APEX DYNAMICS

High Torque

Optimized Output Torque & Inertia Moment

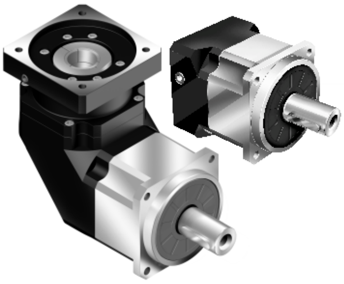
High Precision

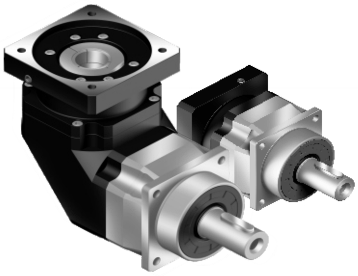
Long Service Life

Low Noise

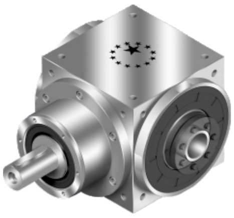
High Precision Reducer

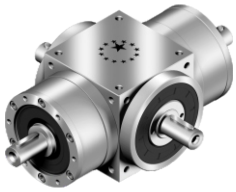

AE Series


AB Series

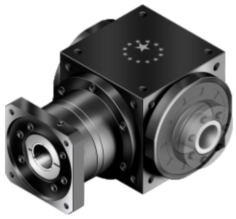

AF Series

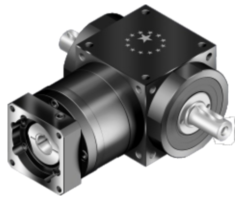

AFH Series


AT-C

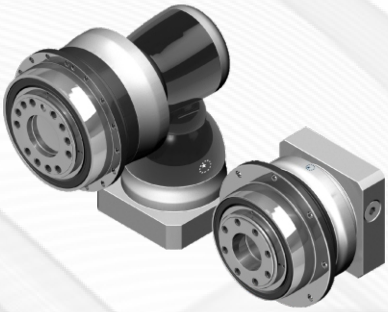

AT-4M


ATB-FH


ATB-FC


ATB-FL

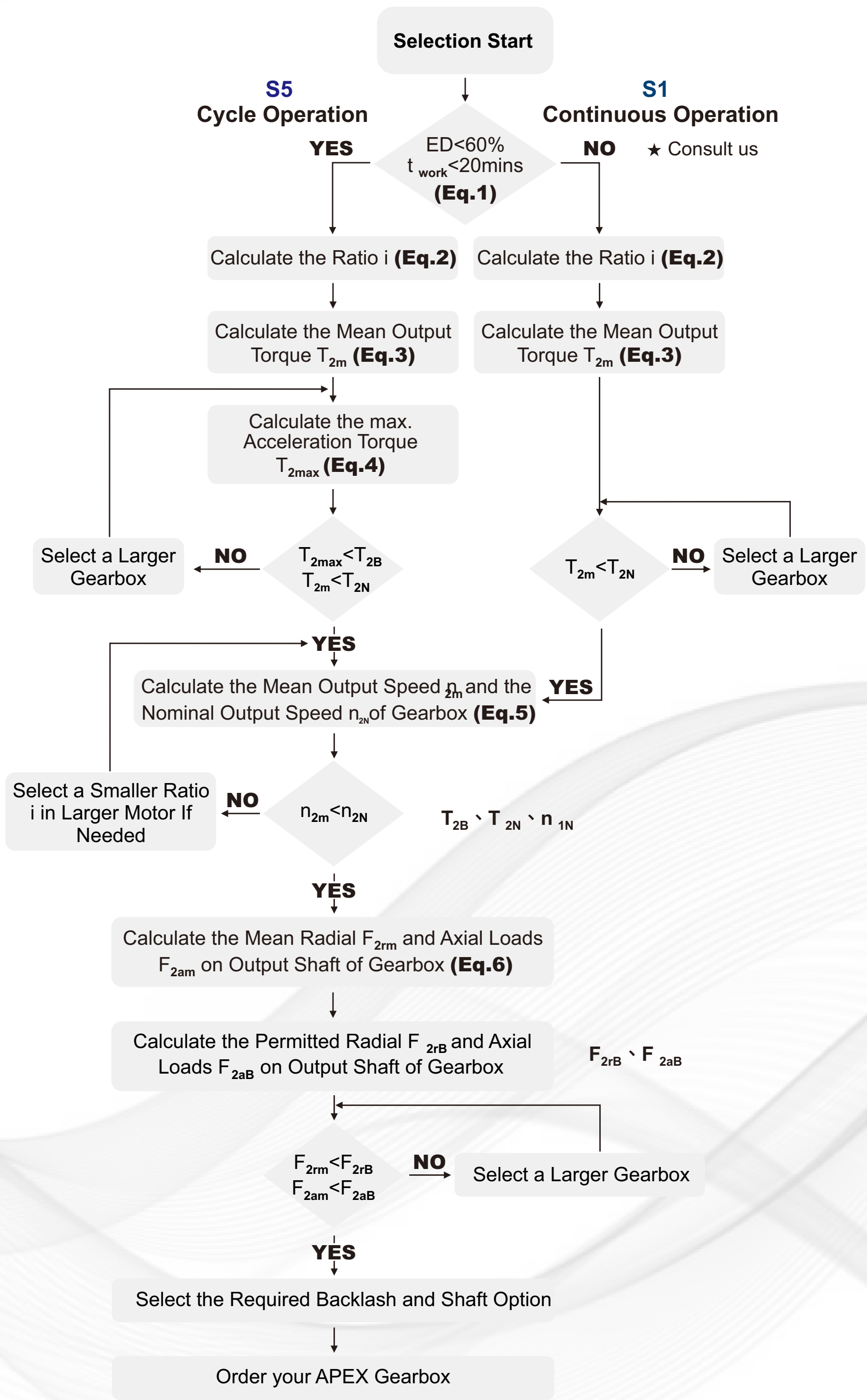

AD Series


AH Series


AP Series


K Series

selection of the optimum gearbox



Recommended (for S5 Cycle Operation)

The general design is given for

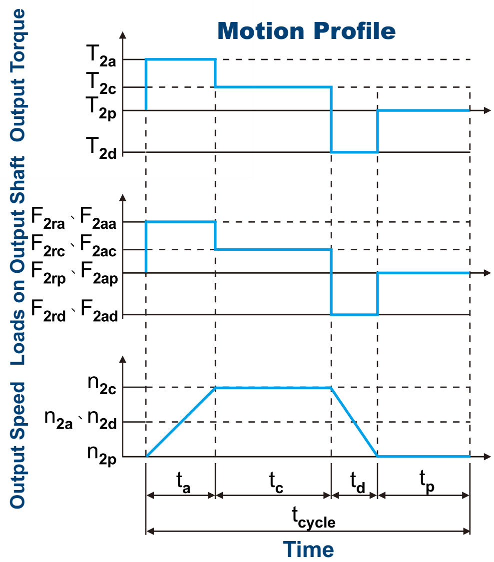
$\frac{J_L}{i^2} \le 4 \times J_m$

The optimal design is given for

$\frac{J_L}{i^2} \cong J_m$

J_L Load Inertia

J_m Motor Inertia



1. $ED = \frac{t_a + t_c + t_d}{t_{cycle}} \times 100\%,\ t_{work} = t_a + t_c + t_d$

Index : a. Acceleration, c. Constant,

d. Deceleration, p. Pause **(Eq.1)**

2. $i \cong \frac{n_m}{n_{work}}$

n_m Output Speed of the Motor

n_{work} Working Speed **(Eq.2)**

3. $$T_{2m} = \sqrt[3]{\frac{n_{2a} \times t_a \times T_{2a}^3 + n_{2c} \times t_c \times T_{2c}^3 + n_{2d} \times t_d \times T_{2d}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

(Eq.3)

4. $T_{2max} = T_{mB} \times i \times k_s \times \eta$

where K_s is

K_s	No. of Cycles / hr
1.0	0 ~ 1,000
1.1	1,000 ~ 1,500
1.3	1,500 ~ 2,000
1.6	2,000 ~ 3,000
1.8	3,000 ~ 5,000

T_{mB} Max. Output Torque of the Motor

η Efficiency of the Gearbox **(Eq.4)**

5. $n_{2a} = n_{2d} = \frac{1}{2} \times n_{2c}$

$$n_{2m} = \frac{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}{t_a + t_c + t_d}$$

