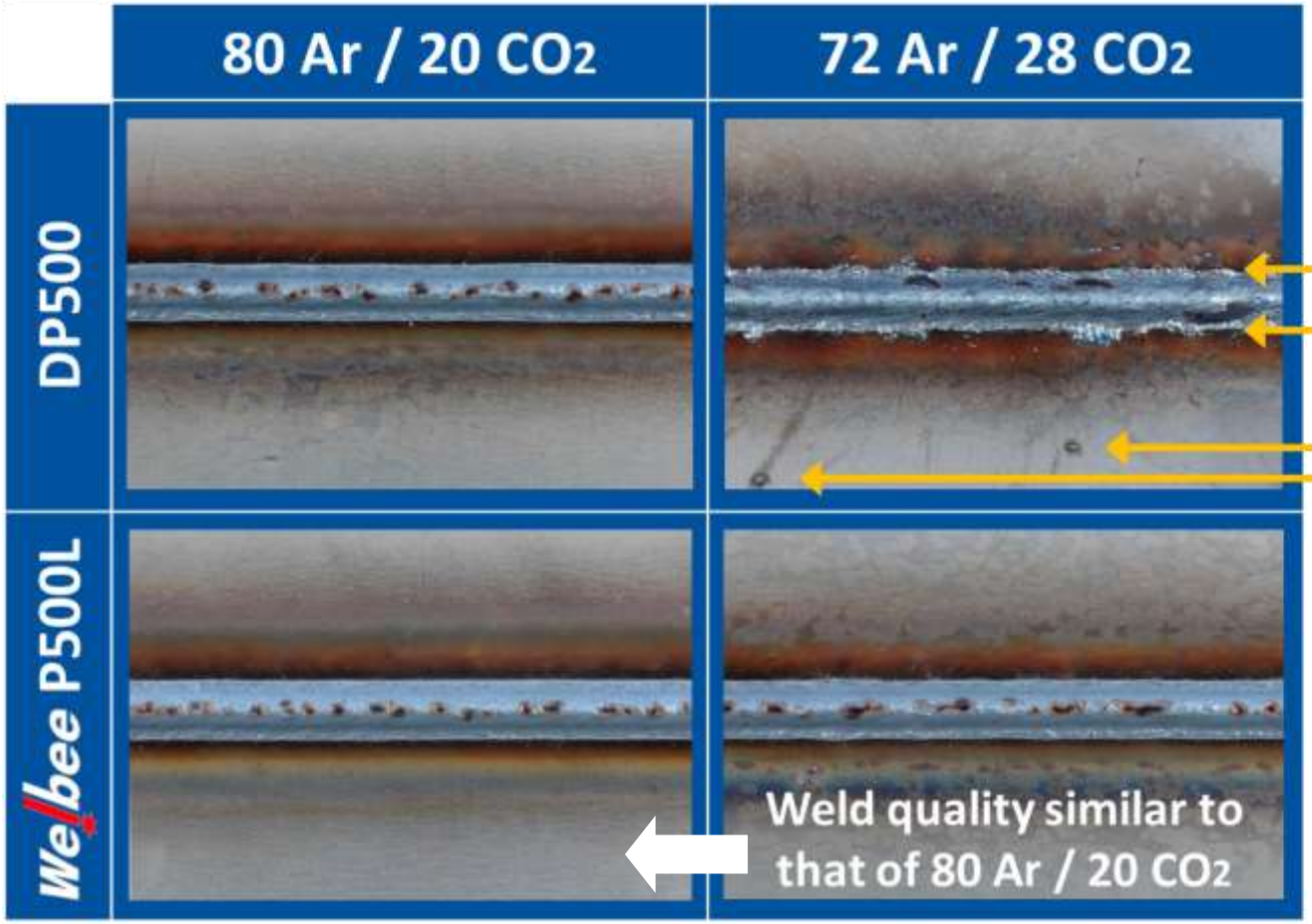
Typical Wave Pulse results on Aluminum

DC Pulse GMAW Benefits for Carbon Steels

- Stable arc even if CO_2 ratio fluctuates
- No need for multiple shielding gases
- Use common shielding gases already in your plant like 75 Ar / 25 CO_2



