JOHN MURRAY MACHINERY

www.jmmachinery.co.uk

INTRODUCING METAL FOLDING

In recent years, interest in automated metal folding technology has grown in the metal fabricating industry all over the world. Fabricators have become interested in folding because it is less tool- and labour-intensive than traditional press brake technology, it is therefore the ideal bending method for small and medium batch sizes and improves parts quality dramatically.

Depending on the application, folding machines can co-exist with press brakes, or can even replace them. They are ideal for short-run, Just-In-Time (JIT), or cellular-type bending applications.

Folding technology has reached totally new levels of flexibility and sophistication. While machines may differ in speeds, capacity, and accuracy, they all bend in the same manner:

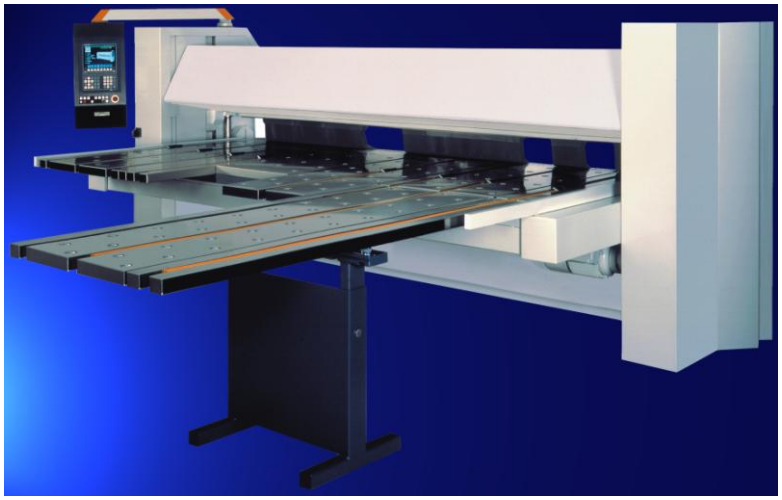
1. The metal is laid upon an integrated sheet support and backgauging system.
2. The metal is clamped between the upper and lower clamping beam.
3. The folding beam sweeps upward to form the desired angle of the bend.

Advantages of Folding Technology include:

1. Material handling is quick and easy because the material is supported by the machine instead of the operator. Multiple operators are usually not needed. This reduces the labour costs dramatically. Simplified material handling improves the cycle time, especially when parts are large.

2. The folding beam moves instead of the operator and the material moving. Therefore even semi-skilled operators are able to create perfect parts after only a few hours of training.

3. Large panels can be run from the rear and small parts from the front side of the machine. This additional flexibility offers perfect material flow without any additional investment.



4. Slippage of the material is eliminated during the bending process. This allows even bending of perforated materials with perfect and repeatable flange dimensions.

5. Tolerances in material thickness do not influence the folding result because the folding beam always references the outside of the material. Folding technology therefore creates perfect bend angles even without an additional angle measuring system.

6. Folding is suitable for sensitive material surfaces such as stainless steel, pre-painted, or coated material. As the relative movement between the tools and the material surface is almost eliminated, folding technology does not create scratches on the material surface.

7. As the folding system gauges the part instead of the part's flanges, any intolerance in the sheet size will be folded into the first bend of each side. All the other flanges and especially the length and width of the part will always show the correct dimensions. This is critical when parts need to be fitted together.

8. Hems can be produced much easier with folding and no special tools are required. After the part is pre-bent to around 140 degrees by the folding beam, the upper beam presses the hem either completely flat, as a teardrop, or as an open hem with a required open dimension – depending on the material thickness and the application.

9. Less tool changing and much less set up time is required making the folding system ideal for short-run applications. Most often a folding machine uses only a single, universal set of tools to bend the complete range of desired applications regardless of the angle, flange dimensions, metal thickness, or metal type.

This tool flexibility reduces the investment in many different tools and storage cabinets, lowers the maintenance costs and because of the reduced set up and changeover costs the folding system starts paying for itself from the first day.

10. Operator health and safety hazards are reduced. Operators are not required to support the weight of the sheet metal, nor are they in contact with the part during clamping and bending cycles. As there is no "whip-up" of the part during bending the folding system is a much safer technology.

