

# BENDING EVOLUTION

As the Industry Changes So Do Your Needs



**GREENLEE®**

Professional. Nothing Less.™





# TODAY'S CONTRACTOR CHALLENGES

- Trade Skills Gap
- Rising Material Costs
- Margin Pressure
- Condensed Timeline Requirements
- BIM – Increased Complexity in Facility Designs

*"Some companies are being quoted 25 to 30 percent increases in future orders from steel producers." <sup>1</sup>*

Arcieri, Bizjournals.com

*"Steel and aluminum tariffs, 25% and 10% respectively, have the potential to hinder construction industry profits." <sup>2</sup>*

Slowey - ConstructionDive.com

*"The Missner Group Chief Operating Officer Bob Nomellini said the higher steel prices are not affecting projects already underway, but are speeding up timelines." <sup>3</sup>*

Sudo - Bisnow



# WHY BENDING SOLUTIONS?

- **Planning & Design with BendWorks®:** Detects errors and potential issues ahead of time, allowing to reduce scrap and increase productivity.
- **Bending Workflow:** Increase productivity and improve bending quality & accuracy to complete jobs on time and under budget.



Error  
Check



Increase  
Productivity



Improve  
Quality



Reduce  
Scrap



Improved  
Accuracy

<sup>1</sup> Arcieri, K. (2018). Steel Prices are Up, But the Tariff Spike is Coming. D.C.-Area Developers are Bracing for it. [online] Bizjournals.com. Available at: <https://www.bizjournals.com/washington/news/2018/04/20/steel-prices-are-up-but-the-tariff-spike-is-coming.html> [Accessed 14 June 2018].

<sup>2</sup> Slowey, K (2018). Material Prices Increase in March, Expected to Constrain Profit Growth. [online] Constructiondive.com. Available at <https://www.constructiondive.com/news/material-prices-increase-in-march-expected-to-constrain-profit-growth/521187/> [Accessed 14 June 2018].

<sup>3</sup> Sudo, C. (2018). Fear Of The Steel Tariff Is Compounding Already-Escalating Materials Pricing. [online] Bisnow.com. Available at: <https://www.bisnow.com/national/news/construction-development/fear-of-the-steel-tariffs-is-already-causing-price-spikes-87587> [Accessed 14 June 2018].

# WHAT'S THE TRUE COST OF SCRAP?

## Estimated Scrap per 1,000 Sticks of Bent Conduit

Traditional Methods					
Bend Type	Sticks of Bent Conduit	Low		High	
		% Scrapped	Sticks of Conduit Scrapped	% Scrapped	Sticks of Conduit Scrapped
Stub (90°)	500	5%	25	8%	40
Offset	150	8%	12	10%	15
Kick - 90° (3D)	150	20%	30	30%	45
Saddle (3) PT	100	10%	10	15%	15
Saddle (4) PT	100	12%	12	15%	15
	Total Bent Sticks	% Scrapped	Total Sticks of Conduit Scrapped	% Scrapped	Total Sticks of Conduit Scrapped
Total	1,000	9%	89	13%	130
Est. Cost of Scrap*					
	Low	\$4,479	High	\$6,543	



### Greenlee Benders Scrap Cost Savings\*

	855GX	1055 Auto Bend
Low	\$1,862	\$4,227
High	\$3,121	\$5,939

### What's YOUR True Scrap Cost?

Avg. Cost of Conduit (per stick)	Avg. Scrapped Sticks of Conduit	Total Scrap Cost
\$50.33	104	\$5,234

\*Estimates are based on 2" Rigid Conduit Cost of \$5.033/ft and proper usage of benders



