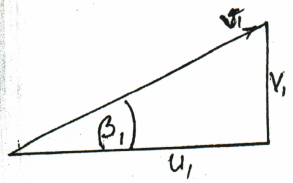
Kecepatan pada sisi masuk dianggap aras radial
$V_1 = V_{r_1}$, sedikit lebih besar dari V_0, misalkan = 185 ft/s



Sudut sudu sisi masuk:

$$\operatorname{tg}\beta_1 = \frac{V_1}{U_1} = \frac{185}{306} = 0{,}605.$$

Harga ini ditambah ± 3 %:

$$1{,}03 \times 0{,}605 = 0{,}624$$

$$\operatorname{tg}\beta_1 = 0{,}624 \rightarrow \beta_1 = \underline{32^\circ}$$

Kecepatan relatif pada sisi masuk

$$v_1 = \sqrt{U_1^2 + V_1^2} = \sqrt{306^2 + 185^2} = 358 \text{ ft/s}.$$

Karena adanya kebocoran luasan impeller ditambah 2,5%

Luas kalkas sisi masuk impeller:

$$A_1 = \frac{1{,}025 \cdot Q_0 \cdot 144}{V_1} = \frac{1{,}025 \cdot 20{,}35 \cdot 144}{185 \cdot 0{,}7854} = \underline{215} \text{ inch}^2$$

Ketebalan sudu: faktor ketebalan sudu = 0,925

$$A_1 = b_1 \cdot \pi D_1 \cdot \epsilon_1$$

$$215 = b_1 \cdot \pi \cdot 19{,}5 \cdot 0{,}925 \rightarrow b_1 = \frac{215}{\pi \cdot 19{,}5 \cdot 0{,}925} = \underline{3{,}8} \text{ inch}$$

UKURAN SISI KELUAR IMPELLER:

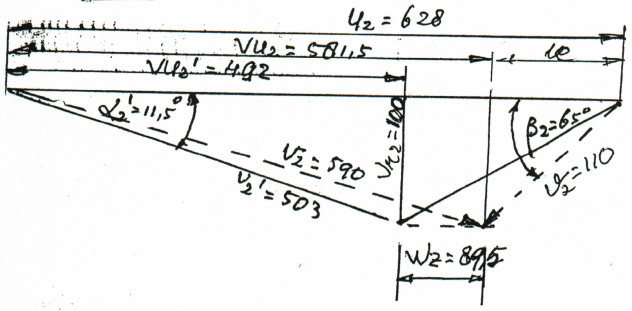
Diameter luar impeller:

$$D_2 = 1300 \frac{\sqrt{H}}{n\sqrt{K'}}$$

K' bertingkat < dari K' satu tingkat diambil = 0,55.

$$= 1300 \frac{\sqrt{6750}}{3600\sqrt{0{,}55}}$$

$$= \underline{40} \text{ inc}$$



Kecepatan tangensial:

$$U_2 = \frac{\pi D_2 n}{12 \cdot 60} = \frac{\pi \cdot 40 \cdot 3600}{12 \cdot 60} = \underline{628} \text{ ft/s}$$

Diambil sudut sudu sisi keluar $\beta_2 = 65°$, jumlah sudu 20, kecepatan keluar arah radial = 100 ft/s.

$$V_{u_2} = U_2 - w$$
$$= U_2 - \frac{V_{r_2}}{\operatorname{tg}\beta_2} \quad \left| \quad \operatorname{tg}\beta_2 = \frac{V_{r_2}}{w}, \quad w = \frac{V_{r_2}}{\operatorname{tg}\beta_2} \right.$$
$$= 628 - \frac{100}{\operatorname{tg} 65°}$$
$$= 628 - \frac{100}{2,145}$$
$$= 581,5 \text{ ft/s}.$$

$$W_2 = \frac{U_2 \cdot \pi \sin\beta_2}{z} = \frac{628 \cdot \pi \cdot \sin 65°}{20} = \frac{628 \cdot \pi \cdot 0,907}{20} = 89,5 \text{ ft/s}$$

$$V_{u_2}' = V_{u_2} - W_2 = 581,5 - 89,5 = 492 \text{ ft/s}.$$

$$V_2 = \sqrt{V_{r_2}^2 + V_{u_2}^2} = \sqrt{100^2 + 581,5^2} = 590 \text{ ft/s}.$$

$$V_2' = \sqrt{V_{r_2}^2 + V_{u_2}'^2} = \sqrt{100^2 + 492^2} = 503 \text{ ft/s}.$$

$$v_2 = \sqrt{V_{r_2}^2 + (U_2 - V_{u_2})^2} = \sqrt{100^2 + (628 - 581,5)^2} = 110 \text{ ft/s}.$$

$$\operatorname{tg}\alpha_2' = \frac{V_{r_2}}{V_{u_2}'} = \frac{100}{492} = 0,2033 \rightarrow \alpha_2' = 11,5°$$

Tinggi tekan virtual (Secara):

$$H_{vir} = \frac{1}{2g}\left(U_2^2 - U_1^2 + V_1^2 - V_2^2\right) = \frac{1}{2g}\left(628^2 - 306^2 + 358^2 - 110^2\right) = 6460 \text{ ft}$$

Kerugian gesekan dll diasumsikan 15 % dlm:

$$H_{vir} = 0,85 \cdot 6460 = 5490 \text{ ft}.$$

$$H_{Nir} = \frac{RT_0}{\frac{k-1}{k}}\left(\varepsilon_p^{\frac{k-1}{k}} - 1\right).$$