HUDSON HEAD TO TRUNK TRANSFER:

$$W = \frac{\gamma_c}{\left(\frac{\gamma_c}{\gamma_w}-1\right)^3} \frac{H_d^3}{K_d \operatorname{cotg}(\alpha)}$$

$$\frac{w_{head}}{w_{trunk}} = \frac{\frac{\gamma_{c,head}}{\left(\frac{\gamma_{c,head}}{\gamma_w}-1\right)^3} \frac{H_d^3}{K_{d,head} \operatorname{cotg}(\alpha,head)}}{\frac{\gamma_{c,trunk}}{\left(\frac{\gamma_{c,trunk}}{\gamma_w}-1\right)^3} \frac{H_d^3}{K_{d,trunk} \operatorname{cotg}(\alpha,trunk)}} = \frac{\gamma_{c,head}\left(\frac{\gamma_{c,trunk}}{\gamma_w}-1\right)^3}{\gamma_{c,trunk}\left(\frac{\gamma_{c,head}}{\gamma_w}-1\right)^3} \frac{K_{d,trunk}}{K_{d,head}} \frac{\operatorname{cotg}(\alpha_{trunk})}{\operatorname{cotg}(\alpha_{head})}$$

$$f = \frac{\gamma_{c,head}\left(\frac{\gamma_{c,trunk}-\gamma_w}{\gamma_w}\right)^3}{\gamma_{c,trunk}\left(\frac{\gamma_{c,head}-\gamma_w}{\gamma_w}\right)^3} = \frac{\gamma_{c,head}}{\gamma_{c,trunk}} \left(\frac{\gamma_{c,trunk}-\gamma_w}{\gamma_{c,head}-\gamma_w}\right)^3 \qquad \gamma_{c,head} = \gamma_{c,trunk} \Rightarrow f = 1$$

$$\frac{w_{head}}{w_{trunk}} = f \frac{K_{d,trunk}}{K_{d,head}} \frac{\operatorname{cotg}(\alpha_{trunk})}{\operatorname{cotg}(\alpha_{head})}$$

$$\frac{w_{head}}{w_{trunk}} = f\ \frac{K_{d,trunk}}{K_{d,head}}\ \frac{\text{cotg}\,(\alpha_{trunk})}{\text{cotg}\,(\alpha_{head})} \qquad \frac{w_{head}}{w_{trunk}} - f\ \frac{K_{d,trunk}}{K_{d,head}}\ \frac{\text{cotg}(\alpha_{trunk})}{\text{cotg}(\alpha_{head})} = 0$$

$$log_{10}\left(\frac{w_{head}}{w_{trunk}}\right) - log_{10}\left(f\ \frac{K_{d,trunk}}{K_{d,head}}\ \frac{\text{cotg}(\alpha_{trunk})}{\text{cotg}(\alpha_{head})}\right) = 0$$

$$\log_{10}\left(\frac{w_{head}}{w_{trunk}}\right) - log_{10}(f) - log_{10}\left(\frac{K_{d,trunk}}{K_{d,head}}\right) - log_{10}\left(\frac{\text{cotg}(\alpha_{trunk})}{\text{cotg}(\alpha_{head})}\right) = 0$$