



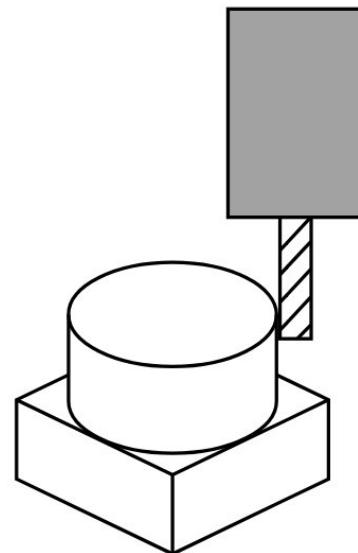
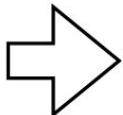
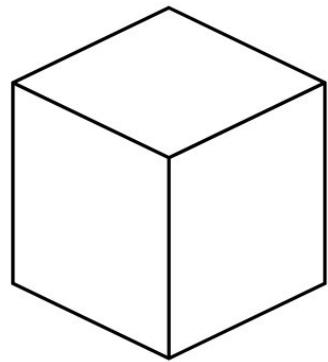
UNITÉ MIXTE DE RECHERCHE SUR LES  
SYSTÈMES MANUFACTURIERS INNOVANTS

# Du CAM au SAM: Quand l'harmonie bat la précision

- Processus de fabrication traditionnel
- Fabrication sur mesure
- Contribution

# Usinage

Matériel brut



Produit fini

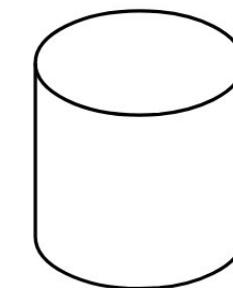




Image obtenue de [avidcnc.com](http://avidcnc.com)

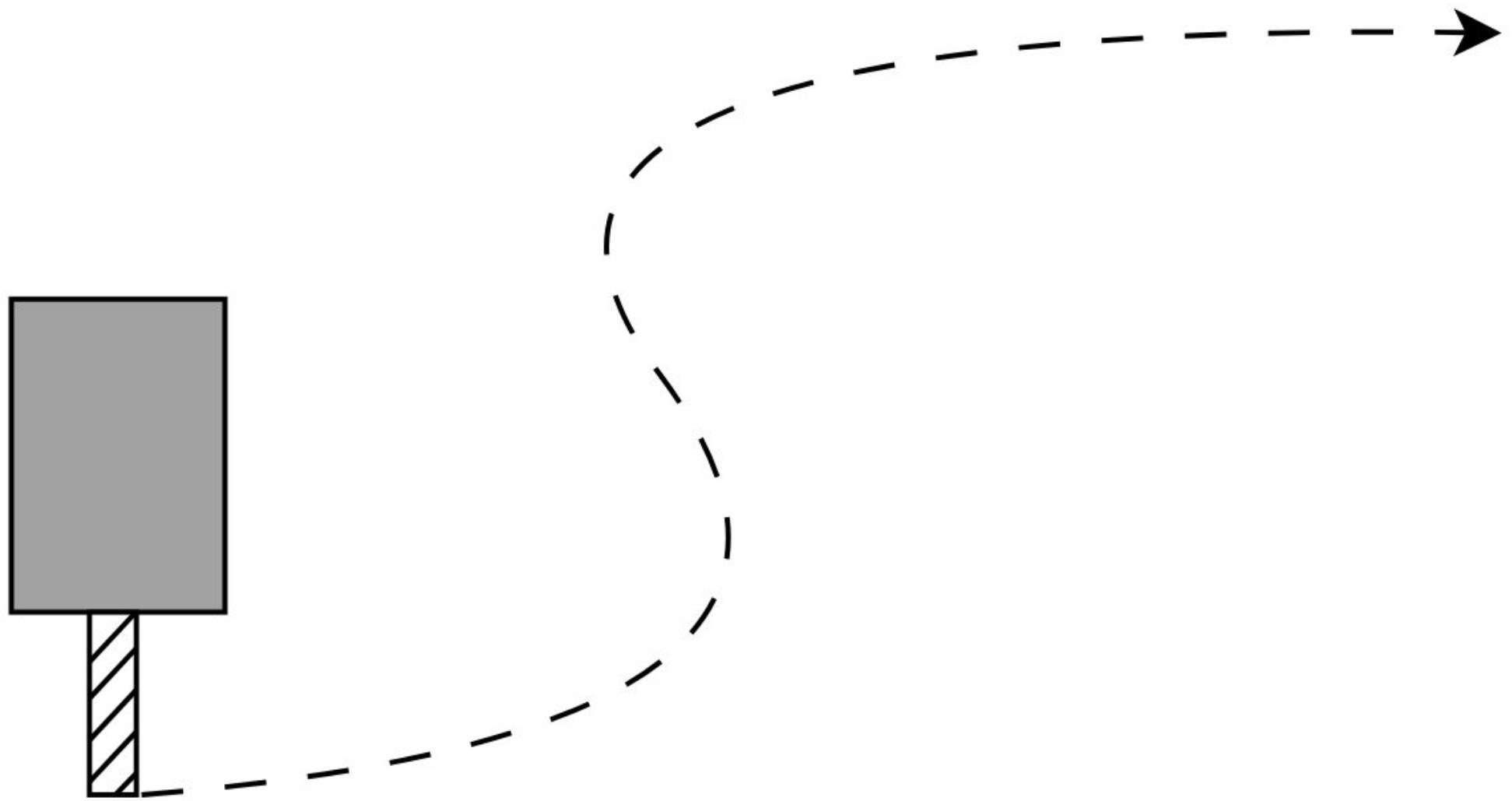
AVIDCNC

- Précise ✓
- Petit espace de travail ✗
- Peu polyvalente ✗

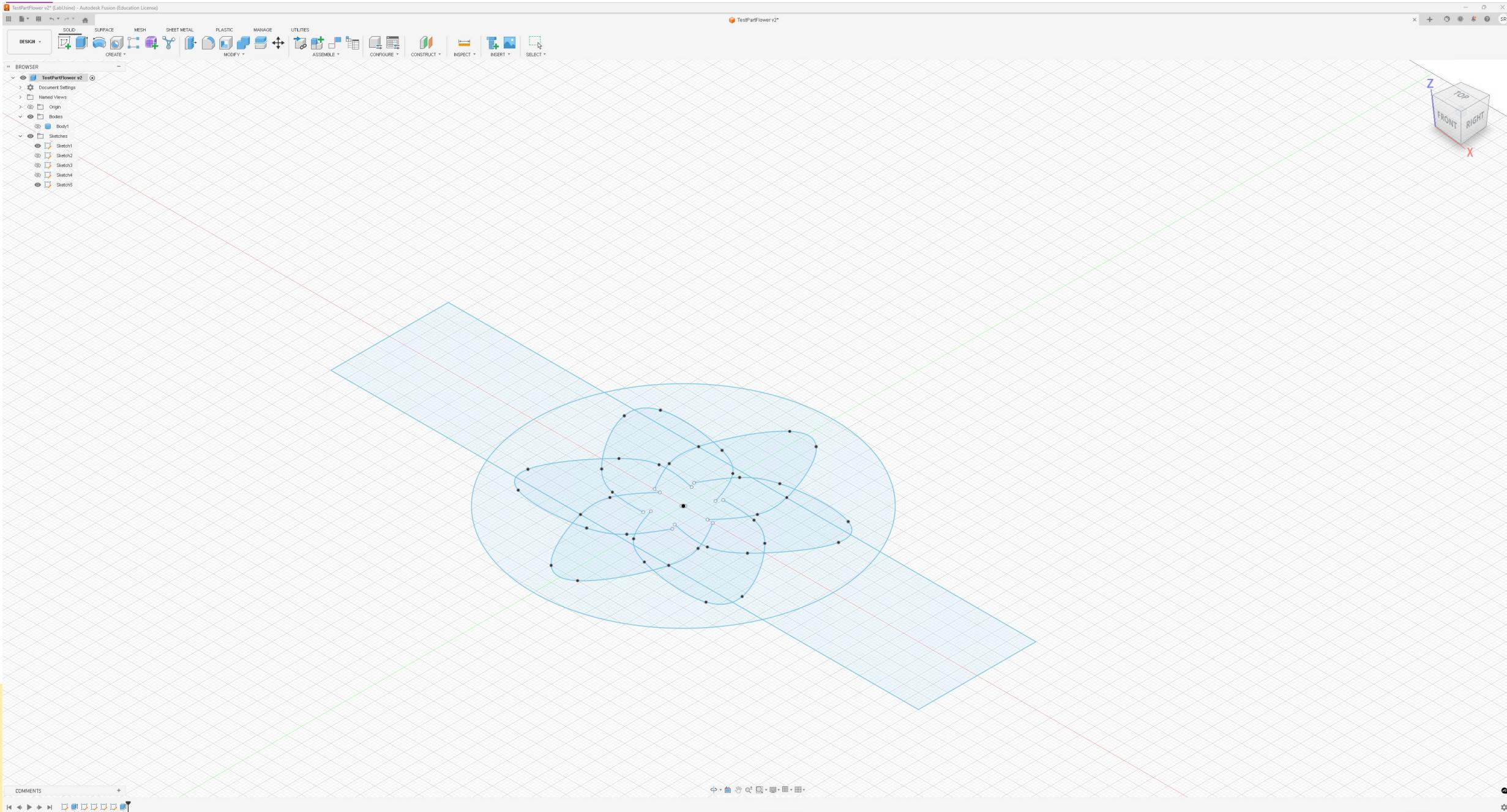


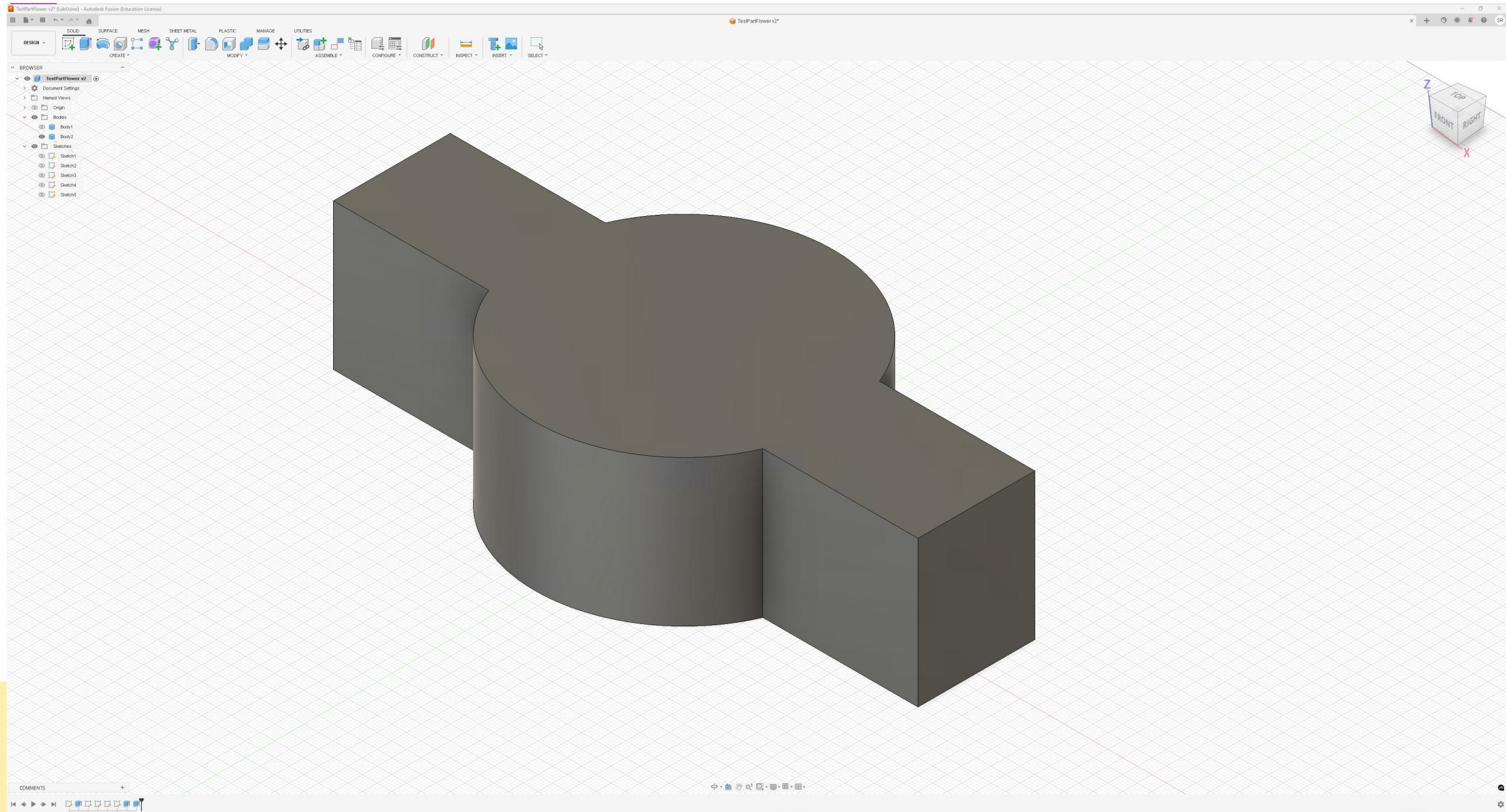
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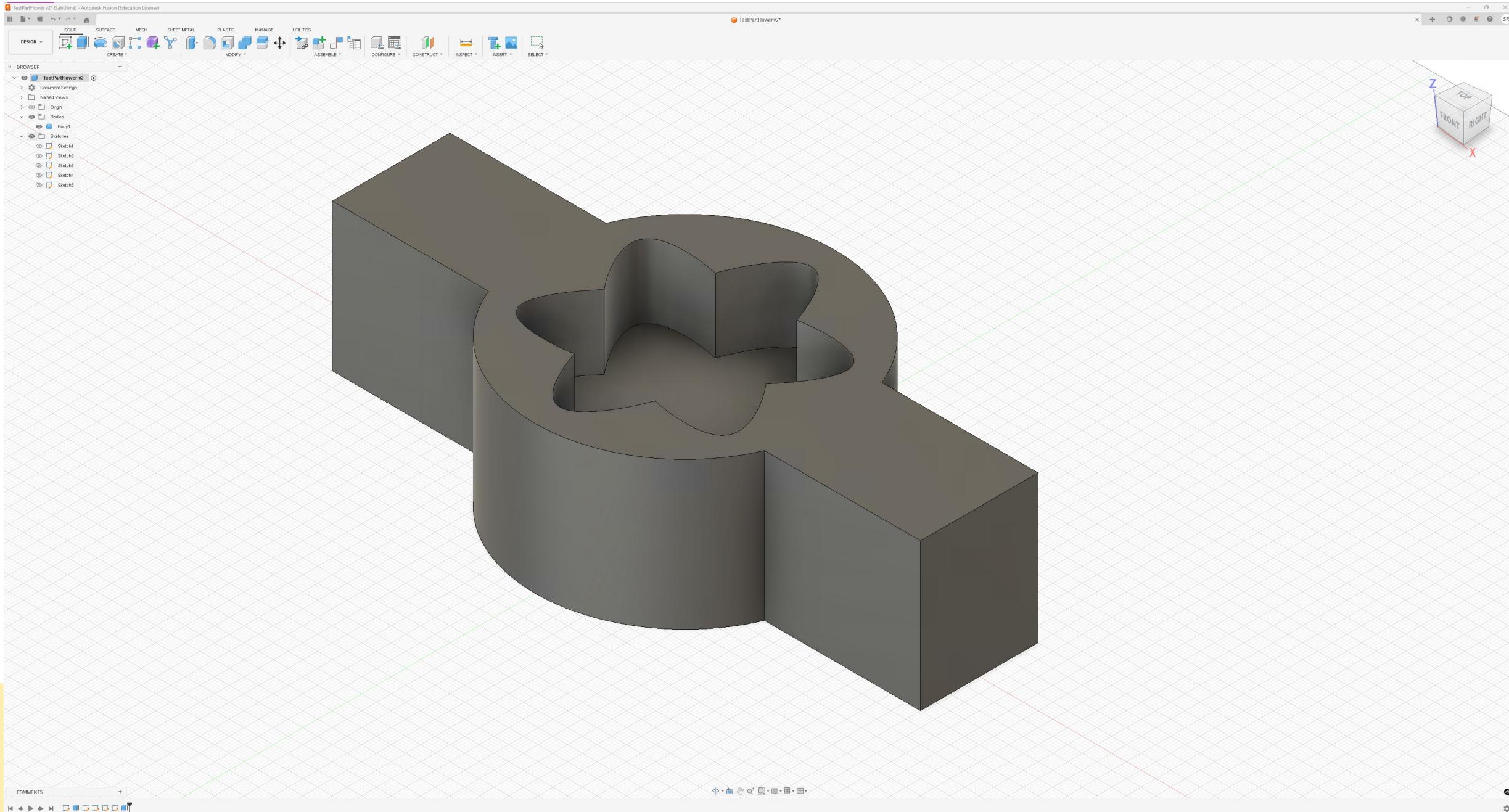
- Peu précis X
- Large espace de travail ✓
- polyvalent ✓



