Improving your wire feed with intelligence

Masterliner and SMARTBOOSTER

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Panelist

Tom Graham,
Director, Key Accounts Group
ABICOR BINZEL USA

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Wire Feeding Basics - What to Know?

Typical issues with wire feeding

- Addressing high pulling forces
- Long distance between wire source and process feeders
- Dress out limitations

Hardware Considerations

- Liner selection - materials / options
- Variations of booster offerings
- Tunability to the process

Information at your fingertips

- Process data
- How to use it

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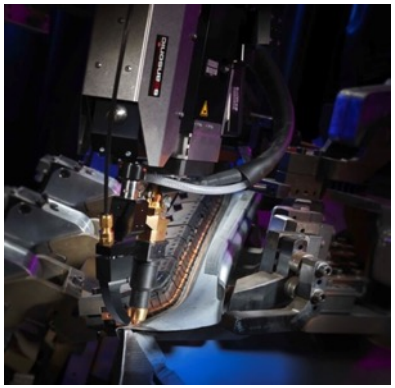
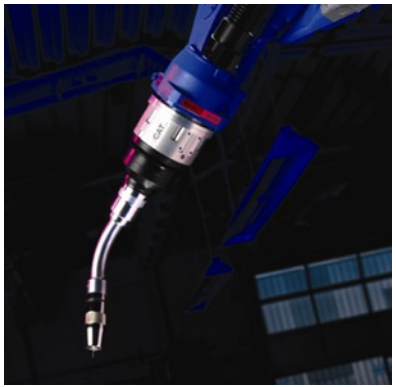
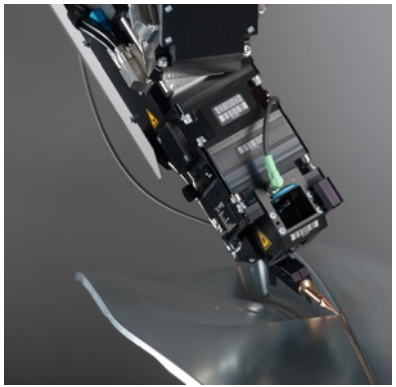
Wire Feeding Basics – Where is it Applied in Automation?

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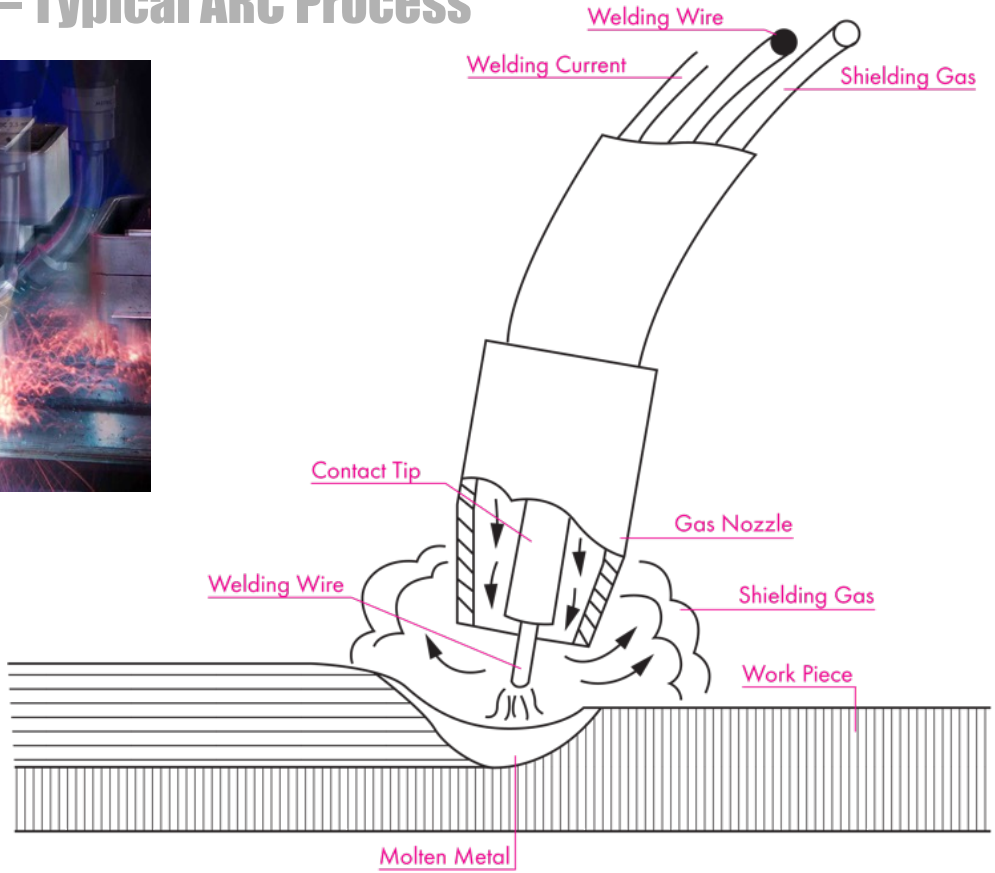
System Description – Typical ARC Process



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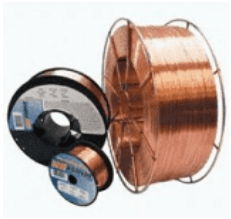
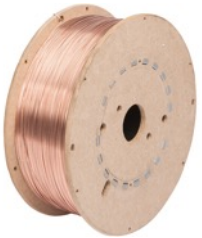
System Description – Wire Delivery Options





Drum Fed wire

- Less Frequent change
- Helix of wire (twist)
- Harder to handle

Spool Fed wire

- More Frequent change
- Cast of wire (bend)
- Easier to handle

The manner in which the wire is supplied directly impacts how the wire feeds through the system and into the process

