PPEB
The Ultimate CNC Hydraulic Press Brakes

Meeting the demands of a constantly changing marketplace requires flexibility, reliability and the use of advanced production techniques that ensure end-product quality.

Flexible automation has become a key element in the success of any manufacturer. LVD Strippit PPEB press brakes represent the latest technology in press brake automation, providing industry with the means to respond to an ever-evolving marketplace.

Features such as these help PPEB press brakes lead the way in process automation:

**User-friendly PC-based CNC Control**

- Powerful CADMAN®-CNC PC-based Windows® Control ensures fail-safe operation of the machine while offering the operator considerable assistance in part programming.
- Exclusive CADMAN-B 3D bending software allows automatic programming of the part and precise determination of the blank size.
- Bending sequences are automatically determined from the user-drawn 2D part created with the simple-to-use graphics editor.
All axes of the press brake, including the CNC crowning system, are calculated by the control and are automatically positioned for optimum bending results.

2D & 3D color graphics simulate part creation and display material handling sequencing for optimum part production.

Tool libraries and interactive databases are maintained automatically for application of the precise bend allowance factors and angle correction values, ensuring accurate first time bends with minimal or no trial bending.

Manual Data Input (MDI) method operation simplifies the task of minor changes to existing part programs or the quick production of simple parts.

Fastest and most accurate way to produce parts on a press brake today.

Provided with the basic data needed for the operator to begin successfully using the machine from the very first day.

Complete online Spare Parts Catalog, providing quick, easy reference to detailed drawings, descriptions and part numbers for all PPEB replacement parts.

Rigid Frame Design

Press brakes up to 350 tons are designed and built utilizing a welded one-piece frame, machined without repositioning and stress relieved by vibration, guaranteeing machine precision.

Hydraulic cylinders are machined from a solid steel billet.

Pistons are steel forgings, precision ground and micropolished for years of trouble-free service.

Easy-Form® Laser Measuring System

Patented system (US 6 727 986 B1) allows exact measurement of the angle during the bending process.

Laser sensing mechanism tracks the plate during the bending process and transmits the digital information in real time to the CNC control unit.

CNC unit processes the information and subsequently recalculates the depth adjustment to obtain the correct angle in real time—with no process interruption and no loss of production time.

Programmable Crowning System V-axis

CNC crowning ensures the ram and table are parallel during the bending operation.

Sheet thickness, length, die opening and tensile strength data are entered into the control.

Force and related deflection of the table and ram are automatically determined, preloading is optimally obtained for each bend.

With LVD Strippit PPEB press brakes, you obtain an optimal bending process and excellent bending results— from the first piece.

Microprocessor Technology for Optimum Precision

Servo-controlled using state-of-the-art hydraulics and electronics to ensure perfect control of the bending process.

Double bed referenced encoders are connected to the bed in such a way that deformation of the side frames during bending does not influence the positioning accuracy of the upper beam (Y1,Y2).
Making Bending Easy

With the improvements in recent years in lasers and punch presses, greater demand has been placed on press brakes to produce complex components to a higher degree of accuracy and repeatability. This has increased the emphasis on selecting the right press brake to produce the correct part from the first blank.

The press brake remains a critical machine in the landscape of metal fabrication. The precise ram repeatability and advances in control technology CNC press brakes provide have made "air bending" the desired method of production in the world today.

Criteria for bending

Regardless of the application and use of available technologies, the production of accurate parts with minimum set-up time must meet and maintain five basic bending criteria. See fig 1. These are:

1. Accurate bend angles
2. Accurate bend angle along bend length
3. Accurate flange length
4. Parallelism of flange length
5. Correct position of internal details

1. Bend angle

All materials used in bending are produced within a certain tolerance range. This non-uniformity and varying dimensional tolerance inherent in all materials is of critical concern when bending. Press brake ram repeatability has always been a key element in producing an accurate bend angle, however the focus on maintaining critical angular tolerances in bending today is no longer the repeatability of the press brake. The focus is on the non-uniformity and varying dimensional tolerances inherent in all materials. Material variation will continue to be a concern in achieving both first article results and consistent parts throughout a production run. If it were possible to control the press brake repeatability to ±"0", this still would not solve the problems effected by varying material conditions. See fig 2.
Furthermore, grain direction changes within the part and/or tensile strength variations in the material may also result in loss of bend angle accuracy regardless of ram repeatability accuracy. Changes in grain direction generally result in the creation of different bend radii. This variation in the production of varying bend radii in the same material will result in varying bend angles if the ram position is not adjusted. See fig 3.

2. Factors affecting bend angle over the full length

**Deflection:** The difficulty in maintaining uniform bend angles along the entire length of the bend line is mainly the result of deflection in the machine frame. If the upper and lower beam do not remain parallel during the bending process, the bend angle will differ along the length of the part. See fig 4.

