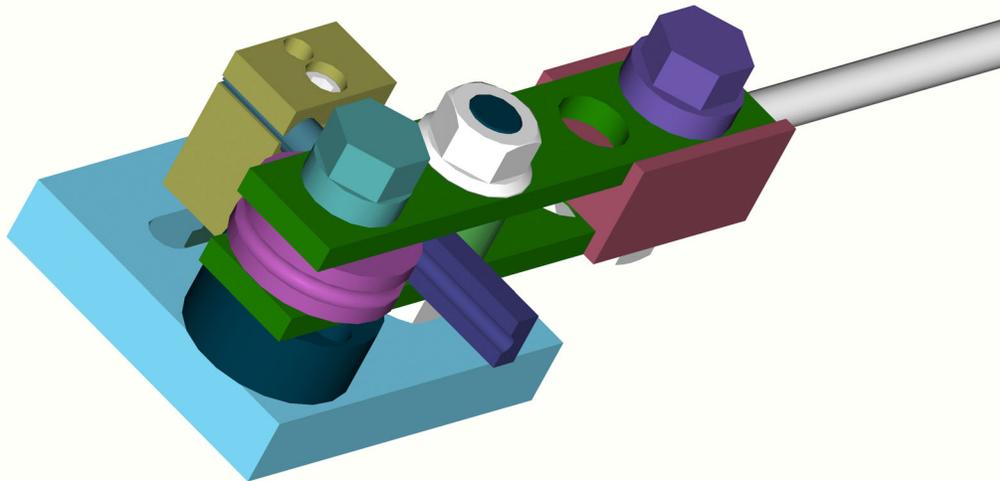


# PRECISION TUBE BENDER

DESIGNED BY MICHAEL WARD

JULY 2002



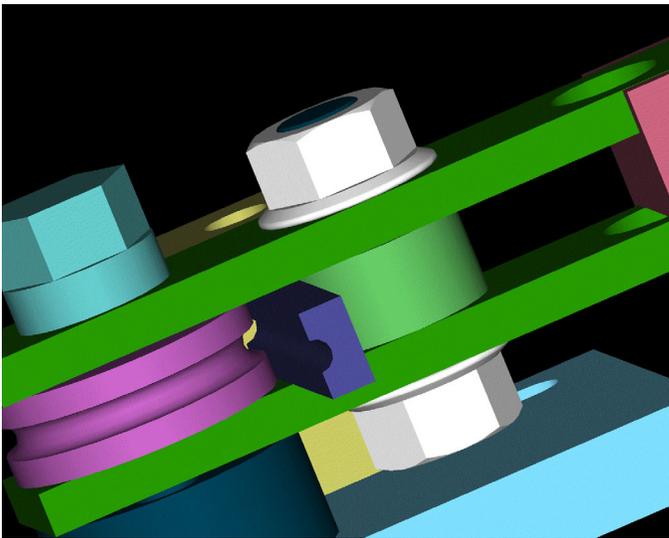
THIS PROJECT IS INTENDED TO BEND TUBES TO A VERY SMALL RADIUS, WITHOUT DEFORMING THE PROFILE OF THE TUBE OR CREATING A CRIMP OR BUILD UP OF MATERIAL AT THE LEADING OF THE BEND - THE CIRCULAR PROFILE SHOULD REMAIN CONSISTENT AND THE STRAIGHT PORTION OF THE TUBE AT EITHER END SHOULD FORM A TANGENT TO THE BEND WITH A SMOOTH TRANSITION FROM STRAIGHT TO CURVE.

THAT'S EASIER THAN IT SOUNDS, BENDING A 5/16 TUBE TO AN INSIDE RADIUS OF 5/16 IS CHALLENGING. A FUNCTIONAL BEND USING CONVENTIONAL TECHNIQUES IS NOT TOO DIFFICULT, HOWEVER AN ASCETICALLY PLEASING ONE IS (IMO).

THIS IS AN EXPERIMENTAL DESIGN AND HAS NOT YET BEEN TRIED. A PROTOTYPE IS UNDER CONSTRUCTION. IF YOU KNOW THE MAGIC SOLUTION TO MAKING THESE BENDS, OR HAVE CONSTRUCTIVE COMMENTS ON THE DESIGN, PLEASE EMAIL, YOU'LL SAVE ME A LOT OF CHIPS.

