Projet de Conception de mécanisme II : DYNABAL

Groupe 36

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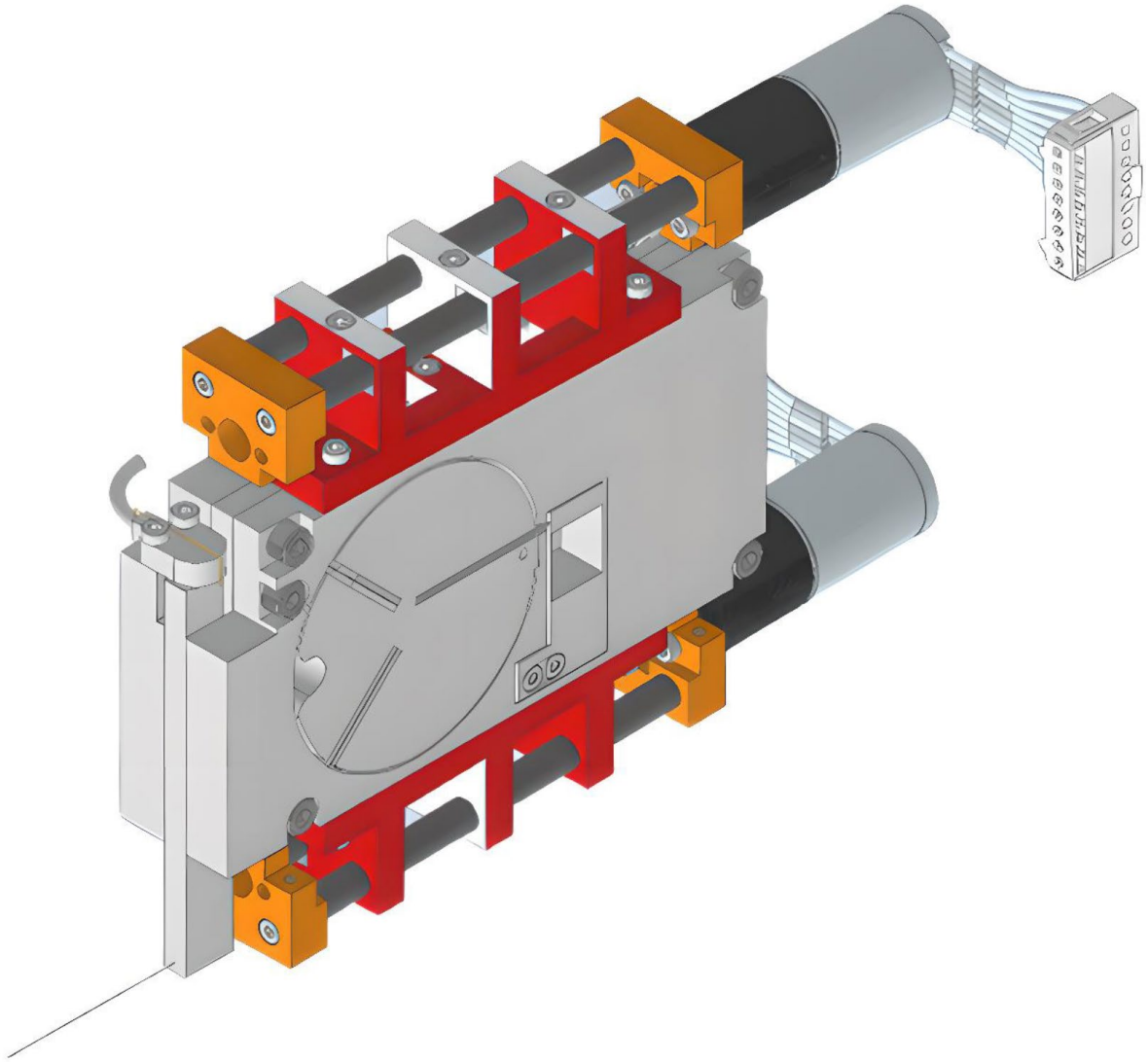

