DIWIRE PRO

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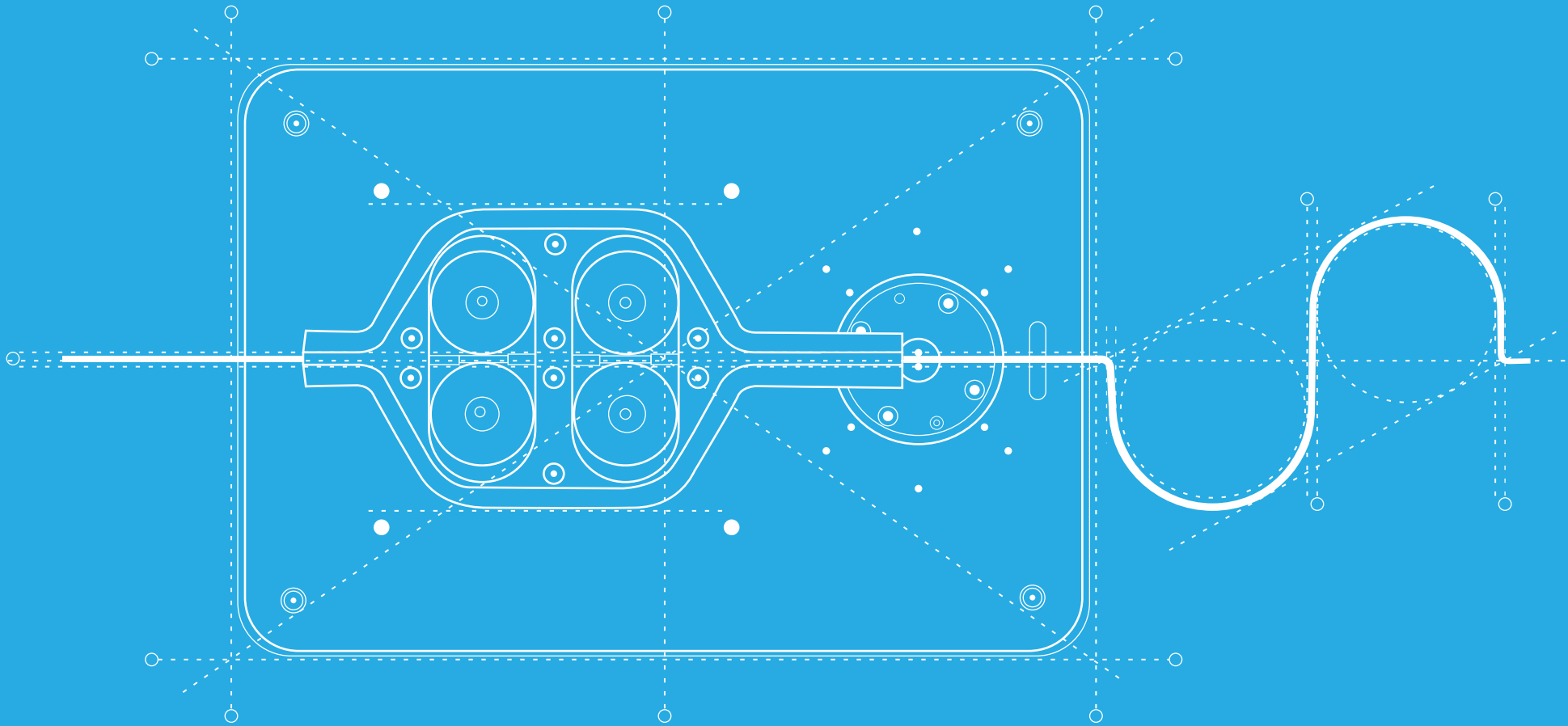
Introduction

Introduction

- THE D.I.WIRE PRO

- D.I.WIRE PRO AND ITS COMPONENTS

- GETTING TO KNOW THE D.I.WIRE PRO

The D.I.Wire Pro

The D.I.Wire Pro is our newest desktop CNC wire bender offering the power, speed, precision and modularity that professionals need. Bend any wire material between 0.027" (0.7mm) and 0.188" (4.8mm), bend strap, and add a straightener and other accessories to optimize production.
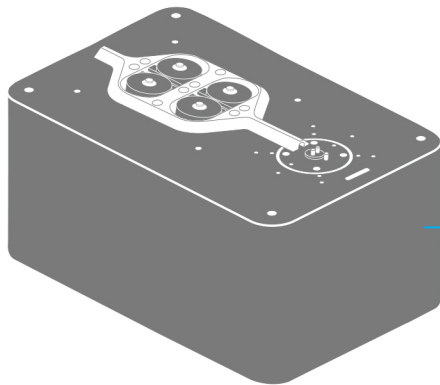
The D.I.Wire Pro

Before Use:

- Use the D.I.Wire Pro only as instructed in this manual. Make sure you read all the instructions and safety precautions before using the machine.

- The D.I.Wire PRO is to be used by qualified personnel only.

- This manual contains valuable info about the operation, care and service of your machine. We recommend you keep it handy.

Note: The instructions in this manual are not meant to cover every possible condition and situation that may occur. Common sense and caution must be practiced when setting-up, operating and maintaining any equipment.
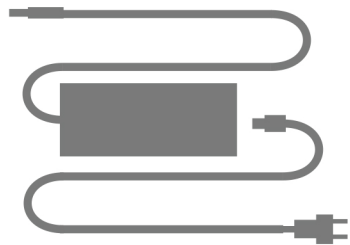
D.I.Wire Pro and Its Components
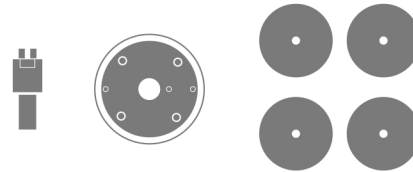
THE MACHINE

D.I.WIRE PRO

AC Wall Adaptor
24 Volts 5A

USB allows D.I.Wire to
communicate with the computer

TOOLS AND ACCESSORIES*

RAMP

BEND HEAD + BEND RING + FEED WHEELS

D.I.Wire comes assembled with your specific
Bend Head, Bend Ring and Feed Wheels.

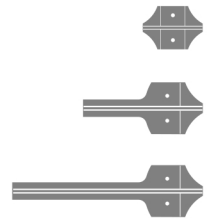Keep tools and hardware somewhere safe!

GUIDES

Guides are custom for
each material diameter.

CUTTERS

SMALL
TORQUE WRENCH

For the Feed Wheels

SOCKET
WRENCH

LARGE TORQUE WRENCH
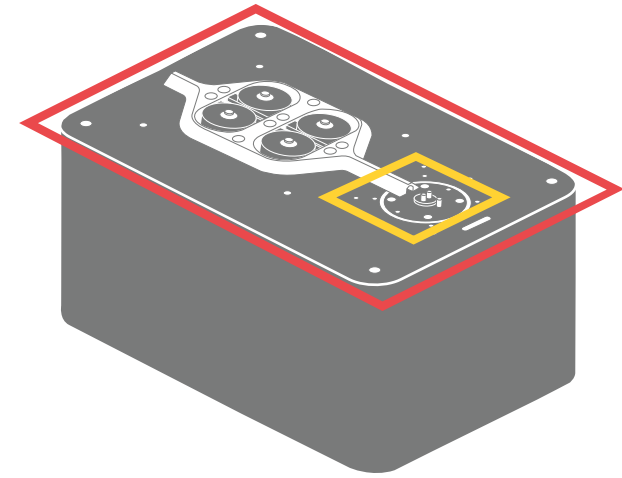For the Bend Head
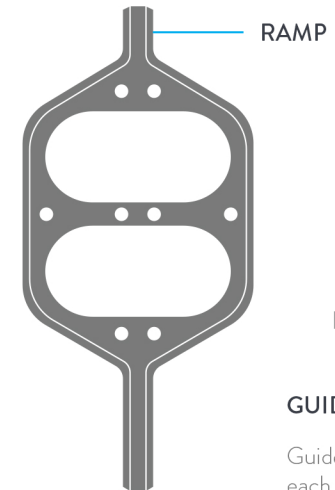
3/32 HEX KEY

1/8 HEX KEY

5/32 HEX KEY

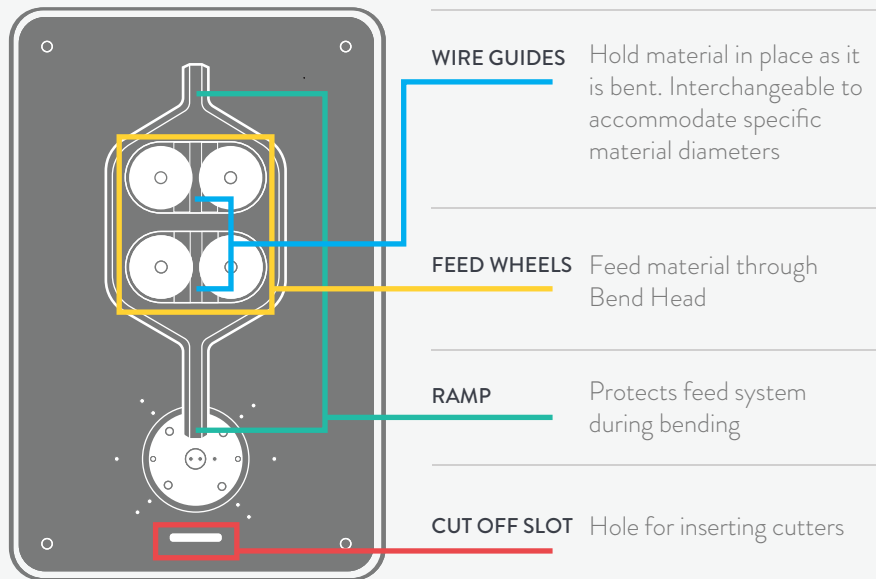Used for
all hardware
fasterners

*Your set of tools may differ, depending on what you purchased.
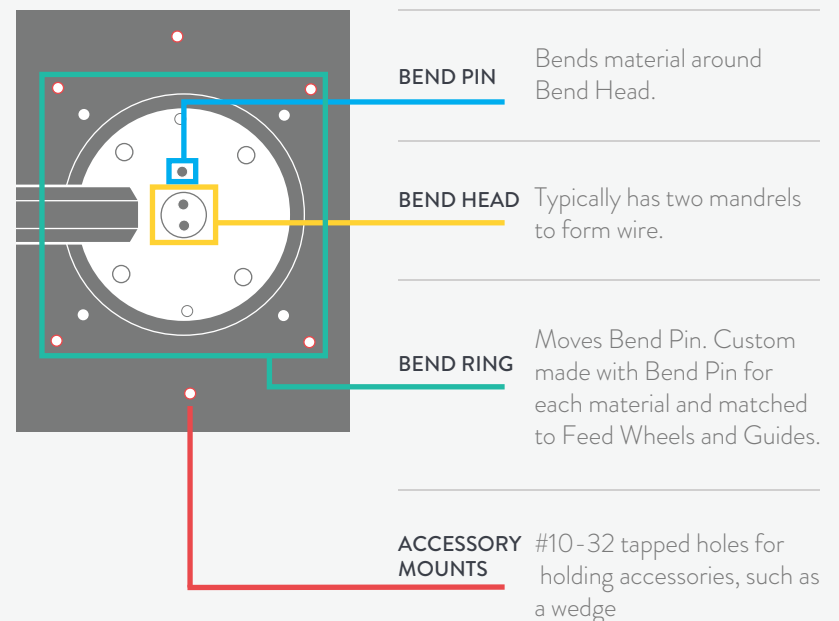
Getting to know the D.I. Wire Pro

Take a few minutes to get oriented to the D.I.Wire Pro.

TOP VIEW

WIRE GUIDES — Hold material in place as it is bent. Interchangeable to accommodate specific material diameters

FEED WHEELS — Feed material through Bend Head

RAMP — Protects feed system during bending

CUT OFF SLOT — Hole for inserting cutters

DETAIL

BEND PIN — Bends material around Bend Head.

BEND HEAD — Typically has two mandrels to form wire.

BEND RING — Moves Bend Pin. Custom made with Bend Pin for each material and matched to Feed Wheels and Guides.

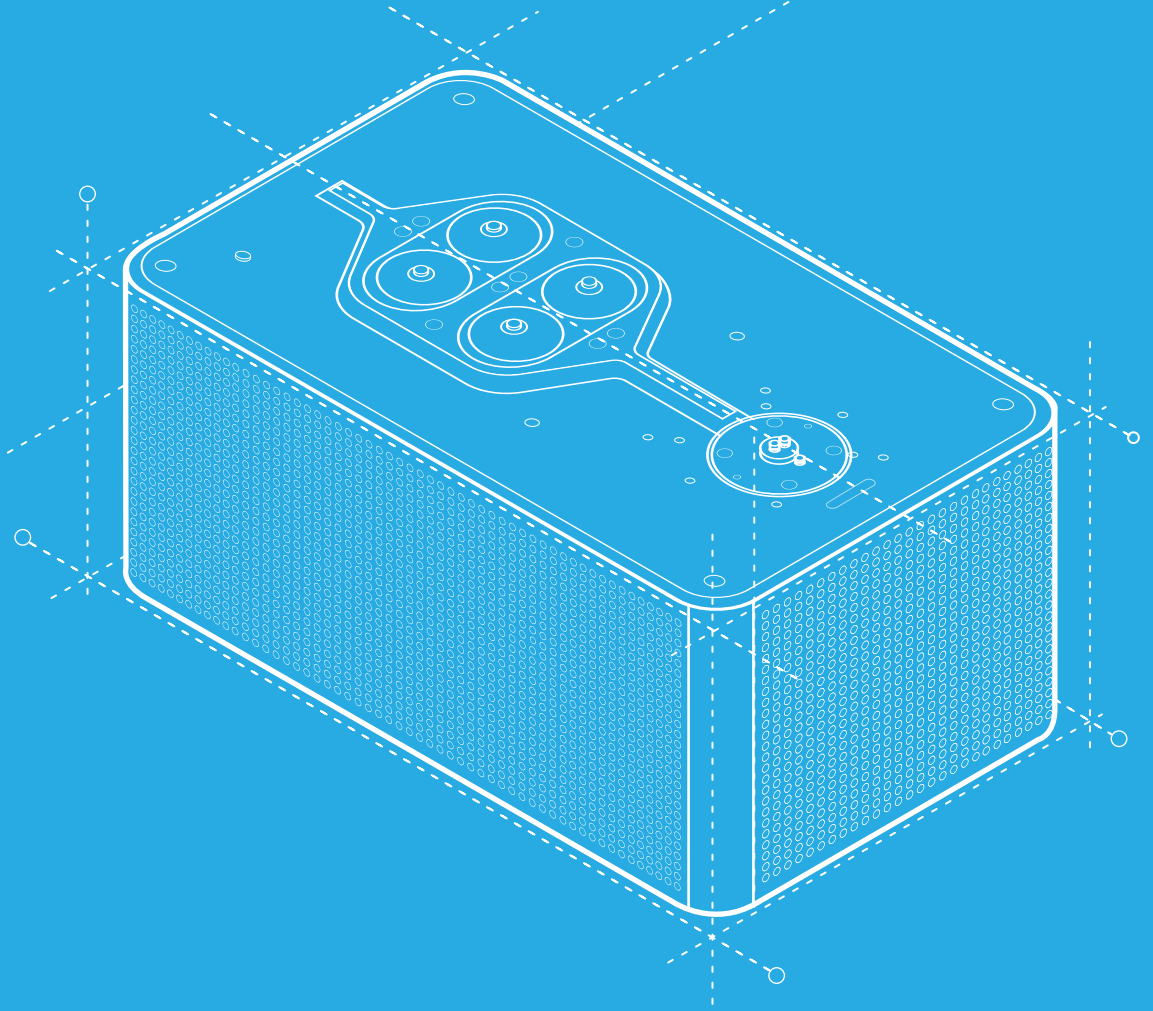**ACCESSORY MOUNTS** — #10-32 tapped holes for holding accessories, such as a wedge

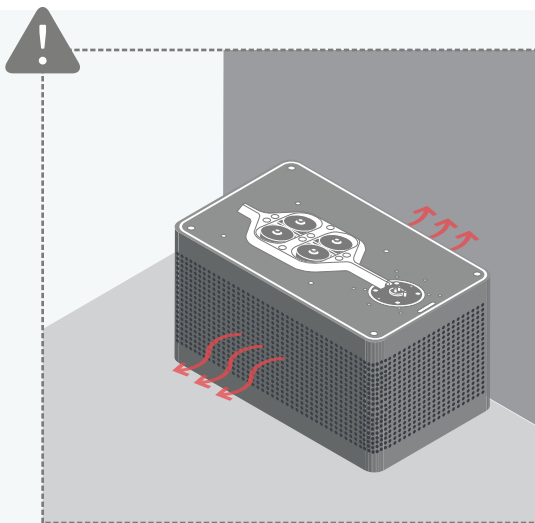# Hardware Setup And Safety

Hardware Setup And Safety

- GETTING SET UP

- D.I.WIRE ORIENTATION

- SAFETY AND PROTECTION
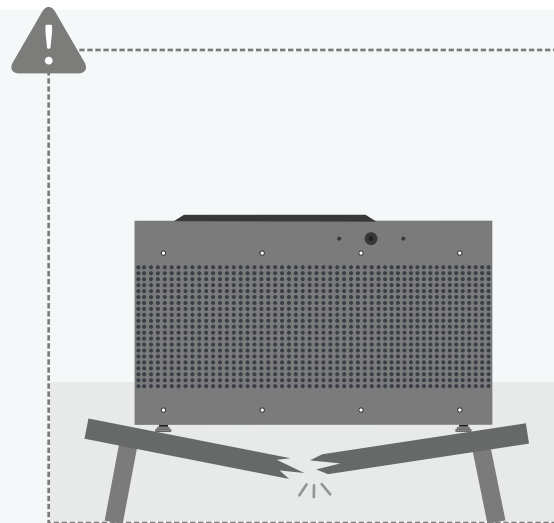
- DO'S AND DON'TS OF THE MACHINE

Getting Set Up

Start by choosing a work area that is appropriate for your D.I.Wire.

1 CHOOSING A WORK AREA

Place the D.I.Wire away from any surface that could obstruct the air flow and cause overheating. Ideally, you'd place the machine on a sturdy table or work bench by itself.

The D.I.Wire is a heavy machine. Make sure you place it on a hard, flat, and sturdy surface that can support the D.I.Wire's weight and remain flat. Particle boards, thin sheet metal, or wire racks are not strong enough.
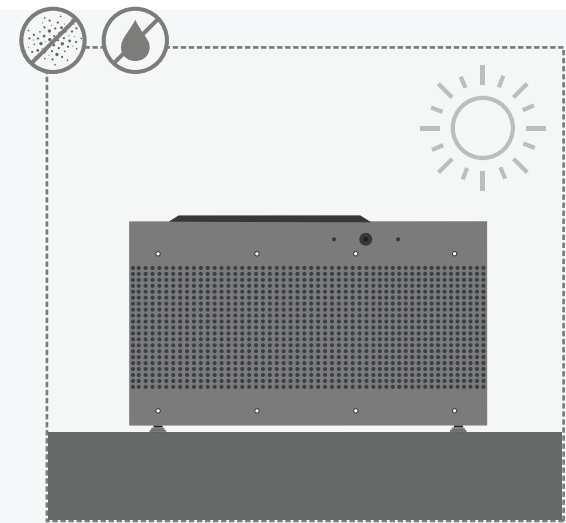
Make sure the work area is well illuminated, and kept clean, free of excessive dust, debris and liquids.

D.I. Wire Orientation

The D.I.Wire requires sufficient work space for the following areas:
Back of the system for material loading; front of the system for part bending; and a dedicated area for the computer running WireWare

SPATIAL ARRANGEMENT

Caution Area

MATERIAL LOADING AREA

BEND AREA
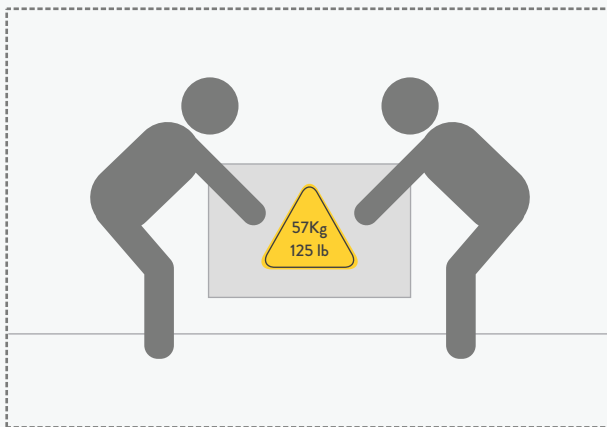Keep clear for parts to move
freely during bending
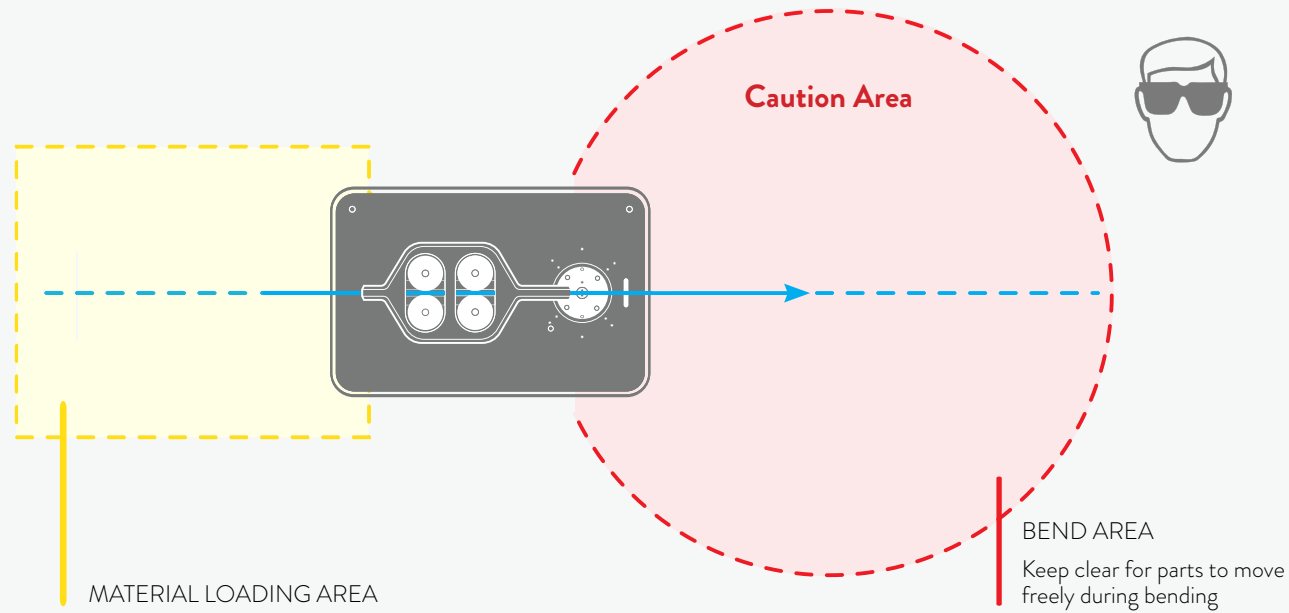
Getting Set Up

The D.I.Wire weights 57 Kg (125 lb). Be safe! Seek assistance to pick it up from its case and to carry it to its assigned work area.
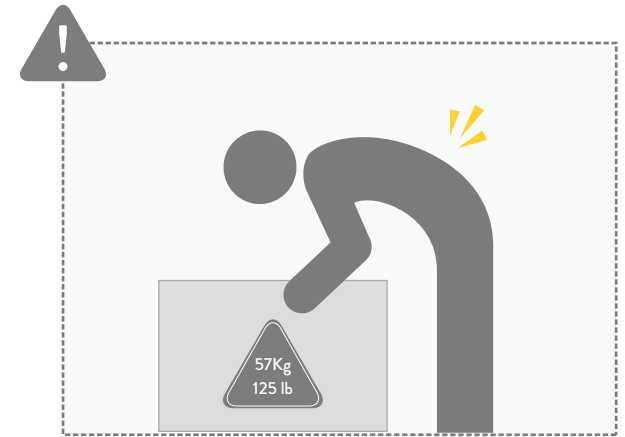
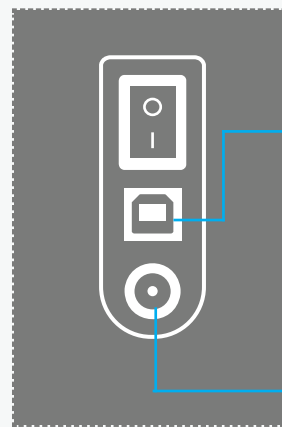**THE D.I.WIRE PRO IS A HEAVY MACHINE AND COULD CAUSE INJURY IF LIFTED INCORRECTLY.**

2 UNPACKING THE DIWIRE

To be safe, use assistance while lifting your D.I.Wire PRO.

