



## **Horn Metric Machines**

Push/Roll Bending Comparison to other  
Bender Manufacturers

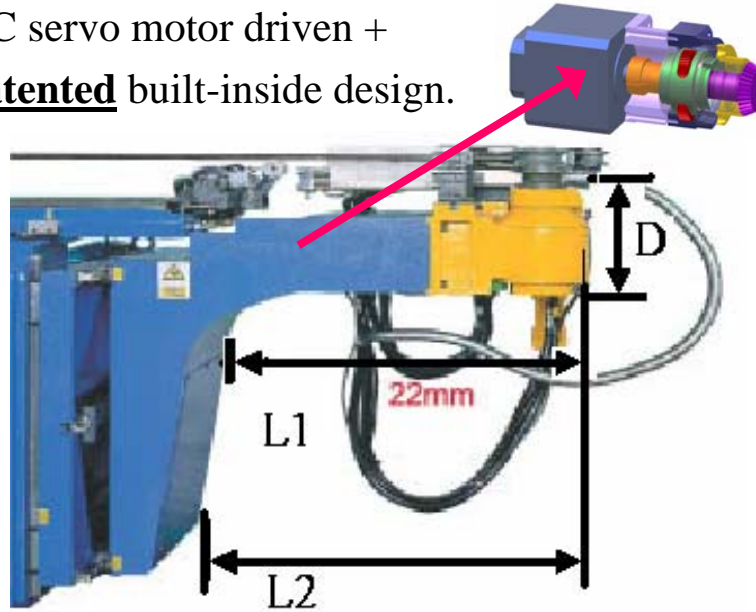
# Comparison between Horn Metric and others.

C-Axis  
(bending axis)

**HORN**

HORN

AC servo motor driven +  
**patented** built-inside design.



	#30	#38	#50
D	253 mm	295 mm	325 mm
L1	400 mm	545 mm	650 mm
L2	680 mm	875 mm	887 mm

Bending head is single-whole assembly design, so the mechanical structure is compact, rigid, tough and with advantage of very limited interference (more space under head)

Other manufacturers


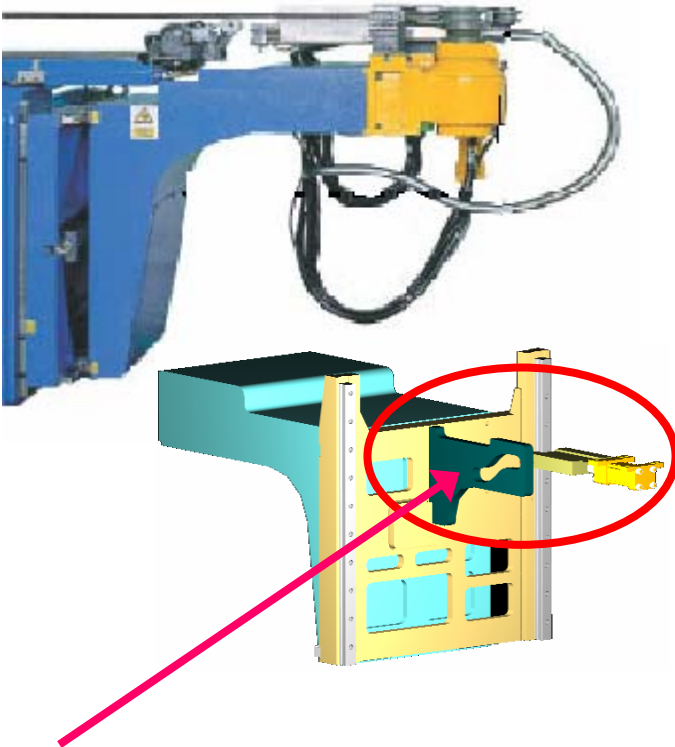


AC servo motor is located under the bending head and outside which collects lube and debris causing maintenance issues.