INFO: MICHAEL0100@HOTMAIL.COM

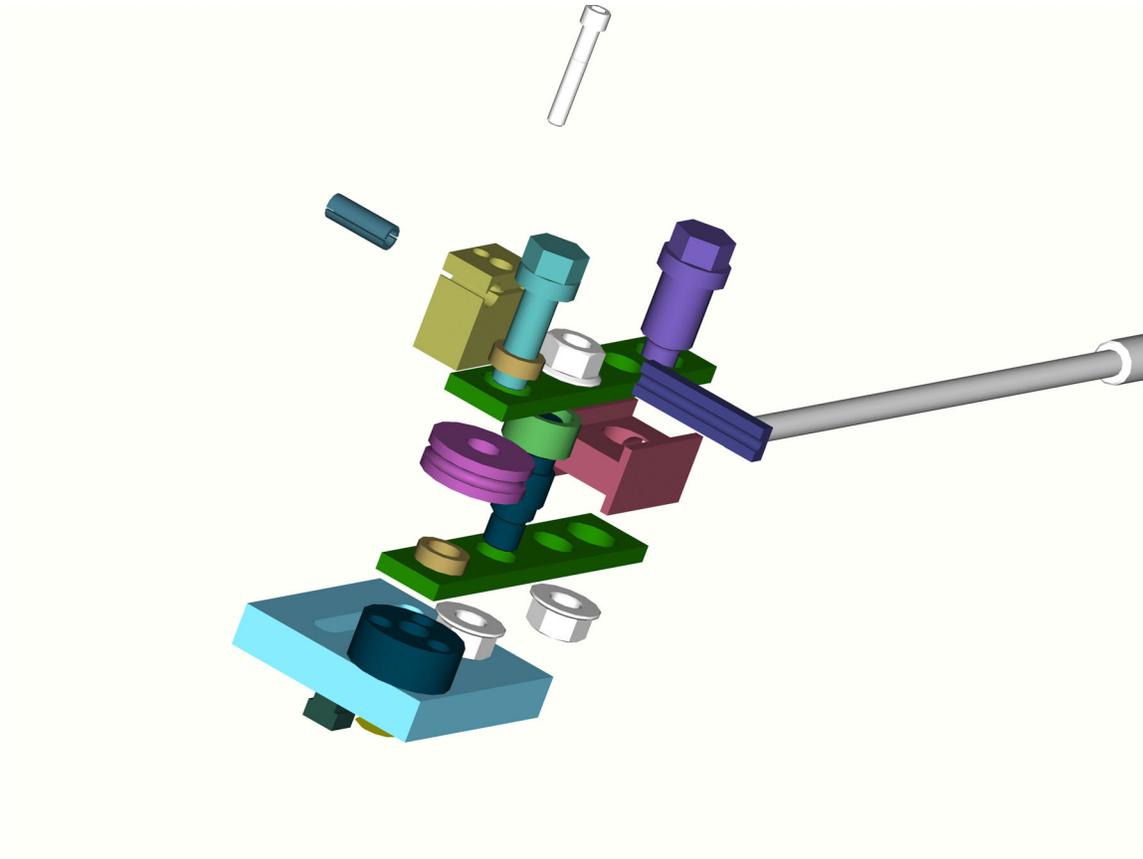
THE KEY TO THE SUCCESS (I HOPE!) IS THE FORMING BLOCK, SHOWN IN PURPLE. LIKE CONVENTIONAL BENDERS, THE INSIDE RADIUS IS FORMED AROUND A FIXED ROUND ROLLER WITH A PROFILE CUT. (I MADE A NEAT TANGENTIAL PROFILE CUTTER FOR THE LATHE, WHICH SAW EXTENSIVE AND SUCCESSFUL USE IN MAKING THE SISTER PROJECT TO THIS, A TUBE STRAIGHTENER). HOWEVER THE OUTSIDE RADIUS IS FORMED BY THE FORMER BLOCK THAT ALSO HAS A PROFILE AND IS HELD TIGHTLY BETWEEN THE FIXED AND MOVING ROLLERS (PINK AND GREEN). THE MARK I PROTOTYPE HAD A ROUND MOVING ROLLER AND TENDED TO BUILD UP A "LEADING EDGE" OF MATERIAL AT THE FRONT OF THE BEND. I MODIFIED THE MARK 1 TO THE ABOVE DESIGN, HOWEVER IT DID NOT HOLD THE BLOCK TIGHTLY ENOUGH TO THE FIXED ROLLER, ALLOWING THE TUBING TO "SQUEEZE" OUT AND PINCH IN THE GAP.



IN OPERATION THE GREEN FRAMES ROTATE ON THE BLUE BOLT TOWARDS YOU, PUSHING THE PURPLE BLOCK AROUND THE PINK FIXED ROLLER

THE GREEN MOVING ROLLER IS MOUNTED ON A SHAFT. I PLAN TO BUILD ONE THAT IS SLIGHTLY ECCENTRIC SO THAT THE DISTANCE BETWEEN FIXED AND MOVING ROLLERS IS SOMEWHAT ADJUSTABLE - SEE DRAWINGS. HAVING A SLOT IN THE GREEN FRAMES TO ADJUST THE MOVING ROLLER DOES NOT WORK!

NUMEROUS COMBINATIONS OF TUBE SIZES AND RADIUS OF BENDS ARE POSSIBLE WITH THE 1", 1.5" AND 2.5" HOLE SPACING ON THE FRAMES WHICH ARE REVERSIBLE. I'VE GENERATED THE TABLES IN THE PLANS.