**Tooling:** Tooling is also largely responsible for problems associated with non-uniform angles along a bend line. If the tooling is not precise or is unevenly worn along its length, the result will be a variation in the angle produced.

3. Precise flange dimensions

To produce the correct flange length, the backgauge position must be accurately determined according to bend angle, bend radius, bend allowance, die geometry and material type.

4. Parallel flanges

Valuable time can be wasted setting up the backgauge to assure the production of parallel bends. In some instances, parts may require the bend lines to be non-parallel, in which case additional complexity will be added, and additional time will be spent setting up the backgauge. Other problems may also hamper the quick and accurate production of either condition. These include tool misalignment, tool wear, or a backgauge that is damaged, inaccurate or out of calibration.

5. Unfolded length & correct position of internal detail

Position of internal detail within a part depends primarily on the accurate application of the bend allowance. Bend allowance or K-factor calculations derived from different sources and used to determine blank development may vary. If the formulas used for calculations vary, blank uniformity will also vary.

All the criteria previously mentioned will effect the position of internal part detail and the development of the precise blank.

### DEPTH CORRECTION PER DEGREE

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These features of LVD Strippit press brake technology address the problems of bending and ensure the quality of every end product produced.

1. Bend Angle

**Precision Engineering:** The LVD Strippit PPEB precision hydraulic press brakes are designed by "finite elements analysis." All models are equipped with bed-referenced linear encoders and the latest servo-controlled hydraulic systems to ensure precise control of the upper beam position and repeatability.

**CADMAN® Control/Software:** The LVD Strippit CADMAN®-CNC press brake control assures first time bend angle results by the automatic application of the exclusive CADMAN angle correction database. Previous bending data experience on specific tools and materials are cross-referenced and automatically applied.

**Easy-Form® Laser:** The patented Easy-Form Laser angle control system controls the bend angle in real time without slowing the bending process. See fig 5a & b.

The unique design of the Easy-Form system allows the machine to adapt to variation in material consistency and compensates for any changes in radius as a result of grain direction changes.

First time bend angles and consistent part repeatability are assured.

The Easy-Form Laser system guarantees the desired angle from the first bending operation. The symmetric angle measuring system, located on the front and back side of the press brake table, consists of two laser monitors linked with an expert software database in the CADMAN-CNC control. As the bending sequence of the press brake is initiated, the sensing device transmits the digital information in real time to the CNC control unit, which processes it and subsequently recalculates the correct depth adjustment to obtain the correct angle. The bending process is not interrupted, and no production time is lost.

2. Factors affecting bend angle over full length

**Deflection compensation system, V-Axis:** The LVD Strippit CNC two-piece wedge deflection compensation system corrects the non-parallel condition of the bed/ram relationship created by deflection of the machine during bending. See fig 6a, b & c.
Tooling: LVD Strippit precision-ground tooling, with the patented STONE® radius, assures accurate bend angles along the entire bending length. LVD Strippit STONE tooling is produced with a progressive radius on both sides of the V-opening, allowing the material to flow into the die more evenly and with less drag. This unique design of the V-die reduces the friction between the material and the die encountered when bending, by creating a rolling condition as the material enters the die. See fig 7a & b.

STONE tooling also provides:
- Reduced tool wear
- Tool interchangeability
- Reduced residue on stainless steel
- Improved material control
- Reduced tonnage requirements
- Symmetric bending

Fig. 7a. Normal radius

Fig. 7b. STONE radius

Fig. 6a

Fig. 6b

Fig. 6c
LVD Strippit Solutions

3. Precise flange dimensions

LVD Strippit uses the following method to obtain the correct position of the backgauge (with consideration for the bend allowance).

A piece of material of known data (e.g., .060” mild steel, 4” x 4”) is entered onto a setup page on the control. See fig 8a. After performing a 90-degree bend, the control requests the following information:

- length of leg 1
- length of leg 2
- inside radius

This information is then stored in a database. See fig 8b. Now, when programming parts of the same material and tooling parameters, the database information is automatically used to give precise flange lengths the first time. This is possible because the database contains actual proven values and not theoretical values. LVD has performed tests on various types and thicknesses of material, using different V-dies. This data is provided on all machines together with a tooling library on CD-ROM. The customer can add details of any specific material to this database.
4. Parallel flanges
The LVD Strippit design assures precision alignment of the upper punch and lower V-die, allowing quick set-up and changeover time. Backgauge re-calibration is eliminated. All LVD Strippit backgauges use the latest technology AC drives and encoders to ensure the highest possible accuracy and repeatability.