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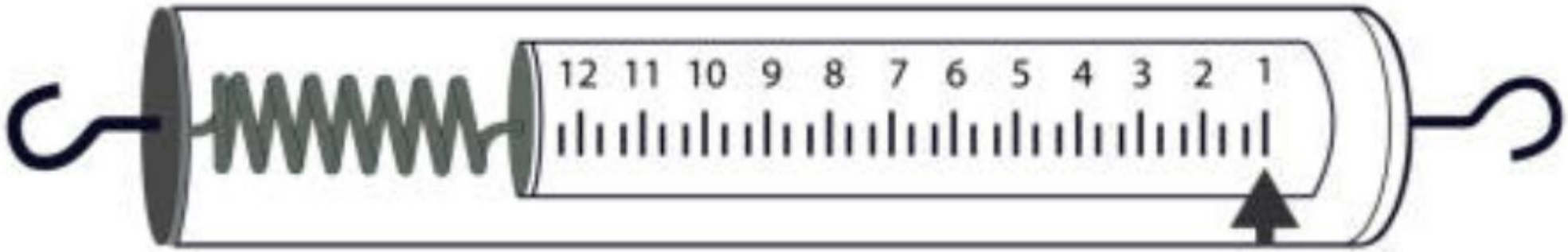
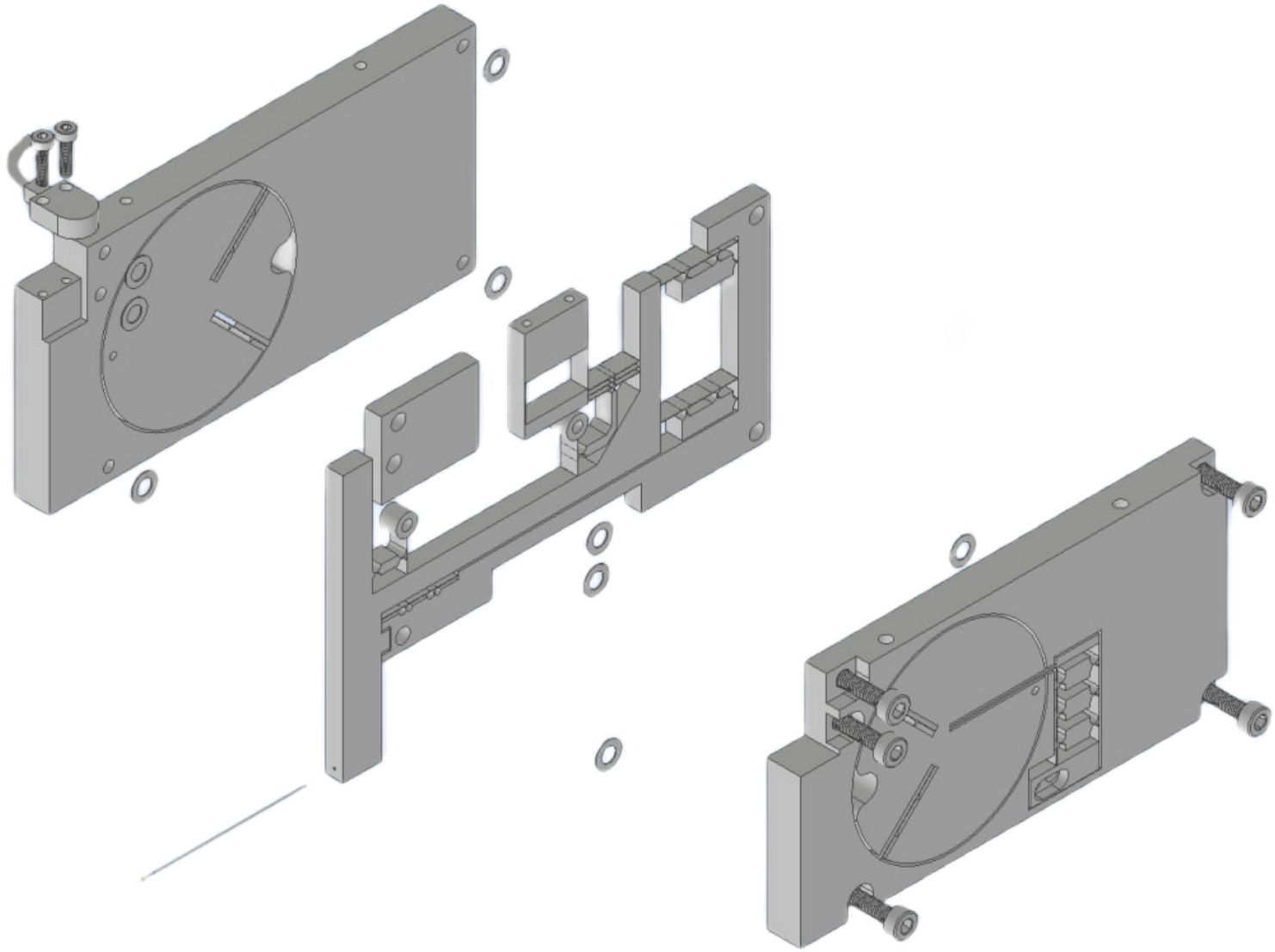
Introduction

