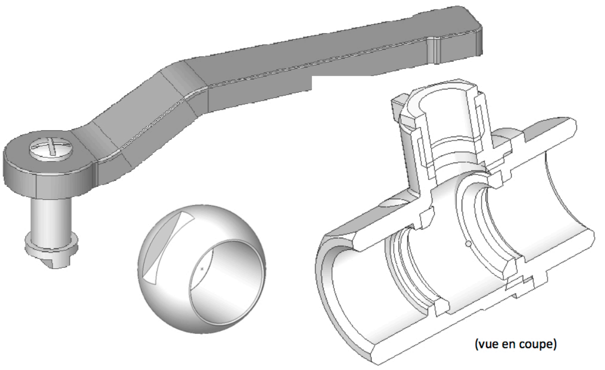
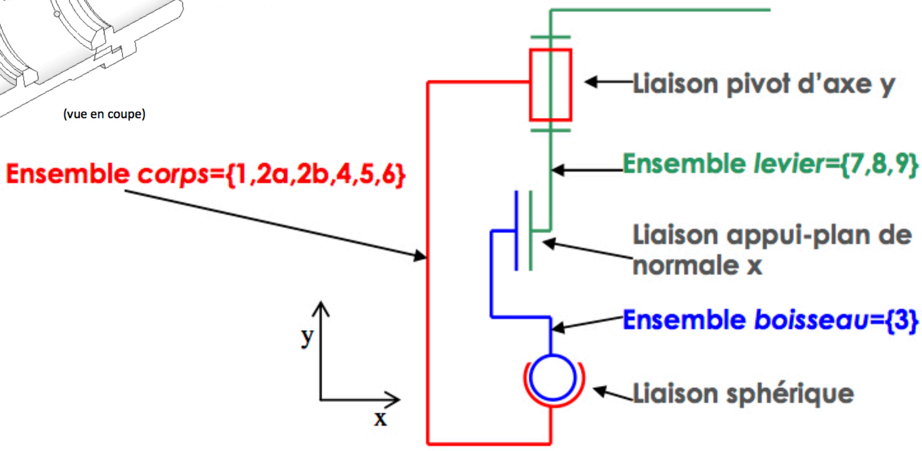
Exercice 1 : ***Vanne à boisseau***





Exercice 2 : ***Barrière Sinusmatic***

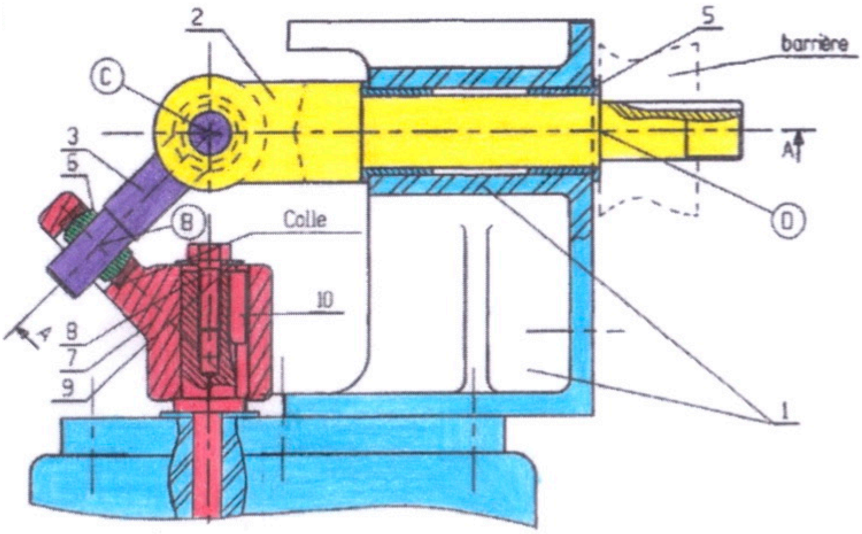
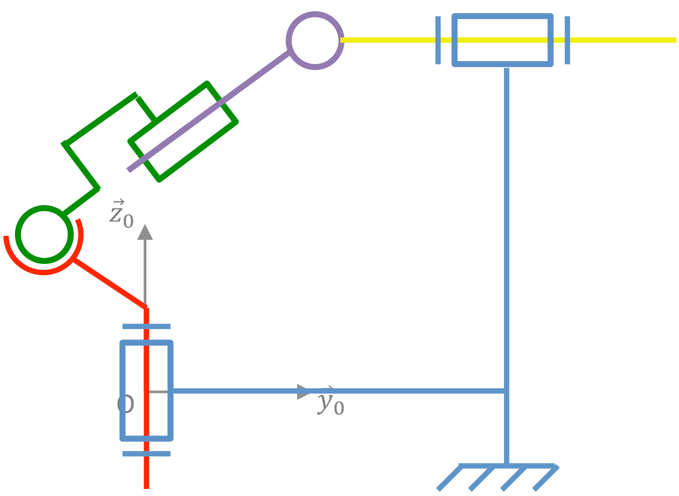
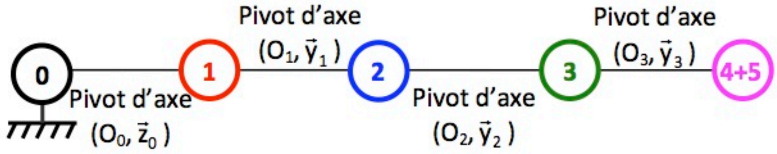


