

# Frame Bending Basics

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## What's required to get started

- Tubing
- Fittings
- Bending Equipment & possibly software
- Tools

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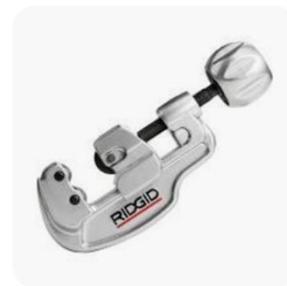
## Selecting the right tubing for Bimini frames

- Aluminum or Stainless?
- If Stainless, 304 or 316?
- Tubing diameter (3/4", 7/8", 1", 1 1/4")
- Tubing length 20' or 24'?
- Tubing thickness .065 or .049?
- Fittings, plastic or stainless?
- Sources and shipping considerations (UPS, Fedex, LTL, Local truck)

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## Basic hand tools needed for frame fabrication

- Tubing cutter, hacksaw, chop saw or grinding wheel
- 1/8" Allen wrenches for fittings
- Screw drivers for fittings
- Round file to remove inside burrs
- Tape measure (Stiff FatMax 25')
- Sharpie marker (black)
- Drill and rivets to set finished frame (1/8" & 5/32")



Ridgid 29963 35S  
Stainless Steel  
Tubing Cutter

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## Frame bending equipment

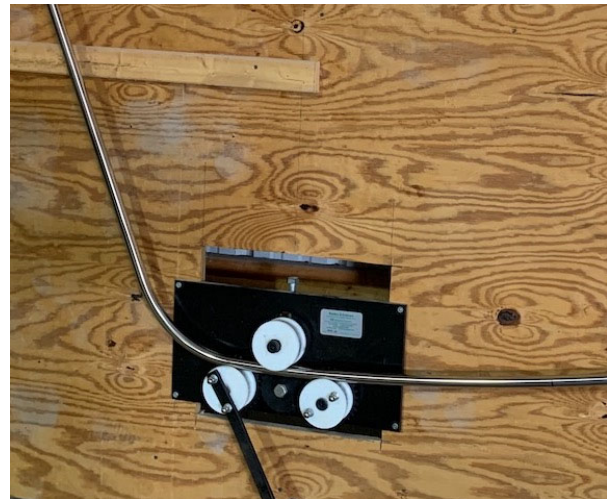
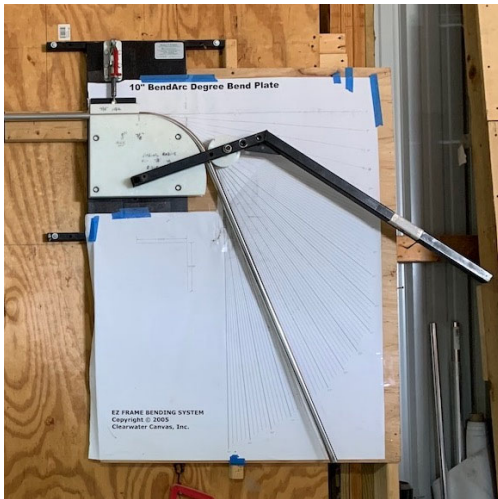
There are a few different types of bending equipment available including:

- BendARC
- Bend-Rite
- King Marine
- Super Bow
- Formed block kidney bean

Some fabricators use software to calculate the bends, others do it by hand the old fashioned way.

Benders can be wall mounted or setup to bend flat on a large table.

## Frame bending equipment (Bender & Crowner)





# Choosing the proper radius for your frame

We have 8" and 10" forming blocks. The equipment is setup for one forming block and roller at a time but its quick to swap it over.

We typically use an 8" radius for single engine boats using 7/8" SS and a 10" radius for larger twin engine boats using 1" SS. We always order thick wall tubing.

You must know the actual bend radius of your equipment as each forming block varies a bit.

**NOTE:** The crowner doesn't change for 7/8" vs 1"



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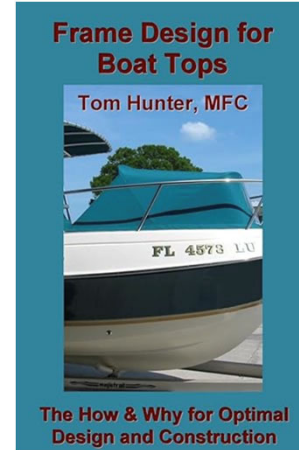
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# Measurements for a Bimini top

