Height calculations

W_{RDU} = width of (2) xsections $W_{RDU} = 2 \cdot W_L$

W_M : width RDU of model (paper model of design)

H_M : height of model (paper model of design)

H_D : height of design

W_{RDU} : width rdu of design

N_{RDU} : # rdus

$$W_{RDU} = \frac{H_D \cdot W_M}{H_M}$$

$$N_{RDUs} = \frac{\text{length design}}{W_{rdus}}$$

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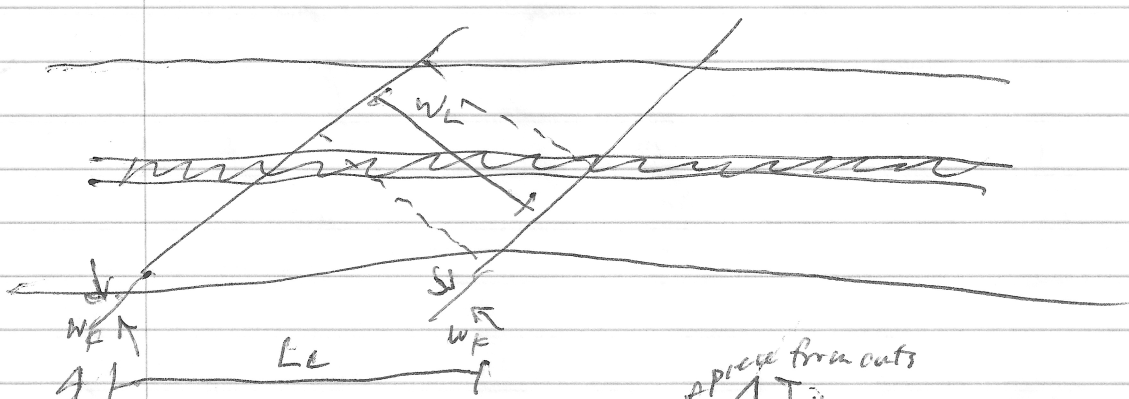
laminate cuts always yield parallelograms



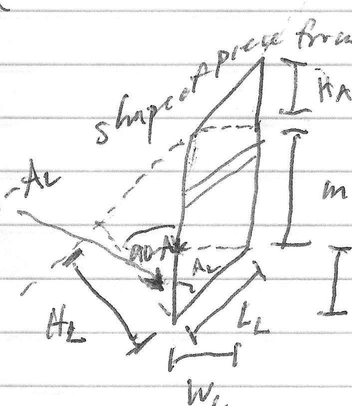
H_A : additional height

H_L : height of original laminate

H_D : height of design

L_L : length xsection

W_L : width xsection



H_A

H_D : we know designed value of this minimum height of design

H_A : $\cos A_L = \frac{H_A}{L_L}$

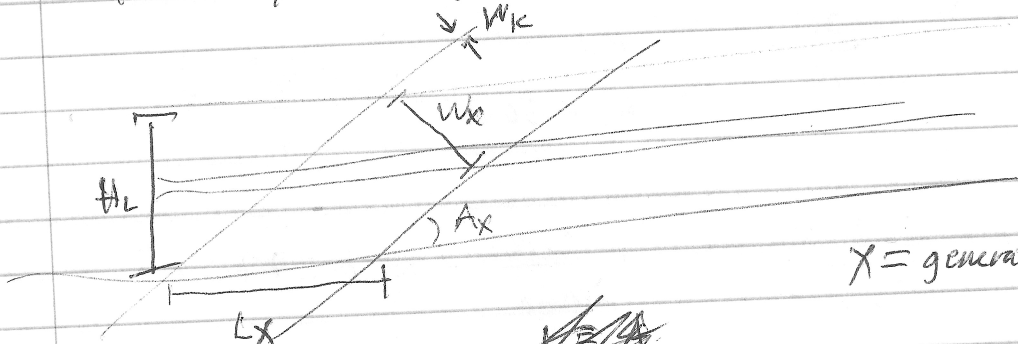
$$H_A = \frac{\cos A_L}{L_L}$$

$$\cancel{\sin A_L = \frac{W_L + W_F}{L_L}}$$

$$\frac{H_L}{H_D + H_A} = \cos(90 - A_L)$$

$$L_L = \frac{W_L + W_F}{\sin A_L}$$

foreach symmetric generation



X = generation #

$$L_X = \frac{W_X + W_K}{\sin A_X}$$

$2 \cdot W_X$ = width rdu

final Length design: L_D

$$2 W_X = \frac{\text{final length design}}{\text{\# rdus}}$$

full length design = $L_X \cdot$ # rdus $\cdot 2$

H_D: we know height of final design

H_L: what we want total $H_{Additional} = \frac{\cos A_X}{L_X}$

start at max generation with final height of design (H_D)

$$\cos(90 - A_X) = \frac{H_L}{H_D + H_{Additional}} = \frac{H_L}{H_D + \frac{\cos A_X}{L_X}}$$

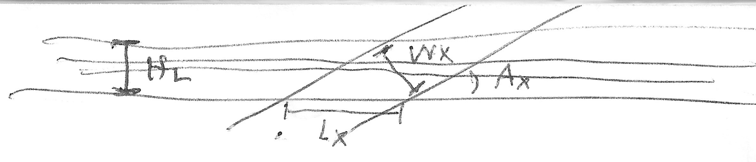
$$\cos(90 - A_X) = \frac{H_L \cdot L_X}{H_D \cdot L + \cos A_X}$$

$$\boxed{H_L = \frac{[\cos(90 - A_X)](H_D \cdot L_X + \cos A_X)}{L_X}}$$

for each previous generation, consider $H_L = H_D$ and then calculate

H_L again & the process continues calculating L_X, W_X & A_X

for previous generation



60° chevron design 20"l x 7"w with 10 rdus

$2 \cdot W_X = \frac{20"}{10}$ ∴ $W_X = 1"$

$A_X = 60°$

$W_K = 1/8" = 0.125$

$H_D = 7"$

$$L_X = \frac{W_X + W_K}{\sin A_X} = \frac{1 + 0.125}{\sin 60} = 1.29904"$$

height original laminate $= H_L = \frac{[\cos(90-60)](7 \cdot 1.29904 + \cos 60)}{1.29904}$

$$H_L = \frac{[\cos(90 - A_X)](H_D \cdot L_X + \cos A_X)}{L_X}$$

$H_L = 6.39551"$ = height of laminate needed

~~rdus~~ # original laminate Xsections $= 10 \cdot 2 = 20$

full length laminate needed

$= L_X \cdot 20 = 1.29904 \cdot 20 = 25.9808"$

l x w of original laminate needed $= 25.9808" \times 6.39551"$

$+ 10\% = 28.57888" \times 7.0351"$

for resulting 20"l x 7"w design