Schéma cinématique 2D dans le plan $(O, \vec{y}_0, \vec{z}_0)$ pour $\vec{x}_0 = \vec{x}_4$:

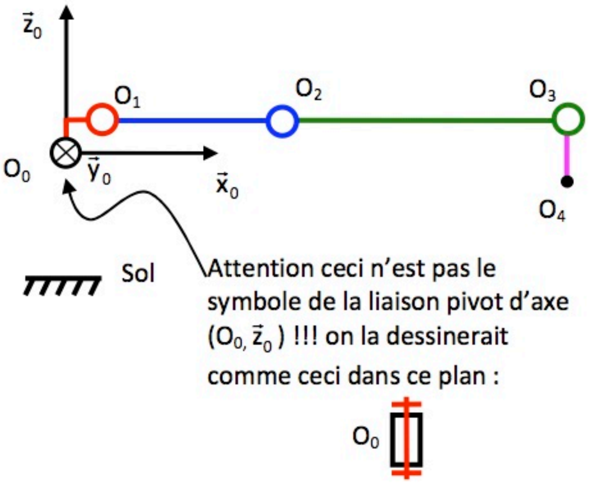


Exercice 3 : ***Bras manipulateur du robot Spirit***

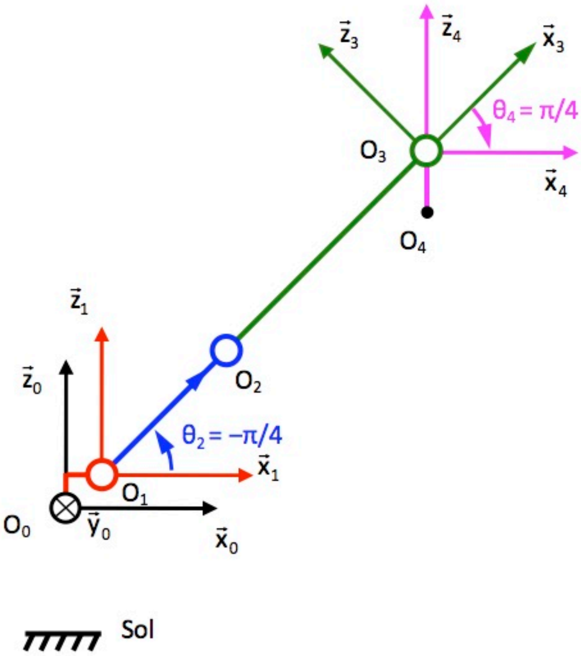
Q.1.



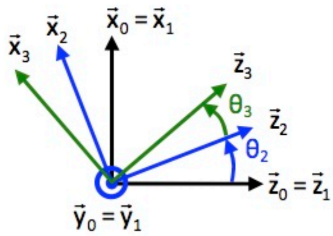
Q.2. Position P_h : $\theta_1 = 0$, $\theta_2 = 0$ et $\theta_3 = 0$.



Position P_v : $\theta_1 = 0$, $\theta_2 = -\pi/4$ et $\theta_3 = 0$.



Q.3. Pour la position P_i, on a $\theta_1 = 0$, $\theta_2 = -\pi/4$, $\theta_3 = \pi/2$.



