SHEET METAL DESIGN GUIDE

DESIGN FOR MANUFACTURABILITY, PERFORMANCE, AND COST EFFICIENCY

dewys.com

15300 8th Ave Marne, MI 49435

TABLE OF CONTENTS

INTRODUCTION

Fabrication Processes

Sheet metal fabrication is one of the most versatile and cost-effective manufacturing methods used today. From industrial equipment and electronics enclosures to transportation and architectural applications, sheet metal enables designers to create strong, lightweight, and scalable products. Successful sheet metal design requires more than simply creating a part that functions—it requires understanding material behavior, fabrication processes, assembly requirements, and cost drivers.

This guide combines industry best practices and manufacturing design standards to help engineers, designers, and product developers create sheet metal components that are easier to manufacture, more durable, and more economical to produce.

Shaping

Sheet metal fabrication shapes flat metal into parts using cutting, bending, and stamping, guided by CAD-based machine instructions, with optional finishing processes like welding and coatings.

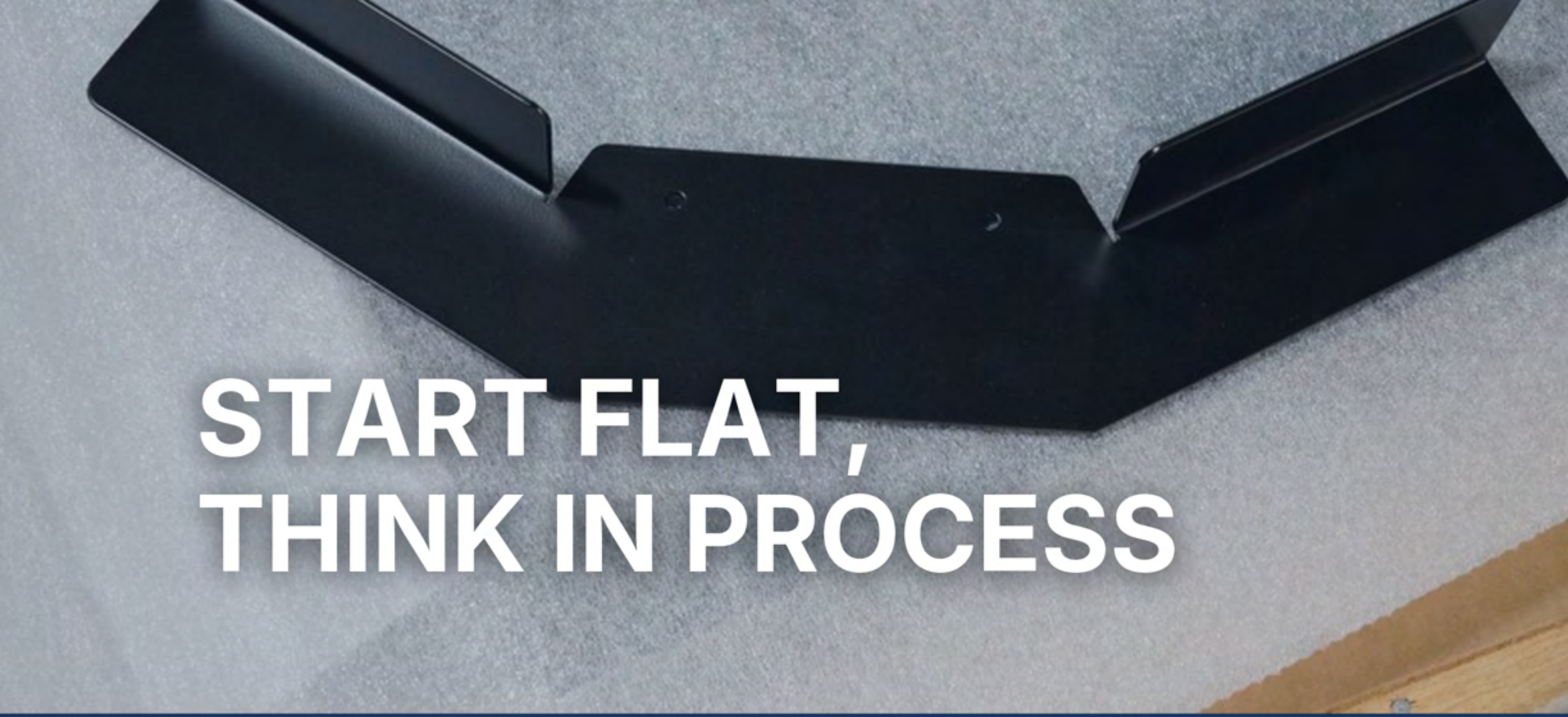
Cost

It is cost-effective and scalable, especially for simple or high-volume parts, while producing strong, durable, and lightweight components.