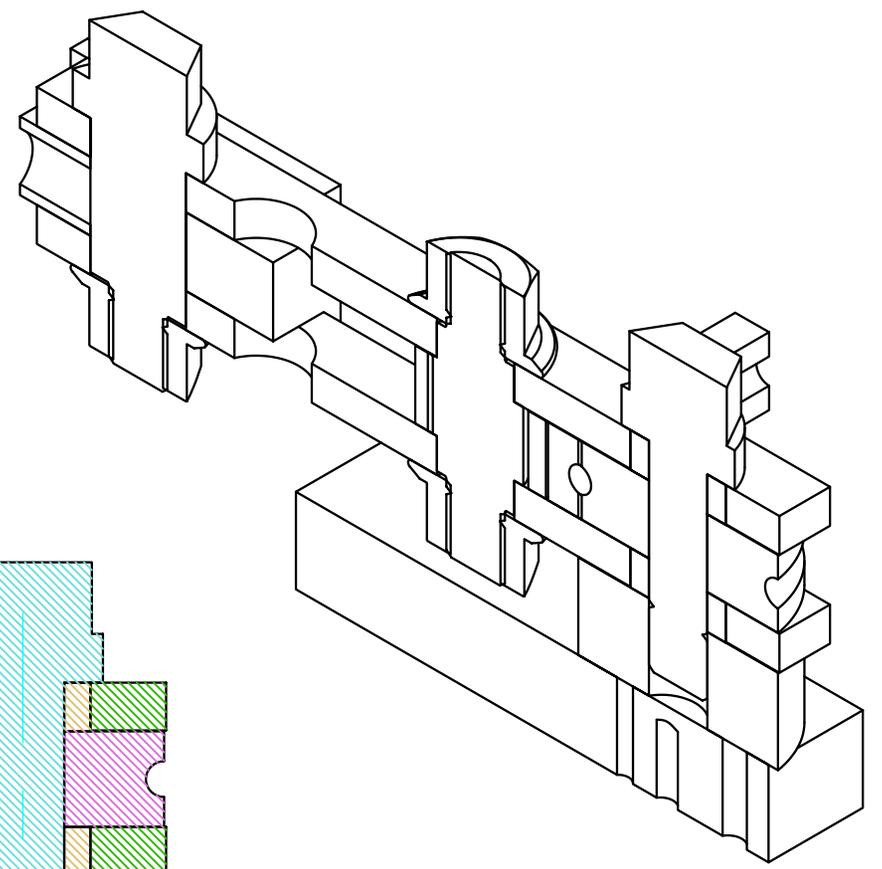
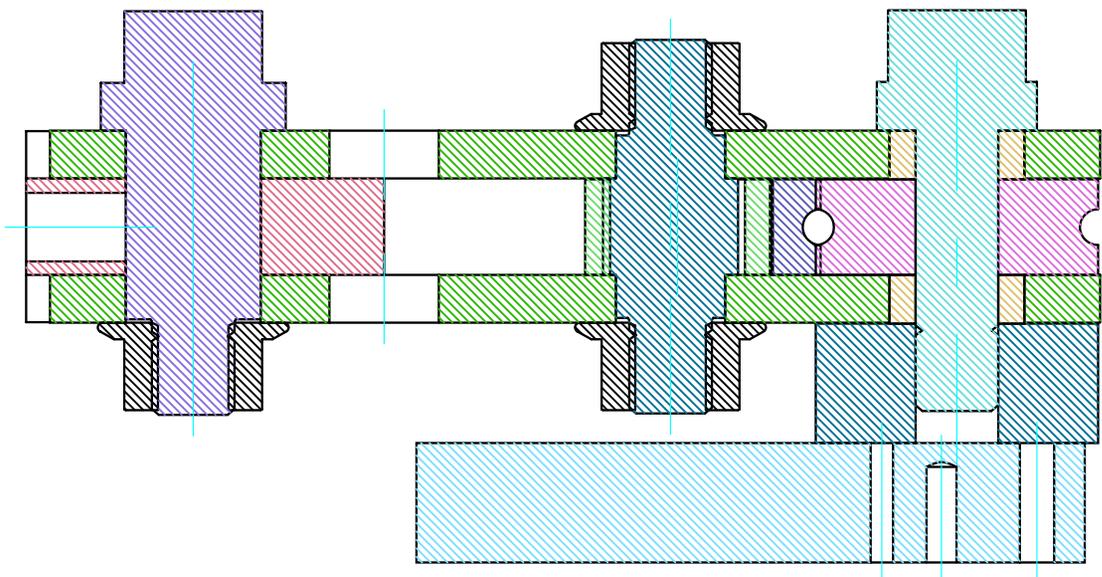


THE DRAFTING IS FAR FROM PERFECT, BUT IT DID TRY TO CLEAN IT UP AFTER BUILDING THIS. CHECK BEFORE YOU BUILD. THIS IS PRESENTED IN THE SPIRIT OF SHARING AND SHOULD NOT BE TAKEN AS A PROVEN OR ACCOMPLISHED DESIGN.