- Dynamomètre

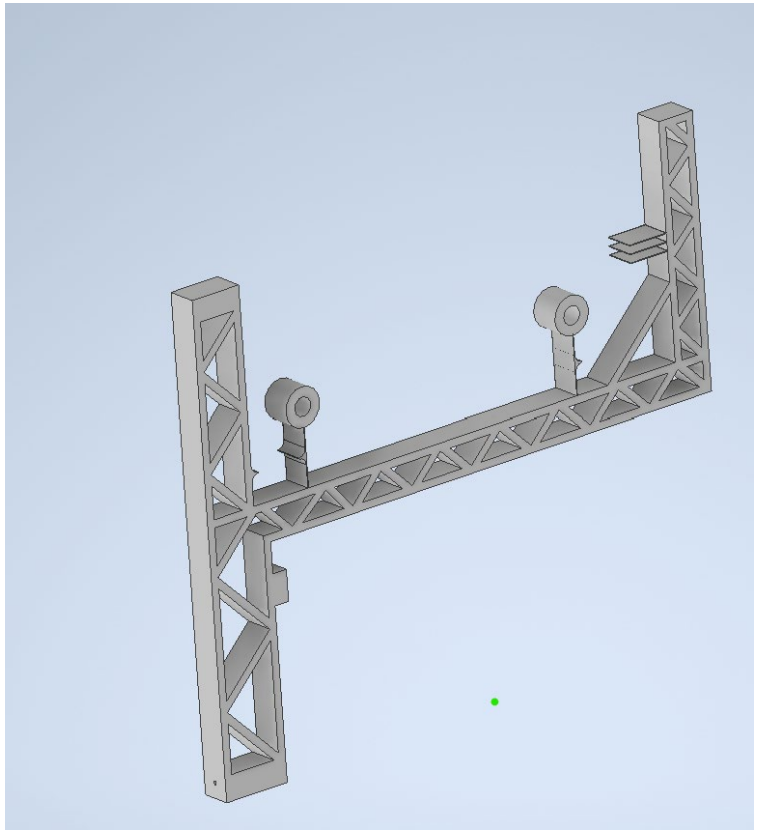


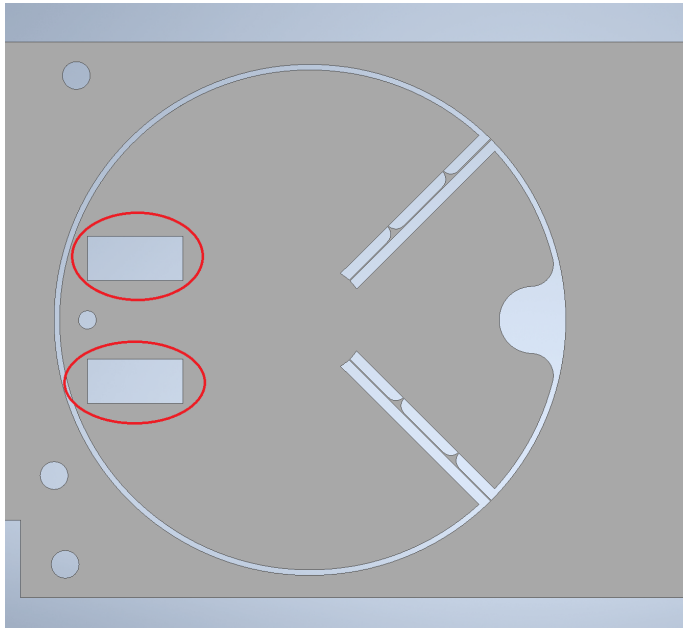
Architecture Général

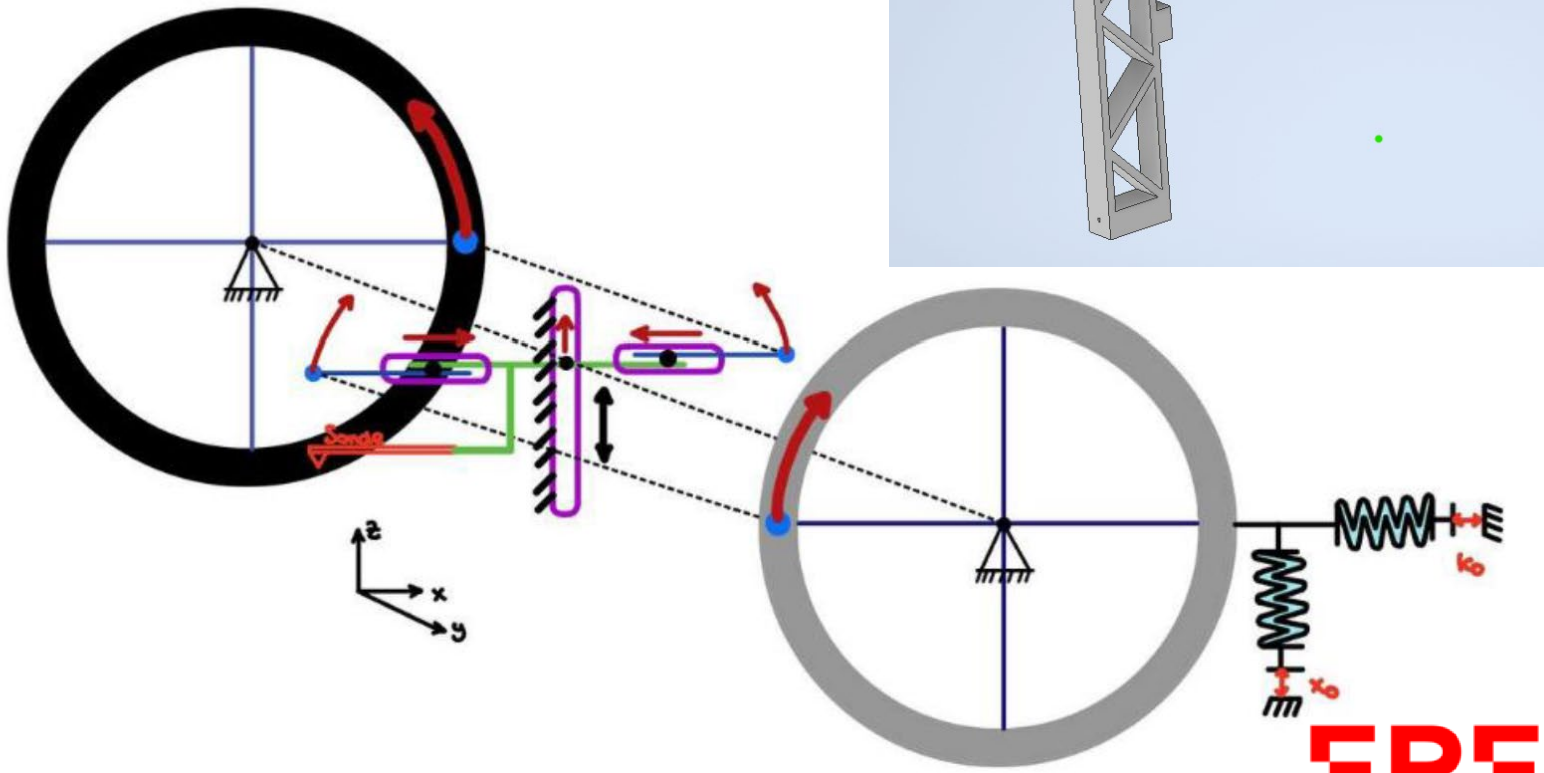


Équilibrage

- Mouvement opposé –> Inverseur de mouvement
- Moment annulé
- Masse optimisé







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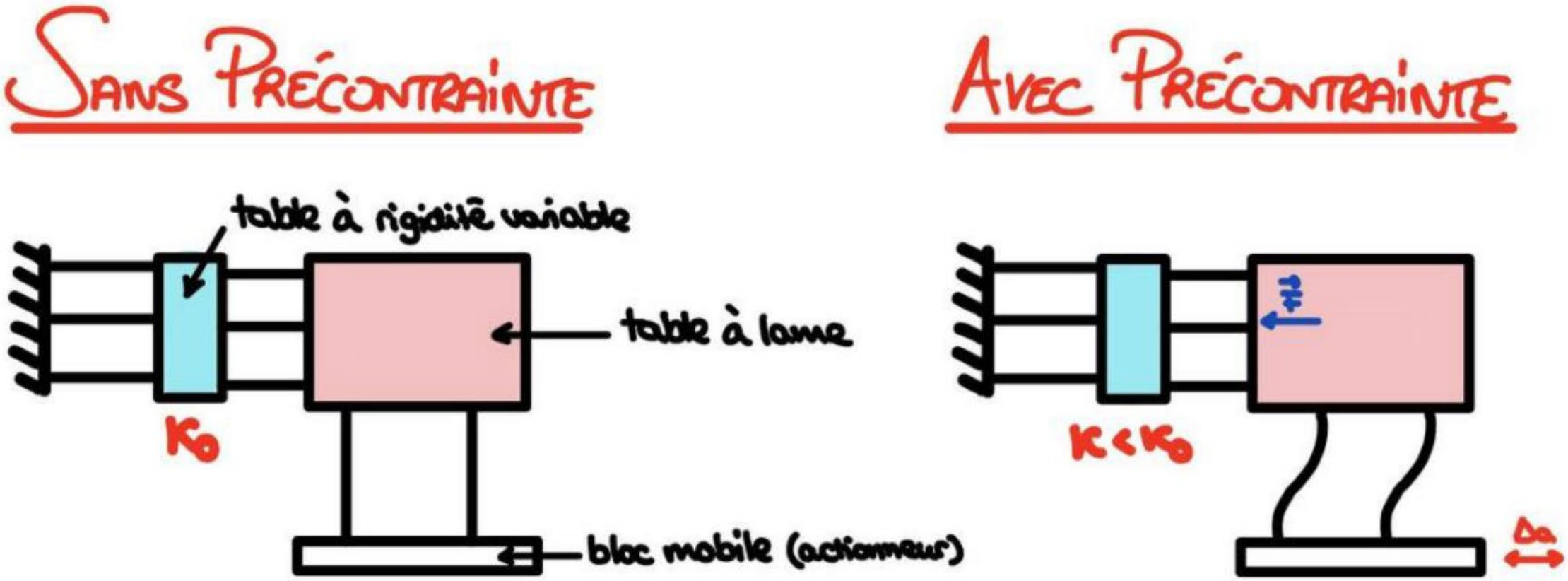
