PRESS BRAKES

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 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® Touch 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

- New CADMAN® Touch control provides the fastest and most accurate way to produce parts on a press brake today
- New graphic interface ensures fast art to part times

Rigid Frame Design

- Press brakes up to 400 tons are designed and built utilizing a welded one-piece frame, machined without repositioning, 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

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)

Easy-Form® Laser Measuring System

- Patented system (EP 1 102 032) 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 PPEB and Easy-Form press brakes, you obtain an optimal bending process and excellent bending results —from the first piece.

CADMAN® Touch
Power at your finger tips

LVD's new generation CADMAN® Touch control employs the latest in infrared touch screen technology on a Windows® embedded PC based control unit, combining the power of the CNC control with the speed and simplicity of touch screen programming.

Key features:

Powerful – A multitasking control features on board integration with LVD's CADMAN-B 3D offline software, seamlessly linking the online intelligent bending database with the offline bending software.

Intuitive – A totally new user interface minimizes input to the control.

Fast 'Art to Part' – CADMAN® Touch has been designed to minimise the operators input from drawing to part.

Flexible – 2D and 3D files can be input directly at the machine control, allowing the flexibility to program parts both on and offline.

Easy to use – CADMAN® Touch's intuitive icon driven interface ensures that operators find using CADMAN® Touch easy and productive.

Highly reliable – the infrared touch screen technology used in the CADMAN® Touch control is a robust industrial design, successfully at work in other LVD products.

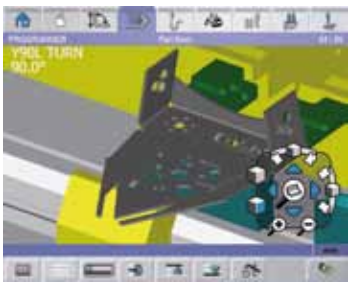
Network compatible – CADMAN® Touch is fully network capable, permitting integration to CADMAN-B 3D offline and workshop networks for programming and backup. This also enables access to LVD's Teleservice remote service system.

Press brakes equipped with the CADMAN® Touch control also feature a jog button on the foot pedal, allowing the operator to 'jog' individual axes of the machine for fine adjustments.

Graphic user interface

Part database

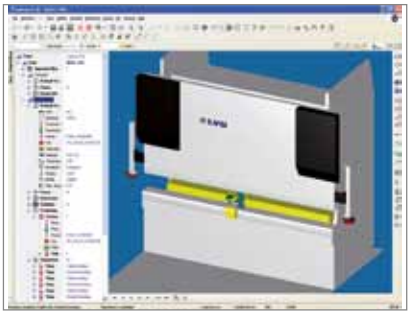
Fast 2D part programming



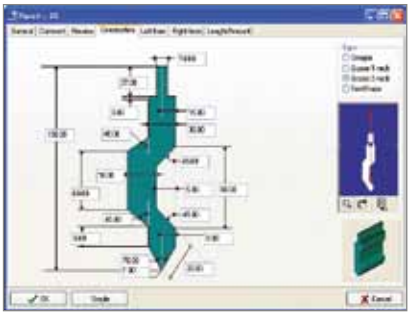
Bending simulation

CADMAN®-B 3D simplifies the programming of formed parts and automatically determines the correct unfolding of the part, the bend sequence, gauging positions and tool selection, all optimized for minimum tool stations and part turns. By utilizing an "intelligent" database shared with the press brake, CADMAN-B 3D ensures that a correct part is achieved from the first part.

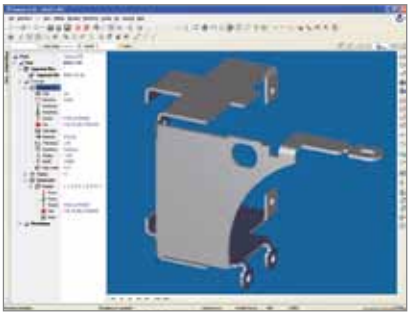
- Automatically calculates the optimum bend sequences using 3D data
- Model matching of imported 2D unfolded parts based on the bending technology
- Automatically calculates the optimum station set-up and provides a complete graphical set-up report for the press brake operator
- Utilizes a true 3D solid model of your press brake and all its options to check interference and collision between the part, tools and machine
- Generates a complete 3D bending simulation, automatically downloaded to your LVD press brake for easy reference during bending production
- Provides automatic definition of inclined, parallel and multi-bends and simplified definition of hemming bends and preliminary bends
- Complete flexibility to manually or semi-automatically sequence, gauge and bend parts



