

## INSTRUCTIONAL PROJECT

# D.I.Wire Bluebird Automaton

Create your own mechanical Bluebird

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## Intro

Learn how to build a mechanical bluebird with the D.I.Wire Plus. It's an fun project that can easily be customized to create whatever you can imagine.

Estimated Time:  
1 Hours

Level:  
Beginner

<p>Software needed</p> <p>WireWare by PENSA Labs supports.svg crankshafts.svg</p>	<p>Tools and Materials needed</p> <p>D.I.Wire Plus or Pro Computer Mac OS or Windows PC Laser cutter (optional) 24" of 1/16" Galvanized Steel Cardboard</p>	<p>Additional resources</p> <p>bird.svg box.svg</p>
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## 1. Material Setup

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✓ PLUS 0625 Galvanized Steel-12202017  
PLUS 0625 Red Nylon Coated Steel-12202017  
PLUS 125 Black Nylon Coated Steel-12202017  
PLUS 125 Galvanized Steel-12202017  
PLUS 125 White Nylon Coated Steel-12202017

Open WireWare software and calibrate your D.I.Wire Pro by clicking “Home” button. Select wire type “PLUS 0625 Galvanized Steel”

Select the type of wire material you will be bending in the drop-down menu in the upper right-hand corner.

💡 **Other wires:** using wire from [PensaLabs.com](http://PensaLabs.com) means that the material has already been preprogrammed into the software. If you are using a different kind of wire, you must calibrate your machine to make proper bends. Learn more at [www.pensalabs.com/support-wireware](http://www.pensalabs.com/support-wireware)

## 2. Load The Wire

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Feed the wire through the feed wheels into the bend head from the back of the machine

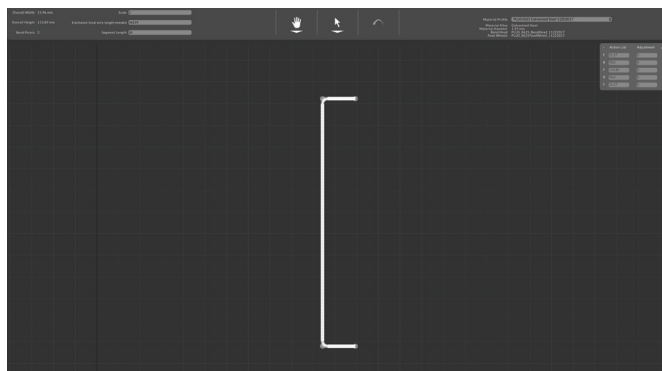
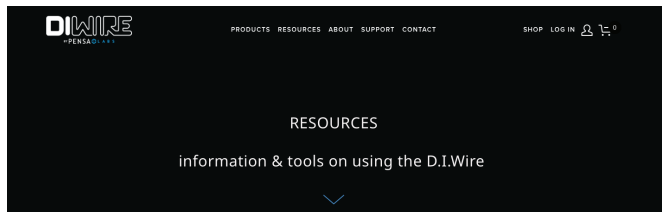
💡 **If you experience any resistance:** make sure that the wire is trimmed flush and there is not a burr. Also, check that the feed wheels are properly tensioned on the D.I.Wire Plus.




Stop right at the end of the bend head before the bend pins

You should only see the very tip of the wire prior to bending.


## 3. Prepare The Support Wires in WireWare



Download sample files from [www.pensalabs.com/resources](http://www.pensalabs.com/resources)

 **Create your own Automaton:** alternatively, you can create your own custom automaton and associated support wires and cranks in any vector based illustration application and export them as .svg file to import to WireWare. If you don't have Adobe Illustrator, we recommend using Inkscape (free)

Select “Path Mode” on WireWare and navigate to the downloaded file location. Open *supports.svg* Leave SVG Import Scale to 1.0 and click “OK”


 **Set SVG Import Scale:** if your file isn't created at the scale you would like to bend, you can adjust the scaling through the Set SVG Import Scale. Typically, we recommend you create your vector files in a 1:1 ratio, actual scale.