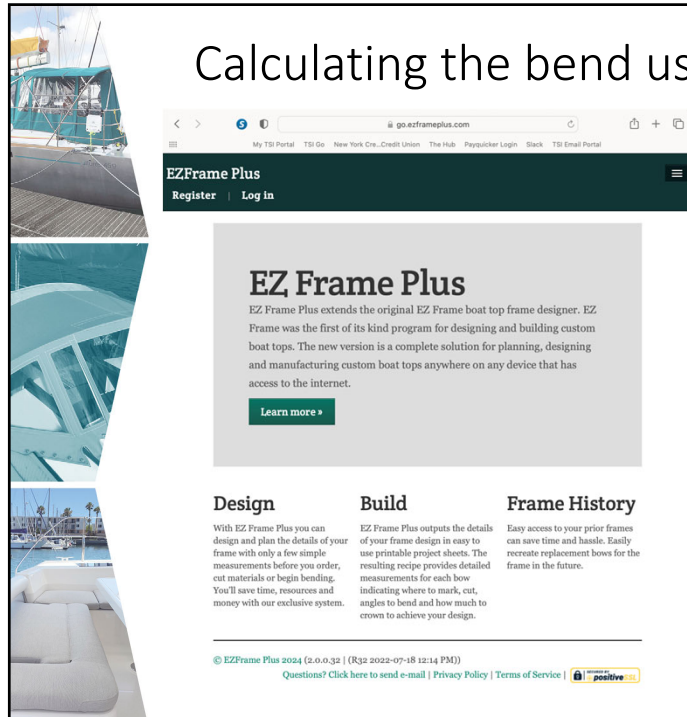
Start by discussing with the customer their expectations. How tall are they? How much shade do they want? Will they be adding enclosure panels later?

To calculate and bend a frame you will need the following information:

- Length of top
- Height of top
- Width between deck mounts
- Distance from deck mounts to floor
- Distance from mount to windshield center
- Desired shoulder width
- Desired crown



# Calculating the bend using Ez-Frame Plus!



Ez-Frame Plus was originally created by Tom Hunter from Clear Water Canvas.

Currently owned and managed by Jeff Hare at Adaptive Marine Solutions in NH.

Currently free to use, although I highly encourage active users to make a yearly donation to Jeff for his time maintaining and updating the platform.

Website: [go.ezframeplus.com](http://go.ezframeplus.com)

Jeff is also a distributor and consultant for BendARC / CrownARC equipment.

Jeff Hare can be reached at 603-490-9624 or by email at [support@ezframeplus.com](mailto:support@ezframeplus.com)



# Getting started with Ez-Frame Plus www.go.ez-frameplus.com

**EZFrame Plus** ☰

### Log in

Email Address

Password

[Login](#) [Register account](#) [Forgot password?](#)



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[Home](#) [Frames](#) [Projects](#) [Customers](#) [Settings](#) ▾

- Profile
- Radius Calculator
- User Manual
- BendArc Scale Setup Directions

## EZ Frame Plus

EZ Frame Plus extends the original EZ Frame boat top frame designer. EZ Frame Plus is a complete solution for planning and building custom boat tops. The new version is a complete solution for planning and building custom boat tops. The new version is a complete solution for planning and building custom boat tops. The new version is a complete solution for planning and building custom boat tops. The new version is a complete solution for planning and building custom boat tops. The new version is a complete solution for planning and building custom boat tops.

### True Bend Radius

A forming block with a 10" radius will actually produce bend with a radius larger than 10". It is important to use the actual radius to create the exact frame you've designed.

[See how to get your Bender's True Radius »](#)

[Radius Calculator Form](#)

**Helpful resources:**

- [Radius Calculator](#)
- [User Manual](#)
- [Scale Setup Instructions](#)

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**New Job**

Details Setup  
Input Data Results

Customer  
Project  
Job/Frame Name

Save Cancel

**New Job**

Details Setup  
Input Data Results

Frame Type  
3 Bow Bimini

Bender Type  
Bendarc

Crowning Method:  Roller  Block

Bender Radius  
8.995 calculate actual radius

Save Cancel

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**New Job**

Details Setup  
Input Data Results

Frame Type  
Choose...

Bender Type  
✓ Choose...  
Bendarc  
Bend-Rite  
Other  
Quick Bow

8.995 calculate actual radius

Save Cancel

**New Job**

Details Setup  
Input Data Results

Frame Type

- ✓ Choose...
- 2 Bow Convertible
- 2 Bow Extension Top
- 2 Bow Regular Dodger
- 2 Bow Reverse Dodger
- 3 Bow Bimini
- 3 Bow Variable Bimini
- 3 Bow Variable Convertible
- 3 Bow Variable Extension Top
- 4 Bow Bimini
- 4 Bow Variable Bimini
- Cockpit Sunshade
- Single/Replacement Bow

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**New Job**

Details Setup  
Input Data Results

Please, enter all measurements in inches.

