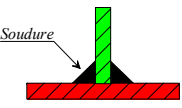
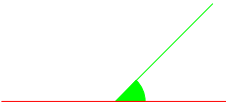
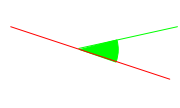
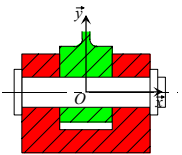
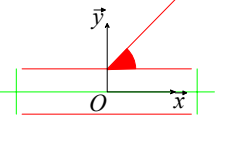
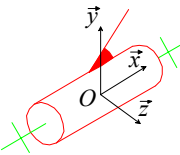
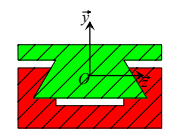
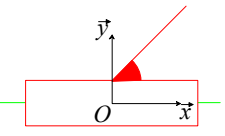
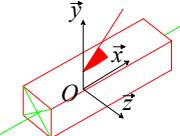
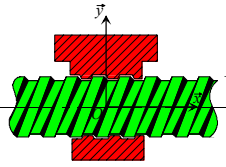
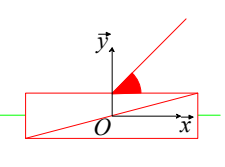
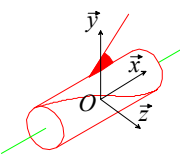
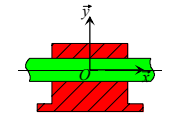
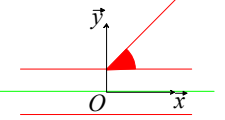
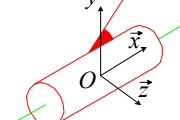
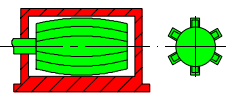
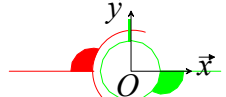
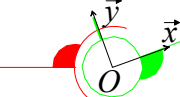


Les liaisons

Les pièces de couleur **rouge** sont les pièces N°1 et les pièces de couleur **verte** sont les pièces N°2.
 Les liaisons sont modélisées selon la normalisation NF EN 23952

Nom de la liaison	Exemple	Représentation plane	Représentation spatiale	n_C	Torseur des petits déplacements	Torseur cinématique	Torseur transmissible	Points de réduction	n_S
Liaison encastrement				0	$_A \begin{Bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	$_A \begin{Bmatrix} 0 & 0 \\ 0 & 0 \\ 0 & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	$_A \begin{Bmatrix} X_{12} & L_{12} \\ Y_{12} & M_{12} \\ Z_{12} & N_{12} \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	Tous les points	6
Liaison pivot d'axe $(O; \bar{x})$				1	$_A \begin{Bmatrix} \delta_{\theta_{x21}} & 0 \\ 0 & 0 \\ 0 & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	$_A \begin{Bmatrix} \alpha_{21} & 0 \\ 0 & 0 \\ 0 & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	$_A \begin{Bmatrix} X_{12} & 0 \\ Y_{12} & M_{12} \\ Z_{12} & N_{12} \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	$A \in (O; \bar{x})$	5
Liaison glissière d'axe $(O; \bar{x})$				1	$_A \begin{Bmatrix} 0 & \delta_{x_{A21}} \\ 0 & 0 \\ 0 & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	$_A \begin{Bmatrix} 0 & u_{21} \\ 0 & 0 \\ 0 & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	$_A \begin{Bmatrix} 0 & L_{12} \\ Y_{12} & M_{12} \\ Z_{12} & N_{12} \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	Tous les points (Torseur couple)	5
Liaison hélicoïdale d'axe $(O; \bar{x})$				1	$_A \begin{Bmatrix} \delta_{\theta_{x21}} & \delta_{x_{A21}} \\ 0 & 0 \\ 0 & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	$_A \begin{Bmatrix} \alpha_{21} & u_{21} \\ 0 & 0 \\ 0 & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	$_A \begin{Bmatrix} 0 & 0 \\ Y_{12} & M_{12} \\ Z_{12} & N_{12} \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	$A \in (O; \bar{x})$	5
Liaison pivot glissant d'axe $(O; \bar{x})$				2	$_A \begin{Bmatrix} \delta_{\theta_{x21}} & \delta_{x_{A21}} \\ 0 & 0 \\ 0 & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	$_A \begin{Bmatrix} \alpha_{21} & u_{21} \\ 0 & 0 \\ 0 & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	$_A \begin{Bmatrix} 0 & 0 \\ Y_{12} & M_{12} \\ Z_{12} & N_{12} \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	$A \in (O; \bar{x})$	4
Liaison sphérique à doigt d'axe $(O; \bar{x})$				2	$_A \begin{Bmatrix} \delta_{\theta_{y21}} & 0 \\ \delta_{\theta_{z21}} & 0 \\ 0 & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	$_A \begin{Bmatrix} \alpha_{21} & 0 \\ \beta_{21} & 0 \\ 0 & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	$_A \begin{Bmatrix} X_{12} & 0 \\ Y_{12} & 0 \\ Z_{12} & N_{12} \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	Point O	4

