

ADVANCES IN PULSED GMAW FOR ALL POSITION WELDING

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Liburdi Dimetrics

Advances in Pulsed GMAW for all Position Welding



Quality Certificate Holders



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General Manager
Liburdi Dimetrics



Orbital GMAW Solution | K Head System

K Weld Head




LCX Universal Controller
with Lincoln s350 with STT




Orbital Pendant
with optional welding lens





Discussion Points

- Liburdi Orbital GMAW Technology
 - Inverter Based Power Supplies
 - Metal Beam
- Orbital GMAW Success Stories
- Paradigm Shift from Mechanized to Automated



"Automation is the single most important growth sector in the welding industry"
AWS Paper on the Future of Welding



Orbital GMAW Solution | 'K' Weld Head



- Quick Setup
- High Speed
- Programmable torch oscillation
- Torch tilting and lead/lag

- Quick release clutch mechanism for rapid 360° setup, cable wrap and weld head positioning
- Compact radial & axial size
- On-board spool holder (flux core or solid core wire)
- Pipe ranging from 4" and up
- Flat plate, ID & Large diameter vessels (*requires optional adapters and tracks)

Ideal for field / shop pipeline, power pipe, process pipe, overlay welding and structural.



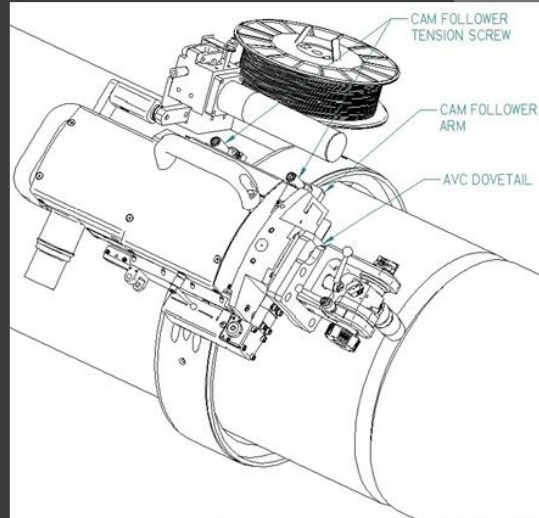
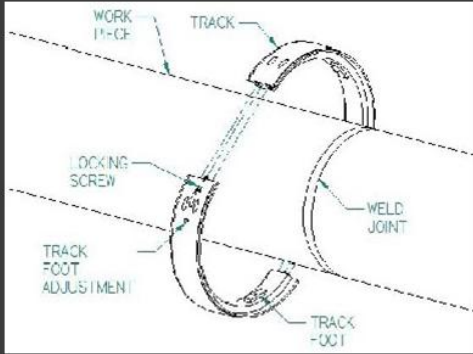
Orbital GMAW Solution | 'K' Weld Head | Video



Ideal for field / shop pipeline, power pipe, process pipe, overlay welding and structural.



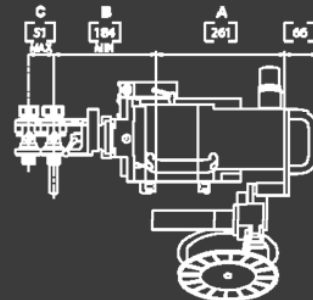
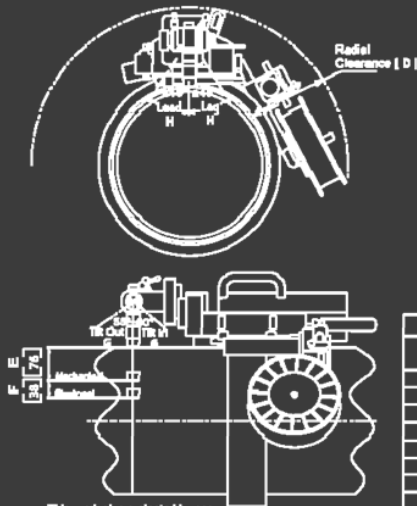
Orbital GMAW Solution | 'K' Weld Head | Track + Weld Head Installation



Ideal for field / shop pipeline, power pipe, process pipe, overlay welding and structural.