Improved Bead Appearance and Reduced Spatter



Through Thick and Thin

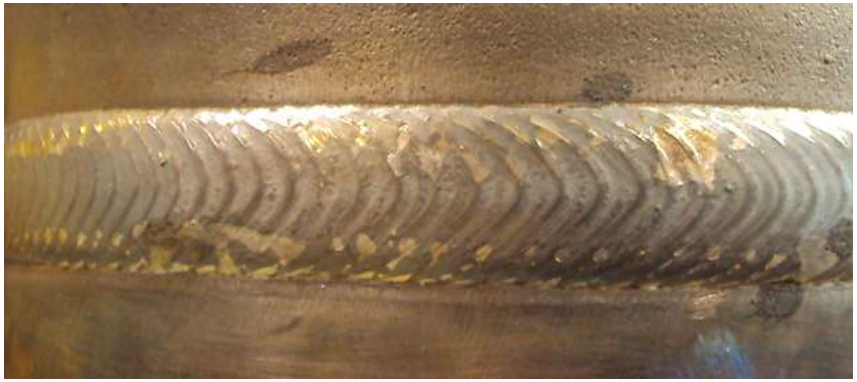
Welbee P500L

Welbee P400

1” Thick ASME Pressure Vessel

High amperage DC Pulse with 1/16” solid mild steel wire maximizes penetration

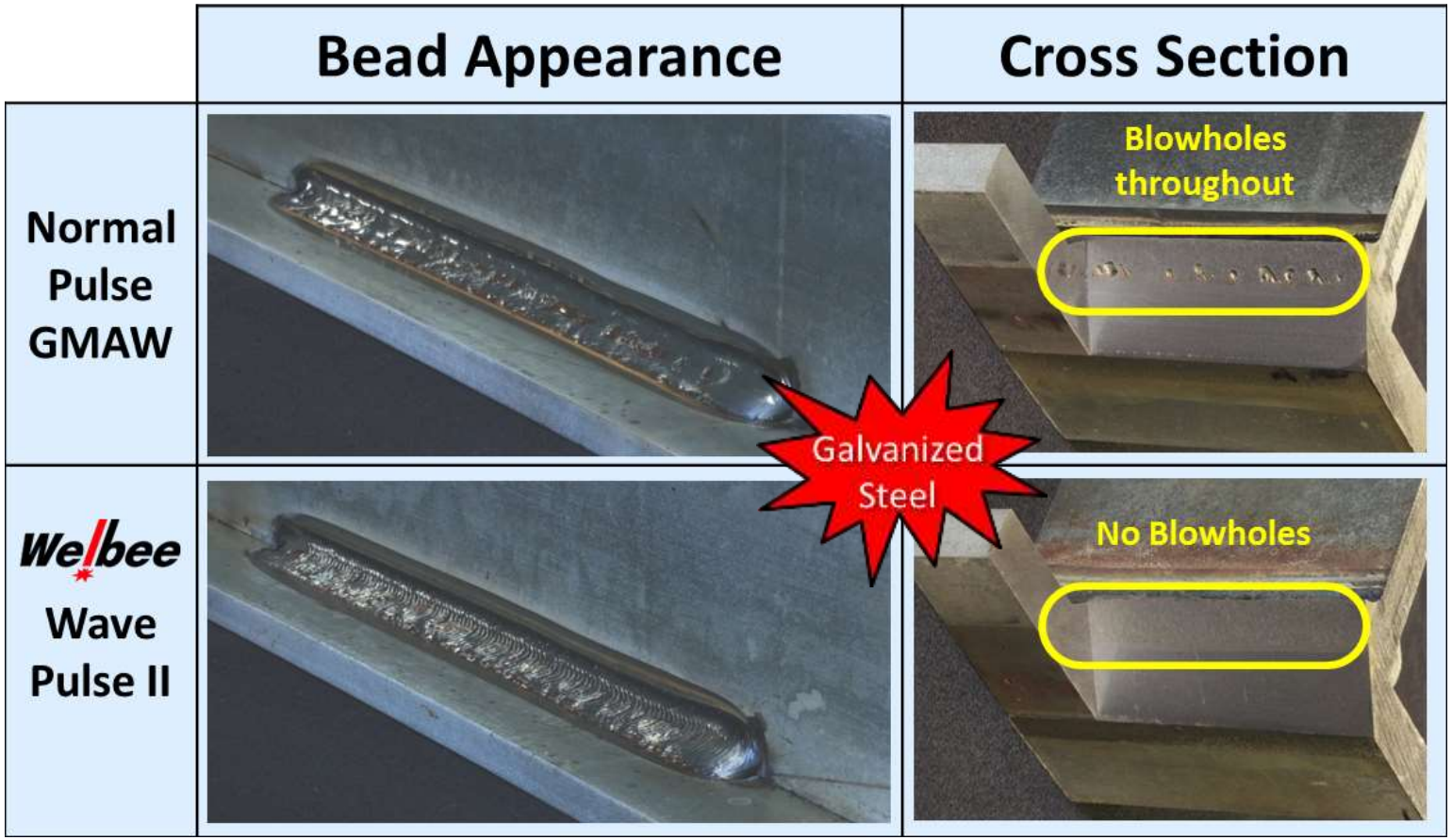
ASME Pressure Piping



Low Frequency DC Wave Pulse with .045” solid mild steel wire provides excellent heat input and penetration control

DC Wave Pulse GMAW for Zinc Coated Steels

Wave Pulse vibrates the molten weld puddle to remove otherwise trapped gasses which cause blow holes

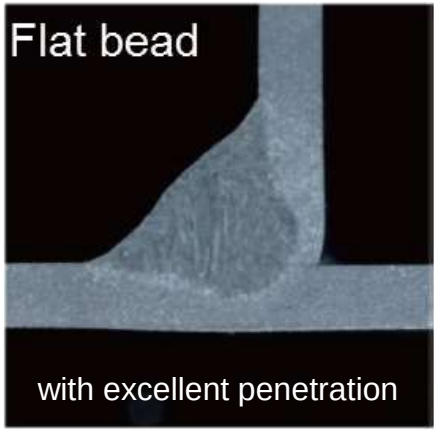


Standard Models with Superior Features

Welbee M350 Welbee M500

These benefits apply to all Welbee models