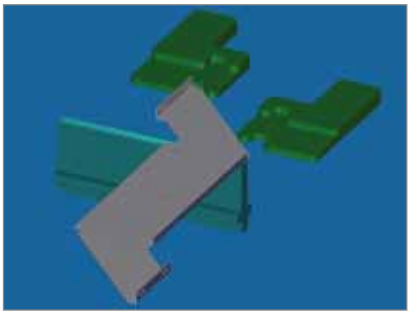
Virtual bending simulation



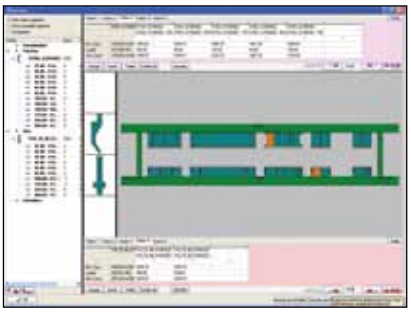
Parametric tooling



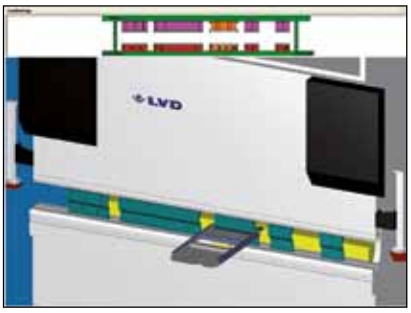
Product tree



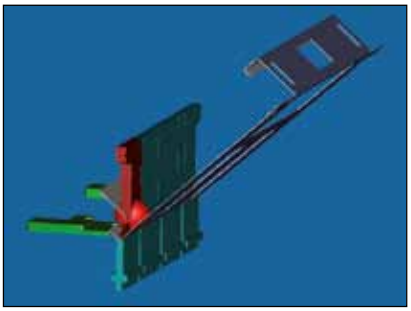
Three point gauge fingers



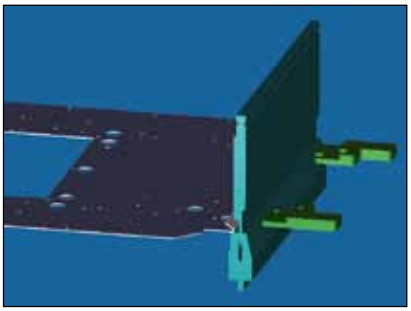
Tool setup



3D view for part & tooling



Automatic collision detection



3D simulation of hemming bends

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. **Constant bend angle over the full bend length**
3. **Accurate flange length**
4. **Parallelism of flange length**
5. **Correct position of internal details**

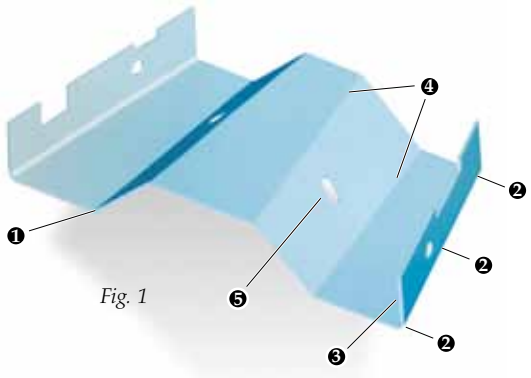


Fig. 1

1. Bend angle

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.

Furthermore, changes in grain direction generally result in the creation of different bend radii. This will result in varying bend angles if the ram position is not adjusted. *See fig 2.*

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.

Tooling: If the tooling is not precise or is unevenly worn along its length, the result will be a variation in the angle produced.

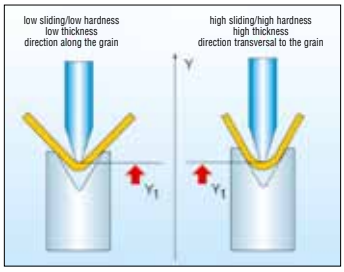


Fig. 2

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.