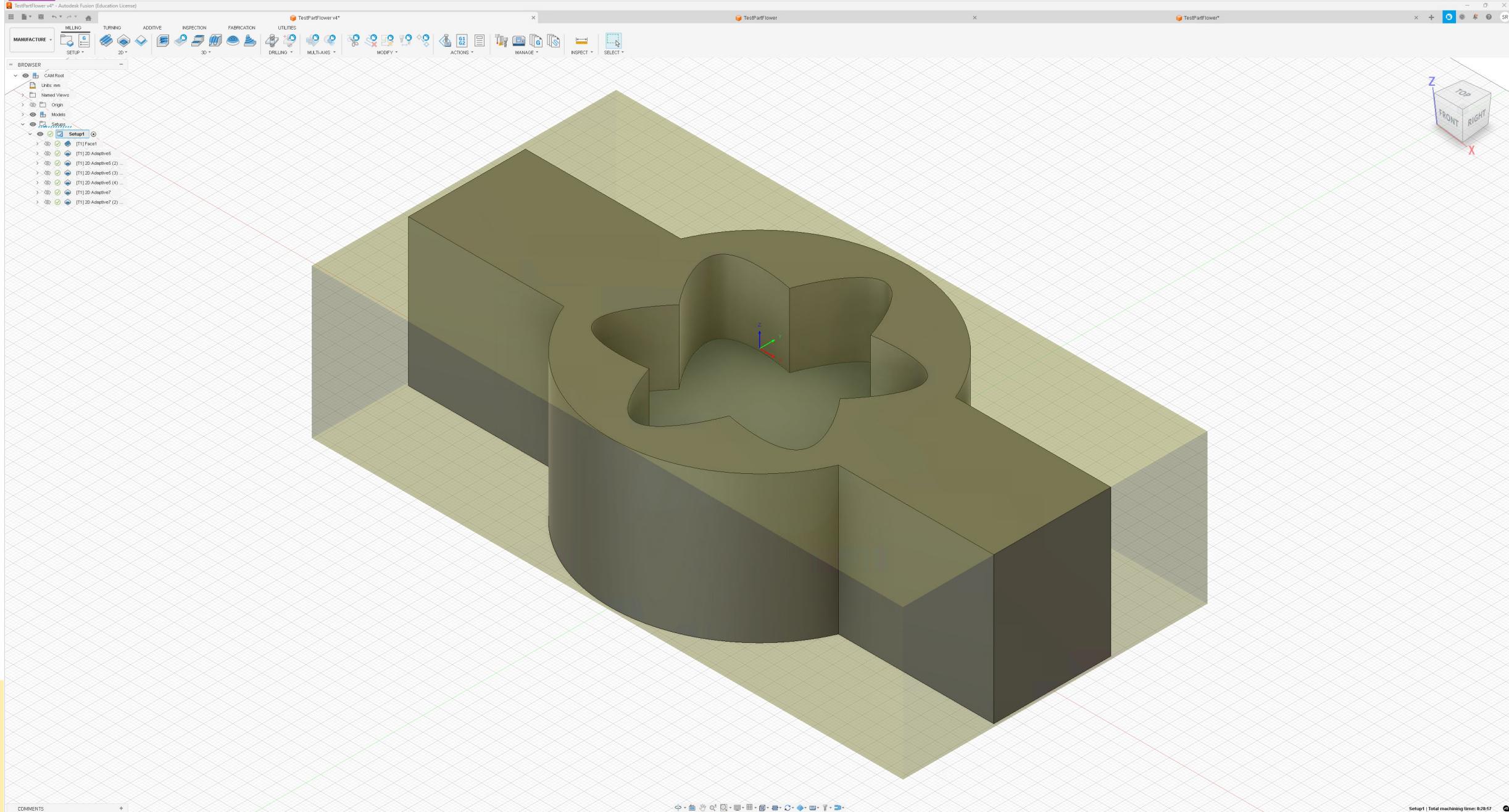
# Conception assistée par ordinateur (CAO) Computer-aided design (CAD)

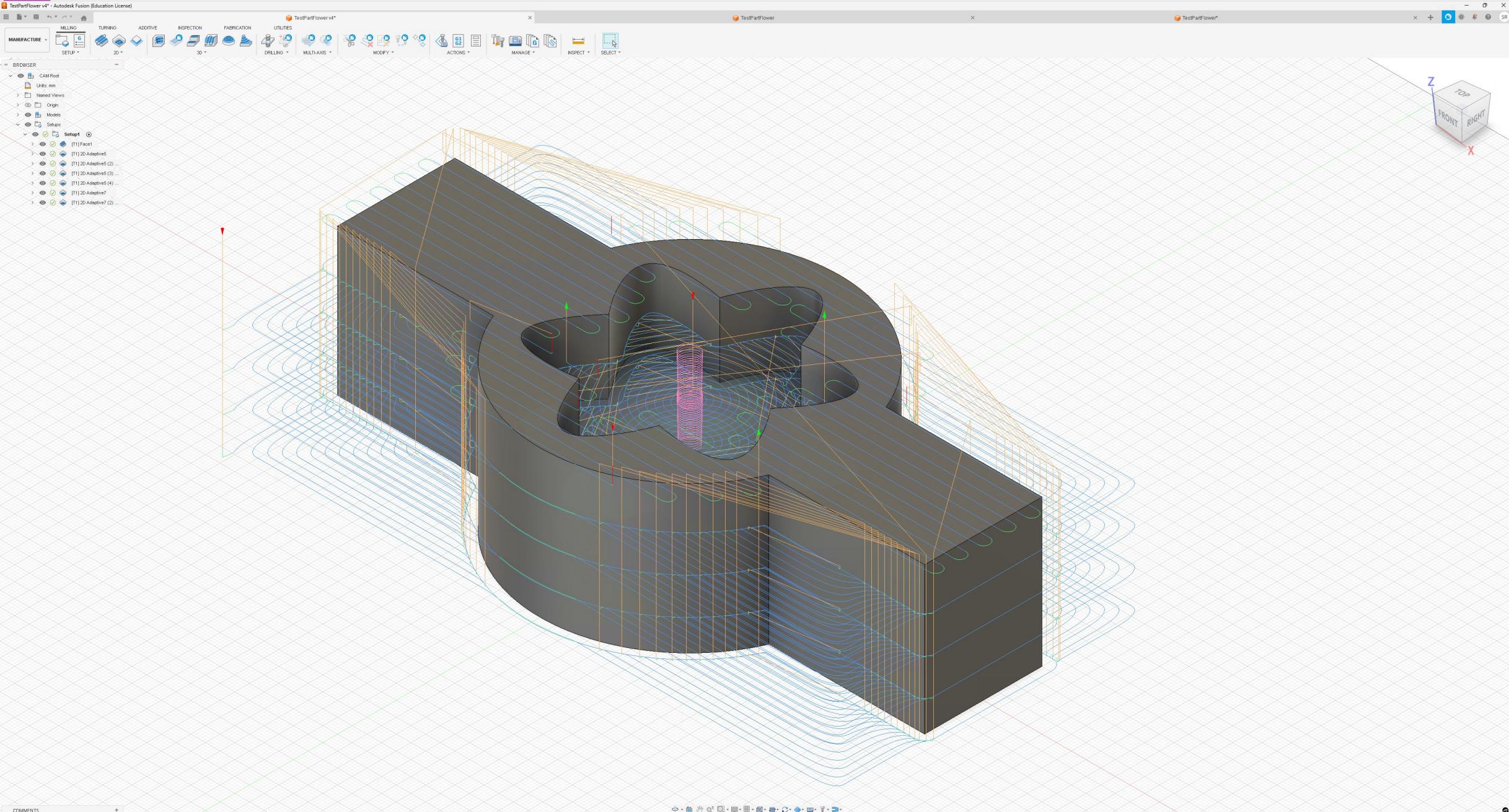






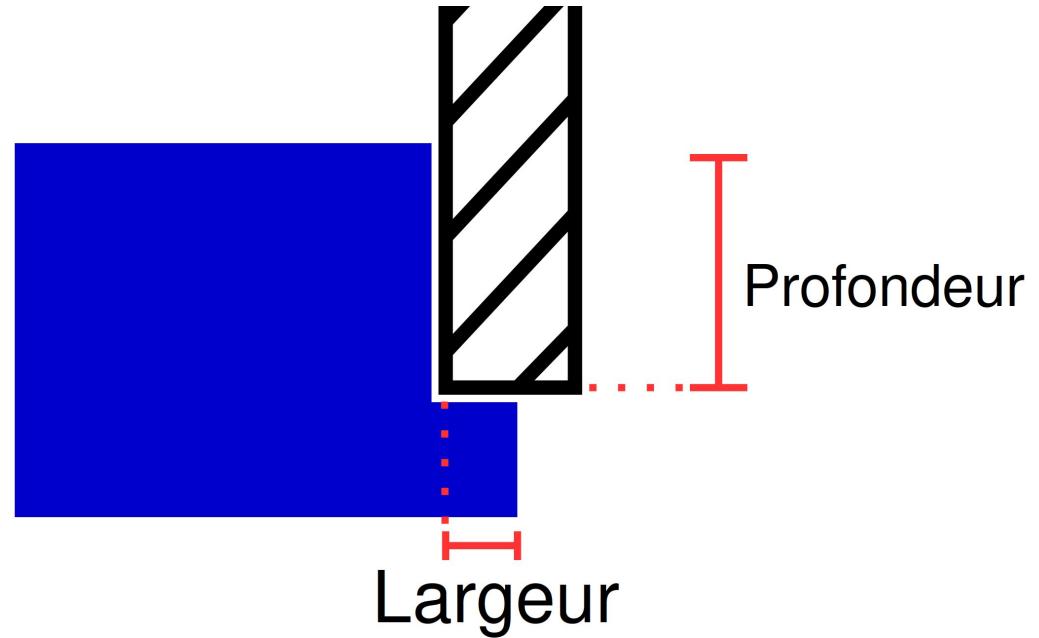
# Fabrication assistée par ordinateur (FAO) Computer-aided manufacturing (CAM)





