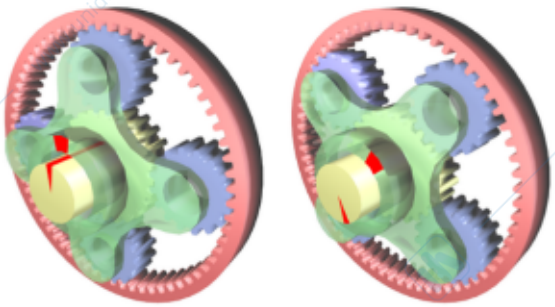
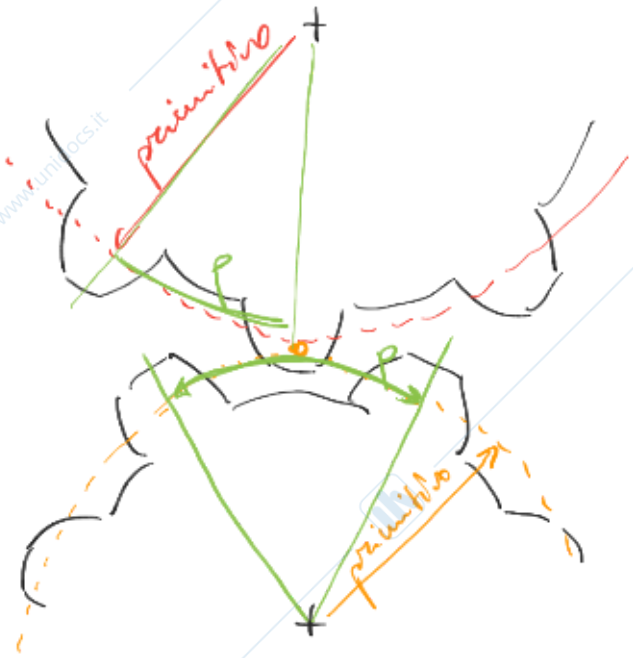
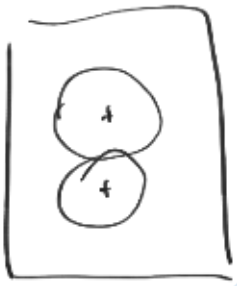
Ese 06 - Rotismo Epicicloidale





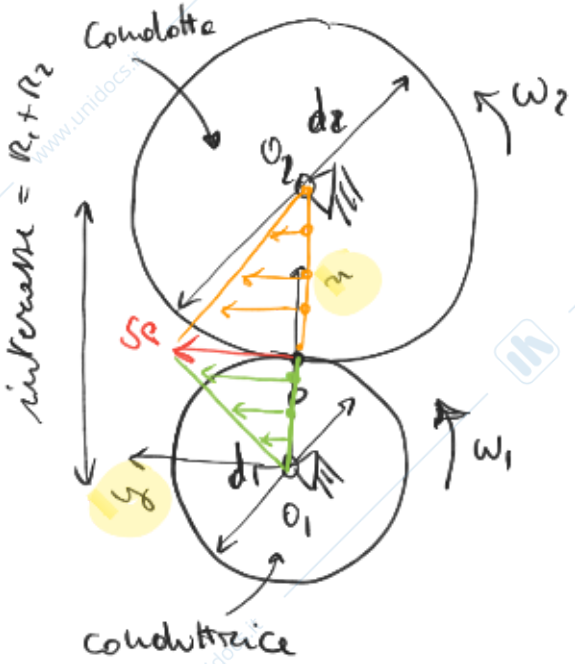


z = n° denti

d = diametro primitivo

$p = \frac{\pi d}{z}$ ← passo

$m = \frac{d}{z} = \frac{p}{\pi}$ ← modulo



$$\begin{cases} \vec{v}_P = \omega_1 \vec{k} \wedge (P - O_1) \\ \quad = \omega_1 \vec{k} \wedge R_1 \vec{i} \\ \quad = \omega_1 R_1 \vec{j} \\ \vec{v}_P = \omega_2 \vec{k} \wedge (P - O_2) \\ \quad = \omega_2 \vec{k} \wedge (-R_2 \vec{i}) \\ \quad = -\omega_2 R_2 \vec{j} \end{cases}$$

$$\omega_1 R_1 = -\omega_2 R_2$$

$$\omega_2 = -\frac{R_1}{R_2}\omega_1$$

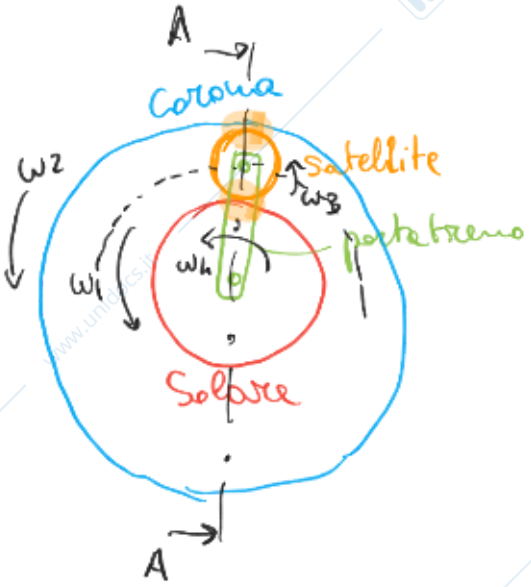
$$\omega_2 = \tau\, \omega_1 \qquad \tau = \frac{\omega_{uscente}}{\omega_{entrante}}$$