LVD Solutions

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

1. Bend Angle

Precision Engineering: The LVD 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.

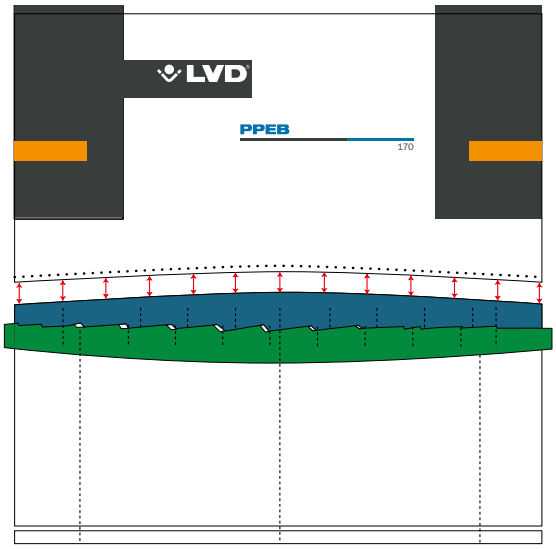


Fig. 3

CADMAN® Control/Software: The LVD CADMAN® Touch 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.

2. Factors affecting bend angle over full length

Deflection compensation system, V-Axis: The LVD 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 3.*

Tooling: LVD precision-ground tooling, with the patented STONE® radius, assures accurate bend angles along the entire bending length. 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 4a & b.*

STONE® tooling also provides:

- Reduced tool wear
- Tool interchangeability
- Reduced residue on stainless steel
- Improved material control
- Reduced tonnage requirements
- Symmetric bending

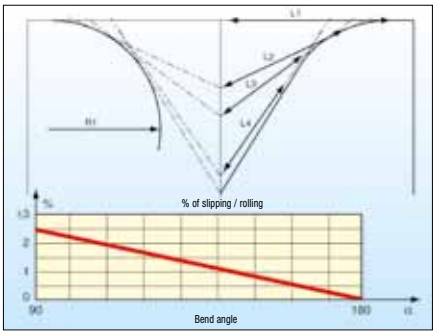


Fig. 4a. Normal radius

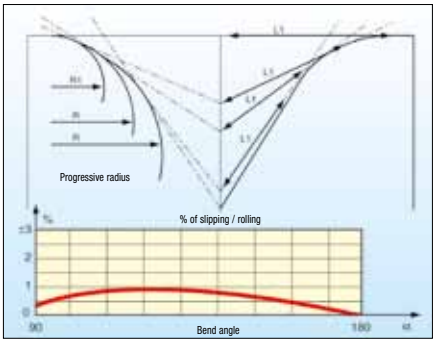


Fig. 4b. STONE radius

3. Precise flange dimensions

Intelligent database: LVD uses this method to obtain the correct position of the backgauge (with consideration for the bend allowance).

A piece of material of known data (*e.g.* 1,2 mm mild steel, 100 x 100 mm) is entered onto a setup page on the control. *See fig 5a.* After performing a 90-degree bend, the control requests the following information: length of leg 1, length of leg 2 and inside radius. This information is then stored in a database. *See fig 5b.*

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 intelligent database which is preloaded on all machines together with a tooling library, can be extended with actual bending results.

4. Parallel and non-parallel flanges

Tool alignment: The LVD design assures precision alignment of the upper punch and lower V-die, allowing quick set-up and changeover time.
The latest technology AC drives and encoders are used to ensure the highest possible accuracy and repeatability.

Backgauge accuracy: LVD backgauge systems offer 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. *See fig 6.*

