Orientalmotor

Call 1-800-GO-VEXTA(468-3982) or 1-847-871-5931

Print

- given information -

Table shape and dimensions

Table type	= Round Table	
Diameter	D = 6	[in]
Width	A =	[in]
Depth	B =	[in]
Weight	W = .5	[lb]
Thickness	t =	[in]
Material	ρ =	[oz/in ^{3}]

Drive shaft dimension

Shaft diameter	D_2 = .25	[in]
Shaft weight	W_2 = .2	[lb]
Shaft length	L =	[in]
Shaft material	ρ_2 =	[oz/in ^{3}]

Load shape and dimensions

Load type	Rectangular pillar type	
Diameter	D_1 =	[in]
Width	A_1 = 1	[in]
Depth	B_1 = 2	[in]
Distance from the table center to the load center	r = 2	[in]
Number of loads	n = 1	pc

Load weight W_1 = .5 [lb]

Load height h_1 = [in]

Load material ρ_1 = [oz/in ^{3}]

Table support

Friction coefficient between the table and the supporting mechanism μ = 0.05

Distance from the table center to the supporting mechanism l = 2 [in]

System efficiency η = 75 %

Mechanism Condition

Mechanism Condition Horizontal operation

Other requirement(s)

Is it necessary to hold the load even after the power supply is turned off? → NO

Is it necessary to hold the load after the motor is stopped, but not necessary to hold after the power supply is turned off? → NO

Operating conditions

Fixed speed operation

Operating speed V_1 = 1 [r/min]

Acceleration / deceleration time t_1 = 10 [s]

Stopping accuracy

Stopping accuracy ± Δθ = 200 °

± Δl = [in]

Safety factor

Safety factor S·F = 1.5

- calculated result -

Load Inertia

J_t = (1/8) (w × 16) × D^2

= (1/8) (.5 × 16) × 6 ^{2} = 36 [$oz \cdot in^2$]

J_S = (1/8) (W_2 × 16) × D_2^2

= (1/8) × (.2 × 16) × .25 ^{2} = 2.5000e-2 [$oz \cdot in^2$]

J_1 = (1/12) (W_1 × 16) × (A_1^2 + B_1^2 + 12 × r^2) × n

= (1/12) (.5 × 16) × (1 ^{2} + × 2 ^{2} + 12 × 2 ^{2}) × 1 = 35.33 [$oz \cdot in^2$]

J_L = J_t + J_s + J_l

= (36 + 2.5000e-2 + 35.33) = 71.36 [$oz \cdot in^2$]

Required Speed

V_m = V

= 1 = 1 [r/min]

Required Torque

T = (T_a + T_L) (Safety Factor)

= (1.2099e-4 + 0.1333) × 1.5 = 0.2002 [lb·in]

= 3.203 [oz·in]

Acceleration Torque

T_a = (J_L / 386) (V_m / (9.55 × t_1)) (1 / 16)

= (71.36 / 386) × (1 / (9.55 × 10)) × (1 / 16) = 1.2099e-4 [lb·in]

= 1.9358e-3 [oz·in]

Load Torque

W_T = W

= .5 = 0.5000 [lb]

W_1 = w_1 × n

$= .5 \times 1 \qquad = 0.5000$ [lb]

$T_L = (W_T + W_1)\ \mu\ (1 / (\eta \times 0.01))$

$= (0.5000 + 0.5000) \times 0.05 \times 2 \times (1 / (75 \times 0.01)) \qquad = 0.1333$ [lb·in]

$= 2.133$ [oz·in]

Required Stopping Accuracy

$\Delta\theta = \Delta\theta$

$= 200 \qquad = 200$ [deg]

Other requirement(s)

- end of the report -