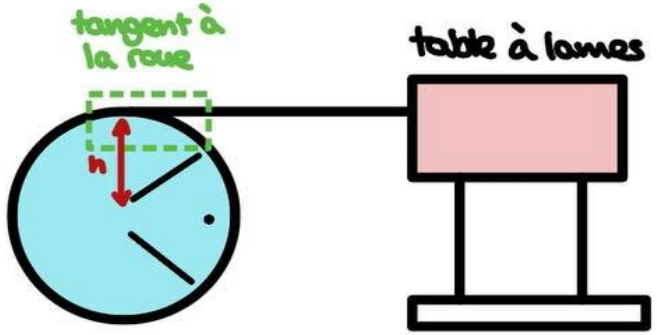
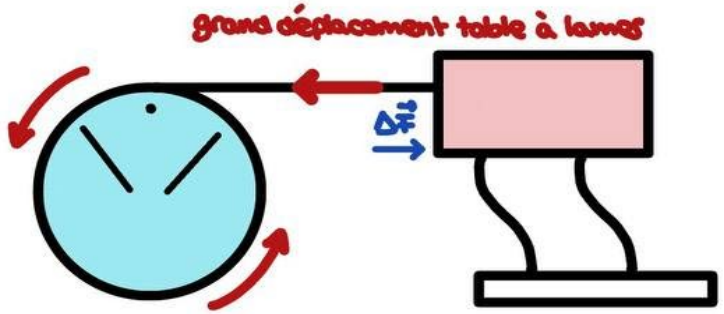
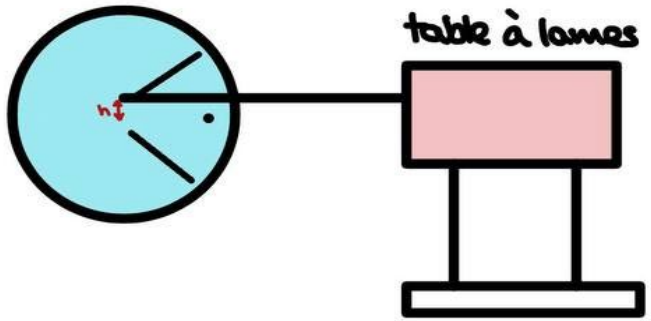
Principe de compensation de rigidité

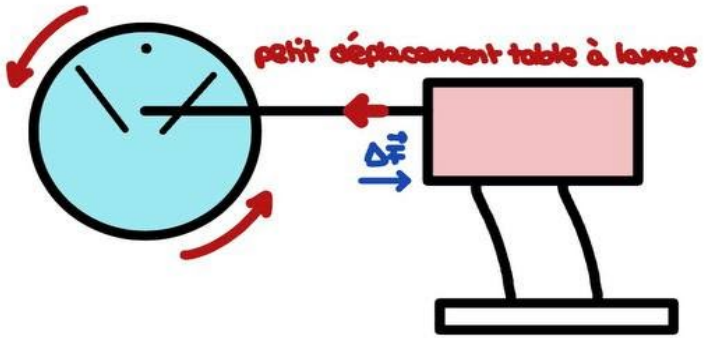


Principe de réglage du zéro









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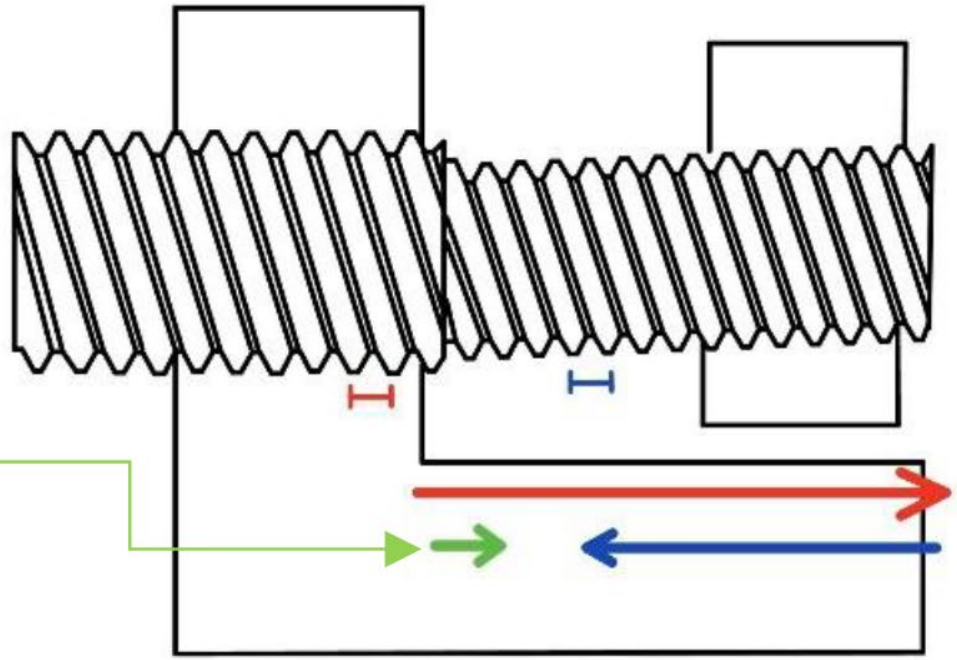
système vis-écrou

