

# Press Brake Terminology

**Air bending:** The method of bending is where the material never touches the bottom of the v- die and expected to take its shape from the amount of depth penetration of the punch.

**American punch:** The forming punch where the tang used for mounting the punch into the upper beam of the press brake is in line (centered) with the top of the punch.

**ANSI:** American National Standards Institute (ANSI) “verified standards” is a private standards producing organization. It does not develop standards but it verifies that the requirements for due process, consensus, and other criteria for approval have been met by the standards developer such as, among others, the Association for Manufacturing Technology. OSHA recognizes ANSI verified standards as accepted industry standards.

**Axis of brakes:** Terminology used to describe functions of press brakes related to a numeric position dimension controlled by a computer or programming control.

**Back gauge fingers:** Stop/gauging devices either on back gauge bar or mounted to the machine.

**Back gauge position:** The distance from the front of back gauge fingers or gauging bar to the center of the “V” opening being used in the die.

**Back gauge retraction:** Very useful for some particular bending jobs requiring a retraction of the back gauge bar as soon as the punch pinches the plate. This will prevent damage of the flanges previously bent down against the back gauge heads or fingers, that could require gauging with a different level position (higher or lower) in relation to the surface of the die.

**Beeper:** Sound warning that the back gauge was set on the required next position.

**Bend allowance:** The amount of compensation considered for the stretch of the material at the bending point in order to produce the proper flange dimension.

**Bend angle:** The angle between two successive flanges of the bent part.

**Bending follower for press brakes:** Device to support large plate/panels during bending operation. This unit is synchronized to the angular bending speed.

**Bending tonnage:** The tonnage required to perform a bend.

**Bending under load:** The capability to adjust the ram depth/bend angle while the machine is exerting pressure.

**Coining/bottom bending:** The method of bending where the material is expected to take its shape from the forming punch.

**Crowning device:** Mechanical system that compensates automatically the natural deflection of the beams. It can be a set of shims, punch holder or device mounted on lower beam. It can be controlled either manually or by a DNC.

**Deflection compensation:** What is done to overcome problems of deflection. One way is to insert material (shim stock) under the lower die as appropriate. Another is to use a crowning device.

**Deflection:** The natural tendency of the upper and lower beams to move, upwards in the case of the upper beam and downwards in the case of the lower beam during the bending of material. The less rigid the beams and construction, the greater the deflection.

**Die opening:** The dimension of the opening.

**Distance between housings:** Distance between the side frames (housings) of the machine allowing for free passage of material between frames (housings).

**European punch:** The forming punch where the tang used for mounting the punch into the upper beam of the press brake is offset from the centerline (tip) of the punch. Generally “European” punches are manufactured to higher tolerances than standard American punches. They are usually provided in approximately 20” and 30” working lengths.

**Flange length:** The distance on the material from the gauged side end and the next bend side (from inside or outside) center of the opening of the die to the back stop.

**Flip-up/swing-up fingers:** Stops/gauging devices either on the back gauge bar or mounted to the machine which can swing up to avoid interference from a flange or part moving up during bending. Using a computer control with back gauge retraction at pinch point removes the need for this type stop.

**Four-way die:** Special die in which die openings have been machined into each one of the four sides of the dies. Some four-way dies have the opening machined into the middle of each side, thus only having one opening. Others have multiple openings in each side.

**Front support arm:** A device mounted on the front of the machine for supporting material or front gauging of part being bent.

**Gibb adjustment:** An adjustable device used to control the play in the guiding system of the movable beam.

**Gooseneck punch:** Very useful when performing channels or deep boxes.

**Graphics control:** A type of control for the axes of the machine which shows the operator how the part is to be bent, allows for the viewing of the tooling geometry, and simulation of the bending process.

**Hemming die:** Also called “Dutch tool”. Special combination allowing for the production of bends by performing a sharp bend and then flattening it on the second operation.

**Hi/low change of speed:** The adjustment to set the point at which the cycle transitions from high speed (fast) approach to the low speed (slow/bending) to help control part whip up.

**Hydromechanical Press Brakes:** This type of machine uses a hydraulic system to power mechanical components to provide the power used in the press brake. The design is subject to wear in the mechanical components causing reduction in the accuracy/repeatability of the machine.

