Calculations for Motor Specifications

Firs of all is used the following formula to know which pair do the motor need to move a Rubik's cube face.

To know the strength needed to move a face, we used a dynamometer, and to apply the formula, we used the half of the diagonal of one of the faces of the Rubik's cube, because we move the cube by the centre of each faces and the dynamometer was applied at the extreme of the cube, to rotate it.

$$T = F * d$$

Then, we used the following formula to know the angular acceleration using as inertia the inertia of a cube.

$$T = I * \alpha$$

Founded the angular velocity we applied the general formula of the angular acceleration to find the time that it lasts to rotate 90 degrees. As we don't know the angular velocity, we also used the uniformly accelerated circular motion and combining those two formulas, we founded the minimum angular velocity needed to move 90 degrees a Rubik's cube face.

$$\alpha = \frac{dw}{dt} \quad \longrightarrow \quad t = \frac{w}{\alpha}$$

$$\theta = \theta o + wo * t + \frac{1}{2} * \alpha * t^2$$

$$t = \frac{w}{\alpha}$$

$$\theta = \frac{1}{2} * \frac{w}{\alpha} \quad \longrightarrow \quad w = \sqrt{2 * \theta * \alpha}$$