# Considération pour le CAM

- Choix des outils
- Passe de découpe
- Entrer dans la matière



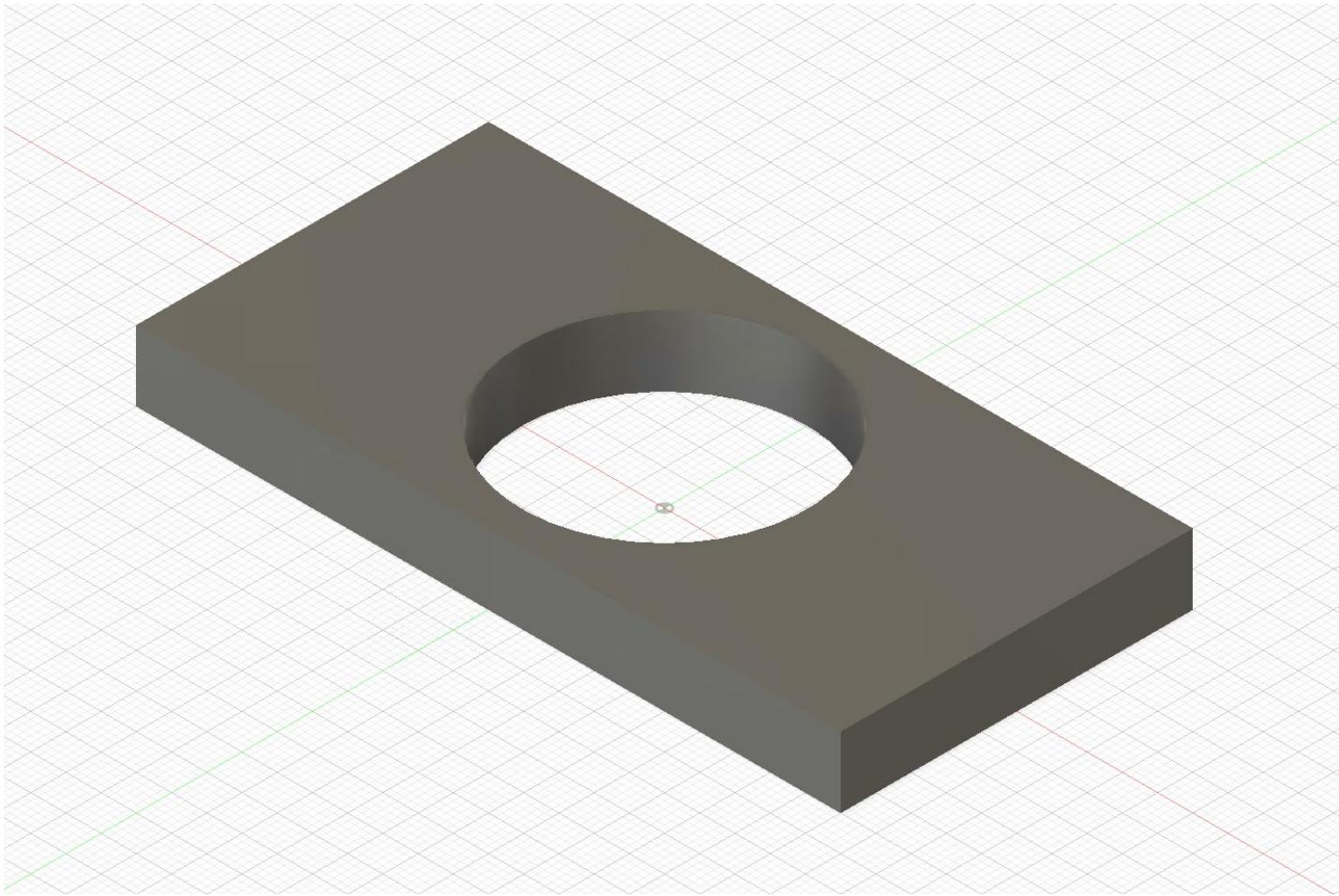
# Le processus CAD-CAM est générique

- Fonctionne pour n'importe quel dessin 3D ✓
- Pas de connaissance du produit X

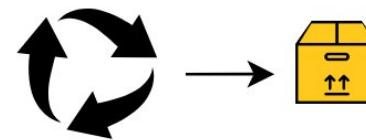
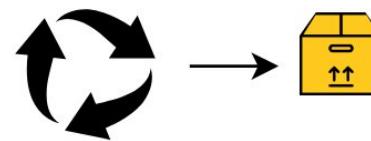
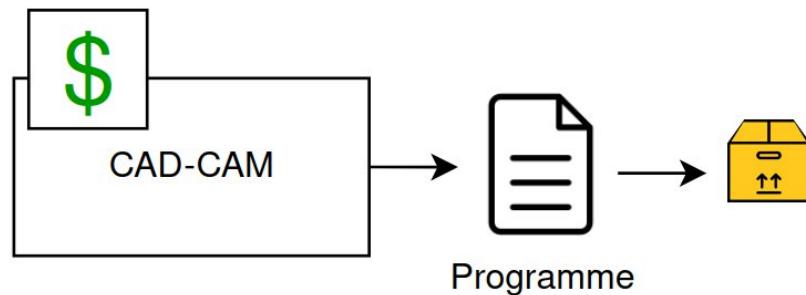
# A est pour assistée

- Conception assistée par ordinateur (CAO)
- Fabrication assistée par ordinateur (FAO)

# Extraction de caractéristiques automatique



# Fabrication de masse



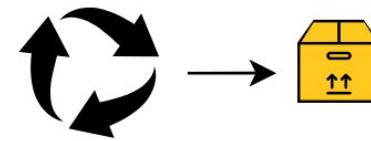
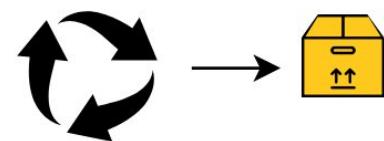
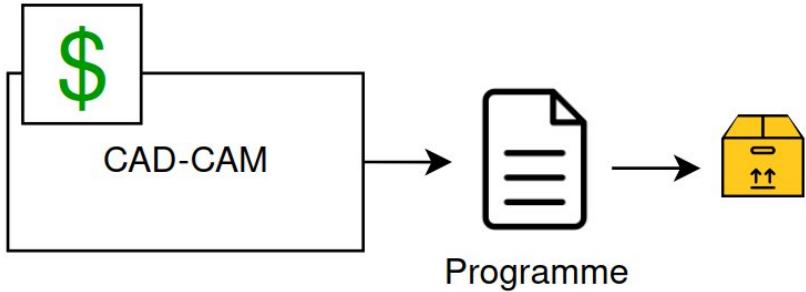
- Processus de fabrication traditionnel
- Fabrication sur mesure
- Contribution

# lab-usine

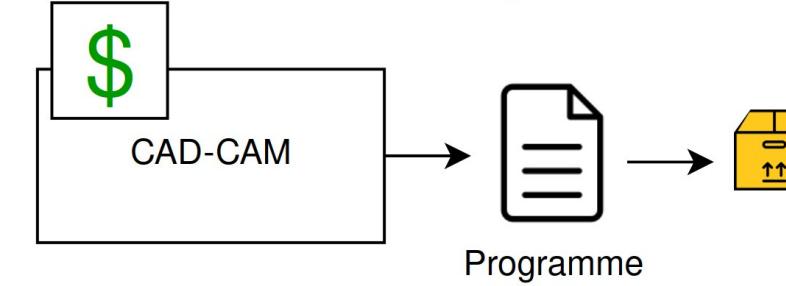
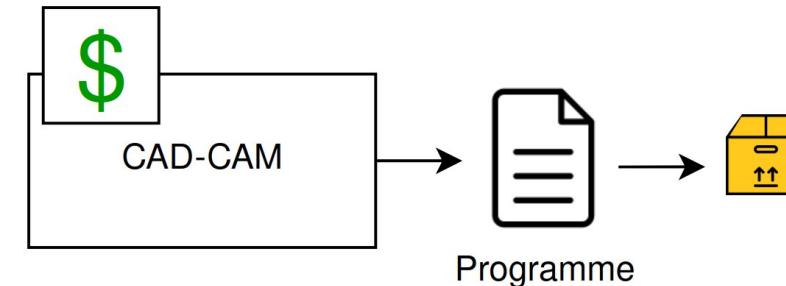
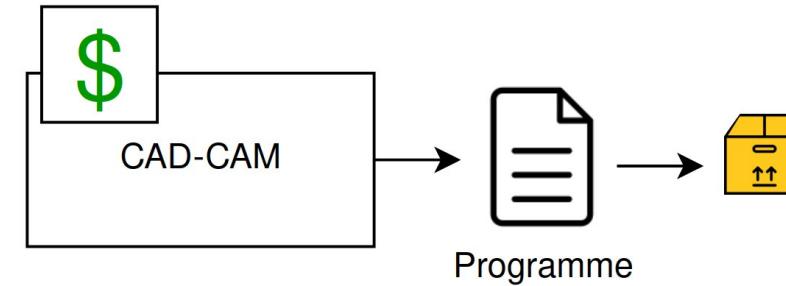
# SOKIO INDUSTRIE