5. Unfolded length and correct position of internal detail

LVD'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 7.*

Fig. 5a

Fig. 5b

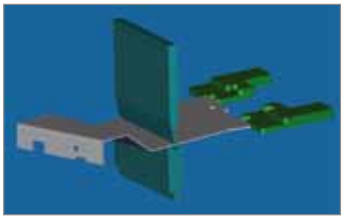


Fig. 6 Three-point gauge fingers

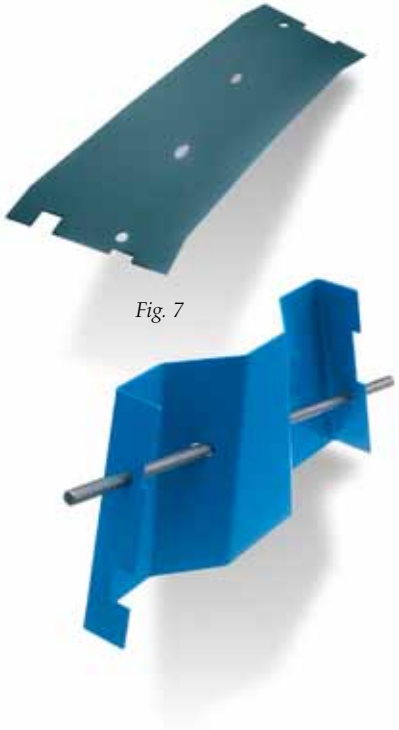


Fig. 7

Easy-Form® Laser

Typical problems:

- **High scrap rates**
- **Small batches**
- **Material variation**
- **Thickness variations**
- **Constant need for angle corrections**

LVD's solution

The patented Easy-Form Laser angle control system controls the bend angle in **real time** without slowing the bending process. *See fig 8a & 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. *See fig 8c.*

Fig. 8a

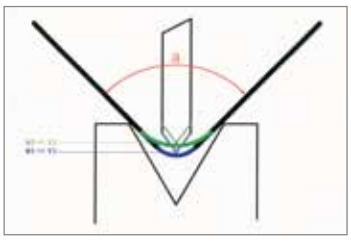
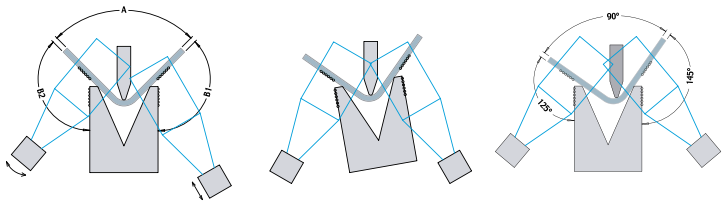


Fig. 8c



Independent of Measuring Device Distance

Independent of Die Orientation

Independent of Off-center Bending Conditions

Fig. 8b

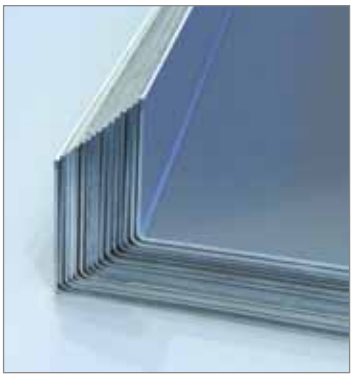
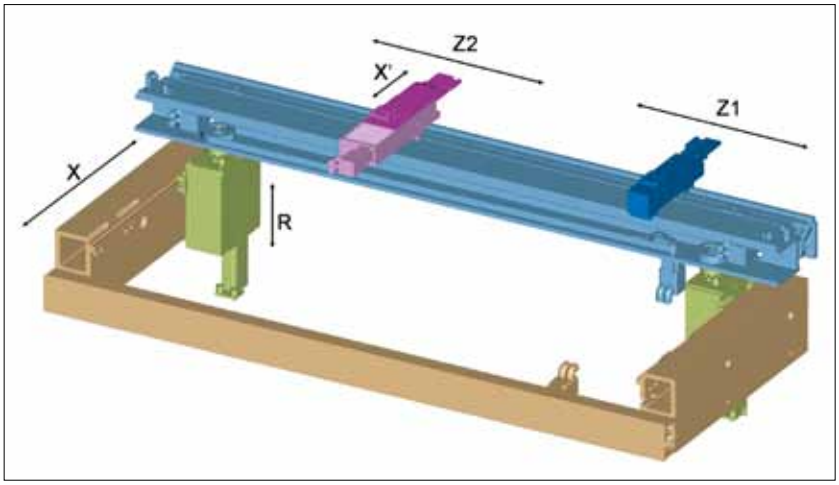