$n_{2N} = \frac{n_{1N}}{i}$ **(Eq.5)**

6. $$F_{2rm} = \sqrt[3]{\frac{n_{2a} \times t_a \times F_{2ra}^3 + n_{2c} \times t_c \times F_{2rc}^3 + n_{2d} \times t_d \times F_{2rd}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

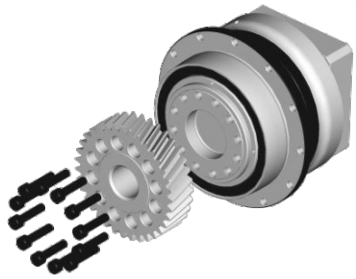
$$F_{2am} = \sqrt[3]{\frac{n_{2a} \times t_a \times F_{2aa}^3 + n_{2c} \times t_c \times F_{2ac}^3 + n_{2d} \times t_d \times F_{2ad}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

(Eq.6)

Rack & Pinion

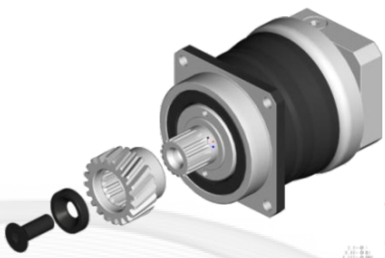
A : Curvic Plate

B : Welded Plate

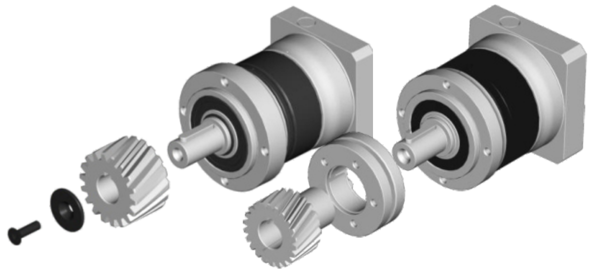


C : Teeth Plate

Plate with Flange



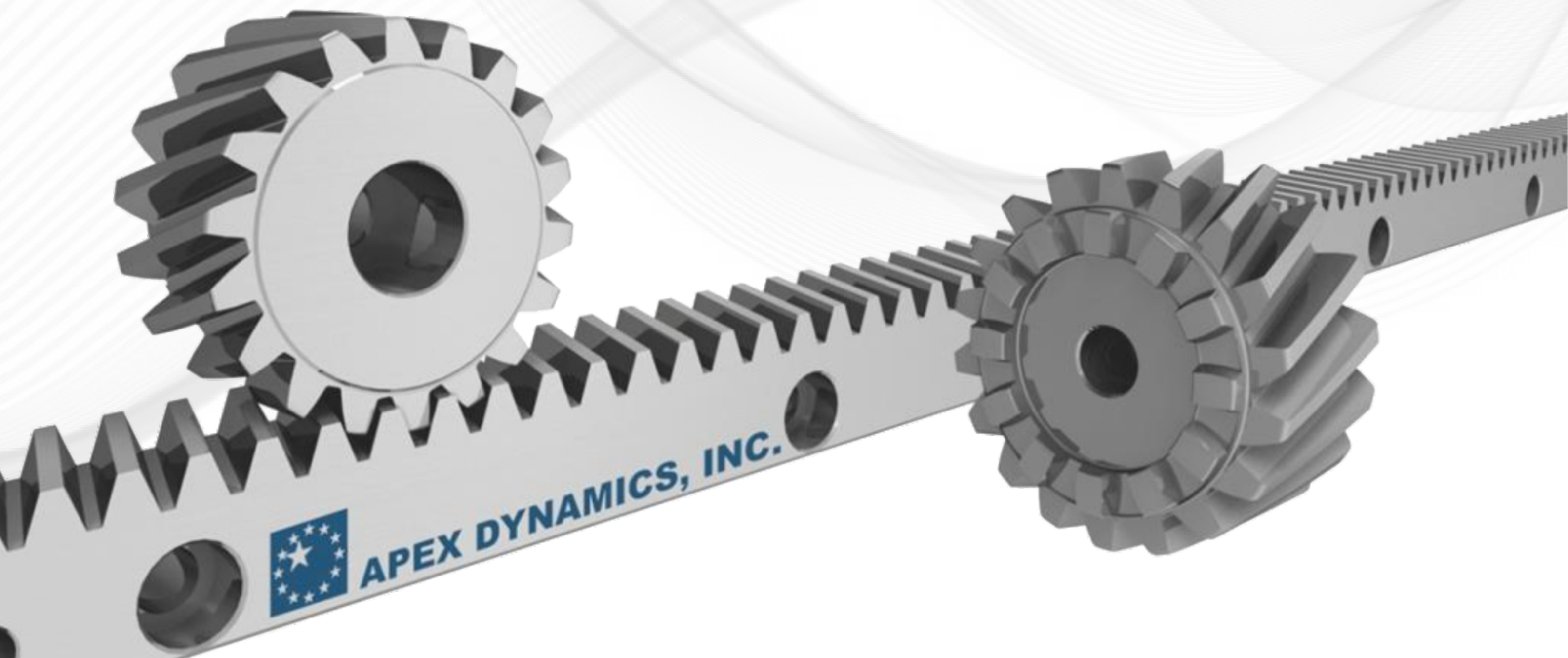
D : DIN 5480



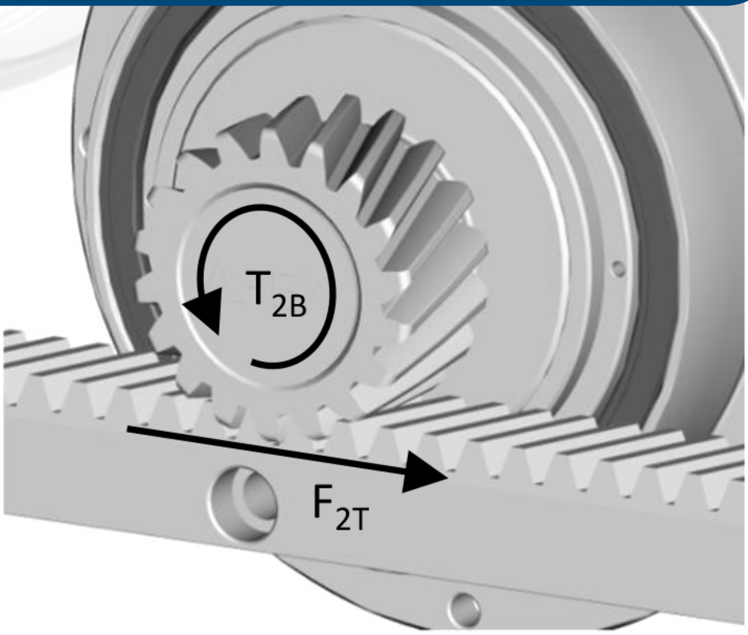
E : Keyway w/o Shrink - Disc
F : Keyway w. or w/o Shrink - Disc

