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What's New with SST™ Cold Spray Technology


BEST MANAGED COMPANIES

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About CenterLine


- Celebrated our 60th Anniversary in business in 2017
- Privately held, Windsor Ontario Canada based organization.
- Current North American annual sales of nearly \$200M.
- Over 43,670 m² (470,000 sq.ft.) of manufacturing space in four (4) facilities in Windsor housing five (5) divisions: **Machinery, Electrodes, Automation Components, Supersonic Spray Technologies (SST) and Mechatronics** (opening Summer 2018)
- Expertise in a variety of processes including: **Resistance Welding, GMAW, Metal forming, mechanical assembly, Cold Spray coatings.**
- Nearly **850** employees in Windsor facilities, **1100** worldwide
- Main customers : **Tier 1 & 2 auto part suppliers and automotive OEM's.**



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Locations



- Canada: Windsor, Ontario
- Mexico: Hermosillo, Querétaro, Cuatrecasas
- United States: Troy, Michigan; Hoover, Alabama
- Germany: Irndorf/Bach
- Romania: Pitești
- China: Guangzhou
- India: New Delhi
- Brazil: Guararimirim - SC

<ul style="list-style-type: none"> • Machinery Division • Automation Components Division • Electrodes & Allied Products Division • Supersonic Spray Technologies Division • CenterLine Welding Products, Inc. • CenterLine SE USA Sales Office 	<ul style="list-style-type: none"> • CenterLine Mexico • CenterLine-Seubert GmbH • CenterLine Romania SRL • CenterLine Brasil Ltda. • CenterLine India Pvt. Ltd. • CenterLine Welding Technologies (Guangzhou) Co., Ltd. China
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Recent Highlights



- Winner of Canada's **Best Managed Companies** award (2013-2015). **Gold Standard** status for 2016 & 2017.
- Windsor-Essex Regional Chamber of Commerce 2016 Business Excellence Award Winner- **Large Company of The Year.**
- Committed to skilled trades development, currently employ **nearly 65 apprentices.**
- A major sponsor of **FIRST Robotics** and **FIRST Lego League** . Sponsoring eight (8) local high school teams. Many staff volunteers serving as mentors.
- Building our 4th facility in Windsor. The **Mechatronics Div.** to manufacture configured machinery brand products solutions
- Planning to add a new Michigan Division in 2018 to support the installation and commissioning of custom automation projects in the United States.

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- The facility has approximately 72,000 square feet of plant space with a two floor office area of 13,000 square feet for a total of 85,000 sq.ft (7,700 m²).



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SINCE 2003

- SST Cold Spray Equipment
- SST Consumables
- SST Cold Spray Powders and Blends
- SST Custom Integrated Systems
- Spray shop for applications development & qualification



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CenterLine's SST Division is pleased to announce a significant product upgrade to our portable cold spray product offerings



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- Introducing **SST™ PX** and **SST™ EPX**; a product update to **SST Series P** and **Series EP** Cold Spray systems
- Updated models deliver significant improvements in operating range, efficiency and reliability while realizing greater up-time, better process control and reduced maintenance interval needs
- The PX and EPX models will replace the Series P and Series EP




SST PX

SST EPX

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centerline SST PX / SST EPX
What's changed / what's stayed the same

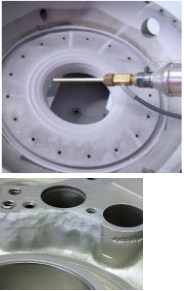


- Updated HMI control for precise process control and storage of multiple recipes.
- New feeder system improves feeding consistency, powder changeover with reduced maintenance – can switch between two separate powders.
- Plug & Play configuration to facilitate adding and removing spray gun, cables, feeders, etc.
- Same compact envelope dimensions for a compact and portable solution.
- Production proven components
- Solid equipment design and build assembly practices from over 60 years of machine building experience

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centerline Focus on **PRACTICAL Cold Spray**

- **Process Cost**
- **Reliability**
- **Repeatability**
- **Maintainability**
- **Productivity**