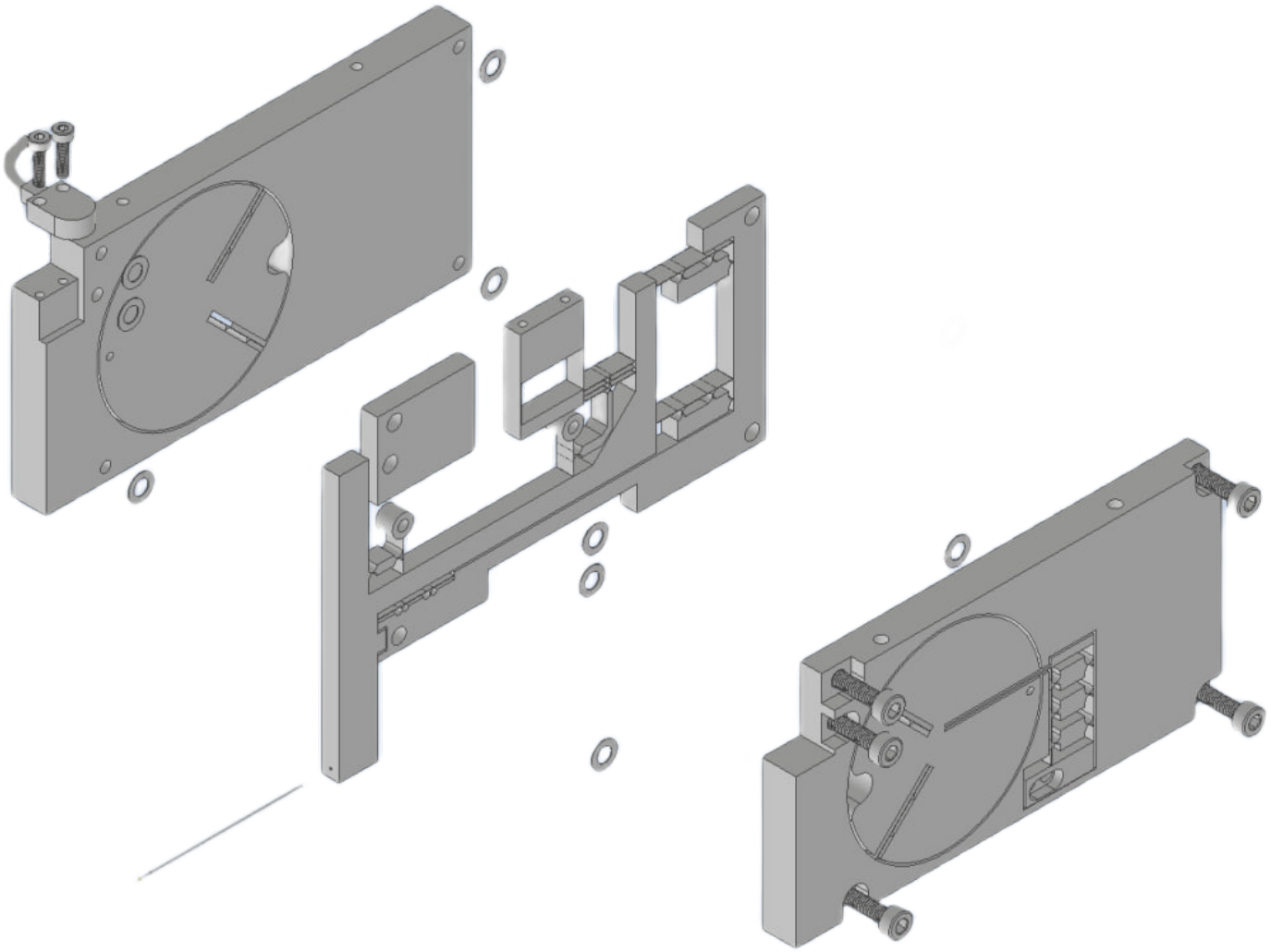
- vis différentielle
- Anti-rotation et guidage
- Accouplement
- Rattrapage du jeu