3 PLUG IN

USB CORD

COMPUTER (WIREWARE LOADED)

POWER CORD

WHAT'S NEEDED D.I.Wire Pro, USB Cord, Power Cord

ADDITIONAL ELEMENTS Computer
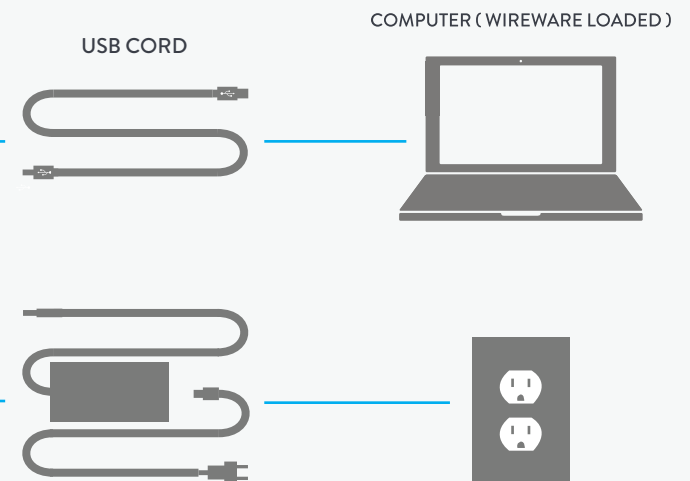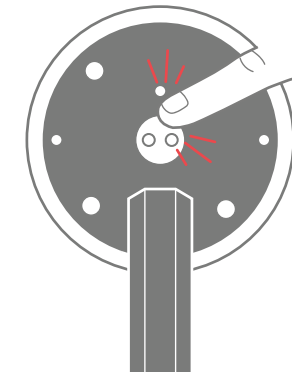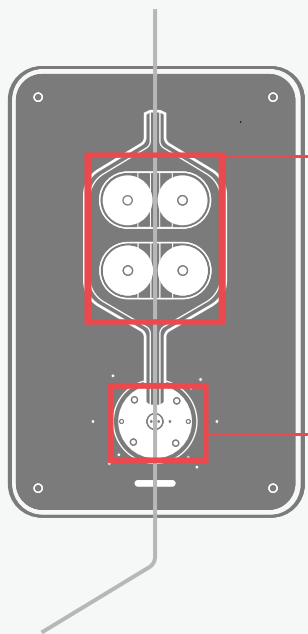
Only use the only provided power supply. Using other power supplies may damage your machine.

Bend Safety

Your safety and the safety of others is very important to us, so we have provided the following safety section and other safety-related messages along the manual. Always read and follow all safety messages.

NEVER TOUCH MOVING PARTS!

|		
⚠ **MOVING PARTS**	NEVER touch the Bend Pins or Feed Wheels during bending. Allow the D.I.Wire to finish bending before reaching into the top plate.
⚠ **REMOVE JEWELRY**	Loose jewelry, like necklaces and/or braceletscan get caught in the moving components. Remove all loose jewelry items before operating the D.I.Wire.
⚠ **AVOID LOOSE CLOTHING**	Long sleeves, ties, sweaters, hoodies and other loose clothing can get caught in the moving components. Do not wear loose clothing while operating the DIWire
⚠ **TIE HAIR BACK**	Long hair can get caught in between the moving components and seriously hurt you. Long hair must always be tied back

STOP **TO STOP MACHINE**	▪ Press STOP or PAUSE in WireWare, or Hit the Power Button *Orient the machine so the switch is easily accessible*
POWER OFF	Power off your D.I.Wire when not in use
ADULT SUPERVISION REQUIRED	Not a toy, the D.I.Wire is intended for use only by or under supervision of adults
AVOID WATER	The D.I.Wire and its power supply are not water proof, keep clear of water and other liquids. Refer to the maintenance section for cleaning instructions. Keep the power adaptor away from water *Tip: don't put your coffee cup on top of your D.I.Wire!*

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Bend Safety
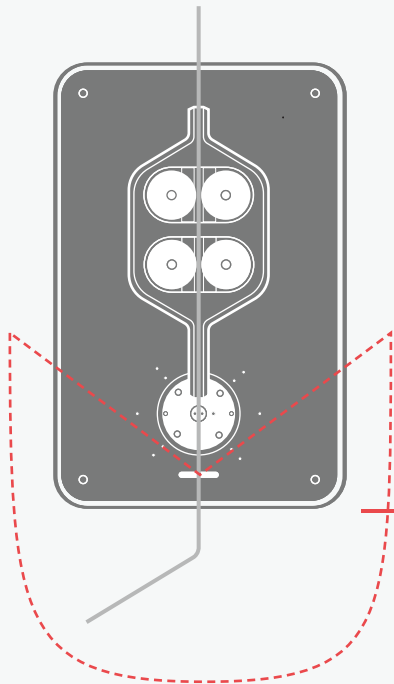
ATTENTION Do not leave the D.I.Wire unattended during operation.

EYE + HAND PROTECTION Always wear protective eyewear when operating the D.I.Wire. Small bits of wire can fly out unexpectedly when bending or cutting the wire. Also, the edge of the wire can be a sharp moving object, eye protection is mandatory.

WORK AREA Always give the D.I.Wire plenty of room to do its work. See the setup section for details.

DO NOT REMOVE PANELS Some hardware components are removable but should not be removed unless instructed by Pensa Labs, or the machine can be rendered unusable. Refer to the service and maintenance section for details.

OVERHEATING The D.I.Wire PRO needs sufficient air flow for proper ventilation. See the Setting Up section for instructions on how to select your work area.

DO NOT TAMPER WITH EXPOSED HARDWARE Removing the covers, modifying the hardware, electronics or switching the power supply can damage the machine and be a potential source for injury. Do not tamper with the machine. It will void your warranty too!

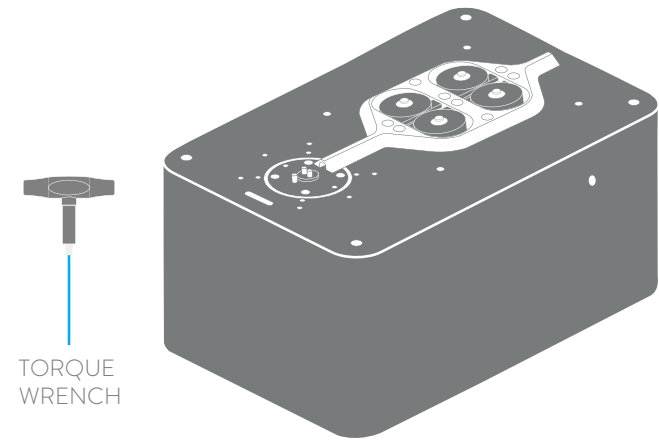# Bending

70

2x R25

55

2x R7.95

170
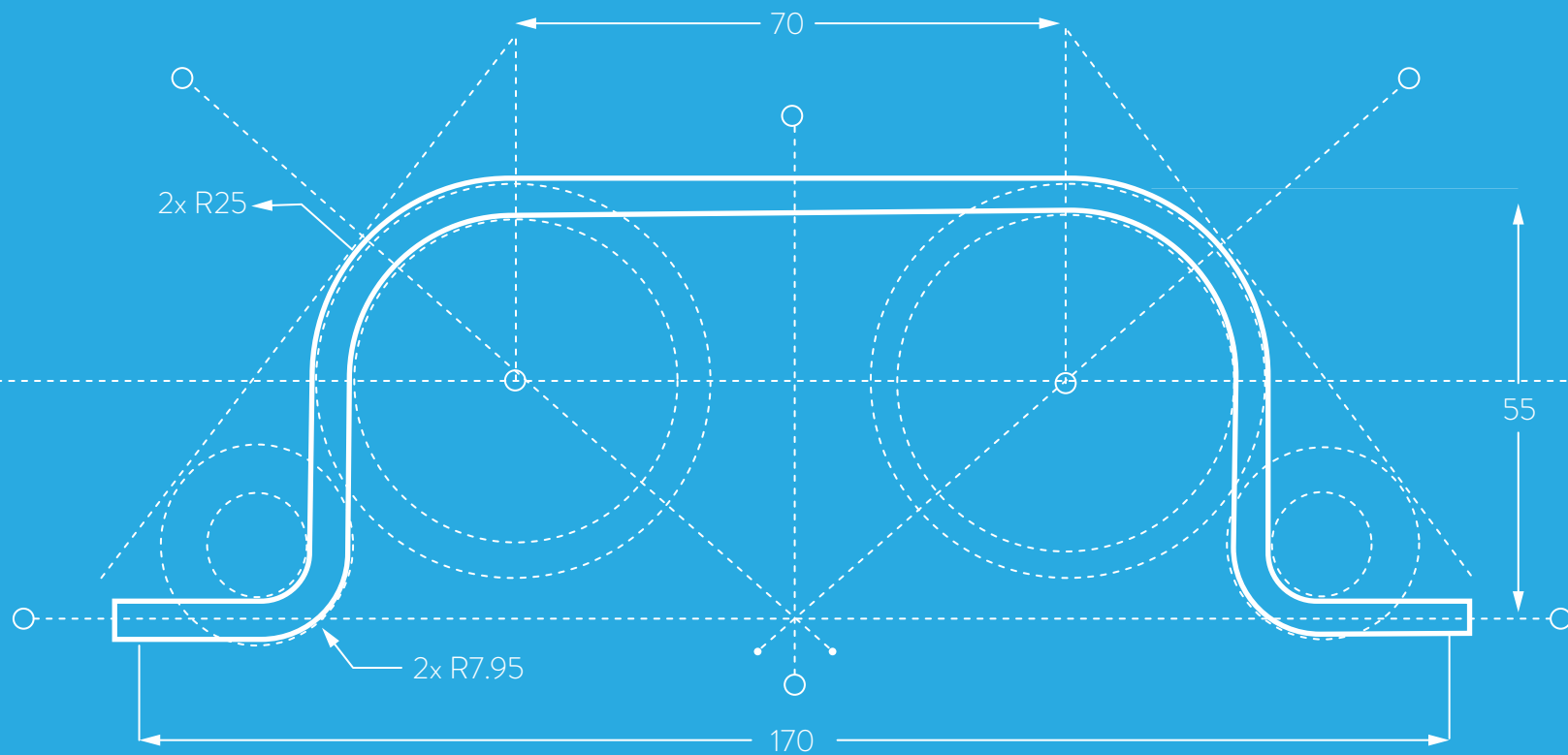
Bending

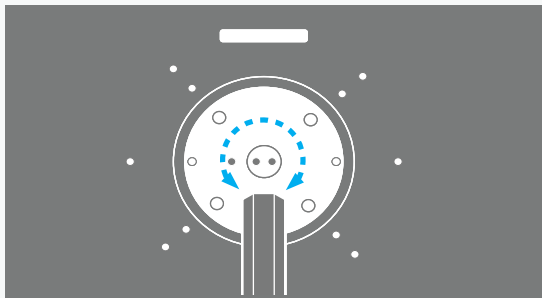- LOADING MATERIAL
- CLAMPING AND ALIGNMENT

Loading Material

Loading material into the D.I.Wire is a simple process.

Use the Preset Torque Wrench to loosen the Feed Wheels, then tighten after material is inserted.
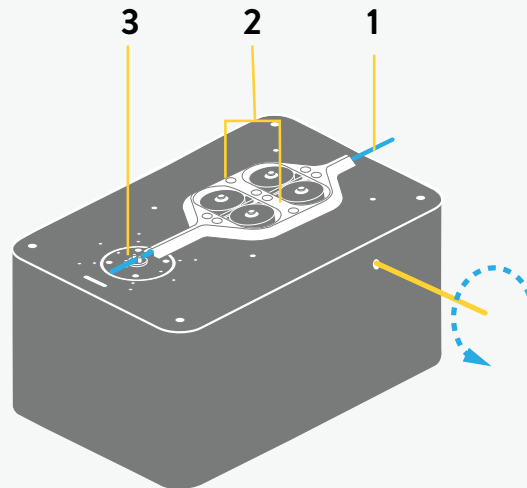
TORQUE
WRENCH

1 HOMING SEQUENCE

Before bending, the D.I.Wire needs to go through the homing sequence to ensure the bend pin is in the proper position.

HOME BUTTON Automatically lowers the Bend Ring and causes the machine to locate and rest at Home (machine position zero)

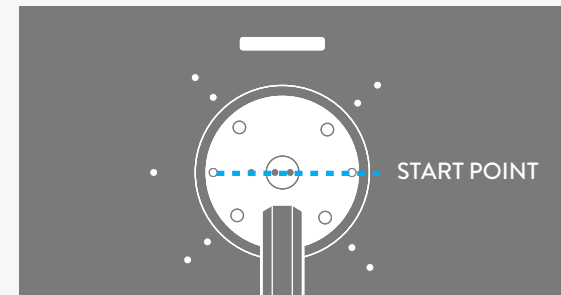*The machine must be homed when turning on the machine, or restarting, or if it has lost position*

2 LOAD MATERIAL

3   2   1

Loosen the Feed Wheels with the Preset Torque Wrench.

Load the wire through the Wire Guides (1), into the Feed Wheels (2), and toward the Bend Head (3).
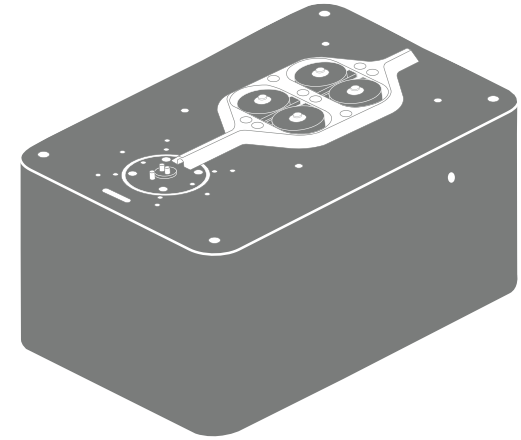
3 START POINT

START POINT

Load material up until the end is positioned between the Bend Head mandrels.

Tighten the Feed Wheels with the Preset Torque Wrench.

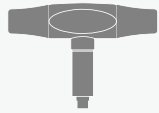*For Path Mode, the path starting position is centered at the Bend Head.*

Clamp Adjustment

If the Feed Wheels are slipping, meaning they are not effectively pulling wire through, the Clamp Adjust needs to be modified.

1 PREPARATIONS

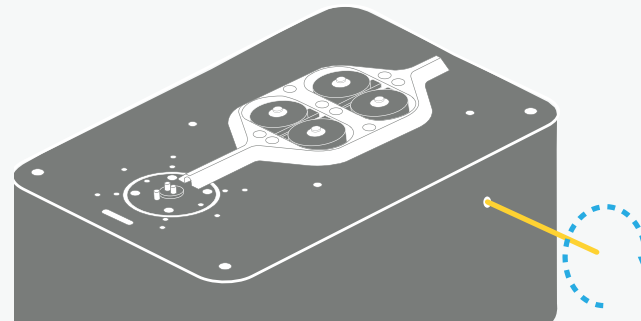WHAT'S NEEDED

TORQUE WRENCH   1/4" HEX BIT

Torque wrench uses a stepped 5/32" to 1/4" hex bit.

You received a pre-set torque wrench that has been selected for your specific application. Do not over-tighten the clamping screw as this may damage your machine or your wire.

## 2 CLAMP ADJUSTMENT

Turn the Clamp Adjust on the D.I.Wire with the preset torque wrench that came with the machine until it clicks once.

Over time, it is possible to get a feel for variation in how different materials should be clamped. Record clamp force in each Material Profile.

*If your application needs higher clamping force, email us at **support@pensalabs.com***
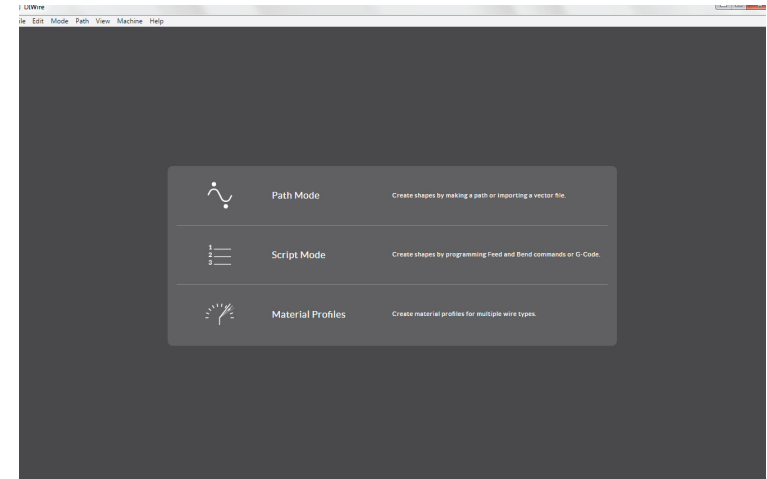
Setting Up WireWare
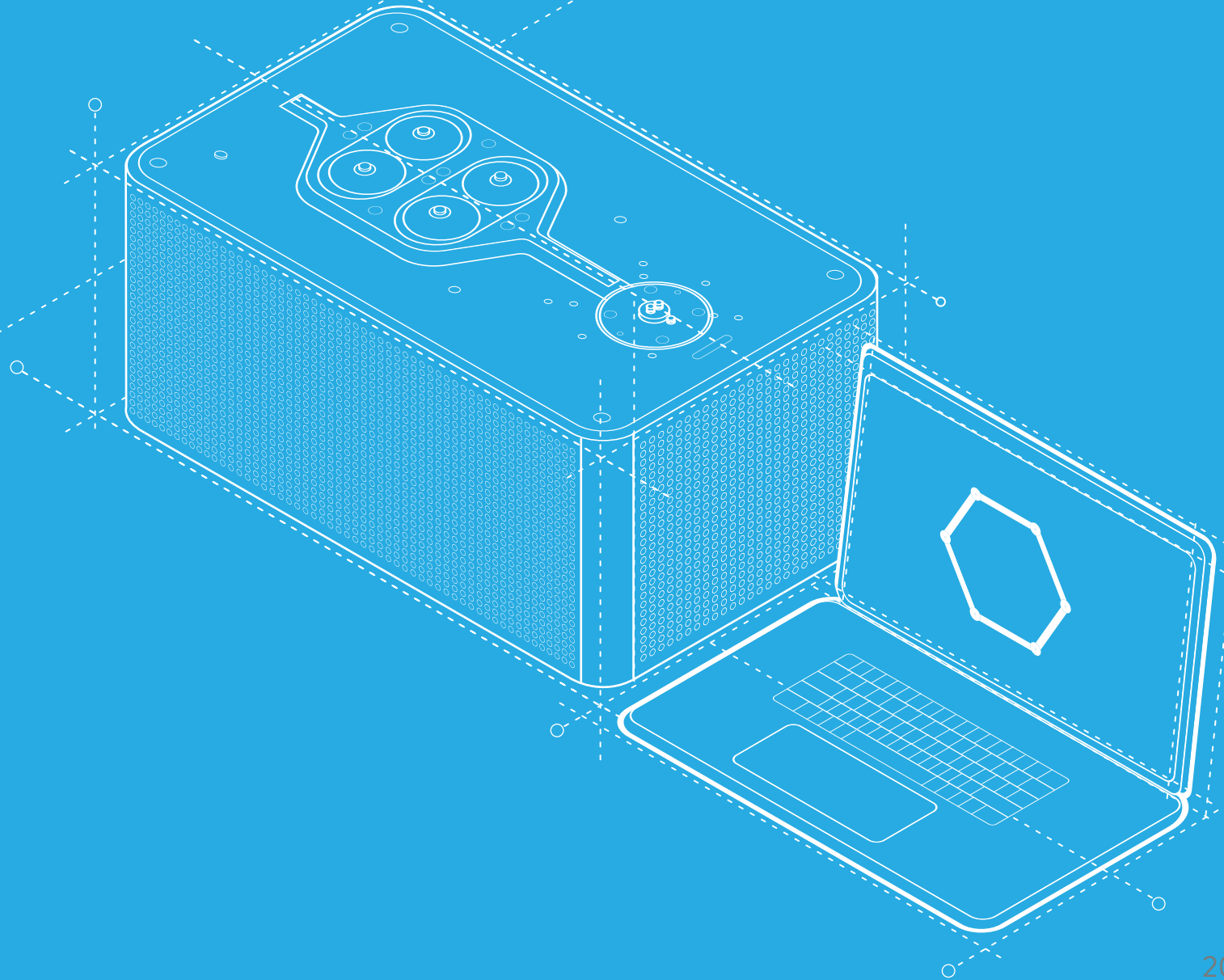
Setting Up WireWare

- DOWNLOAD WIREWARE

- PATH MODE

- SCRIPT MODE

- MATERIAL PROFILE MODE

Download WireWare

Download WireWare software to run the D.I.Wire Pro.
WireWare prepares your files for bending on the D.I.Wire.

1 INSTALL WIREWARE

After recieving WireWare, download to the computer. Reference the materials that come with the software.

WINDOWS / MAC   Choose either Windows or Mac version of WireWare to install on the computer.
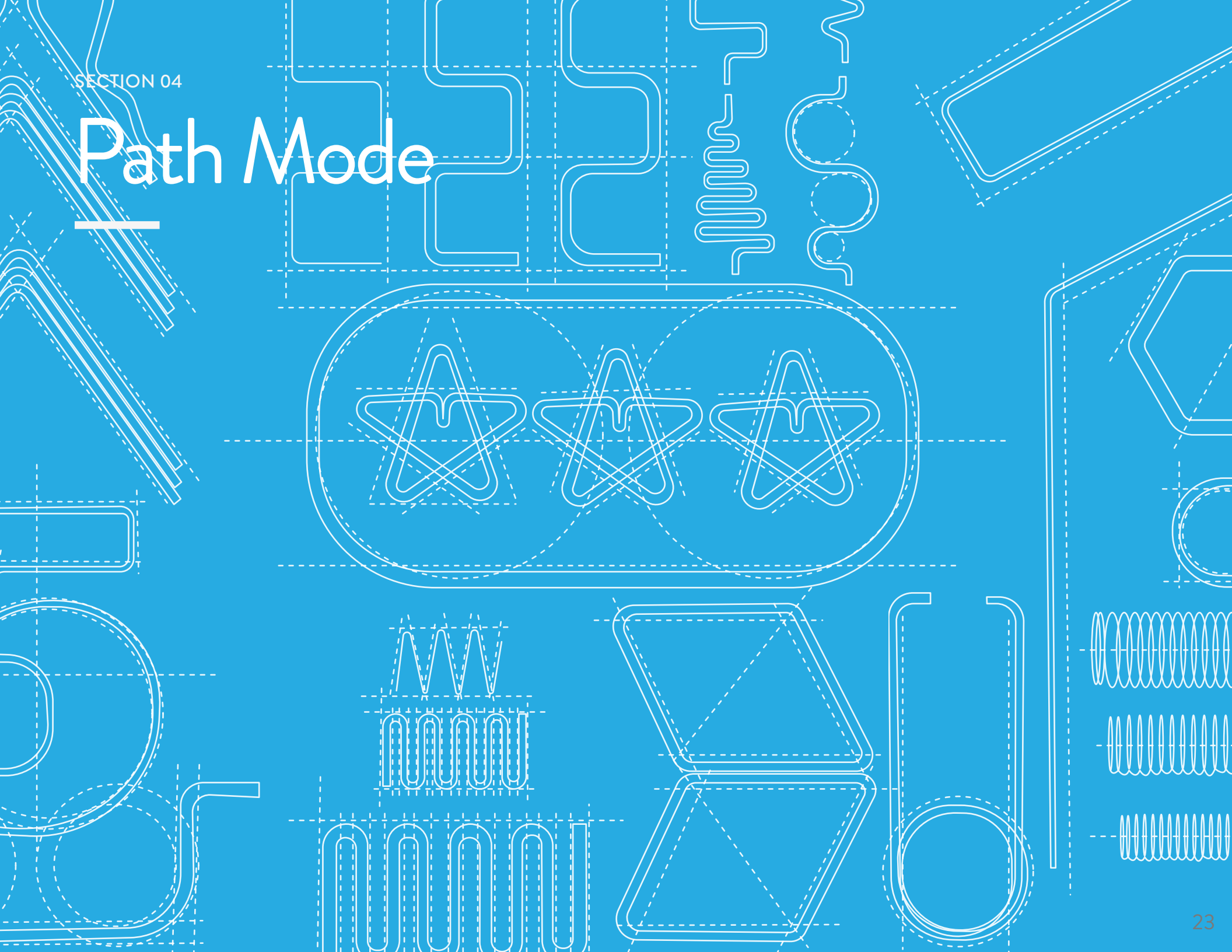
2 CONTACT US

We're here to help! For any questions or problems with the download or installation of WireWare, please contact us:

EMAIL   support@pensalabs.com

PHONE   +1 844-434-9473

Path Mode

Path Mode

Import .SVG files, or create a bend path in Path Mode. It is an interactive workspace to view and edit paths and prepare them for bending. It has been designed to provide basic manipulation and adjustments to bend points and line segments and to manage multiple paths on the work area.