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PROCESS COST

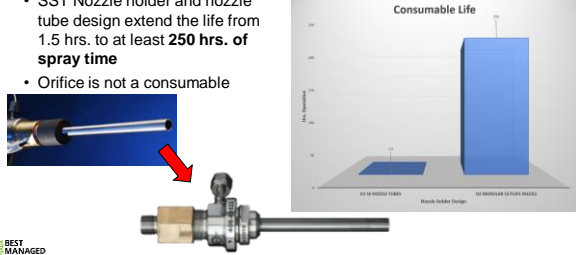
- ✓ Increase Consumable Service Life
- ✓ Reduce consumable cost per lbs sprayed
- ✓ Reduce non productive time
- ✓ Reduce cost per lbs sprayed

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Increased Consumable Service Life

- SST Nozzle holder and nozzle tube design extend the life from 1.5 hrs. to at least **250 hrs. of spray time**
- Orifice is not a consumable

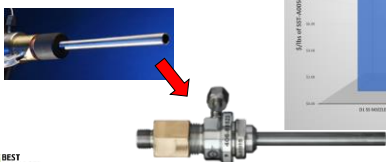


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Reduce Consumable cost per lbs sprayed

- Nozzle holder and nozzle tube reduces the operating cost from \$10.50/lbs. to approx **\$2.52/lbs.**



Consumable Cost/lbs of SST-A0050 Sprayed


Design	Consumable Cost / lbs
3/8" IN NOZZLE TUBES	10.50
NOZZLE DESIGN	2.52

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Reduce Consumable cost per lb sprayed

- New SST powder feeder design reduces operating cost from \$3.84/lb to **\$0.29/lb ***



Consumable Cost /lbs of SST-A0050 Sprayed

Design	Consumable Cost / lbs
HERMABLOC FEEDER	3.84
FEEDER DESIGN	0.29

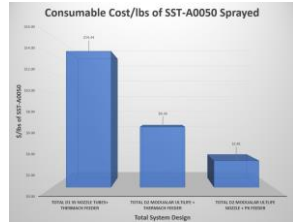
* Based on data for SST A0050 powder

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TOTAL Consumable cost savings per lb sprayed

- Combining all the improvements the new system improves from \$14.34/lbs. to \$2.81/lbs., a savings of **\$11.53/lbs. or 80.4% reduction in operating costs.**



Consumable Cost/lbs of SST-A0050 Sprayed

Design	Consumable Cost / lbs
3/8" IN NOZZLE TUBES HERMABLOC FEEDER	14.34
NOZZLE DESIGN HERMABLOC FEEDER	3.84
NOZZLE DESIGN FEEDER DESIGN	2.81


Total System Design

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Reduce non productive time

- New SST powder feeder design improves maintenance interval time requirements from 258 min./100 lbs. to **.57 min./100 lbs.**



Maintenance Interval

Design	Maintenance Interval (min./100 lbs)
HERMABLOC FEEDER	258
POWDER FEEDER DESIGN	0.57

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Reduce Non Productive time

- The decrease in the maintenance interval and maintenance repair times will substantially improve the equipment up time available for production
- Down time has been improved from approximately 10 min/ spray hr. to about 1 min/spray hr

	Existing System		Updated System	
	Operating Life (min)	Operating Life (min)	Improvement	% Improvement
Nozzle Consumable Cost	90 min	15000 min	14910	99.40%
Feeder Operating Cost	Maint interval/100 lbs. sprayed	Maint interval /100 lbs. sprayed		
	258 min.	.57 min	257.43	99.78%

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RELIABILITY

- ✓ Powder feeder
- ✓ Gas heater
- ✓ Nozzle orifice


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Reliability Improvements

- New feeder design is manufactured from production proven, commercially available, hardware.
- Feeder is non clogging, and requires reduced maintenance (estimate 1000 hours of run time before need for seal service)
- Less than 10 minutes for powder changeover. Can also change entire feeder within 5 minutes to optimize run-time.
- Powder volume capacity up to 540 ml per feeder – 2 feeder canisters /machine
- Orifice is not a consumable-two part nozzle design
- UltiLife™ and UltiFlow™ nozzle technology provide long life and anti-clogging capability .