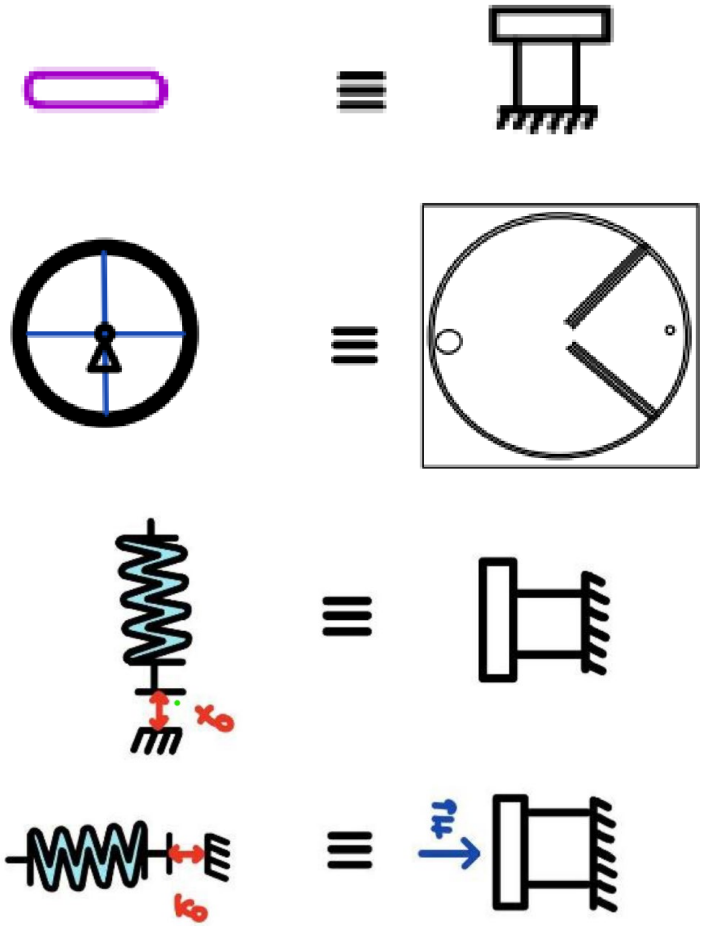
Pas virtuel de 50 µm



2.6: Schéma du principe de vis différentielle

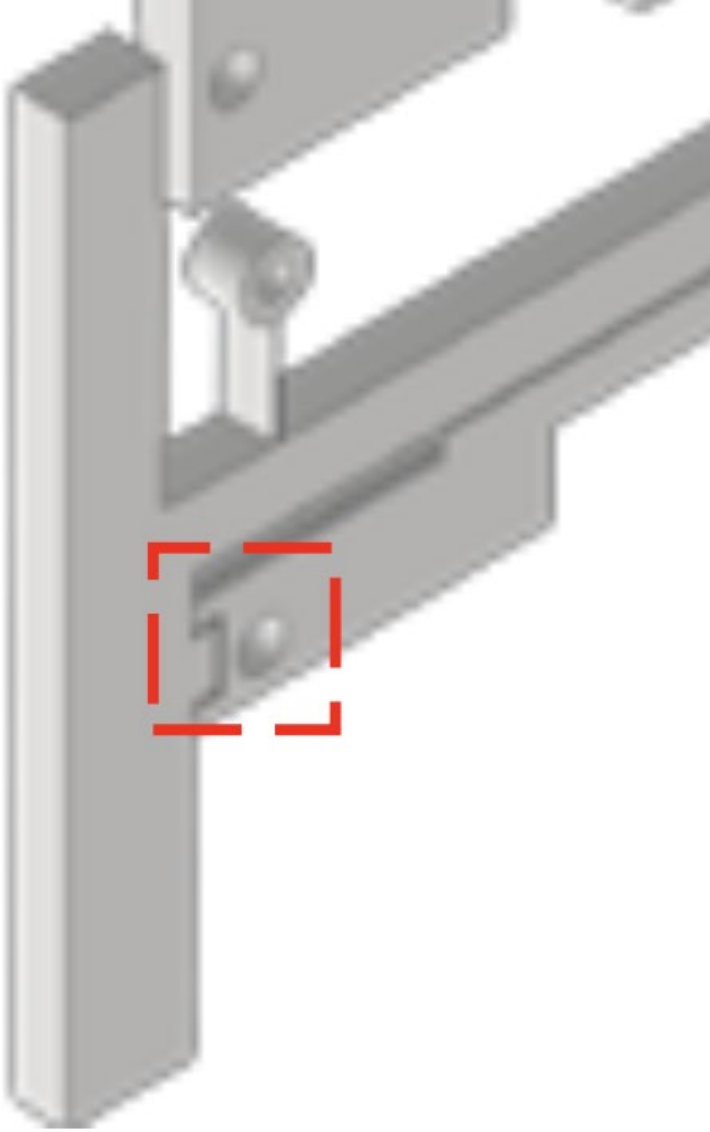
Traduction en guidage Flexible





Concepts Originaux

- Equilibrage SFMI à l'aide des roues
- Principe de vis différentielle
- Précontrainte d'usine
- Système multicouches
- Système de protection du mécanisme



Dimensionnement du mécanisme

- Minimisation du nombre de lammes
- Minimisation de la rigidité des lammes
- Dimensionnent Réglage du zéro
- Calcul de la rigidité total à vide
- Dimensionnement pusher Réglage de la rigidité

Optimisation Python

FlexProbeOptimisation › main.py

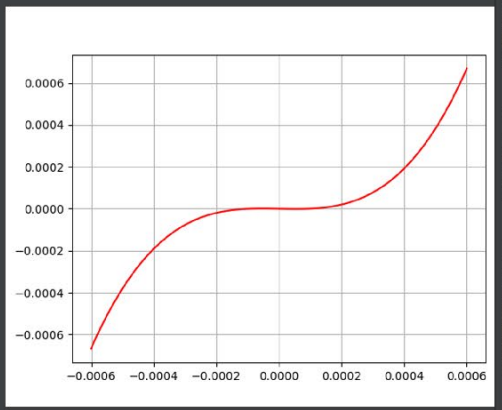
mouvmentConversionLibrary.py | flexLibrary.py | main.py | report.md

```
forceMax = parameters["forceMaxRigidity"]
rangeMin = parameters["rangeXProbeMin"]  # -0.0006 #-0.0011
rangeMax = parameters["rangeXProbeMax"]  # 0.0006 #0.0011
# define the mechanism
print("-----------------------------------------")
b_wheel = parameters["thicknessWheelPlate"] # 8 mm
b_converter = parameters["thicknessConverterPlate"]  # 8 mm
 parameters["Eyoung"]  #200 GPa steel, 110 titanium
tRCC      = RCCPivot(b_wheel , parameters["BladeLengthRCC"], parameters["BladeThicknessRCC"], E
lAnchor   = SpringBlade(b_converter, parameters["bladeLengthWheelAnchor"], parameters["bladeThi
tiveBladePusher = NegativeRigidityBlade(b_converter, parameters["bladeLengthTablePushing"], par
tiveBlade = NegativeRigidityBlade(b_converter, parameters["bladeLengthTable"], parameters["blad
eConverter = SpringBlade(b_converter, parameters["bladeLengthForceConverter"], parameters["blad
Converter = SpringBlade(b_wheel, parameters["bladeLengthZeroConverter"], parameters["bladeThick
ConverterActuatorSide = SpringBlade(b_wheel, parameters["bladeLengthZeroConverter"], parameters
anismZero = [ZeroConverterActuatorSide, ZeroConverterActuatorSide]  # reglage zero
anismKeqForce = [ForceConverter, ForceConverter] # k_eq
anism = [pivotRCC, pivotRCC, wheelAnchor, wheelAnchor, negativeBladePusher, negativeBladePusher

t("mechanism definition :")
 part in mechanism:
 print("")
 part.show()

eate a new folder and copy xlsx parameter to the folder
print("-----------------------------------------------")
```

bladeThicknessTablePushing	0.1	mm
bladeThicknessTable	0.1	mm
bladeThicknessForceConverter	0.2	mm
bladeThicknessWheelAnchor	0.1	mm
BladeThicknessRCC	0.1	mm
bladeThicknessZeroConverter	0.1	mm
forceMinRigidity	2.63	N
forceMaxRigidity	1.315	N
rangeXProbeMax	0.0006	m
rangeXProbeMin	-0.0006	m
Eyoung	1.10E+11	Pa
bladeLengthTablePushing	12	mm
bladeLengthTable	18	mm
BladeLengthRCC	18	mm
bladeLengthWheelAnchor	7.5	mm
bladeLengthForceConverter	12.125	mm
bladeLengthZeroConverter	20	mm
safetyPlay	0.1	mm
OffsetMotorSpring	-1	mm
RCCdeadCenter	5	mm
thicknessWheelPlate	8	mm
thicknessConverterPlate	4	mm



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Modified: 19.05.2023 09:57
Created: 10.05.2023 12:28

