

BEND ALLOWANCE HANDOUT WITH PROBLEM

In sheet metal bends to precise dimensions, allowances must be made for bends. The intersection of the plane surfaces adjacent to a bend is called a mold line and this line, rather than the center of the arc, is used to calculate bend dimensions. The procedure for calculating bends is fairly typical. When two inner plane surfaces of an angle are extended, their line of intersection is called an IML or inside mold line. Similarly, when two outer plane surfaces are extended, they produce the OML or outside mold line. The centerline of bend (CLB) refers to the center of the bend radius. Hence, bend allowance is subtracted for parts measured externally and added for parts measured internally.

The length, or stretchout, of a bend pattern equals the sum of the flat sides (minus the material thickness) of the angle(s) plus the distance around the bend radius (bend allowance) measured along a neutral axis. When metal bends, it compresses on the inside and stretches on the outside. At a certain zone in between, the metal is neither compressed nor stretched. This is called a neutral axis. The neutral axis is usually assumed to be 44% of the thickness from the inside surface of the metal.

$$\text{Offset Thickness} = \text{Thickness of Part} \times .44 \quad (.063 \times .44 = .02772)$$

The developed length of material, or bend allowance (BA), to make the bend is computed from the empirical formula:

$$BA = (.017453 R + .0078 T) N$$

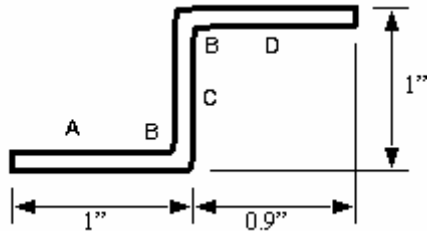
Where:

- R = radius of bend (commonly the same as the thickness),
- T = metal thickness, and
- N = number of degrees of bend.

(Source: "Technical Drawing" or "Engineering Graphics" Pearson Prentice-Hall)

TRY IT!

A sheet metal piece is bent to have the profile below. The steel sheet thickness is 1/16", and the inside bend radii, at B, are both 1/16".



Q.) What is the length of the sheet metal blank before bending the part?

1. Bend Allowance formula for 90° -  $(0.64 \times T) + (1.57 \times R) = B$   
 $(0.64 \times .0625) + (1.57 \times .0625) = .138^*$
2. Overall Length  $A + B^* + C + B^* + D = ?$
3.  $(1.000 - .0625) + B^* + (1.0000 - .1250) + B^* + D = ?$
4.  $.9375 + .138 + .8750 + .138 + .9 = 2.9885$

B	MS – Gage	Inside Radius	Thickness	90 Degrees
	1/16	.0625	0.0625	0.142 (*)

(Source: Table 3. - "Machinery's Handbook" P. 1179, 23<sup>rd</sup> Edition)

NOW CHECK YOUR WORK:

Go to [www.SheetMetalGuy.com](http://www.SheetMetalGuy.com) and check your calculations using their online Calculator!