- Beautiful flat bead appearance with low spatter generation from low to high output even when using extension cables
- High speed welding mode for automated applications
- End Pulse function and Digital Turbo Start provides instantaneous arc starts



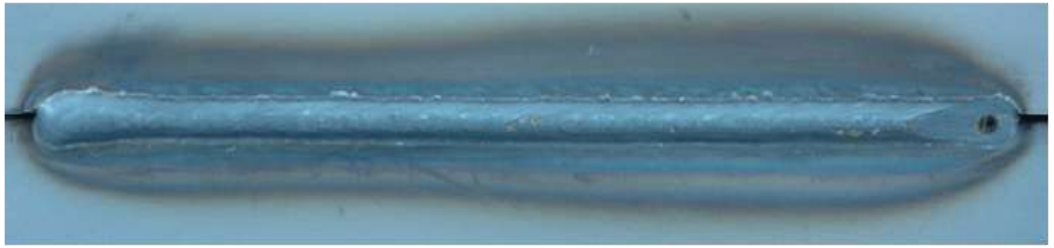
End Pulse function optimize the shape of the wire tip

Uniform and beautiful bead appearance with very low spatter

A stable arc is maintained even with variations in Tip-to-Work distance such as weaving the torch

Welding current: 300 A
Welding voltage: 30V
Wire type: Mild steel flux cored
Wire size: .045in.
Plate thickness: 9mm t
Weaving frequency: 2.5Hz
Oscillation: ± 1.5mm

A further increase in speed is realized by using the high-speed welding mode



Welding current: 250 A
Welding voltage: 25V
Welding speed: 40ipm
Wire size: .045in.

