Evaluating MIG Guns

Selection, Productivity, Ergonomics, and Maintenance

ABICOR BINZEL®

www.binzel-abicor.com

Evaluating MIG Guns

Panelists

Dave Detmer,
District Sales Manager
Central Mid-West, USA

Jim DiLeo,
Regional Sales Manager
Ontario & Western Canada

ABICOR BINZEL®

www.binzel-abicor.com

Evaluating MIG Guns

Selection – MIG Gun Ratings

Amperage	250 Amp	350 Amp	450 Amp	500+ Amp
Duty Cycle	60% for Air-cooled		100% for Water-cooled	
Gas Blend	100% CO2		Argon Mix	

Evaluating MIG Guns

Selection Criteria

- How many pounds of wire do you lay down daily?
  - Ultimate measure of productivity
- What features of the torch have greatest effect on this productivity?
  - Consumable performance
  - Torch versatility
  - Comfort for the welder

Evaluating MIG Guns - Productivity

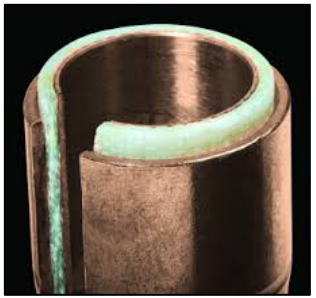
Consumables Performance - Nozzles

- Nozzles
  - Material & Thickness
    - Brass
    - Copper
    - Chrome or Nickel-Plated

- Slip-on vs. Threaded
  - Slip-on:
    - PRO: Fast removal
    - CON: Can promote spatter bridging, fall off
  - Threaded:
    - PRO: Secure & Concentric
    - CON: Usually higher priced; longer removal time

- Insulation
  - Electrical & Thermal Insulation
  - Fiberglass can become brittle
  - Other molded material: better performance under harsh conditions

Spatter bridges against tip. Interfere with shielding gas and nozzle now electrically hot and disrupt shielding gas



Evaluating MIG Guns

Productivity - Consumables – Tip Holders

- What does the tip holder do?
- May include gas holes drilled
- May have nozzle retaining spring or snap-ring
- Brass or Copper Material:
  - Brass – less conductive, reduces galling/seizing
  - Copper – better electrical conductivity, run cooler

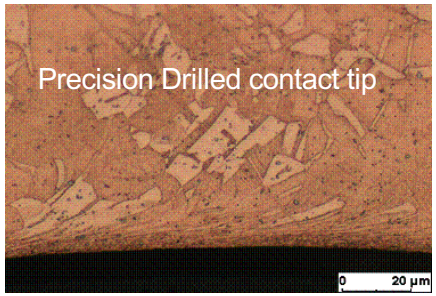
ABICOR BINZEL®

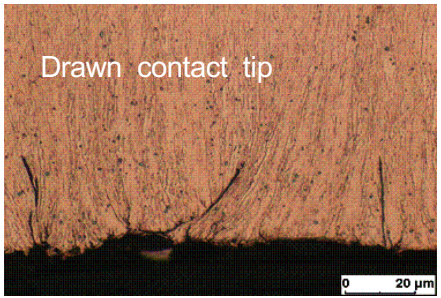
www.binzel-abicor.com

Evaluating MIG Guns

Productivity – Contact Tips

- What affects tip life? – Heat, Spatter, Skill
- Heat and Spatter:
  - Copper softens over time in the heat of the arc
  - Different materials hold up better than others
  - Tip Tolerance = Greater Wire Contact = More Arc Consistency
- How are Contact Tips made?
  - Drawn & Swaged
  - Precision-drawn
  - Precision Drilled





Evaluating MIG Guns

Productivity – Total Cost of Ownership

Process Improvement Calculator - Consumables	
Inputs	
Total Number of Cells	
Labor Rate w/ Overhead	
Avg tip change time (in minutes)	
Current Tip Price	
Proposed Tip Price	
Avg Diffuser change time (in minutes)	
Current Diffuser Price	
Proposed Diffuser Price	
Avg Insulator change time (in minutes)	
Current Insulator Price	0
Proposed Insulator Price	0
Avg Nozzle change time (in minutes)	1
Current Nozzle Price	$10.03
Proposed Nozzle Price	$13.07
Equipment Costs per Cell	$276.25