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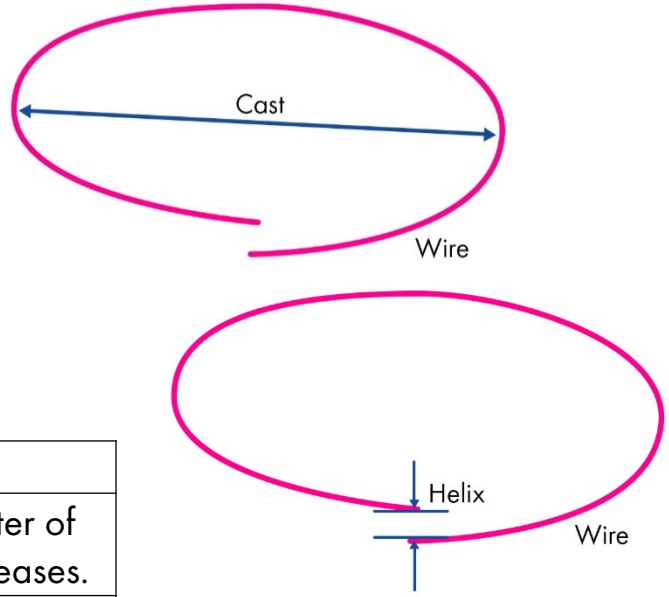
System Description – Properties of Welding Wire (Cast vs Helix)

Wire Cast – the diameter of the circle the **wire** forms when it's cut from a spool and laid on a flat surface

Wire Helix – the vertical height from the flat surface



	Drum	Spool
Cast	Fairly constant	Changes closer to center of spool as diameter decreases.
Helix	Can vary from drum to drum. Shows up as a "twist" in the wire	Fairly constant

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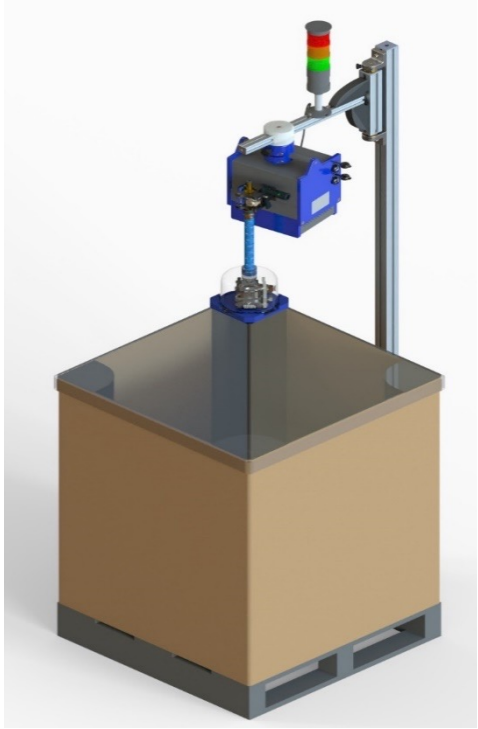
System Description – Wire Conduits



TWISTER:

THE ULTIMATE «TENSION RELIEVER» FOR BRAZING AND ALUMINIUM WIRES (RECOMMENDED FOR 5000 GRADES)

Version with Connector for Masterliner

Wire Straighteners

- Wire straighteners can be added to system to help address cast / helix issues that can impede smooth feeding

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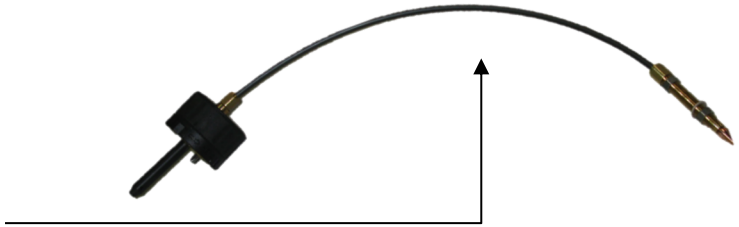
Master Feeder System V3 – Liner Options

Part Number	Liner Type	Wire Size	Abrasion Resistance	Wire Type	Temp Range	Liner Description
125.0006	PTFE	0.035-0.045	Better	All	Med Temp	PTFE = Teflon
125.0007	C-TFE	0.035-0.045	Better	Stainless, Fluxcore, Aluminum E5356	High Temp	C-TFE = Carbon infused Teflon
125.0008	PA	0.035-0.045	Good	Smaller ga. All wire types	Low Temp	PA = Polyamide is a carbon filled nylon
125.0016	PA	0.052-0.062	Good	Smaller ga. All wire types	Low Temp	PA = Polyamide is a carbon filled nylon
125.0026	PTFE	0.035-0.045	Good	Up to 0.045". All wire types	Med Temp	High density Teflon
125.0030	PTFE	0.052-0.062	Good	Up to 0.045". All wire types	Med Temp	High density Teflon
125.0033	PA	0.030-0.040	Good	Smaller ga. All wire types	Low Temp	PA = Polyamide is a carbon filled nylon

Various liners for front end delivery available. Designed to fit assortment of process requirements to provide best possible long term performance