A beautiful weld bead appearance and less voltage fluctuations are realized even during high speed welding in which small fluctuations of the arc is likely to cause defects in the weld bead appearance.

Features of all Welbee Models

CM-742U

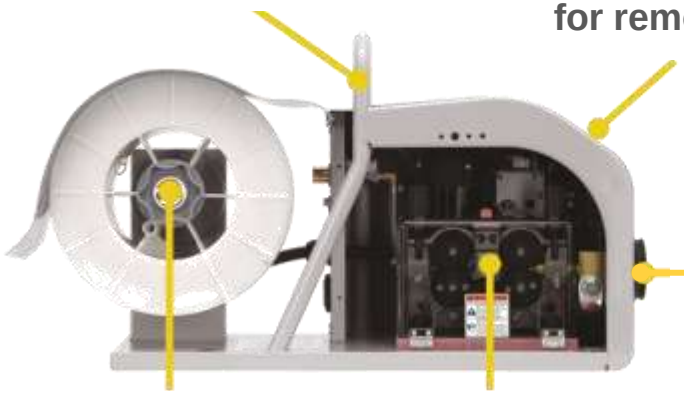
The Toughest Little Wire Feeder Ever Made!

- Control PC board is built-in the power source for unmatched reliability in rugged environments
- Most compact / lightweight 4-Drive roll wire feeder on the market
- Tweco style connection accepts OTC and virtually any brand torch
- Optional wire reel and side covers prevents dust and moisture penetration
- Optional aluminum kit, water cooled torch kit

