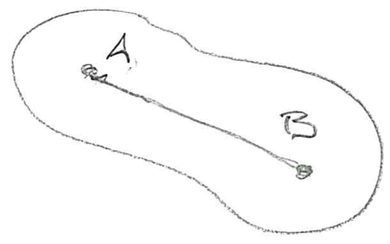
$$\bar{V}_B = \bar{V}_A + \bar{V}_{B/A}$$

$$\bar{V}_{B/A} = \bar{\omega} \wedge \overline{AB}$$

$$\bar{a}_B = \bar{a}_A + \bar{a}_{B/A}$$

$$\bar{a}_{B/A} = \bar{a}_{B/A})_n + \bar{a}_{B/A})_\tau$$

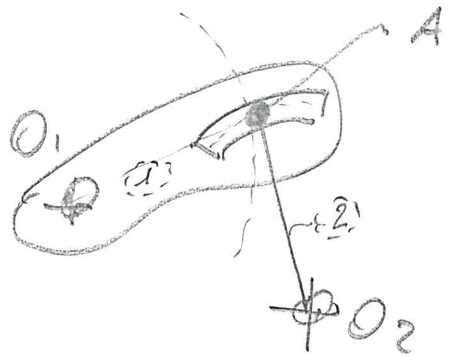



$$\bar{V}_A = \bar{V}_{A_r} + \bar{V}_{A_t}$$

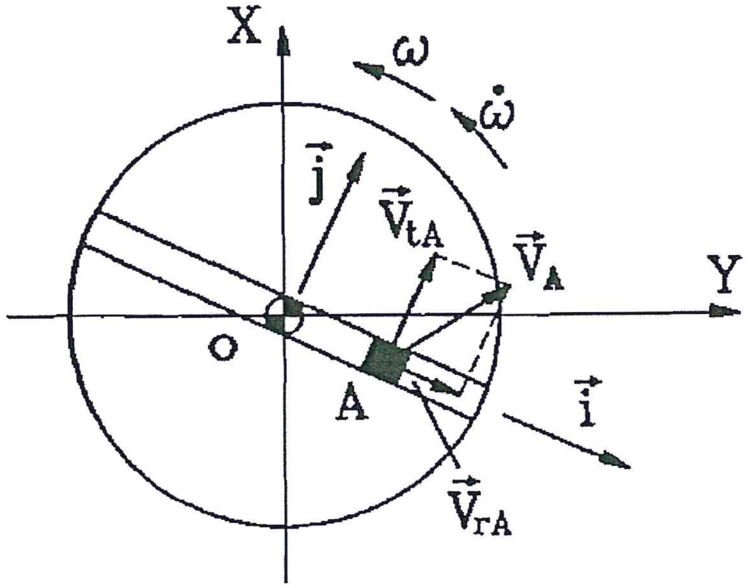
$$\bar{a}_A = \bar{a}_{A_r} + \bar{a}_{A_t} + a_c$$

$$\bar{a}_{A_t}) = \bar{a}_{A_t})_n + \bar{a}_{A_t})_\tau$$

$$\bar{a}_c = 2\bar{\omega}_t \wedge \bar{V}_r$$



Il disco di figura ', nell'istante considerato, ruota attorno ad O con velocità $\omega = 4$ *rad/s* e accelerazione $\dot{\omega} = -10$ *rad/s*$^2$.
Separatamente viene controllato il moto della slitta A, che nell'istante considerato si trova ad una posizione $OA = r = 150$ *mm*, avendo una velocità radiale $\dot{r} = 125$ *mm/s* e una accelerazione radiale $\ddot{r} = 2025$ *mm/s*$^2$.
Si vuole determinare la velocità e l'accelerazione assoluta di A in questo istante



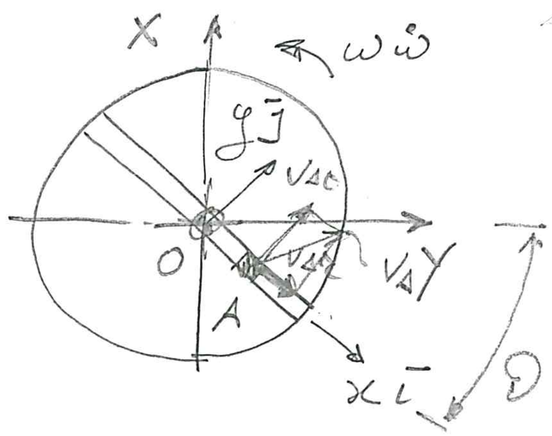
$\omega = 4\ rad/s$

$\dot{\omega} = -10\ rad/s^2$

$OA = r = 150\ mm$

$\dot{r} = 125\ mm/s$

$\ddot{r} = 2025\ mm/s^2$




$\bar{V}_A = \vec{V}_{At} + \vec{V}_{Ar}$

$\bar{V}_{Ar} = \dot{r}\,\vec{i} = 0{,}125\,\vec{i}\ m/s$

$\bar{V}_{At} = \omega r\,\vec{j} = 4 \cdot 0{,}150\,\vec{j} = 0{,}6\,\vec{j}\ m/s$

