CGI Product Selection Chart

Step 1. Determine the Duty Cycle

$$\text{Duty Cycle} = \frac{(t_1 + t_2 + t_3)}{(\text{Cycle Time})} * 100\%$$

$$t_1 + t_2 + t_3 + t_4 = \text{Cycle Time}$$

Step 2. Is the Duty Cycle < 60% and the Cycle Time < 20 minutes?
If Yes, then use the Cyclic Operation steps A through C
If No, then use the Continuous Operation steps D through E

CYCLIC OPERATION
A. Select the desired gearhead ratio
B. Determine the Nominal Torque (T$_{NOM}$)
      T$_{NOM}$ = T$_{MEAN}$ x S$_f$
      T$_{MEAN}$ = Average Torque = Root Mean Cube of
           application torques. (see Formula no. 1)
      S$_f$ = Speed Factor (see Table no. 1)
C. Determine the Max Acceleration Torque (T$_{MAX}$)
   If the application T$_{MAX}$ is unknown, then use this formula
   to approximate:
      T$_{MAX}$ = T$_{MOTOR}$ x Ratio x C$_f$ x Gearhead Efficiency
      T$_{MOTOR}$ = Motor Peak Torque
      Ratio = Reduction Ratio (from catalog)
      C$_f$ = Cycle Factor (see Table no. 2)
      Gearhead Efficiency (from catalog)

CONTINUOUS OPERATION
D. Select the desired gearhead ratio
E. Determine the Nominal Torque (T$_{NOM}$)
      T$_{NOM}$ = T$_{MEAN}$ x S$_f$ x C$_f$
      T$_{MEAN}$ = Average Torque = Root Mean Cube of
           application torques. (see Formula no. 1)
      S$_f$ = Speed Factor (see Table no. 1)
      C$_f$ = Cycle Factor (see Table no. 2)

Step 3. Determine E-STOP load requirements
(torque and inertia reflected on gearhead in case of emergency stop)

Step 4. Evaluate speed requirement and determine if appropriate gearhead ratio has been selected

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Step 5. Evaluate Radial and Axial load requirements and compare to catalog ratings

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Step 6. Compare the above outputs
(T$_{NOM}$, T$_{MAX}$ & T$_{E-STOP}$) to the gearhead specifications and ratings to select a gearhead. If needed, choose the next size or configuration that meets your specifications

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FORMULA 1

$$T_{MEAN} = \sqrt[3]{\frac{(n1*t1*T1^3) + (n2*t2*T2^3) + (n3*t3*T3^3) + (n4*t4*T4^3)}{(n1*t1) + (n2*t2) + (n3*t3) + (n4*t4)}}$$

FORMULA 2

$$RPM_{MEAN} = \frac{(n1*t1) + (n2*t2) + (n3*t3)}{t1 + t2 + t3}$$
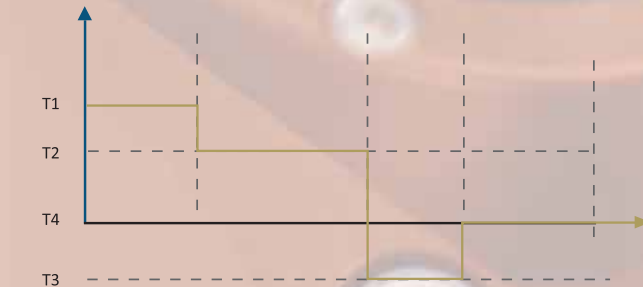
SPEED PROFILE

TORQUE PROFILE

TABLE NO. 1

S$_f$ =	Input RPM (Mean) (Refer to Formula 2)
1.00	0 to 1000
1.15	1000 to 3000
1.30	3000 to 5000
1.50	> 5000

TABLE NO. 2

C$_f$ =	Cycles per Hour
1.00	0 to 1000
1.3	1000 to 2000
1.6	2000 to 3000
1.8	3000 to 5000
2.0	> 5000
2.0	Continuous

DEFINITIONS
T$_{NOM}$ = Nominal Torque
T$_{MEAN}$ = Average (RMC) Torque
T$_{MAX}$ = Maximum Acceleration Torque
T$_{E-STOP}$ = Emergency Stop Torque
C$_f$ = Cycle Factor
S$_f$ = Speed Factor
T$_{MOTOR}$ = Motor Peak Torque

t1 = Acceleration Time
t2 = Run Time
t3 = Deceleration Time
t4 = Dwell / Pause Time

n1 = Average Speed During t1
n2 = Speed During t2
n3 = Average Speed During t3
n4 = Dwell Speed During t4

T1 = Torque During t1
T2 = Torque During t2
T3 = Torque During t3
T4 = Torque During t4