Orbital GMAW Solution | 'K' Weld Head | Specs



ITEM	DESCRIPTION	DIMENSION
A	Track to Rear	10.28" (261 mm) 12.88" (327 mm) including Handle
B	Track to Electrode Center	7.28" (184 mm)
C	Oscillator Stroke	2.00" (51 mm)
D	Radial Clearance	5.80" (146 mm) with spool
E	Up/Down Mechanical Adjust	3.00" (76 mm)
F	AVC Stroke	1.50" (38 mm)
G	Manual Torch Adjust Theta	58° Outboard, 90° Inboard
H	Manual Torch Adjust Lead/Lag	±45°
	Wire Feeder Speed - Max	600 ipm (1.50 m/min)
	Wire Spool Holder Capacity	8" (203 mm) 10/16 lbs maximum

This product is protected by one or more of the following patents:
3,793,788 3,918,882 4,918,018
4,331,305 4,372,434 4,308,725
with others pending.

Ideal for field / shop pipeline, power pipe, process pipe, overlay welding and structural.

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Orbital GMAW Solution | O Head System

O Weld Head



LCX Universal Controller
with Lincoln s350 with STT



Orbital Pendant
with optional welding lens



LIBURDI

Orbital GMAW Solution | 'O' Weld Head



- Spring loaded STT contact on the head eliminates standard "clamp on" set up.
- Integrates Ethernet based S350 with STT module.
- STT open root passes followed by pulse MIG or flux core fills.
- Designed to run self shielded flux core wire.
- Encoder feedback on travel and programmable lead/lag
 - Key to success with self shielded flux core wire
 - Enables wire speed control and torch lead/lag as function of position
- Knurled wire feed rollers to accept flux cored wires
- Quick disconnect umbilical for easier setup and handling



Orbital GMAW Solution | LCX Controller



- Seamless compatibility with a variety of industry power sources.
- Fully compatible with Liburdi Dimetrics Gold Track pipe welding systems.

Choice of **CABINET**, **PROTECTIVE SHOCK-PROOF CASE**
or **ALL-IN-ONE ORBITAL FIELD KIT**



Ideal multi-process controller is suitable for TIG, MIG and PLASMA.

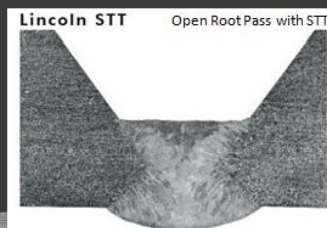


Orbital GMAW Solution | LCX Controller | Lincoln s350 STT



Advantage LCX +STT

- Reliable open root pass and complete back bead
- Reduced burn-through and distortion
- Ensures excellent sidewall fusion
- Reduced Cost, using 100% CO₂, lowest cost gas when welding carbon steel
- High speed quality open rootwelds





Orbital GMAW Solution | Orbital Pendant (*Optional welding lens)

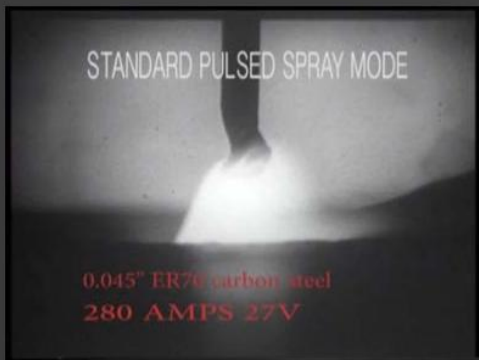


- Easy to operate. No programming required.
- Improved form factor (reduced pendant height)
- Side handles support
- Optional integrated welding lens

Works well with *Orbimig II™*, *P300™*, *GTVI™* and *GTVP™*



Orbital GMAW Solution | Metal Beam



- Digital reincarnation of Dimetrics patented GMAW system from 1980s
- Highly collimated spray transfer
 - Precise pinch effect with excellent arc stability
 - Minimal expulsion events
 - Shorter arc length while maintaining spray transfer when compared to inverter waveforms
- Deep Penetration at high switching frequencies
 - Enables heavy land zero gap root welding with conventional double bevel geometry
- Based on GTVI Power Supply
 - PGMW-GTAW switchable
 - Backward compatibility with all Dimetrics full function weldheads