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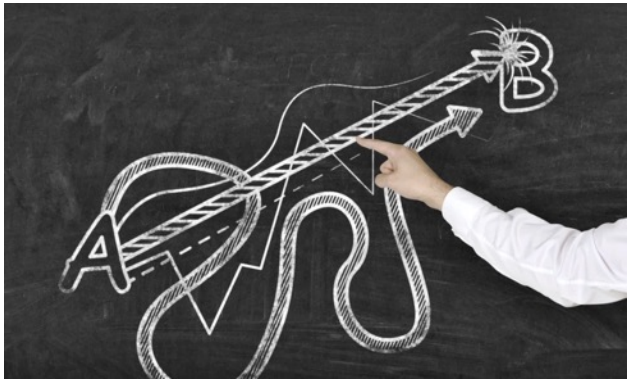
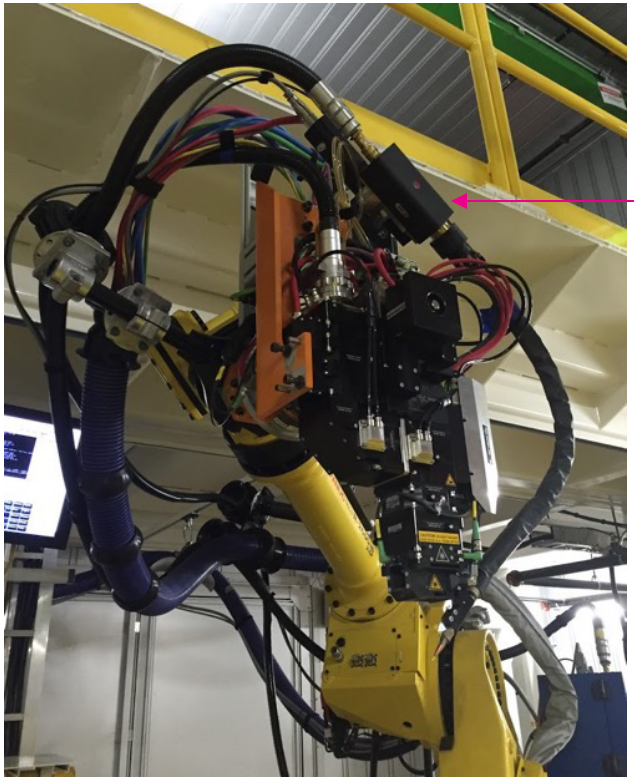
System Description – Wire Conduits



Shortest Distance between 2 points is a straight line

Dress out of torch cable / wire feed conduits critical to ensure the smoothest feeding of wire



MasterFeeder System MFS-V3

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Auxiliary Rear Feeders

What is an auxiliary rear feeder?

There are two types of assisted feeding systems:

- Push-push
  - Where the two feeders are electrically connected and interacting between themselves
- Stand-alone/push-pull
  - Where the rear feeder acts independently from the front feeder

How does a push-push system work?

How does a standalone/push-pull rear feeder work?

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System Description – Wire Boosters

Wire Boosters

Boosters are utilized to help support pushing wire over longer distances. They range from simple pneumatic to advanced electronic controls / recording.

What stand-alone systems are available on the market?

- **Pneumatic Boosters**
  - Air assist motors
- **Electric Boosters**
  - SmartBooster

Pneumatic,
Clutch based

Electronic,
Automation ready

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SMARTBOOSTER and Masterliner MAXI FLEX and HD

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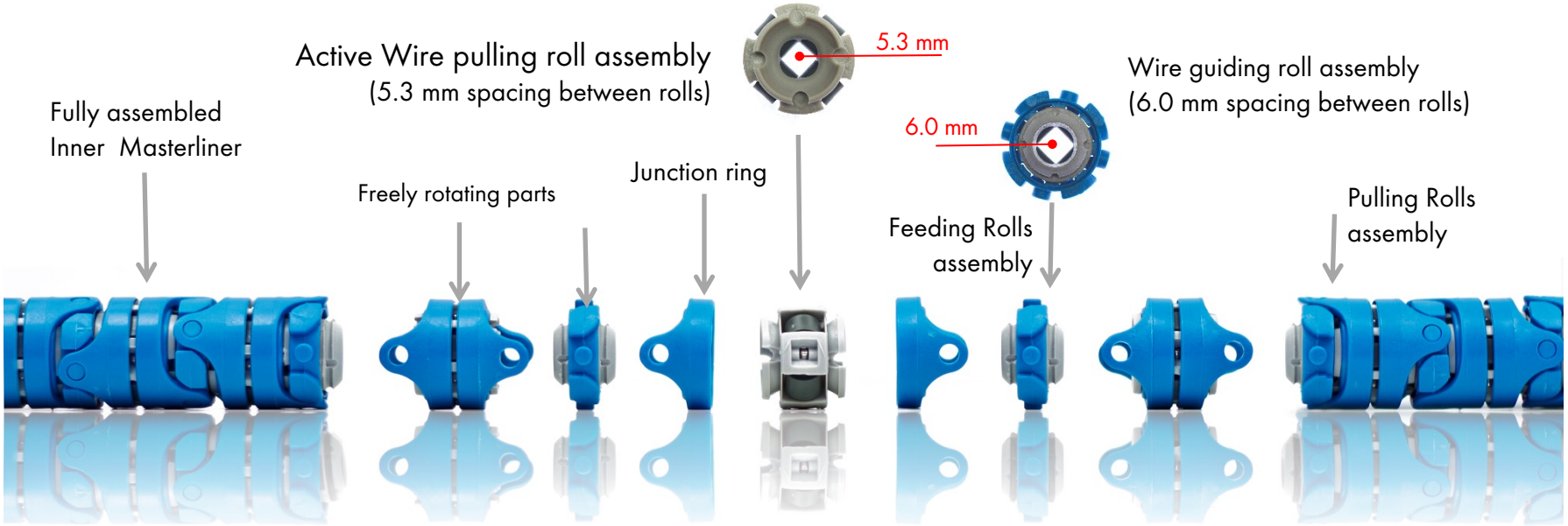
SMARTBOOSTER and Masterliner MAXI FLEX and HD