Fig. 8d

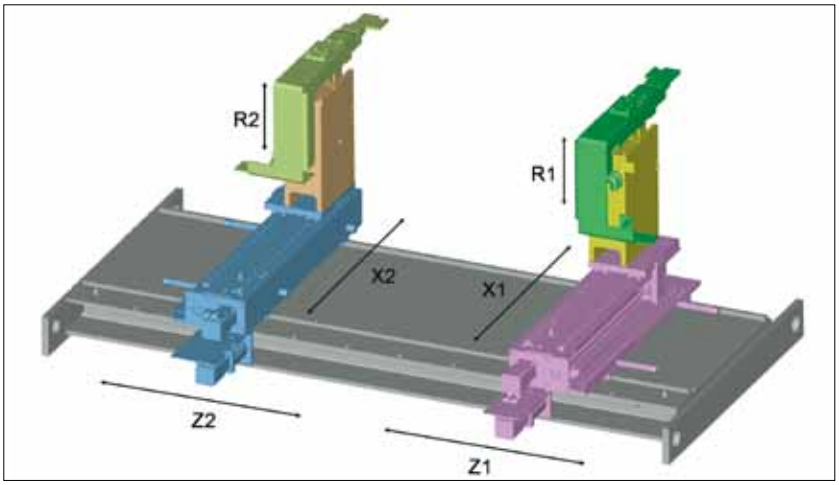
First time bend angles and **consistent part repeatability** are assured. *See fig 8d.*

The Easy-Form Laser system **guarantees the desired angle** from the first bending operation. The angle measuring system, located on the front and back side of the press brake table, consists of two laser monitors linked with an intelligent bending database in the CADMAN® Touch 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**.



Five-axis backgauge X-R-Z1-Z2-X' (standard on PPEB-8 and PPEB-EFL)

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 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

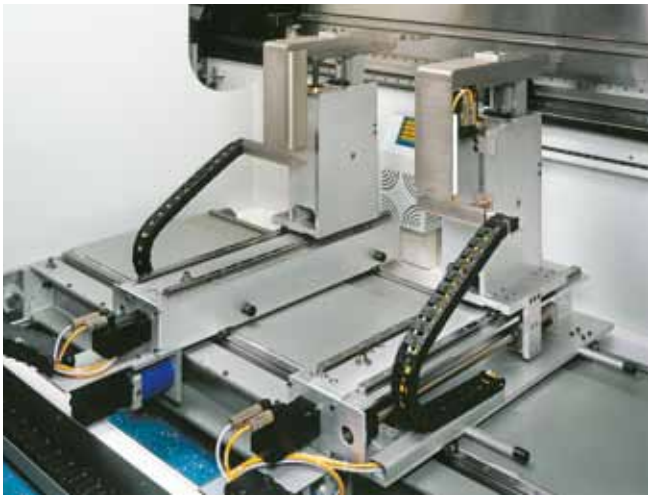
		PPEB-EQ	PPEB-5	PPEB-8	PPEB-EFL	PPEB-H
X-R-Z1-Z2		●				
X-R			●			
X-R-Z1-Z2-X'				●	●	
Modules	X1R1-X2R2					❍
	X1R1Z1-X2R2Z2			❍	❍	❍

● *Standard up to 400 T*

❍ *Optional*

Two-axis backgauge (X-R) with manual Z-axis.
Pneumatic clamping for finger positioning on PPEB-5

Five-axis backgauge X-R-Z1-Z2-X' on PPEB-8 and PPEB-EFL



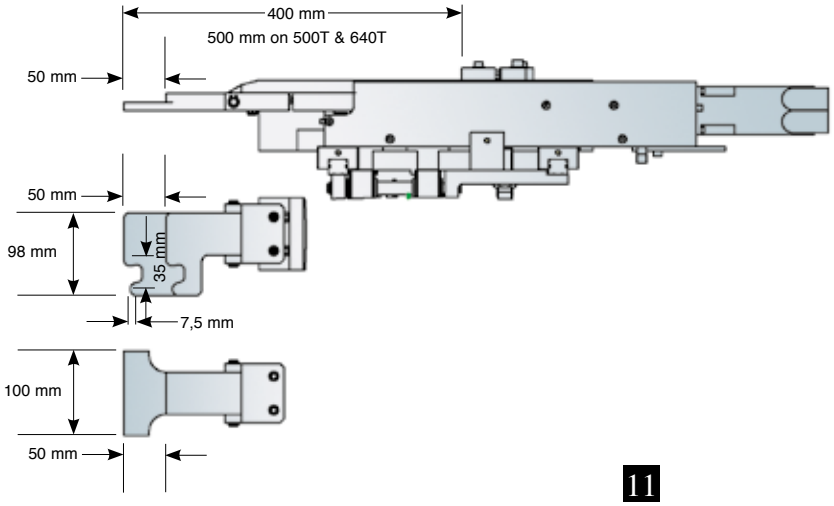
Six-axis modular backgauge X1R1Z1-X2R2Z2 up to 400T
PP8250 - X = 600 mm, PP8251 - X = 1000 mm

