3.3. Efficiency and Thrust

The efficiency (η) at which the screw transfers a torque into thrust is obtained from the following equation.

$$\eta = \frac{1 - \mu\tan\alpha}{1 + \mu/\tan\alpha}$$

where

η : Efficiency
α : Lead angle
μ : Friction coefficient

Fig. 1 shows the result of the above equation.

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

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

where

Fa : Thrust generated (N)
T : Torque (input) (N-m)
R : Lead (mm)

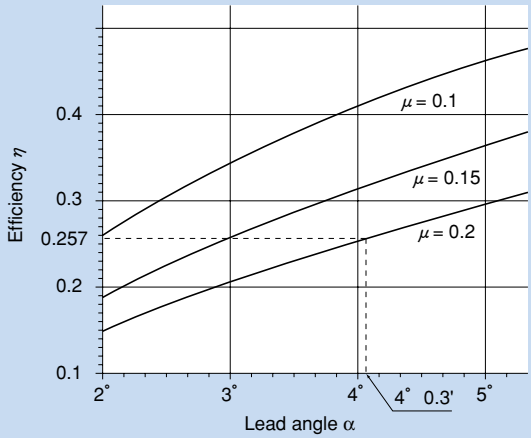

Fig. 1 Efficiency

[Example of calculation]

Assuming that Screw Nut model DCM20 is used and the input torque T = 19.6 N-m, obtain the thrust to be generated.
Calculate the efficiency (η) when μ = 0.2.
The lead angle (α) of model DCM20: 4°03'
From the diagram in Fig. 1, the efficiency (η) when the friction coefficient μ = 0.2 is obtained as η = 0.257.
Obtain the thrust generated.

$$Fa = \frac{2 \cdot \pi \cdot \eta \cdot T}{R \times 10^{-3}} = \frac{2 \times \pi \times 0.25 \times 19.6}{4 \times 10^{-3}} \fallingdotseq 7700 \text{ N}$$