

Efficiency, Thrust and Torque

The friction coefficient of change nuts (μ) is approximately 0.1 to 0.2 as a guideline. The efficiency (η) with the friction coefficient at 0.1 to 0.2 is Table2.

Note: The friction coefficient may exceed the above-mentioned value depending on the lubrication and mounting conditions, so the value shall be used as a reference.

Table2 Friction Coefficient and Efficiency

Frictional coefficient (μ)	0.1	0.15	0.2
Efficiency (η)	0.82	0.74	0.67

The thrust generated when a torque is applied is obtained from the following equation.

$$F_a = 2 \cdot \pi \cdot \eta \cdot T / R \times 10^{-3}$$

F_a	: Thrust generated	(N)
T	: Torque (input)	(N·m)
R	: Lead	(mm)

Also, the torque generated when a thrust is applied is obtained from the following equation.

$$T = \eta \cdot F_a \cdot R \times 10^{-3} / 2\pi$$

T	: Torque generated	(N·m)
F_a	: Thrust (input)	(N)
R	: Lead	(mm)

Example of thrust force calculation

Assuming that Change Nut model DCMB20T is used and the torque T is equal to 19.6 N·m, obtain the thrust to be generated.

If " μ " is 0.2, the efficiency " η " is 0.67 (see Table2), and the generated thrust (F_a) is calculated as follows.

$$F_a = 2 \cdot \pi \cdot \eta \cdot T / (R \times 10^{-3}) = \frac{2 \times \pi \times 0.67 \times 19.6}{60 \times 10^{-3}} \doteq 1370 \text{ N}$$

Example of torque calculation

Assuming that Change Nut model DCMB20T is used and the thrust F_a is equal to 980 N, obtain the torque to be generated.

If " μ " is 0.2, the efficiency " η " is 0.67 (see Table2), and the generated torque (T) is calculated as follows.

$$T = \frac{\eta \cdot F_a \cdot R \times 10^{-3}}{2\pi} = \frac{0.67 \times 980 \times 60 \times 10^{-3}}{2\pi} = 6.27 \text{ N·m}$$