- OVERVIEW

- GETTING STARTED

- PATH & WORKSPACE INFO

- TOOLBAR

- MATERIAL PROFILE SELECTION

- ACTION LIST

- CONTROL & JOG BAR

- ARROW KEY CONTROLS

- OTHER FEATURES

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Screen Overview

PATH INFO   TOOLBAR   SELECTED MATERIAL PROFILE INFO

ACTION LIST

WORKSPACE

GRID TOOLS   CONTROL & JOG
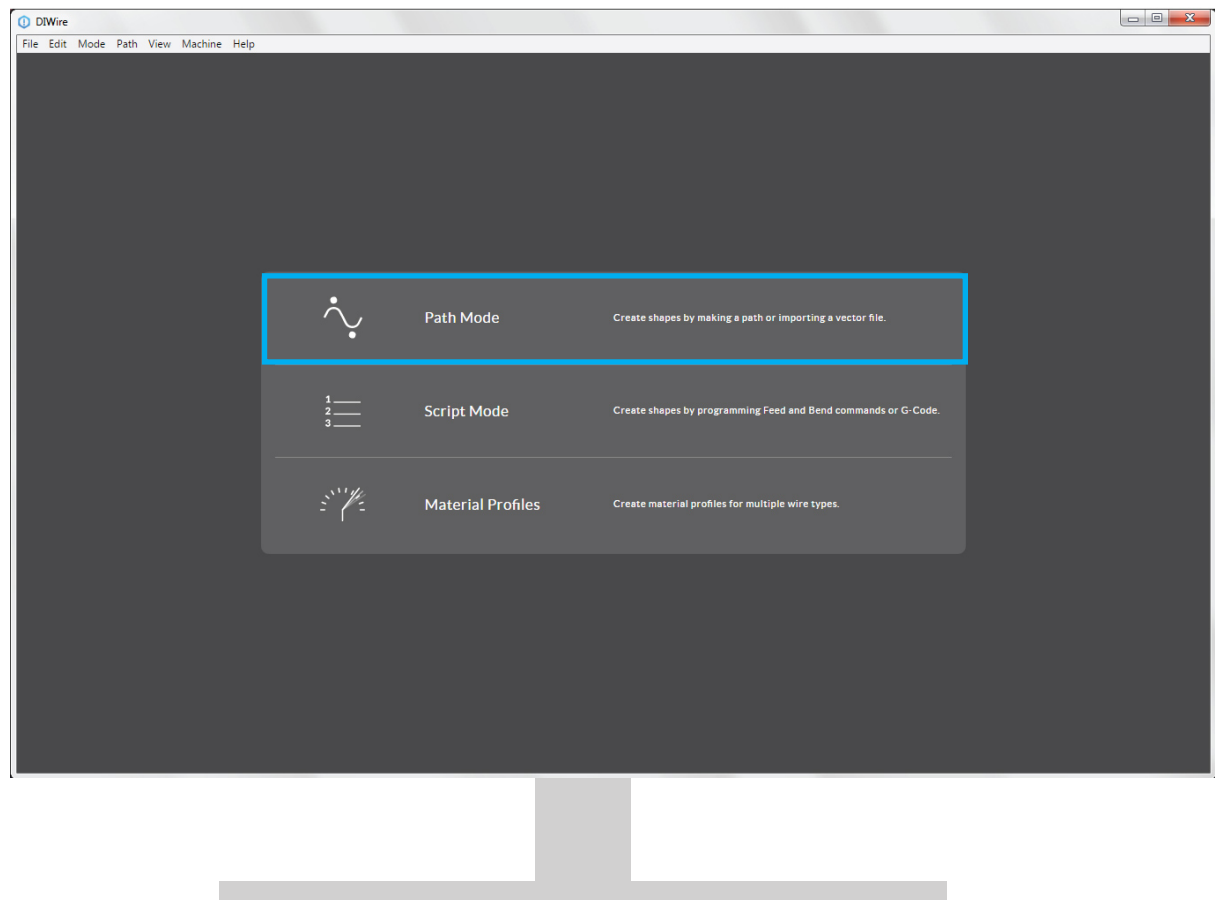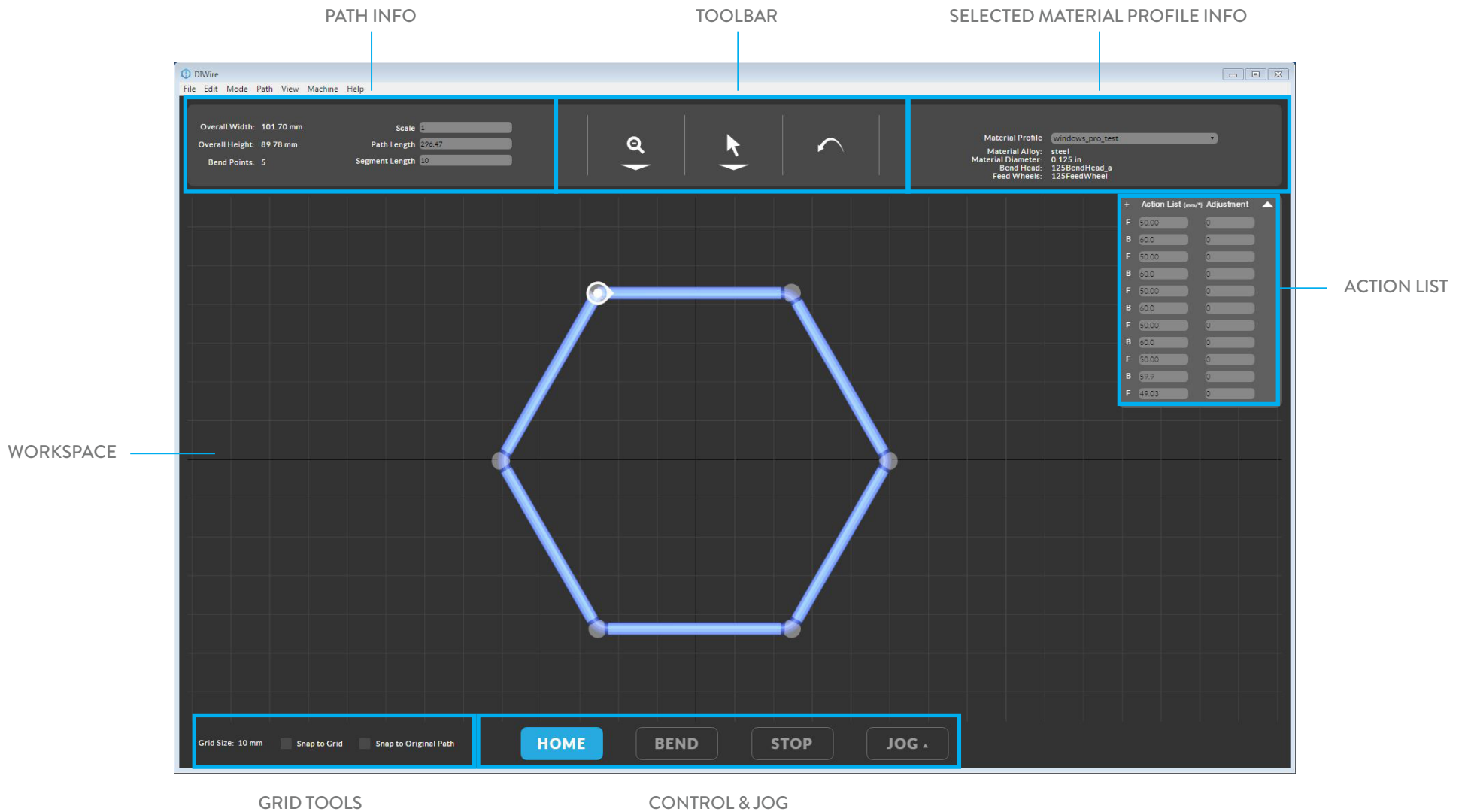
Getting Started
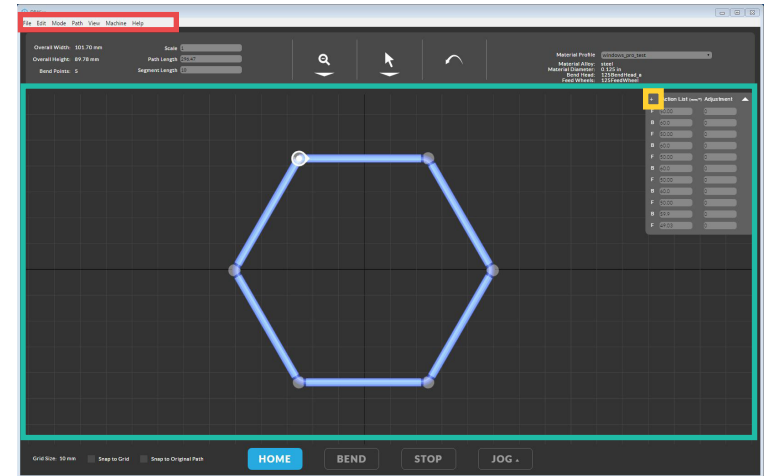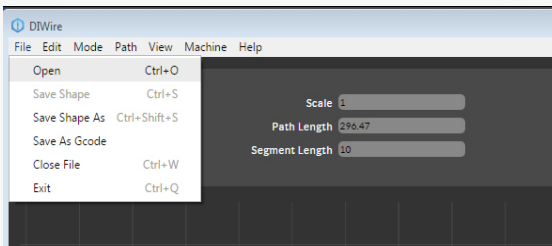

Import a curve as an .SVG format or create a path.

IMPORT A FILE

Go to File, Open, to open a saved SVG file from your computer.

CTRL + O   Quick key to open a file

CREATE A SHAPE
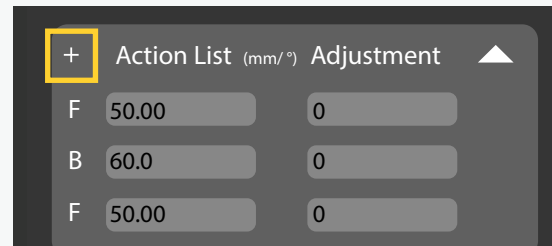
Add Bend (B) and Feed (F) points to the Action List to start creating a new part.

(+)   The Plus icon adds feed and bend points to the list. Clicking the Plus will add a bend and feed after the last segment of a shape.

> *After adding several Feed/Bend Actions, zoom out to view and manipulate the new set of segments and bend points.*

WORKSPACE
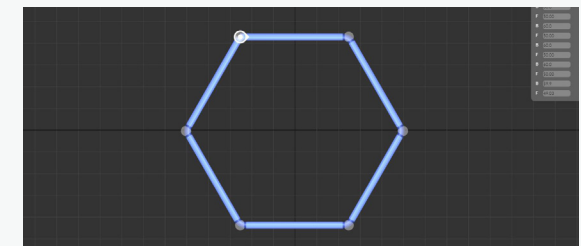
The path is a series of bend angles and line segments.

These bend angles and line segments can be manipulated using the tools on the following pages.

Path & Workspace Info

The Path Info section displays properties of the shape and Grid Tools provide Grid Size units and Snap behavior control.

PATH INFO

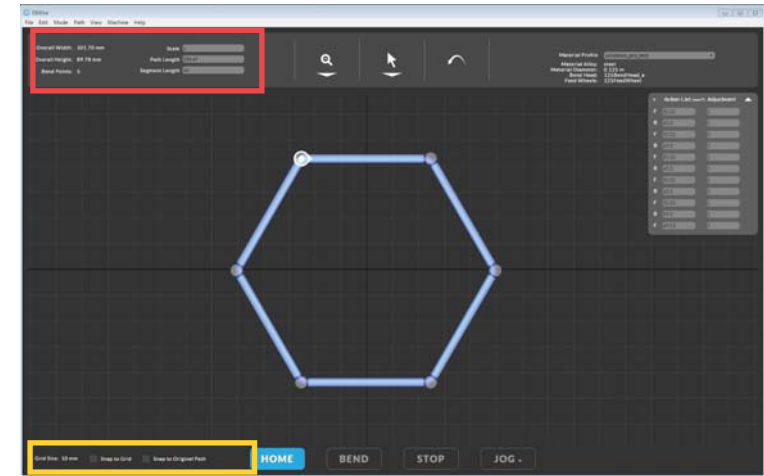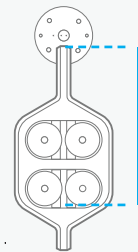|	
Overall Width: 101.70 mm	Scale: 1
Overall Height: 89.78 mm	Path Length: 296.47
Bend Points: 5	Segment Length: 10

OVERALL WIDTH — Overall width of the path

OVERALL HEIGHT — Overall height of the path

BEND POINTS — Number of bend points of the active path

SCALE — The scale of the part relative to its initial size.

PATH LENGTH — The estimated total wire length needed for the part

8.25" (209mm) of extra wire is needed in addition to the path length so that the feed wheels are always engaged.

SEGMENT LENGTH — Shows the minimum distance between bend points on a path. Enter a small segment length value to get a smoother curve with many bend points.

GRID TOOLS

Grid Size: 10 mm   ☐ Snap to Grid   ☐ Snap to Original Path

**GRID SIZE** — Size of the grid on the workspace and the units in use

Change the units by going to the Edit Tab and selecting Change Units.

SNAP TO GRID — Bend points and line segments will snap to the grid as they are moved around on the workspace.

SNAP TO ORIGINAL PATH — Bend points and line segments will snap to the ghosted imported path as they are moved around on the workspace.

Toolbar

The Zoom, Select and Undo tools allow for flexible navigation of the workspace and control of the path.
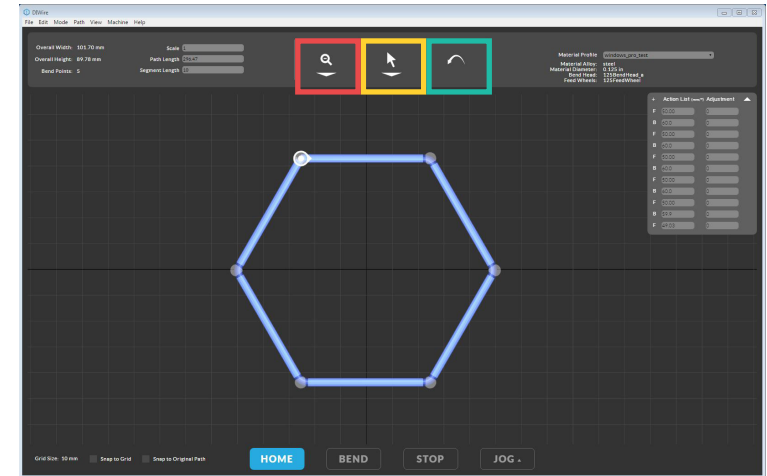
ZOOM

Zoom tools help you to navigate around your workspace.

	FIT TO SCREEN	Resize the view of the workspace to show the entire active part.
	ZOOM IN	Zoom into desired details of the workspace.
	ZOOM OUT	Zoom out to view more of the workspace.
	PAN	Move around the viewable area of the workspace by clicking and dragging.

SELECT

Select Tool allows you to click on line segments and bend points and move them.

|	SELECT VERTICES	Click on line segments and bend points to move them around on the workspace.
	ADD A VERTEX	Add new bend points on the active path
	REMOVE A VERTEX	Remove bend points from the active path
	ADD A PAUSE POINT	Select a Bend Point where the machine will pause before the bending at that location
	CHANGE STARTING POINT	Choose which end of the path to start bending

UNDO TOOL

Undo changes made to the Path.

	UNDO TOOL	Click on the Undo Tool to undo changes made on the path
CTRL + U		Undo previous action on the Workspace
CTRL + SHIFT + U		Redo previous action on the Workspace

Material Profile Selection

Selecting the Material Profile that matches the wire in use ensures accurate bending of the Path. A Material Profile is needed to bend from Path Mode or Run WireWare Script commands in Script Mode.
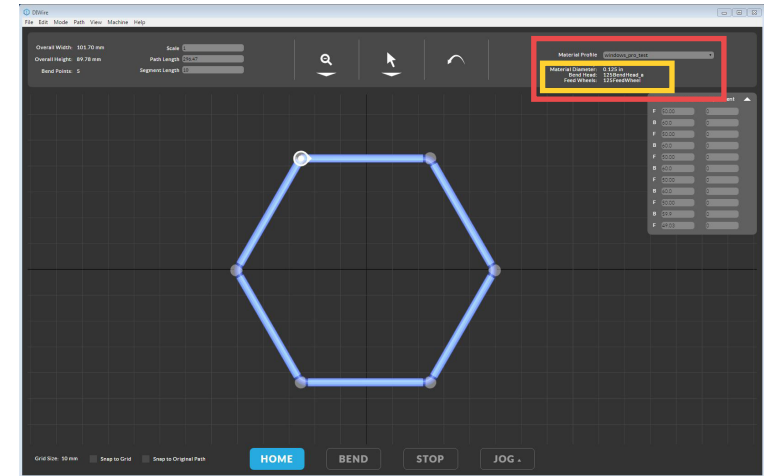
🟥 MATERIAL PROFILE

The Material Profile data is used to compensate for the spring back of the wire. Any wire used by the D.I.Wire needs a Material Profile

DROPDOWN MENU   Select among saved Material Profiles

In order to modify or create new material profiles go to Material Profile Mode

🟨 SELECTED MATERIAL INFO

Displays the associated Material Alloy, Material Thickness, Feed Wheels and Bend Head

Always make sure to select the proper material profile of the wire you are bending. Using other profiles will make Wireware calculate the wrong compensation angles.

Action List

The Action List shows an editable sequential list of all of the actions that the machine will make while bending the Path.
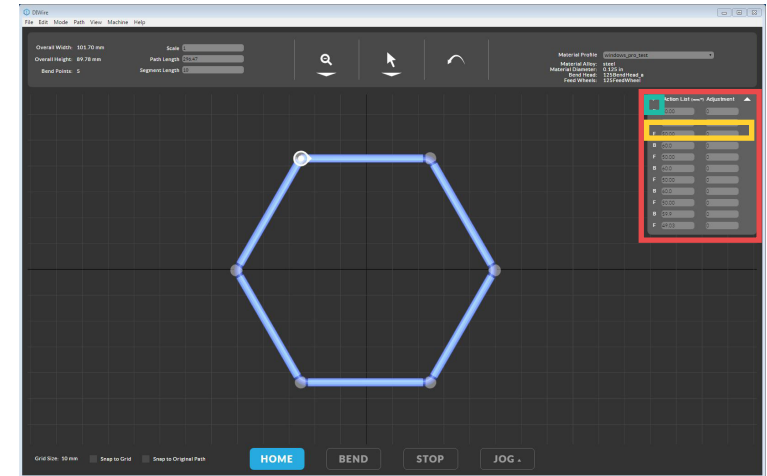
## 🟥 BENDS (B) & FEEDS (F)
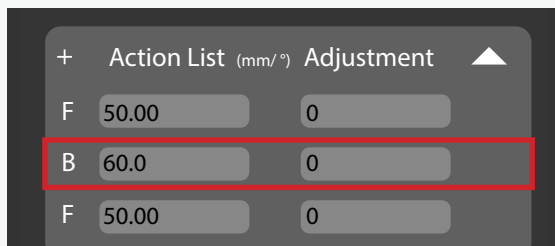
If a file is imported into the Path Mode workspace, WireWare breaks the shape up into Feed and Bend actions.

BEND (B) & FEED (F) FIELDS
A sequential list of feed (F) and bend (B) actions and their values.

SELECTION
Click on a Bend Point or line segment to see its corresponding Action, or click on the Action to see the corresponding Bend Point/ line in the Path. Change values to adjust Path.
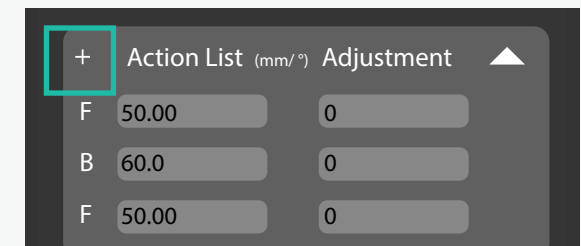
🟨 ACTION LIST ADJUSTMENTS
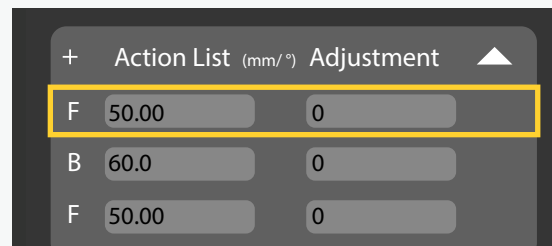
Action List values can be changed on the list and the Path will update on the workspace.

ADJUSTMENT FIELDS
Allows for corrections to discrepancies on the bent wire part.

For example, if a 10° Action results in a 9° bend output, simply put a 1° in the adjustment field for a correction.

🟩 ADDING TO A SHAPE

Add Bend (B) and Feed (F) points to the Action List to add to the end of a Path.

(+)
The Plus icon adds Feed and Bend Points to the list. Clicking the Plus will add a bend and feed after the last segment of a shape.

After adding several Feed/Bend Actions, zoom out to view and manipulate the new set of segments and bend points

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Control & Jog Bar

The Control Bar and Jog Bar at the bottom of the workspace can be found in every mode. These controls are **Home** the bend pin, **Bend** the path, and **Stop** the D.I.Wire. The Jog bar shows the location and controls to move the bend pin and feed wheels.
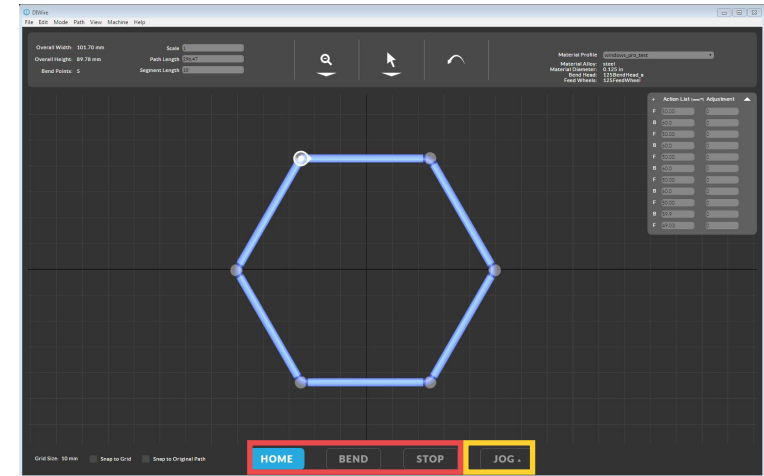
HOME, BEND & STOP
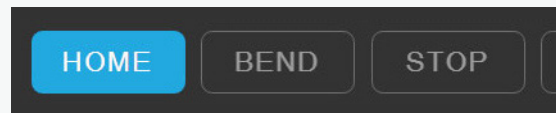
|	
HOME	Commands the D.I.Wire to locate and rest at Home (machine position zero)
	The machine must be homed when turning on the machine or restarting or if it has lost its location
BEND	Starts bending the active path
STOP	Immediately stops moving the machine axes

JOG

Jog controls the machine with simple movements set in the numerical fields for each moving part of the machine

This may be helpful for loading wire
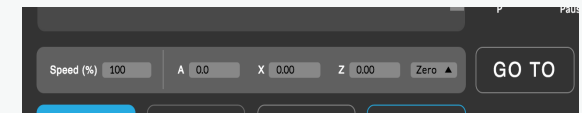
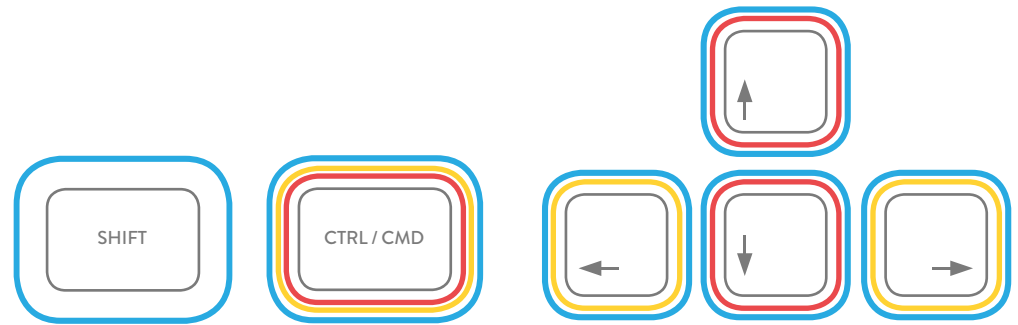|	
SPEED %	Shows the speed the machine is running as a percent of the maximum speed determined by machine settings
A	Controls position of the bend pin, measured in degrees
X	Controls the feed of the wire, measured in the units in use (inches or mm)
Z	Controls the up/down position of the pin
ZERO	Sets the current position of the specified axis to 0
GO TO	Go to the position entered in the jog bar

Arrow Key Controls

Use key commands to manually move the Bend Ring, Bend Pin, or material forward and backward.