Initial Cost Outlay-Per Cell	$	276.25
Total Cells		42
Total Cost Outlay	$	11,602.50
Monthly Savings	$	3,256.68
Total Annual Savings	$	39,080.16
Payback Period in months		3.56

	Existing Nozzle	New Nozzle	% Change
# of nozzle changes monthly-Per Cell	3	1	-67%
Price	$10.03	$13.07	30%
Yearly Usage	1512	504	-67%
Total Nozzle spend annually	$15,165.36	$6,587.28	-57%
Labor Rate	75	75	
Time to change nozzle (in minutes)	1	1	
Total time spent changing tip	1512	504	
Total Labor changing nozzles	$1,890.00	$630.00	

	Existing Tip Holder	New Tip Holder	% Change
cell	2	1	-50%
	$6.05	$5.08	-16%
	1008	504	-50%
	$6,098.40	$2,560.32	-58%
	75	75	
s)	3	3	
	3024	1512	
	3780	1890	

	Existing TIP	New TIP	% Change
	30	15	-50%
Price	$0.79	$0.93	18%
Yearly Usage	15120	7560	-50%
Total Tip spend annually	$11,944.80	$7,030.80	-41%
Labor Rate	75	75	
Time to change tip (in minutes)	2	2	
Total time spent changing tip	30240	15120	
Total Labor changing tips	37800	18900	

ABICOR BINZEL®

www.binzel-abicor.com

Evaluating MIG Guns

Ergonomics

Study conducted at Justus Liebig University of Giessen

- Included more than 20 experienced professional welders
- Welding in 2 positions – welder sitting and standing
- Measuring all relevant muscle activity during welding in the arm, shoulder, neck and back
- Measuring blood pressure, heart rate and lactate scale

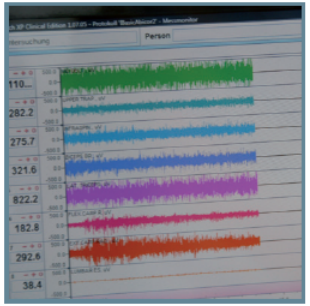
Key Welding torch designs in addressing ergonomics:

