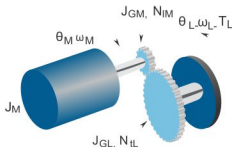
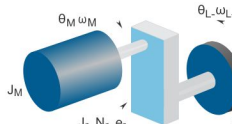
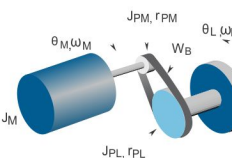
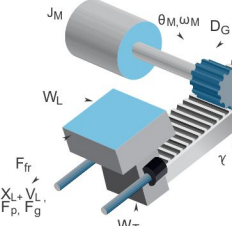
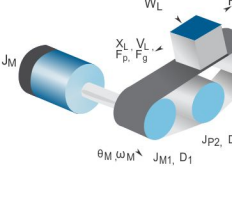
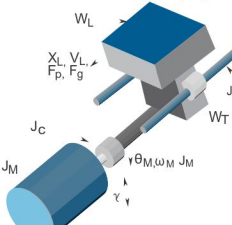


Motion e Momentos de Inércia

Equação da Mecânica e Movimento	Equação Torque e Inércia	Outros fatores a considerar
 $N_r = \frac{N_{IL}}{N_{IM}}$ $\theta_M = N_r \times \theta_L$ $\omega_M = N_r \times \omega_L$	$J_{Total} = J_M + J_{GM} + J_{GL \rightarrow M} + J_{L \rightarrow M}$ $J_{GL \rightarrow M} = \left(\frac{1}{N_r}\right)^2 \times J_{GL}$ $J_{L \rightarrow M} = \left(\frac{1}{N_r}\right)^2 \times J_L$ $T_{L \rightarrow M} = \frac{T_L}{N_r \times e}$	<ul style="list-style-type: none"> • Viscosidade do Lubrificante (óleo ou graxa) • Backlash • Eficiência
 $N_r = \frac{\theta_M}{\theta_L} = \frac{\omega_M}{\omega_L}$ $\theta_M = N_r \times \theta_L$ $\omega_M = N_r \times \omega_L$	$J_{Total} = J_M + J_r + J_{L \rightarrow M}$ $J_{L \rightarrow M} = \left(\frac{1}{N_r}\right)^2 \times J_L$ $T_{L \rightarrow M} = \frac{T_L}{N_r}$ <p>J_r = inercia refletida na entrada do redutor</p>	<ul style="list-style-type: none"> • Inércia do acoplamento • Inércia Refletida do Redutor
 $N_r = \frac{N_{TL}}{N_{IM}} = \frac{D_{PL}}{D_{PM}}$ $\theta_M = N_r \times \theta_L$ $\omega_M = N_r \times \omega_L$	$J_{Total} = J_M + J_{PM} + J_{PL \rightarrow M} + J_{B \rightarrow M} + J_{L \rightarrow M}$ $J_{PL \rightarrow M} = \left(\frac{1}{N_r}\right)^2 \times J_{PL}$ $J_{B \rightarrow M} = \frac{W_B}{g} \times \left(\frac{D_{PM}}{2}\right)^2$ $J_{L \rightarrow M} = \left(\frac{1}{N_r}\right)^2 \times J_L$ $T_{L \rightarrow M} = \frac{T_L}{N_r}$	<ul style="list-style-type: none"> • Inércia das Polias • Inércia é proporcional a r^2 ! • Inércia da correia / corrente
 $C_G = \pi \times D_G = \frac{N_t}{P_G}$ $\theta_M = \frac{X_L}{C_G}$ $\omega_M = \frac{V_L}{C_G}$	$J_{Total} = J_M + J_G + J_{L \rightarrow M}$ $J_{L \rightarrow M} = \frac{(W_L + W_T)}{g} \times \left(\frac{D_G}{2}\right)^2$ $F_g = (W_L + W_T) \times \sin \gamma$ $F_{fr} = \mu \times (W_L + W_T) \times \cos \gamma$ $T_{L \rightarrow M} = \left(\frac{F_P + F_g + F_{fr}}{e}\right) \times \left(\frac{D_G}{2}\right)$	<ul style="list-style-type: none"> • Backlash • Inércia do pinhão • Atrito do rolamento • Balanceamento vertical • Freio das cargas • Limite máximo de velocidade do rolamento
 $C_{P1} = \pi \times D_{P1} = \frac{N_t}{P_G}$ $\theta_M = \frac{X_L}{C_{P1}}$ $\omega_M = \frac{V_L}{C_{P1}}$	$J_{Total} = J_M + J_{P1} + \left(\frac{D_{P1}}{D_{P2}}\right)^2 \times \frac{J_{P2}}{e} + \left(\frac{D_{P1}}{D_{P3}}\right)^2 \times \frac{J_{P3}}{e} + J_{L \rightarrow M}$ $J_{L \rightarrow M} = \frac{(W_L + W_B)}{g} \times \left(\frac{D_{P1}}{2}\right)^2$ $F_g = (W_L + W_B) \times \sin \gamma \quad F_{fr} = \mu \times (W_L + W_B) \times \cos \gamma$ $T_{L \rightarrow M} = \left(\frac{F_P + F_g + F_{fr}}{e}\right) \times \left(\frac{D_{P1}}{2}\right)$	<ul style="list-style-type: none"> • Inércia do Pinhão • Inércia da correia ou corrente • Balanceamento • Cargas dos freios na vertical • Limite máximo de velocidade do rolamento
 $\theta_M = P_S \times X_L$ $\omega_M = P_S \times V_L$	$J_{Total} = J_M + J_C + J_S + J_{L \rightarrow M}$ $J_{L \rightarrow M} = \frac{(W_L + W_T)}{g} \times \left(\frac{1}{2\pi \times P_S}\right)^2$ $F_g = (W_L + W_T) \times \sin \gamma \quad F_{fr} = \mu \times (W_L + W_T) \times \cos \gamma$ $T_{L \rightarrow M} = \left(\frac{F_P + F_g + F_{fr}}{2\pi \times P_S \times e}\right) + T_P$	<ul style="list-style-type: none"> • Inércia da rosca • Inércia do acoplamento • Atrito do Rolamento • Máxima velocidade do rolamento

Tipos Coeficientes de Atrito ($F_{fr} = \mu W_L \cos \gamma$)

Material	μ
Aço / Aço	~0.58
Aço / Aço (com graxa)	~0.15
Alumínio	~0.45
Cobre / Aço	~0.30
Latão / Aço	~0.35
Plástico / Aço	~0.15-0.25

Densidades de Materiais

Material	gm/cm ³	ib/in ³
Alumínio	~2.66	~0.096
Latão	~8.30	~0.300
Bronze	~8.17	~0.295
Cobre	~8.91	~0.322
Plástico	~1.11	~0.040
Aço	~7.75	~0.280
Madeira	~0.80	~0.029

Eficientes

Acme-screw w/brass nut	~0.35-0.65
Acme-screw w/plastic nut	~0.50-0.85
Ball-screw	~0.85-0.95
Preloaded Ball-Screw	~0.75-0.85
Spur or Bevel Gears	~0.90
Timing Belts	~0.96-0.98
Chain & Sprocket	~0.95-0.98
Worm Gears	~0.45-0.85