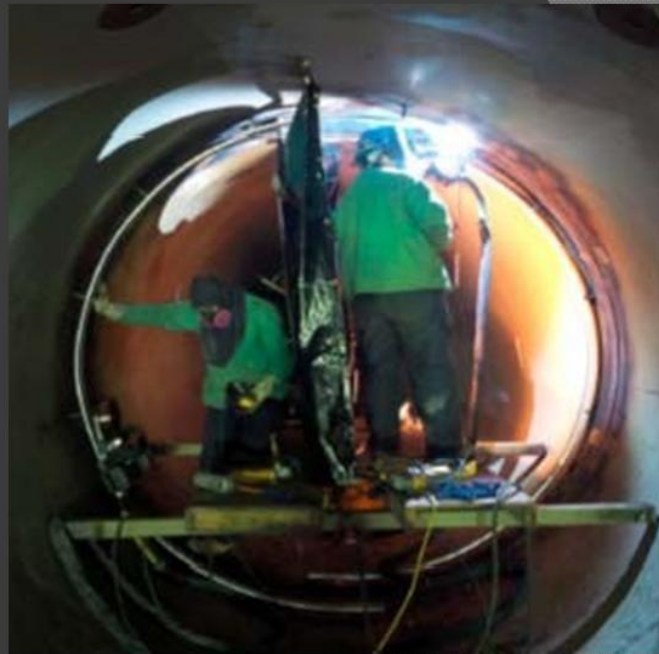


ORBITAL GMAW SUCCESS STORIES



Hydroelectric Penstock Weldment Forest Kerr, BC, Canada

- K Head
- Pipe Size: 9'-2" ID, WT: 1" and 3/4"
- Number of Welds: 27
- Reject Rate: 0% (UT, MT, and VT)
- Material: SA 516 Gr. 70N
- Only Equipment Maintenance required during 42 day project was replacement of wireliner



ORBITAL GMAW SUCCESS STORIES



Utilities
West Closure
New Orleans

K Head used to weld double wall fuel pipes which transport fuel from onsite backup fuel farms to the pump station in emergency situations.



ORBITAL GMAW SUCCESS STORIES



Utilities
West Closure
New Orleans

Located half mile south of the Harvey and Algiers canals, the west closure complex consists of a navigation flood gate, flood walls, levees and a pump station.

Sole purpose is to reduce the risk to residence and businesses in this area from storm surge.

Pump station houses 11 pumps, each rated at 800,000 gallons per minute. The largest pumps ever produced.



ORBITAL GMAW SUCCESS STORIES



Utilities
West Closure
New Orleans
K Head + Orbimig II

Manual welding 6 hrs
to weld 24" carbon
welds with semi-auto
flux core.

Machine welding 25
minutes each, rolling
and 30 minutes doing
vertical ups and 2G.



ORBITAL GMAW SUCCESS STORIES



Utilities
Thermal Solar
Florida Power



ORBITAL GMAW SUCCESS STORIES

LIBURDI

Utilities
Thermal Solar
Florida Power

Parabolic trough technology captures solar heat

200,000 parabolic mirrors


Total power 155,000 MWh annually – enough power for 11,000 homes or 26,000 people.

K-head and OrbiMig II weld system used to weld 8"-30" pipes for heat transfer fluid tubes (oil) to absorb the concentrated sunlight.

Fluid temperature 400°C

The heat transfer fluid is then used to heat steam in a standard turbine generator.


L4000 closed chamber heads were also used to weld stainless steel solar tubes.



ORBITAL GMAW SUCCESS STORIES

LIBURDI

Technical Collaboration Results in Nano-Quantity Defects in Construction of a Solar Power Plant.
Lauren



PIPE WELDING SYSTEM:

- Repair rates 0.6%.
- Labor savings per weld 67%.
 - Welders were able to produce three welds for every one made by conventional (manual) means.
- Number of certified welders required was reduced

Orbital Gas Metal Arc Welding system to produce high quality welds.

REFERENCES



Reference
OrbiMig GMAW Typical Results

Orbital mechanized MIG welding using Liburdi Dimetrics (K-Head),
LCX controller and Miller/Lincoln power supplies.

