

## Bending Steel Products and Listing

### A-1 Roll Co.

301 Church Street  
Mount Clemens, MI 48043  
Ph: 586.783.6677  
Fax: 586.783.1122



A-1 Roll supplies rolled structural shapes worldwide, specializing in putting radii in angles, bars, beams, channels, rails, pipes, tubes, aluminum extrusions, copper, brass, and conveyor curves. From buildings to bridges, conveyors to train tracks, auto-show displays to skate parks, you will see A-1's work. In 2000, A1 built a 25,000-sq.-ft building and ordered a larger machine. The new machine allows A1 to bend 30" beams, 26" channels, 3" x 12" bars, 175# rails, 8" x 8" x 1" angles, 8" pipe, and large tubes. Family owned and operated since 1980, A-1 Roll provides products, services and quick turn-around time.

### Albina Pipe Bending Co., Inc.

12080 SW Myslon St.  
Tualatin, OR 97062  
Ph: 503.692.6010 or 866.ALBINA8  
Fax: 503.692.6020  
info@albinapipebending.com  
www.albinapipebending.com



Since 1939, Albina Pipe Bending has produced innovative products, competitively priced and on time. APB works with all forms of structural steel including: angle, wide flange and I-beams, channels, square and rectangular HSS, and bars. APB supplies products to a range of industries, including steel fabricators, public works contractors, architectural designers, sculptors, pulp and paper mills, truck manufacturers, and others. APB produces virtually any metal component that needs to bend or curve. Every piece of bending equipment owned has been engineered and upgraded to perform beyond known industry specifications. APB is a designated Kirk & Blum distributor for dust and air handling systems. Component parts are in stock for immediate delivery and quantity discounts are available.

### Bendco Inc.

801 Houston Ave.  
Pasadena, TX 77502  
Ph: 713.473.1557  
Fax: 713.473.1882  
bendco@ghg.net  
www.bendco.com



Structural profile bending and pipe bending by Bendco are tools for meeting complex and innovative architectural applications. Before constructing your next stadium, ballpark, airport, hotel, etc., contact Bendco for cold or induction bending. Bendco welcomes you to visit their manufacturing facilities at any time. Please contact Bendco or visit the web site for more information.

### Bendtec, Inc.

366 Garfield Ave.  
Duluth, MN 55802  
Ph: 218.722.0205  
Fax: 218.722.6598  
wendy@bendtec.com  
www.bendtec.com



BendTec is a leader in bending and fabrication for projects involving curved architectural and structural members. AISC-Certified for conventional steel building structures, simple steel bridges, complex steel building structures and major steel bridges. Products include roof trusses, parabolic arches, Vierendeel trusses, long radius bends, light/power poles, signs, bridge arches, park benches and window mullions.

### Cal Pipe

9650 Washburn Rd.  
Downey, CA 90241  
Ph: 800.225.7473  
Fax: 562.803.9883  
sales@calpipe.com  
webendpipe.com

Commercial and job binding for heavy industrial, architectural construction, OEMs, refinery and chemical industries. Cal Pipe bends pipe; rectangular, square, and round HSS; angles, beams, channels, plate, spirals, stringers and coils.

### Chicago Metal Rolled Products Company

3715 S. Rockwell Street  
Chicago, IL 60632  
Ph: 773.523.5757  
Fax: 773.650.1439  
sales@cmrp.com  
www.cmrp.com



On the world's largest beam roller, Chicago Metal Rolled Products bends up to 44" x 285# beams both the "easy way" and the "hard way." On one of the world's largest section rolls, the company bends up to 20"-diameter pipe and 20" x 12" HSS.

With 55 rolling machines and 95 years of experience, Chicago Metal provides two-to-three-day delivery of curved structural steel, with a 98% on-time-delivery record. The company can roll-curve sections to tight radii with minimum distortion, for example, a W6 x 12# beam rolled the "hard way" to a 2' radius. The company regularly bends steel into ellipses; rolls arcs with tangents; does off-axis and multi-axis bending; creates true, helical coils; and manufactures plumb, circular stair stringers. Lastly, the company curves aluminum extrusions to create arches and bows on curtain-wall and store-front systems.