- Weight
- Balance
- Flexibility and Versatility

Sitting measuring position

Standing measuring position

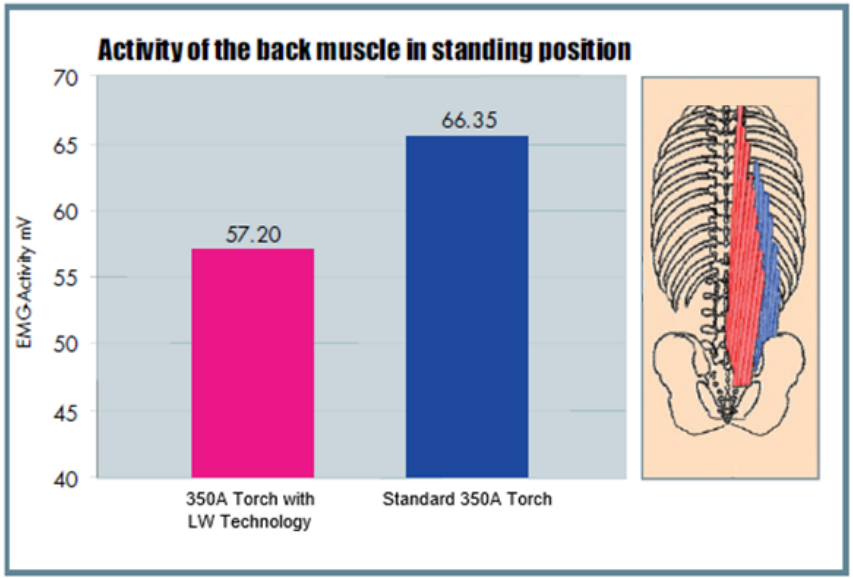
Position of electrodes and cabling

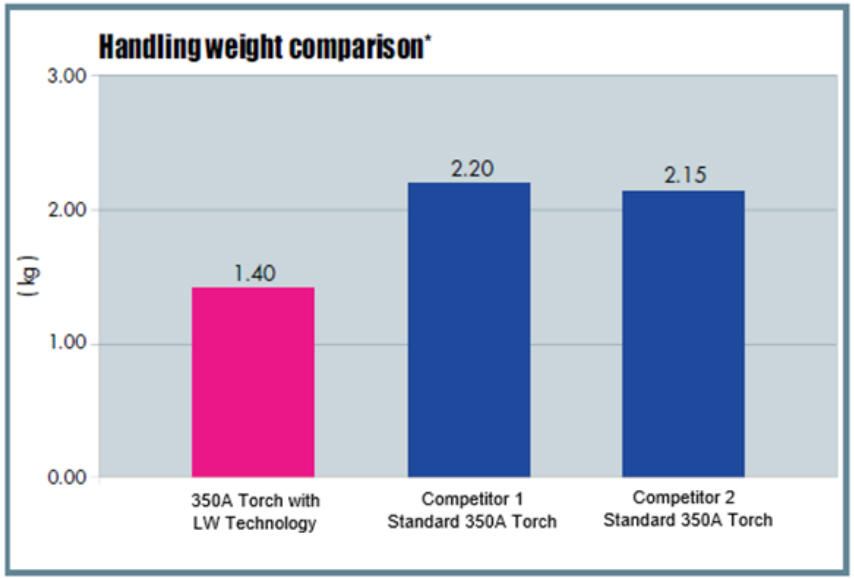


EMG-data

Evaluating MIG Guns

Ergonomics - Weight





Evaluating MIG Guns

Ergonomics – Weight

- Significantly reduced stress on back, shoulder and arm muscles
- Welders were able to weld longer and more consistantly
- Reduced feeling of exertion when using light weight torches
- Lighter weight welding torches on the market can be up to 50% lighter than standard torches

ABICOR BINZEL®

www.binzel-abicor.com

Evaluating MIG Guns

Ergonomics – Balance

Make sure there is good balance between the neck, handle and cable.

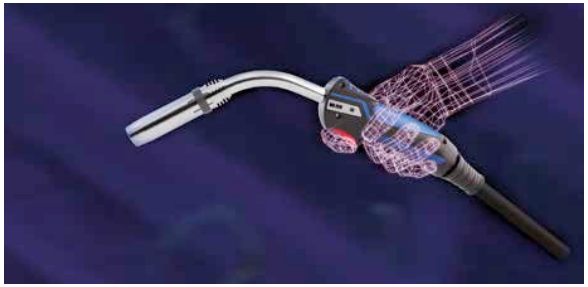
A balanced torch design can have a positive impact on the welder's health.

- Place finger under the handle and see where it balances
- Optimal balance is near the trigger
- Larger handles can result in added stress to the hand and wrist

Torch characteristics that affect balance:

- Length and bend of neck
- Cable weight and stiffness
- Size and weight of handle
- Spring or rubber strain release at rear of handle

Without the necessity to constantly fight an unbalanced torch, welders will notice a lot less neck pain during work.