# GREENLEE PROGRAMMABLE AND ELECTRIC BENDERS - SELECTION GUIDE



	Model	AutoBend 3D	855GX	854DX	555°CX	555°C
Machine Spec	Weight	Stationary	532 Lbs	550 Lbs	300 Lbs	360 Lbs
	# Of Shoes Needed To Bend RIGID/IMC/EMT	All-in-One	All-in-One	All-in-One	2	2
	Bend Capacity	1/2" to 4"	3/4 to 2" Rigid/IMC 1" to 2" EMT	1/2" to 2"	1/2" to 2"	1/2" to 2"
	Solid State Electronics	✓	✓	✓	✓	
	Accessory - Shotgun Shoe			✓	✓	✓
	Accessory - PVC Coated Shoe		✓	✓	✓	✓
	UL Classified		✓	✓	✓	✓
Smart Feature	Digital Readout		✓	✓	✓	
	Digital Angle Selection	✓	✓	✓		
	Compatible with BendWorks® TXT Files	✓	✓	✓	✓	✓
	Compatible with BendWorks® CSV Files	✓	✓			
	Complete Programmability	✓	✓			
	Auto Conduit Selection	✓	✓			
	Spring Back Adjustment	✓	✓			
	USB Port	✓	✓			
	Able to Connect to the Network	✓				
Accuracy	+/- 1 Degree Bend Accuracy	✓	✓	✓		
	No Bend Measurement and/or Marking on Conduit	✓				
	Fully Automated Conduit Feeding	✓				
	Automated Conduit Rotation	✓				





# BendWorks®

## SMARTER SOFTWARE DESIGNED FOR YOU.

BIM technology alone can't serve the unique needs of electrical contractors in the field. That's why Greenlee created BendWorks® software—putting a century's worth of electrical know-how in one program.

UP TO

40%

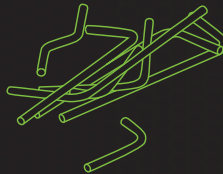
Improved Fabrication  
Productivity



UP TO

35%

Reduction in Scrap



UP TO

80%

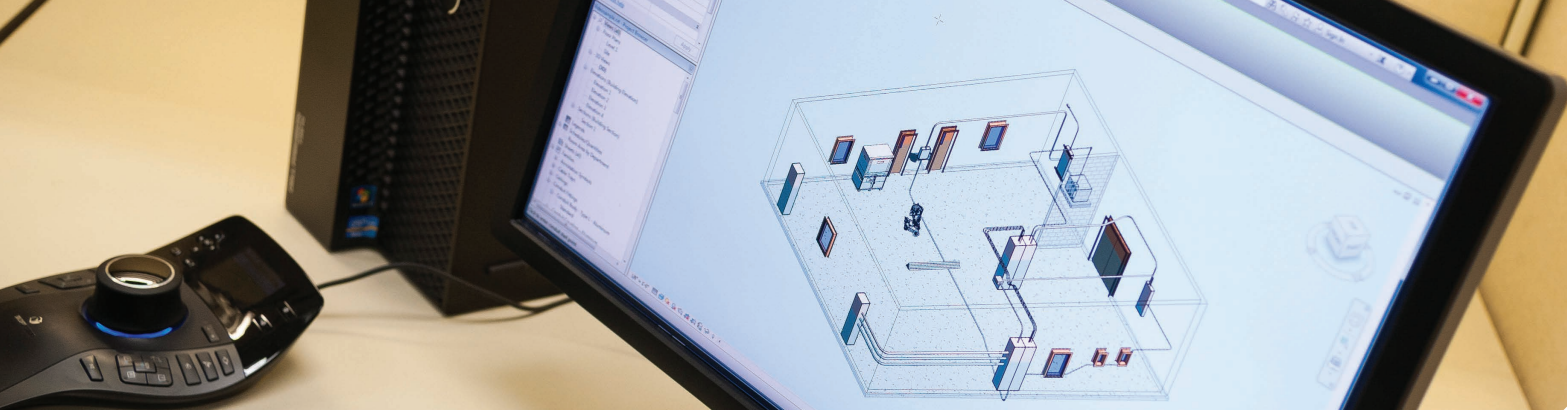
Less Rework



*"BendWorks has bridged the gap between coordination and prefabrication and has become the much needed missing piece that allows our field electricians to return to being installers."*

—GREG CUMMINS, BIM COORDINATOR, SCHULER-HAAS





### Error Checking

- Verifies design against conduit bending rules and the Greenlee bender-specific parameters

### Material Optimization

- Optimizes conduit runs for fewest cuts and segments

### Waste Reduction

- Reduces the conduit bone pile and workflow inefficiencies

### Bill of Material Accuracy

- Provides output files of required conduit length and removes guesswork from conduit bill of material

### Quality Control and Assurance

- Retains run information automatically during changes
- Details output of conduit segments with unique identification for traceability on the jobsite