### Clayton Industries

315 4th Street North  
Birmingham, AL 35204  
Ph: 205.715.2000  
Fax: 205.715.2002  
JClay82612@aol.com  
www.claytonind.com

Clayton Industries supplies a range of industries with a variety of services. Large equipment capacities allow Clayton to roll beams as large as 44", form plates on a 1,000-ton, 40' press brake, and roll plate as thick as 6" x 14'. Clayton also has a full-line machine shop, with large CNC lathes and mills. Clayton employees' skills, experience, and devotion to the operation of the plant contributes to the company's production, service and product.

### COMEQ, Inc.

P.O. Box 207  
White Marsh, MD 21162-0207  
Ph: 410.933.8500  
Fax: 410.933.1600  
sales@comeq.com  
www.comeq.com

COMEQ, Inc. is the exclusive North American agent for ROUND O of Sweden, the company that produces the broadest range of bending rolls in the world, including the world's largest section-bending

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machines. Working with the customer, COMEQ and ROUND0 have placed section-bending machines in many companies that roll sections and profiles in North America. These range from the world's largest angle roll, the Model R-15S, to the ROUND0 Beam-benders, the largest section-bending machine in the world. ROUND0 supplies 22 standard sizes of section-bending machines, or angle rolls, ranging from 2" x 2" angle up to the giant R-15S, which can roll up to 24" pipe and 30" beams the hard way! All models are hydraulically operated, and most feature hydraulic guide rolls to insure optimum bending results.

**E.G. Heller's Son, Inc.**  
 18330 Oxnard St.  
 Tarzana, CA 91356  
 Ph: 800.233.0929 or 818.881.0900  
 Fax: 818.344.8898  
 sales@hellerson.com  
 www.hellerson.com



E.G. Heller's Son sells plate and profile-bending machinery worldwide for the production of various products ranging from farm combines/tractors, wind turbine towers, railcar producers, structural steel fabricators and other industries. In business since 1916, E.G. Heller's Son has established a network that works closely with the end user. Also sell plate shears, press brakes, ironworkers and rebar benders and shears used in the concrete industry. Log onto the web site for a more complete range of what's offered.

**Greiner Industries, Inc.**  
 1650 Steel Way  
 Mount Joy, PA 17552  
 Ph: 800.782.2110 or 717.653.8111  
 Fax: 717.653.8642 or 717.653.2013  
 greinerindustries@earthlink.net  
 www.greinerindustries.com

Greiner Industries, Inc. rolls structural wide-flange beams up to 40" the easy way and 24" the hard way; tubing up to 26" by 16" or 20" square; and pipe up to 20" diameter with their ROUND0 R-13 structural roll. Greiner also rolls structural tees, channel, and angle, as well as square, round and flat bar. Greiner can roll A36 carbon steel plate up to 1-1/4"-thick by 144"-wide, and bend up to 1"-by-120" wide. Greiner specializes in the fabrication of large pipe trusses, wide-flange beam trusses, plate girders, heavy structural columns, and base plates. Their 266,000-sq.-ft. facility includes 80'-wide-by-400'-long fabrication bays with 85-ton crane capacity and 81,000-sq.-ft. blasting & coatings facility with 100-ton, four-point pick-and-carry crane capacity inside. Greiner Industries offers cutting, forming, fabrication, welding, machining, blasting, and coating as individual services, or as a complete project.

## product case study

### Gerald Ratner Athletic Center (University of Chicago)

Architect Cesar Pelli focused on creating a design that is both functional and exciting for the Ratner Athletic Center at the University of Chicago. His solution of a cable-stayed waved roof with soaring masts meets this goal and makes the building instantly recognizable.

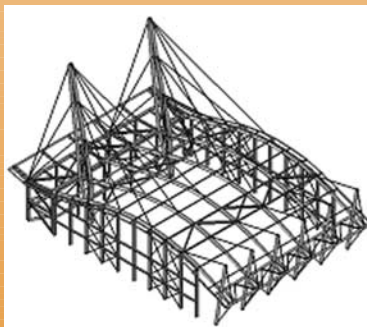
Early in the project, co-architect and project structural engineer OWP/P contacted **Chicago Metal Rolled Products** to find out if it was possible to create an S-curve in a single member with no splicing. Chicago Metal had the capability, and was able to roll the eight pieces of W33x169 (93' long) to an 85' radius (14' arc), followed by a 22' straight tangent, followed by a 146' radius reverse bend (12' arc).