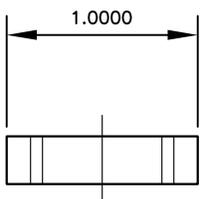
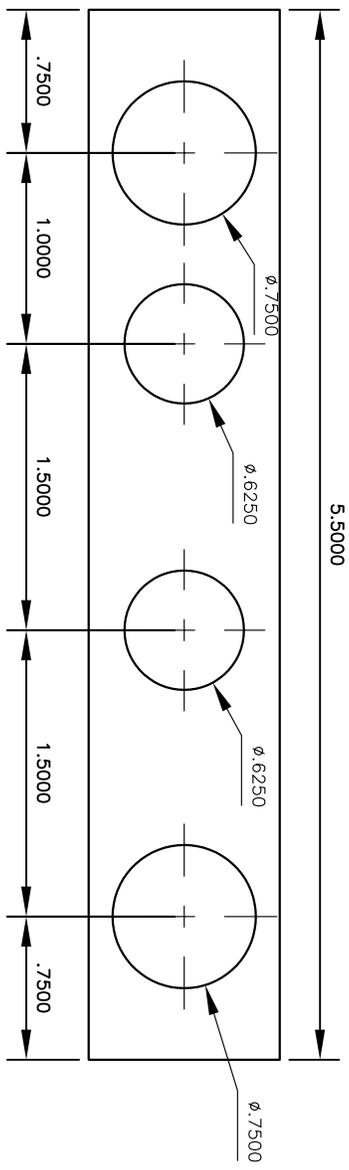
IDEAS WELCOME!

MICHAEL WARD  
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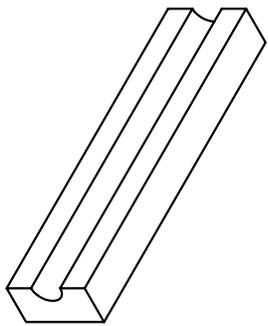
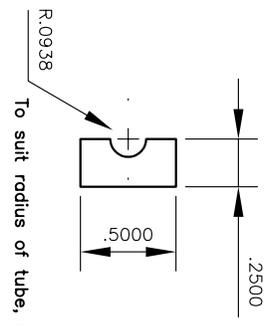
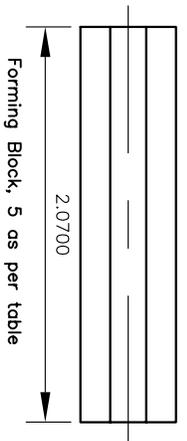
DRAWINGS FOLLOW AS WELL AS DRAWINGS OF A CRANK OPERATED TUBE STRAIGHTNER



FILE NAME C:\My Documents\MW\shop\pipe bender2\bender.dwg	SIZE A	FSCM NO -	DWG NO -	Pipe Bender No 1	REV
DRAWN 31/07/02 m	SCALE 1'0"=1'0"	Michael Ward	SHEET Cross Section		



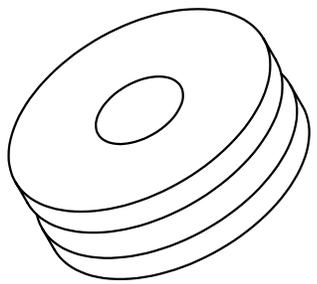
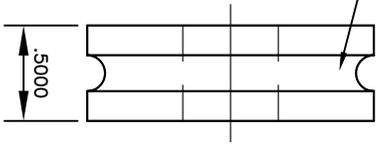
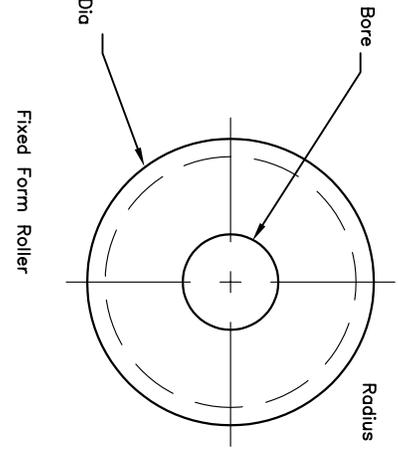
Frame, 2 Req, CR



Former Block Tube Size	Radius	Length
1/8	0.06250	1.67750
3/16	0.09375	2.07000
1/4	0.12500	2.07000
5/16	0.15625	2.07000
3/8	0.18750	2.85500

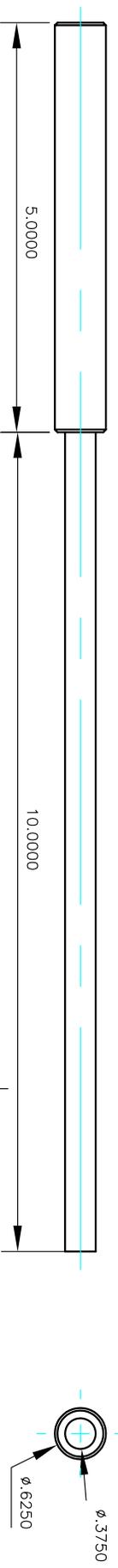
Fixed Form Roller, Variables

Tube	Radius of Bend (CL)	Former Dia	Bore
0.1250	0.2500	0.5000	0.3125
0.1250	0.3750	0.7500	0.5000
0.1250	0.5000	1.0000	0.5000
0.1250	0.7500	1.5000	0.5000
0.1875	0.2813	0.5625	0.3125
0.1875	0.3750	0.7500	0.5000
0.1875	0.5000	1.0000	0.5000
0.1875	0.7500	1.5000	0.5000
0.1875	1.0000	2.0000	0.5000
0.2500	0.3750	0.7500	0.3125
0.2500	0.5000	1.0000	0.5000
0.2500	0.6250	1.2500	0.5000
0.2500	0.7500	1.5000	0.5000
0.2500	1.0000	2.0000	0.5000
0.3125	0.4688	0.9375	0.5000
0.3125	0.6250	1.0000	0.5000
0.3125	0.6250	1.2500	0.5000
0.3125	0.7500	1.5000	0.5000
0.3750	0.5625	1.1250	0.5000
0.3750	0.7500	1.5000	0.5000
0.3750	1.0000	2.0000	0.5000
0.3750	1.5000	3.0000	0.5000

