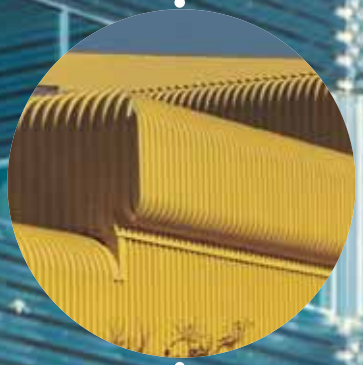
designing with curved metal panels: an ideabook.

Curveline, Inc.

custom-curving of profiled metal panels.



the Curveline concept.

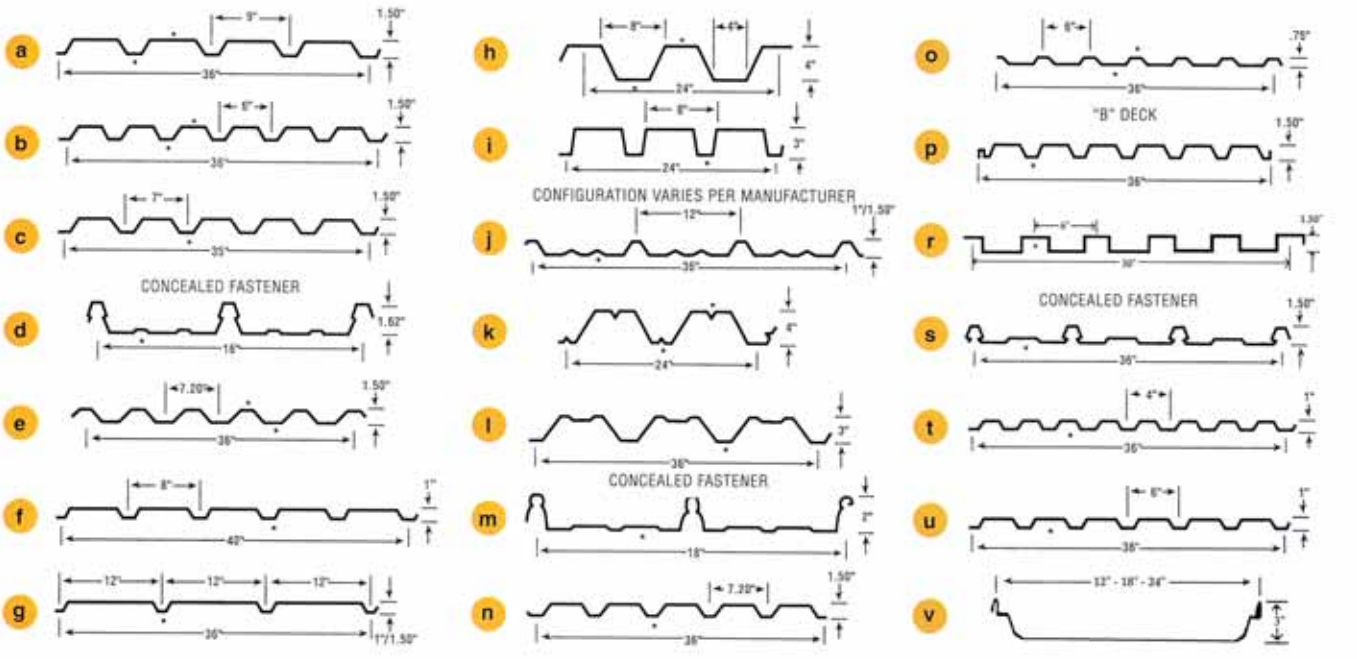
"why settle for only three or four choices in curved panels? with Curveline, you can have 103 or 104 choices — curved just about any way you want – *and* you can source panels from more than 100 different manufacturing locations."
-municipal project architect

CURVELINE, INC. SPECIALIZES IN CUSTOM-CURVING OF PROFILED METAL PANELS. So unique it's patented in 14 countries, our "crimp-curving" process makes it possible to create the greatest possible range of contours and shapes, using the widest selection of metal panels available *anywhere*. No wonder Curveline curves have become an enduring feature of today's architectural landscape.

