3.2. Selecting a Screw Nut

Calculate the dynamic permissible thrust (F) and the pV value as a measuring stick for selecting a screw nut. For details, see the section "Selecting a Nut" on page M-7. The "p" and "V" values required to obtain the pV value of the nut are calculated from the following equations.

Calculating the Contact Surface Pressure p

The value of "p" is obtained as followed.

$$p = \frac{P_F}{F} \times 9.8$$

where

p : Contact surface pressure on the teeth from an axial load (P_F N) (N/mm^2)
F : Dynamic permissible thrust (N)
P_F : Axial load (N)

Calculating the Sliding Speed V on the Teeth

The value of "V" is obtained as followed.

$$V = \frac{\pi \cdot Do \cdot n}{\cos\alpha \times 10^3}$$

where

V : Sliding speed (m/min)
Do : Effective diameter (mm)
(See the corresponding dimensional table in the "THK General Catalog - Product Specifications," provided separately.)
n : Rotation speed per minute (min^{-1})
α : Lead angle (degree)
(See the corresponding dimensional table in the "THK General Catalog - Product Specifications," provided separately.)
R : Lead (mm)

[Example of calculation]

Assuming that Screw Nut model DCM is used, select a screw nut that travels at feed speed S = 3 m/min while receiving an axial load P_F = 1,080 N, which is applied in one direction.
First, tentatively select model DCM32 (dynamic permissible thrust F = 21,100 N).
Obtain the contact surface pressure (p).

$$p = \frac{P_F}{F} \times 9.8 = \frac{1080}{21100} \times 9.8 \fallingdotseq 0.50\ \mathrm{N/mm^2}$$

Obtain the sliding speed (V).
The rotation speed per minute (n) of the screw shaft needed to move it at feed speed S = 3 m/min is calculated as follows.

$$n = \frac{S}{\ell \times 10^{-3}} = \frac{3}{6 \times 10^{-3}} = 500\mathrm{min^{-1}}$$

$$V = \frac{\pi \cdot Do \cdot 500}{\cos\alpha \times 10^3} = \frac{\pi \times 29 \times 500}{\cos 3^\circ 46' \times 10^3} \fallingdotseq 45.6\ \mathrm{m/min}$$

From the diagram of pV values (Fig. 2) on page M-7, it is judged that there will be no abnormal wear if the sliding speed (V) is 47 m/min or below against the "p" value of 0.50 N/mm².
Second, obtain the safety factor (f_S) against the dynamic permissible thrust (F). Given the service conditions: temperature factor f_T = 1 and applied load P_F = 1,080 N, the safety factor is calculated as follows.

$$f_S \leqq \frac{f_T \cdot F}{P_F} = \frac{1 \times 21100}{1080} = 19.5$$

Since the required strength will be met if "f_S" is at least 2 because of the type of load, it is appropriate to select model DCM32.