Design

Designs must maintain uniform thickness and account for bends and spacing to ensure accuracy and meet manufacturing tolerances.

(616)677-5281



START FLAT, THINK IN PROCESS

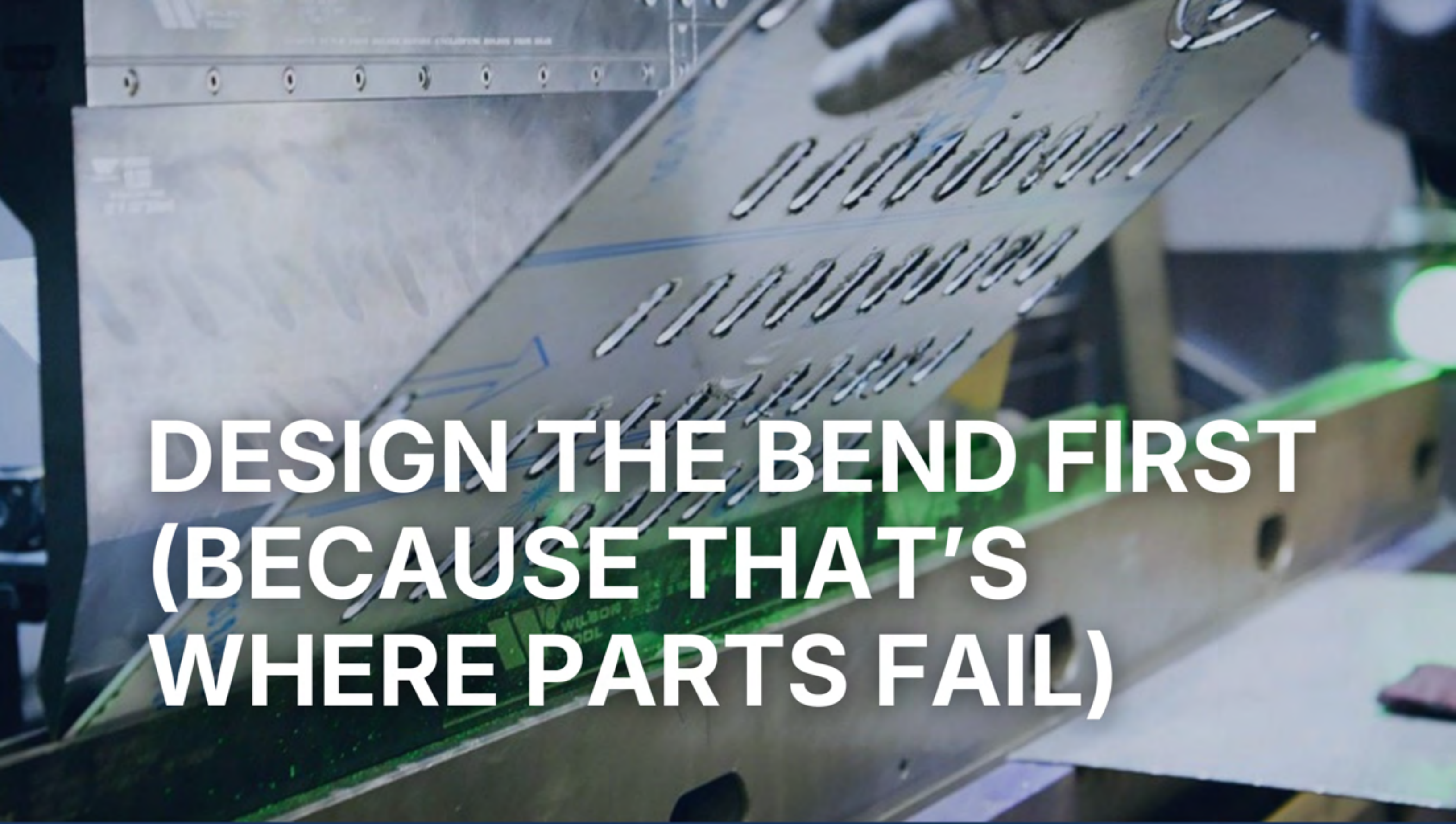
Everything begins—and ends—with the flat pattern

Every successful sheet metal project starts with understanding how the part will be made. The flat pattern is the foundation, and smart designs account for cutting, forming, material behavior, and production flow from the beginning—not after problems appear on the shop floor.