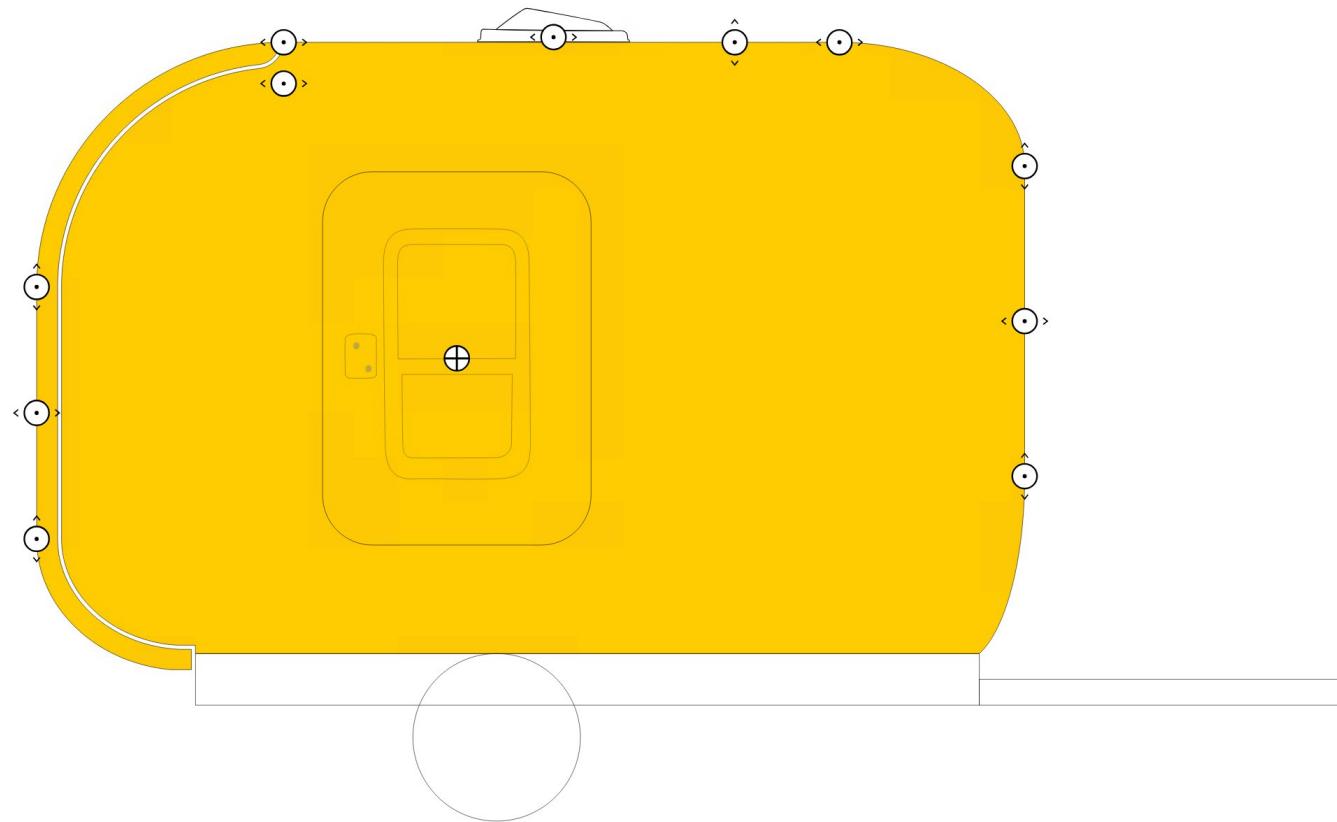
# Fabrication de masse

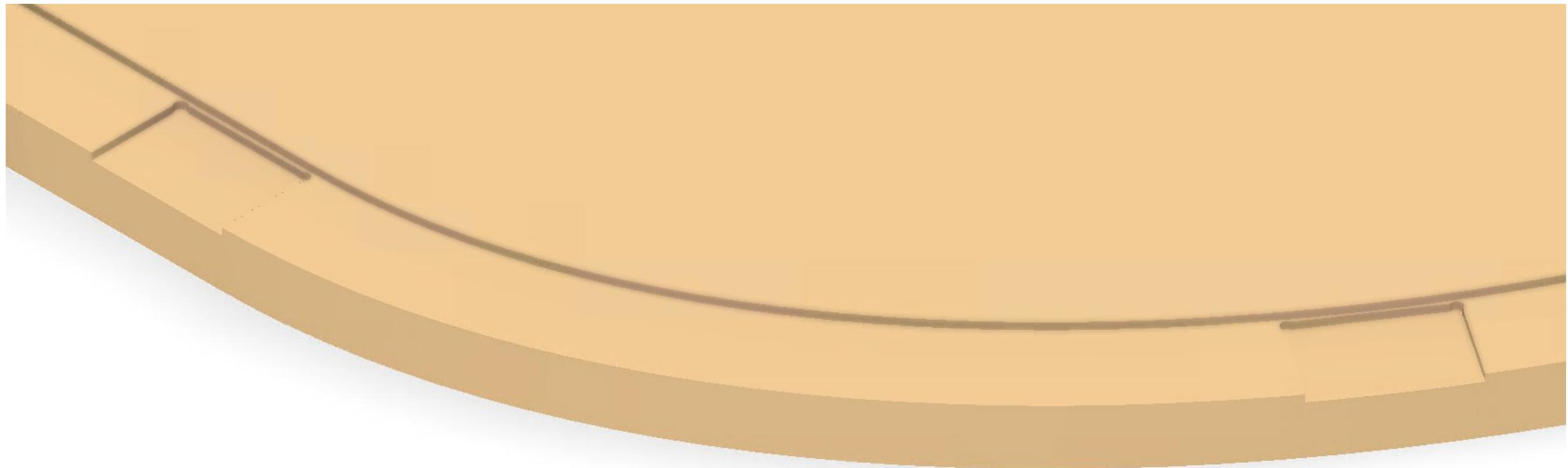


# Fabrication sur mesure



# Configurateurs



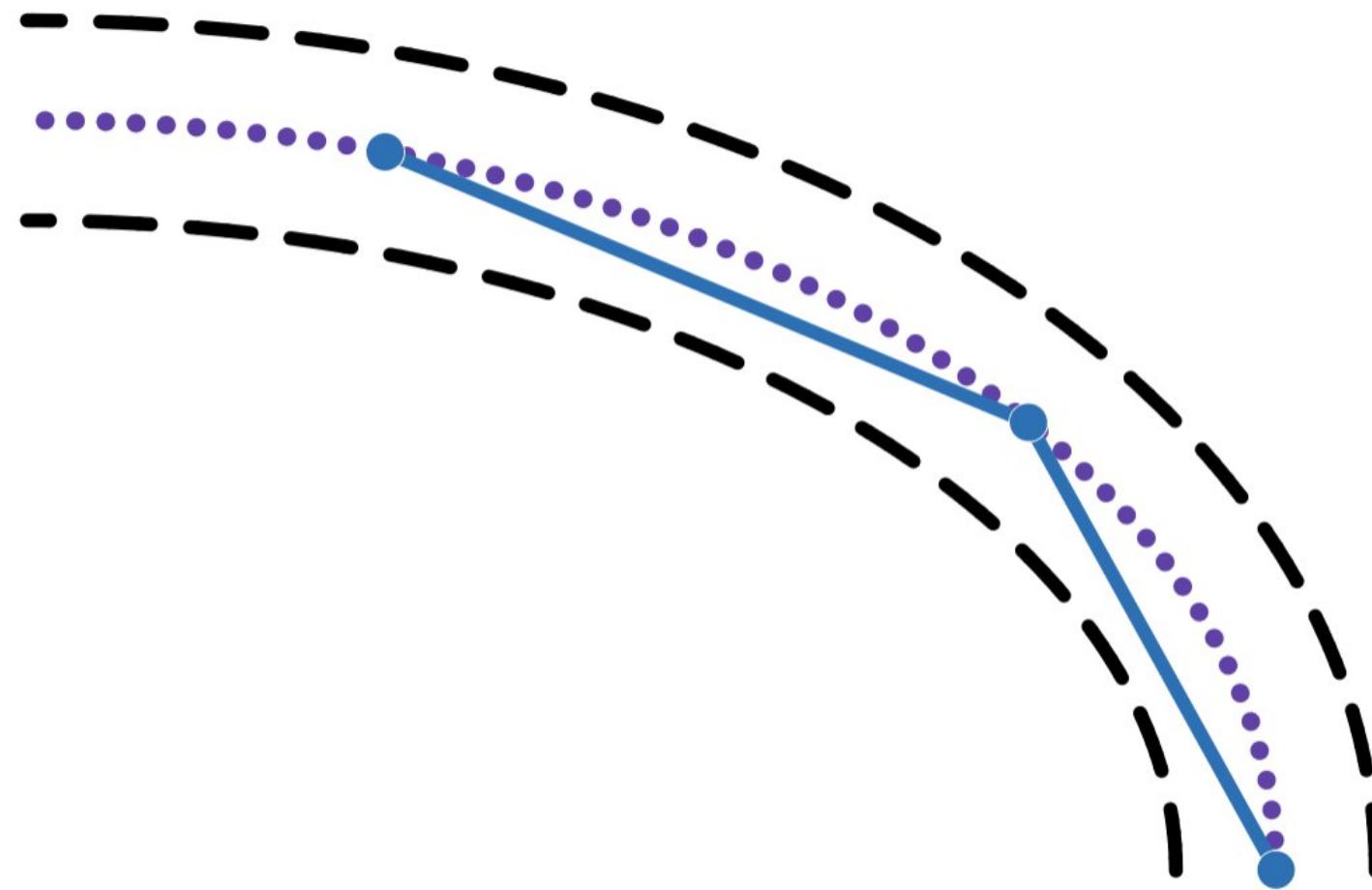


- Processus de fabrication traditionnel
- Fabrication sur mesure
- Contribution

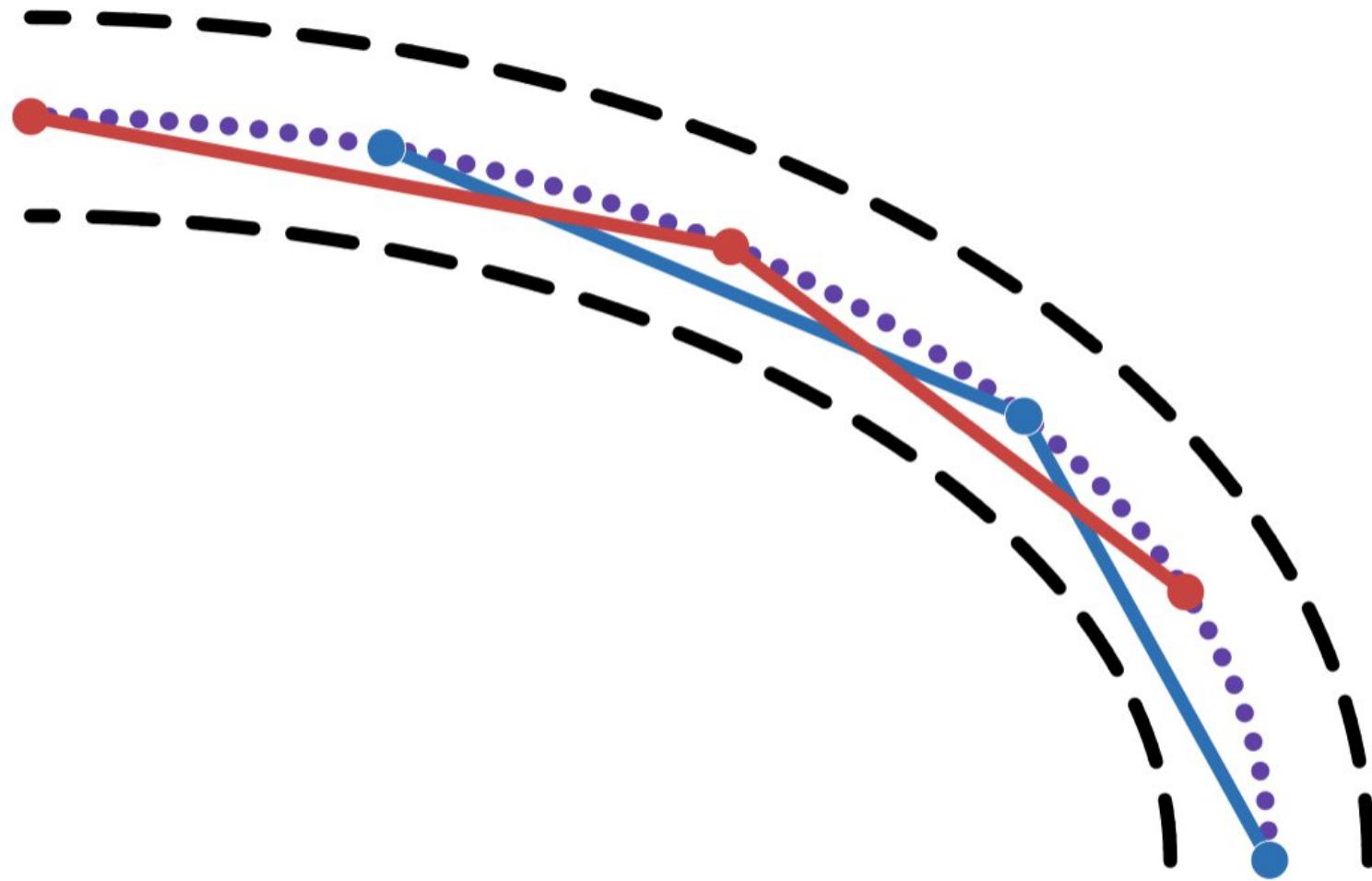
# Assemblage



# Qualité d'une pièce

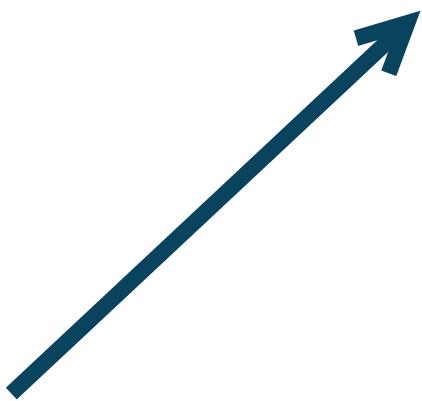