Bender Radius

Save Cancel

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**Edit Job - 3 bow bimini**

Details Setup Input Data Results

Please, enter all measurements in inches.

Bender Radius

- Maximum width between bows is 40"
- Crown height min 2", recommended is 3" – 5"
- Typical shoulder is 8" less than width of frame


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Print results and go to your bending station.

Save and staple to Customer paperwork On case you ever need To bend again, but Also for reference on similar boats.



### Edit Job - 3 bow bimini

Details
Setup
Input Data
Results

	Main Bow	Secondary Bow	Main Mid Bow
<b>Frame Build Information (1/8" precision)</b>			
Tube Cut Length	155.875"	150.750"	103.625"
Tube Mark Centerline	77.875"	75.375"	51.750"
Distance from Tube Centerline to start of bend	26.000"	26.000"	26.000"
<i>for Bendarc benders, set tube centerline at</i>			
	52.125"	52.125"	52.125"
<i>degrees of bend needed to create shoulder</i>			
	69.721°	69.721°	69.721°
<b>Additional Information (1/8" precision)</b>			
Bow Height	51.875"	49.250"	25.875"
Leg Length	41.000"	38.375"	14.875"
Shoulder Width	65.000"	65.000"	65.000"
Crown Length	52.125"	52.125"	52.125"
Shoulder Length	11.000"	11.000"	11.000"
locate hinge 0.712" in front of center of top (measured from main bow end)			

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Cut tubing to calculated length and mark length and center on each piece.  
Also mark the weld so you can place it UP.



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Place tubing seam UP and measure from center to start of bend.



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Bend to calculated degrees of bend, then flip and repeat.

Degrees of bend  
Poster available from  
Jeff Hare.



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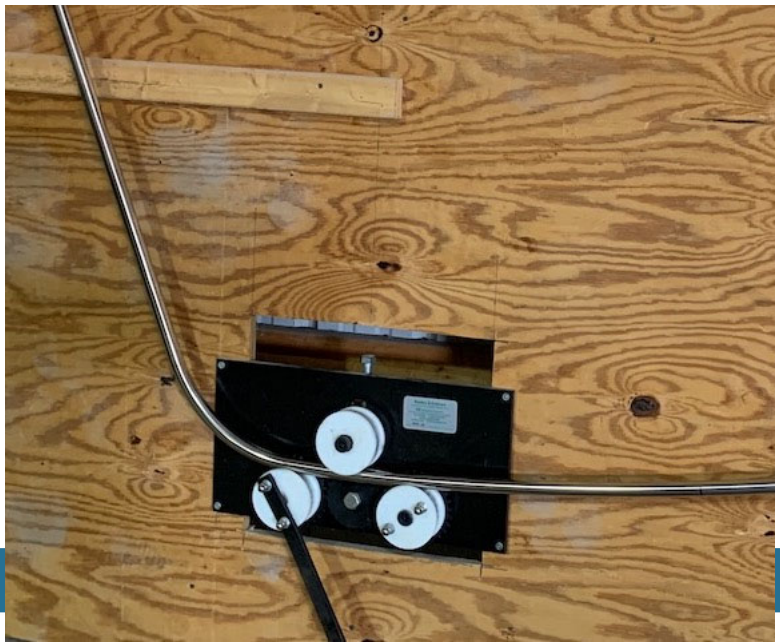
Run through crowner with small adjustments until legs are at desired width.

#### Typical Crowning Increments

Start flat  
 $\frac{1}{2}$  turn flip  
 $\frac{1}{2}$  turn flip  
 $\frac{1}{4}$  turn flip  
 $\frac{1}{4}$  turn flip  
 $\frac{1}{4}$  turn flip

Repeat until desired width  
of legs.

I mark top of turn bolt  
With sharpie so I know  
Where I started.



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Place together to verify all crowns are the same and legs match up. Adjust by hand as needed.



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Various types of mounts  
To include:

- Straight deck mounts
- Angled deck mounts
- Concave windshield mounts
- Side mounts



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5" of crown front  
And back frames.

Once frame is set where  
I want it I replace all  
Set screws with rivets.

5/32" drill through  
Screw hole with 5/32"  
SS rivet.

Optional leave screw and  
Drill 1/8" hole in side  
And us 1/8" rivet.



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5" of crown on front  
and back frames.



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Non Typical frame  
Outside the windshield



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Using webbing straps  
To set frame up before  
patterning



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Eliminated forward bow  
Stays and installed  
Stainless stations  
Inside for greater  
Stability.

Customer has heavy  
Solar panels mounted  
On top of frame.



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Trying to mimic shape of windshield with 10" Radius and proper shoulder width.



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Questions ???



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