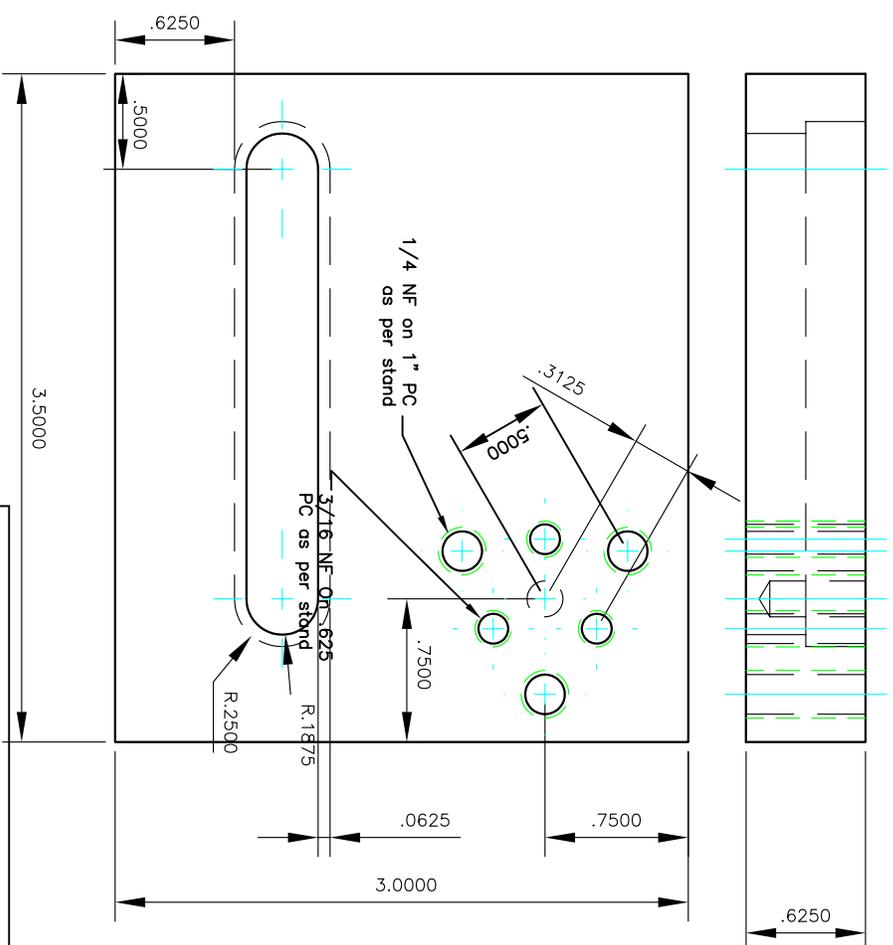


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 DRAWN 31/07/02 m  
 ISSUED

SIZE	FSCM NO	DWG NO	REV
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SCALE	1"=1"	Michael Ward	SHEET 1

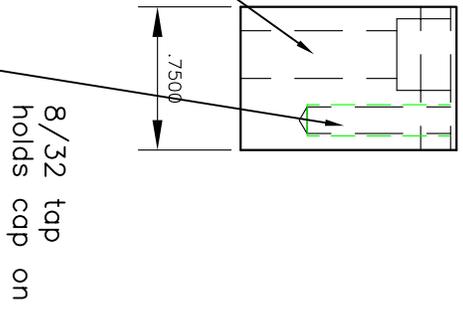
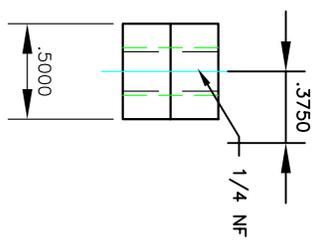
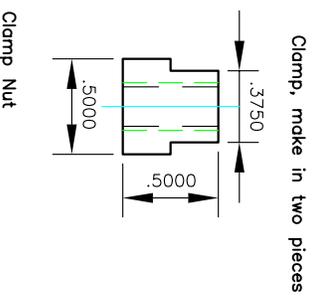
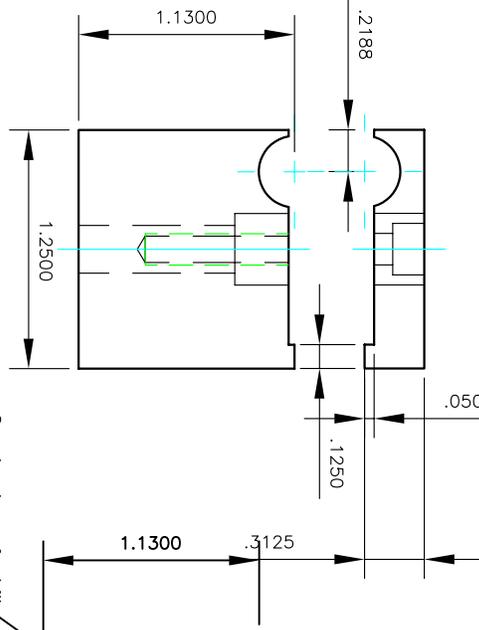
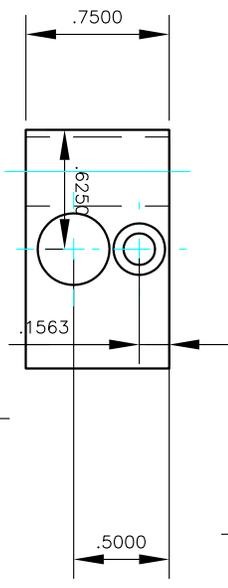