SHIFT   CTRL / CMD

---

1 FEED MATERIAL : X AXIS

CTRL / CMD

CMD / CTRL + UP ARROW	Feeds the material forward
CMD / CTRL + DOWN ARROW	Feeds the material back

2 MOVE BEND PIN : A AXIS

CTRL / CMD

CMD / CTRL + LEFT ARROW	Moves the bend pin counter-clockwise
CMD / CTRL + RIGHT ARROW	Moves the bend pin clockwise

3 RAISE/LOWER BEND RING: Z AXIS

CTRL / CMD

CMD / CTRL + GREATER-THAN	Moves the Bend Ring up (Z0)
CMD / CTRL + LESS-THAN	Moves the Bend Ring down (Z-12 max)

4 INCREMENTAL MOVES
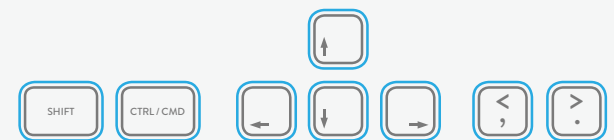
SHIFT   CTRL / CMD

SHIFT + CMD / CTRL + LEFT / RIGHT ARROW	Moves the Bend Pin incrementally (0.5° per move)
SHIFT + CMD / CTRL + UP / DOWN ARROW	Moves the material incrementally (0.20" / 0.5 mm per move)
SHIFT + CMD / CTRL + GREATER-THAN / LESS-THAN	Moves the Bend Ring up and down incrementally (0.047" / 1 mm per move)

Other Path Features

These are other Path Mode tools that are helpful for Path selection, imported file clean up and quick undo/ redo of actions on the Workspace.
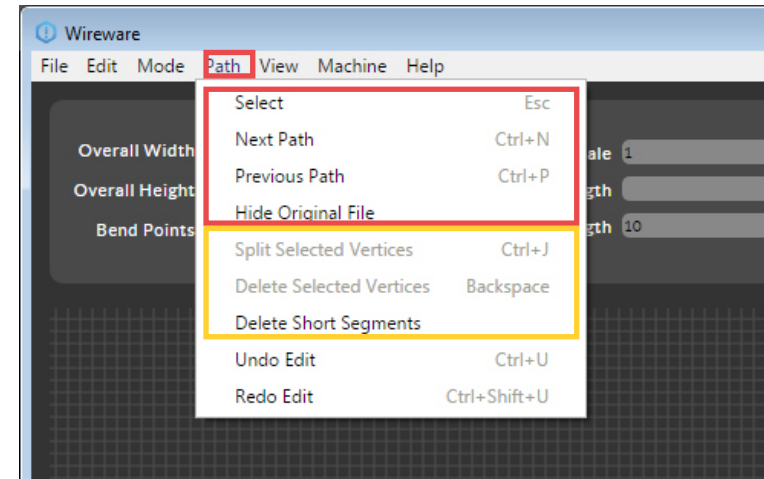
🟥 PATH SELECTION

SELECT ESC KEY	Selects the "Select bend points" Tool
NEXT PATH CTRL + N	Selects the next Path in order of creation, if Workspace has multiple Paths
PREVIOUS PATH CTRL + P	Selects the Path that was previously selected, if Workspace has multiple Paths
HIDE ORIGINAL FILE	Hides / Shows the ghosted silhouette of the imported SVG

🟨 PATH CLEAN UP

Use these tools to modify the imported Path. Paths must be modified to accomodate Bend Head geometry and minimum segment lengths.

SPLIT SELECTED VERTICES CTRL + J	Divides a selected Bend Point into two equal angle Bend Points. *e.g. a 160 ° bend angle into two 80 ° Bend Points. This allows easier manipulation of larger angles.*
DELETE SELECTED VERTICES BACKSPACE	Deletes selected Bend Point.

🟨 PATH CLEAN UP

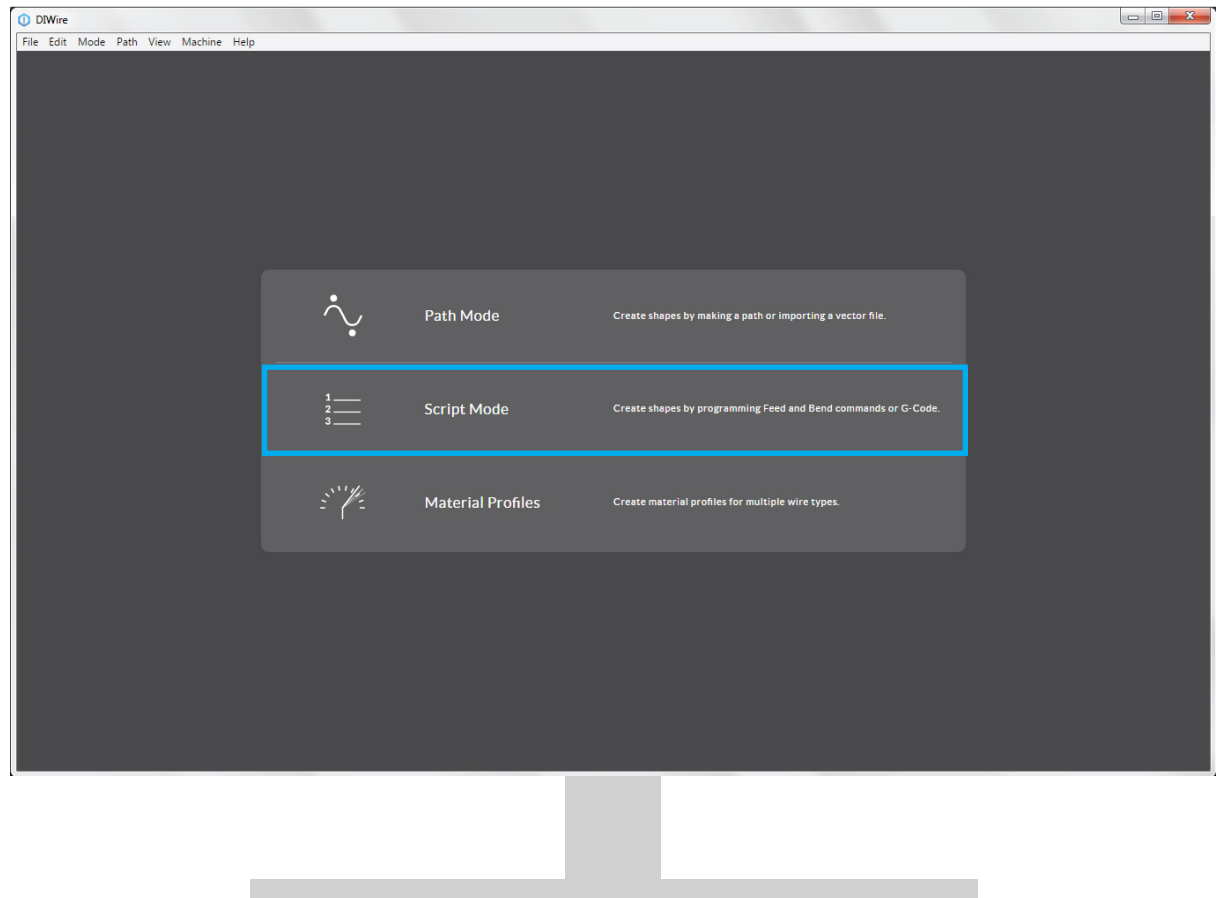|	
DELETE SHORT SEGMENTS	Simplifies complex Paths by deleting segments smaller than a threshold relative to the path size.

Script Mode
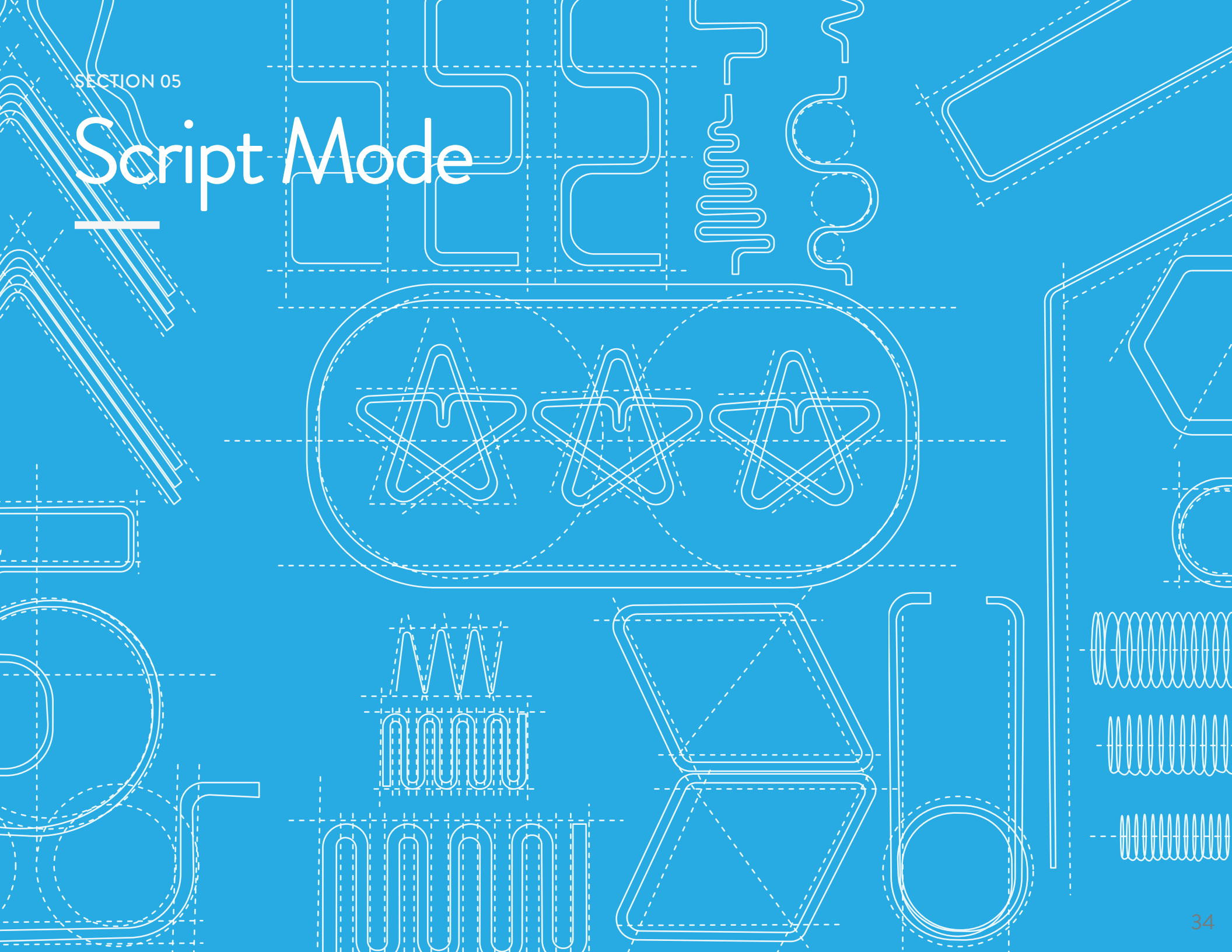
Script Mode

Create precise shapes using written WireWare script commands or G-Code commands to control the D.I.Wire. These allow for a higher level of control over the output.

- OVERVIEW

- GETTING STARTED

- MATERIAL PROFILE SELECTION

- CONTROL & JOG BAR

- ARROW KEY CONTROLS

Screen Overview

FILE INFO

SCRIPT WINDOW

SELECTED
MATERIAL
PROFILE INFO

SCRIPT MODE
GLOSSARY

G-CODE
GLOSSARY

CONTROL & JOG BAR

 DIWire   File   Edit   Mode   Path   View   Machine   Help   100% ▯   Fri 1:08 PM

Material

Material Profile	test_plus
Material Alloy:	steel
Material Diameter:	0.125 in
Bend Head:	125BendHead_a
Feed Wheels:	125FeedWheel
Bend Velocity:	4500
Feed Velocity:	4500
Creator Name:	steel
Date:	2017-05-14
Clamp Torque:	test_clamp_t
Notes:	test_plus_notes

Maximum Velocity (G0):
X: 4500
A: 4500

Script

```
1    (Smooth Arc, 125 Galvi)
2
3    REPEAT 30:
4    g90 x2
5    g91 a25
6    g91 a10
7    END
8
9    Feed 10
10
11
```

HOME   RUN   STOP   JOG ▲

Script Mode Glossary
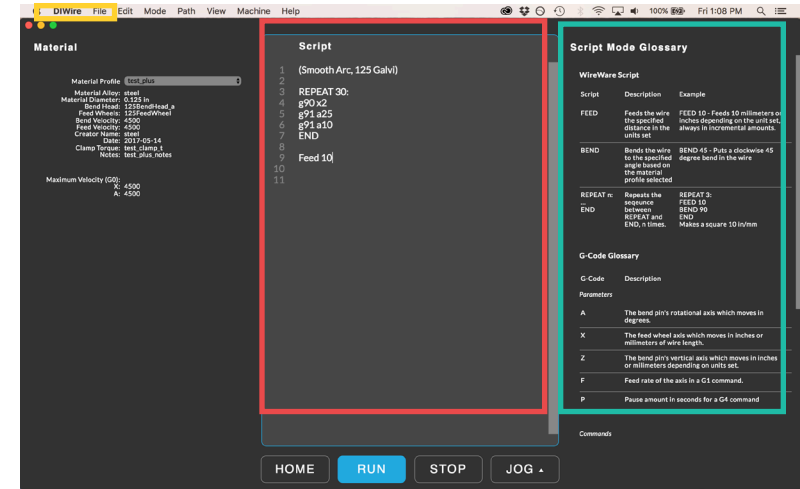
WireWare Script

Script	Description	Example
FEED	Feeds the wire the specified distance in the units set	FEED 10 - Feeds 10 milimeters or inches depending on the unit set, always in incremental amounts.
BEND	Bends the wire to the specified angle based on the material profile selected	BEND 45 - Puts a clockwise 45 degree bend in the wire
REPEAT n: ... END	Repeats the seqeunce between REPEAT and END, n times.	REPEAT 3: FEED 10 BEND 90 END Makes a square 10 in/mm

G-Code Glossary

G-Code	Description

Parameters

|	
A	The bend pin's rotational axis which moves in degrees.
X	The feed wheel axis which moves in inches or milimeters of wire length.
Z	The bend pin's vertical axis which moves in inches or milimeters depending on units set.
F	Feed rate of the axis in a G1 command.
P	Pause amount in seconds for a G4 command

Commands

05 | SCRIPT MODE

Getting Started

Start a new Script in the Script Window
using WireWare Script or G-Code commands.
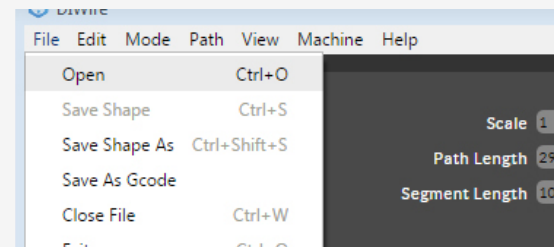

■ SCRIPT WINDOW
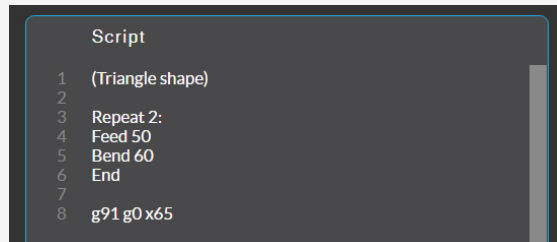
Click into the Script Window to type in
commands or copy and paste text.

WIREWARE SCRIPT + G-CODE   Create shapes using the WireWare script
commands or G-Code

*The Script Window is active when it has a blue
outline. Click anywhere outside of the Script
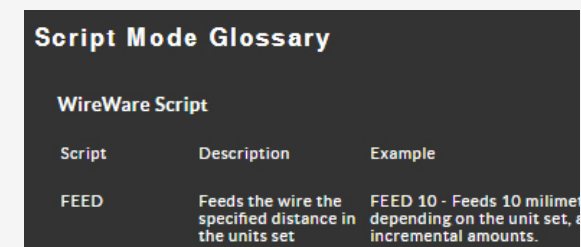Window to be able to use the keys for manually
driving the machine. (Page 32)*

■ IMPORT A FILE

Use the file menu to open a saved file
from your computer.

CTRL + O   Open a file from your keyboard

*Paths can be saved as G-Code from Path Mode
and opened in Script Mode.*

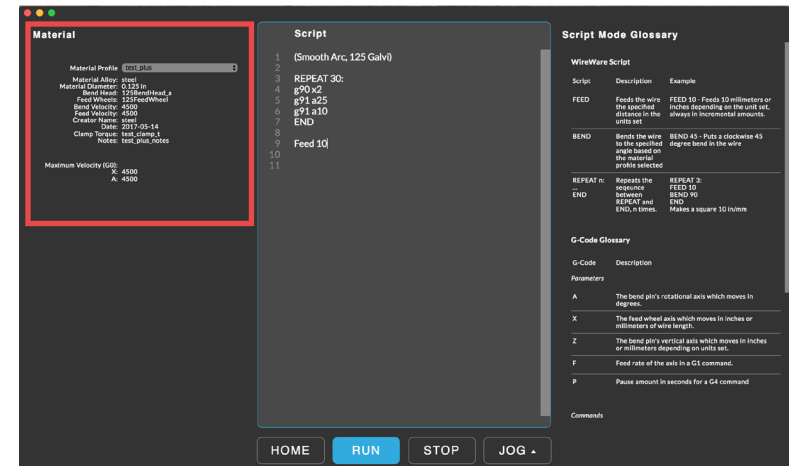---

■ SCRIPT MODE GLOSSARY

This is a glossary of WireWare Script and
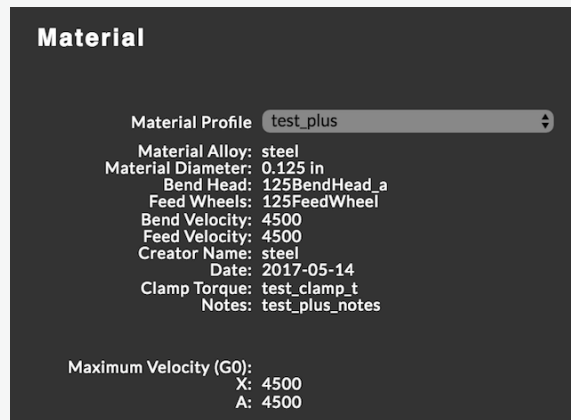G-Code commands.

---

*Refer to the Reference section at the end of this
manual for a complete glossary of terms and other
available commands*

Material Profile Selection

When using the WireWare script select a Material Profile to compensate for the wire spring back.

MATERIAL PROFILE

When you select a Material Profile, you will also be able to view its associated information.

Bend Velocity is measured in degress/minute.
Feed Velocity is measured in mm/minute (in/min).

For more information, see the References section.

---

DROPDOWN MENU   The Drop down menu lets you select among saved Material Profiles in your Library.

---

*Straight G-Code will not use Material Profile information.
It's only used for WireWare script commands.*

*In order to modify or create new material profiles
go to Material Profile Mode.*

Control & Jog Bar

The Control Bar and Jog Bar at the bottom of the workspace can be found in every mode. These controls are **Home** the bend pin, **Run** the script, and **Stop** the D.I.Wire. The Jog bar shows the current positions and controls to move the bend pin and feed wheels.
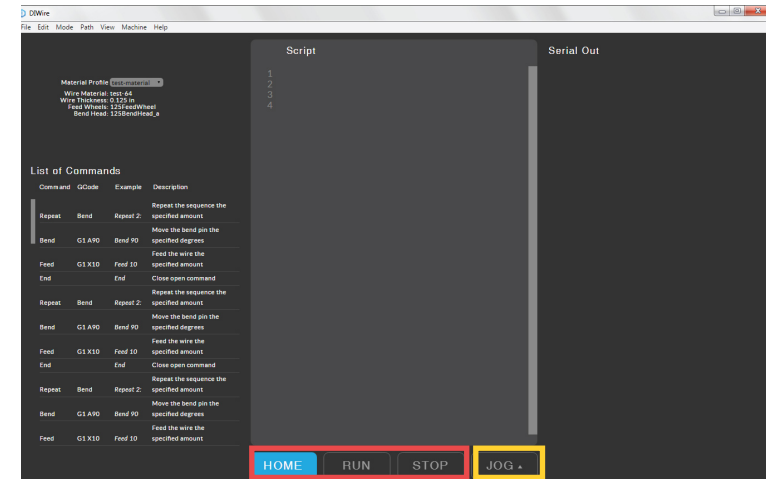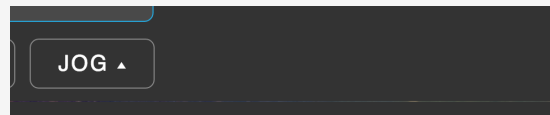

1 HOME, BEND & STOP
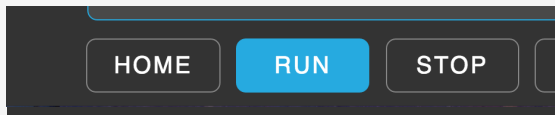
|	
HOME	Commands the D.I.Wire to locate and rest at Home (machine position zero)
	The machine must be homed when turning on the machine or restarting or if it has lost its location.
BEND	Starts bending the active path
STOP	Immediately stops moving the machine axes

2 JOG

Jog controls the machine with simple movements set in the numerical fields for each moving part of the machine.

This may be helpful for loading wire
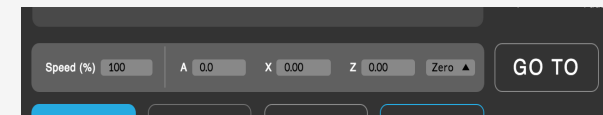
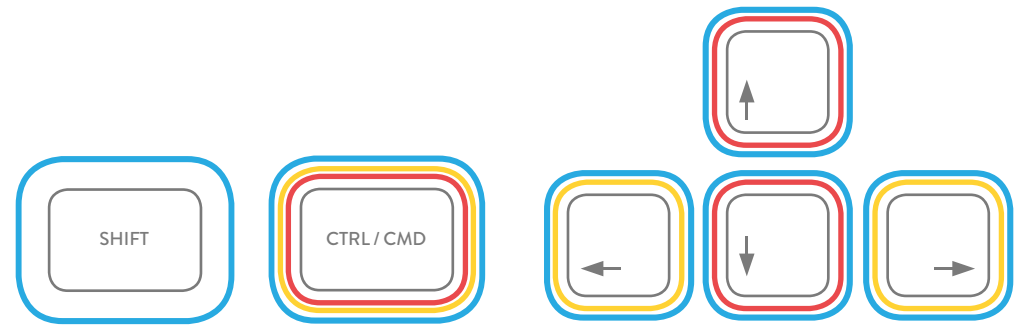|	
SPEED %	Shows the speed the machine is running as a percent of the maximum speed determined by machine settings
A	Controls position of the bend pin, measured in degrees
X	Controls the feed of the wire, measured in the units in use (inches or mm)
Z	Controls the height of the Bend Pin in relation to the top shape (0 to -12 mm)
ZERO	Sets the current position of the specified axis to 0
GO TO	Go to the position entered in the jog bar

Arrow Key Controls

Use key commands to manually move the Bend Ring, Bend Pin, or material forward and backward.

SHIFT   **CTRL / CMD**   ↑ ← ↓ →

---

1   FEED MATERIAL : X AXIS

CTRL / CMD   ← ↑ ↓ →

CMD / CTRL + UP ARROW	Feeds the material forward
CMD / CTRL + DOWN ARROW	Feeds the material back

2   MOVE BEND PIN : A AXIS

CTRL / CMD   ← →

CMD / CTRL + LEFT ARROW	Moves the bend pin counter-clockwise
CMD / CTRL + RIGHT ARROW	Moves the bend pin clockwise

3   RAISE/LOWER BEND RING: Z AXIS

CTRL / CMD   < ,   > .