# Qualité d'un assemblage

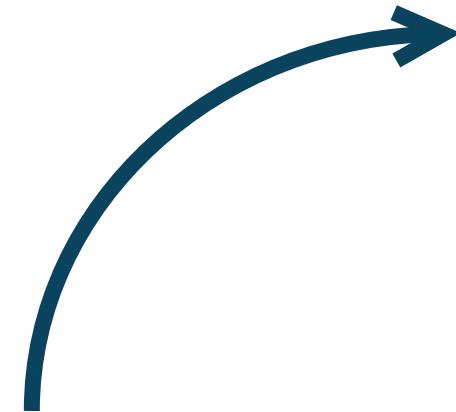


Code G

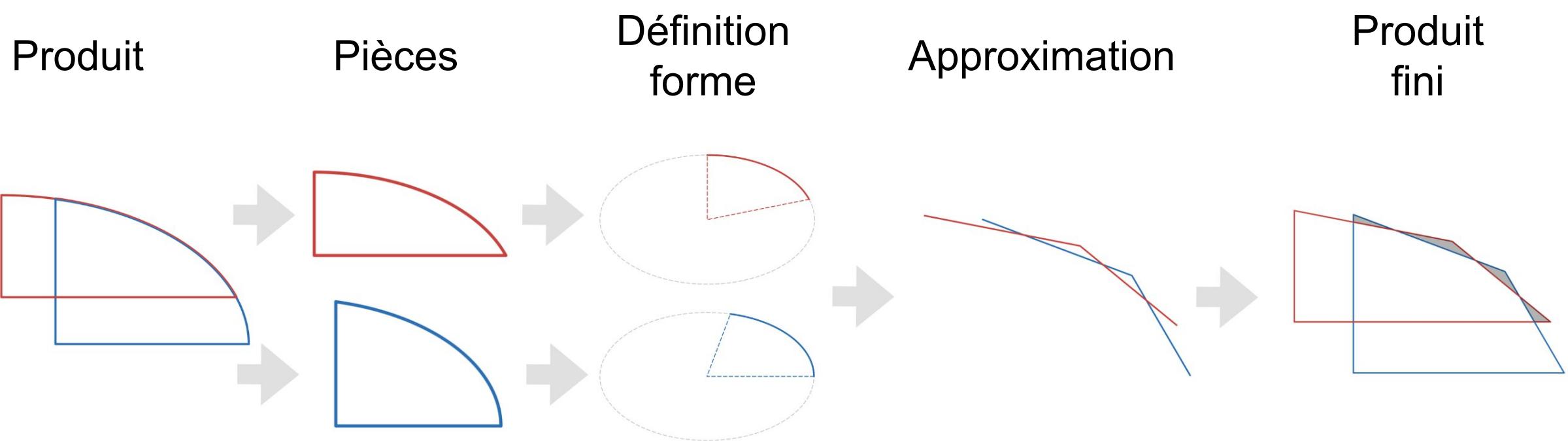
G01



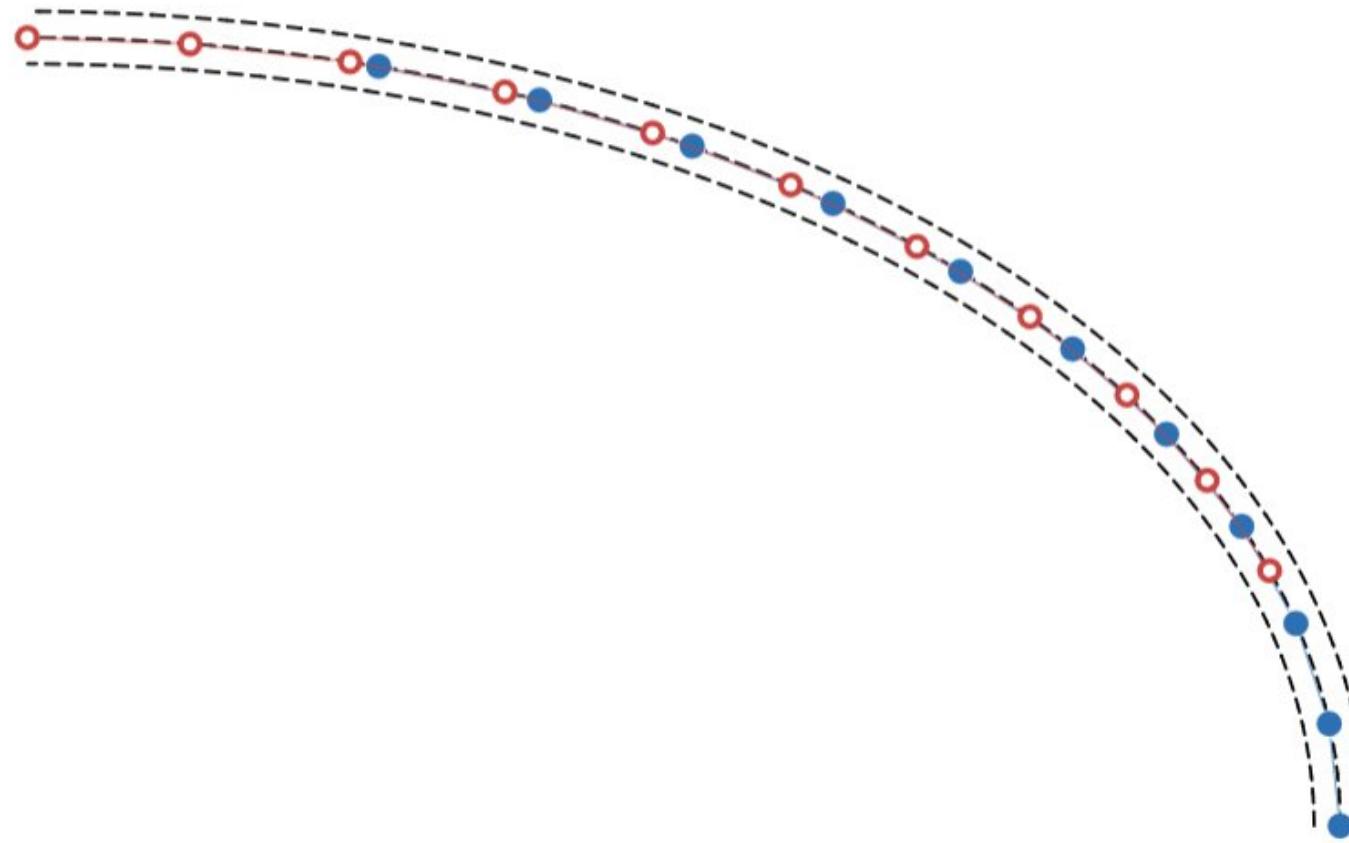
G02/G03



# Processus CAD/CAM

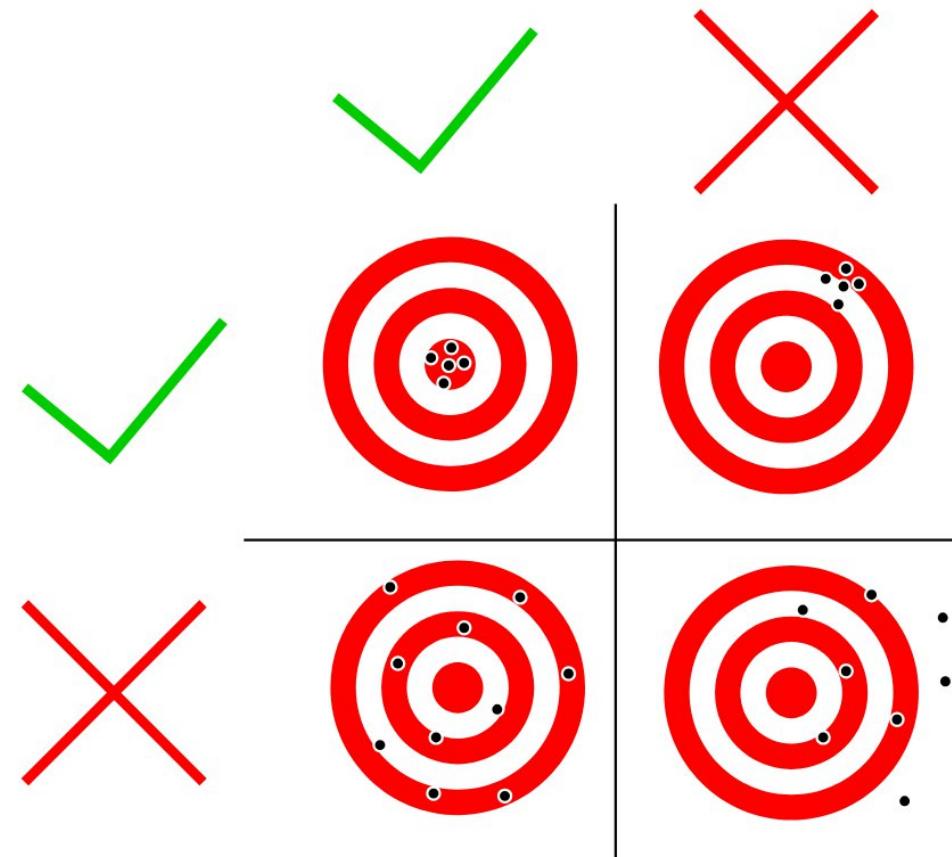


# Approximation plus fine?

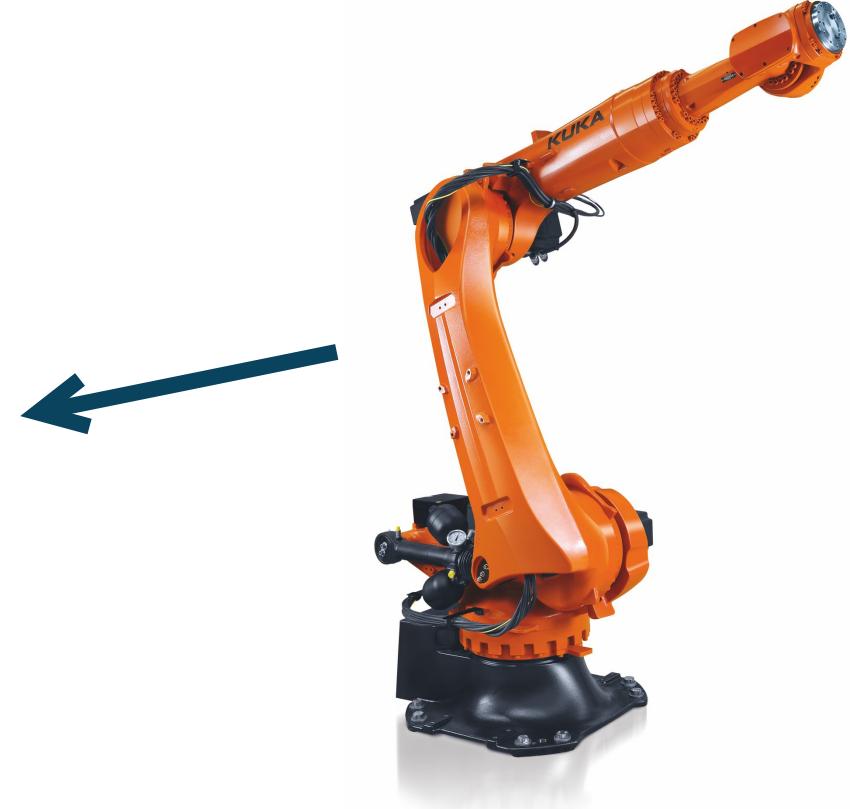
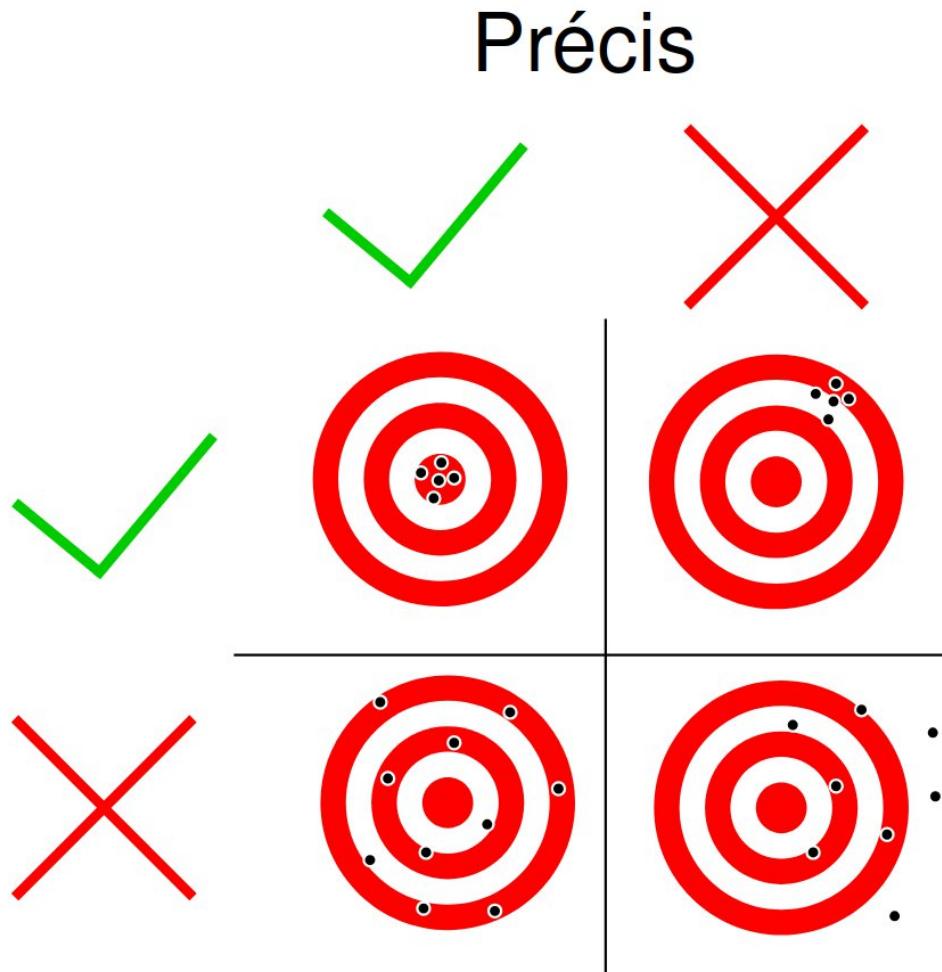