G : Long Shaft w. Keyway

H : Long Shaft without Keyway



Rack Calculation & Selection



$F_{2T} = 2 \times T_{2B} / d$

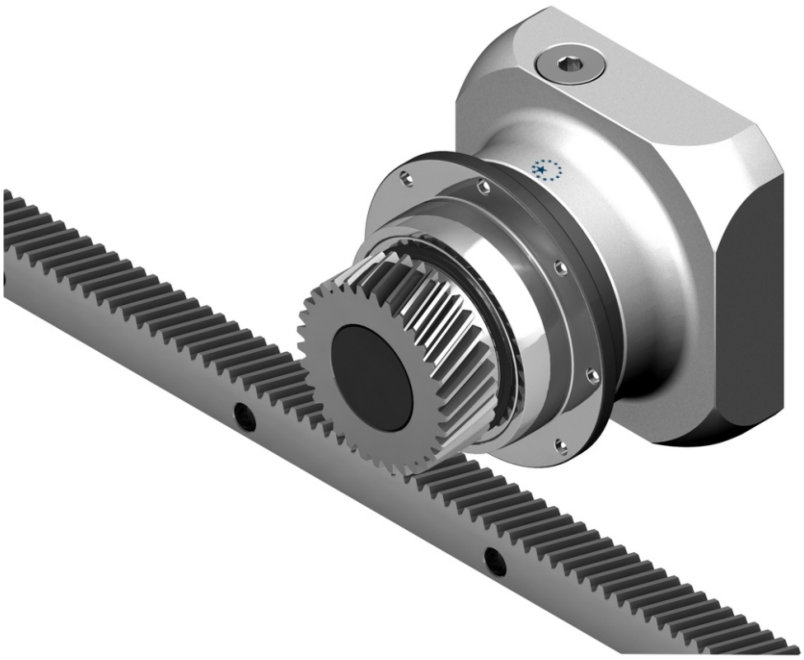
d : Pitch Circle Diameter

Application		Horizontal handling	Vertical lifting
Unit		Application parameters	
Total load weight	M	Kg	Kg
Speed	V	m/s	m/s
Acceleration time	ta	s	s
Gravitational acceleration	g	9.8 m/s^2	9.8 m/s^2
Friction coefficient	μ	-	-
Pitch circle diameter of pinion	d	mm	mm
Other additional forces	F	N	N
Safety factor	S_B (1)	-	-
		Computational formulas	
		$\alpha = V / t\alpha$ (m/s^2)	$\alpha = V / t\alpha$ (m/s^2)
Tangential force of rack	F_N	$F_N = M \times g \times \mu + M \times a + F$ (N)	$F_N = M \times g + M \times a + F$ (N)
Torque	T_N	$T_N = (F_N \times d) / 2000$ (Nm)	$T_N = (F_N \times d) / 2000$ (Nm)
Design demand torque	T_{NV}	$T_{NV} = T_N \times S_B$ (Nm)	$T_{NV} = T_N \times S_B$ (Nm)
Max. Speed of pinion	N_V	$N_V = (V \times 19100) / d$ (rpm)	$N_V = (V \times 19100) / d$ (rpm)

(1) Please consider the safety factor according to your experience and application, the general recommended range of 1 to 4 (S_B ≒ 1 to 4).

Select a suitable pinion.
Calculate the design demand torque (T_{NV})
To choose T_{2B} (> T_{NV}) according to the table "the max. permitted torque and feed force of pinion"
To select the appropriate gearbox and speed ratio to fit the torque.
Refer to APEX Dynamax for a more detailed calculation.

Linear Drive System
For Laser Cutting Industry



Performance

Ratio (1)	5		7	
Pinion Module No.	2			
Pinion Teeth No.	33	37	33	37
Nominal Output Torque T_{2N} Nm	165		130	
Max. Acceleration Torque T_{2B} Nm	247.5		195	
Emergency Stop Torque T_{2NOT} Nm	495		390	
Max. Drive Force F_{2T} N	6913	6172	5447	4863
No Load Running Torque Nm	0.7			
Backlash (2) arcmin	≦ 3			
Torsional Rigidity Nm/arcmin	22			
Nominal Input Speed n_{1N} rpm	3,600			
Max. Input Speed n_{1B} rpm	6,000			
Max. Drive Speed V_{Max} m/s	4.4	3.1	4.9	3.5
Service Life (3) hr	20,000			
Operating Temp. ° C	-10° C~ 90° C			
Lubrication	Synthetic Lubrication Grease			
Mounting Position	All Directions			
Running Noise (4) dB(A)	≦ 59			
Efficiency η %	≧ 97%			
Inertia kgcm.^{2}	4.52			

Order Code

L - 24 - 5 - 33

- **Teeth No. 33T / 37T**
- **Ratio R5 / R7**
- **Motor Shaft (5) 22 / 24**

(1) Ratio ($i = N_{in} / N_{out}$)
(2) Backlash is measured at 2% of Nominal Output Torque T_{2N}
(3) Continuous operation is not recommended
(4) These values are measured by gearbox with ratio 7 at 3,000 rpm without loading
(5) Motor adapter specification please refer to the dimension of linear drive system

Automatic Lubrication System

PT Surya Sarana Dinamika

Perkantoran Mega Sunter B-40

Jl. Danau Sunter Selatan, Jakarta, 14350 Indonesia

p: (62-21) 6583 5077 - 78 | ***f*** : (62-21) 6583 5079 - 80

e: sales@suryasarana.com | ***w*** : www.suryasarana.com