INNER MASTERLINER COMPONENTS & DESCRIPTION

Each assembly rotates freely to easily discharge tensions built by liner torsions

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System Description – Wire Conduits

HD

FLEX

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System Description – Wire Conduits

Liner Dimensions and Weight

Bare uncoated:	OD 26mm (1.06″) Weight: 0.46 Kg/mt (0.31 Lb/Ft)
HD (aramid fibers coating)	OD 31mm (1.22″) Weight: 0.54 Kg/mt (0.36 Lb/Ft)
FLEX (corrugated outer hose)	OD 35mm (1.38″) Weight: 0.49 Kg/mt (0.32 Lb/Ft)

Wire Diameter Range Recommended

All wire diameters from 0.80mm (0.030″) thru 4.00 mm (5/32″)

Length Considerations

Available in standard lengths in typical 1M increments – 3, 5, 7, 8, 10, 12, and 15M
Maximum lengths available up to 90M

Bend Radius

Minimum bend radius – 150mm (suitable for dress out on robot or in cat track)

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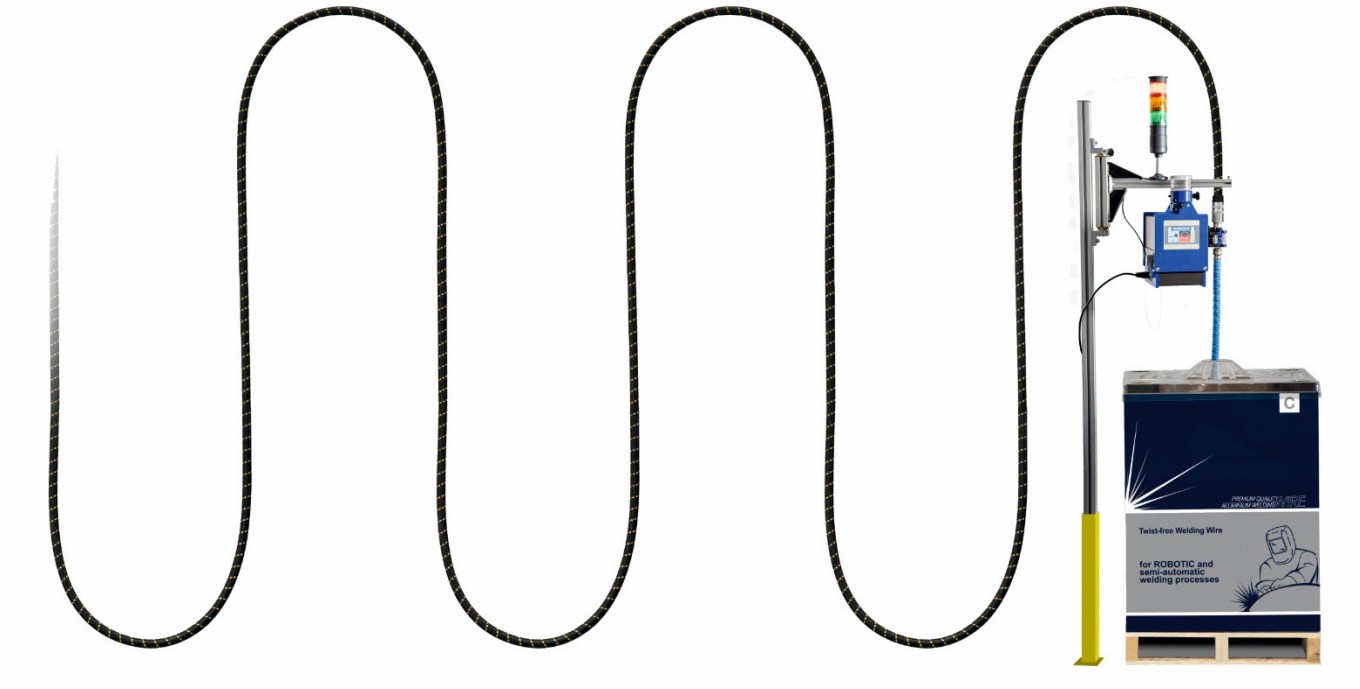
SMARTBOOSTER & MASTERLINER



THE COMPLETE SOLUTION FROM PACK TO FEEDER

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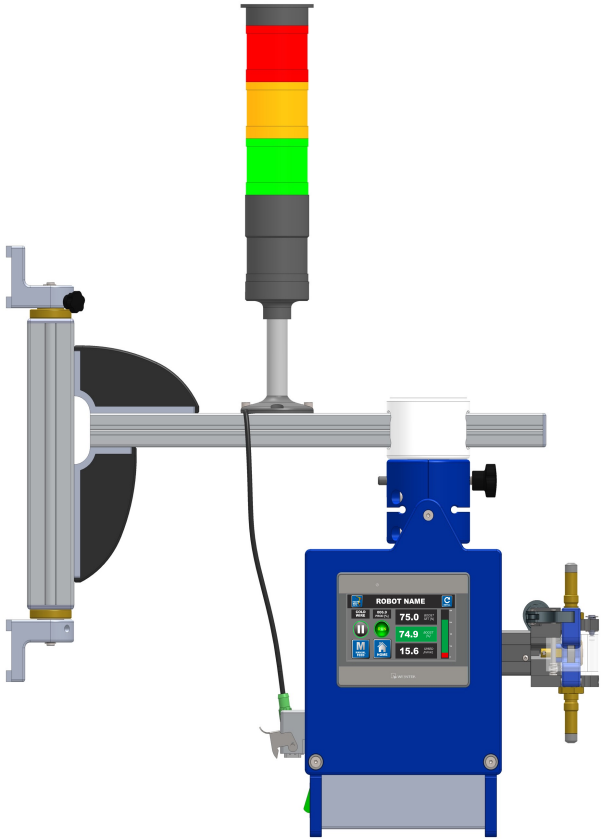
Improving Your Wire Feed with Intelligence

