

OFI Weight Balance
8/21/13

x CG of optics table, in	$x_{cgt} := -0.487$
y CG of optics table, in	$y_{cgt} := -0.076$
y-postion of CW1, in	$y_{cw1} := 2.750$
x-postion of CW2, in	$x_{cw2} := 7.56$
Weight of optics table, lbs	$CGT := 35.097$
axial position of blade, in	$S_x := 2.871$

Pair 1

blade 1 balance weight, lbs	$W_1 := 20.33$
blade 2 balance weight, lbs	$W_2 := 20.33$
counterweight #1, lbs	$CW1 := 1.663$
counterweight #2, lbs	$CW2 := 3.9$
x-postion of CW1, in	$x_{cw1} := -7.448$
y-postion of CW2, in	$y_{cw2} := -0.489$

$$CW1 := W_1 + W_2 - CGT - CW2$$

$$CW1 = 1.663$$

$$x_{cw1} := \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{CW1}$$

$$x_{cw1} = -7.451$$

$$CW2 := W_1 + W_2 - CGT - \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{x_{cw1}}$$

$$CW2 = 3.9$$

$$y_{cw2} := -\frac{CW1 \cdot y_{cw1} + CGT \cdot y_{cgt}}{CW2}$$

$$y_{cw2} = -0.489$$

Given

equation 1

$$CW1 = W_1 + W_2 - CGT - CW2$$

equation 2

$$x_{cw1} = \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{CW1}$$

equation 3

$$CW2 = W_1 + W_2 - CGT - \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{x_{cw1}}$$

equation 4

$$y_{cw2} = -\frac{CW1 \cdot y_{cw1} + CGT \cdot y_{cgt}}{CW2}$$

$$\begin{pmatrix} CW1eval \\ x_{cw1eval} \\ CW2eval \\ y_{cw2eval} \end{pmatrix} := \text{Find}(CW1, x_{cw1}, CW2, y_{cw2})$$

$$\begin{pmatrix} CW1eval \\ x_{cw1eval} \\ CW2eval \\ y_{cw2eval} \end{pmatrix} = \begin{pmatrix} 1.663 \\ -7.451 \\ 3.9 \\ -0.489 \end{pmatrix}$$

Actual values

$$\underline{CW1} := 1.75$$

$$\underline{CW2} := W_1 + W_2 - CGT - CW1$$

$$CW2 = 3.813$$

$$\underline{CW2} := 4$$

$$\underline{y_{cw2}} := -\frac{CW1 \cdot y_{cw1} + CGT \cdot y_{cgt}}{CW2}$$

$$y_{cw2} = -0.536$$

$$\underline{x_{cw1}} := \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{CW1}$$

$$x_{cw1} = -7.513$$

Pair 2

blade 1 balance weight, lbs

$$\underline{W_1} := 20.18$$

blade 2 balance weight, lbs

$$\underline{W_2} := 20.22$$

counterweight #1, lbs

$$\underline{CW1} := 1.553$$

counterweight #2, lbs

$$\underline{CW2} := 3.75$$

x-position of CW1, in

$$\underline{x_{cw1}} := -7.175$$

y-position of CW2, in

$$\underline{y_{cw2}} := -0.428$$

$$\underline{CW1} := W_1 + W_2 - CGT - CW2$$

$$CW1 = 1.553$$

$$x_{cw1} := \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{CW1}$$

$$x_{cw1} = -7.175$$

$$CW2 := W_1 + W_2 - CGT - \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{x_{cw1}}$$

$$CW2 = 3.75$$

$$y_{cw2} := -\frac{CW1 \cdot y_{cw1} + CGT \cdot y_{cgt}}{CW2}$$

$$y_{cw2} = -0.428$$

Given

equation 1

$$CW1 = W_1 + W_2 - CGT - CW2$$

equation 2

$$x_{cw1} = \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{CW1}$$

equation 3

$$CW2 = W_1 + W_2 - CGT - \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{x_{cw1}}$$

equation 4

$$y_{cw2} = -\frac{CW1 \cdot y_{cw1} + CGT \cdot y_{cgt}}{CW2}$$

$$\begin{pmatrix} CW1_{eval} \\ x_{cw1}_{eval} \\ CW2_{eval} \\ y_{cw2}_{eval} \end{pmatrix} := \text{Find}(CW1, x_{cw1}, CW2, y_{cw2})$$

$$\begin{pmatrix} \text{CW1eval} \\ x_{\text{cw1eval}} \\ \text{CW2eval} \\ y_{\text{cw2eval}} \end{pmatrix} = \begin{pmatrix} 1.553 \\ -7.175 \\ 3.75 \\ -0.428 \end{pmatrix}$$