### Automated Calculations for Bending Operator

- Greenlee bender-specific output files provide bending instructions and reduce operator error

### Fully Integrated with Autodesk® Revit® and Revit® MEP

- Supports collaboration between multiple design users, and allowing for compatibility back and forth between Autodesk® Revit® and BendWorks™

## SUPPORTED CONDUIT SIZES AND TYPES

BendWorks® software supports any type and size of conduit that is supported by the following Greenlee benders:

555, 555C, 555CX, 555DX, 853, 854, 855, 854DX, 855GX, 881, 882, 1055 AutoBend 3D

## SUPPORT

Help documents can be found on:

- BendWorks® software page at the Autodesk® App Store
- The help section of BendWorks® software
- The BendWorks® software page at: [greenlee.com/products/BendWorks](http://greenlee.com/products/BendWorks)

How-to videos explaining each function of the software can be found on the Greenlee Youtube channel at: [youtube.com/GreenleeDEMO](https://www.youtube.com/GreenleeDEMO)

Email support: [CSBendWorks@greenlee.textron.com](mailto:CSBendWorks@greenlee.textron.com)

Phone support: 1-800-435-0786

## PURCHASING

Stand-alone licenses are available for the latest versions of Autodesk® Revit® and Revit® MEP

- Download the software via the 30-day free trial on the Autodesk® App Store
- Purchase license from: [greenlee.com/products/BendWorks](http://greenlee.com/products/BendWorks)

No additional purchase necessary when upgrading versions of Autodesk® Revit®

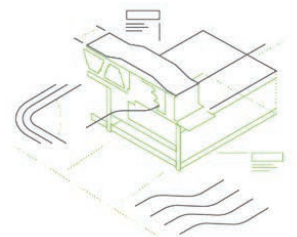
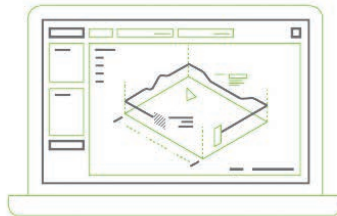
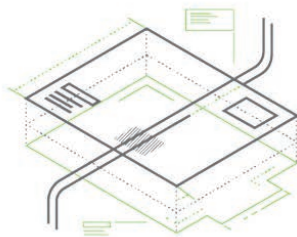
CAT. NO.	# OF LICENSE(S)	DESCRIPTION
BENDWORKS-1L-MO	1	1 License: 1-month auto renewal
BENDWORKS-1L-YR	1	1 License: 12-month auto renewal
BENDWORKS-5L-MO	5	5 Licenses: 1-month auto renewal
BENDWORKS-5L-YR	5	5 Licenses: 12-month auto renewal

Autodesk and Revit are registered trademarks of Autodesk, Inc.



# BENDING WORKFLOW: GREENLEE VS. TRADITIONAL TECHNOLOGY

The journey from drawing to bending conduit can be a long one, depending on the methods you use. You can rely on traditional methods to get the job done—or you can make it happen efficiently with Greenlee's **Bending Solutions**.



TRADITIONAL TECHNOLOGY	GREENLEE BENDERS	GREENLEE 855GX BENDER	GREENLEE AUTOBEND 3D
BIM Drawing	BIM Drawing	BIM Drawing	BIM Drawing
Detail Out Conduit Bends	Import Into BendWorks™	Import Into BendWorks™	Import Into BendWorks™
	Print txt File	Download & Upload CSV File	Send CSV File
Calculate Measurement of Each Bend	Prepare Conduit for Bend	Prepare Conduit for Bend	Load Conduit
	Bend Conduit	Bend Conduit	Bend Conduit
Prepare Conduit for Bend	GOOD Time Savings vs. Traditional Technology	BETTER Time Saving and Ease of Use vs. Traditional Technology	BEST Time Saving, Effortless Setup and Precise Accuracy vs. Traditional Technology
Bend Conduit			



# FIRST-OF-ITS-KIND AUTOMATED BENDER FOR FABRICATION

## AUTOBEND 3D

### Productivity

- Up to 8X faster than traditional bending

### Safety

- Sensor helps increase safety while bending through a two-zone alert system to protect workers

### Protection

- Light curtain safety zone to keep workers out of the landing zone during the bending process