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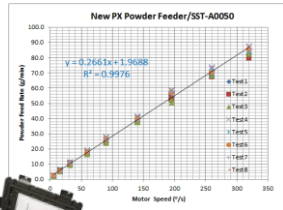
REPEATABILITY

- ✓ Heater Control Loop
- ✓ Calibration Tools
- ✓ Nozzle quick change
- ✓ Powder feed rate

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- Redefined heater control loop for **improved temperature stability**.
- **SST Calibration Kit** available to verify temperature and pressure operating parameters
- Quick change adapter design for nozzle positioning/exchange
- Powder feeder design provides improved feed linearity **independent of powder fill levels**.



Linear relationship between motor speed and powder feed rate



MAINTAINABILITY

- ✓ Nozzle quick disconnect
- ✓ Powder feeder maintenance

- System is designed for ease of maintenance
- Nozzle change quick disconnect
- New powder feeder design allows powder changeover in less than 15 min
- New powder feeder has increased time between maintenance intervals compared to commercial feeders
- New powder feeder design prevents clogging for non free flowing powders.




PRODUCTIVITY

- ✓ Warm up ready time
- ✓ Fully integrated powder feeder
- ✓ Wide range of feed rates
- ✓ Non pressurized powder feeder

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Productivity Improvements

- Warm up time to stable temperature less than 60 seconds
- New feeders are fully integrated into PX & EPX Cold Spray machines
- Feed rates up to 125 g/min compared to 80 g/min for previous design
- Non-pressurized design is **practical, simpler and more reliable.**



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PX Robotic
17 bar - 4.25KW

PX Manual
17 bar - 3.8KW

SERVICE REQUIREMENTS
Electrical
240V+- 2% AC Single Phase, 30Amp

WEIGHT & DIMENSIONS
Manual Gun
approx. 4.5 lb (2 kg) not including cable

Cabinet
approx. 150 lbs (68.2 kg)

Cabinet size
21.5" W X 20" Deep x 44" H
(546 mm X 508 mm X 1,118 mm)

Pressurized Powder Feeder
100 lbs. (45.5 kg)



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EPX Robotic
34 bar - 15 KW


SERVICE REQUIREMENTS
Electrical
480V+- 2% AC 3Ø, 30Amp

WEIGHT & DIMENSIONS
Automatic Gun
approx. 50 lbs. (22.7 kg) not including cable

Cabinet
approx. 165 lbs. (75 kg)

Cabinet size
25.5" W X 20" Deep x 44" H
(648 mm X 508 mm X 1,118 mm)

Pressurized Powder Feeder
100 lbs. (45.5 kg)



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SST PX Integrated Walk in-Manual

Custom Designed 87" Deep x 72" Wide x 7.5' High
Booth enclosure complete with 6' x 3.5' x 3' High work surface
5000CFM Wet Dust Collector Unit
Volumetric Powder Feeder
Integrated safety equipment
NEMA 12 electrical cabinet
Integrated air pressure regulators



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centerline SST Cold Spray Equipment

SST PX Integrated Cabinet-Manual/Automatic




36" x 60" Cabinet for Manual&Automatic Spraying
 Work area each side 30"X 30"X 26"
 Durable Non Spark Aluminum Construction
 Volumetric Powder Feeder
 2 Axis Cartesian Robot 300 mm X 300 mm travel
 Integrated safety equipment
 NEMA 12 electrical cabinet
 Integrated air pressure regulators

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SST PX Integrated Cabinet-Robot 6 axis



Robotic Spray system
 Volumetric Powder Feeder
 6-axis Motoman robot
 Rotary table 200 Lb capacity max. rpm 200
 OD: 8'-8" w. x 5'-8" D. x 6'-8" H.
 4" thick Type "H" wall, ceiling, and floor Panel system for noise reduction
 16 Ga. Solid exterior face, 4" Acoustic fill, bonded mat.
 22 Ga. perforated inner face
 Double door 84" W. x 56" H., RH. On 96" wall
 24" W. x 36" H Double glazed (Limo Tint) window panel
 One plenum 36" W.36" H on 60" wall
 Ceiling light with switch

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- SST Cold Spray becoming a more viable production tool by reducing process operating costs and improving up-time.
- SST™ PX** and **SST™ EPX** systems have the capabilities and operating consistencies needed for production applications



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THANK YOU

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