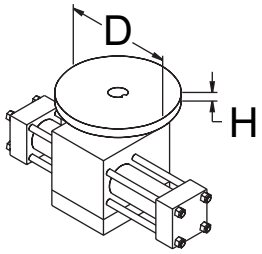
INDEXING SIMPLIFIED: CALCULATE IMPACT EASILY

Impact can displace work pieces, damage fixtures or the indexing actuator itself by breaking its shaft or ratchet key.

Avoid these effects by limiting rotational speed with a flow control; use the maximum available time consistent with cycle requirements.

CALCULATE MOMENT OF INERTIA

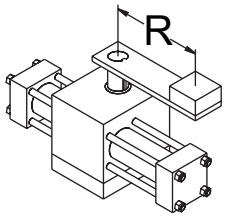
D = diameter
H = thickness, in
$\mathfrak{D}$ = density, lb/in^3
M = weight, lb
R = radius, in
L = length, in
A = width, in



DISC:

$$J = \frac{D^4 \pi H \mathfrak{D}}{12365} \text{ in lb sec}^2$$

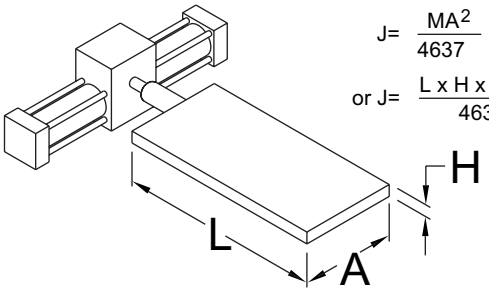
$$\text{or } J = \frac{MD^2}{3091}$$



CONCENTRATED LOAD:

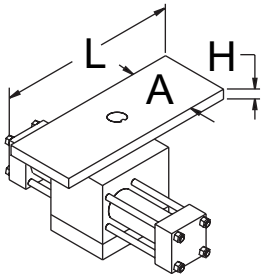
$$J = \frac{MR^2}{386.4} \text{ in lb sec}^2$$

PLATE ON AXIS:



$$J = \frac{MA^2}{4637} \text{ in lb sec}^2$$

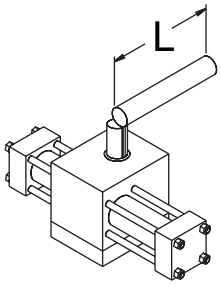
$$\text{or } J = \frac{L \times H \times \mathfrak{D} \times A^2}{4637}$$



RECTANGULAR PLATE:

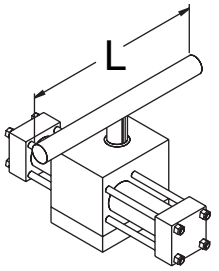
$$J = \frac{M(L^2+A^2)}{4637} \text{ in lb sec}^2$$

$$\text{or } J = \frac{AHL\mathfrak{D}\,(L^2+A^2)}{4637}$$



THIN ROD
AROUND ONE END:

$$J = \frac{ML^2}{1159} \text{ in lb sec}^2$$



THIN ROD
AROUND CENTER:

$$J = \frac{ML^2}{4637} \text{ in lb sec}^2$$

CALCULATE IMPACT IN ROTARY MOTION

θ = angle of motion in radians, 1 radian = 57.3 degrees

ω = angular velocity in radians/second

t = time duration of motion in seconds

For many pneumatic systems

$\omega = 2.3 \times \theta / t$ gives a reasonable estimate of maximum angular velocity

Impact energy:

W = impact energy in in lb

J = total moment of inertia of entire shaft load in in lb sec^2

= J of workpiece + J of fixtures + J of supports member(s)

$W = 1/2 J\omega^2$

UNIT SELECTION

The following are maximum practical values of W for production use. They are based upon shaft tests to failure and provide a factor of safety of about 4 for shaft fracture. Though safe for the shaft, this impact may dislodge product or have other inertia effects.

UNIT	FRONT SHAFT	REAR SHAFT
X1 & X12	2.1 in lb	.4 in lb
X2 & X22	4	1.2
X3 & X32	8.9	4
X4 & X42	17.4	6.4