SmartBooster and MasterLiner MAXI FLEX and HD

- STAND-ALONE electric rear feeder assistant, with minimum maintenance required (periodic replacement of the pushing wheel).
- Software controlled brushless DC motor activated by either tension / pulling on the wire (Cold Wire Mode) or by a voltage pick up on the wire when the arc is initiated (Voltage Mode)
- Universal 24V transformer works with all world voltages. Works with standard 110V – 60 hz.
- SmartBooster, being electrical, does not require expensive compressed air to operate, unlike pneumatic feeders commonly used on the market.
- The touch screen control allows an accurate digital adjustment of the device functions and settings
- **It is password protected to prevent unwanted changes.**
- USB and Ethernet ports for remote controls (4.0 compliant).
- Recording of cell welding & performance data and actual wire usage during the welding process.
- Low wire level alert signal and proximity sensor detecting end of wire in pack.
- External light tower (three lights) for easier visual activity monitoring and warning.
- Possibility to connect more devices via a wifi access router.



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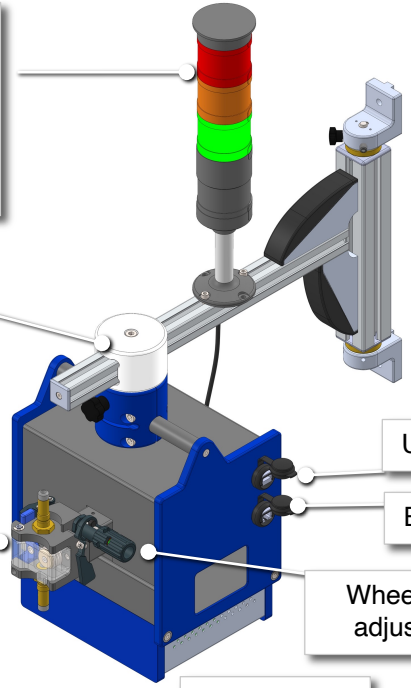
SmartBooster and MasterLiner MAXI FLEX and HD

Alarm and function Light tower with 3 colours:
- Red
- orange
- green

Swivel connector

Wheel Protection cover



USB port

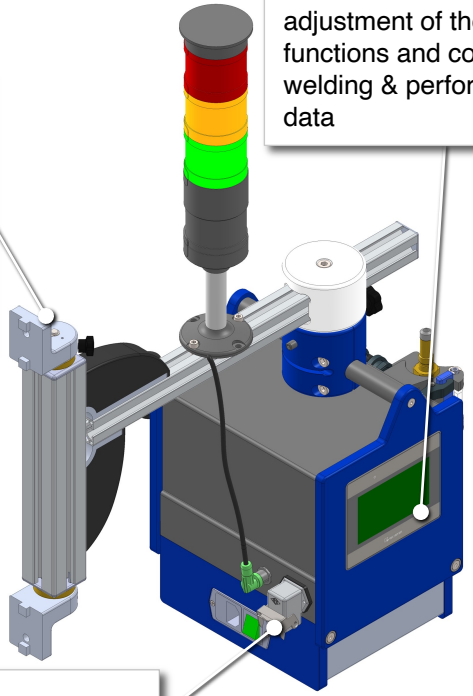
Ethernet port

Wheel pressure adjusting knob

Driver and transformer aeration grid

Swinging support arm complete with ball-bearings, brake, as shown in the picture. The combination of swinging arm and top swivel Booster connector considerably facilitates the pack moving and replacement procedures.

Touch screen control: allows an accurate adjustment of the device functions and collects cell welding & performance data



Alarm light connection

Connection for :
- wire insert
- wire retract
- low wire level signal output

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SmartBooster

Internalized ROI functionality (Pneumatic vs. Electric)

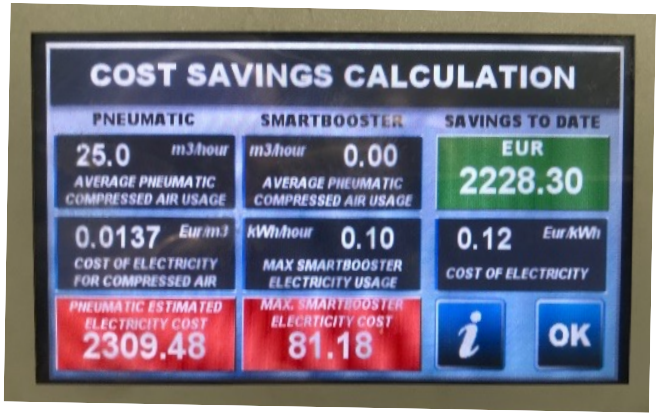
Enables straight line comparison on electrical usage of the unit itself vs. the electricity required to provide compressed air for a pneumatic unit

SAMPLE DATA USED FOR CALCULATION

Compressor output (acc. to Pn2 CPTC2)	m3/h	303
Operating Temperature (t)	°C	20
Operating Pressure	bar	8
Total Power Usage	kW	31.89
Motor Efficency (protection degree IP 54)	η_m	92.50
Total Power Input from Mains	kW	34.47