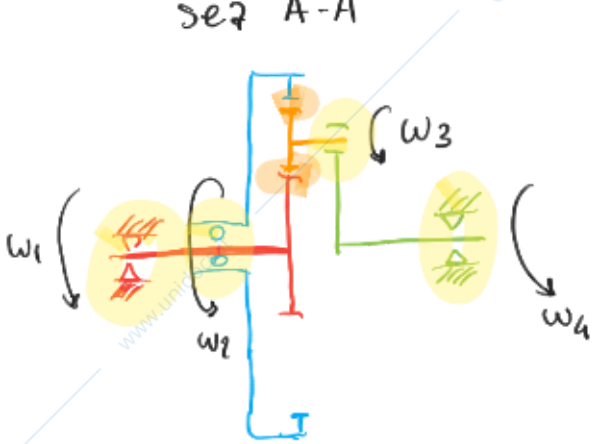
ω_2 R_1 d_1

$$\tau = \frac{\omega_1}{\omega_2} = -\frac{R_2}{R_1} = -\frac{d_2}{d_1}$$

$$= -\frac{m z_2}{m z_1} = -\frac{z_2}{z_1}$$

$$m = \frac{d}{z}$$





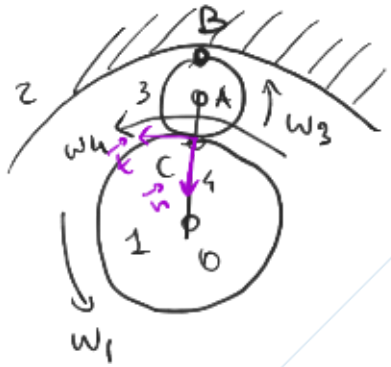
4 corpi → 12 gdl

4 cerniere → 8 pdv

2 rot senza strisciamento → 2 pdv (2 contatto)

2 gdl residui

$\omega_2 = 0$ blocchiamo la corona



disco 3 → ruota senza strisciare rispetto al disco 2

B → $\vec{v}_B = 0$

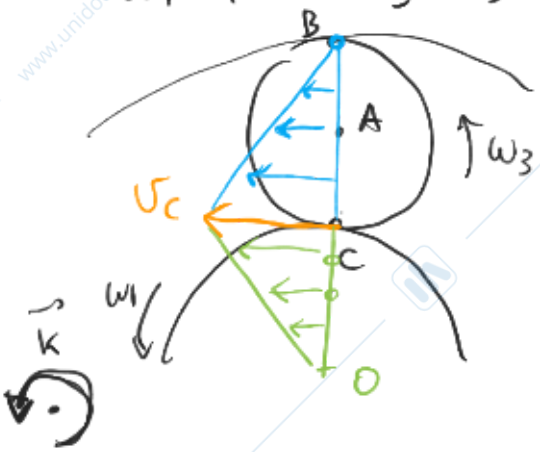
B → CIR assoluto di (3)

disco 1 ruota intorno a O

C → CIR moto relativo 3-1

$$\begin{cases} \vec{v}_C = \omega_1 \vec{k} \wedge (C-O) = \omega_1 \vec{k} \wedge (-R_1 \vec{n}) = \omega_1 R_1 \vec{t} \\ \vec{v}_C = \omega_3 \vec{k} \wedge (C-B) = \omega_3 \vec{k} \wedge (2R_3 \vec{n}) = -\omega_3 2R_3 \vec{t} \end{cases}$$

$\omega_1 R_1 = -\omega_3 2R_3 \rightarrow \omega_3 = -\frac{R_1}{2R_3}\omega_1$



$\vec{v}_A = \frac{\vec{v}_C}{2} = \frac{\omega_1 R_1}{2}\vec{t}$ Considerazioni geometriche

$\vec{v}_A = \cancel{\vec{v}_B}^{0} + \omega_3\vec{k} \wedge (A-B)$ Rivals CIR

$= -\frac{R_1}{2R_3}\omega_1\vec{k} \wedge (R_3\vec{n})$

$= -\frac{R_1\omega_1}{2}(-\vec{t}) = \frac{R_1\omega_1}{2}\vec{t}$

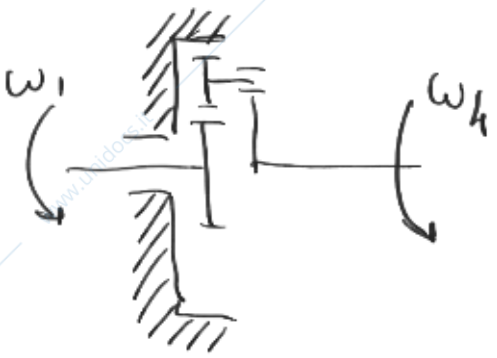
$\vec{v}_A = \omega_4\vec{k} \wedge (A-O)$

$= \omega_4\vec{k} \wedge (-(R_1+R_3)\vec{n})$

$= \omega_4(R_1+R_3)\vec{t} = \frac{R_1\omega_1}{2}\vec{t}$

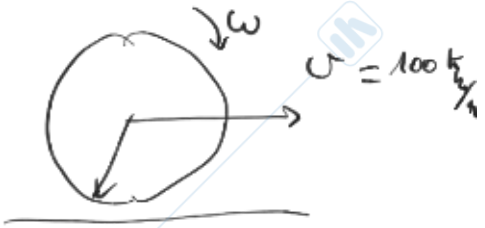
$\omega_4 = \frac{R_1}{2(R_1+R_3)}\omega_1$

$\omega_4 = \tau_{41}\omega_1$



$\omega_1 = 0 \rightarrow \tau_{42}$?

1000 → 6000 rpm



$v = 100$ km/h $= \frac{100}{3.6} \simeq 27$ m/s

$R = 0{,}3$ m

$\omega = \frac{v}{R} = 90$ rad/s $\simeq$ 860 rpm