Précis

Répétable

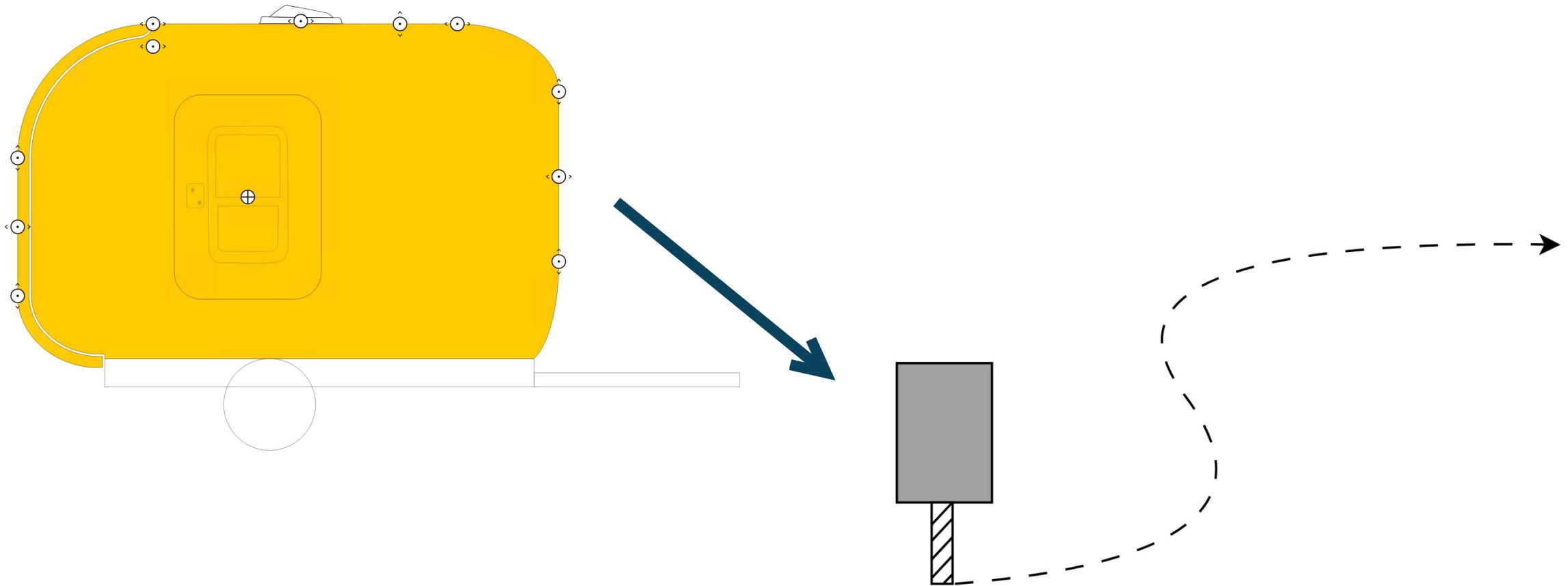


Répétable

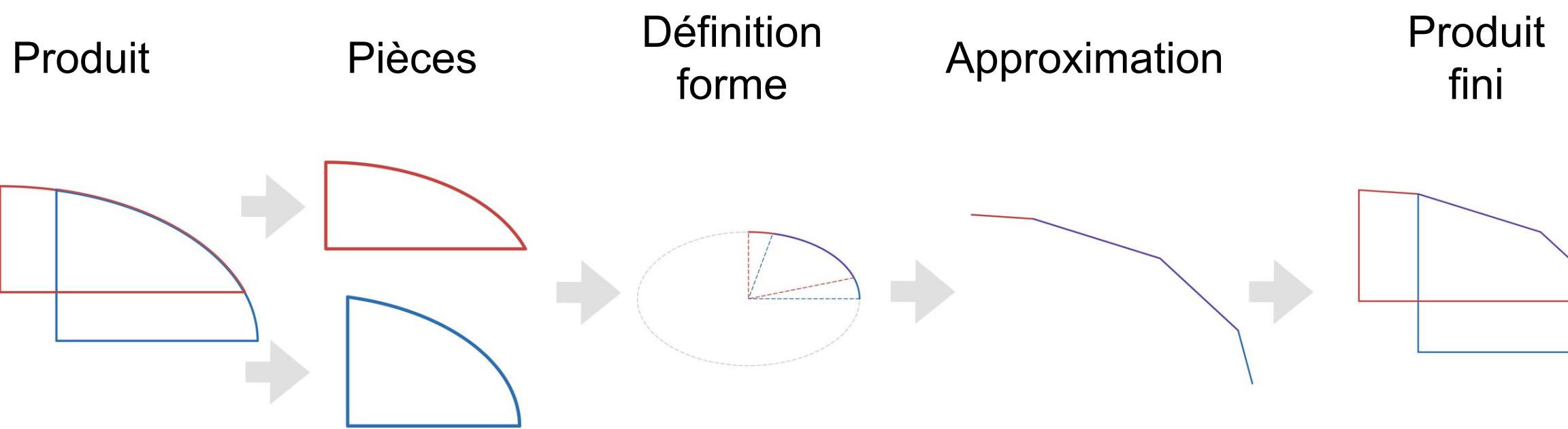


# Shared Approximation Method (SAM)

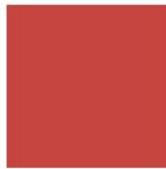
# Configurateur



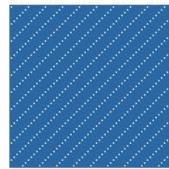
# Processus SAM



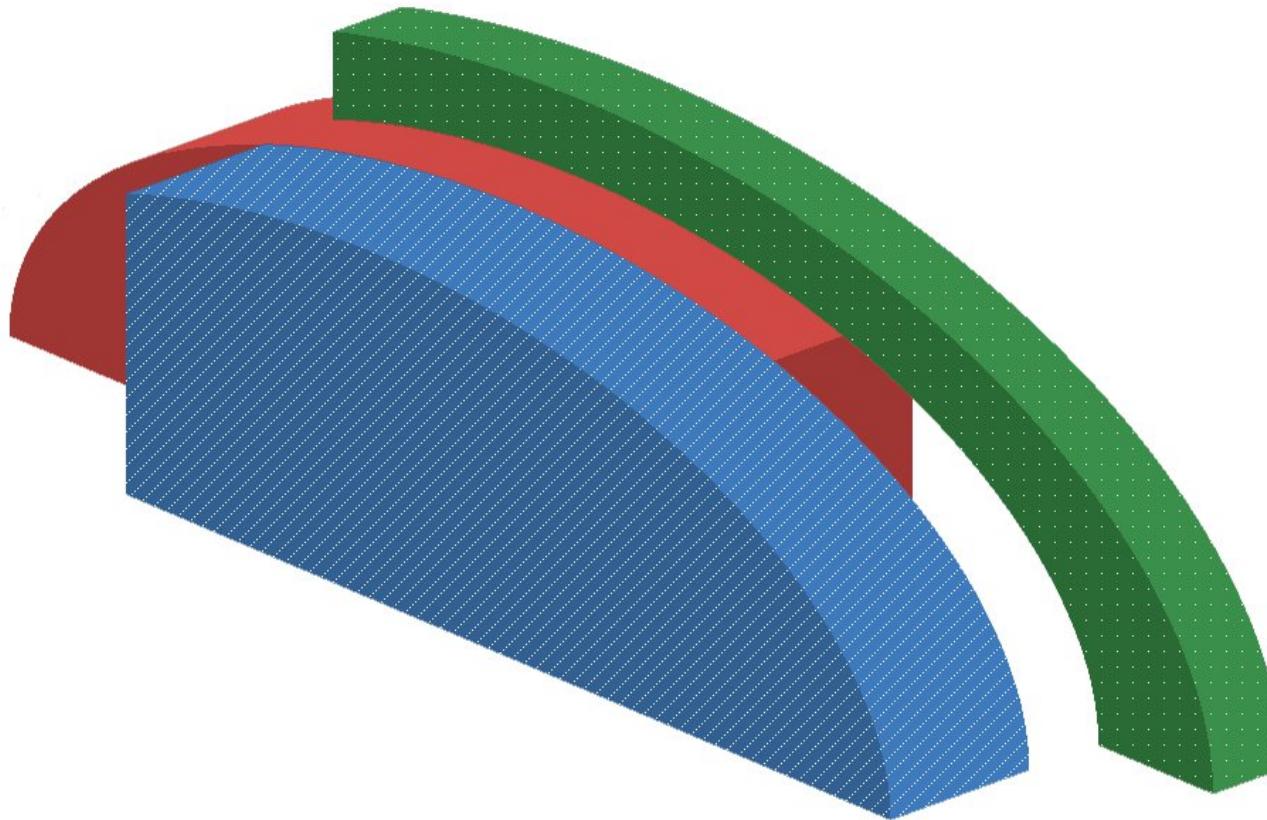
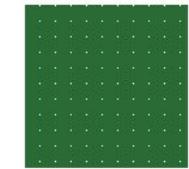
Part A



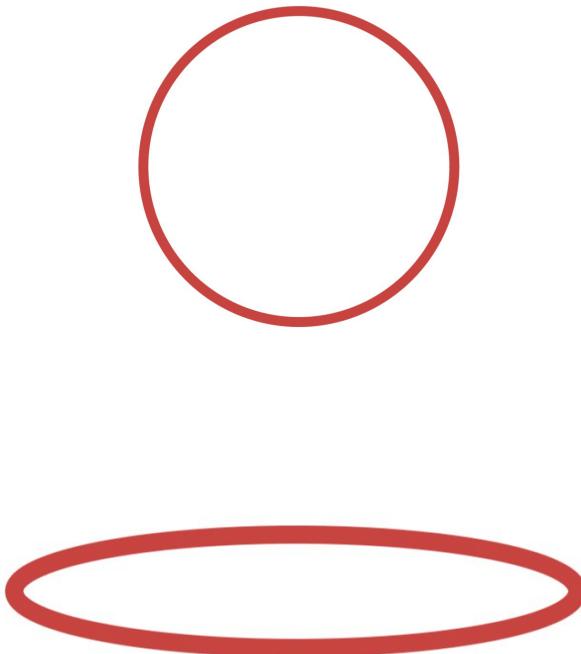
Part B



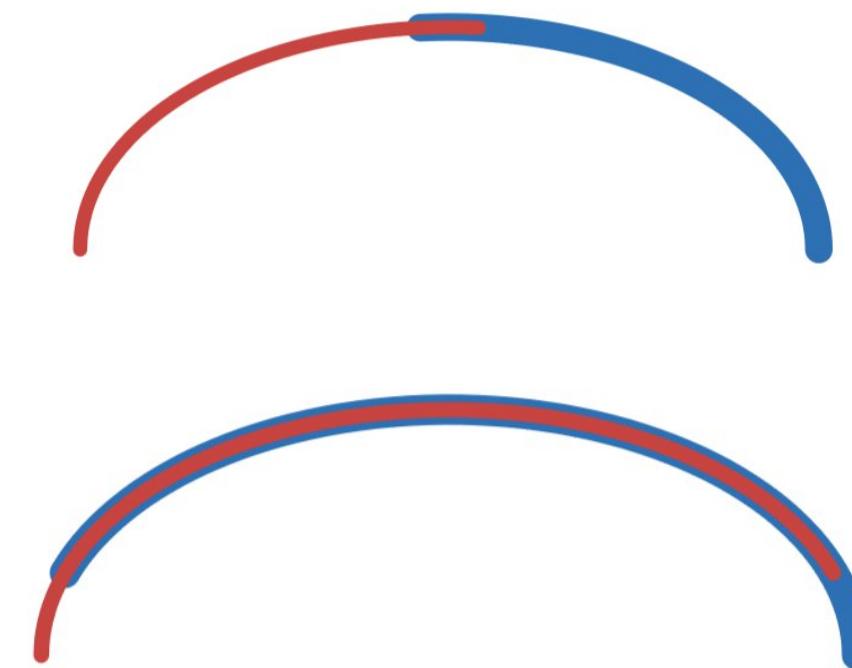
Part C



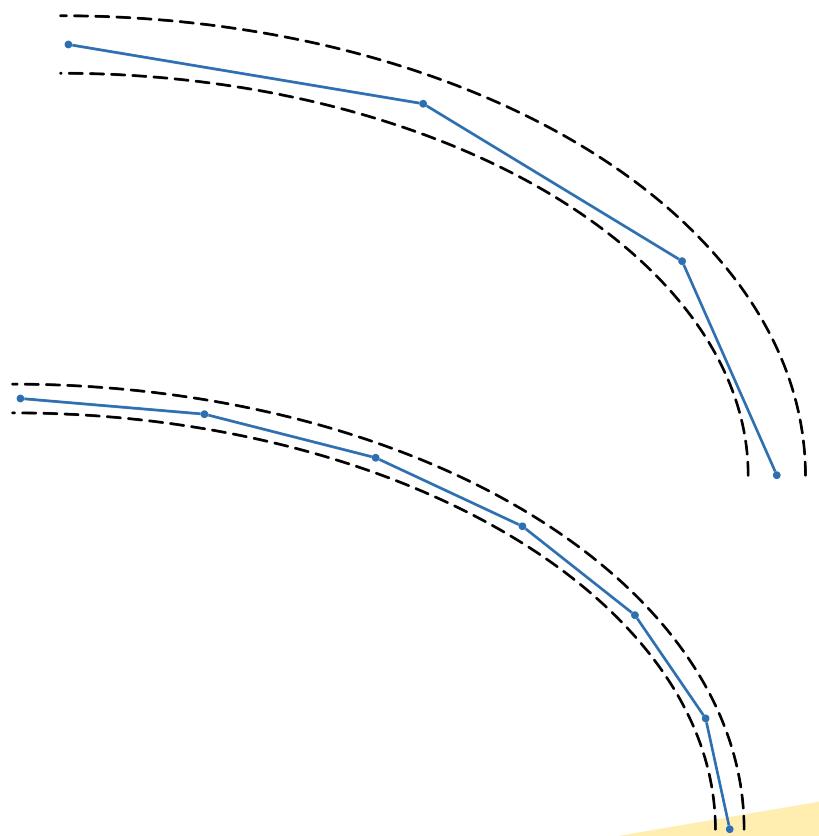
Excentricité



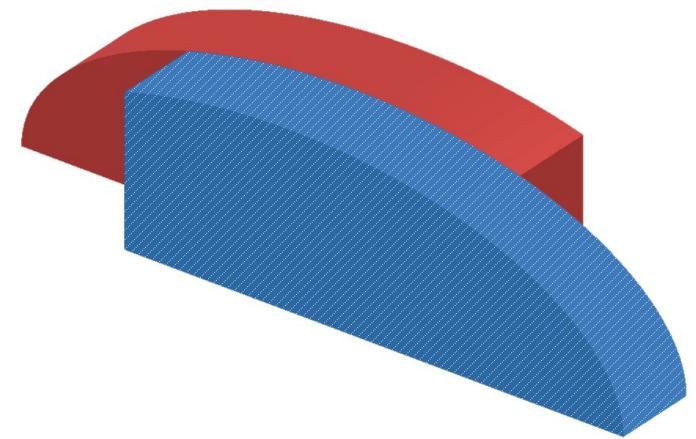
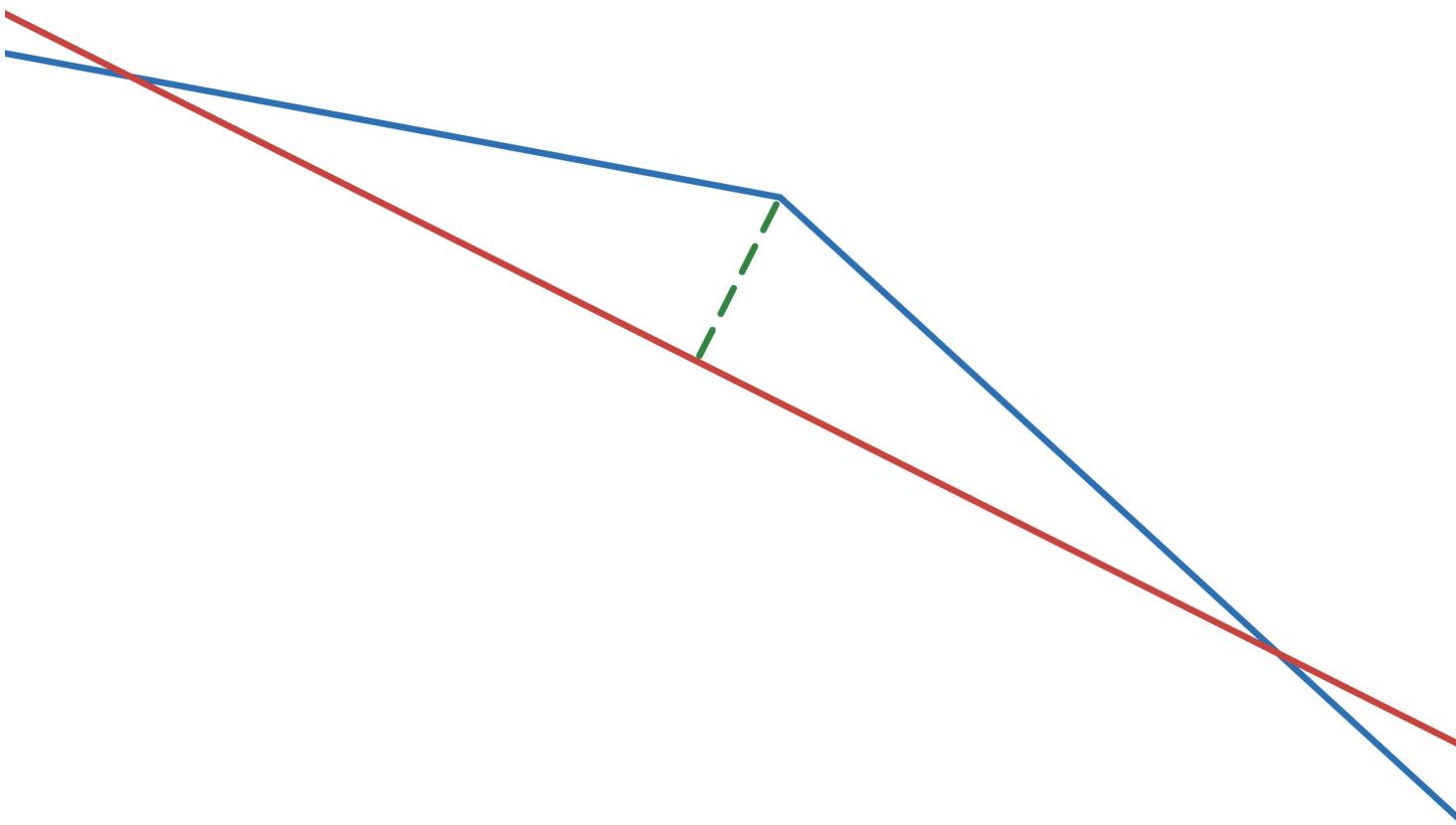
Longueur de l'arc partagé