$\rightarrow \overrightarrow{O_0O_3} = \overrightarrow{O_0O_1} + \overrightarrow{O_1O_2} + \overrightarrow{O_2O_3} = a_1.\vec{x}_1 + c_1.\vec{z}_1 + a_2.\vec{x}_2 + a_3.\vec{x}_3$

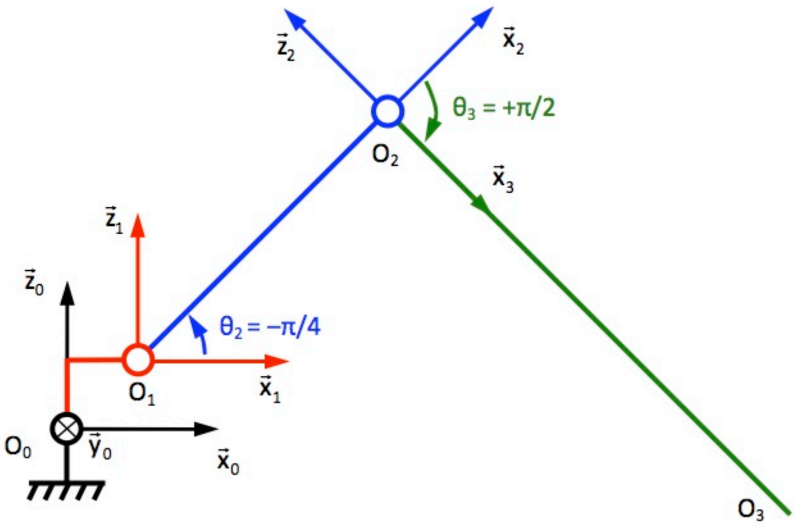
Avec $\vec{x}_2 = -\sin\theta_2.\vec{z}_0 + \cos\theta_2.\vec{x}_0$

et $\vec{x}_3 = -\sin(\theta_2 + \theta_3).\vec{z}_0 + \cos(\theta_2 + \theta_3).\vec{x}_0$

$$\overrightarrow{O_0O_3} = \begin{vmatrix} a_1 + a_2.\cos\theta_2 + a_3.\cos(\theta_2+\theta_3) \\ 0 \\ c_1 - a_2.\sin\theta_2 - a_3.\sin(\theta_2+\theta_3) \end{vmatrix}_0$$

A.N. : $$\overrightarrow{O_0O_3} = \begin{vmatrix} 0{,}1 + \frac{\sqrt{2}}{2}.(0{,}5 + 0{,}8) \\ 0 \\ 0{,}1 + \frac{\sqrt{2}}{2}.(0{,}5 - 0{,}8) \end{vmatrix}_0$$

$\rightarrow \boxed{\overrightarrow{O_0O_3} = 1{,}02.\vec{x}_0 - 0{,}11.\vec{z}_0}$



Q.4. Calcul de la hauteur maximale d'étude de la roche par rapport au sol.

On a : $-\pi/2 \leq \theta_1 \leq \pi/2$

$-\pi/4 \leq \theta_2 \leq \pi/4$

$0 \leq \theta_3 \leq \pi$

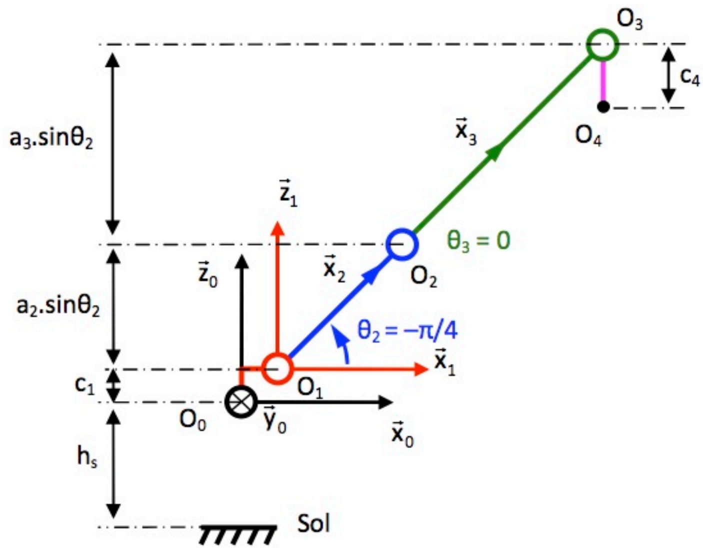
et O_3O_4 doit être vertical tel que $(\vec{z}_0, \vec{z}_4) = 0$.