### Intelligence

- Touch screen interface eliminates manual calculations or markings on conduit

### Consistency

- Repeat with accuracy and precision even the most complex bends, minimizing scrap, while increasing productivity



CAT. NO.	UPC NO.	DESCRIPTION
1055	05661	AutoBend 3D



# 855GX ELECTRIC PROGRAMMABLE BENDER

## Precise

- Bends conduit to desired angle, eliminating the need for joggling

## Operator's Input

- Automatically calculates spring back from operator's input and reduce scrap and rework

## Accurate

- Automatically calculates spring back and reduce scrap and rework

## Productive

- 4X faster setup

## Efficient

- Split squeeze roller eliminates the need to change between IMC and EMT setup

## Intelligent

- Reduce the risk of calculation errors. The smart interface provides step-by-step instructions for marking and bending conduit. Sensors automatically detect conduit size.

## BendWorks™ Compatible

- Able to download BendWorks files and follow the step by step instructions. Reduce the time required for training.



CAT. NO.	UPC NO.	DESCRIPTION
855GX	12579	Bender, Electric- Programmable
12582	12582	PVC RIGID Shoe Group 1/2" to 2" for 855GX



## Quick Setup

- Easily change from vertical to table top position



## Optional PVC Shoe Group

- Bends 1/2" to 2" PVC Coated RIGID





# 854DX ELECTRIC BENDER

## Accurate

- Absolute encoder stops bending at exact angles, no guesswork involved

## Easy To Use

- Digital pendant sets angles and monitors progress

## Reliable

- Solid state electronics decreases down time, rated for 1,000,000+ bends

## Capacity

- 1 shoe bends 1/2" to 2" EMT, IMC, and RIGID conduit

CAT. NO.	UPC NO.	DESCRIPTION
854DX	02670	854DX Electrical Bender
02840	02840	1/2" to 2" PVC Coated RIGID Shoe Group for 854DX
SG4-854	04034	Shotgun™ Shoe for 854DX



## Quick Setup

- Easily change from vertical to table top position



02840

## Optional PVC Shoe Group

- Bends 1/2" to 2" PVC Coated RIGID



SG4-854

## Optional Shotgun™ Shoe Group

- Bends 1/2" to 1" RIGID and IMC, and 3/4" to 1" EMT





## 555® CLASSIC ELECTRIC BENDER

### Mobility

- Lightweight, compact design for easy jobsite portability

### Reliable

- Greenlee's classic "triple-nickel" electric bender features simple relay controls

### Capacity

- Bend 1/2 to 2" RIGID/IMC/EMT on 2 shoes

CAT. NO.	UPC NO.	DESCRIPTION
555C	06900	Classic Electric Bender Power Unit without Bending Accessories



555C

## 555®CX CLASSIC ELECTRIC BENDER

### Mobility

- Lightweight, compact design for easy jobsite portability

### Reliable

- Greenlee's classic "triple-nickel" electric bender features simple relay controls

### Capacity

- Bend 1/2 to 2" RIGID/IMC/EMT on 2 shoes

CAT. NO.	UPC NO.	DESCRIPTION
555CX	12425	Electric Bender, Standard Pendant



555CX



# 555® SERIES ELECTRIC BENDER SHOE GUIDE

## RIGID/IMC

Use with 555®C and 555®CX



28008

## EMT

Use with 555®CX



13934

## EMT

Use with 555®C



23803

## PVC-COATED RIGID

Use with 555®C and 555®CX



12586

## IMC ROLLER SUPPORT

Use with RIGID Shoe 555®C



01323

## 1-1/2" TO 2" IMC SQUEEZE ROLLER

Use with RIGID Shoe 555®CX



13856

CAT. NO.	UPC NO.	DESCRIPTION	555C	555CX
28008	01319	RIGID Shoe Group, 1/2" to 2"	✓	✓
13934	01320	EMT Shoe Group, 1/2" to 2"		✓
23803	01322	EMT Shoe Group, 1/2" to 2"	✓	
12586	01321	PVC-Coated Shoe Group, 1/2" to 2"	✓	✓
SG4	02419	Shotgun Shoe for 555 Series	✓	✓
01323	01323	IMC Roller Support, 1-1/2" to 2"	✓	
13856	13856	1-1/2" to 2" IMC Squeeze Roller		✓