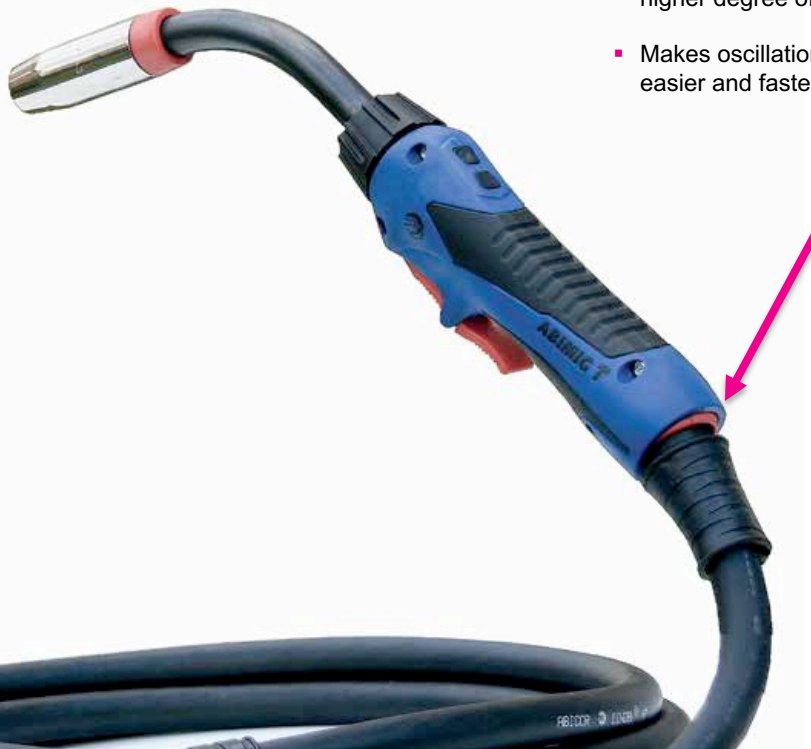
Evaluating MIG Guns

Ergonomics – Flexibility

Cables and Handles

- Stiff cables and rigid connection points causes the welder to constantly fight to get the torch in proper position.
- Inner core tube material used can help with flexibility

- A Polyethylene inner core is a good combination of flexibility and ease of installing wire liners.



- A Ball Joint at the rear of the handle offers a higher degree of flexibility
- Makes oscillation and the ability to maneuver easier and faster

ABICOR BINZEL®

www.binzel-abicor.com

Evaluating MIG Guns

Ergonomics – Versatility

Torch set up – Often the welder often has to adapt to new challenging welding jobs

- Consider a torch that uses rotatable and quick neck changes to suit the job at hand
- Difficult to access, tight spots are much easier for a welder to accomplish. Reduces straining to reach hard to access welds
- Some manufacturers have a wide range of possible combinations
- Trigger options – select a torch that has a comfortable trigger for your application
- Added cost benefit – reduced inventory

ABICOR BINZEL®

www.binzel-abicor.com

Evaluating MIG Guns

Durability and Maintenace - Intro to Maintenance

- The durability of your equipment is a direct reflection of how well it is maintained. Poorly maintained equipment is likely to have a poor lifespan compared to the equipment that is properly maintained
- MIG gun maintenance can be broken down into a few different parts, from daily, weekly, monthly, and bi-annual, following these checks will help to get the longest life possible
- Consult with you MIG gun manufacturer or your welding parts supplier to identify what maintenance should be done to your specific MIG gun

Evaluating MIG Guns

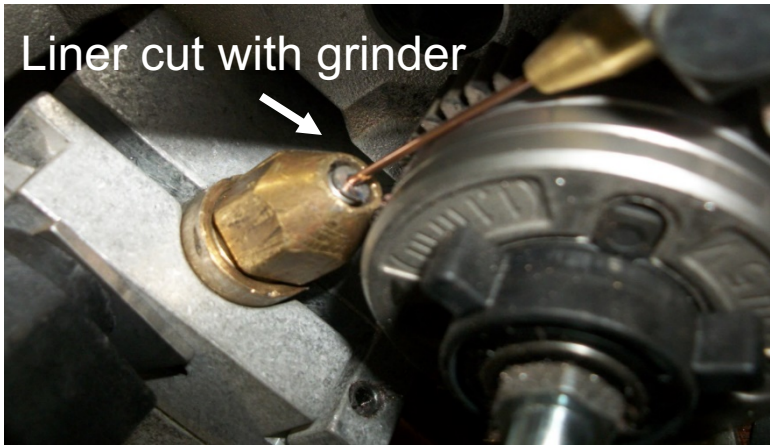
Durability and Maintenace - Contact Tips