Six-axis modular backgauge X1R1Z1-X2R2Z2 for 500T & 640T
X = 1200 mm, R = 300 mm

Standard PPEB backgauge with three gauge positions allows gauging to 1000 mm with material support

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

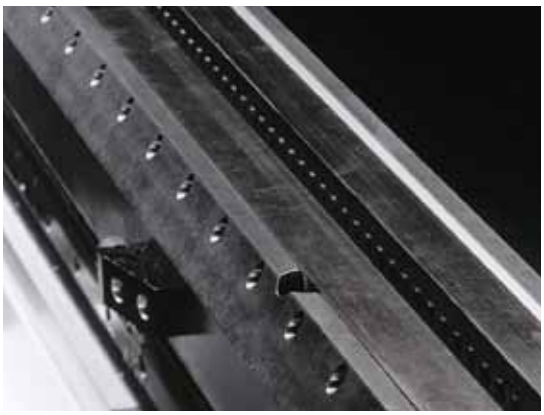
Standard backgauge finger PPEB-5



Features Designed for Productivity

Quick set-up time

- Quick-acting manual or hydraulic clamping
- Vertical removable self-seated tooling
- Precision hardened and ground tooling
- In process angle measurement



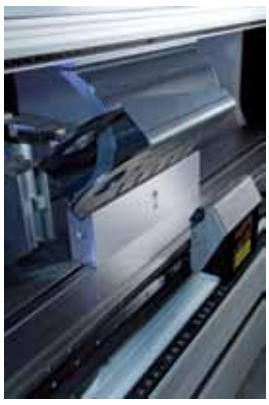
Hydraulic clamping system on table PP3160

Self-seating manual clamping system PP3090

Self-seating hydraulic clamping system PP3100

Easy-Form® Laser 90

Easy-Form® Laser 130

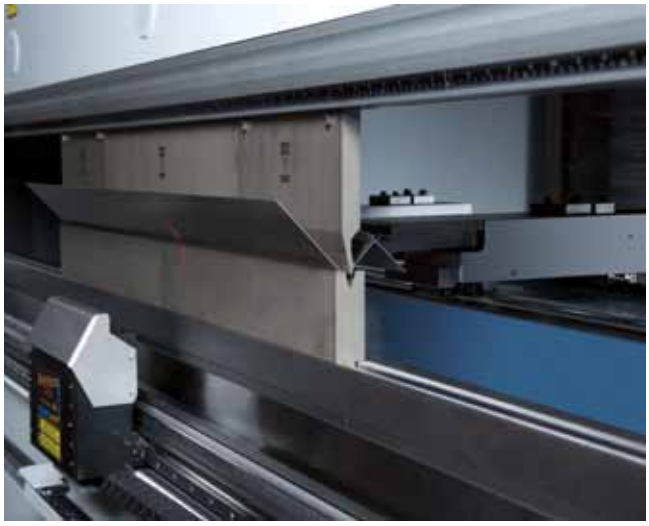


Easy-Form® Laser 200

Safety
& Increased Productivity

- Safe operation
- Programmable tooling
- Front sheet supports
- CNC controlled sheet followers