The LVD Strippit five-axis backgauge offers the ultimate in flexibility in the production of both parallel and non-parallel flanges. The unique three-point gauge fingers allow automatic calculation and setting of both the backgauge and side stop positions for accurate part production at any point along the length of the machine. See fig 9.

5. Unfolded length and correct position of internal detail
LVD Strippit’s CADMAN software automatically applies information from the bend allowance database, making it possible for the user to determine exact positions of internal details and the correct dimensions for the undeveloped blank.

Having proven data from the press brake in advance of blank production means no alterations are necessary to the part throughout its production. Accurate blank development, laser or punch press processing and bending are assured by using proven data provided by the CADMAN software. See fig 10.
Five-axis backgauge X-R-Z1-Z2-X' (standard on PPEB-8)

Whether you require a basic two-axis backgauge or a more complex system to allow multi-bend set-ups and the production of taper bends, LVD Strippit can offer a solution that takes the guess work out of all axis position calculations by using the CADMAN advanced software.

Six-axis backgauge X1R1Z1-X2R2Z2 (PP8250 - PP8251)

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● Standard
○ Optional
Four-axis backgauge on PPEB-EQ (X-R-Z1-Z2)

Two-axis backgauge (X-R) with pneumatic clamping for finger placement on PPEB-5

Standard PPEB backgauge with three gauge positions allows gauging to 39.3" with material support

Standard eight-axis three-point gauging finger PPEB-8

Standard backgauge finger PPEB-5

X' with three-point gauge fingers on PPEB-8

Four-axis modular backgauge X1-R1-X2-R2 (PP8211) on PPEB-H Z1 and Z2 also available (PP8251)
CADMAN®-CNC, the latest LVD Strippit press brake control technology:
- Simple, user-friendly control
- High reliability
- Operation of own user applications
- All operation functions via single operating point
- Easy integration to network
- Complete separation between control unit and MMI
- Ergonomic design

**Specifications:**

**MMI (Man Machine Interface)**
- Windows®
- Located on a pivoting arm
- 12-inch color flat panel display
- Track ball mouse
- Solid push buttons
- Qwerty keyboard
- Motor start, stop, reset and emergency stop

**PC RACK**
- Located in the electrical cabinet
- CD-ROM disk
- Floppy disk
- Hard disk
- USB port
- PC board
- Real-time board for axis control

**REMOTE CONSOLE**
- Located in the working area
- Hand wheel for manual axis movement
- Multi-purpose display with 6 softkeys for remote operations
- Two-hands control
- Foot pedal

CADMAN®-CNC control with remote console (optional bar code reader)
CADMAN software is the ideal solution to prepare offline programs for bending, laser cutting, or punching.

- Parts can be drawn in 2D as well as 3D
- Every surface of the 3D workpiece can be selected as either:
  - a base surface for unfolding
  - to make alterations
- Development has been based on "top down" design methodology:
  - a functional model of the final product is produced first
  - final data, such as material, sheet thickness, connections between the surfaces, are entered
  - the program provides visualization of the solid 3D model
  - the design is developed into a flat blank that forms the basis for the CAM modules
- Can read 2D and 3D DXF files, 3D IGES files and 3D SAT files from external CAD systems
- Can export 2D DXF files of the unfolded part
Features Designed for Productivity

Quick set-up time
- Various tool clamping systems available
- Quick-acting manual or hydraulic clamping
- Vertical removal or standard style tooling
- Self-seating tooling system
- Precision ground tooling
- Positive tool alignment between punch and die
- Programmable tooling
**Increased Productivity & Safety**

**Sheet Support Systems**
- One-man operation
- Prevention of back bending
- Angle repeatability
- Improved part quality
- Ease of material handling

**PP1020 Front gauge with T-slot (not possible with Easy-Form Laser)**

**PP1115 Front sheet supports**

**PP5320 Lazer Safe protection**

**PP8402 T1, T2 CNC sheet supports with CNC vertical adjustment / Standard duty**

**Heavy duty**
APPLICATIONS

Custom-Made Machines

Features
- Increased daylight
- Increased stroke
- Increased throat gap
- Automatic tool changing
- Automated material handling
- Programmable tooling

Tandem Operation
- Synchronized operation of two machines with single CNC control
- Independent operation of each machine with separate control
- Dissimilar tonnage and lengths in tandem
- CNC deflection compensation

Easy-Form 220/35 and PPEB 220/35 in tandem

PPEB 320/30

Special tooling application
PPEB 2000/140

PPEB 1500/100 and PPEB 800/60 in tandem

PPEB 1000/50
### Technical Specifications

#### PPEB

**Specifications subject to change without notice.**

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Specifications subject to change without notice.

Different combinations of stroke and daylight are available in our standard range in increments of 3.9” (100 mm).

Upon request, other specifications are also available.
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