OK

Note: the above calculation does not take into account possible idle periods



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SmartBooster

Light Tower Functions

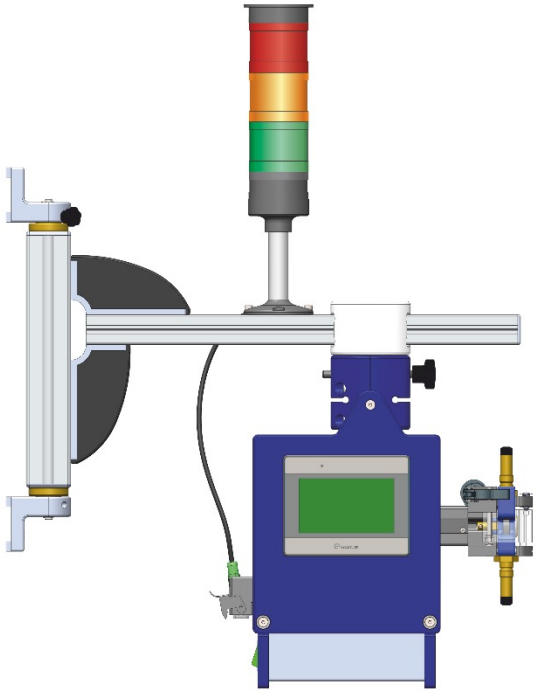
Each booster is equipped with 3 color light tower: Red, Green, and Orange

Red Light – indicates an anomaly (system is in pause, an error is present, or is not in Auto) and immediate intervention or corrective action is required by the operator

Red + Green Light (together) – suggests pushing wheel is turning at an excessively high speed. This is due to either the wheel pressure adjustment is incorrect or there is no wire pushing through the system (i.e. out of wire)

Orange Light – signals when an electrical signal is detected on the wire.

Green light – when it flashes intermittently on and off, it indicates that the SmartBooster is turned on and in standby mode. When continuously lit, it shows that the SmartBooster is working correctly and is actively pushing the wire.



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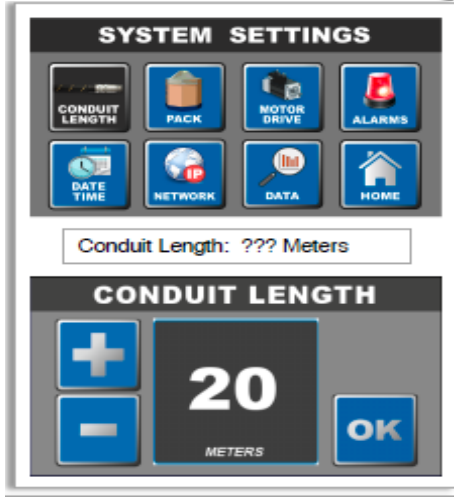
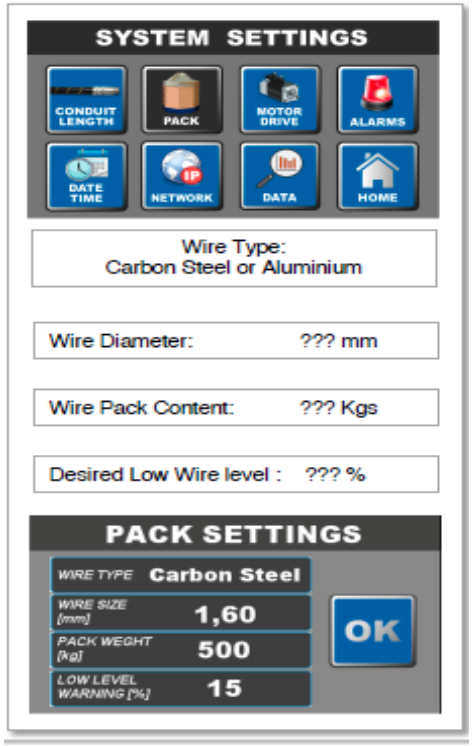
SmartBooster

Initial setting of device operating parameters – Conduit, wire and pack





These settings are the basis to providing correct data for the processing and recoding of several SmartBooster functions, such as

- The automatic initial inserting of wire through the Masterliner
- The measurement of the amount of wire inside the bulk pack
- The amount of wire deposited during the welding process.

Formulas provided are fairly accurate being they are based on the average diameter of the wire taking into account the min and max sizes specified by industry. By utilizing the specific gravity of the material, a per unit area mass can be provided. This will enable a calculation to correlate the mass / specs of wire into a length in the barrel.

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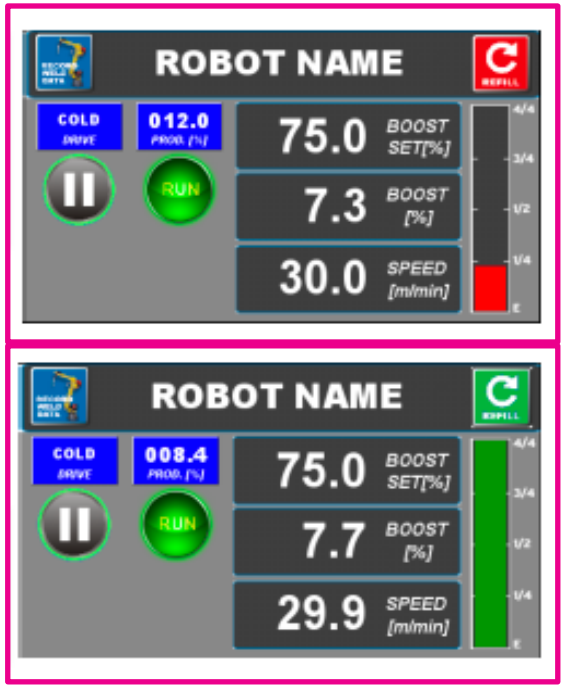
SmartBooster

Alarm Options / Wire Pack Content Meter and low wire reserve level

The Alarm options menu can be accessed the the Alarm command in the SETTINGS menu screen

The Active ALARM OPTIONS provide both audible and visual options as necessary.