PP5320 Lazer Safe protection



PP3000 Hemming table in combination with EFL90

PP1115 Front sheet supports

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

PP8402 Heavy duty

Technical Specifications PPEB

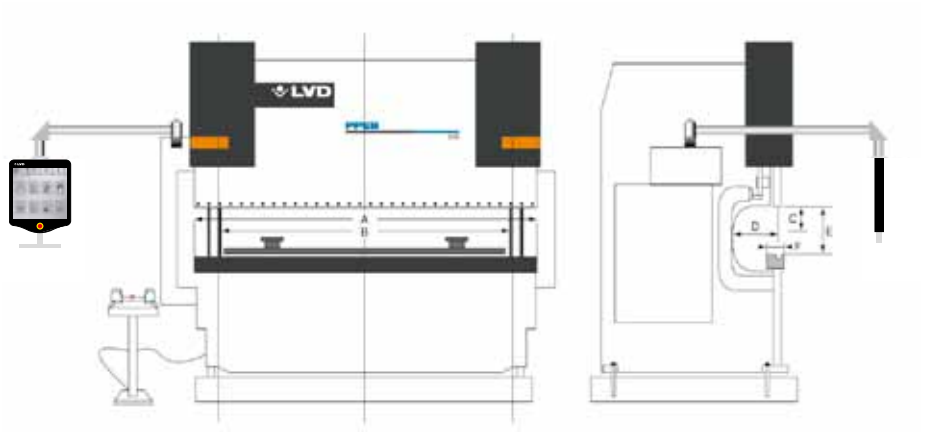
Type			80/15	80/20	80/25	80/30	80/Turbo	110/30	110/40
Pressing force	kN		800	800	800	800	800	1100	1100
Working length	mm	A	1500	2000	2500	3050		3050	4000
Distance between uprights	mm	B	1050	1550	2050	2600		2600	3150
Stroke	mm	C	200	200	200	200		200	200
Distance table/ram	mm	E	400	400	400	400		400	400
Gap	mm	D	400	400	400	400		400	400
Table width	mm	F	120	120	120	120		120	120
Approach speed*	mm/s		130	130	130	130	160	130	130
Working speed**	mm/s		10	10	10	11	22	12	12
Return speed	mm/s		115	115	115	115	200	115	115
Motor	kW		7,5	7,5	7,5	7,5	15	15	15
Oil	l		125	125	125	125		250	250

Type			220/30	220/30Plus	220/40	220/40Plus	220/42	220/42Plus	220/50	220/50Plus	220/61
Pressing force	kN		2200	2200	2200	2200	2200	2200	2200	2200	2200
Working length	mm	A	3050	3050	4000	4000	4270	4270	5000	5000	6100
Distance between uprights	mm	B	2600	2600	3150	3150	3820	3820	4550	4550	5050
Stroke	mm	C	200	300	200	300	200	300	200	300	200
Distance table/ram	mm	E	400	570	400	570	400	570	400	570	400
Gap	mm	D	400	400	400	400	400	400	400	400	400
Table width	mm	F	120	200	120	200	120	200	120	200	120
Approach speed*	mm/s		120	120	120	120	120	120	120	120	120
Working speed**	mm/s		21	21	21	21	21	21	21	21	21
Return speed	mm/s		200	200	200	200	200	200	200	200	200
Motor	kW		37	37	37	37	37	37	37	37	37
Oil	l		350	350	350	350	350	350	350	350	350

* For CE-countries only if the machine is equipped with an optional safety system

** For CE-countries working speed is limited to safety norm

Different combinations of stroke and daylight are available in our standard range by steps of +100 mm.



110/42	110/Turbo	135/30	135/40	135/42	135/Turbo	170/30	170/40	170/42	170/50	170/Turbo
1100	1100	1350	1350	1350	1350	1700	1700	1700	1700	1700
4270		3050	4000	4270		3050	4000	4270	5000	
3820		2600	3150	3820		2600	3150	3820	4550	
200		200	200	200		200	200	200	200	
400		400	400	400		400	400	400	400	
400		400	400	400		400	400	400	400	
120		120	120	120		120	120	120	120	
130	180	130	130	130	180	100	100	100	100	180
12	22	12	12	12	22	12	12	12	12	22
115	200	115	115	115	200	130	130	130	130	200
15	22	15	15	15	22	22	22	22	22	37
250		250	250	250		350	350	350	350	