Handle, 1 Req, shown half size

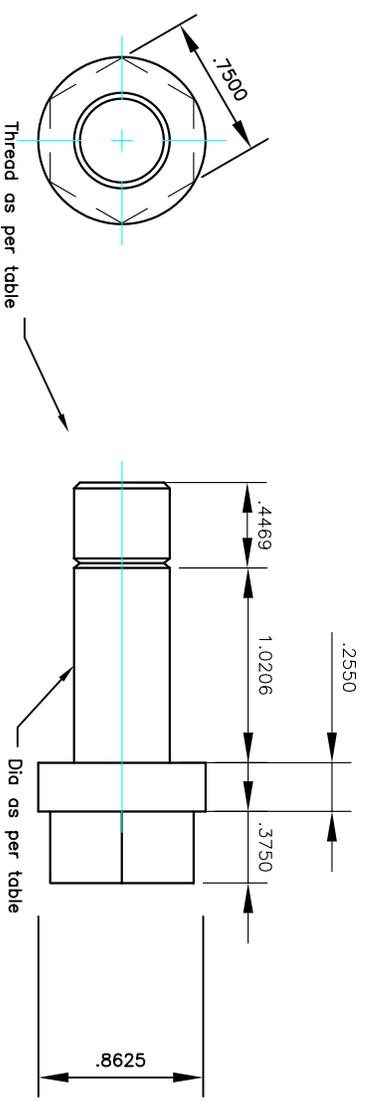


Base Plate, 1 Req

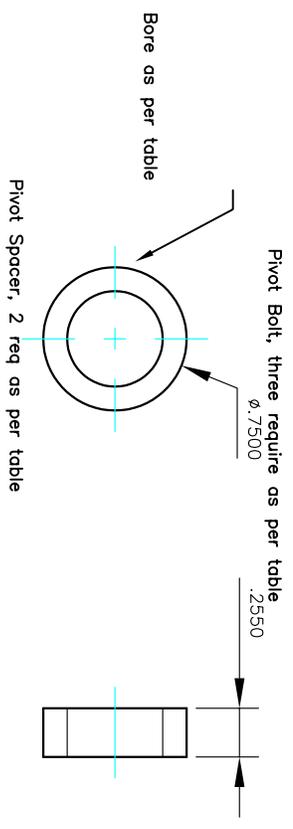
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 DRAWN 31/07/02 m  
 ISSUED



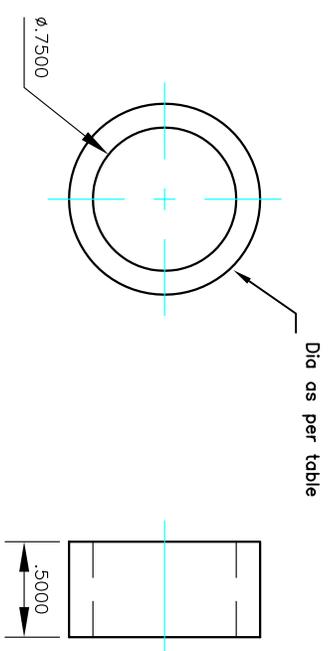
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SIZE	A	FSCM NO	—		
PIPE BENDER No 1		Michael Ward		SHEET 2	



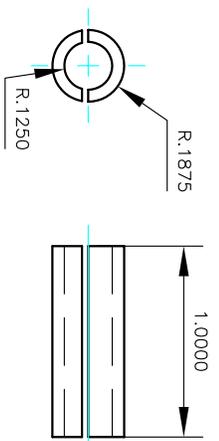
Pivot Bolt	Pivot Thread
Pivot Dia	3/16 NF
0.31250	1/2 NF
0.50000	



Spacer Dim	
Bore	0.3125
	0.5000



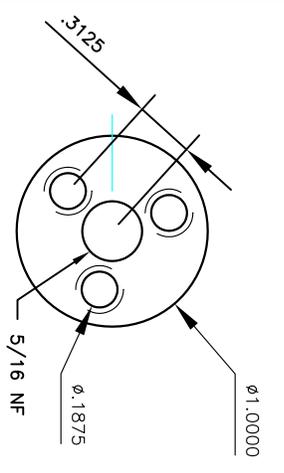
Floating Roller	
Dia	1.00000
	1.25000
	1.37500
	1.50000
	1.56250
	1.75000
	1.93750