CMD / CTRL + GREATER-THAN	Moves the Bend Ring up (Z0)
CMD / CTRL + LESS-THAN	Moves the Bend Ring down (Z-9 max)

4   INCREMENTAL MOVES
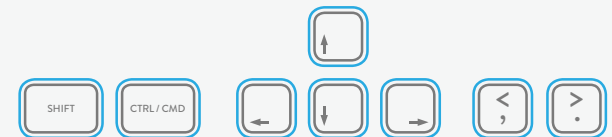
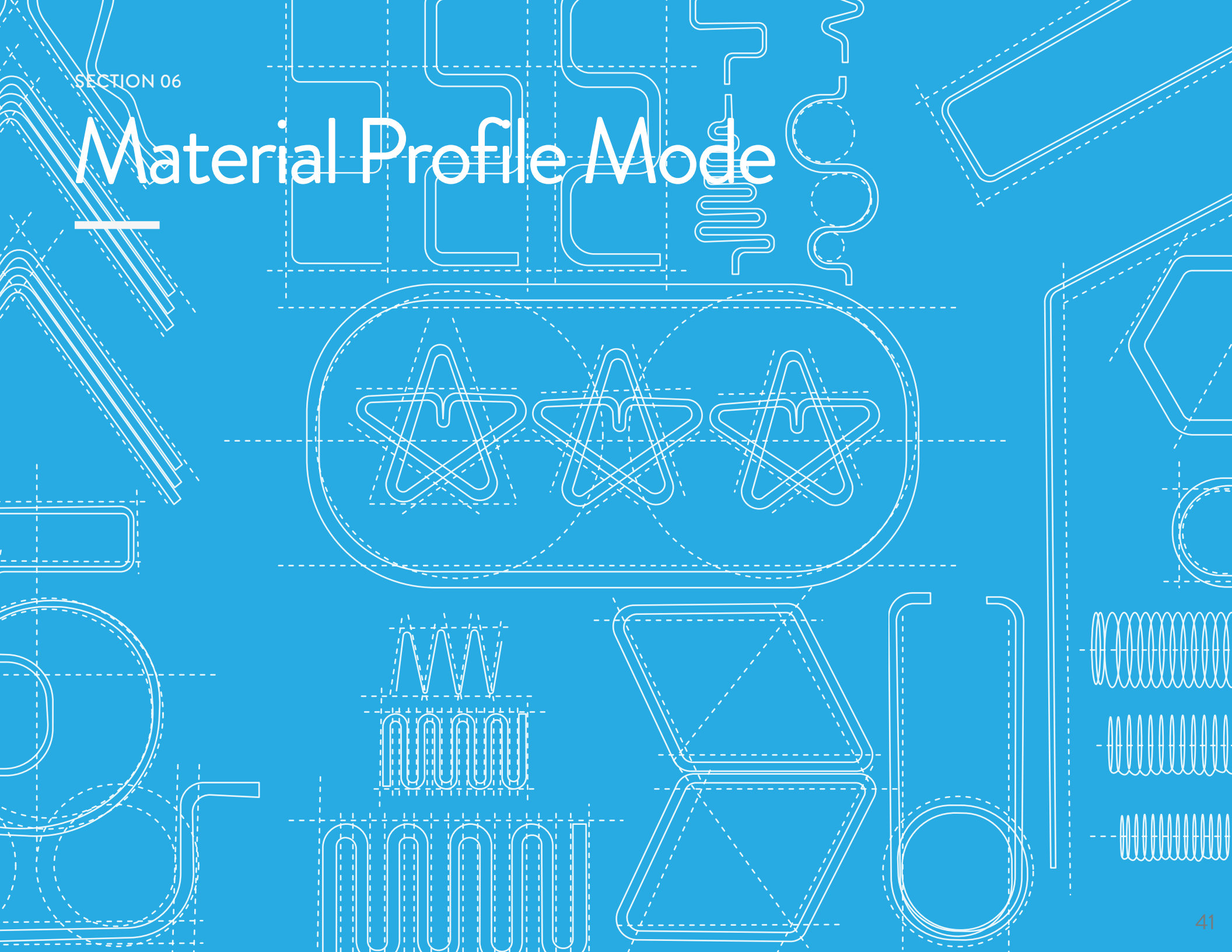SHIFT   CTRL / CMD   ↑ ← ↓ →   < ,   > .

|	
SHIFT + CMD / CTRL + LEFT / RIGHT ARROW	Moves the Bend Pin incrementally (0.5° per move)
SHIFT + CMD / CTRL + UP / DOWN ARROW	Moves the material incrementally (0.20" / 0.5 mm per move)
SHIFT + CMD / CTRL + GREATER-THAN / LESS-THAN	Moves the Bend Ring up and down incrementally (0.047" / 1 mm per move)

Material Profile Mode

Material Profile Mode

A Material Profile can be created for any wire used in the D.I.Wire. Material Profile data is used to compensate for wire spring back during a bend.

A Material Profile is needed to bend from Path Mode or Run WireWare Script commands in Script Mode.

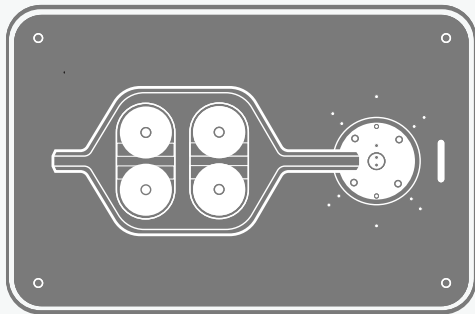WireWare comes pre-loaded with Material Profiles for wire sold on Pensalabs.com
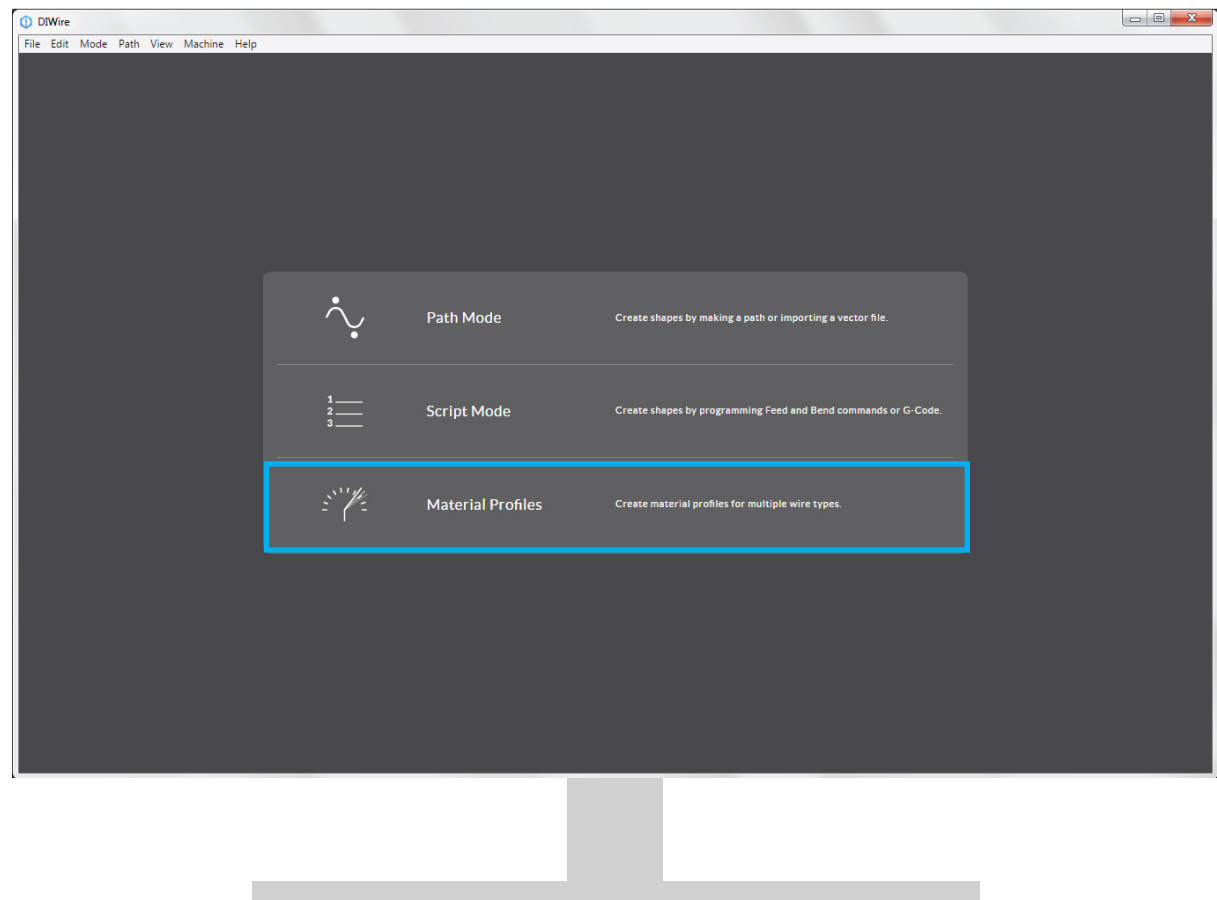
What is a Material Profile?

When creating a Material Profile the D.I.Wire learns how much to compensate for wire spring back. Material Profiles consist of Hardware Definition information and Dataset measurements.
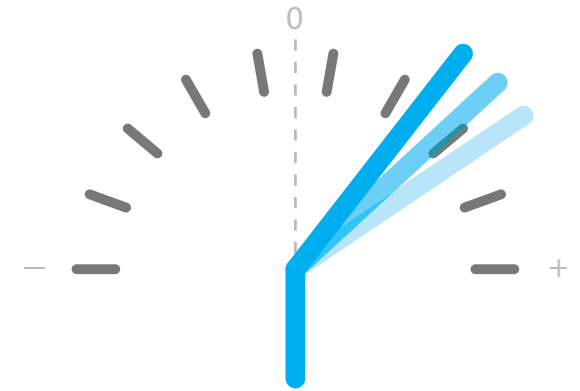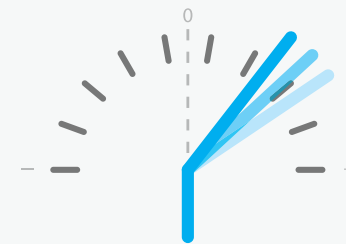
HARDWARE DEFINITION

The Hardware Definition is information about the Bend Head and Feed Wheels for a specific setup. This information needs to be entered every time a new Material Profile is made.

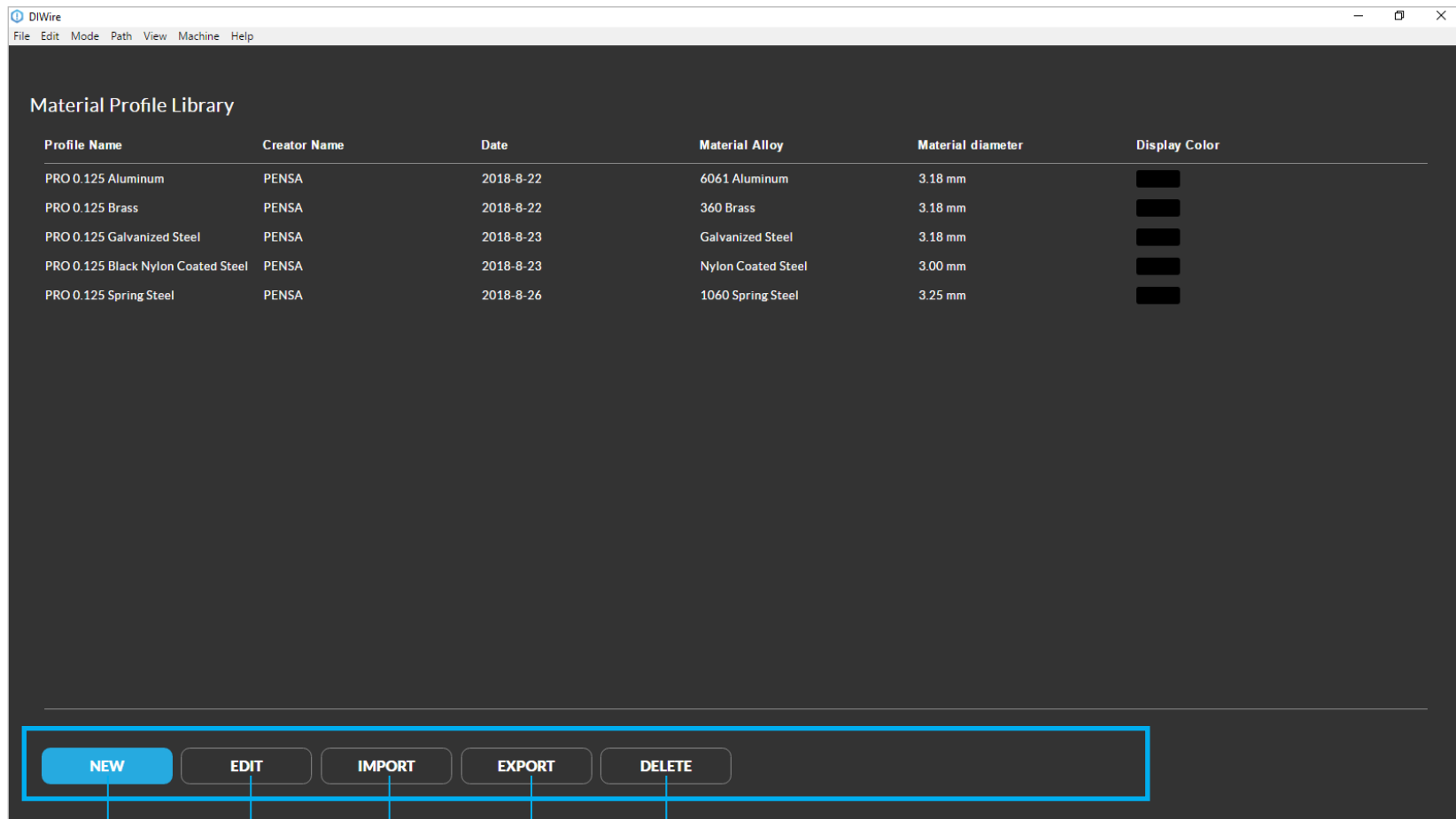For more information, see the Reference section.

DATASET MEASUREMENTS

A dataset consists of bending discrete angles, measuring each using a protractor and inputting the results into a table.

It is necessary to complete all three Datasets.

Library Overview

The Material Profile Library is a collection of wire materials that have been calibrated for the D.I.Wire.

DIWire

File Edit Mode Path View Machine Help

Material Profile Library

Profile Name	Creator Name	Date	Material Alloy	Material diameter	Display Color
PRO 0.125 Aluminum	PENSA	2018-8-22	6061 Aluminum	3.18 mm	▬
PRO 0.125 Brass	PENSA	2018-8-22	360 Brass	3.18 mm	▬
PRO 0.125 Galvanized Steel	PENSA	2018-8-23	Galvanized Steel	3.18 mm	▬
PRO 0.125 Black Nylon Coated Steel	PENSA	2018-8-23	Nylon Coated Steel	3.00 mm	▬
PRO 0.125 Spring Steel	PENSA	2018-8-26	1060 Spring Steel	3.25 mm	▬

MENU BAR

[NEW] [EDIT] [IMPORT] [EXPORT] [DELETE]

CREATE NEW PROFILE | EDIT EXISTING PROFILE | IMPORT & EXPORT EXISTING PROFILE | DELETE EXISTING PROFILE

Creating a Material Profile

1 PREPARATION

Prepare the following to create a NEW Material Profile.

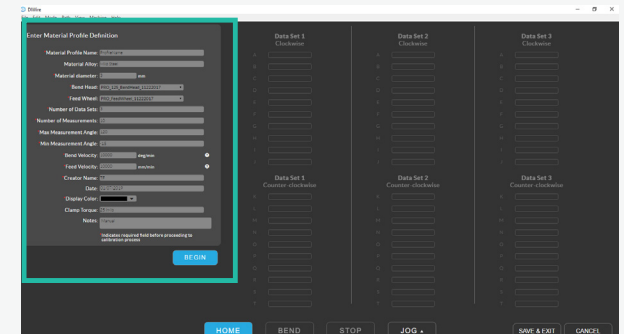|	
MATERIALS NEEDED	D.I.Wire, at least ~20 feet (610cm) of wire, cutting tool, preset torque tool and digital protractor.
TIME NEEDED	1-2hrs total

2 CREATE NEW PROFILE
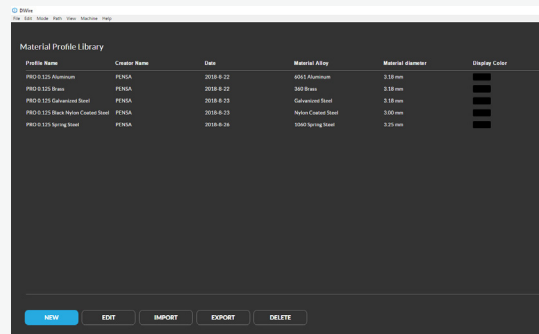
Select the NEW button from the Material Profile Library Screen

3 PROFILE DEFINITION

Fill in the information about the wire and the D.I.Wire hardware setup and click BEGIN when ready to move on.

Red* fields are required, others are optional

To determine the Bend and Feed Velocities for the material being used, see Pensalabs.com for a reference guide.

*Clamp Torque affects the Material Profile.
Use the preset torque wrench or record torque using a digital torque wrench.*

Creating a Material Profile

4 HOME BEND PIN
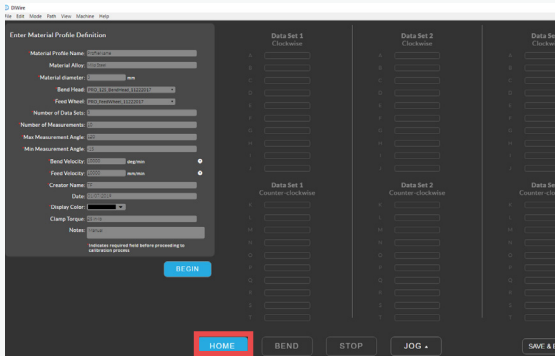
Before bending, the D.I.Wire needs to go through the homing sequence to ensure the bend pin is in the proper position.

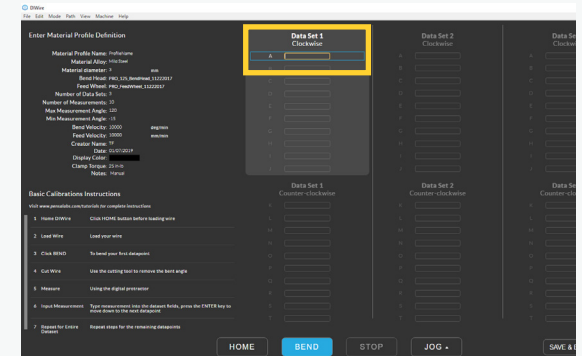| HOME BUTTON	Commands the D.I.Wire to locate and rest at Home (machine position zero)

The machine must be homed when booted or if it has lost its location

5 LOAD WIRE
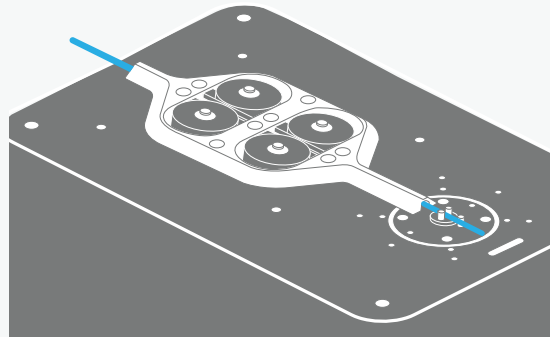
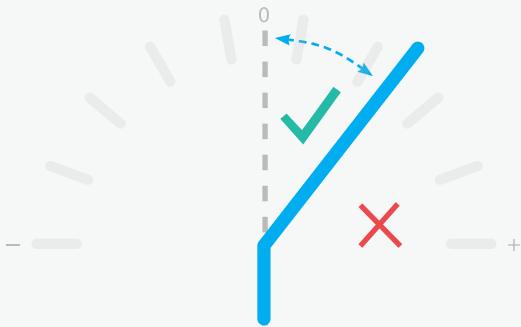Load the wire through the Wire Guides, the Feed Wheels and into the Bend Head.

6 BEND

Click BEND to bend your first datapoint. Use the cutting tool to remove the bent wire from the D.I.Wire

The BEND button will bend the angle of the active data field.

Creating a Material Profile

7 MEASURE ANGLE

Measure the angle of the bent wire using a protractor.

8 INPUT
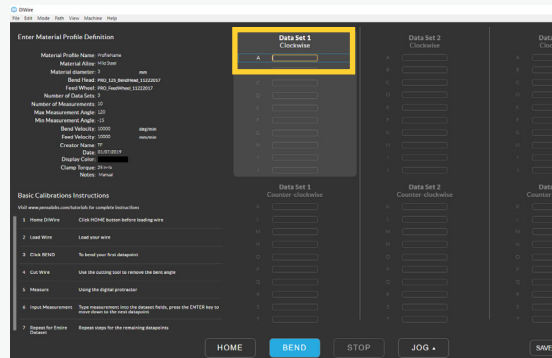
Type measurement into the dataset fields, press the ENTER key to move down to the next datapoint

9 REPEAT & SAVE
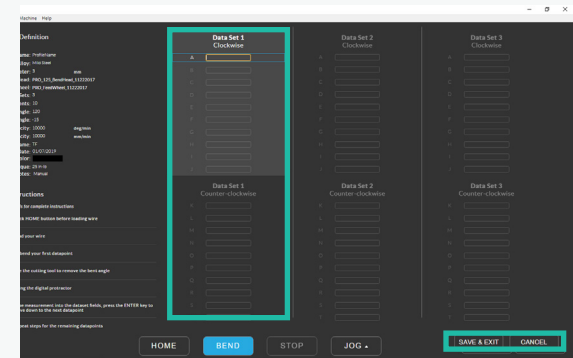
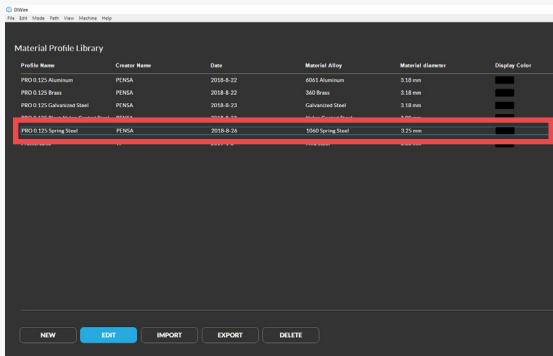Repeat these steps for every datapoint in the Dataset.

SAVE & EXIT Click the Save & Exit button to save a completed or in-progress Material Profile

> *The file will not show up in the Materal Profile drop down lists until all three datasets are complete.*

CANCEL Click the Cancel button to exit without saving the file.

Editing a Material Profile

1 EDIT PROFILE

In the Material Profile Library, select the Material Profile to be edited and click the EDIT button.

The blue box will appear around the Material Profile when it is selected
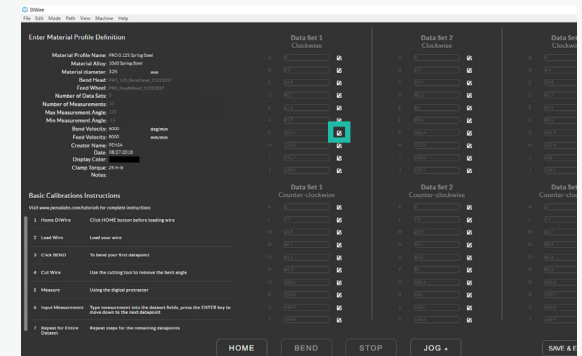
2 EDIT DEFINITION
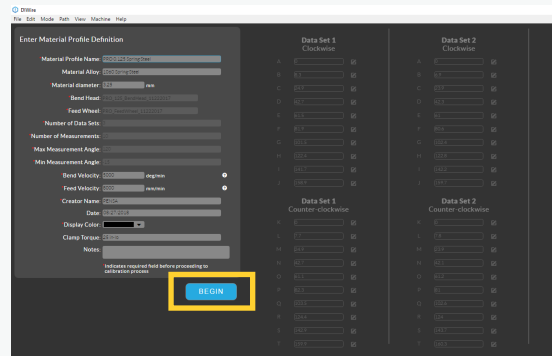
Make any needed changes to the Material Profile Definition and click BEGIN.

Note that the Bend Head and Feed Wheel types and velocities cannot be changed as the datapoints are linked to this information
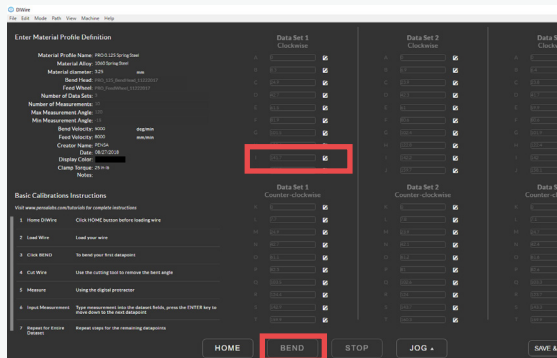
3 INITIATE EDITING

Click the EDIT icon next to the datapoint that needs to be edited.

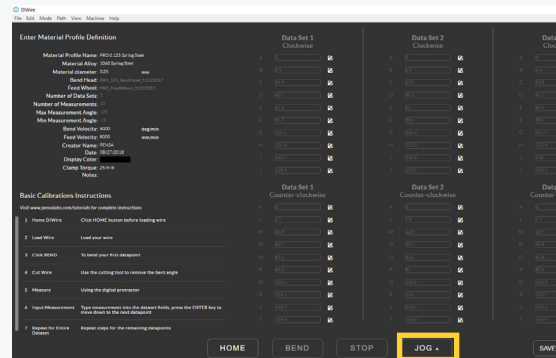# Editing a Material Profile

4 EDIT DATAPOINT

Click BEND to rebend this value and/or input measured angle.