220/61 Plus	320/30	320/40	320/45	320/61	400/40	400/45	400/61	500/40	500/45	500/61	640/45	640/61	640/81
2200	3200	3200	3200	3200	4000	4000	4000	5000	5000	5000	6400	6400	6400
6100	3050	4000	4500	6100	4080	4590	6120	4080	4590	6120	4590	6120	8160
5050	2600	3150	3820	5050	3150	3820	5050	3150	3760	5050	3760	5050	7050
300	300	300	300	300	300	300	300	300	300	300	300	300	300
570	570	570	570	570	570	570	570	570	570	570	570	570	570
400	400	400	400	400	400	400	400	400	400	400	400	400	400
200	200	200	200	200	200	200	200	200	200	200	200	200	200
120	120	120	120	120	100	100	100	100	100	100	90	90	90
21	14	14	14	14	11	11	11	9	9	9	9	9	9
200	130	130	130	130	120	120	120	80	80	80	100	100	100
37	37	37	37	37	37	37	37	37	37	37	55	55	55
350	400	400	400	400	500	500	500	700	700	700	850	850	850

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

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

PPEB 640T

Special tooling application

PPEB 2000/140

Special tooling

PPEB 1500/100 and PPEB 800/60 in tandem

PPEB 1000/50

TYPICAL HEAVY DUTY APPLICATIONS

Large custom-built press brakes is a niche market for LVD

When it comes to heavy bending applications, LVD has the custom solution for:

- Earth moving equipment
- Yellow goods
- Lighting poles
- Transportation
- Defence / Aerospace / Marine
- Industrial and commercial machinery

Technical Specifications PPEB-H

Type			800/45	800/61	800/80	1000/61	1000/80	1000/100	1000/120
Pressing force	kN		8000	8000	8000	10000	10000	10000	10000
Working length	mm	A	4500	6100	8000	6100	8100	10000	12000
Distance between uprights	mm	B	3760	5050	7050	5050	7050	8050	9050
Stroke	mm	C	600	600	600	600	600	600	600
Distance table/ram	mm	E	870	870	870	870	870	870	870
Gap	mm	D	400	400	400	400	400	400	400
Table width	mm	F	300	300	300	300	300	300	300
Approach speed*	mm/s		100	100	100	80	80	80	80
Working speed**	mm/s		10	10	10	9	9	9	9
Return speed	mm/s		100	100	100	90	90	90	90
Motor	kW		90	90	90	90	90	90	90
Oil	l		1500	1500	1500	1500	1500	1500	1500

Type			1250/61	1250/80	1250/100	1250/120	1600/80	1600/120	2000/140	3000/150
Pressing force	kN		12500	12500	12500	12500	16000	16000	20000	30000
Working length	mm	A	6100	8100	10000	12000	8000	12000	14000	15000
Distance between uprights	mm	B	5050	7050	8050	9050	6550	9050	12470	12000
Stroke	mm	C	600	600	600	600	600	600	900	800
Distance table/ram	mm	E	870	870	870	870	1000	1000	1600	2000
Gap	mm	D	500	500	500	500	600	600	1250	850
Table width	mm	F	300	300	300	300	500	500	800	900
Approach speed*	mm/s		80	80	80	80	60	60	77	70
Working speed**	mm/s		7	7	7	7	7	7	9	6
Return speed	mm/s		85	85	85	85	72	72	85	55
Motor	kW		90	90	90	90	2x55	2x55	2x90	2x90
Oil	l		1500	1500	1500	1500	1800	1800	3000	3500

* For CE-countries only if the machine is equipped with an optional safety system
** For CE-countries working speed is limited to safety norm
Upon request, other specifications are also available

ADDRESSES

HEADQUARTERS

LVD Company nv
Nijverheidslaan 2
B-8560 GULLEGEM
BELGIUM
Tel. + 32 56 43 05 11
Fax + 32 56 43 25 00
e-mail: info@lvd.be

Strippit Inc.
12975 Clarence Center Rd.
USA-AKRON NY 14001
UNITED STATES
Tel. + 1 716 5424511
Fax + 1 716 5425957
e-mail: info@strippit.com

JOINT VENTURES

LVD-HD
Huangshi City,
Hubel Province, China

SUBSIDIARIES *

LVD BeNeLux nv
Gullegem, Belgium

LVD GmbH
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Magal LVD India Pvt. Ltd.
Bangalore, India

P.T. LVD Center
Jakarta, Indonesia

LVD (Malaysia) Sdn. Bhd
Shah Alam, Malaysia

LVD Company Ltd.
Bangkok, Thailand

LVD-Strippit (Shanghai) Co., Ltd.
Shanghai, China

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