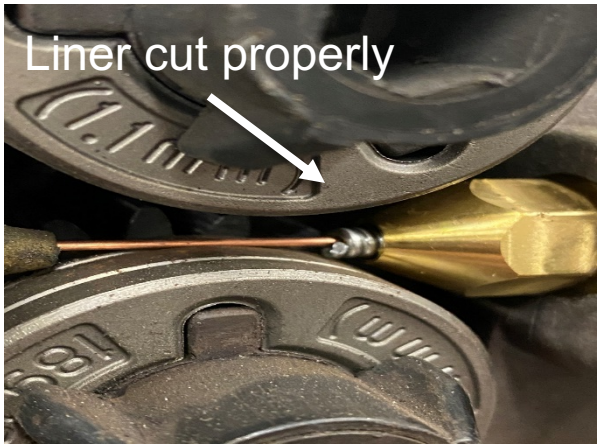
- One of the most replaced parts and most important parts is the contact tip, being that it is the most replaced part it can be the highest cost of downtime
- Two key habits to help with the life of tips is to make sure the tip is tight to the tip holder/diffuser and to make sure the tip stays clean and free of spatter adhesion. These two habits also go hand in hand with cleaning and maintaining a good connection of the nozzle and other front end parts.

Evaluating MIG Guns

Durability and Maintenace - Liners

- Excessive bends or loops in the weld cable should be minimized
- Proper cable length
- Liners should be paired up with the type of wire
- The wire need to be properly cut and any burr made from the cut needs to be smoothed with a file

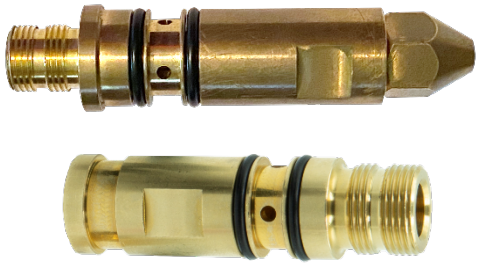




Evaluating MIG Guns

Durability and Maintenace - Feeder Connection

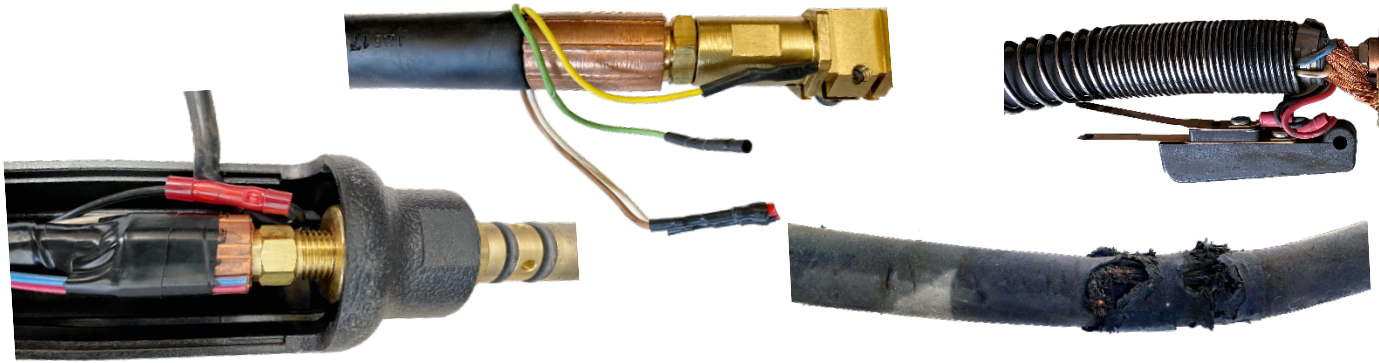
- The brass pin that connects to the feeder is the main point of transferring current from the feeder/power source to the welding lead
- Many manufacturers have various types of connections for the power pin and trigger circuit
- If the power pin isn't tightly fastened to the power source, the most common failures that will occur will be:
    - High resistance
    - Loss of Current Transfer
    - Arcing at the Rear Connect
    - Loss of shielding gas