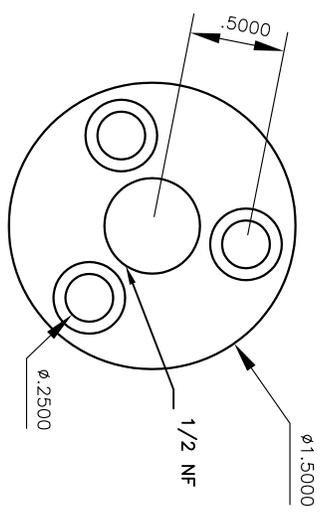
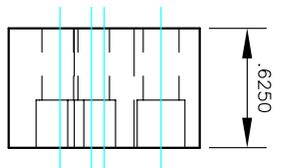
Clamp Inserts		
Tube	ID	OD
1/8	0.1250	0.3750
3/16	0.1875	0.3750
1/4	0.2500	0.3750
5/16	0.3125	0.3750

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 DRAWN 31/07/02 m  
 ISSUED

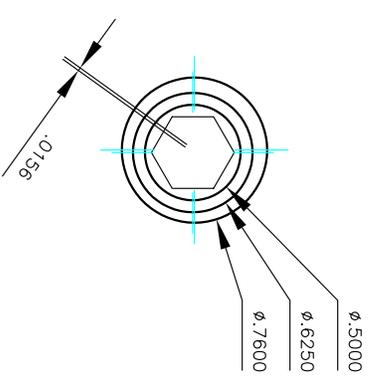
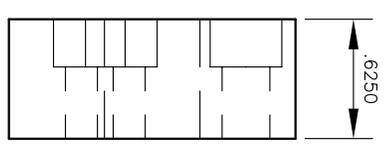
SIZE	FSCM NO	DWG NO	Pipe Bender No 1	REV
A	-	-		
SCALE	1"=1'0"	Michael Ward	SHEET 3	



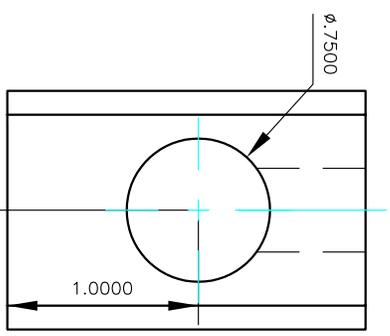
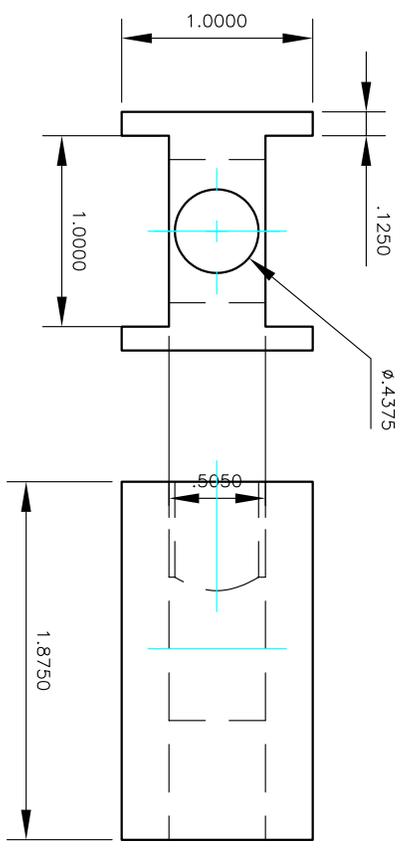
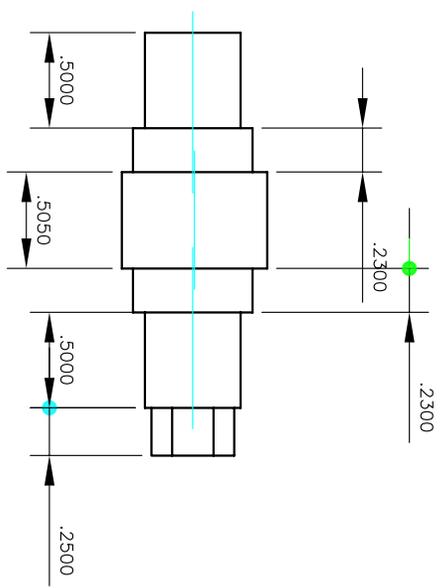
Small Stand, 1 Req, CR