After new numerical value is entered, press the ENTER key to move down.
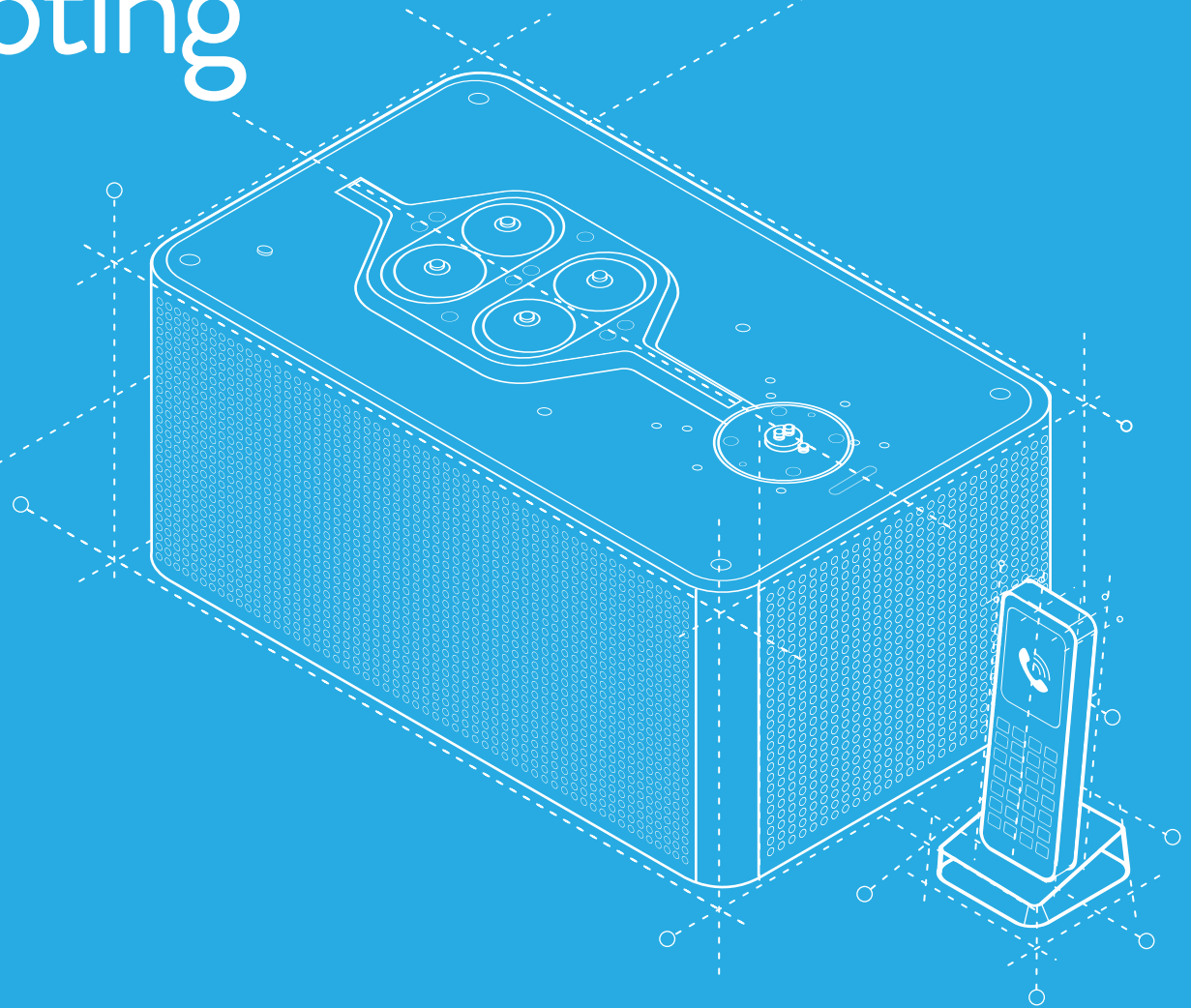
5 SAVE & EXIT

Save and Exit the Material Profile at anytime if needed. However, this file will not appear in a Material Profile drop down list until all 3 Datasets are complete.

Maintenance & Troubleshooting

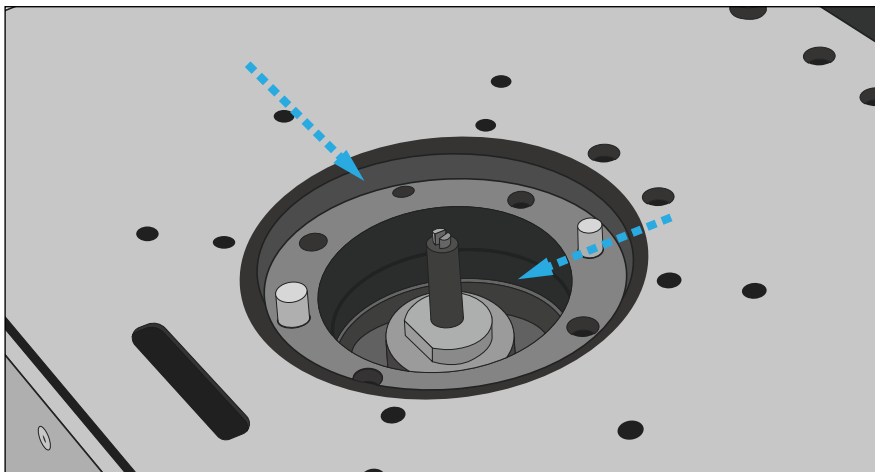# Maintenance and Troubleshooting

- HOW TO CARE FOR YOUR MACHINE

- REPLACING BENDING COMPONENTS

- TROUBLESHOOTING

# How To Care For Your Machine

Cleaning And Lubrication

We recommend applying a way oil lubricant to the following areas:
- Between the top bushing and duck ring
- Between the inner tube and the top bushing

Our team uses PerLube WL-68 for this process. Using a fine tip syringe is helpful when applying lubricant to these tight areas.

Apply once a month, or every 50hr of accumulated use.
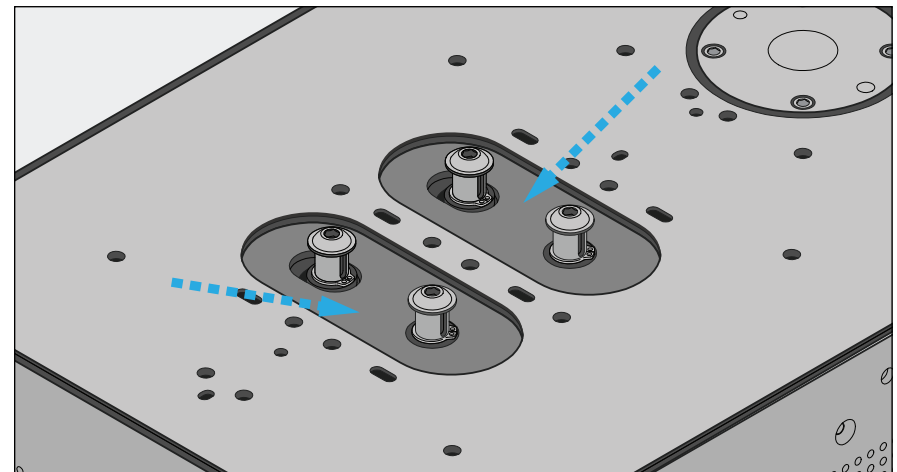
Clean any dust or debris from under the feed wheels. The preferred method is by using a vacuum cleaner, but compressed air can also be used. Just make sure to not blow particles into the bearings.

Cleaning And Lubrication
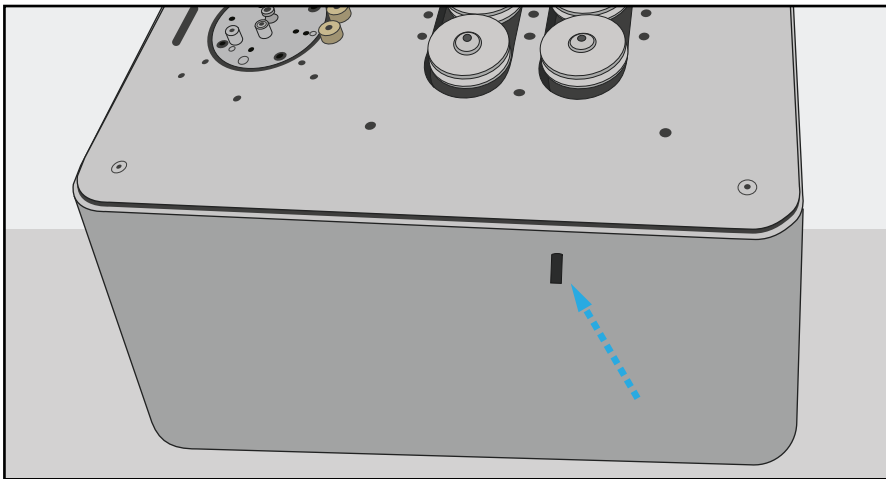
Apply anti-cease grease to the Feed Clamping Screw every 2 months or every 100 to 200 clamping cycles (open-close).

Unscrew the clamping screw completely until fully removed. Inspect the state of the threads and wipe clean with a shop rag or paper towel. Also do a quick inspection of the threads in the nut.

We normally apply a small amount of Moly-Graph #2 grease to the first few threads of the screw and reinsert.

54

Replacing Your Bending Components

Replacing Your Bending Components

- REPLACING YOUR BEND RING AND BEND HEAD

- REPLACING YOUR FEED WHEELS

- REPLACING YOUR WIRE GUIDES

- CONFIGURE YOUR D.I.WIRE PRO FOR A DIFFERENT WIRE SIZE

Replacing Your Bending Components

The Bend Head, Bend Ring, Feed Wheels, and Wire Guides are all in constant contact with the wire and they will wear out over time. But don't worry, replacing them is a straight forward process. Follow the steps in this section and you'll be ready to continue bending in no time!

The Bend Head, Bend Ring and Wire Guides also need to be changed if you are reconfiguring your machine for a different wire size. Just follow the same process as for replacing the bending cmoponents but use your desired size configuration instead of a replacement kit.

Note:

If your components wore out but you don't have replacement parts, send us an email to **support@pensalabs.com** *to purchase a replacement kit.*

Replacing The Bend Head
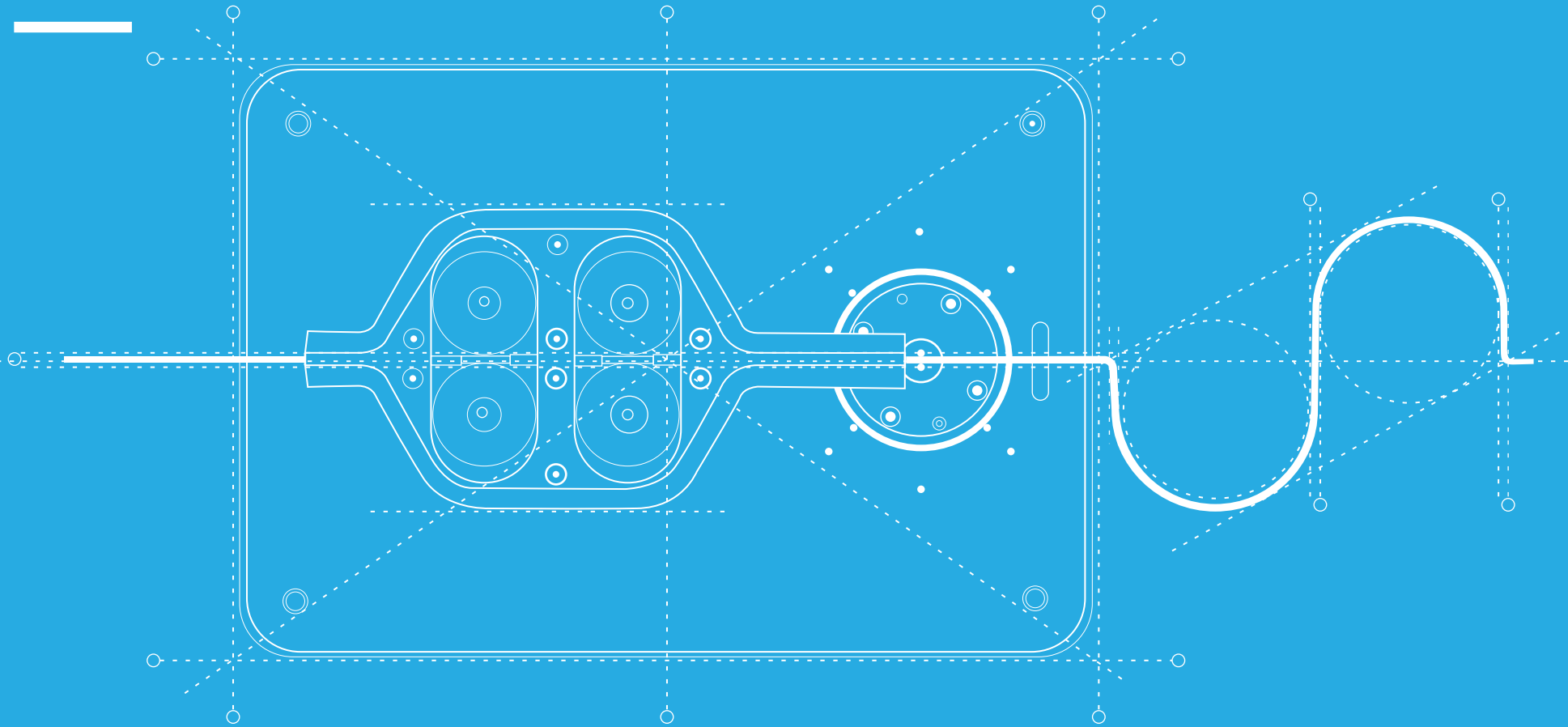
Replacing The Bend Head

TOOLS REQUIRED

**REPLACEMENT
BEND HEAD**

TORQUE WRENCH
For the Bend Head

**SOCKET
WRENCH**

**ALIGNMENT
PLATE**
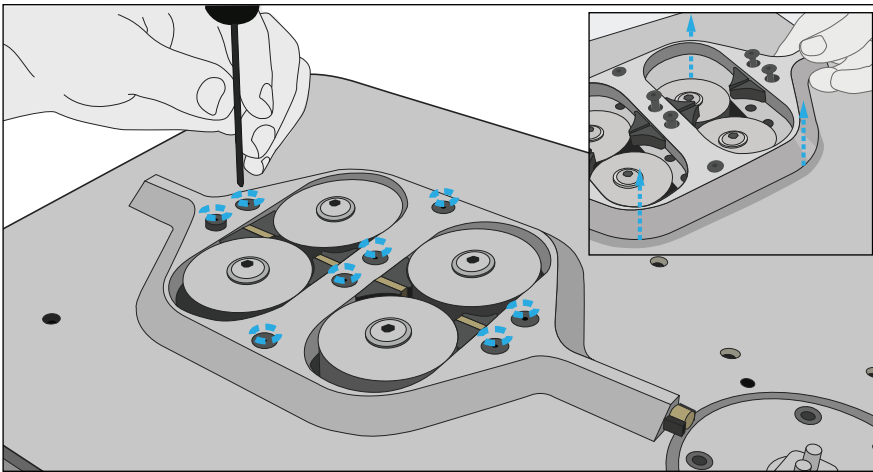
MAGNET

(not provided)

5/32 HEX KEY
For Bend Ring

1/8 HEX KEY
For Bend Ramp
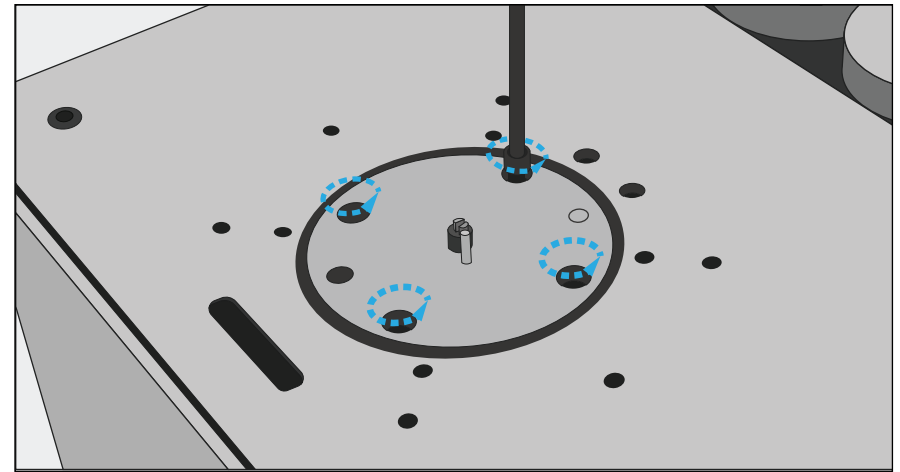
Replacing The Bend Head

1

TOOLS   1/8 Hex Key

Remove the ramp / guides by unscrewing all the #10 flathead screws.
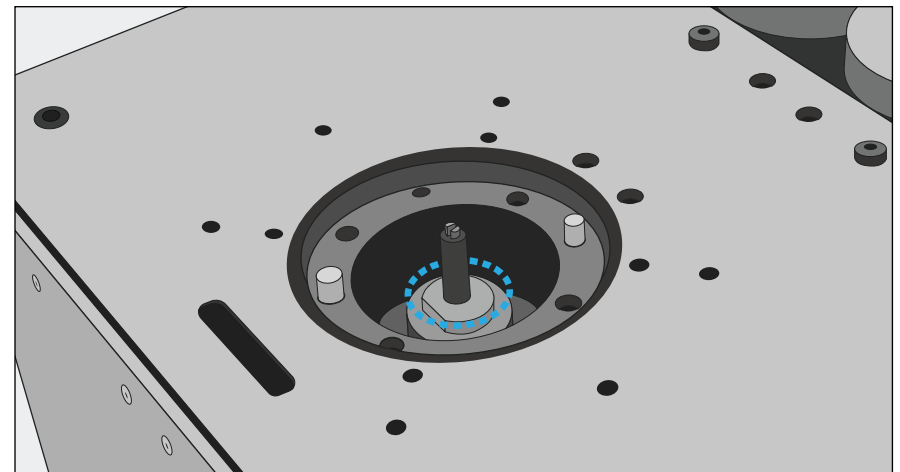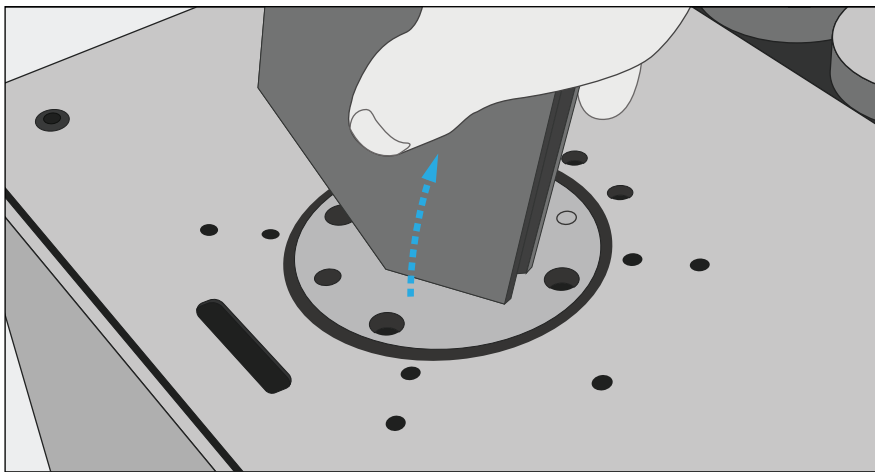
2

TOOLS   5/32 Hex Key

Prepare Bend Ring for removal by taking out the 4 #10 bolts that hold it in place.

Replacing The Bend Head

3

TOOLS   Magnet (not provided)
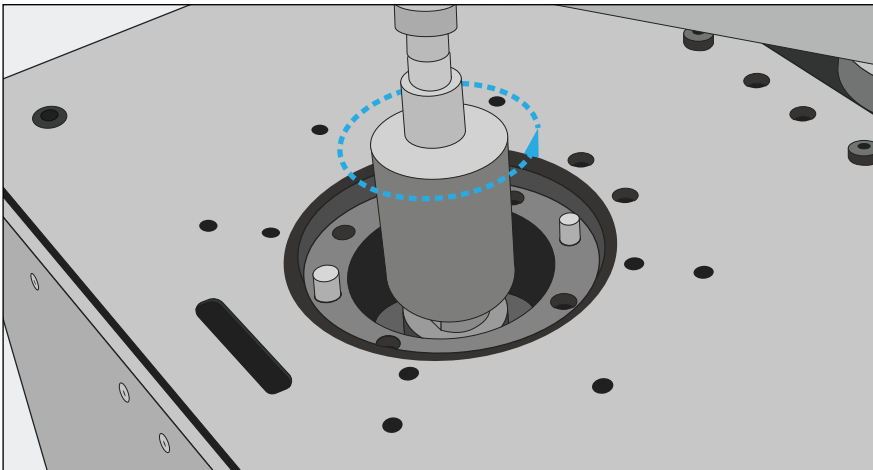
Remove the Bend Ring to access the Bend Head.

We did not provide the magnet. It is possible to remove the Bend Ring without a magnet, but the magnet makes the process easier.

Once the Bend Ring is removed, you will have access to the Bend Head.
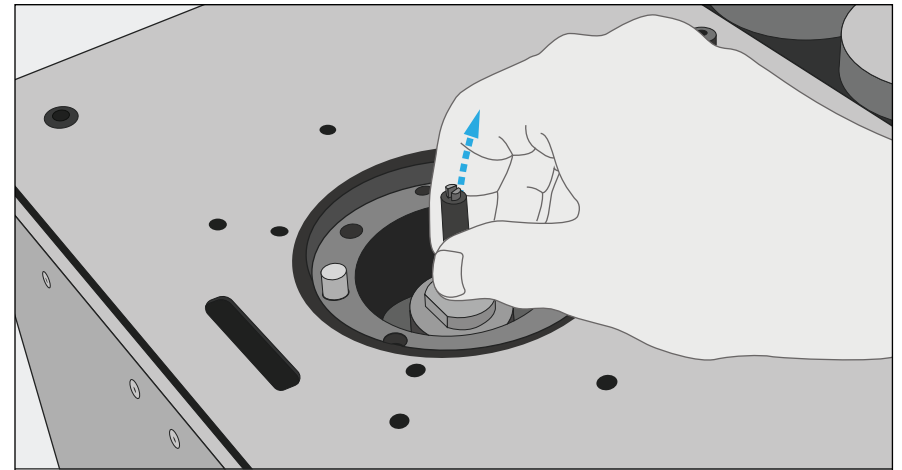
Different Bend Heads will look different, but all are installed the same way.

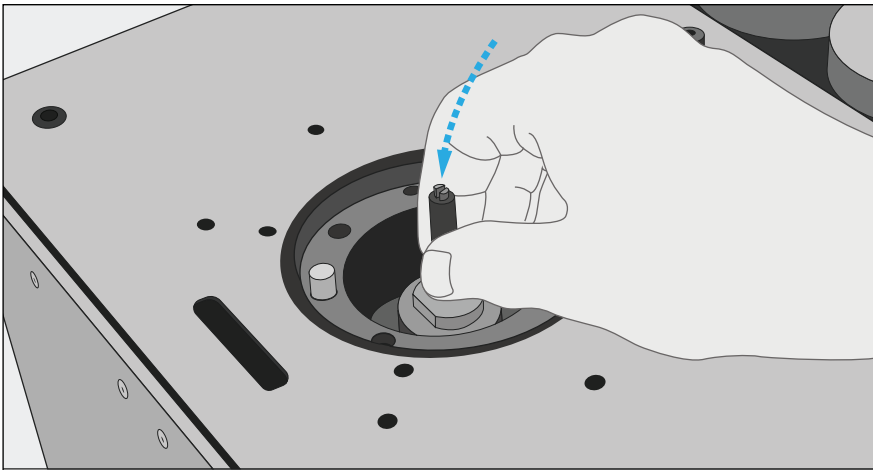# Replacing The Bend Head

4

5

TOOLS   Bend Head Torque Wrench, 30mm Socket Wrench

The Bend Head is held by an ER20 collet.
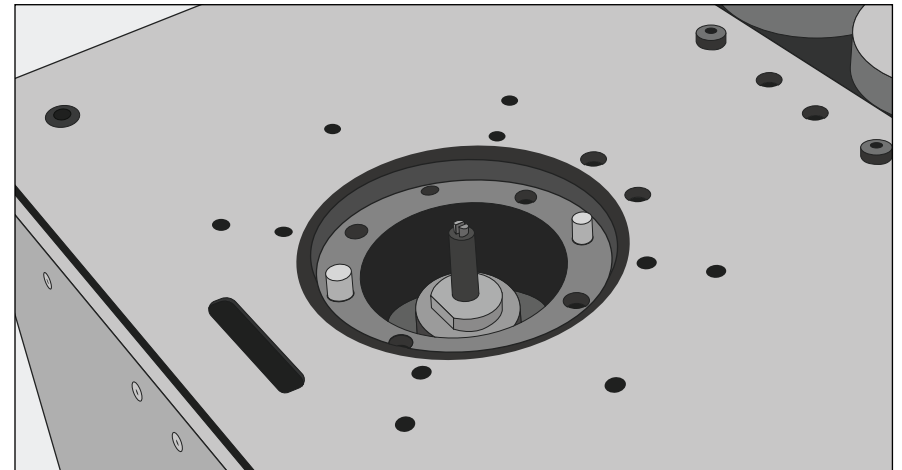Start by loosening the collet nut, but don't remove it completely.