Evaluating MIG Guns

Durability and Maintenace - Cable Assembly

- The cable assembly is primary carrier of current, gas, and wire
- Cables are largely an afterthought for the welder as it’s often out of sight while performing their job
- Some cables are repairable
- Many are replaceable with basic tools
- Spare trigger leads are sometimes inside the cable assembly
- Use a protective cable cover to reduce abrasions

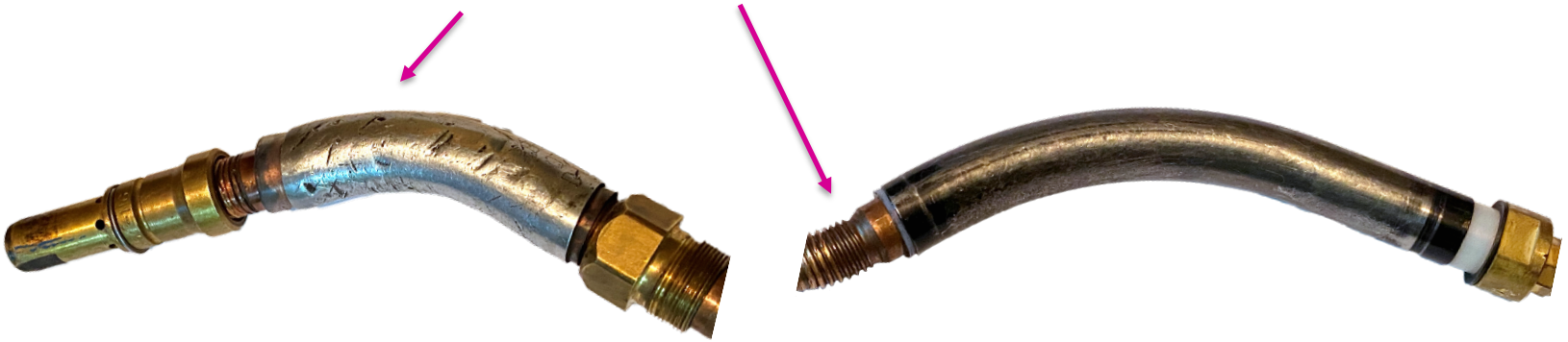


Evaluating MIG Guns

Durability and Maintenace - Torch Necks

- Torch necks come in various lengths and angles
- There is little repair that can be done to necks
- Do not use necks to move parts for fit-up, a neck is not a hammer
- Keep the neck to cable interface tight

Damages from hitting parts with neck



Evaluating MIG Guns

Durability and Maintenace – Maintenance Plan

- Learn the proper care and eliminate bad habits of poor maintenance
- The key is being consistent and monitoring good practices, remember your welding torch is a specific tool designed to weld, use it as such
- Creating a preventative maintenance plan will help in getting the most possible life out of your investment

Preventative Maintenance Schedule	Daily	Weekly	Monthly
Visually inspect tip oriface	X		
Check tightness of tip	X		
Check tightness of nozzle	X		
Check tightness of tip holder/diffuser	X		
Check tightenss of neck to handle		X	
Check tightness of rear power pin		X	
Check cable for abrasions/cuts	X		
Check wire liner for wear		X	
Lube O-Rings on power pin			X
Lube O-Rings on water-cooled neck			X

Evaluating MIG Guns

Conclusion

- Key items to keep in mind when selecting your next MIG gun
    - Selection – Gun Ratings
    - Productivity – Cost of Ownership and Performance
    - Ergonomics - Weight, balance, flexibility, and versatility will keep you comfortable
    - Maintenance – Select a gun that is maintenace friendly

Evaluating MIG Guns

Contact Information

Dave Detmer,
District Sales Manager
Central Mid-West, USA
ddetmer@abicorusa.com
573-823-4171

Jim DiLeo,
Regional Sales Manager
Ontario & Western Canada
jdileo@binzel.ca
416-985-3824

ABICOR BINZEL®

www.binzel-abicor.com