

**Task:**

A sheet of aluminum of thickness 20 mm is cut with vertical machine that have blade of length 10 cm and width 0.2 cm while cutting the blades each exert a force of 30 N on the sheet . The length of each blade that makes contact with the sheet is approximately 0.5 mm. Calculate the shear stress on the sheet.

**Solution:****SHEET METAL WORK****Operations**

Cutting operations: Piercing Blanking, Punching, Lancing, Parting of, cutting off, Notching, Shaving, Trimming.

Bending operations: Edge bending or wiping, U-bending, v-bending,

Forming operations: embossing, Flanging, Curling

Drawing operations: Drawing, deep drawing.

Spinning, coining

Piercing: It is an operation of making a hole in sheet. E.g. central hole in washer. Punch is of correct size and clearance (+ve) provided on die.

Blanking: It is an operation of cutting a required component from sheet metal. e.g. out side dia. Of washer, Hawai slipper. Die opening is of correct size and (-ve) clearance is provided on the punch.

Lancing: A combination cutting and bending operations. eg : Tortoise coil stand

Parting off: separating a blank from sheet metal by cutting along two lines.

Cutting off: separating a blank from sheet metal by cutting along one line.

Notching: Cutting along edges of the blank.

Shaving: Clearing and squaring of a blank or pierced hole.

Trimming: Correcting the edges a drawn product.

Force required in cutting operation  $F_{sh} = \sigma_{sh} L t$

$L$  = length of cut  $t$  = thickness of sheet ,  $\sigma_{sh}$  = shear stress of sheet.

$$\sigma_{sh} = \frac{F_{sh}}{Lt} = \frac{30 N}{20 mm \cdot L} = \frac{1.5 \frac{N}{mm}}{L}$$

$L$  is not totally clear from your description. Try to draw it. Then  $L$  will become obvious.

**Answer:**

$$\sigma_{sh} = \frac{1.5 \frac{N}{mm}}{L}$$