**Inside radius:** The radius on the inside of a bent part.

**Knife punch:** Also called sharp or acute angle punch. Has normally a 28 to 45 degree angle edge and it is very useful when sharp bends are required.

**Lower die holder:** A device to hold American tooling with a tang in place.

**Lower die:** The lower tool the punch uses to form bend angles.

**Mechanical stops:** Used in certain types of hydraulic press brakes to assure repeatability in the stopping of the ram. The stopper set inside or outside the cylinder to set the bending depth/stopping position.

**Multiple-opening lower die:** See four-way die.

**Off-center bending:** The bending of parts off the centerline of the brake.

**Open height:** The amount of opening/distance between *bottom* of upper/top beam and *top* of bottom/lower beam without tooling when the stroke length available is at its maximum.

**OSHA:** Occupational Health and Safety Administration (OSHA) “promulgated standards” is a part of the United States Department of Labor whose mission is to encourage employers and employees to reduce workplace hazards and to implement new or improve existing safety and health programs. It is responsible for standard promulgation and enforcement.

**Overall length:** Distance from one end of the brake to the other, left to right as you face the brake from the front.

**Overload protection (discuss tooling, punch holders weak point, side load):** The capability to limit damage by adjusting the tonnage control, or turning off power to engage machine.

**Pinch point retraction:** The moment that the punch pinches the plate causing the back gauge retraction.

**Pit/no pit machines:** Whether or not the machine requires a hole in the floor to mount the lower beam.

**Press brakes in tandem:** Mounting two press brakes of the same length and tonnage side-by-side to bend long parts.

**Punch holder:** The device used to clamp/hold punch in brake. Punch holder can be part of upper beam or intermediate/separate device. When separate, it is very useful to perform deep boxes with

lower punches (less expensive). Some punch holders have a feature to allow for compensating for the natural deflection of the beams if needed.

**Quick clamp punch holder/die holder:** A quick release system used to clamp/hold punch tooling or die tooling. Can be mechanically or hydraulically activated.

**R Axis:** Adjustment of back gauge bar or back stops up and down. Useful when gauging parts with successive bend legs with different heights in relation to the lower die, which could require a different level position (higher or lower).

**R1-R2:** Independent adjustment of each of two stops of back gauge, up and down.

**Repeatability:** The accuracy which a beam will move to the same position repeatedly.

**Safety enhancements:** Machines are provided with certain safety items as standard. Additional features can be purchased to enhance the safety of operators. The choice of these additional safety features and devices should

be governed by operator safety (ANSI, OSHA, other federal, state and local requirements) and the purposes for which your press brake will be used.

**Safety Tang:** The additional device on the tang to help prevent punch from dropping out when clamp is released.

**Segmented/fractioned punch:** A punch which has been cut into smaller pieces, and milled for alignment to allow box forming.

**Servo machine:** A machine with electro-hydraulic balancing of the beam, and control of the stopping of the beam, usually delivered with programmable control.

**Stroke length:** (adjustable on hydraulic machines) – The amount of travel of the moving beam.

**Tang:** The part on the punch or die that fits in the holder usually 1/2" wide x 5/8" tall or deep for American style tooling.

**Throat depth:** The distance of the cut-out in the side frame/machine housing that determines the maximum length of flange that can be bent when bending to overall length of machine.

**Tilting (ram):** Position of the upper beam when it becomes out of parallelism with the bottom beam (bed). Useful to perform some types of cones.

**Tonnage chart:** The chart usually showing material thickness and die opening and corresponding tonnage required per foot to make a bend on mild steel using 60,000 PSI UTS. Please note that many of the steels today, especially A-36, have a higher tensile strength than the 60,000 PSI shown on the chart requiring more tonnage to bend the material (on average 25% – 30% more tonnage).

**Tonnage control:** Capability to regulate the tonnage available for use on the machine, up to its maximum rating.

**Torsion bar:** A device to tie the moving beam to the side frame to assure a parallel beam movement during the bending operation, normally associated with machine having mechanical stops for cylinder (bending depth/bend angle) position.

**Twin vee die:** Special die combining two different V-openings on one side. It always requires a die holder.

**X-axis:** Movement of back gauge in and out – front-to-back – (used to control flange dimension).

**X-X1:** Further, independent movement (offset) of the one stop on back gauge bar in and out.

**X1-X2:** Tilt of back gauge. Angling the back gauge bar out of parallel with relation to the die.