Benefits of investment in a Folding Machine

- improved parts quality
- simplified handling
- increased productivity by reducing handling and set-up-times
- increased flexibility
- lower production costs (and after-treatment costs)

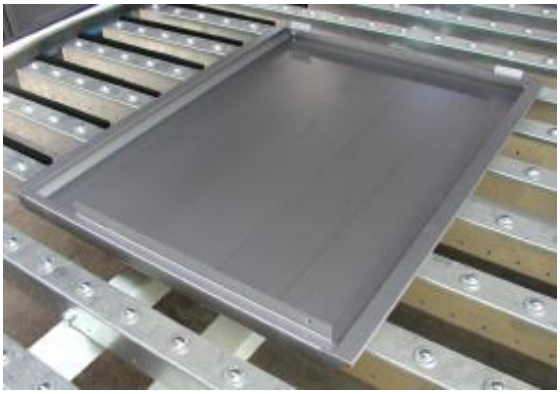
Large Panels

Handling and positioning of panels can be difficult, especially when they are large. However; more critical is whether the punched or laser-cut blank is large and complicated to handle onto the machine, and during forming? On a folder the integrated sheet support and backgauging system holds the weight of the part, so a single operator is able to create finished workpieces with the same quality from early in the morning up until late in the afternoon even on a hot summer day.

Sensitive Material Surface

Folding treats the material surface more gently than press brake bending and provides minimal material surface damage. This is especially useful when sensitive surface material is used, such as stainless steel and pre-painted or coated metals. Using a press brake there is relative movement between the workpiece and the tool when the upper tooling presses the material into the lower V-tooling. As the metal is pressed into the lower V-tooling by the upper tooling, the sheet metal scrapes along the shoulder of the tool. Consequently, the sheet metal surface is subject to scratching.

In a folding system the folding beam rotates upward around its pivot point and rolls with the material. Folding is the natural and smooth way of bending sheet metal. Except for extremely sensitive materials, it is possible to bend parts with virtually no scratches on the surface. Even lacquered and coated sheet metals can be run without using a protective film.



Accuracy

For panel production a folding machine is a must. A press brake measures the flanges so all cutting-tolerances are kept in the middle section of the finished part. This is often the most critical dimension of the finished component when parts must fit Together, and can cause problems in later assembly or welding operations. With folding systems the backgauge system measures the part instead of the flange. All cutting tolerances disappear while bending the first flange on each side, where often a hem provides additional stiffness and is used as a safety edge.

As the folding beam on precision folding systems swings up with 0.1degree accuracy, precise and repeatable parts are guaranteed. In addition the folding beam always references the outside of the material and therefore material thickness tolerances do not influence the angles.

When using a full rail folding beam tool only, there is no need for a crowning system to compensate for the deflection created by the bending forces. The folding beam is designed as a deep, stiff and torsion-free machine component that can resist the bending forces, and in addition the folding beam tool is a little higher in the centre than at the outside. However, if the folding beam is equipped with segmented tools for internal bends and other applications, some folding systems offer an integrated and adjustable crowning system, so that extremely straight bends can be achieved for any material thickness.

Short-run production with less set-up time and real flexibility

Flexible production of small batch sizes or single parts production requires a low set-up time. With folding machines there is typically **no** need for different upper tools when:

- the material thickness changes
- material quality changes
- the bend angle changes.

This does not only affect the investment but more important the daily running costs. Tooling can be segmented for all of the beams.

No more multiple machines and multiple operators

With press brakes the part often cannot be finished in one set-up, but requires multiple handling on multiple machines or multiple set-ups on the same machine. Folding systems allow a multiple station set-up along the working width of the machine. Parts with 30 bends and more and also different bend angles, open or closed hems and bends inside the part can be finished with one set-up. As the part stays on the sheet support and is positioned by the backgauge system, there is no need for the operator to lift the part. Therefore even large parts can be run by a single operator.

Applications

Specific applications for which metal folding could be considered,
if appropriate for each fabricator's individual operation, include:

1. Metal doors/furniture/shelving.
2. Roofing/architectural
3. Control boxes.
4. Electrical enclosures/equipment.
5. Cooling or heating equipment/ovens.
6. Machinery/machine tools.
7. Air Conditioning/refrigeration
8. Lighting equipment.
9. Catering equipment.
10. Medical equipment.
11. Elevators/conveyors.

In general, metal folding can be helpful to users who make complex or large sheet metal parts in short-run operations and, in particular, for panel bending. Fabricators should examine their specific operation to determine the best options for quality and cost-effectiveness.