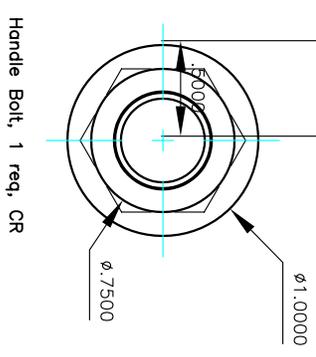
Large Stand, 1 req CR



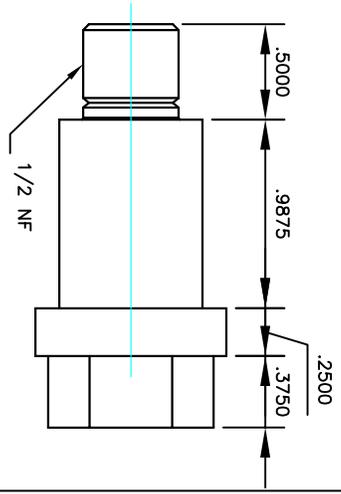
Float Roller Bolt  
Centre section is eccentric by 15 thou  
to allow adjustment in set up  
offset .015, both ends threaded 1/2 20



Handle Bracketed, 1 req CR



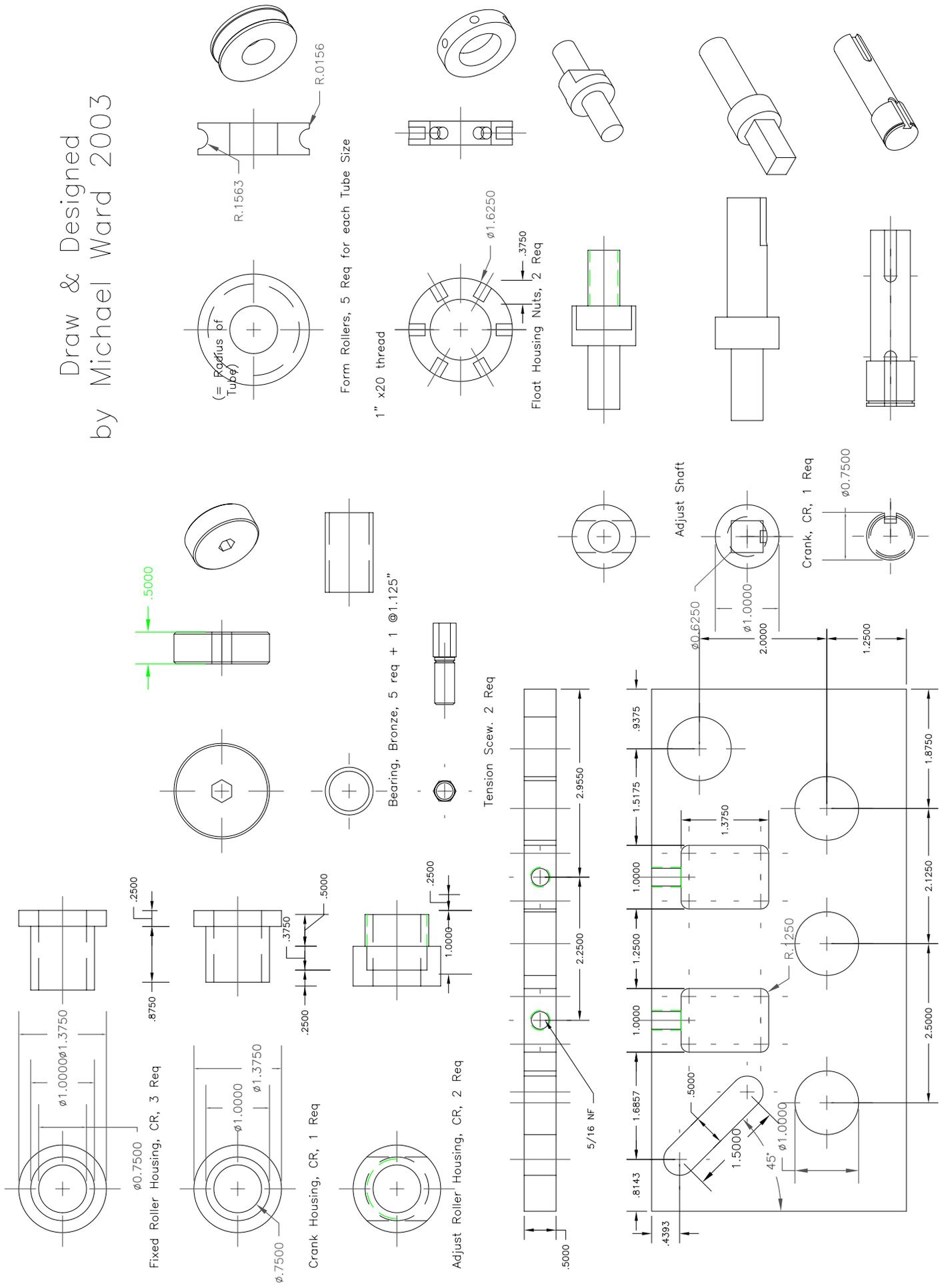
Handle Bolt, 1 req, CR



FILE NAME C:\My Documents\MM\shop\pipe bender\pender.dwg  
DRAWN 31/07/02 m  
ISSUED

SIZE	FSCM NO	DWG NO	REV
A	-	Pipe Bender No 1	
SCALE	1"=1"	Michael Ward	SHEET 4

# Draw & Designed by Michael Ward 2003



Roller Shafts, CR, 5 Req

Frame, .5" Colled Rolled, 1 Req