\*Separate shoes used for different conduit types (RIGID/IMC, EMT, and PVC-Coated)



# SHOTGUN™ SHOE

## Productivity

- Up to 2X faster bend cycle time - pays for itself in less than 1 year\*

## Efficiency

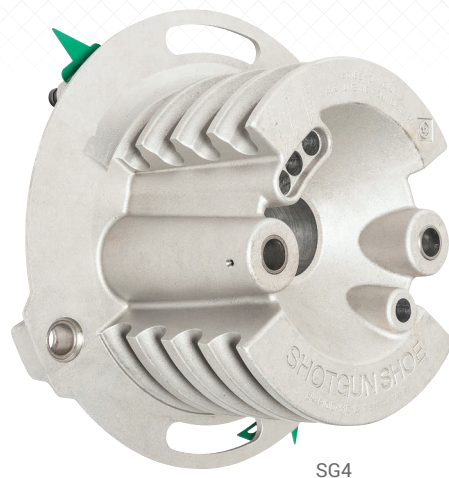
- Bend 4 piece of conduit at once

## Capacity

- 1 shoe bends 8 conduit types:  
RIGID - 1/2", 3/4", 1",  
IMC - 1/2", 3/4", 1"  
EMT - 3/4", 1"

CAT. NO.	UPC NO.	DESCRIPTION
SG4-854	04034	Shotgun™ Shoe for 854DX
SG4	02419	Shotgun™ Shoe for 555 Series
04030	04030	854DX Adapter Kit

\*Based on an estimated labor rate (\$100/hr) and conduit usage



# CAM-TRACK® CONDUIT BENDERS

## Mobility

- Fast and easy set up on the jobsite

## Durability

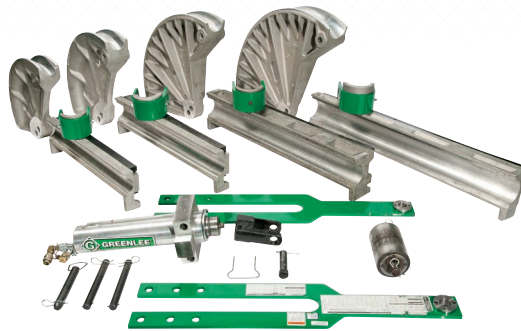
- Steel reinforced follow bars for long life

## Capacity

- Works with 980 and 980-22PS electric hydraulic pumps
- 2-1/2" - 4" EMT, IMC, and RIGID

## Productivity

- True one-shot 90° bends with CT models for quick accurate bends
- Bend a 90° elbow in 4" RIGID conduit in 95 seconds



881CT

CAT. NO.	UPC NO.	DESCRIPTION
881CT	31287	Cam-Track Conduit Bender for One-Shot 90° Bends in 2-1/2", 3", 3-1/2" and 4" EMT, IMC, and RIGID conduit, without hydraulic pump
881CTE980	34208	Cam-Track Conduit Bender for One-Shot 90° Bends in 2-1/2", 3", 3-1/2" and 4" EMT, IMC, and RIGID conduit, with 980 Electric Hydraulic Pump
881CTD	38466	Cam-Track Conduit Bender for One-Shot 90° Bends in 2-1/2", 3", 3-1/2" and 4" EMT, IMC and RIGID conduit, without hydraulic pump & 3-1/3" shoe group
881CTDE980	38467	Cam-Track Conduit Bender for One-Shot 90° Bends in 2-1/2", 3", 3-1/2" and 4" EMT, IMC and RIGID conduit, with 980 Electric Hydraulic Pump, without 3-1/2" shoe group

# MOBILE BENDING TABLE

## Productivity

- Allows the bender to easily move with the job throughout the jobsite, increasing productivity by reducing the distance between the bending operation and installation

CAT. NO.	UPC NO.	DESCRIPTION
881-MBT	00903	Mobile Bending Table



Mobile Bending Table with 881CTE980 Bender



# HOW WE CAN HELP YOU AND YOUR TEAM

- Professional Tool Specialist demonstration of tools and equipment
- Free Prefab Consultations
- Technical Support (1-800-435-0786)
- Tool & Equipment Service and Repair
- Training



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