- Sheet metal parts are cut from flat stock, then formed (not machined)
- Complex 3D geometry must translate cleanly into a flat layout
- Certain shapes (deep contours, compound curves) are limited or costly
- Uniform wall thickness is required across the entire part
- Standard sheet sizes and gauges should guide design from day one

DeWys Take: If the flat pattern doesn't make sense, the part won't either.

(616)677-5281



DESIGN THE BEND FIRST (BECAUSE THAT'S WHERE PARTS FAIL)

Bending is where precision, cost, and quality collide.

Most sheet metal problems show up at the bend. Material stretches, springs back, and behaves differently depending on thickness and radius. Designing bends correctly up front improves quality, reduces rework, and keeps production moving efficiently.

- Minimum bend radius ≈ material thickness to prevent cracking
- Bending stretches material—account for it (K-factor, springback)
- Keep bends consistent to reduce tooling changes and cost
- Align bends in the same direction to simplify manufacturing
- Avoid tight bends on thick material—they reduce accuracy and increase scrap

DeWys Take: Don't "fix" bends later—design them right the first time.

TOLERANCES

Forming and bending: +/- 0.020"

Bend to hole or feature: +/- 0.010"

Linear dimensions excluding locations to bends: +/- 0.005"

Diameters with inserts: +0.003" / -0.000"

Angularity: +/- 2°

Surface roughness (blank material): Ra 125 µin maximum

Surface finish should not exceed Ra 100 microinches. Edges are typically smoothed and deburred automatically, so any edges that need to remain sharp must be clearly indicated on the drawing.

