

## 4.3. Efficiency, Thrust and Torque

The efficiency ( $\eta$ ) of the change nut in relation to the friction coefficient ( $\mu$ ) is indicated in table 1.

Table 1 Friction Coefficient and Efficiency

Friction coefficient ( $\mu$ )	0.1	0.15	0.2
Efficiency ( $\eta$ )	0.82	0.74	0.67

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

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

where

Fa : 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.

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

where

T : Torque generated (N-m)

Fa : Thrust (input) (N)

R : Lead (mm)

### [Example of calculation - 1]

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 " $\mu$ " is 0.2, the efficiency " $\eta$ " is 0.67 (see table 1), and the generated thrust (Fa) is calculated as follows.

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

### [Example of calculation - 2]

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

If " $\mu$ " is 0.2, the efficiency " $\eta$ " is 0.67 (see table 1), and the generated torque (T) is calculated as follows.

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