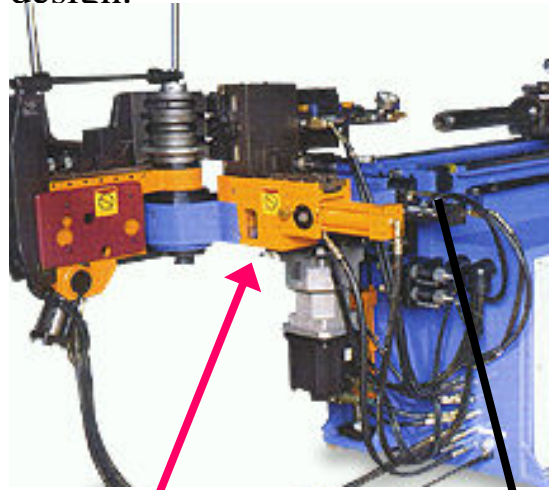
Tube forming space occupied by servo motor and the throat depth (L1 of bending head is short. Also compare “D” dimension.

Possibility of tube collision with machine body.

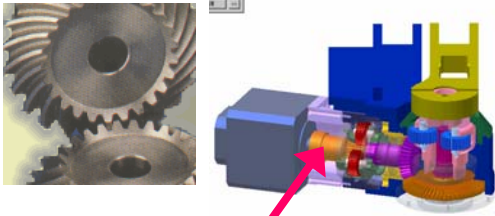



# Comparison between Horn Metric and others.

	HORN	Other manufacturers
<p data-bbox="51 221 352 464">Vertical movement of bending head for automatic die changing</p> 	<p data-bbox="404 221 1232 264">Hydraulic driven + <b>patented</b> cam-lifting design</p>  <p data-bbox="404 1049 1212 1192">Bending head vertical movement for die changing is patented cam-lifting design ensuring smooth/fast movement and is strong.</p> <p data-bbox="404 1220 1232 1363">Compact, rigid and stable bending head ensures accuracy and durability of the bending machine.</p>	<p data-bbox="1295 221 1895 264">Hydraulic drive direct push design.</p>  <p data-bbox="1305 656 2009 899">Hydraulic direct acting design creates bending head moment. Weaker design with alignment problems. The durability of machine and bending quality is compromised.</p>  <p data-bbox="1305 1220 1947 1363">Loose mechanical structure does not conform to general engineering principles.</p>


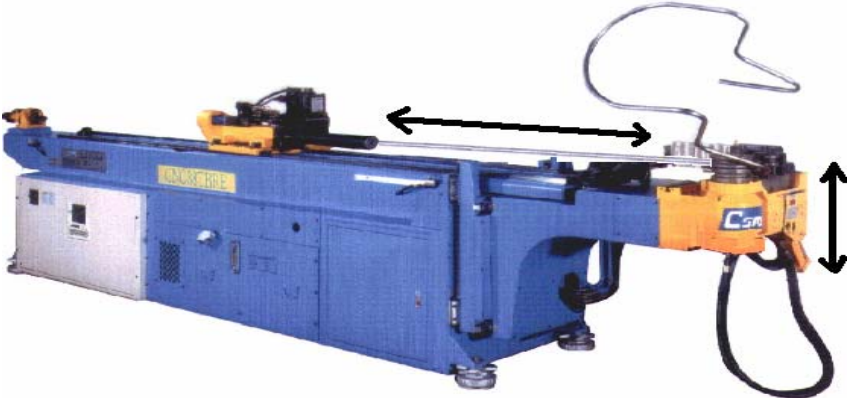

# Comparison between Horn Metric and others.

	HORN	Other manufacturers
<p data-bbox="51 221 352 464">Horizontal movement of bending head for automatic die changing</p> 	<p data-bbox="404 221 1004 264">AC servo motor + ball screw drive</p>  <p data-bbox="445 1178 1129 1270">Ball screw is covered to prevent it from damage by dirt, lube and iron chips.</p>	<p data-bbox="1295 221 1947 307">AC servo motor + exposed ball screw drive.</p> <p data-bbox="1295 321 1937 414">Or simple and rough hydraulic direct push design.</p>  <p data-bbox="1295 921 1916 1063">There is a moment problem in the machine head because of cantilever design.</p> <p data-bbox="1295 1092 1958 1242">Even with ball screw design, it is exposed to working environment and easily damaged by dirt and iron chips.</p>

