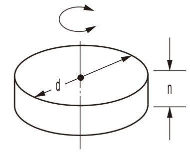
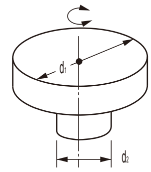
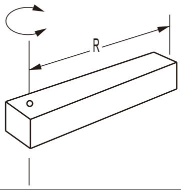
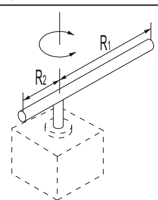
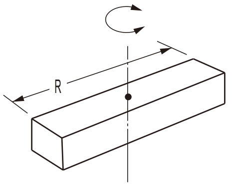
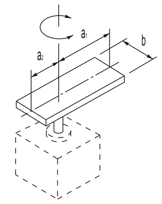
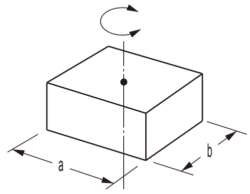
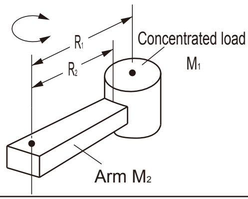
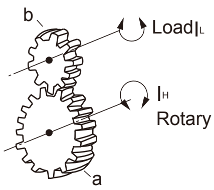
1. Inertial Moment Calculation Drawings

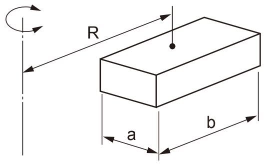
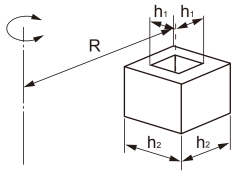
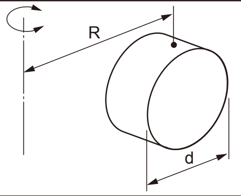
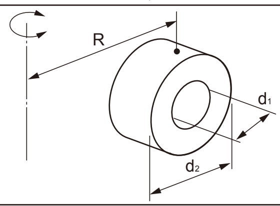
If rotary axis passes through workpiece

Shape	Sketch	Requirement	Inertial moment I, kg/m²	Rotation radius K_1^2	Remarks
Disk		• Diameter d(m) • Weight M(kg)	$I=\frac{Md^2}{8}$	$\frac{d^2}{8}$	• No particular mounting direction • Other considerations required if the disk is to be used sliding.
Stepped disk		• Diameter d_1(m) d_2(m) • Weight: part d_1 M_1(kg) part d_2 M_2(kg)	$I=\frac{1}{8}(M_1d_1^2+M_2d_2^2)$	$\frac{d_1^2+d_2^2}{8}$	• May be ignored if part d_2 is significantly smaller than part d_1.
Rod (end is rotation center)		• Rod length R(m) • Weight M(kg)	$I=\frac{MR^2}{3}$	$\frac{R^2}{3}$	• Horizontal mounting • Oscillating time will change for vertical mounting.
Thin rod		• Rod length R_1 R_2 • Weight M_1 M_2	$I=\frac{M_1 \cdot R_1^2}{3}+\frac{M_2 \cdot R_2^2}{3}$	$\frac{R_1^2+R_2^2}{3}$	• Horizontal mounting • Oscillating time will change for vertical mounting.
Rod (center of gravity is rotation center)		• Rod length R(m) • Weight M(kg)	$I=\frac{MR^2}{12}$	$\frac{R^2}{12}$	• No particular mounting direction
Thin rectangular plate (cuboid)		• Plate length a_1 a_2 • Edge length b • Weight M_1 M_2	$I=\frac{M_1}{12}(4a_1^2+b^2)+\frac{M_2}{12}(4a_2^2+b^2)$	$\frac{(4a_1^2+b^2)+(4a_2^2+b^2)}{12}$	• Horizontal mounting • Oscillating time will change for vertical mounting.
Cuboid		• Edge length a(m) b(m) • Weight M(kg)	$I=\frac{M}{12}(a^2+b^2)$	$\frac{a^2+b^2}{12}$	• No particular mounting direction • Other considerations required if the disk is to be used sliding.
Concentrated load		• Concentrated load shape • Length to concentrated load center of gravity R_1 • Arm length R_2(m) • Concentrated load weight M_1(kg) • Arm weight M_2(kg)	$I=M(R_1^2+k_1^2)+\frac{M_2R_2^2}{3}$	k_1^2 calculated based on concentrated load shape.	• Horizontal mounting • May be calculated based on M_2 = 0 if M_2 significantly smaller than M_1.

Method involving calculation of load IL around rotary actuator axis when employing gears

Shape	Sketch	Requirement	Inertial moment I, kg/m²	Rotation radius K_1^2	Remarks
Gear		• Gear Rotary side (number of teeth) a Load side (number of teeth) b • Load inertial moment N·m	Inertial moment around load rotary axis $I_H=\left(\frac{a}{b}\right)^2 I_L$		• The greater the gear size, the more it becomes necessary to consider the gear inertial moment.

●If rotary axis is offset from workpiece

Shape	Sketch	Requirement	Inertial moment I, kg/m²	Remarks
Cuboid		● Edge length a(m) ● Distance from rotary b(m) axis to load center R(m) ● Weight M(kg)	$I=\frac{M}{12}(a^2+b^2)+MR^2$	● Same for cuboid
Hollow cuboid		● Edge length h_1(m) h_2(m) ● Distance from rotary axis to load center R(m) ● Weight M(kg)	$I=\frac{M}{12}(h_1^2+h_2^2)+MR^2$	● Cross section applies to cuboid only
Cylinder		● Diameter d(m) ● Distance from rotary axis to load center R(m) ● Weight M(kg)	$I=\frac{Md^2}{16}+MR^2$	
Hollow cylinder		● Diameter d_1(m) d_2(m) ● Distance from rotary axis to load center R(m) ● Weight M(kg)	$I=\frac{M}{16}(d_1^2+d_2^2)+MR^2$	

* When obtaining the inertial moment, first model the load and jig, etc., convert the shape to something simpler, and then calculate.
In the case of combined loads, calculate the individual inertial moments and add them up.