Actual values

$$\text{CW1} := 1.5$$

$$\text{CW2} := W_1 + W_2 - \text{CGT} - \text{CW1}$$

$$\text{CW2} = 3.803$$

$$\text{CW2} := 3.75$$

$$y_{\text{cw2}} := -\frac{\text{CW1} \cdot y_{\text{cw1}} + \text{CGT} \cdot y_{\text{cgt}}}{\text{CW2}}$$

$$y_{\text{cw2}} = -0.389$$

$$x_{\text{cw1}} := \frac{-\text{CW2} \cdot x_{\text{cw2}} - \text{CGT} \cdot x_{\text{cgt}} - (W_1 - W_2) \cdot S_x}{\text{CW1}}$$

$$x_{\text{cw1}} = -7.429$$

Pair 3

blade 1 balance weight, lbs

$$W_1 := 20.22$$

blade 2 balance weight, lbs

$$W_2 := 20.26$$

counterweight #1, lbs

$$\text{CW1} := 1.633$$

counterweight #2, lbs

$$\text{CW2} := 3.75$$

x-postion of CW1, in

$$x_{cw1} := -6.824$$

y-postion of CW2, in

$$y_{cw2} := -0.486$$

$$CW1 := W_1 + W_2 - CGT - CW2$$

$$CW1 = 1.633$$

$$x_{cw1} := \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{CW1}$$

$$x_{cw1} = -6.824$$

$$CW2 := W_1 + W_2 - CGT - \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{x_{cw1}}$$

$$CW2 = 3.75$$

$$y_{cw2} := -\frac{CW1 \cdot y_{cw1} + CGT \cdot y_{cgt}}{CW2}$$

$$y_{cw2} = -0.486$$

Given

equation 1

$$CW1 = W_1 + W_2 - CGT - CW2$$

equation 2

$$x_{cw1} = \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{CW1}$$

equation 3

$$CW2 = W_1 + W_2 - CGT - \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{x_{cw1}}$$

equation 4

$$y_{cw2} = -\frac{CW1 \cdot y_{cw1} + CGT \cdot y_{cgt}}{CW2}$$

$$\begin{pmatrix} CW1eval \\ x_{cw1eval} \\ CW2eval \\ y_{cw2eval} \end{pmatrix} := \text{Find}(CW1, x_{cw1}, CW2, y_{cw2})$$

$$\begin{pmatrix} CW1eval \\ x_{cw1eval} \\ CW2eval \\ y_{cw2eval} \end{pmatrix} = \begin{pmatrix} 1.633 \\ -6.824 \\ 3.75 \\ -0.486 \end{pmatrix}$$

Actual values

$$CW1 := 1.5$$

$$CW2 := W_1 + W_2 - CGT - CW1$$

$$CW2 = 3.883$$

$$CW2 := 3.75$$

$$y_{cw2} := -\frac{CW1 \cdot y_{cw1} + CGT \cdot y_{cgt}}{CW2}$$

$$y_{cw2} = -0.389$$

$$x_{cw1} := \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{CW1}$$

$$x_{cw1} = -7.429$$

Pair 4

blade 1 balance weight, lbs	$W_1 := 20.00$
blade 2 balance weight, lbs	$W_2 := 19.82$
counterweight #1, lbs	$CW1 := 1.183$
counterweight #2, lbs	$CW2 := 3.54$
x-postion of CW1, in	$x_{cw1} := -8.606$
y-postion of CW2, in	$y_{cw2} := -0.166$

$$CW1 := W_1 + W_2 - CGT - CW2$$

$$CW1 = 1.183$$

$$x_{cw1} := \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{CW1}$$

$$x_{cw1} = -8.611$$

$$CW2 := W_1 + W_2 - CGT - \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{x_{cw1}}$$