$$\boxed{h_{maxi} = h_s + c_1 + (a_2 + a_3).\sin\theta_2 - c_4}$$

A.N. :

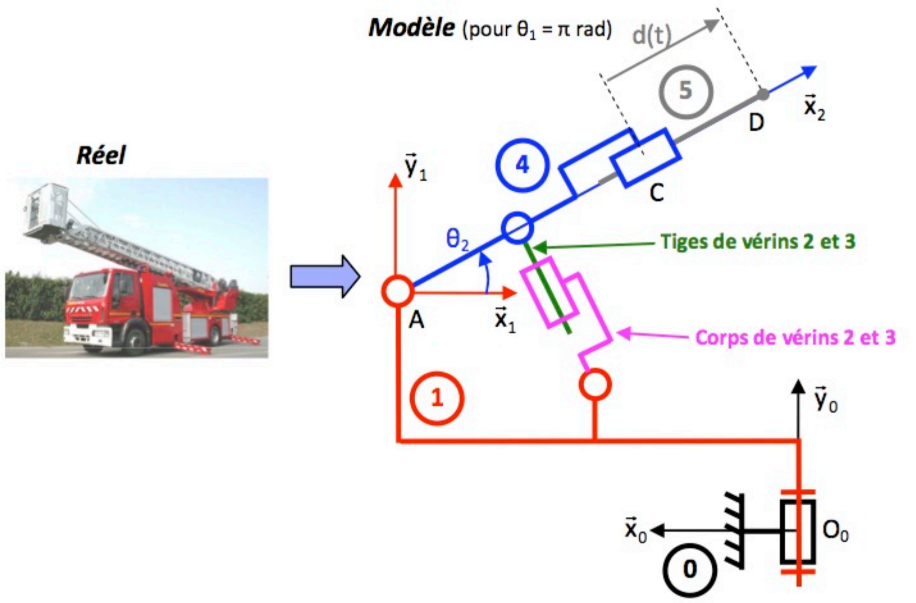
$$h_{maxi} = 0{,}5 + 0{,}1 + \frac{\sqrt{2}}{2}.(0{,}5 + 0{,}8) - 0{,}15$$

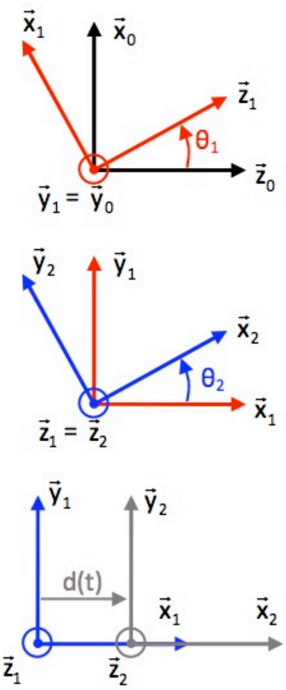
$\boxed{h_{maxi} = 1{,}37 \text{ m}}$ → C.d.C.F. ok.



Exercice 4 : *Echelle Pivotante Automatique*

Q.1. et **Q.2.**





Q.3. $\overrightarrow{O_0D} = \overrightarrow{O_0A} + \overrightarrow{AC} + \overrightarrow{CD} = -b.\vec{x}_1 + a.\vec{y}_1 + c.\vec{x}_2 + d(t).\vec{x}_2$ avec :

$\vec{x}_1 = -\sin\theta_1.\vec{z}_0 + \cos\theta_1.\vec{x}_0$

$\vec{y}_1 = \vec{y}_0$

$\vec{x}_2 = \cos\theta_2.\vec{x}_1 + \sin\theta_2.\vec{y}_1$

$$\rightarrow \overrightarrow{O_0D} = -b.(-\sin\theta_1.\vec{z}_0 + \cos\theta_1.\vec{x}_0) + a.\vec{y}_0 + (c + d(t)).(\cos\theta_2.\vec{x}_1 + \sin\theta_2.\vec{y}_1) = \left|\begin{array}{l} b.\cos\theta_1 + (c + d(t)).\cos\theta_2.\cos\theta_1 \\ a + (c + d(t)).\sin\theta_2 \\ b.\sin\theta_1 - (c + d(t)).\cos\theta_2.\sin\theta_1 \end{array}\right._{b0}$$