Chicago Metal roll-curved this steel as well as W21x93, W18x76, W14x48, W14x30 and W14x22, for a total 310 tons of beams, cold-bent about the strong axis, to complete the flattened, S-curve roof. The architects, engineers, general contractor, and fabricator all visited the shop to view the bending.

Steel cables support the roof girders. The cables are linked to two tall masts over the roof of complex's pool, two tall masts over the roof of the complex's gym, and 15 smaller masts that rise above the pool and gym roofs. The roof's shape was then "tuned" by the cables until it met the desired shape.

With the masts doing the heavy lifting, only thin beams were needed to span large, column-free areas. With an all-glass east wall under the sinuous roof line, the roof floats like a magic carpet.

Read more about the Ratner



Center in the March 2004 issue of *Modern Steel Construction* in the article "Design Considerations in Cable-Stayed Roof Structures." The project received an AISC Engineering Award of Excellence, covered in the April 2004 issue of *MSC*.★





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### Hodgson Custom Rolling Inc.

M.P.O. Box 1526  
Niagara Falls, N.Y. 14302-1526  
or  
5580 Kalar Road  
Niagara Falls, ON  
Canada L2H 3L1  
Ph: 800.263.2547 or 905.356.8132  
Fax: 905.356.6025  
hodgson@hodgson.on.ca  
www.hodgsoncustomrolling.ca



Hodgson Custom Rolling provides heavy-plate rolling and forming for industrial and commercial applications. Hodgson rolls structural shapes, including stringers for spiral staircases. Forming steel and steel products, Hodgson produces cones, component parts for heavy equipment, and one-of-a-kind heavy-plate fabrications. Rolling steel plate up to 7" thick, Hodgson processes products such as cylinders, rings and hoist drums for cranes. With 85,000 sq. ft under roof, Hodgson is ASME and ISO9001:2000 certified, and can provide solutions, with customized service for prototypes and multiple units.

### Iwatani International Corp of America

2050 Center Ave., Suite 425



Ft. Lee, NJ 07024  
Ph: 201.585.2442  
Fax: 201.585.2369  
gary@iwatani.com  
www.iwatani.coml

The advanced Kurimoto plate-bending machine is a three-roll machine which uses a movable top roll to perform almost 100% complete end-bending on the leading and trailing edge. During the bending process, the top roll automatically moves vertically and horizontally to position itself throughout the process, so the operator just needs to feed the plate into the machine. Crowning of the top roll along with backup rolls for the bottom rollers produce perfect circularity. Operators can be quickly trained to produce rolls, because they only need to learn how to feed the machine. This will keep perfect rolls coming out of your shop because you can quickly train many people to roll plate.

### Kottler Metal Products, Inc

1595 Lost Nation Road  
Willoughby, OH 44094  
Ph: 440.946.7473  
Fax: 440.946.7655  
kottler@apk.net  
Kottlermetal.com



With years of experience, Kottler Metal's team offers bending expertise and service to customers. Kottler has one of the world's largest structural steel roll-bending capacities. The company can form up to 40" channel and I-beam, both easy/hard way, 20" pipe and tube with minimal distortion, 10" x 10" x 1" angle, and a broad scope of solid and hollow shapes. Mandrel draw bending and Rotoform bending capacities range from 1/4" O.D. to 12.00" pipe. With a multitude of tooling, mandrel-quality bends can be as small as 1-1/2 times the diameter of the pipe and HSS.

### Kubes Steel Inc.

930 Arvin Avenue  
Stoney Creek, Ontario  
Canada, L8E 5Y8  
Ph: 905.643.1229  
Fax: 905.643.4003  
kubes@kubesteel.com  
www.kubesteel.com



Kubes Steel Inc. performs structural, section and plate rolling and forming for architectural, structural, manufacturing, mining, and mechanical process applications. Kubes is celebrating its 30th anniversary of service to the North American steel fabrication industry. An array of machines offer capabilities ranging from the manufacture of machined-quality seal rings, to rolling 36" beams on the massive Roundo R13s. Whether large projects or small components, Kubes will make the effort to meet your needs.