Once the collet nut is loosened, pull the Bend Head out.
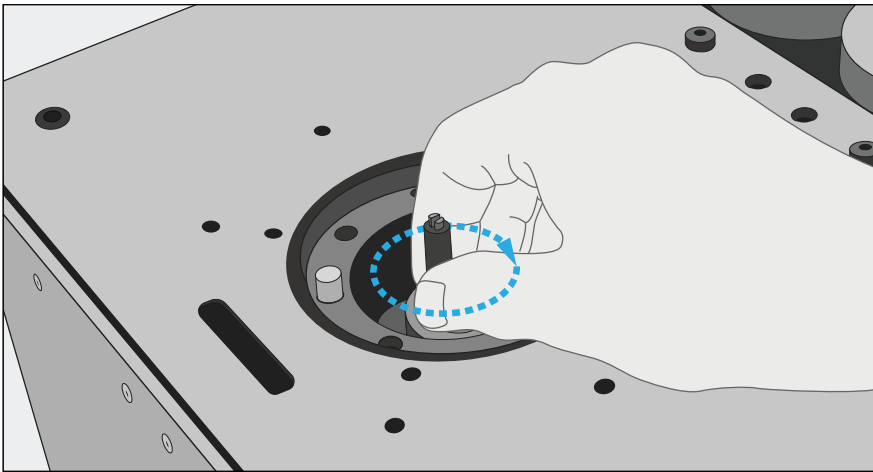
Replacing The Bend Head

6

TOOLS   Replacement Bend Head

Insert the Replacement Bend Head and ensure it is sitting all the way down.

7

If Bend Head is not able to be all the way down, loosen the collet nut a bit more with your hand.
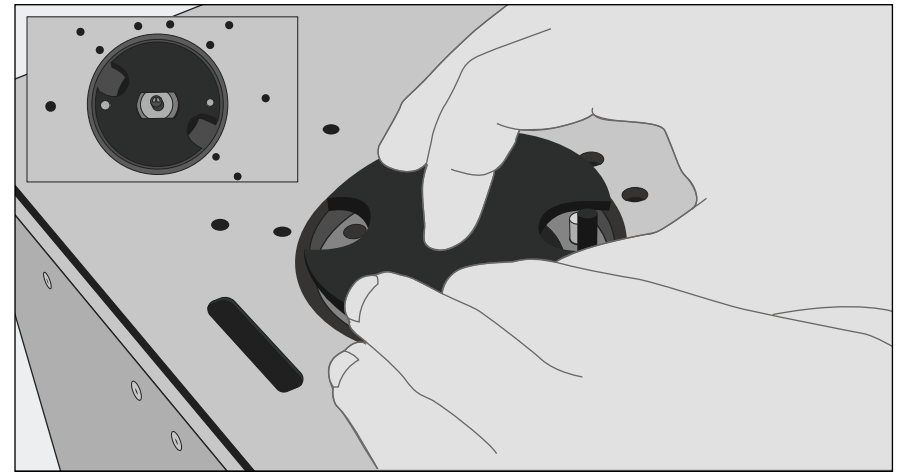
Replacing The Bend Head

8

While ensuring the Bend Head doesn't lift, hand tighten the collet nut.

*Apply downwards pressure to the top of the Bend Head with one hand as you tighten the collet nut with the other*

9

TOOLS   Alignment Plate

Hold the plate over the Bend Ring area and orient the center with Bend Head.

Most Bend Heads cue the same Alignment Tool, but some may need a different one. If your Bend Head needs a special Alignment Tool, we will send it when we ship the Bend Head
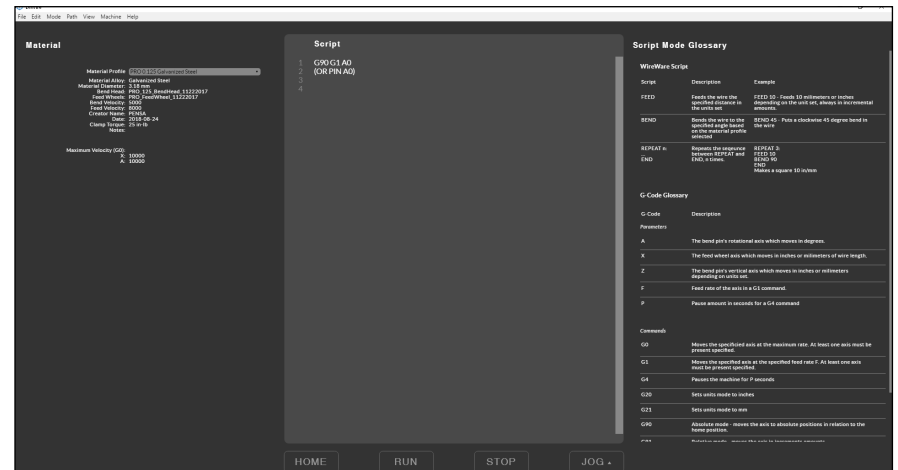
Replacing The Bend Head

10
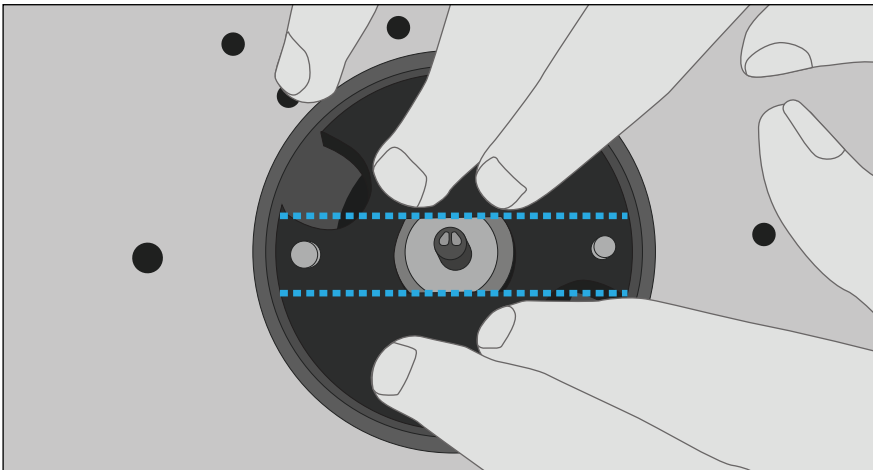
TOOLS   Alignment Plate, WireWare

Using WireWare's manual controls, JOG the Bend Ring until the pins are inline the the alignment plates holes.

Once the holes for the collet and pins are inline, duck the Bend Ring, and mare sure the flats on the tool engage with the flats on the Bend Head

11

Command your D.I.Wire to go to the 0 position by either:

- Run the Homing cycle by pressing [home]
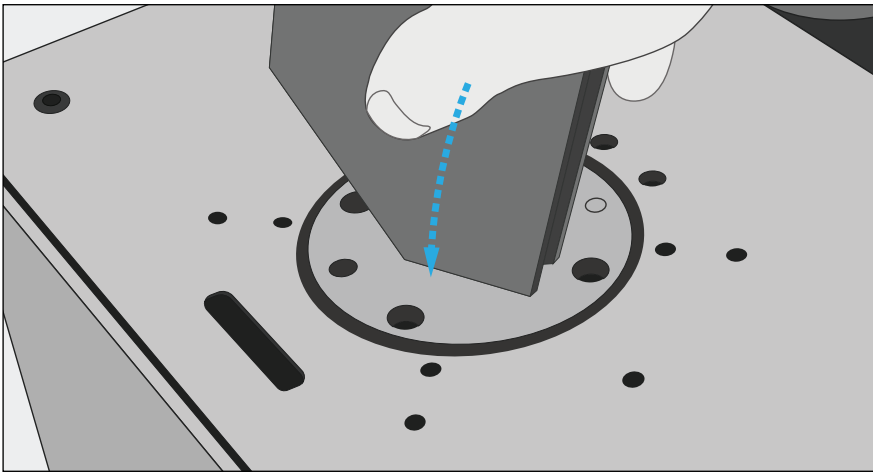- Run the following script:
      G90 G1 A0
      or PINA 0

Type 0 on the jog box for axis A and hit the [go to] button

Verify the Alignment Tool remains fully engaged with the flats on the Bend Head.

The process makes sure the Bend Head is aligned with the 0 position of the machine.
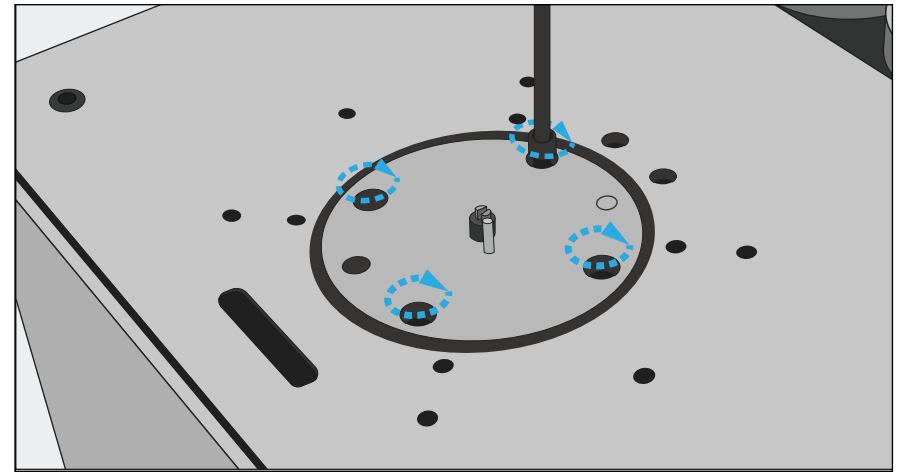
Replacing The Bend Head

12

13

Insert the Bend Ring back into the system.

Make sure the dowel pins align, and gently press down until the Ring is fully seated.
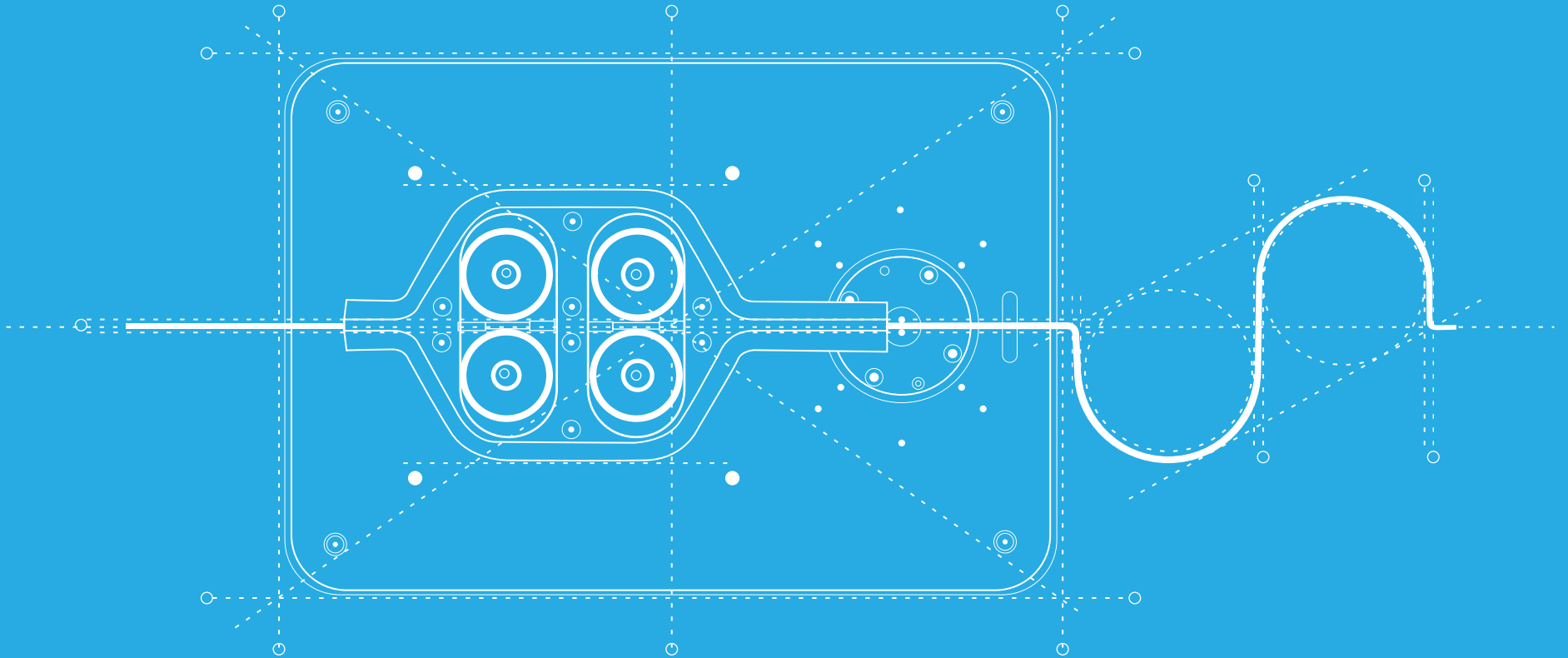
TOOLS   5/32 Hex Key

Fasten the bend ring into place by reinstalling and tightening the 4 #10 screws.

Do not use excessive force when tightening the screws. 10 lb-in is sufficient.
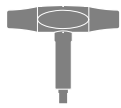*If you don't have a way to measure the force, go to hand tight plus a quarter turn.*

Changing The Feed Wheels

Changing The Feed Wheels

TOOLS REQUIRED

**SMALL
TORQUE WRENCH**

For the Feed Wheels
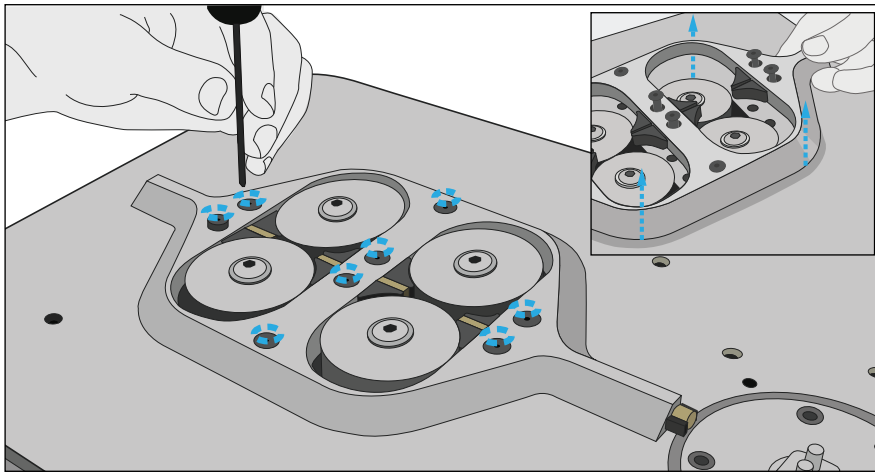
1/8 HEX KEY

For Ramp

3/16 HEX KEY

For Feed Wheel Fasterners

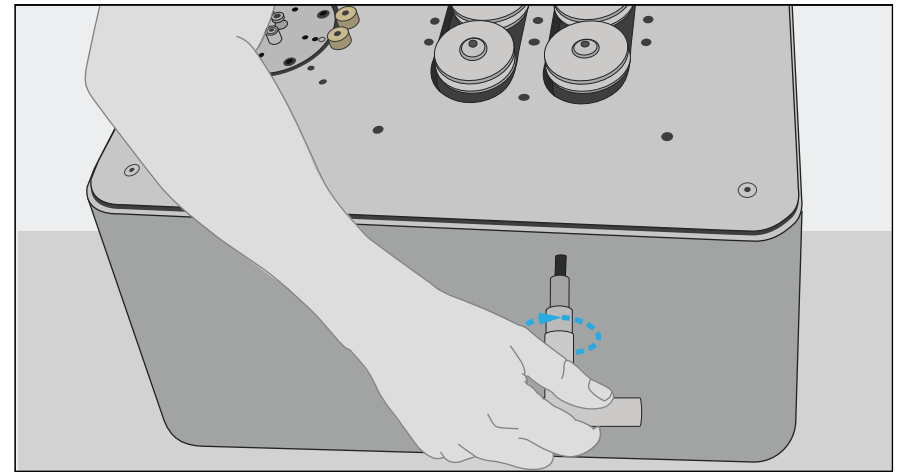# Changing The Feed Wheels

1

TOOLS   1/8 Hex Key

Loosen the fasteners for the ramp.
Remove the ramp from the system.

2

TOOLS   Feed Wheel Torque Wrench

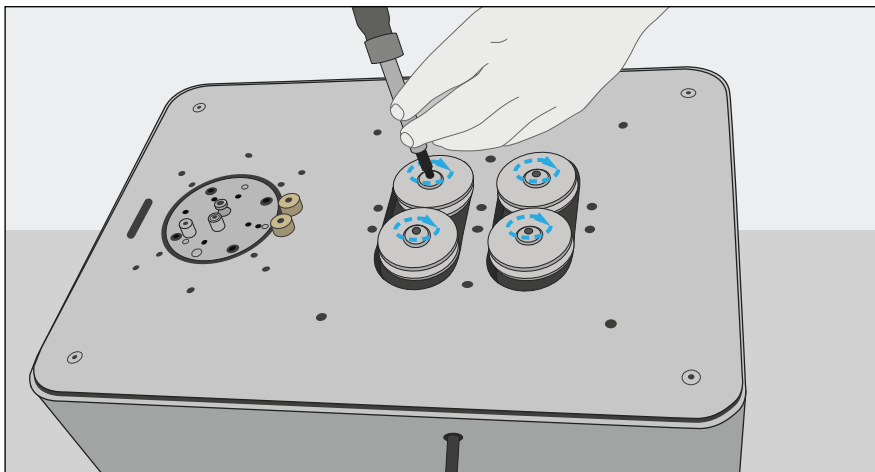Start by clamping the Feed Wheels together by tightening the clamp screw with your Torque Wrench.
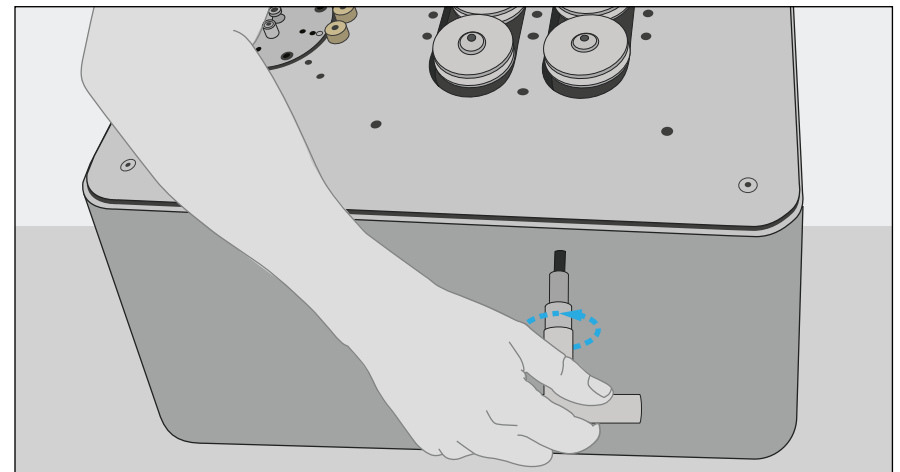
Changing The Feed Wheels

3

TOOLS   3/16 Hex Key, Feed Wheel Torque Wrench

With the feed wheels pushed together, loosen and remove the feed wheel fasteners.

4

TOOLS   Feed Wheel Torque Wrench

Loosen and fully open the feed wheel carriage to allow the removal of the feed wheels.

Changing The Feed Wheels

5

6
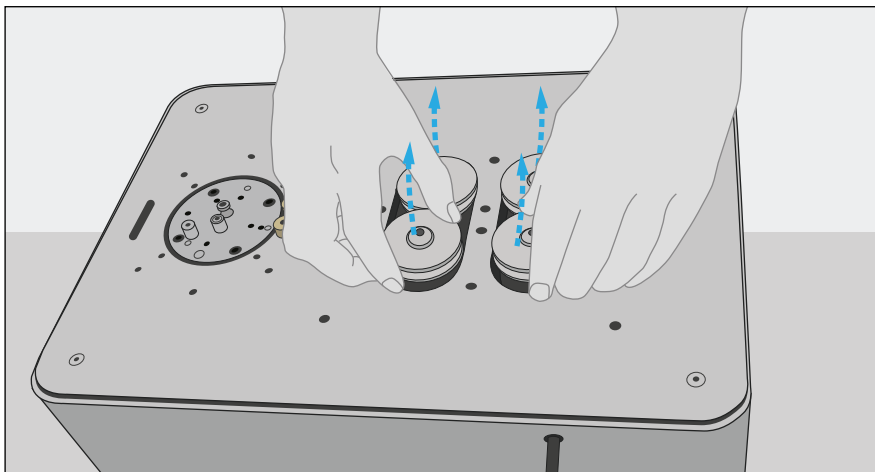
Remove the Feed Wheels from the D.I.Wire by pulling them out of their shafts.

If the Wheels are too tight, use the help of a strong magnet to pull them out.
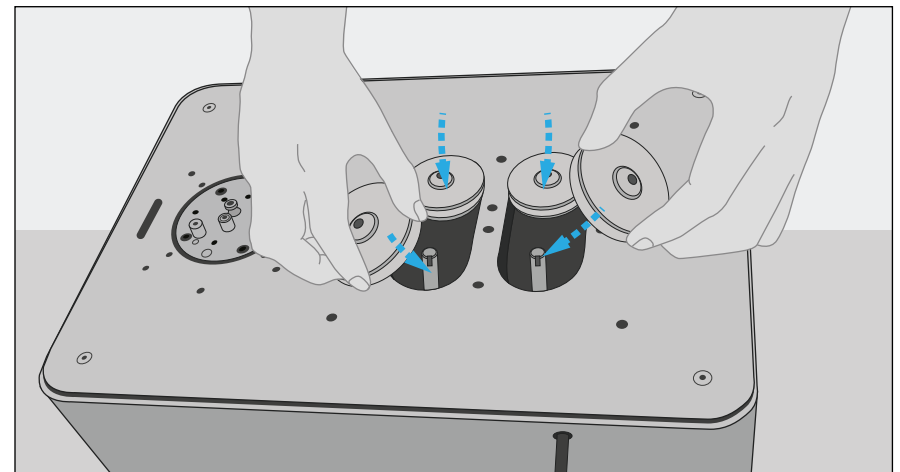
Insert new Feed Wheels into the D.I.Wire.

Align the keyway on the wheels to the keys on the shafts. Ensure they are fully seated.

Changing The Feed Wheels

7
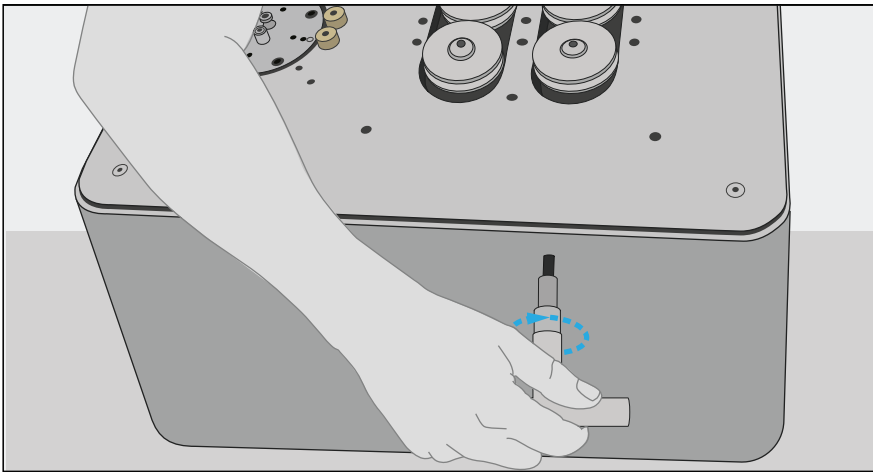
TOOLS   Feed Wheel Torque Wrench

Tighten the feed carriage.

