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A Research on Optimization of Swing Type Auto Flush Door Outside Handle System

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The purpose of this study is to ensure usability through mechanical optimization of swing-type auto flush handles. To solve this problem, we discussed how to determine a package with a structure that is easy to use while reflecting the design as much as possible, and to determine the gear ratio to deploy the handle with the power of the motor in order to achieve the gear ratio in a small package.

In order to prevent damage when the user presses the handle in the deployed state, a gear ratio in which the worm-wheel gear and the screw gear are not subjected to self-locking, which is characteristic of the screw gear, are found to prevent damage to the handle in consideration of the tolerance of the housing constituting the actuator.

The material and gear specifications is selected through the stiffness analysis when the gear is twisted in the tolerance range by conducting a tolerance analysis. A sample produce reflecting this to confirm that the swing type auto flush handle is operated normally and the damage prevention function is operated normally.

$$\sum F_x = Q\cos\alpha\sin\alpha - \mu Q\cos^2\alpha - f' = 0$$

$$f' = \mu N = \mu(Q\cos^2\alpha + \mu Q\cos\alpha\sin\alpha)$$

$$Q\cos\alpha\sin\alpha - \mu Q\cos^2\alpha - \mu(Q\cos^2\alpha + \mu Q\cos\alpha\sin\alpha) = 0$$

$$\sin\alpha - 2\mu\cos\alpha - \mu^2\sin\alpha = 0$$

$$2\mu\cos\alpha = (1-\mu^2)\sin\alpha$$

$$\tan\alpha = \frac{2\mu}{1-\mu^2} \qquad \alpha = \tan^{-1}\frac{2\mu}{1-\mu^2}$$

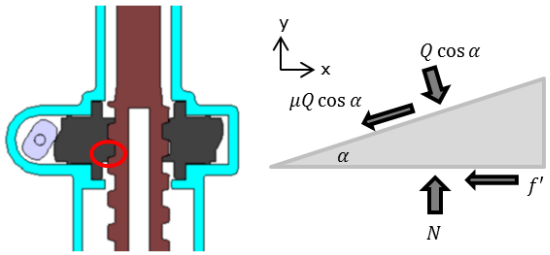

Fig.1 Thread Gear Boundary Conditions for Wheel-Rod