Typical Results:

- 50%-70% labor hour savings versus manual SMAW process
- Higher duty cycle due to increased "arc on" hours (as high as 80% vs 25%)
- Higher operator efficiency vs manual welding.
 - Typical manual efficiency – 40%/50%, Typical mechanized efficiency – 90%
 - Less operator fatigue especially welding pre-heated pipe
- Higher weld deposition rates – 3-4 lbs/hr vs 8-9 lbs/hr (1.4-1.8 kg/hr vs 3.6-4.1 kg/hr)
- Lower repair rates (usually 0.5% or less)
- Lower joint prep time using standard V-bevel or compound bevel
- Can tolerate joint gap up to 0.157" (4mm) and misalignment up to 0.079" (2mm)
- Controlled heat input assists with high tensile material (X80, X100) and duplex steel welding

REFERENCES



Reference
OrbiMig GMAW Typical Results

Sample Weld Program:

20" dia. x 0.500" wall (508mm x 12.7mm)

Material – Carbon Steel Pipe, 30° V-bevel

Weld Time – 45 minutes

Average Deposition Rate – 6.2 lbs/hr (2.8 kg/hr)

- Using manual SMAW weld would have a weld time of 90 minutes.

Cost per joint would be approximately 100% higher.

36" dia. X 0.688 wall (900mm x 17.5mm)

Material – Carbon Steel Pipe, 37° V-bevel

Weld Time – 165 minutes

Average Deposition Rate – 6.4 lbs/hr (2.9 kg/hr)

- Using manual SMAW weld would have a weld time of 336 minutes.

Cost per joint would be approximately 100% higher.

24" dia. X 1.81 wall (610mm x 50mm)

Material – Carbon Steel Pipe, compound bevel 37°/10°

Weld Time – 11.3 hours

Average Deposition Rate – 6.3 lbs/hr (2.9 kg/hr)

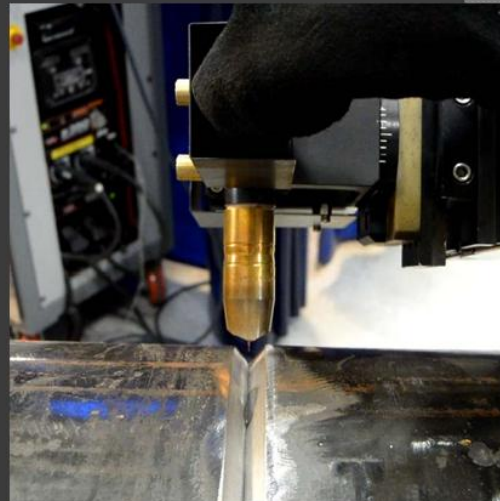
- * Using manual SMAW weld would have a weld time of 23.7 hours

REFERENCES



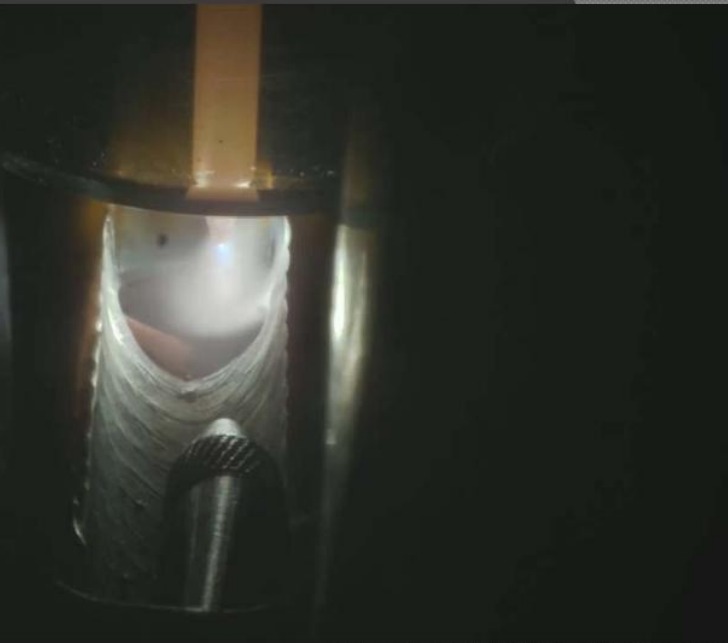
Development Paradigm Shift from Mechanized to Automated Welding

- Coordinated motion of torch theta and Oscillation axes for improved sidewall fusion on conventional prep
 - “Walking the Cup”
- Improved torch proximity control based on GTAW AVC technology
 - Automatic Height Control (AHC)
- Improved weld vision using digital imaging technology
 - Utilize weld pool imaging for seam tracking and adaptive fill
- Heavy land (.13”) (3.3mm) conventional bevel machine root using Metal Beam technology



Liburdi FireOptic lens

1920x1200
resolution
Scaled to 720P
Digital Capture





Thank You

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