Easy Access Standard Configuration

Handle for easy moving or hanging

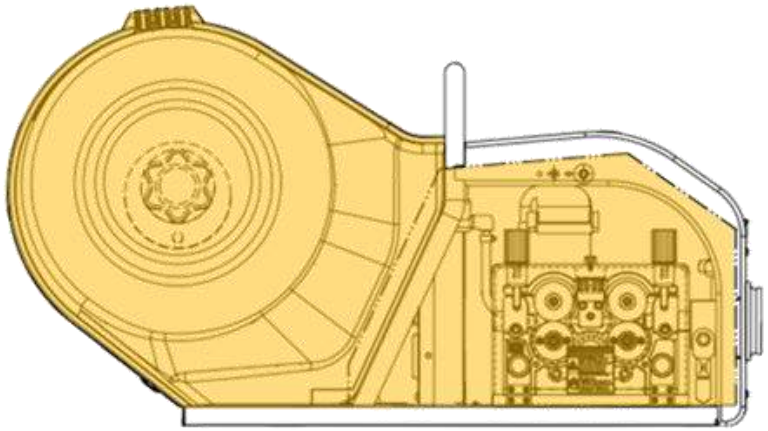
Convenient mounts for remote pendant



Tweco style torch connection

Easy and secure wire spool tension adjustment

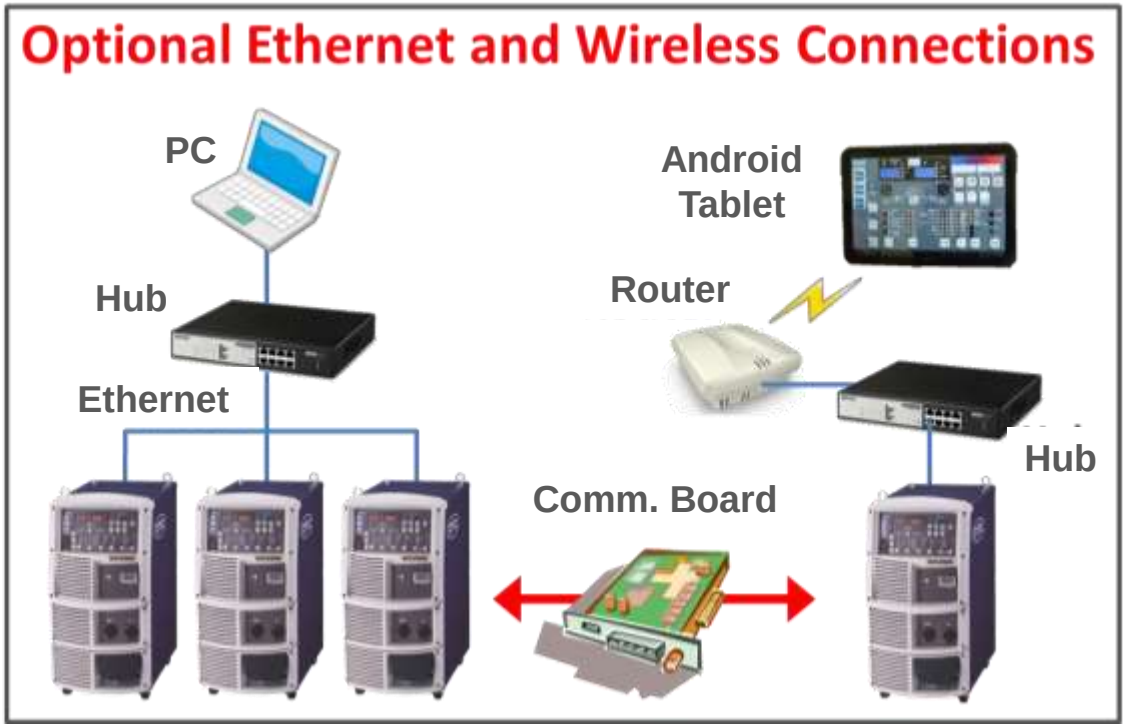
Powerful 4-Drive roll system with durable plastic cover



Optional wire reel and side cover

Quality Control Via IT (Information Technology)

Multiple methods of gathering large quantities of detailed information for quality control



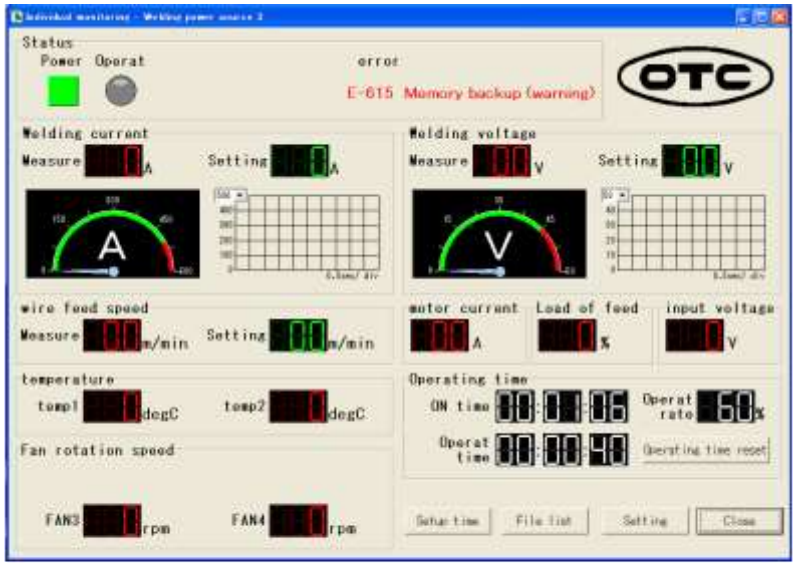
IT Features & Benefits

Standard USB Port

- Back-up large amounts of detailed data
- Edit the Welding Condition Memory
- Transfer welding conditions from machine to machine

Optional Weld Monitor, Ethernet and Wireless Control

- Back-up and transfer data
- Control panel functions remotely
- Weld data monitoring
- Use for troubleshooting
- Built-in oscilloscope
- Check welding time and wire consumption



Weld Monitor Screen

Standard Automation Interface

Easy Connect Terminal Box

- Built-in interface conveniently located on the back of the power source
- Quick slip-in terminals require no tools
- Quickly connect OTC FD Friendly Series robots

Side Air Flow Structure

High Dust Resistance & Easy Maintenance

- Prevents dust from entering electrical components
- Blow out with clean shop air without opening the case

OTC
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AHB
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COMPLETE METALWORKING SOLUTIONS

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Thank you for your valuable time and kind attention.

Please let us know if you have any questions.

Welbee