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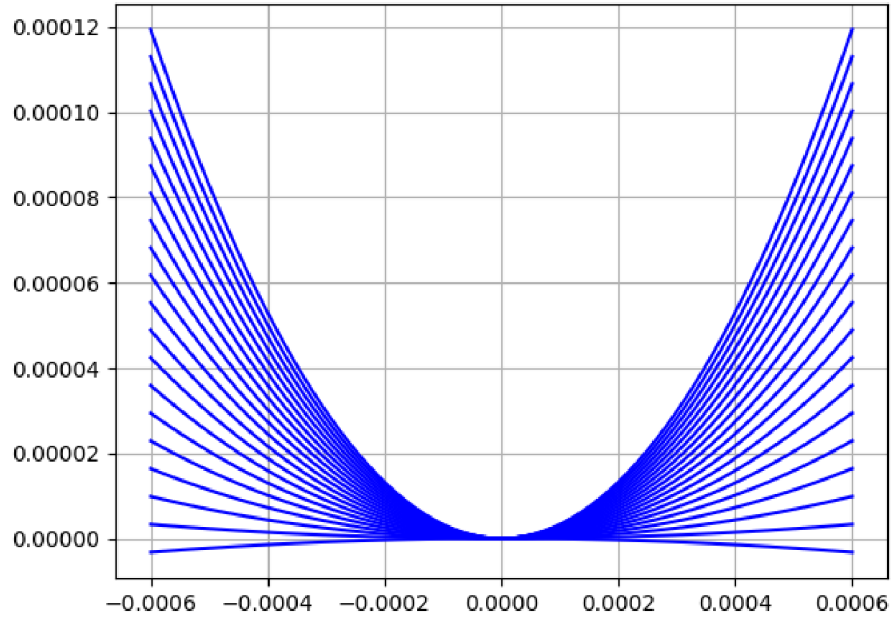
Dimensionnent du pusher rigidité zéro



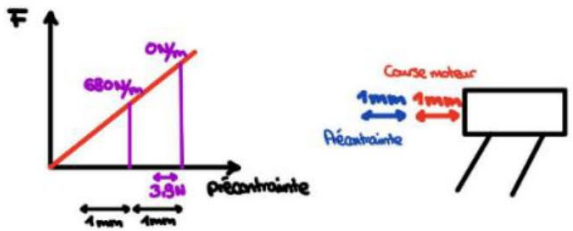
par simulation on connait une plage de force à appliquer

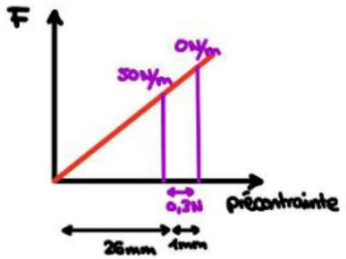
on calcule une rigidité

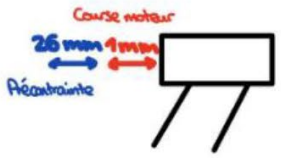
Ce qui donne une précontrainte ⚠ TROP IMPORTANTE ⚠

On change la Rigidité pour trouver une précontrainte acceptable

K = 394 $N \cdot m^{-1}$







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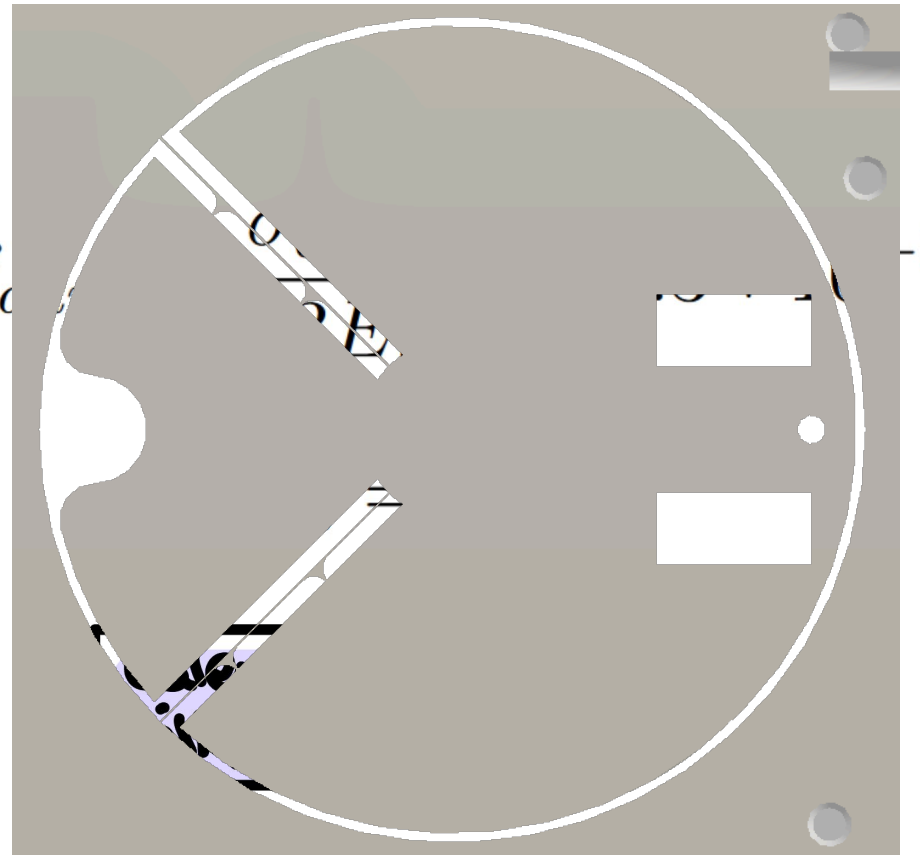
Contraintes maximales admissibles