How is Curveline able to offer so much? It's all due to our *independent service center* concept. Our service center works with metal panel and systems building manufacturers across the country to curve their profiled panels to customers' specifications. Only with Curveline do you receive:

- A selection of panels from more than three dozen leading manufacturers in 100+ locations — allowing you to source panels from your supplier of choice. (Ask Curveline for a complete list of manufacturing sources.) Shown here are the roofing, siding and decking profiles most widely used for curving.
- The ability to create a nearly unlimited variety of radii and angles. Only Curveline can form single, double, triple radius and S-shaped curves, for maximum design versatility.
- The ability to curve an unequaled variety of substrates and gauges.
- Proven international experience — Metal panels curved by Curveline have been specified for some 5,000+ projects worldwide.

profiles available for curving



the list of profiles suitable for curving is constantly expanding. contact Curveline for an up-to-date profile sheet and a complete list of panel manufacturing sources.

* radius side or crimped surface

technical data.

"we needed someone who could handle several custom colors, different materials (stainless and galvanized steel) and gauges in a single curving application... creating both single and multiple radius curves. Curveline provided the high degree of customization needed for the job."

-store project architect

Curveline's innovative technology enables you to use economical metal panels for all types of curved components. As a result, you enjoy greater design freedom and superior aesthetics, along with all the durability and high performance that are inherent to metal.

Crimp-curving increases metal's rigidity, often making it possible to reduce panel gauge and/or the required amount or type of structural support. The result: material and labor savings.

Following are general guidelines for crimp-curved panels:

Panel thickness: *Steel:* 18 gauge to 26 gauge.
Aluminum: .032", .040" and .050".
Stainless steel: 20 gauge to 26 gauge.
Panel length: 2' to 30'
Panel depth: 3/4" to 4" deep
Panel width: 4' maximum
Minimum radius: Varies by profile: Consult Curveline for specific information. As a general rule, allow 1 foot of radius for every inch of panel depth.

R = design outside radius
Ø = design angle (various: 0° to 320°)
b = radius girth (as required)
S1 = uncurved panel (6" minimum required with less than 9'0" radius)
S2 = uncurved panel (optional)

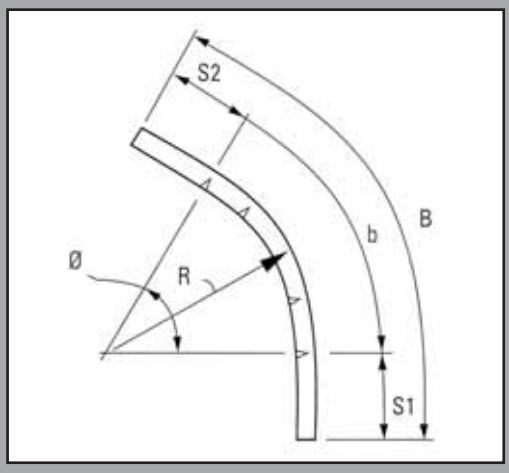
$$\mathbf{b} = \frac{R \times 3.1416 \times Ø}{180}$$

B = b + S1 + S2

Order example:
R = 12
Ø = 60°

$$\mathbf{b} = \frac{(12 \times 3.1416 \times 60)}{180} = 12\ 9/16\text{" say } 12\ 5/8\text{"}$$

S1 = 6"
S2 = 6"
B = 12-5/8" + 6"+ 6" = 24-5/8"
Panel length: 2' - 0 5/8"



No. panels: As needed. (Note: Two panels required per radius or arc change for set-up.)