### Mark IV Metal Products, Inc.

200 West El Segundo Blvd.  
Los Angeles, CA 90061  
Ph: 800.663.4760  
Fax: 310.217.9704  
alex@markivmetal.com  
www.markivmetal.com

Mark IV is a contract manufacturer that specializes in manufacturing products made out of tubing. Mark IV provides individual services like tube-bending, cutting, punching, drilling, welding, notching, powder coating etc., or complete manufacturing of your product, including packaging. Along with bending round HSS, Mark IV bends "square" and "rectangular" HSS.

### Marks Metal Technology

10300 SE Jennifer  
Clackamas, OR 97015  
Ph: 800.526.1031  
Fax: 888.656.1985  
scott@marksmetal.com  
www.marksmetal.com



Since 1946, Marks Metal Technology has provided rolling and fabrication services. Under one roof, you can find multiple processes, including structural and plate rolling and forming, Diamond Curve Technology for curving wide-flange beam the hard way of the web, specialty manufacturing, and OEM component manufacturing. MMT fabricates and processes stainless steel, aluminum, carbon steel and other metals. Some products include: rolled structural profiles, truss components, circular stairs, cylinders, cones, reducers, transitions, heavy bands, bridge components, and utility hardware and towers. MMT also specializes in Advanced Digital Welding Technologies supporting Narrow Gap MIG and High Energy TIG welding processes.

### Max Weiss Co., Inc.

8625 West Bradley Road  
Milwaukee, WI 53224  
Ph: 888.649.3477  
Fax: 414.355.4698  
sales@maxweiss.com  
www.maxweiss.com

Max Weiss Company's structural forming process and craftsmen provide high quality and tight-bending radii services. Max Weiss performs rolling and forming of structural steel sections, and also hot-forms, fabricates, welds, machines and supplies threaded products. Max Weiss can form structural sections to tight radii with minimal distortion and marring, while maintaining piece-to-piece consistency. Customers include architects, manufacturers, designers, erectors, fabricators, steel service centers and contractors. Application engineers will analyze your project, develop concepts, and customize services to fit your needs.

### N.J. McCutchen Inc.

123 W. Sonora St.  
Stockton, CA. 95203  
Ph: 209.466.9704  
Fax: 209.466.2874  
www.njminc.com

Experienced staff, state-of-the-art equipment and attention to detail allows N.J. McCutchen to meet steel-rolling needs of clients. The company can roll virtually all structural shapes, from standard applications to those with unique requirements. N.J. McCutchen can supply the needed materials or use

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yours. The company can roll up to W36" beams, and members as small as 1" x 1" x 1/8" angle, with unlimited length capabilities. Rolling capabilities also include plate rolling with widths up to 12', and both ferrous and non-ferrous materials with thicknesses up to 1.5". N.J. McCutchen's rolling systems yield precision work with minimal distortion.

### Oakley Steel Products Company

650 S. 28th Ave.  
Bellwood, IL 60104  
Ph: 708.544.7970  
Fax: 708.544.7986  
elibby@oakleysteel.com  
www.oakleysteel.com



Oakley is one of the largest custom shaping, bending and forming shops in the Midwest. Oakley can curve some of the largest structural shapes produced and form plates up to 6" thick. From large jobs to small ones, Oakley can provide high-quality products, delivered to your door, on time.

**Shaped Steel, Inc.**  
3000 Heartland Drive  
Liberty, MO 64068  
Ph: 866.781.5717  
Fax: 816.781.8381  
rdevans@shapedsteel.com  
www.shapedsteel.com



Shaped Steel, Inc., handles everything from small structural sections to some of the largest sections produced, from sheet metal to 6" plate, square and rectangular HSS to 20". Products for small to large jobs, and across numerous industries. Shaped Steel, Inc. is shaping the new world we live in!

