higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NASIENRIGLYN

NASIONALE SERTIFIKAAT

MEGANOTEGNIEK N4

23 November 2023

Hierdie nasienriglyn bestaan uit 10 bladsye.

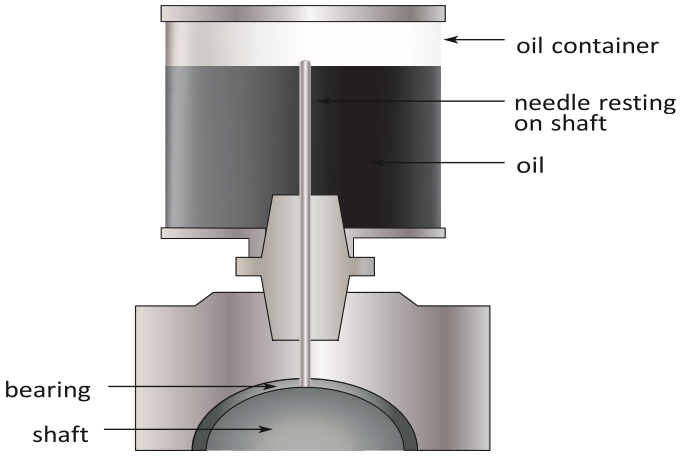
Kopiereg voorbehou

VRAAG 1

1.1
- Daar is 'n matige vraag na die produk.
- Vervaardiging word in 'n paar verskillende bedrywighede verdeel.
- 'n Beperkte hoeveelheid items word op 'n slag vervaardig.
- Die vervaardigingsvolume is laer as in massavervaardiging.
- Daar is 'n mate van standaardisering, want elke item in lotvervaardiging is identies. (5)

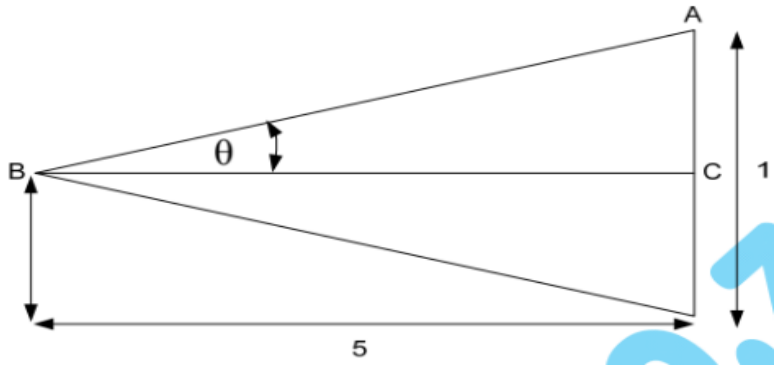
1.2
- Verlaag oormatige spuiting
- Minder oplosmiddel word benodig
- Oorhoofse spuitverfwerk is moontlik
- Lugblase word uitgeskakel, wat eenvormige dekking op ongelyke oppervlakke verseker
- Verfhouer bevat 'n groot hoeveelheid verf (5)

1.3



(2 punte vir korrekte skets en 3 punte vir enige 3 korrekte byskrifte) (5)
[15]

VRAAG 2



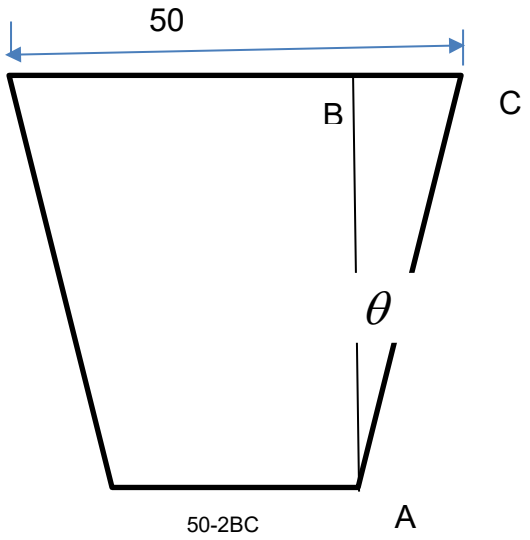
$$\tan\theta = \frac{AC}{BC}$$

$$= \frac{0.5}{5} \checkmark$$

$$\theta = \tan^{-1}(0.1)$$

Ingeslote hoek = $2(5.711^0)$

$$= 11^0 25' \checkmark$$



In driehoek ABC:

$AB = 80$

$$\tan\theta = \frac{BC}{AB}$$

$$BC = AB\tan\theta$$

$$= 80\tan\theta$$

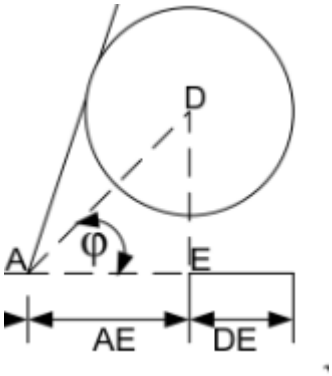
$$= 80\tan 5.711 \checkmark$$

$$= 8mm \checkmark$$

- Klein deursnee $= 50 - 2BC$ ✓

$$= 50 - 2(8)$$
$$= 34mm \quad ✓$$

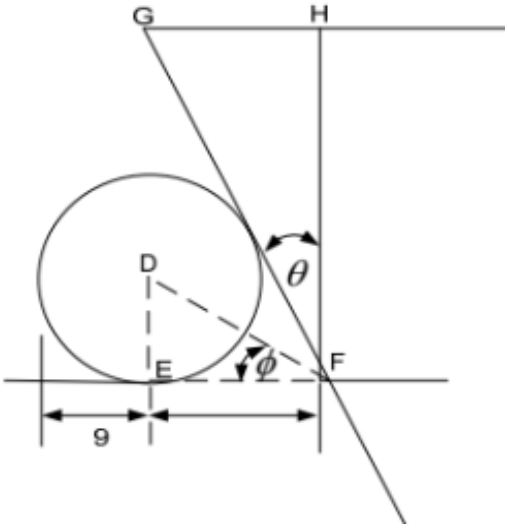
$$X = 34 + 2AE + r$$



In driehoek ADE:

$$\theta = \frac{(90 - 5.711)}{2} ✓$$

$$\theta = 42{,}145^0 ✓$$



$$EF = AE = \frac{9}{\tan 42.15} = 9.944 \checkmark$$

X = 34 + (2 x 9,944) + (2 x 9) ✓
= 71,888 mm ✓

$$HF = 80 - 55$$
$$= 25mm \checkmark$$

$$\tan\theta = \frac{GH}{HF}$$

$$GH = HF \tan\theta$$
$$= 2,5 \tan 5.711$$
$$= 2,5mm \checkmark$$

$$Y = (50 - 2GH) + 2 \times 9 \times 9.944 \checkmark$$

$$= (50 - 2 \times 2.5) + 2 \times 9 \times 9.944$$
$$= 82,89mm \checkmark$$

[15]

VRAAG 3

3.1

Toestand	Rat A	Rat B	Rat C	Rat D	Arm E
Vaste arm E en draai rat A met +1 rev	$+1\surd$	$\frac{+60}{+20}\times\frac{+24}{-16}=-4,5$ $\surd$	$\frac{+60}{+20}=3$ $\surd$	$\frac{+60}{+20}=3$ $\surd$	0
Vermenigvuldig met x en tel y by	$x+y$	$-4,5x+y\surd$	$3x+y$	$3x+y$	$+y\surd$
$N_E=0$ $N_B=120$	$N_A=?$	$N_B=120$			$0\surd$
$N_B=+120$ $N_A=0$	$N_A=0$ $\surd$	$N_B=120$			$N_E=?$

NB: Halfpunt vir elke punt (√) in tabel

$-4,5x+y=120$.....1✓

$y=0$.....2✓

Trek vergelyking 1 van vergelyking 2 af

$-4,5x=120$

$x=-\frac{120}{4,5}$✓

$x=-26,66$

En $y=0$

Maar $N_A=x+y$✓

$N_A=-26,66+y$

$N_A=-26,66+0$

$=-26,66r/m$✓ (8)

3.2

$x+y=0$.....1✓

$-4.5x+y=120$.....2✓

Trek vergelyking 1 van vergelyking 2 af

$5.5x=-120$.....2✓

$x=\frac{-120}{5.5}$

$x=-21.82$✓

$y=+21.82$✓

$N_E=y$✓

$N_E=+21,82r/m$✓ (7)

[15]