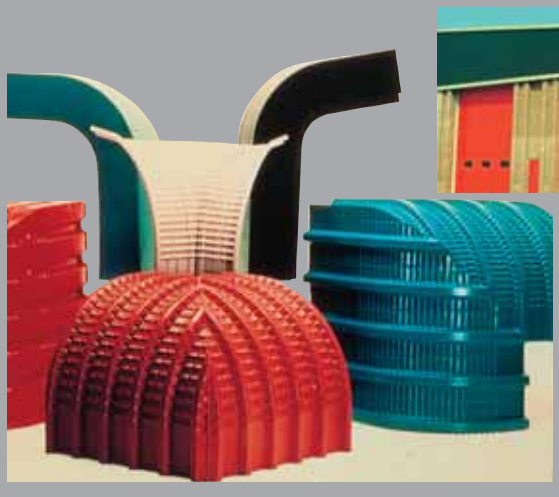
Materials: Panel materials suitable for crimp-curving include painted or unpainted galvanized steel, or Galvalume®, aluminum, anodized aluminum and stainless steel. ASTM Grades A, B, C, and D steel, H14 temper aluminum, and Type 304 maximum temper stainless steel can be readily crimp-curved.

Colors and finishes: Virtually all paint systems used on standard profiled panels are suitable for crimp-curving. Stainless steel finishes up to 2B maximum are also suitable for curving. Consult panel manufacturer for information on available colors and finishes.

Warranty: Warranties on materials and finishes are provided by the panel manufacturer. Curveline, Inc. warrants the crimp-curving fabrication process for up to 20 years under the conditions stated in the panel manufacturer's warranty.

Technical support services: Curveline's technical staff is available to answer your questions on all types of standard and special curving applications. Curveline can provide additional technical data on request, including some engineering span tables (90° and 180°) based on snow load and wind conditions. Sketch drawings are also available to stimulate design ideas.

need help with a curving question?
call Curveline at 1.888.998.0311 or 909.947.6022. consult panel manufacturers for specific product data.



In addition to radiused panels of all types, Curveline can provide curved flashings, trim and mitered corners.

curved panel applications

- roofing systems
- wall systems
- fascias and mansards
- canopies and walkway covers
- structural decking (hidden and exposed)
- storefronts and entranceways
- "faux" columns
- solar screens and solar equipment components
- equipment screens
- enclosures for mechanical and electrical components
- curved girts and light framing members to match curved panels
- curved flashings and trim

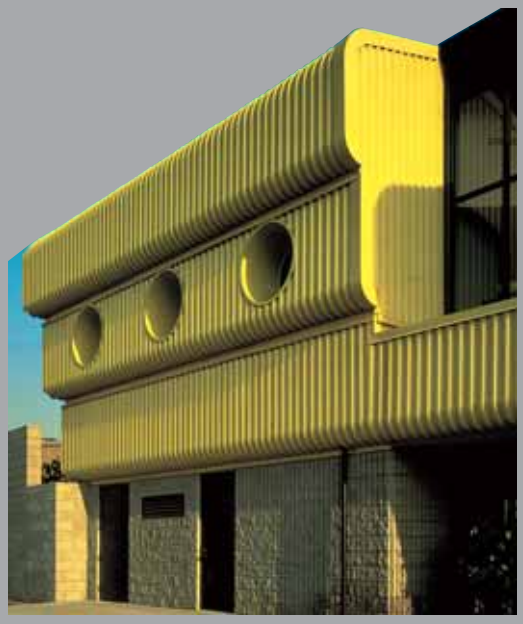
architectural applications.

"curved panels are regularly specified for projects where metal is favored but a more unusual look is desired. the uniqueness has also enticed many designers to make curved panels an integral component for projects where standard metal panel systems were simply not being considered."