While wire is being fed by the SmartBooster, the meter shows the actual quantity remaining inside the pack.

After the wire quantity reaches the set low level warning, the meter bar and refill command icon change from green to red.

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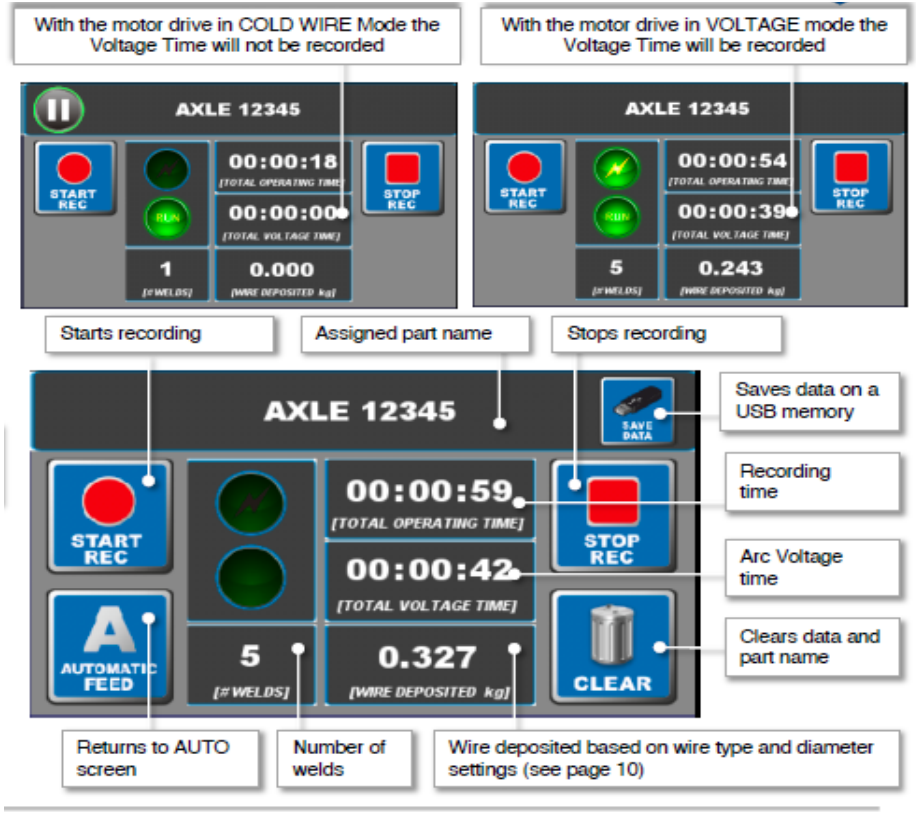
SmartBooster

Recording and saving of weld data

System provides the ability to record weld data from the Auto Screen.



The **WELD DATA** screen provided options to record all the wire deposited, welds done over a certain time interval, weld sequence or a single welded part or a group of parts.

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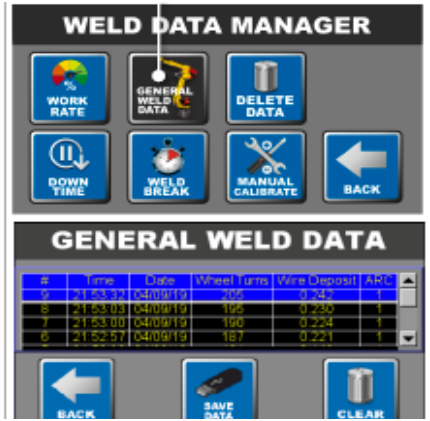
SmartBooster

Weld Data Manager

WORK RATE will provide information on the overall robot cell productivity the value (%) is given by the total device on time and the total “wire feed” time of the Smartbooster pushing wheel.

DOWN TIME provides information saved by the operator with ability to report unwanted stops and their causes.

GENERAL WELD DATA provide information on all of the welds done and recorded during the past 7 days. Information automatically overwritten unless saved.