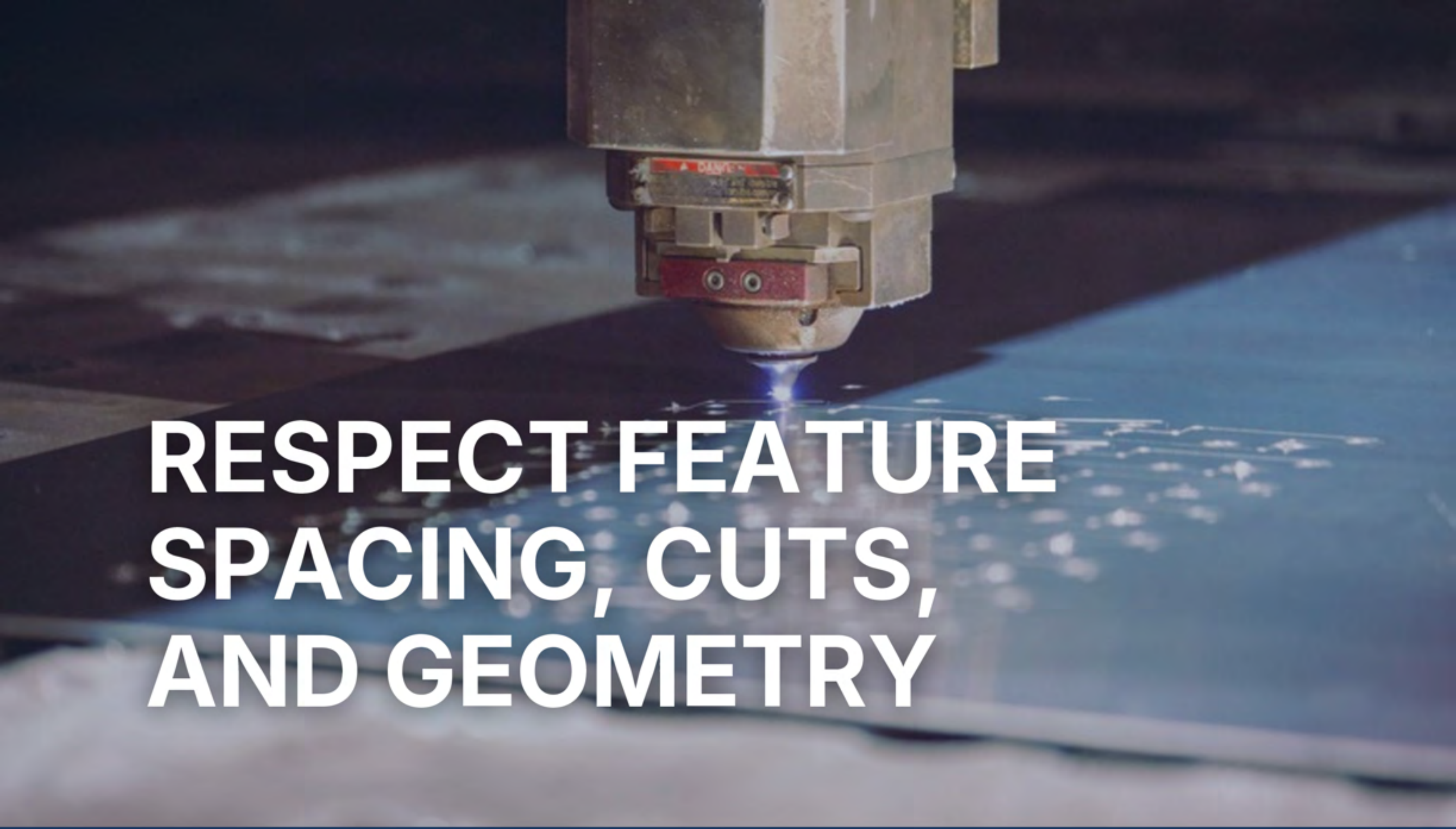
TOLERANCE DIAGRAMS

	Single Surface	
Edge to Edge	+/- 0.005	A
Edge to Hole	+/- 0.005	B
Hole to Hole	+/- 0.005	C
Hole to Diameters	+.003/- 0.000	D
Bend to Edge/Hole	+/- 0.015	E

	Multiple Surfaces	
Hole to Hole/ Edge to Edge	+/- 0.015	F
Overformed Part	+/- 0.015	G
Bend Angle	90˚ +/- 1˚	H

Flat sheet metal components are produced from standard material thicknesses and do not include bends or machined features. These parts can typically achieve tolerances of ±0.005″ (±0.127 mm).

When dimensions span across several bends, tolerances of approximately ±0.030″ (0.762 mm) can be maintained.



RESPECT FEATURE SPACING, CUTS, AND GEOMETRY

Most manufacturability issues come from overcrowded features.

Holes, slots, notches, and edges all affect how a part cuts and forms. Crowded features can distort during bending, weaken the part, or create manufacturing headaches. Giving features the right amount of space improves consistency and durability.

- Maintain distance between holes, edges, and bends to prevent distortion
- Laser/waterjet cutting introduces kerf (material removed during cutting)
- Small or intricate features may not cut cleanly or consistently
- Use fillets and relief cuts to reduce stress and tearing
- Sharp internal corners should be avoided—round them for durability

DeWys Take: Give your features room to breathe—or they'll fight the process.

ENGINEER FOR ASSEMBLY, HARDWARE, AND FINISHING

Fabrication is only step one—assembly is where value shows up.

A fabricated part is rarely the final product. Hardware, welding, finishing, and assembly all need to be considered during design. Parts that are easy to assemble save time, reduce errors, and perform better in the field.

- Plan for inserts, fasteners, welding, and riveting early
- Ensure tool access for installation and assembly operations
- Countersinks are possible; complex machined features may require secondary ops
- Hems, flanges, and tabs can add strength and safety when sized correctly
- Finishes (powder coat, plating) impact tolerances and final fit

DeWys Take: A great part isn't just fabricated—it's easy to assemble and built to last.

CONTROL COST, SPEED, AND SCALABILITY

Every design decision has a price tag.

Design choices directly impact lead time, material usage, setup time, and overall cost. The most efficient parts use standard materials, sensible tolerances, and clean CAD data so they can move smoothly from quote to production.

- Standard materials and gauges reduce cost and lead time
- Simpler bends and fewer setups = faster production
- Overly tight tolerances increase cost without improving function
- Efficient nesting improves material utilization and lowers scrap
- Clean CAD files (DXF for flat, STEP/3D for context) speed quoting and production

DeWys Take: Good design removes friction—from quoting to final assembly.

READY TO START YOUR PROJECT?

Get in touch with our engineering team to discuss your sheet metal design and manufacturing needs.

Phone

616.677.5281

Email

contact@dewysmfg.com

Address

15300 8th Ave, Marne, MI 49435

Web

dewys.com