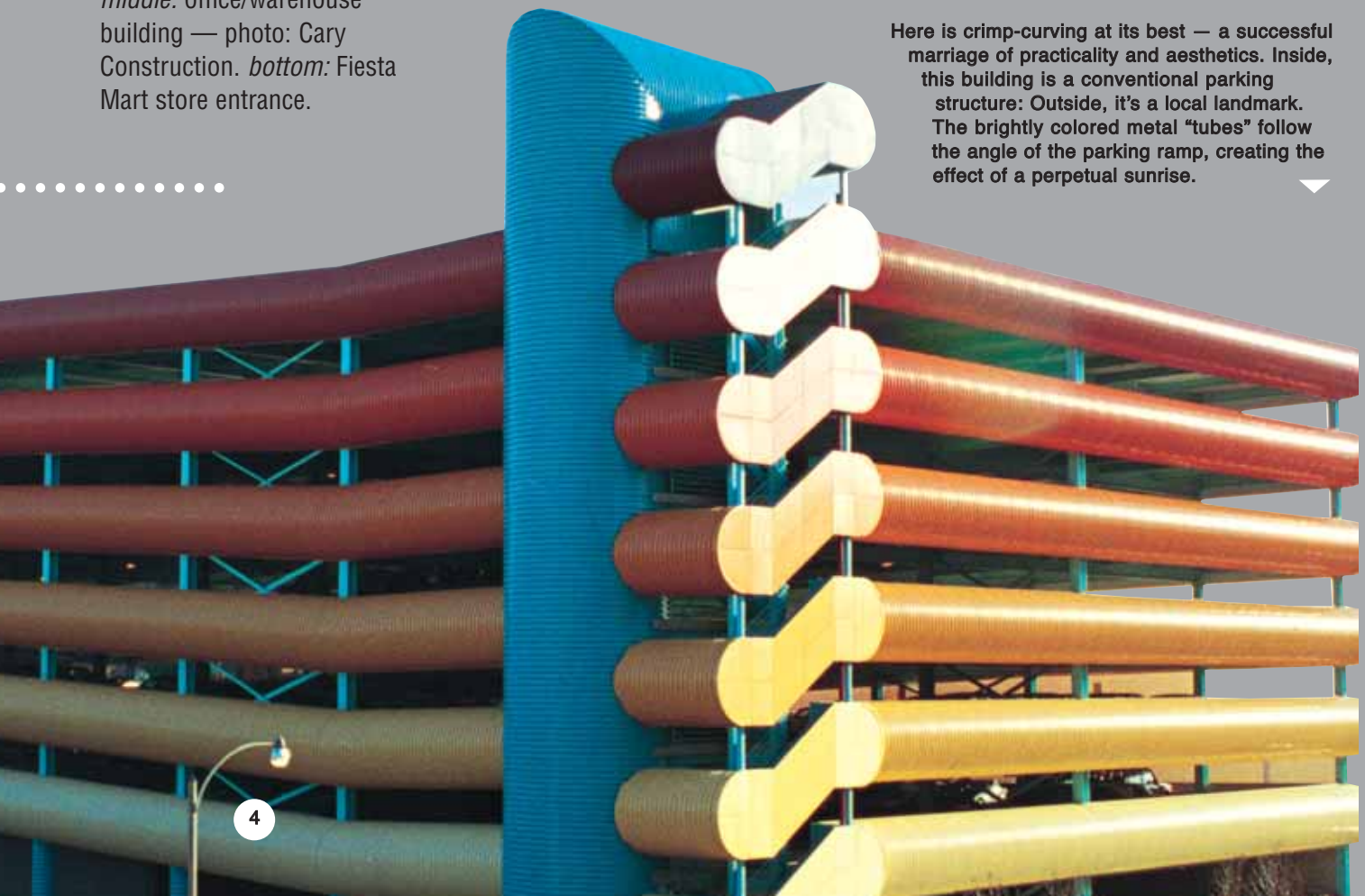
-Metal Architecture magazine

On front cover — *main photo:* Landerbrook Place office building — photo: H.S. Westover, Inc. *top:* Los Angeles Department of Water & Power building. *middle:* office/warehouse building — photo: Cary Construction. *bottom:* Fiesta Mart store entrance.

S-curved metal panels formed by Curveline create a simulated "space station" look for the Space Camp Habitat at the Space & Rocket Center in Huntsville, Alabama. Curveline's ability to form multiple-radius curves eliminates seam lines, enhancing the look of the exterior and simplifying panel installation.



This Los Angeles Department of Water & Power (DWP) building creates a bright spot in an aging industrial neighborhood. The vibrant yellow hue relates thematically to the DWP's fleet of maintenance vehicles. The subtly contoured metallic bands symbolize the power lines that the DWP provides to the community.