$\bar{V}_A = 0{,}125\,\vec{i} + 0{,}6\,\vec{j}$

$|\bar{V}_A| = \sqrt{(0{,}125)^2 + (0{,}6)^2} = 0{,}613\ m/s$

$\vec{a}_A = \bar{a}_{At})_n + \bar{a}_{At})_\tau + \bar{a}_{Ar} + \bar{a}_{AC}$

$\bar{a}_{At})_n = \omega^2 OA(-\bar{i}) = -2{,}4\,\bar{i}\ m/s^2$

$\bar{a}_{At})_\tau = \dot{\omega}\,OA\,\bar{j} = -1{,}5\,\bar{j}\ m/s^2$

$\bar{a}_{Ar} = 2{,}025\,\bar{i}\ m/s^2$

$\bar{a}_c = 2\bar{\omega}_t \wedge \bar{V}_r = 2 \cdot 4\,\bar{k} \wedge 0{,}125\,\bar{i} = 1 \cdot \vec{j}\ m/s^2$

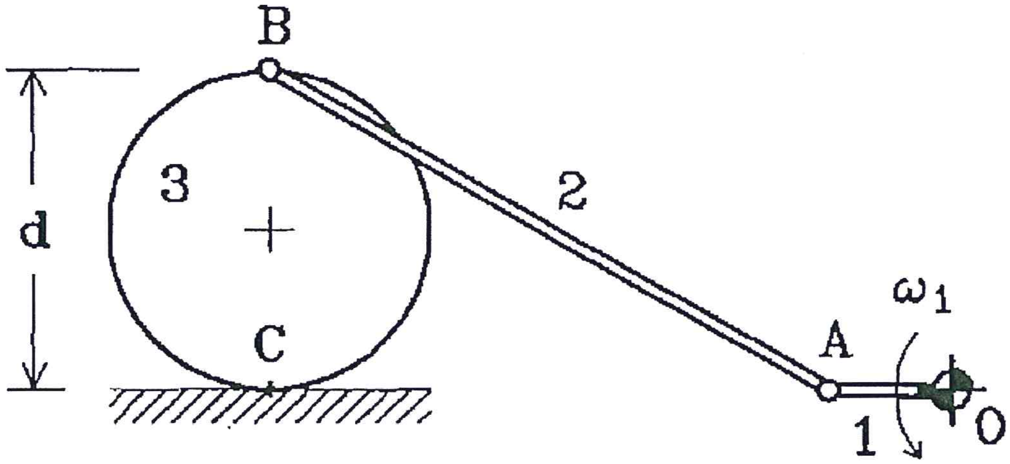
$\bar{a}_A = \bar{i}\,(-2{,}4 + 2{,}025) + \bar{j}\,(-1{,}5 + 1)$

$\bar{a}_A = -0{,}375\,\vec{i} - 0{,}5\,\bar{j}\ m/s^2$

Nel meccanismo raffigurato la manovella 1 ruota alla velocità $\omega_1$ e comanda il moto del disco 3 tramite la biella 2. Il disco 3 rotola senza strisciare su un piano orizzontale.

Sono dati: *AB=200 mm; d=100 mm; AO=40 mm;* $\omega_1$ *=50 rad/s.*

Nella situazione raffigurata (manovella orizzontale, asse BC verticale) determinare: la velocità del punto B; la velocità angolare della biella 2; la velocità angolare del disco 3.