8
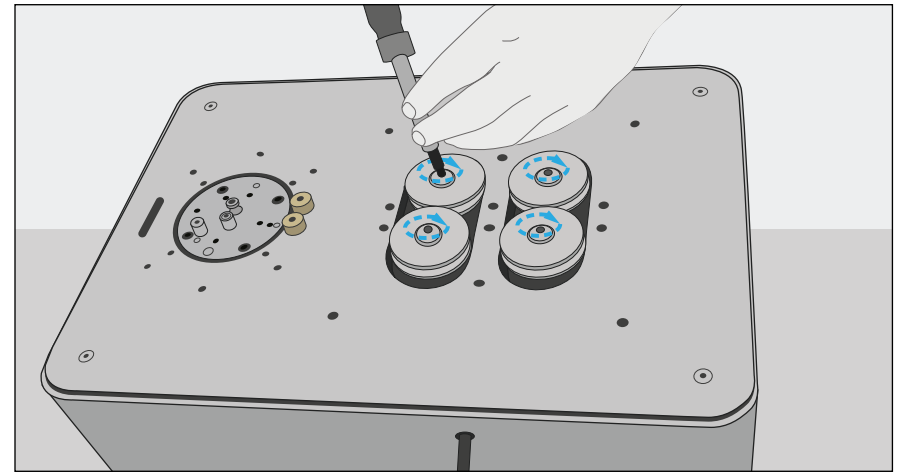
TOOLS   3/16 Hex Key

With the feed wheels pushed together, tighten the feed wheel fasteners.

Changing The Feed Wheels

9
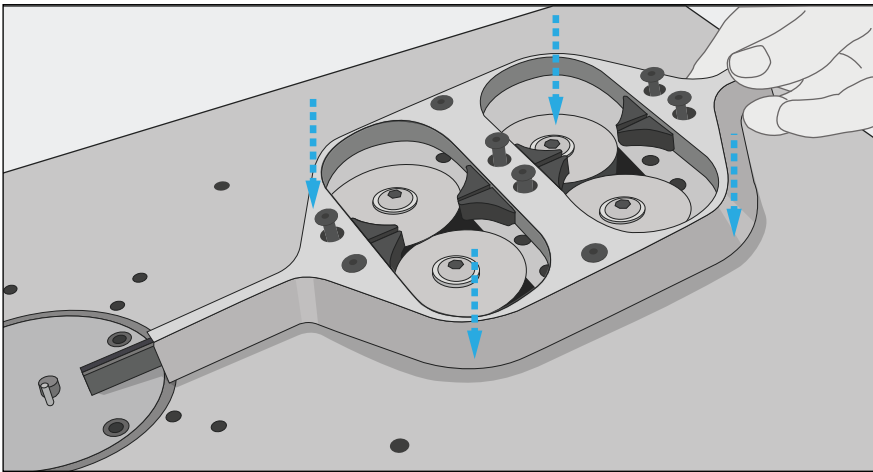
Place the ramp back onto the system.

10
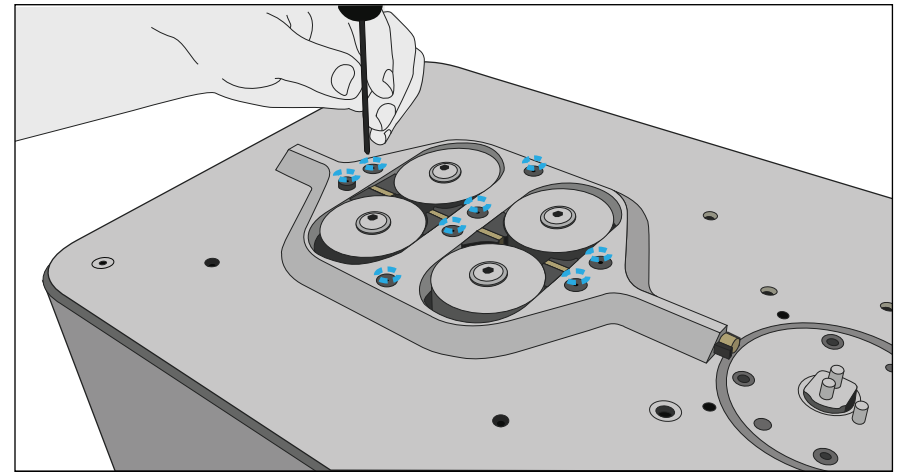
TOOLS 1/8 Hex Key

Tighten the fasteners for the ramp.

Changing The Guides
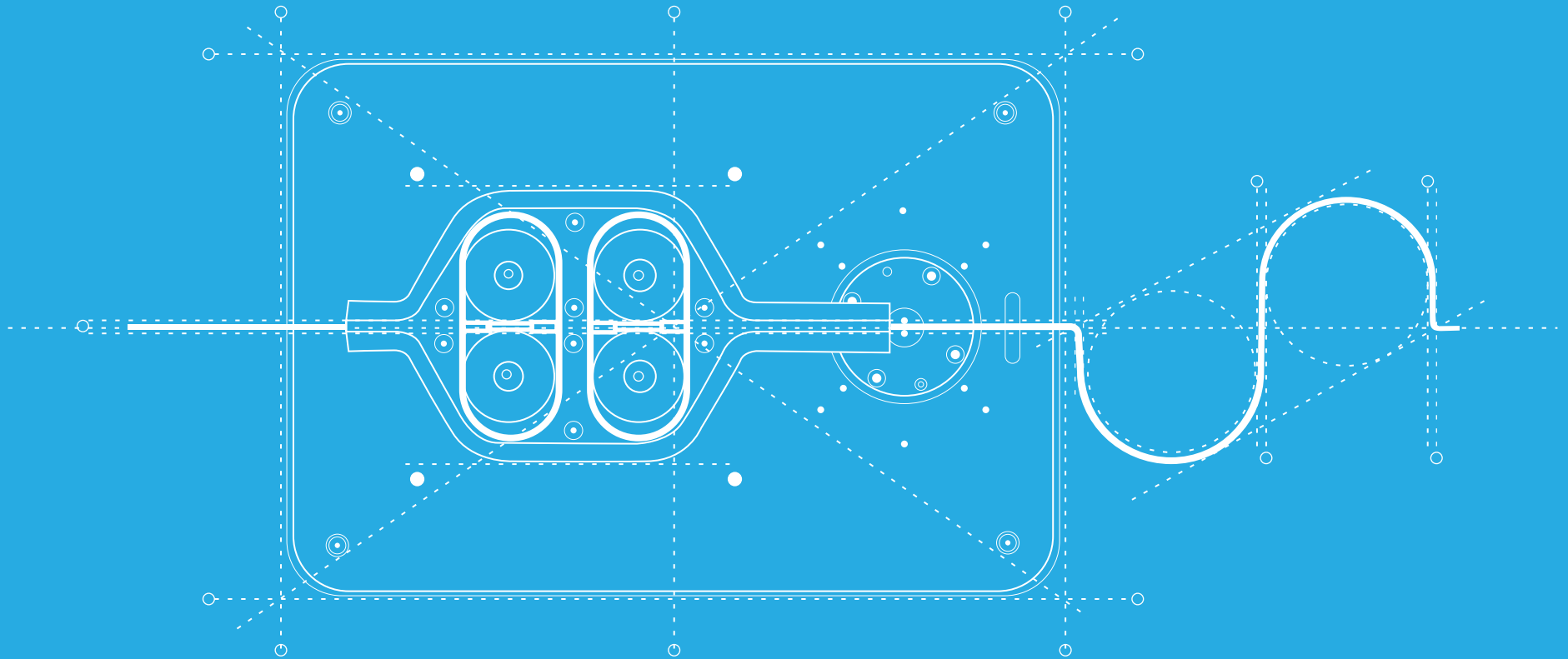
Changing The Guides

TOOLS REQUIRED

REPLACEMENT GUIDES

Guides are custom for each material diameter.

1/8 HEX KEY

For Ramp

Changing The Guides

1

2
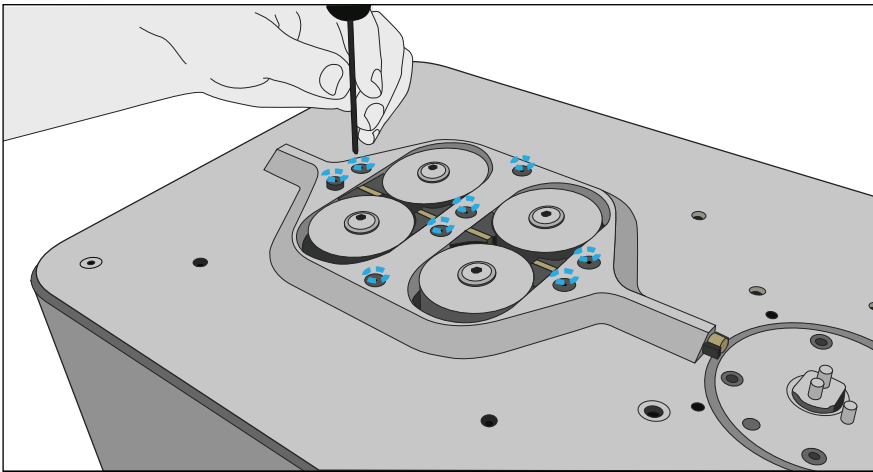
TOOLS   1/8 Hex Key

Loosen the fasteners for the ramp.
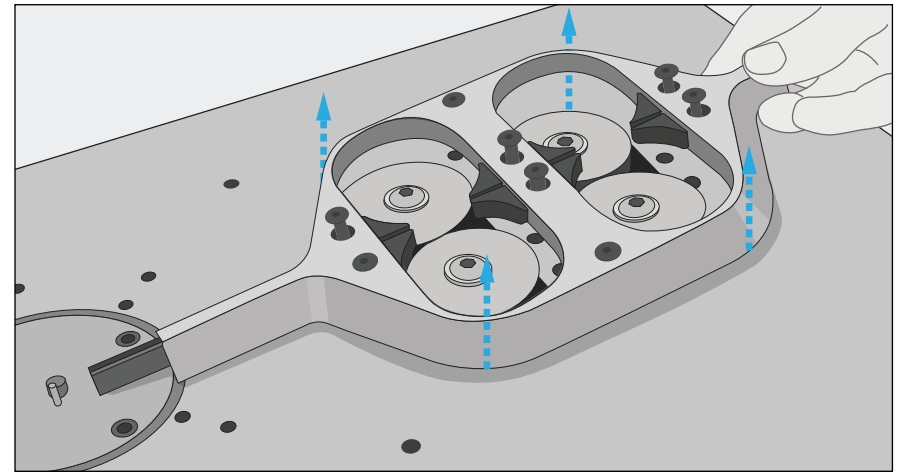
Remove the ramp from the system.

Changing The Guides

3

4
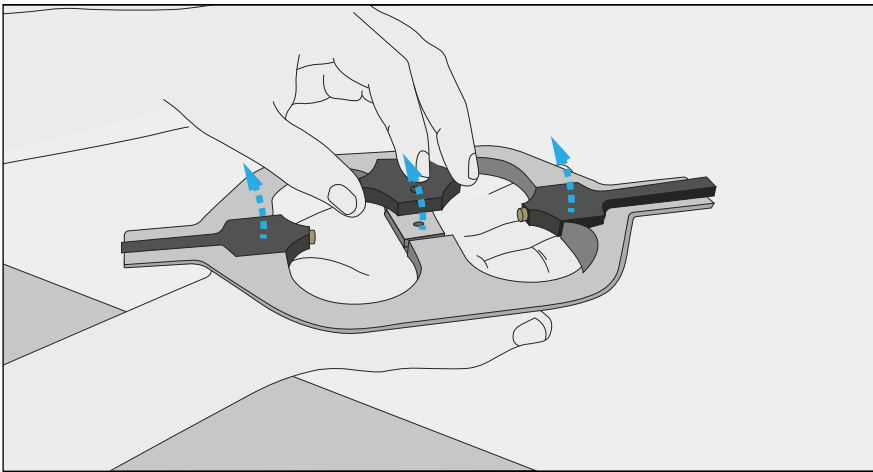
Flip over the ramp and remove the guides by pulling them out.
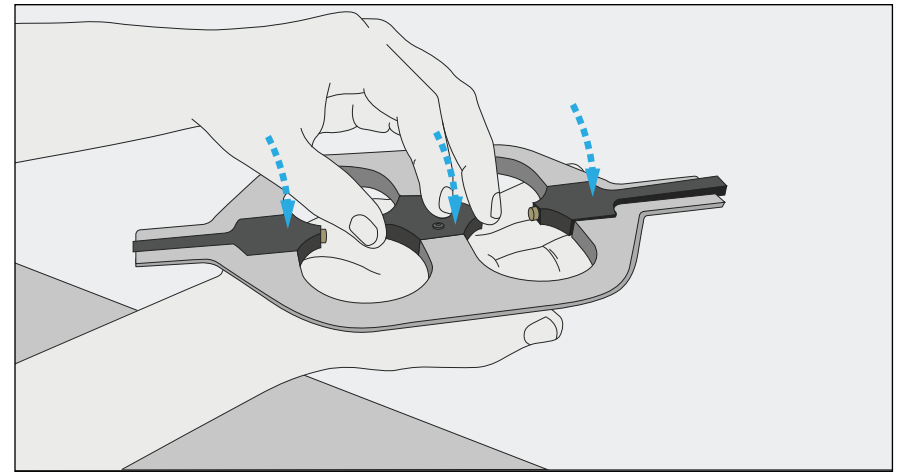
Insert the new guides into the ramp.
Make sure they are fully seated.

This section describes the process for our most common type of wire guides. If your guides look different and need some help, send us an email to **support@pensalabs.com**

Changing The Guides

5
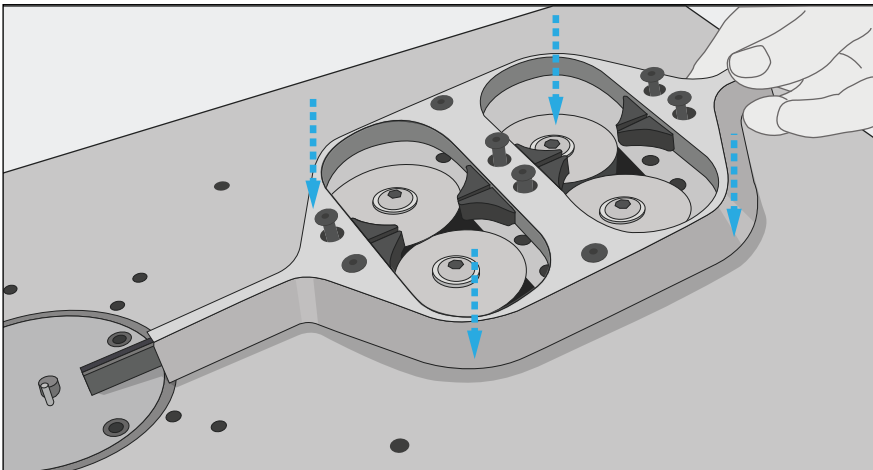
Place the ramp back onto the system.

6

TOOLS 1/8 Hex Key

Tighten the fasteners for the ramp.

78
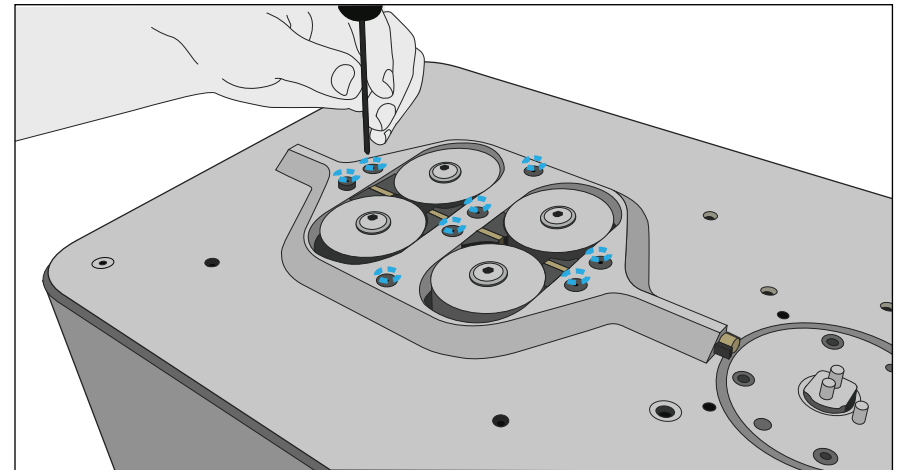
Troubleshooting

Note:

This section aims to solve the most common issues we have found on the field, but we cannot cover every imaginable scenario. If you can't find your issue in the following tables, or the solution proposed is not solving it for you, feel free to give us a call or shoot us an email at **support@pensalabs.com** and we will be more than happy to help.
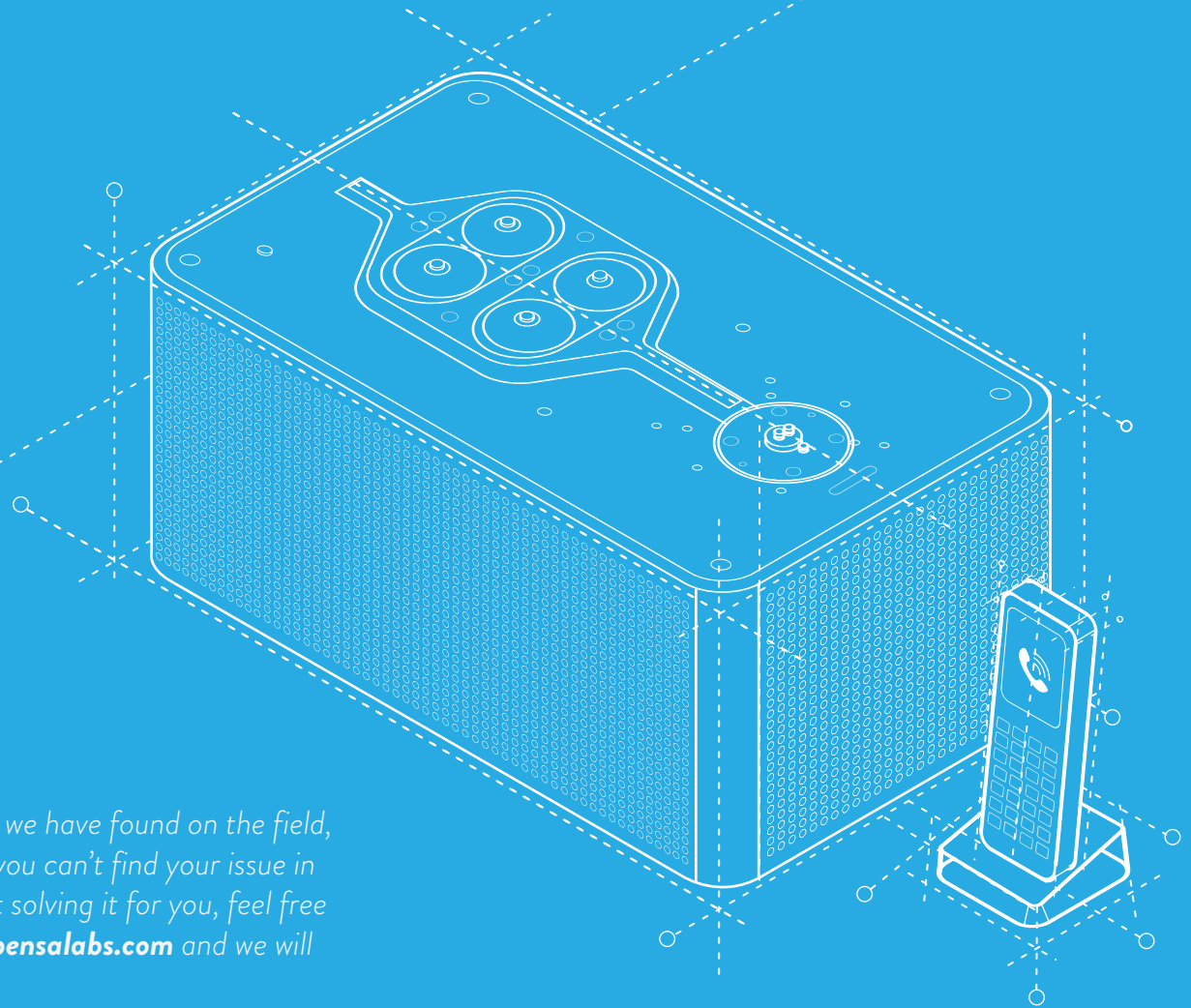
Troubleshooting

Our technical support team at Pensa is here to assist with troubleshooting problems you may experience using the D.I.Wire.

You may contact our technical support team via phone, email, or website listed below:

Technical support phone number	+1 844-434-9473
Email	Support@pensalabs.com
Technical support website	https://www.pensalabs.com/support/

What to do before contacting Pensa for technical assistance:

- Have the serial number to your system available
- Be prepared to work with the machine, as many issues will require live troubleshooting
- Check the basic settings of the computer you use to operate the D.I.Wire, such as the operating system and version (e.g. MacOS X / Windows 10)
- A description of the issue, the more detailed, the better

References

Glossary and Definitions

TERM	DESCRIPTION
HARDWARE	
Bend Head	Static bending mandrels. The center of the bending area that doesn't move.
Bend Ring	Rotating plate that carries the Bend Pin. Rotates around the Bend Head.
Bend Pin	The moving bending mandrel that is mounted on the Bend Ring. This could be a pin pressed on the Bend Ring, or an easy to replace insert
Feed Wheels	The four wheels that drive, or "feed" the wire into the bending area.
WIREWARE SCRIPT	
FEED x	Moves the wire an "x" amount in either inches or mm. The "x" value can be either positive (forward), or negative (backwards) Uses the feed speed defined in the Material Profile
BEND a	Moves the Bend Ring an "a" amount in degrees. The "a" value can be either positive (Clockwise) or negative (counterclockwise). Uses the bend speed defined in the Material Profile
REPEAT n: ... END	A loop that repeats the code between "REPEAT" and "END" an "n" number of times. Very useful when bending many copies of the same part, or bump bending. Currently we do not support nested REPEAT loops (REPEAT within a REPEAT)
PINA a	Moves the Bend Pin an "a" amount in degrees. PINA is a much more convenient way to write the GCode: "G90 G1 A_ F_". The "a" value can be either positive (Clockwise) or negative (Counterclockwise). Uses the bend speed defined in the Material Profile
PINZ z	Moves the Bend Ring a "z" amount in either inches or mm. The "z" value can be either positive (up) or negative (down), but take in account that the maximum travel is from 0 to -10mm, and could vary depending on your bend hardware configuration.
PAUSE	Holds the script until the "Resume" button is pressed. This is equivalent to the "!" in GCode (but we don't support that code). This is different to the G4 GCode command in that PAUSE does not need a time parameter.

Quick Key Commands

MODE	COMMAND	FUNCTION	DESCRIPTION
Global	Command/CTRL + T	Connect	Connect to a plugged in D.I.Wire
	Command/CTRL + O	Open	Open a file in either Path or Script Mode
	Command/CTRL + Q	Exit	Quits WireWare
	Command/CTRL + Shift + C	Material Profile Mode	Switch to Material Profile Mode
	Command/CTRL + Shift + G	Script Mode	Switch to Script Mode
	Command/CTRL + Shift + P	Path mode	Switch to Path Mode
Path	Command/CTRL + S	Save Shape	Saves shape in Path Mode Workspace
	Command/CTRL + Shift + S	Save Shape As	Opens Save As dialog for path in Workspace
	Command/CTRL + U	Undo	Undo last action in Workspace
	Command/CTRL + Shift + U	Redo	Redo last action in Workspace
	Command/CTRL + N	Next Shape	Switch to the next path when there are multiple paths on the Workspace (in order of creation)
	Command/CTRL + P	Previous shape	Switch to the previous path when there are multiple paths on the Workspace
	L	Zoom Extents	Center camera on Path and zoom to fill application window
	Backspace	Delete selected vertices	Delete currently selected Bend Points
	Escape	Select Mode	Switch to select mode
	CTRL + 1	Snap to Grid	Click and drag Path interactions snap to the grid
	CTRL + 2	Snap to Original	Click and drag Path interactions snap to the original shape
	E	Show/Hide Original	Show or hide the original Path outline
	Click and drag + Shift + CTRL	Snap to Horizontal/Vertical	While in the Workspace, snap interactions to horizontal/vertical
	Click and drag + Shift + CTRL	Snap to Tangent	While in the Workspace, snap interactions to the tangent line of the next and previous Bend Points
	Click and drag + alt	Pan	While in the Workspace, Pan across the Workspace with mouse
Script	Command/CTRL + X	Cut	Cut selected text
	Command/CTRL + C	Copy	Copy selected text
	Command/CTRL + V	Paste	Paste text in clipboard
	Command/CTRL + Z	Undo	Undo last changes in Textbox

http://www.pensalabs.com
support@pensalabs.com