## 4. Bend The Support Wires (Repeat 3 Times)



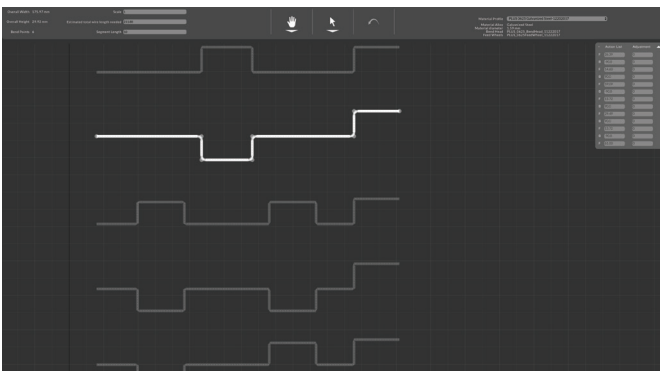
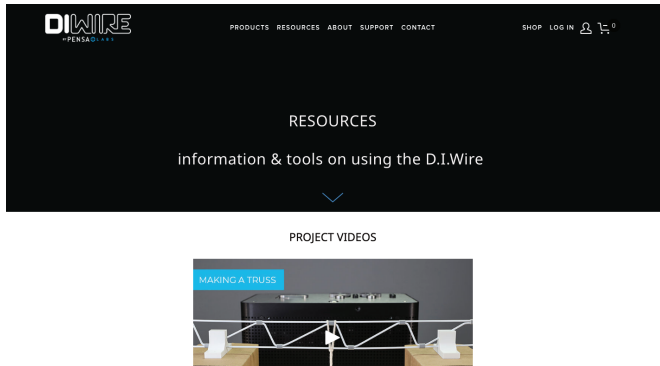
Click “Bend” in WireWare

The D.I.Wire should start feeding the wire and making the appropriate bends. Repeat this process until you have 3 support wires.


 **Click “Stop” if there is any error with a feed or bend:** if something just doesn't seem right, immediately stop the bending. This will reduce the risk of the wire getting caught in the machine bend head, or damage the D.I.Wire

 **Keep in mind that you need room for the out-feed of the bent wire:** make sure there is enough room not only in front of the bend head, but an equal amount of room on both sides as the wire will move back and forth


## 5. Prepare The Crankshaft in WireWare



Download sample files from [www.pensalabs.com/resources](http://www.pensalabs.com/resources)

 **Create your own Automaton:** we provide you with a few different crankshafts, but you can easily customize one to your own needs either by directly editing the paths in WireWare, or simply create a new .svg file in whatever drawing program you like to use.

Select “Path Mode” on WireWare and navigate to the downloaded file location. Open *crankshafts.svg* Leave SVG Import Scale to 1.0 and click “OK”


 **Set SVG Import Scale:** if your file isn't created at the scale you would like to bend, you can adjust the scaling through the Set SVG Import Scale. Typically, we recommend you create your vector files in a 1:1 ratio, actual scale.


## 6. Bend The Crankshaft



Click “Bend” in WireWare

Select the crankshaft you want to bend by cycling through all the options (Path>Next Path) Next, click “Bend” and the D.I.Wire should start feeding the wire and making the bends.

 **Click “Stop” if there is any error with a feed or bend:** if something just doesn't seem right, immediately stop the bending. This will reduce the risk of the wire getting caught in the machine bend head, or damage the D.I.Wire

 **Keep in mind that you need room for the out-feed of the bent wire:** make sure there is enough room not only in front of the bend head, but an equal amount of room on both sides as the wire will move back and forth



## 7. Cut The Box Files

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Download sample files from [www.pensalabs.com/resources](http://www.pensalabs.com/resources)

We designed a custom box to display our bluebird automaton. Use a laser cutter to cut the box file. (box.svg) out of cardboard.

💡 **Note:** You don't need a laser cutter. You can cut these shapes out by hand with scissors or a craft knife.

## 8. Assemble The Box

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**A few folds and you'll be done!**

Folding up the box is simple. We added score marks on all the folds. Start by folding the top and bottom sections over themselves and snapping them into the large rectangular openings.