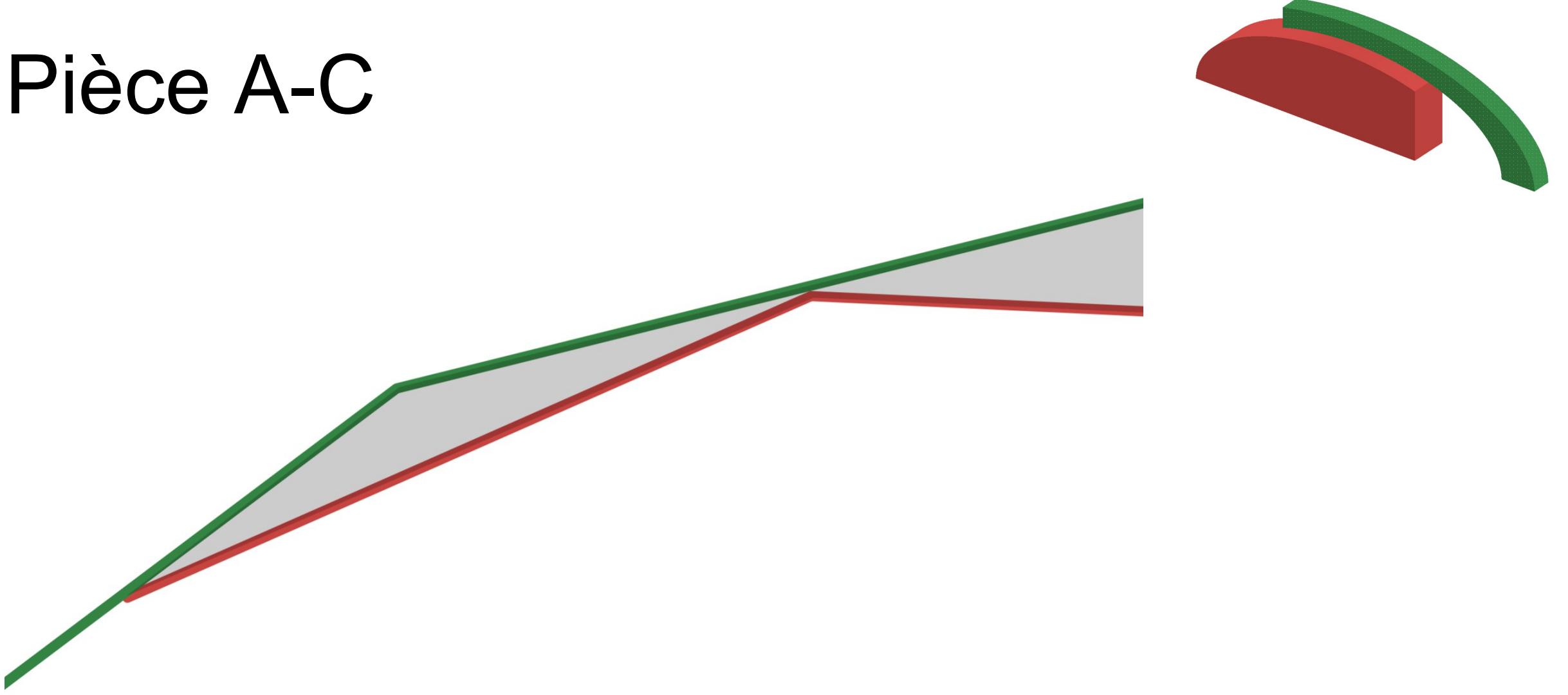
Tolérance

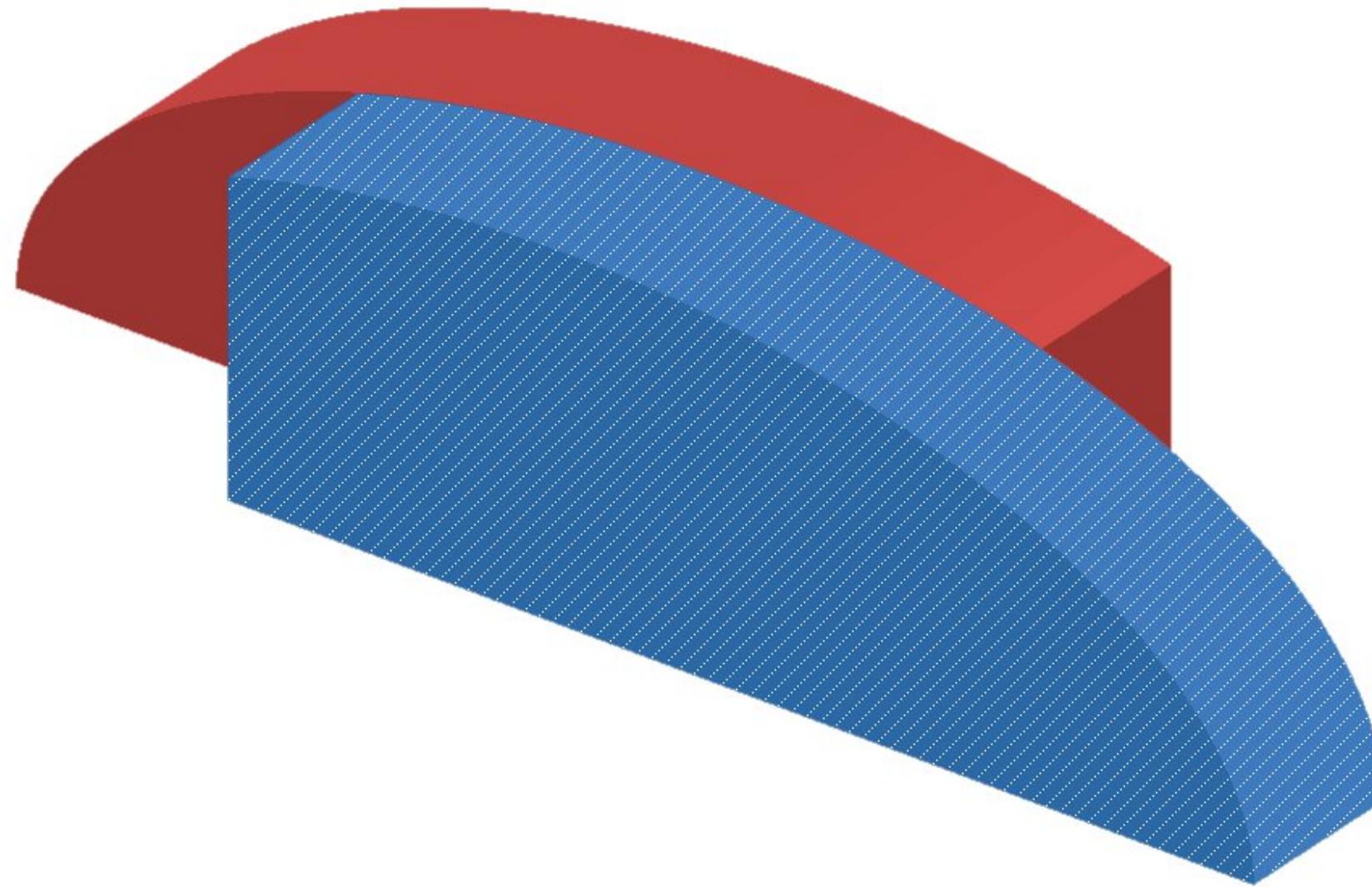


# Pièce A-B



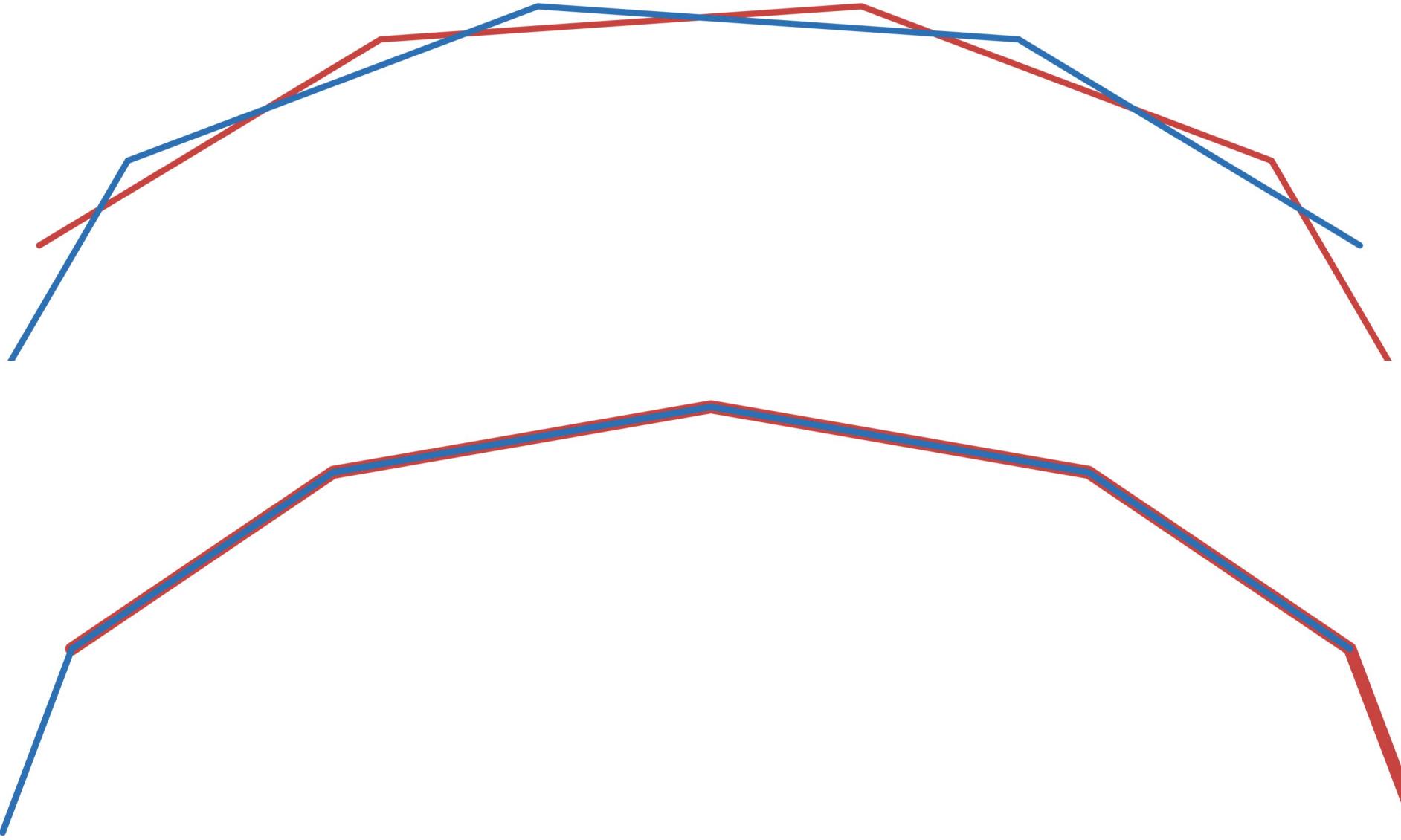
# Pièce A-C



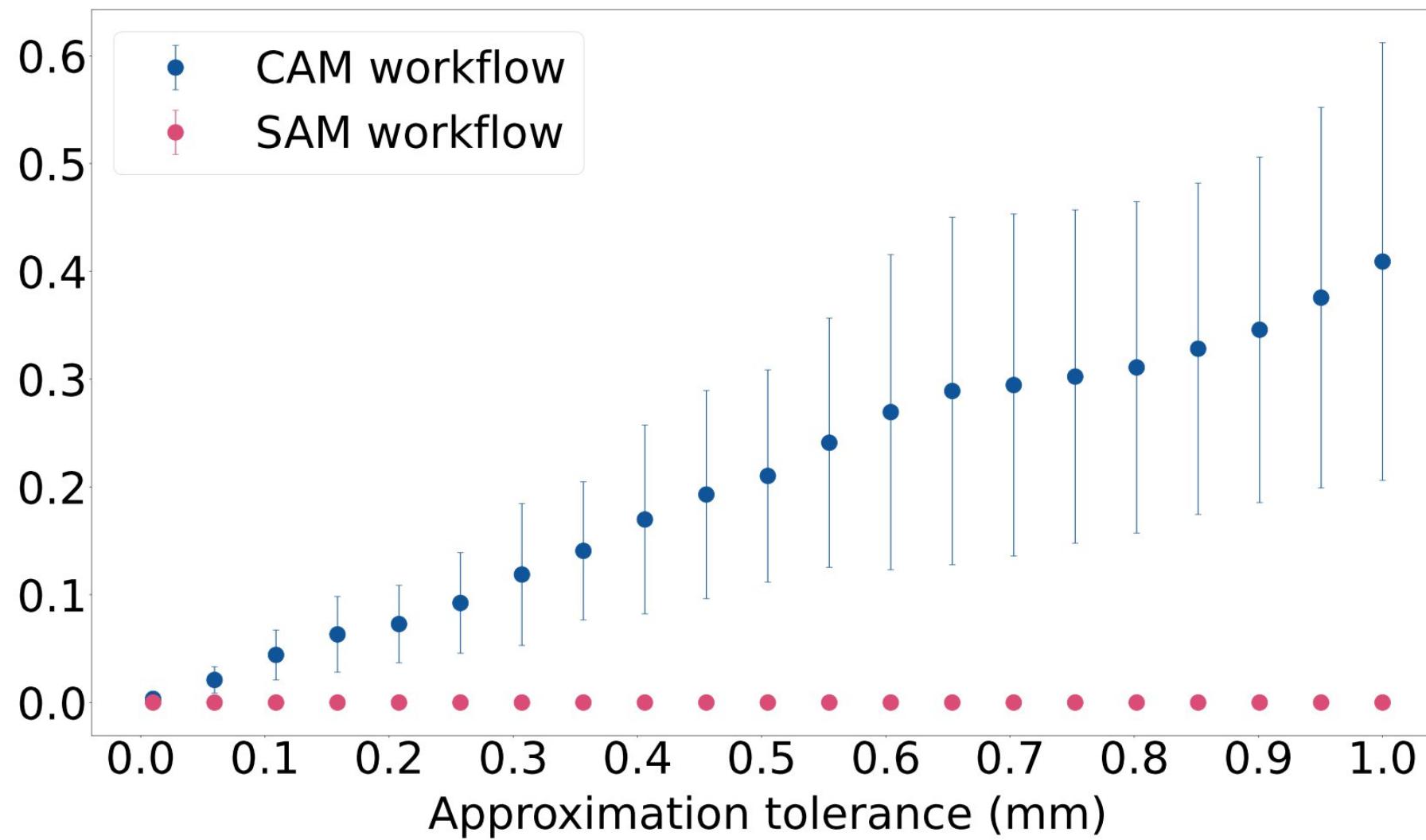


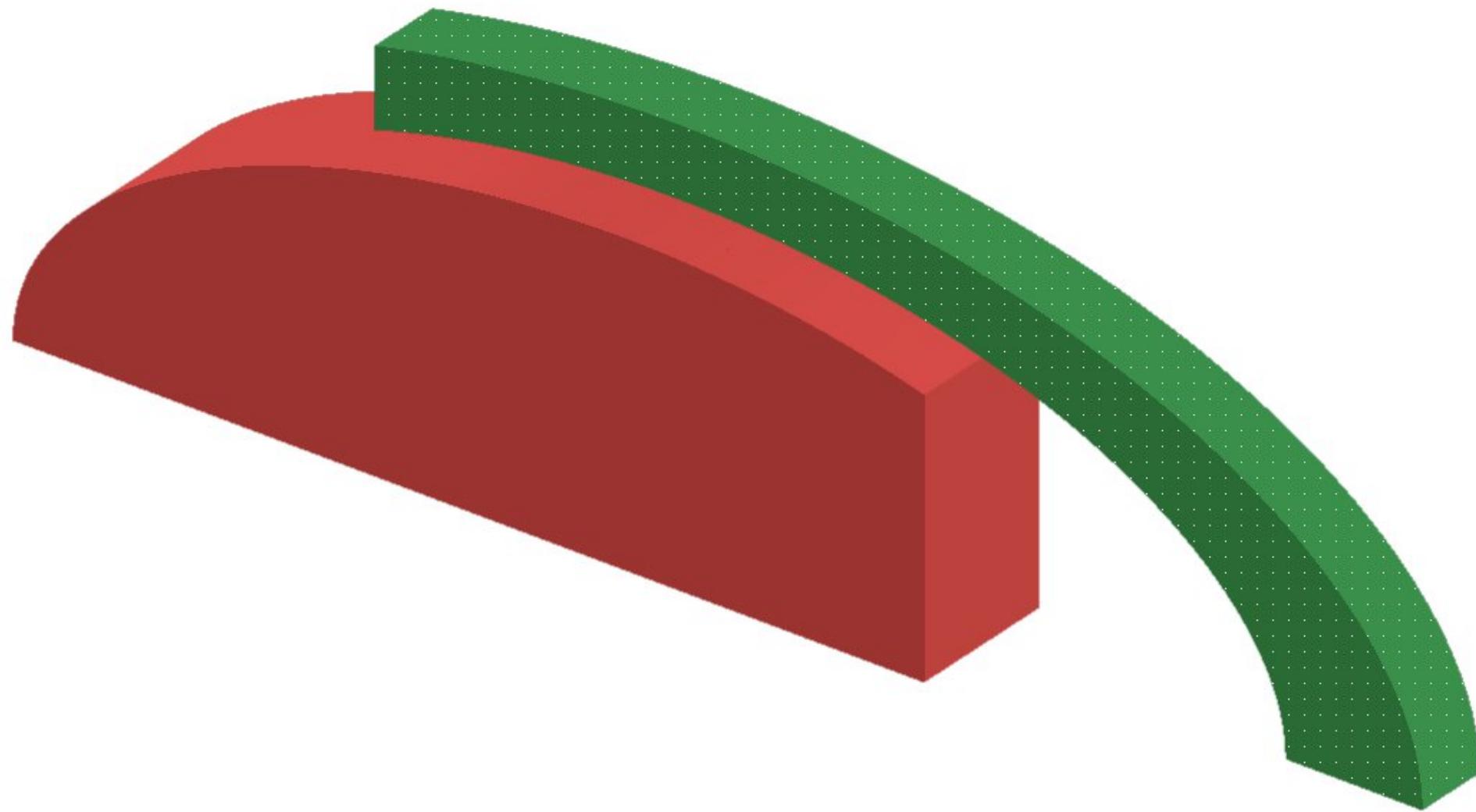
CAM

SAM

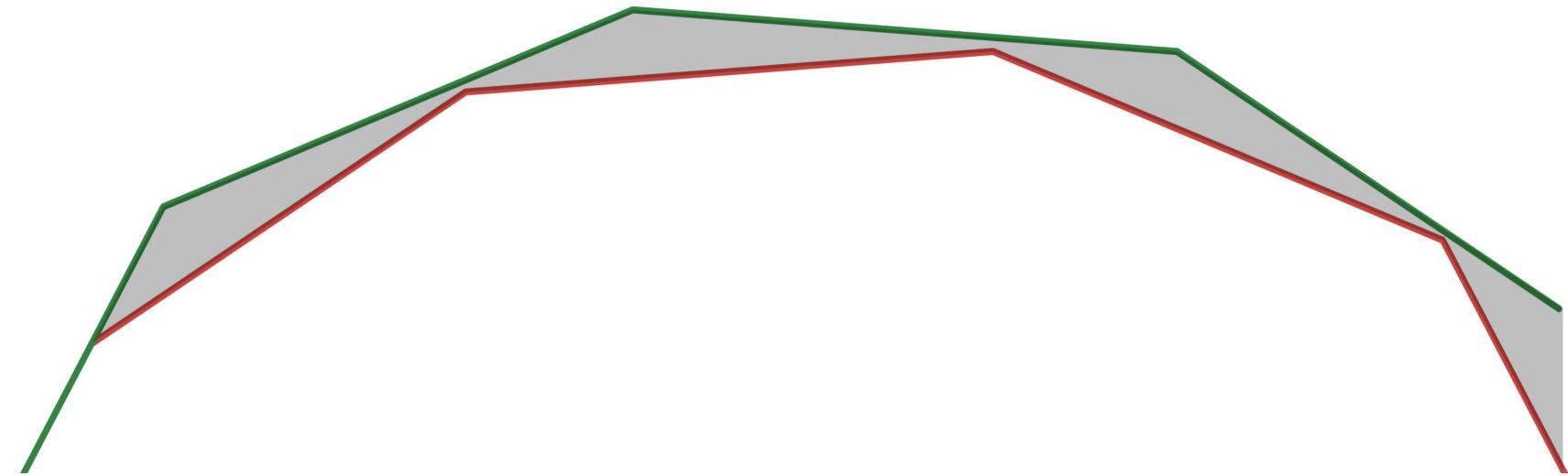


## Distribution of inter-approximation error (mm)





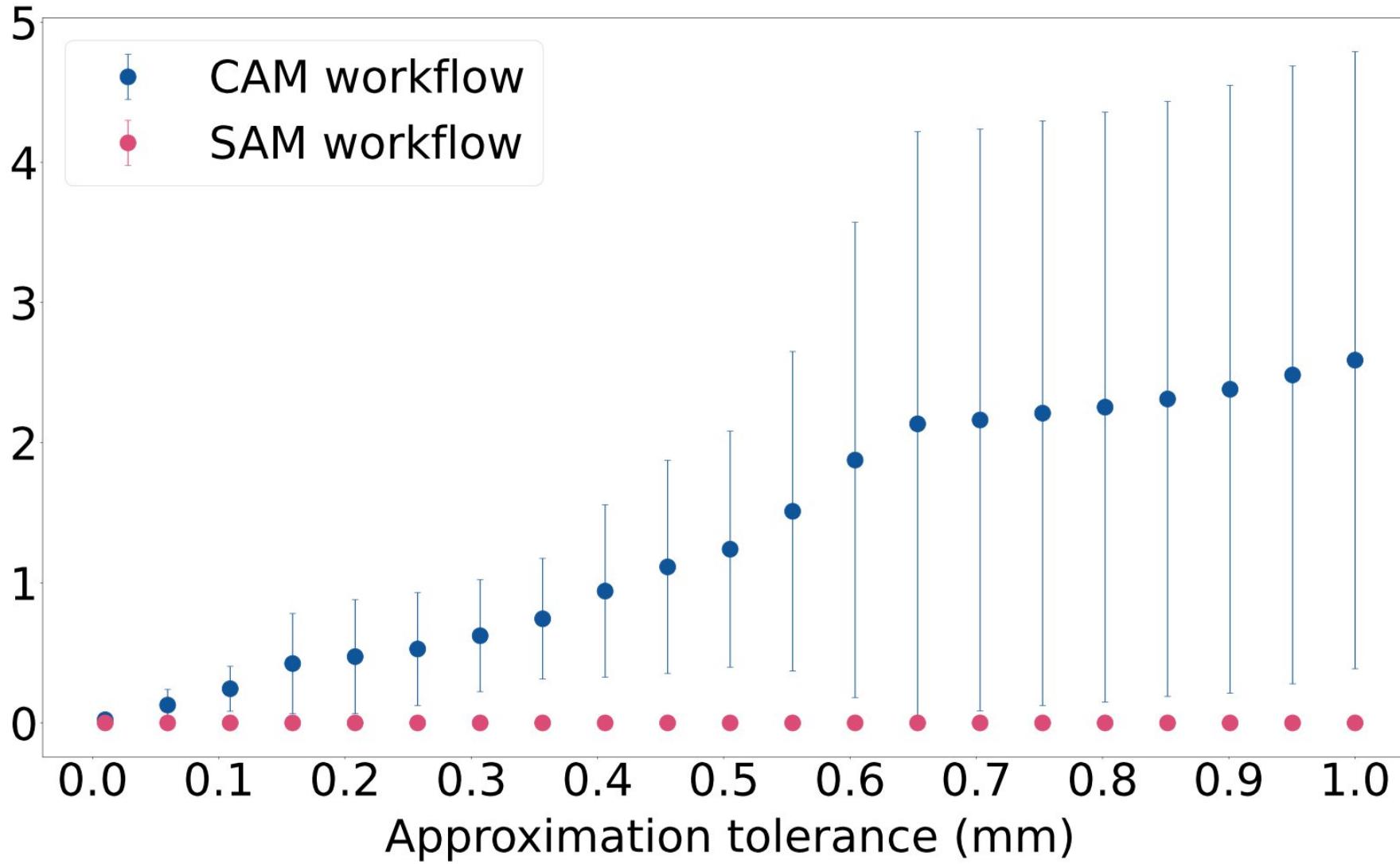
CAM



SAM



# Distribution of area between approximation error ( $\text{mm}^2$ )



# Du CAM au SAM: Quand l'harmonie bat la précision

- Améliore la qualité des assemblages
- Permet d'exploiter la répétabilité des robots dans l'industrie du sur mesure
- Permet de réduire les tolérances en éliminant les erreurs d'approximation
- Permet d'utiliser des outils moins précis, tout en conservant une bonne qualité d'assemblage