**WhiteFab Inc.**  
724 Avenue W  
Birmingham, AL 35214  
Ph: 205.791.2011  
Fax: 205.791.0500  
sales@whitefab.com  
www.whitefab.com

WhiteFab has built and patented specially designed equipment for cold-forming structural shapes into curves. WhiteFab forms shapes to tight radii with little distortion. With this process, customers



can use thinner sections to form tight radii. Some sections formed are: structural tubing up to 20" x 12", hard way and easy way; beams up to 24", hard way and easy way; all channels; hard way and easy way; pipe up to 16"; angles, tees, bars and rails. Plate processing provides: leveling up to 72" wide-form coils; shearing up to 1/2" x 20'-0"; forming complex bends on press brakes up to 1000 tons; and plate rolling up to 1/2" x 10'-0".

### Advanced Bending Technologies Inc. (formerly Van Ingen Services)

27372 Gloucester Way  
Langley, BC V4W 4A1 Canada  
Ph: 800.563.BEND  
Fax: 888.563.BEND  
sales@bending.net  
www.bending.net

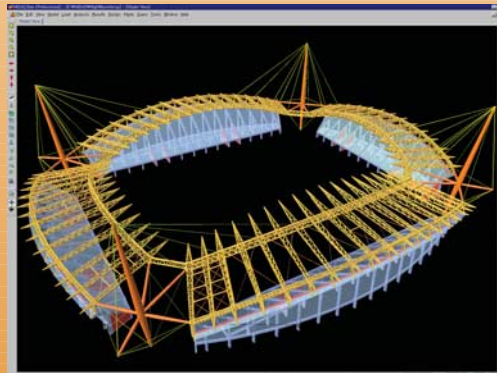
Let Advanced Bending Technologies save you time and money by bending exactly what you need to the highest possible AESS quality. Don't assume it can't be done until you talk to us! Advanced is a leading specialist since 1982 in low-deformation and high-precision bending, rolling and spiraling of beams, channel, pipes and tube. Their new, larger plant doubles capacity and adds a 40" induction bender. They offer solutions tailored to your requirements.

## product case study

### World Cup Stadium—Cable Stayed Roof Structure

Careful engineering work and an effective software package contributed to the successful design of the 2002 World Cup soccer stadium in Chonju, Korea. Since then, the 42,000-seat stadium has been used extensively and has stood up to several major typhoons. CS Structural Engineering Inc., in association with MIDAS IT, used **MIDAS/Gen** software to explore numerous design alternatives and engineer the final product.

The footprint of the stadium occupies an area of 853' by 525'. More than 200,000 sq. ft. of roof coverage was required, with unobstructed views. A structural steel system was the best alternative for the roof structure, and was chosen from the outset. Many different designs for the roof structure were considered, including an arch concept, a tension-cable membrane structure, a space-frame concept and other variations. Engineers designed preliminary schemes for the alternatives, and compared estimated costs using MIDAS/Gen for analysis, design and quantity take-off. The constructed design met requirements for cost, schedule, architectural expression and constructability. The lower-stand structure was designed with reinforced, post-tensioned and precast concrete, and integrated with the structural-steel roof structure using the same analysis and design model.



The roof structure is a hybrid steel system that comprises structural steel trusses, cable stays and four-corner masts with branch beams. The inner ring truss acts as the primary roof support, which is suspended from the 2.5" o.d. to 3.5" o.d. front stay cables at 28 points stemming from the four corner masts. The 28 front and back stay cables are suspended from the four masts, which rise 220' above the third floor. The masts retain a non-prismatic built-up profile through the entire height. They vary from 3.3' o.d. with 1.75" thickness at the base to 10' o.d. with 0.75" thickness at the branch beams at the 65' mark. The masts then taper to a smaller diameter at the peak, where the front and back stay cables merge together.

The scope of the roof-structure design extended beyond the scope of typical structure design. Analysis required the staging of cable tensioning and erection engineering. There were more than 100 load cases and combinations. Using MIDAS/Gen, designers performed a construction sequence analysis in conjunction with a large-displacement nonlinear analysis using cable element. MIDAS/Gen also provided buckling analysis and connection-detail analysis using the auto-meshing feature. With MIDAS/Gen's analysis tools, graphic visualization and speed, the design team met sophisticated structural requirements. ★