Oriental motor

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

Print

- given information -

Table shape and dimensions

Table type		= Rectangular Table
Diameter		D = [in]
Width		A = 12 [in]
Depth		B = 2 [in]
Weight		W = [lb]
Thickness		t = 1 [in]
Material	Nylon	ρ = 0.64 [oz/in ^{3}]

Drive shaft dimension

Shaft diameter		D_2 = .25 [in]
Shaft weight		W_2 = [lb]
Shaft length		L = 2 [in]
Shaft material	Stainless-steel 304	ρ_2 = 4.62 [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 = 4 [in]
Number of loads		n = 1 pc

Load weight	W_1 = .2	[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 = 4	[in]
System efficiency	η = 50	%

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?	→ YES

Operating conditions

Fixed speed operation	Operating speed	V_1 =	10	[r/min]
	Acceleration / deceleration time	t_1 =	20	[s]

Stopping accuracy

Stopping accuracy	± Δθ =	50	°
	± Δl =		[in]

Safety factor

Safety factor	S·F =	1.5

- calculated result -

Load Inertia

J_t = (1/12) p A B t (A^2 + B^2)

= (1/12) × 0.64 × 12 × 2 × 1 (12 ^{2} + 2 ^{2}) = 189.4 [oz·in ^{2}]

J_S = (π/32) ρ_2 L D_2^4

= (3.14 / 32) × 4.62 × 2 × .25 ^{4} = 3.5435e-3 [oz·in ^{2}]

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

= (1/12) (.2 × 16) × (1 ^{2} + × 2 ^{2} + 12 × 4 ^{2}) × 1 = 52.53 [oz·in ^{2}]

J_L = J_t + J_s + J_l

= (189.4 + 3.5435e-3 + 52.53) = 242.0 [oz·in ^{2}]

Required Speed

V_m = V

= 10 = 10 [r/min]

Required Torque

T = (T_a + T_L) (Safety Factor)

= (2.0513e-3 + 0.4640) × 1.5 = 0.6991 [lb·in]

= 11.19 [oz·in]

Acceleration Torque

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

= (242.0 / 386) × (10 / (9.55 × 20)) × (1 / 16) = 2.0513e-3 [lb·in]

= 3.2821e-2 [oz·in]

Load Torque

W_T = (1/16) ρ A B t

= (1/16) × 0.64 × 12 × 2 × 1 = 0.9600 [lb]

W_1 = w_1 × n

= .2 × 1 = 0.2000 [lb]

T_L = (W_T + W_1) μ (1 / (η × 0.01))

= (0.9600 + 0.2000) × 0.05 × 4 × (1 / (50 × 0.01)) = 0.4640 [lb·in]

= 7.424 [oz·in]

Required Stopping Accuracy

Δθ = Δθ

= 50 = 50 [deg]

Other requirement(s)

Holding Torque

- end of the report -