$$CW2 = 3.54$$

$$y_{cw2} := -\frac{CW1 \cdot y_{cw1} + CGT \cdot y_{cgt}}{CW2}$$

$$y_{cw2} = -0.166$$

$$CW1 := 1.664$$

Given

equation 1

$$CW1 = W_1 + W_2 - CGT - CW2$$

equation 2

$$x_{cw1} = \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{CW1}$$

equation 3

$$CW2 = W_1 + W_2 - CGT - \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{x_{cw1}}$$

equation 4

$$y_{cw2} = -\frac{CW1 \cdot y_{cw1} + CGT \cdot y_{cgt}}{CW2}$$

$$\begin{pmatrix} CW1eval \\ x_{cw1eval} \\ CW2eval \\ y_{cw2eval} \end{pmatrix} := \text{Find}(CW1, x_{cw1}, CW2, y_{cw2})$$

$$\begin{pmatrix} CW1eval \\ x_{cw1eval} \\ CW2eval \\ y_{cw2eval} \end{pmatrix} = \begin{pmatrix} 1.326 \\ -6.864 \\ 3.397 \\ -0.289 \end{pmatrix}$$

Actual values

$$CW1 := 1.5$$

$$CW2 := W_1 + W_2 - CGT - CW1$$

$$CW2 = 3.223$$

$$CW2 := 3.5$$

$$y_{cw2} := -\frac{CW1 \cdot y_{cw1} + CGT \cdot y_{cgt}}{CW2}$$

$$y_{cw2} = -0.416$$

$$x_{cw1} := \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{CW1}$$

$$x_{cw1} = -6.59$$

Pair 5

blade 1 balance weight, lbs

$$W_1 := 20.29$$

blade 2 balance weight, lbs

$$W_2 := 20.55$$

counterweight #1, lbs

$$CW1 := 1.888$$

counterweight #2, lbs

$$CW2 := 3.855$$

x-postion of CW1, in

$$x_{cw1} := -5.985$$

y-postion of CW2, in

$$y_{cw2} := -0.655$$

$$CW1 := W_1 + W_2 - CGT - CW2$$

$$CW1 = 1.888$$

$$x_{cw1} := \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{CW1}$$

$$x_{cw1} = -5.988$$

$$CW2 := W_1 + W_2 - CGT - \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{x_{cw1}}$$

$$CW2 = 3.855$$

$$y_{cw2} := -\frac{CW1 \cdot y_{cw1} + CGT \cdot y_{cgt}}{CW2}$$

$$y_{cw2} = -0.655$$

$$\underline{CW1} := 1.664$$

Given

equation 1

$$CW1 = W_1 + W_2 - CGT - CW2$$

equation 2

$$x_{cw1} = \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{CW1}$$

equation 3

$$CW2 = W_1 + W_2 - CGT - \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{x_{cw1}}$$

equation 4

$$y_{cw2} = -\frac{CW1 \cdot y_{cw1} + CGT \cdot y_{cgt}}{CW2}$$

$$\begin{pmatrix} \underline{CW1eval} \\ \underline{x_{cw1eval}} \\ \underline{CW2eval} \\ \underline{y_{cw2eval}} \end{pmatrix} := \text{Find}(CW1, x_{cw1}, CW2, y_{cw2})$$

$$\begin{pmatrix} \underline{CW1eval} \\ \underline{x_{cw1eval}} \\ \underline{CW2eval} \\ \underline{y_{cw2eval}} \end{pmatrix} = \begin{pmatrix} 1.815 \\ -6.532 \\ 3.928 \\ -0.592 \end{pmatrix}$$

=

Actual values

$$\underline{CW1} := 1.75$$

$$\underline{CW2} := W_1 + W_2 - CGT - CW1$$

$$CW2 = 3.993$$

$$\underline{CW2} := 4$$

$$y_{cw2} := -\frac{CW1 \cdot y_{cw1} + CGT \cdot y_{cgt}}{CW2}$$

$$y_{cw2} = -0.536$$

$$x_{cw1} := \frac{-CW2 \cdot x_{cw2} - CGT \cdot x_{cgt} - (W_1 - W_2) \cdot S_x}{CW1}$$

$$x_{cw1} = -7.086$$

S_x

i_x

S_x

S_x