Here is crimp-curving at its best — a successful marriage of practicality and aesthetics. Inside, this building is a conventional parking structure: Outside, it's a local landmark. The brightly colored metal "tubes" follow the angle of the parking ramp, creating the effect of a perpetual sunrise.

renovation projects.

"motorists driving by our store are grinding to a halt because of the curves – not any curves on the road, but the curved fascia system we added to our building. it's so distinctive it actually attracts customers and builds store traffic. the impact on our business has been dramatic."

-furniture store owner

Photos: Di Bella Murphy Saemisch

This school project uses a dramatically curved metal canopy system — formed from a steel decking profile — to replace the existing canopy. The new design updates and transforms the entire look of the building while providing a way to route utility lines to the building's interior. It also meets stringent owner requirements for strength, durability, safety and low maintenance.

An attractive curved roofing and fascia system enabled developers to change the look of this strip center within tight budget constraints. The copper-colored panels were curved in the opposite direction from normal to hide the crimps from view. This technique is popular for designs where a smooth appearance is desired.

By specifying a framing system of curved subgirts matching the panels, the renovation team for this True Value store was able to use standard 24-gauge exterior panels, instead of the more costly 22 or 20 gauge metal required without framing. Curveline curved the exterior panels and the matching radiused subgirts to create the colorful, eye-catching facade at tremendous savings.

systems buildings.

"the tin-box, 'designless' look of yesterday's metal buildings is gone when curves are added to the equation. whether they are used as an accent – or to soften the overall lines of the project –curved panels can even mean the difference between approval and rejection in cities where planners don't readily accept metal-skinned buildings."

-systems building dealer

Subtly contoured facades, trim and mitered corners can all help to soften the lines of pre-engineered office and warehouse facilities — helping to improve aesthetics and win acceptance from local communities. As a result, a growing number of systems building manufacturers are offering curved panels as a standard product or as an option.

Photo: Cary Construction

Photo: Cary Construction

A curved fascia system lends a "sculptured look" to this pre-engineered shopping center and creates a dynamic contrast to the backdrop of stucco and glass.

structural decking.

"where domed roofs and other vaulted designs are planned, curved metal decking is a lightweight alternative to concrete. the Curveline process increases panel strength — making it possible to design a deck as a multiple span panel, using lighter gauge material. savings from reduced substrate and structural requirements can be dramatic."

-director of engineering, metal deck manufacturing company

Designers of shopping malls, libraries, airports, arenas and other facilities may now use domes and arches where flat ceilings were previously required and still achieve the desired acoustical characteristics. How? Through the use of curved acoustical decking panels in 22 to 18 gauge steel. Along with their acoustical benefits, the curved metal panels form a self-supporting deck that's lightweight yet strong.

Photo: VIrginia Air & Space Center/Hampton Roads History Center

At the Virginia Air & Space Center (Hampton, VA), metal decking is curved to conform with massive arched trusses, creating the look of a bird in flight. Metal was the material of choice because it was lower in weight and cost than concrete decking, while keeping the structure as light-looking as possible. Curveline's crimp-curving process allowed the use of lighter gauge decking, for a 20 percent savings in material costs.

Photo: Rancorn Wildman Krause Brezinski

covers, screens and specialties.

"our original walkway system design was limited to 400 linear feet — all the budget would allow. then Curveline's technical staff showed us how crimp-curved panels could reduce both material and substructure costs. we were able to extend the walkway to 1200 feet... tripling our coverage without increasing our costs!"

-industrial park developer

From functional to fanciful, curved covers come in all sizes, shapes and colors. Used in walkway systems for office and government complexes, curved covers offer a virtually self-supporting system with minimal framing requirements.

Installed on rooftops or other locations, curved screens offer an excellent way to conceal HVAC equipment, ductwork and other mechanical and electrical components.

Curved metal is also an attractive and economical option for covering transit shelters.

Used in retail applications like this award-winning car wash, double-radiused curved panels of unpainted galvanized steel make a provocative design statement.

Photo: william p. bruder • architect, ltd

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