VRAAG 4

4.1

$$v = \frac{\pi dN}{60}$$

$$v = \frac{\pi \times 0,4 \times 300}{60}$$

$$v = 6.283 m/s \checkmark$$

$$\frac{T_1}{T_2} = e^{(\frac{0.2\times\pi}{\sin 20^0})}$$

$$T_1 = 6.278 T_2$$

$$\sigma = \frac{T_1}{A}$$

$$T_1 = 7\times10^6 \times 300 \times 10^{-6}$$

$$= 2100N \checkmark$$

Vervang 2 in 1

$$\frac{2100}{T_2} = 6.278$$

$$T_2 = 334.5N \checkmark$$

$$P = (T_1 - T_2)v$$

$$= (2100 - 334.5)6.283$$

$$= 11093W \checkmark$$

Drywing vir drie bande = $3(11093)$

$$P = 33.28kW \checkmark$$ **[5]**

VRAAG 5

5.1

$$Q = C_d \times A \times \sqrt{\frac{2gh}{(m^2 - 1)}}$$

$$A = \frac{\pi D^2}{4}$$

$$= \frac{\pi 0.08^2}{4}$$

$$= 5.026 \times 10^{-3} m^2 \checkmark$$

En

$$m^2 = \frac{D^4}{d^4} \checkmark$$

$$m^2 = \frac{0.08^4}{0.03^4}$$

$$m^2 = 50.57 \checkmark$$

Ook

$$h = 12.6(h_1)$$

$$h = 12.6(0.025)$$

$$h = 0.315m \checkmark$$

$$Q = 0.95 \times 0.00503 \times \sqrt{\frac{2g(0.315)}{(50.57 - 1)}} \checkmark$$

$$= 0.00167 m^3 / s \checkmark$$

$$= 0.00167 \times 3600 \times 1000$$

$$= 6012 l / \text{h} \checkmark$$

(7)

5.2

$$Q_a = \frac{54000}{1000 \times 60 \times 60} = 0.015 m^3 / s \checkmark$$

$$Q_t = A_t \times v_t$$

$$= \frac{\pi d^2}{4} \times \sqrt{2gh} \checkmark$$

$$= \frac{\pi 0.06^2}{4} \times \sqrt{2g4}$$

$$= 0.025 m^3 / s \checkmark$$

$$C_d = \frac{Q_a}{Q_t} \checkmark$$

$$= \frac{0.015}{0.025}$$

$$= 0.6 \checkmark$$

(5)

5.3 $Q_1 = Q_2$ ✓

$v_1 \times A_1 = v_2 \times A_2$ ✓

$$v_2 = \frac{v_1 \times A_1}{A_2}$$

$$v_2 = \frac{20 \times 0.2^2}{0.4^2}$$ ✓

$v_2 = 5m/s$ ✓

Bepaal P_2

$$\frac{P_1}{\rho \times 9.81} + \frac{v_1^2}{2g} + h_1 = \frac{P_2}{\rho \times 9.81} + \frac{v_2^2}{2g} + h_2$$

$$\frac{16000}{1000 \times 9.81} + \frac{20^2}{2(9.81)} + 0 = \frac{P_2}{1000 \times 9.81} + \frac{5^2}{2(9.81)} + 0$$ ✓

$1.631 + 20.387 = 0.000102P_2 + 1.274$ ✓

$22.018 - 1.274 = 0.000102P_2$ ✓

$20.744 = 0.000102P_2$

$P_2 = 203.373kPa$ ✓ (8)

[20]

VRAAG 6

6.1
- Lineêr skommelende las
- Skommelende trappieslas
- Sinusoïdale skommelende las
- Deurlopende skommelende las (4)

6.2 $P = (T_1 - T_2)\,\mathrm{v}$

$140000 = (15T_2 - T_2)\frac{1500}{60}$ ✓

$(15T_2 - T_2) = \frac{140000}{25}$ ✓

$T_2 = 400N$ ✓

En

$T_1 = 15(400)$ ✓

$T_1 = 6000N$ ✓

Dus:

Totale trekkrag op elke laer $= \frac{6000 + 400}{2}$ ✓

$= 3200N$ ✓ (7)

6.3 $$L_{10h} = \left(\frac{1\times10^6}{60\times n}\right)\times\left(\frac{C_r}{P_r}\right)$$ ✓

p = 3 vir koeëllaers✓

$$L_{10h} = \left(\frac{1\times10^6}{60\times1200}\right)\times\left(\frac{48,2\times10^3}{4500}\right)^3$$ ✓

$$L_{10h} = 17068 hours$$ ✓ (4)

[15]

VRAAG 7

7.1 7.1.1

$$v = \frac{\pi Dn}{60}$$ ✓

$$v = \frac{\pi 0.08(400)}{60}$$ ✓

$$v = 1.676 m/s$$ ✓ (3)

7.1.2

$$F_u = \mu \times F$$

$$F_u = 0.04\times30000$$ ✓

$$F_u = 1200N$$ ✓ (2)

7.1.3

$$P_u = F_u \times v$$

$$P_u = 1200\times1.676$$ ✓

$$P_u = 2011.2W$$ ✓ (2)

7.2 7.2.1

$$P = F\times v$$

En

$$v = \frac{0.15}{6}$$ ✓

$$v = 0.025 m/s$$ ✓

$$P = 850\times0.025$$ ✓

$$P = 21.25W$$ ✓ (4)

7.2.2

$$P = F\times v$$

En

$$v = \frac{\pi Dn}{60}$$ ✓

$$v = 3.927 m/s$$ ✓

$$P = 750\times3.927$$ ✓

$$P = 2945.25W$$ ✓ (4)

[15]

TOTAAL: 100

Kopiereg voorbehou