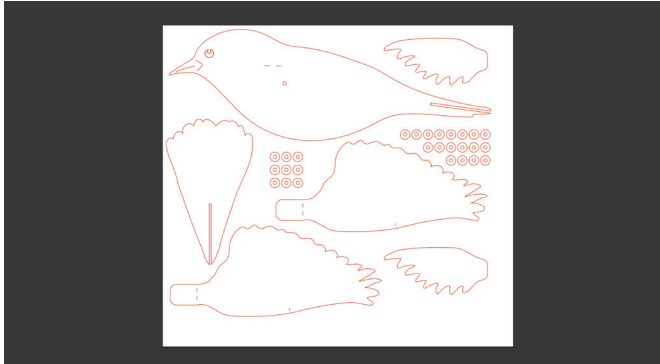


Next, bend up the sides of the box and bend them over the tabs from the top and bottom sections. Now, just like the top and bottom sections, snap them into the rectangular slots. That's it. No glue required!

💡 **Custom Box:** we made a several different automatons here at PENSA Labs, and most were built using an ordinary box. If you don't have a laser cutter, just find a cardboard box that will accommodate your crankshaft.

## 9. Cut The Bluebird Files

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Download sample files from [www.pensalabs.com/resources](http://www.pensalabs.com/resources)

We created a bluebird cut file (bird.svg) that works great in your laser cutter. The file also includes the cardboard spaces for the crankshaft. Remember, you can easily modify this project to make a walking robot, slithering snake, or anything you can imagine.

💡 **Note:** You don't need a laser cutter. You can cut these shapes out by hand with scissors or a craft knife.

## 10. Assemble The Bluebird

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**Gather all the parts and get ready to assemble the Automaton**

Start by gluing the top set of feathers to the main wing. They will line up perfectly.

💡 **Note:** Keep in mind, you can easily modify this project to make a walking robot, slithering snake, or anything you can imagine.



Next, bend the wings at the scored line and glue it to the bird's body at the dashed marks on the bird's body. Finally, slide the tail feathers into the body of the bluebird. It's a snug fit, so no glue is required.

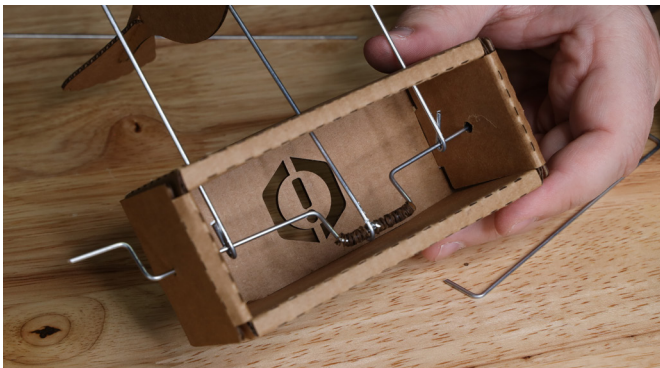
💡 **Note:** Any craft glue works, but for instant satisfaction try hot glue!

## 11. Assemble The Automaton



### Gather all the parts and get ready to assemble the Automaton

Start by feeding the crank shaft into one side of the box. Then add 8-10 of the cardboard spacers to the crank. Finally, feed the crankshaft into the other opening on the box and bend the end at a 90° angle.



Next, feed the 3 support rods into the box and secure them to the crankshaft with needle-nose pliers. Just a simple pinch of the support wires should hold them in place.



Now you can attach the bluebird to the support wires by bending the center support rod at a 90° angle to the body and fold it over. Next, feed the wire into the wings. There are small marks to show you where to insert the wires. Simple!

### Congratulations! You're all done!

Don't forget to share your projects on social media or send it to us by email. We love to see what our community is making!

More Projects

Find more instructional projects on our website [PensaLabs.com/resources](https://www.pensalabs.com/resources)

Additional Resources

PENSA Labs Instagram: [instagram.com/pensalabs](https://www.instagram.com/pensalabs)

Contact Us: [pensalabs.com/contact](https://www.pensalabs.com/contact)

Website: [pensalabs.com](https://www.pensalabs.com)