# Comparison between Horn Metric and others.

	HORN	Other manufacturers
<p data-bbox="58 222 306 368">Transmission design of bending head.</p> <div data-bbox="64 586 364 711" style="border: 2px solid blue; padding: 5px; display: inline-block; background-color: yellow;"><b>HORN</b></div>	<p data-bbox="379 222 1106 311">AC servo motor + patented planetary gear transmission</p> <div data-bbox="650 282 1143 496"></div> <div data-bbox="513 582 1135 902"></div> <p data-bbox="395 1082 1172 1330">Planetary gear assembly creates maximum torque for bending. <b>Accuracy is 0.01 deg.</b> Transmission torque efficiency is 95% better than traditional chains. No adjusting for wear reduces maintenance.</p>	<p data-bbox="1228 222 1889 265">AC servo motor + chain drive design .</p> <div data-bbox="1390 265 1929 743"></div> <div data-bbox="1307 886 2022 1108"></div> <p data-bbox="1245 1179 1980 1345">Chain is flexible while under load and less accurate. Requires constant maintenance.</p>

# Comparison between Horn Metric and others.

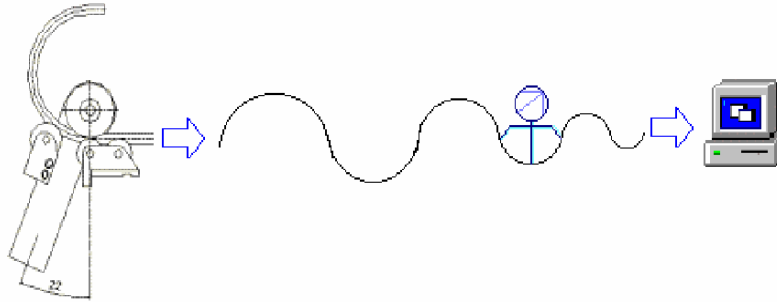
	HORN	Other manufacturers
<p data-bbox="37 201 273 344">Mechanical structure of bending head</p> 	<p data-bbox="416 247 1158 339">While bending, there is forward force and pulling force exerting on the bending head.</p>  <p data-bbox="426 872 1172 1015">While die changing (up and down), there is very heavy stress and inertia force requirements.</p> <p data-bbox="426 1096 1218 1293">This bending head is a single/whole assembly and designed to comply with dynamics of push and pull forces exerted during bending process.</p>	<p data-bbox="1272 201 2011 294">This bending head assembly is designed in multiple pieces and sub assemblies.</p>  <p data-bbox="1292 1065 2007 1262">This design implemented the die position movements subsequent to the machines original use for single stack bending only.</p>

# Comparison between Horn Metric and others.

Performing a large radius push/roll bending job.



## HORN



1. Bend a 3 Meter long tube with 6 bends in automatic.
2. Use Horn special made curvature gauge to measure the 6 bending arcs. Key in the 6 corresponding coefficients.
3. Use the related tube spring back characteristics for program reference.
4. The necessary bend arm position will be determined automatically to get accurate rolling quality with good repeatability.
5. Future set ups are effortless and require less scrap to ensure quality bends.

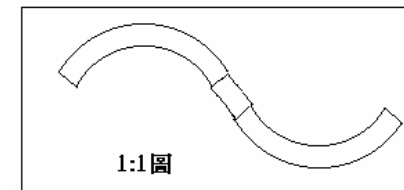
## Other manufacturers

Mathematic calculations used to determine the bend arm position for push bending. The possible spring back character of different tube material is entirely ignored.



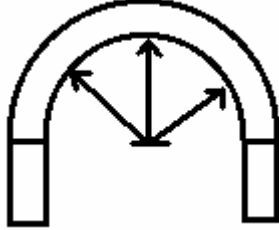
Every new set up requires the operator to make a lot of test tubes and creates waste to get correct bending datum for production.

To prove practically,

1. make a 1:1 CAD drawing as below.
2. Then try to produce a correct push bending sample to put on the drawing.
3. It is difficult to make a correct sample without the unique Horn program and control.



# Comparison between Horn Metric and others.

	HORN	Other manufacturers
<p data-bbox="37 225 348 368">Practical performance on a machine.</p> 	<p data-bbox="397 239 1205 331">Horn Metric machines produce the best quality and repeatability.</p> 	<p data-bbox="1274 239 2034 331">We feel it is important, to ask for a practical demonstration.</p> <p data-bbox="1274 368 1972 459">Compare all of the bent samples to each other for repeatability.</p>  <p data-bbox="1558 811 1736 902">Check for symmetry.</p> 