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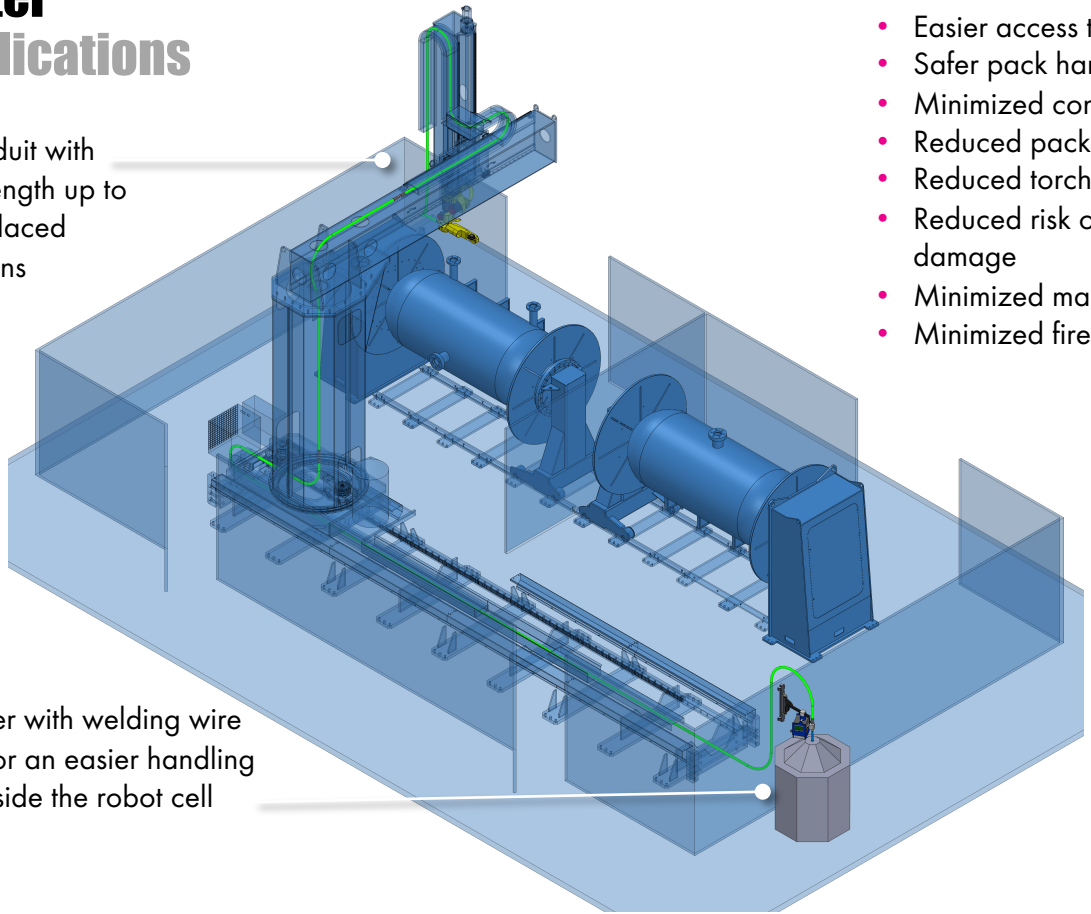
SmartBooster
Typical applications

The Masterliner conduit with rolls (of a variable length up to 90 meters) can be placed inside the cable chains (axes x,y,z)



Extra large container with welding wire safely positioned (for an easier handling and inspection) outside the robot cell compound

Advantages

- Easier access to pack and wire for inspection
- Safer pack handling
- Minimized content – maximized productivity
- Reduced pack changeover downtime
- Reduced torch tip consumption
- Reduced risk of pack (lifting) handling damage
- Minimized maintenance costs
- Minimized fire hazard during welding

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SmartBooster

Typical applications – Safer Setups

Hazardous setup with packs traveling high to minimize distance to wire feeder. Besides the risk for the operator, the pack change process costs production downtime.

In the picture a 250KG pack on a carriage to minimize distance between the pack and the wire feeder

Safer environment with packs on the floor and no need to climb to dangerous elevations to change packs.

In the picture a 550KG pack with carbon welding wire smoothly fed through 35 meter MaxiGlide placed inside the cable chains and the pack safely on the floor

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SmartBooster

Typical applications – Safer Setups

Hazardous setup with packs traveling high. Besides the risk for the operator, the pack change process costs production downtime and the wire is exposed to contamination.

In the picture a 40KG spool with welding wire mounted on a moving arm to minimize distance between the pack and the wire feeder

Safer environment with packs on the floor and no need to climb to change the spool.

In the picture a 400KG pack of aluminum wire smoothly fed through a 15 meter MaxiGlide inside three cable chains and the pack safely on the floor

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Typical applications – Novarc SWR – Spool Welding Robot

The SWR is a compact boom based cobot based system for pipe welding applications.

Requirements of system needed wire feed to run up boom and across arm. The combination of Masterliner and SmartBooster helped solve their wire feed issues

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Typical applications – The Wire Farm

Increase productivity and decrease space taken up by wire drums

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SmartBooster & MasterLiner - Overview

What applications would benefit mostly from the combined action of SmartBooster and Masterliner?

- All moving robots where, for safety and efficiency, the conduit transporting the wire should preferably travel inside the cable tracks.
- Large gantries where the bulk pack, which is required to carry a limited quantity of wire, can no longer be placed high due to the dangerous nature of servicing. When placed on the floor the pack, end result provides the opportunity to contain a larger amount of wire thus improving efficiencies related to downtime savings.
- Booms (also suitable in manual welding applications) where changing the spool from a handing or suspected wire feeder as these represent a possible hazard. As in the previous case, productivity can be enhanced by placing wire in a more serviceable position which provides reduction in changeover times offered by a bulk pack as opposed to a conventional small spool
- Wire Farms with numerous bulk packs that are concentrated in one area enabling wire to be transported as far as 300 ft to the process

Improving Your Wire Feed with Intelligence

SmartBooster & Masterliner - Overview

What are the advantages offered by the SmartBooster?

The SmartBooster offers several unique features:

- Precise adjustment via touch screen and digital controls.
- A visual combination of color codes (both on the touch screen and the light tower) instantly alerting the operator in case of errors or simply confirming that the device is working correctly and actively pushing the wire.
- Collection and recording of productivity data.
- Possibility to connect the device to a router and to view one or more SmartBoosters via WI-FI on a remote computer terminal or on a mobile phone connected to the same wireless network.

When should a SmartBooster be retrofitted to a Masterliner ?

- When the Masterliner is longer than 30ft (10M)
- When the Masterliner has many curves
- When a Masterliner is traveling inside the cable tracks

Can a SmartBooster also work with conventional conduits ?

- Not necessarily: the SmartBooster is designed to specifically react to any friction inside the conduit and resistance to wire advancement. It has been developed to cooperate with the Masterliner conduit whose rolls minimize friction, especially at the curves.

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QUESTIONS?

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Contact Us!

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