Déplacements admissibles

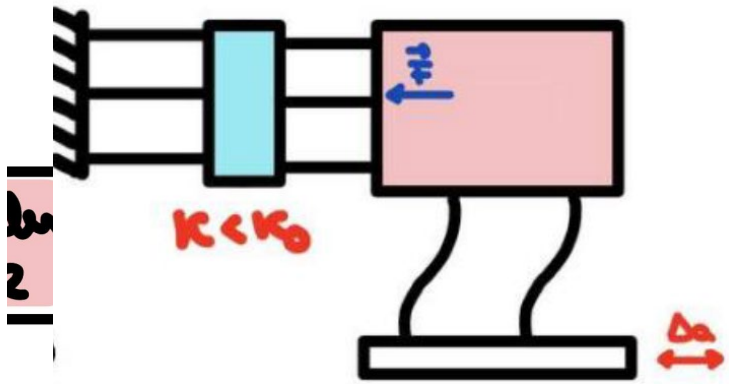
$\zeta = 1.5$

Dimensionnement préalable python

v



f_c -3



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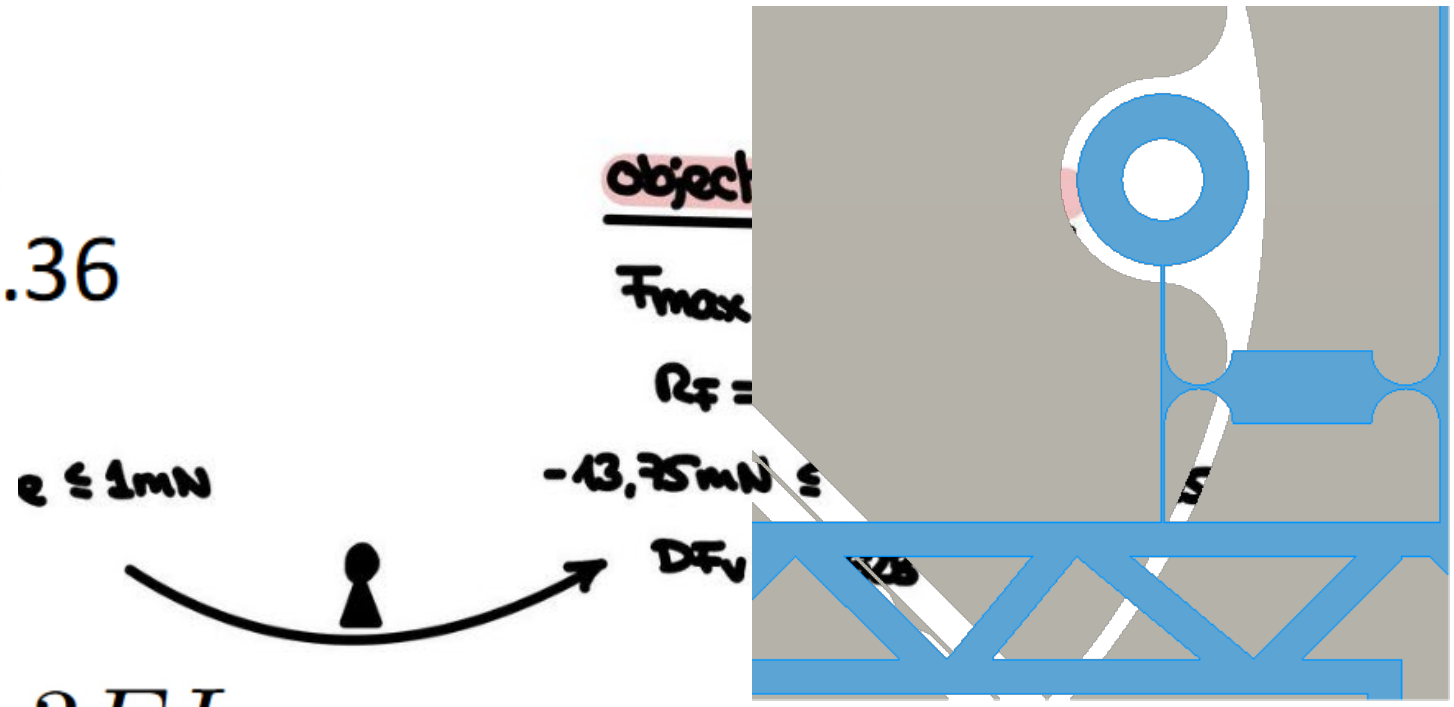
Revue des performances

μ_{r_pmin}=7 931 363.36

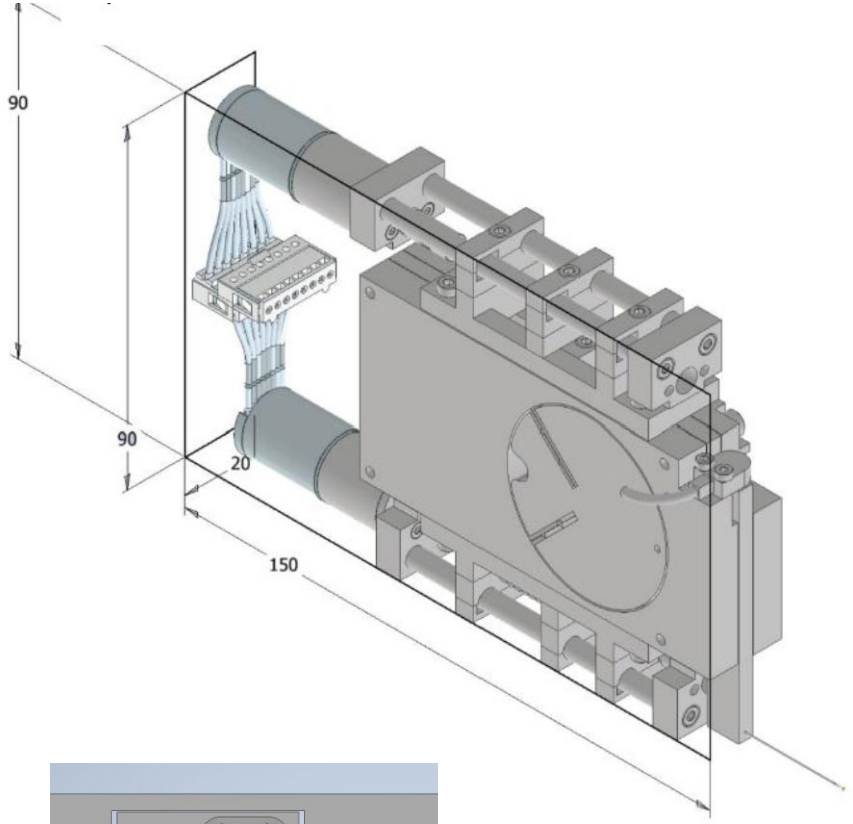
μ_{r_pmax} = 4 757.85

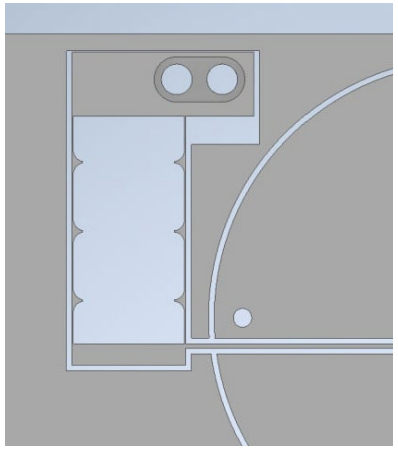


$$\frac{3EI}{l^3} r^2 sin^2(\frac{x}{r})$$

Construction

- Assemblage vissé
- Supports pour lames
- Alliage Ti-6Al-4V





Conclusion