$\omega_1 = 50\ rad/s\ (+\bar{k})$ cost

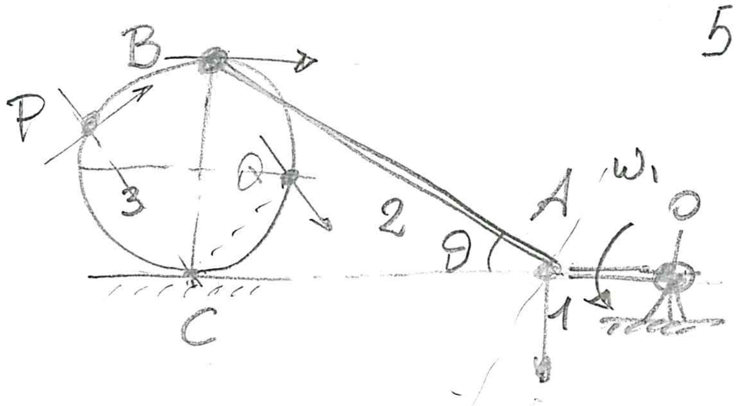
$AB = 200\ mm$

$d = BC = 100\ mm$

$AO = 40\ mm$

AO ORIZZONTALE

BC VERTICALE




$$\vartheta = \arcsin \frac{BC}{AB} = \frac{100}{200} = 30°$$

$V_B,\ \omega_2,\ \omega_3,\ a_B,\ \dot{\omega}_2,\ \dot{\omega}_3$

$$V_A = \omega_1 AO = 50 \cdot 0{,}04 = 2\ m/s \qquad \bar{V}_A = \bar{\omega}_1 \wedge \bar{OA}$$

$\perp OA$

$$\bar{V}_B = \bar{V}_A + \bar{V}_{B/A}$$

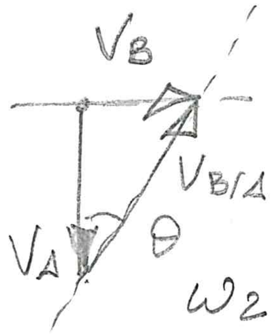
| | $\bar{V}_B$ | $\bar{V}_A$ | $\bar{V}_{B/A}$ |
|---|---|---|---|
| M | $\omega_3 d$ ? | $\omega_1 AO$ $2\ m/s$ | $\omega_2 AB$ ? |
| D | $\perp BC$ | $\perp AO$ | $\perp AB$ |
| V | ? | ↓ | ? |

$$V_{B/A} = \frac{V_A}{\cos\vartheta}$$

$$V_B = V_A \operatorname{tg}\vartheta$$

$V_{B/A} = 2{,}31\ m/s$

$V_B = 1{,}155\ m/s$




$$\omega_2 = \frac{V_{B/A}}{AB} = 11{,}55\ \frac{rad}{s}\ (-\bar{k})$$

$$\omega_3 = \frac{V_B}{d} = 11{,}55\ \frac{rad}{s}\ (-\bar{k})$$

$\bar{a}_A = \bar{a}_{An} + \bar{a}_{At} \rightarrow \bar{a}_A = \bar{a}_{An} = \omega_1^2 \cdot OA \quad A \rightarrow O$

$a_A = 100\ m/s^2 \quad A \rightarrow O$

$\vec{a}_B = \underset{a_{An}}{a_A} + a_{B/A})_n + a_{B/A})_t$

| | $\vec{a}_B$ | $a_A$ ($a_{An}$) | $a_{B/A})_n$ | $a_{B/A})_t$ |
|---|---|---|---|---|
| M | ? | $\omega_1^2 OA$ $100\ m/s^2$ | $\omega_2^2 AB$ $26{,}68\ \frac{m}{s^2}$ | $\dot{\omega}_2 AB$ ? |
| D | ? | $/\!/ OA$ | $/\!/ AB$ | $\perp AB$ |
| V | ? | $A \rightarrow O$ | $B \rightarrow A$ | ? |

$\bar{a}_B = \bar{a}_C + \bar{a}_{B/C})_n + \bar{a}_{B/C})_t$

| | $\bar{a}_B$ | $\bar{a}_C$ | $\bar{a}_{B/C})_n$ | $\bar{a}_{B/C})_t$ |
|---|---|---|---|---|
| M | ? | $\omega_3^2 \cdot \frac{d}{2}$ $6{,}67\ m/s^2$ | $\omega_3^2 d$ $13{,}34\ m/s^2$ | $\dot{\omega}_3 d$ ? |
| D | ? | $/\!/ BC$ | $/\!/ BC$ | $\perp BC$ |
| V | ? | $\uparrow$ | $B \rightarrow C$ | ? |

$\xi)\quad a_A + a_{B/A})_n \cos\vartheta - a_{B/A})_t \sin\vartheta - a_{B/C})_t = 0$

$\eta)\quad - a_{B/A})_n \sin\vartheta - a_{B/A})_t \cos\vartheta + a_{B/C})_n - a_C = 0$