Nom de la liaison	Exemple	Représentation plane	Représentation spatiale	n_c	Torseur des petits déplacements	Torseur cinématique	Torseur transmissible	Points de réduction	n_s
Liaison sphérique de centre O				3	${}_A \begin{Bmatrix} \delta_{\theta_{x21}} & 0 \\ \delta_{\theta_{y21}} & 0 \\ \delta_{\theta_{z21}} & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	${}_A \begin{Bmatrix} \alpha_{21} & 0 \\ \beta_{21} & 0 \\ \gamma_{21} & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	${}_A \begin{Bmatrix} X_{12} & 0 \\ Y_{12} & 0 \\ Z_{12} & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	Point O	3
Liaison appui plan normale $(O; \bar{x})$				3	${}_A \begin{Bmatrix} \delta_{\theta_{x21}} & 0 \\ 0 & \delta_{y_{A21}} \\ 0 & \delta_{z_{A21}} \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	${}_A \begin{Bmatrix} \alpha_{21} & 0 \\ 0 & v_{21} \\ 0 & w_{21} \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	${}_A \begin{Bmatrix} X_{12} & 0 \\ 0 & M_{12} \\ 0 & N_{12} \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	Tous les points	3
Liaison linéaire rectiligne de normale $(O; \bar{x})$				4	${}_A \begin{Bmatrix} \delta_{\theta_{x21}} & 0 \\ 0 & \delta_{y_{A21}} \\ \delta_{\theta_{z21}} & \delta_{z_{A21}} \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	${}_A \begin{Bmatrix} \alpha_{21} & 0 \\ 0 & v_{21} \\ \gamma_{21} & w_{21} \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	${}_A \begin{Bmatrix} X_{12} & 0 \\ 0 & M_{12} \\ 0 & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	$A \in (O; \bar{x}, \bar{y})$	2
Liaison linéaire annulaire de centre O et d'axe $(O; \bar{x})$				4	${}_A \begin{Bmatrix} \delta_{\theta_{x21}} & \delta_{x_{A21}} \\ \delta_{\theta_{y21}} & 0 \\ \delta_{\theta_{z21}} & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	${}_A \begin{Bmatrix} \alpha_{21} & u_{21} \\ \beta_{21} & 0 \\ \gamma_{21} & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	${}_A \begin{Bmatrix} 0 & 0 \\ Y_{12} & 0 \\ Z_{12} & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	Point O	2
Liaison ponctuelle de normale $(O; \bar{x})$				5	${}_A \begin{Bmatrix} \delta_{\theta_{x21}} & 0 \\ \delta_{\theta_{y21}} & \delta_{y_{A21}} \\ \delta_{\theta_{z21}} & \delta_{z_{A21}} \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	${}_A \begin{Bmatrix} \alpha_{21} & 0 \\ \beta_{21} & v_{21} \\ \gamma_{21} & w_{21} \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	${}_A \begin{Bmatrix} X_{12} & 0 \\ 0 & 0 \\ 0 & 0 \end{Bmatrix}_{(\bar{x}, \bar{y}, \bar{z})}$	$A \in (O; \bar{x})$	1

GigaHERTZ

Les liaisons entre deux solides se définissent par la connaissance des caractéristiques générales suivantes :

- La géométrie du contact (Plan-plan, plan-cylindre, plan-sphère, cylindre-cylindre, etc.)
- La fonction mécanique de la liaison, ou l'aptitude du contact à transmettre des efforts et à permettre des mouvements relatifs (degrés de liberté).

Remarque : Les symboles des liaisons sont indépendants des solutions technologiques.