Encadrement: T. Gilet (MFL ULiège), C. Rousselle (OPRL),
S. Creppe (CC Sprimont, Bacchus Quartet)

Projet intégré: concert olfactif

Contexte

Bacchus Quartet, OPRL

➔ Projet d'un concert olfactif,
avec parfumeur liégeois

Objectif: Système permettant de diffuser des parfums et de les changer en cours de morceau.

Challenges:

Changement toutes les minutes, timing contrôlé depuis la scène. Tout le monde doit pouvoir sentir. Les odeurs doivent se dissiper assez vite pour ne pas se mélanger.

➔Maitrise des quantités délivrées, de leur transfert, programmation.

➔Invention pure !

Encadrement: T. Gilet (MFL ULiège), F. Rigo (V2i), François@Moutardente

Projet intégré: Capsuleuse

Contexte

Moutardente = moutarderie liégeoise
(bio, locale, « à l'ancienne »)

Capsuleuse ➔ goulot de la chaine de production
(pas entièrement automatique,
arrivée aléatoire des capsules, etc.)

Objectif: Reconcevoir le système
pour le rendre efficace

Challenges:

Actionnement, détection, motorisation, cadence > 2 pots/min,
low-cost (➔ composer avec l'existant)

Encadrement: T. Gilet (MFL ULiège), F. Rigo (V2i), François@Moutardente

Projet intégré: Meule à l'ancienne

Contexte

Moutardente = moutarderie liégeoise
(bio, locale, « à l'ancienne »)

Meule industrielle (corindon) ➔ moutarde lisse, échauffement (friction) ➔ goût altéré.

Meule en pierre ➔ moins broyé, goût meilleur

Objectif: Fabriquer une meule (et son système de dispensing) sur base de pierres existantes.

Challenges:

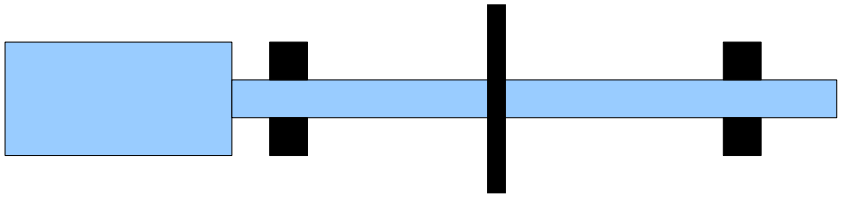
Dispensing passif, pierres = 1 tonne, low-tech, motorisation électrique

Projet intégré de mécanique

DYNABANC : Banc didactique simple pour la dynamique des rotors

Encadrement – É. Béchet, A. Bolyn

- Besoin : Étudier/montrer la dynamique d'un arbre en rotation
  - Transportable
  - Facile à utiliser
  - Permettant de **voir** les phénomènes d'instabilités
  - Sécurisé...



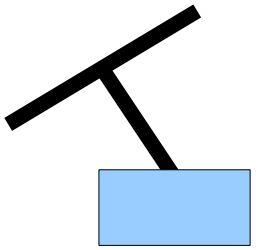
Projet intégré de mécanique

5

ASTRO : platine de suivi céleste

Encadrement – É. Béchet, A. Bolyn

- Besoin : Suivi d'objets célestes (ou autres) pour long temps de pose
  - Léger et transportable
  - Facile à configurer
  - Autonome
  - …



Projets intégrés de mécanique et d'automobile.

Liste des projets 2023-2024

Pierre Duysinx
Romain Vanderbeeken
Département Aérospatiale & Mécanique
Ingénierie des Véhicules Terrestres

LIÈGE université
Sciences Appliquées

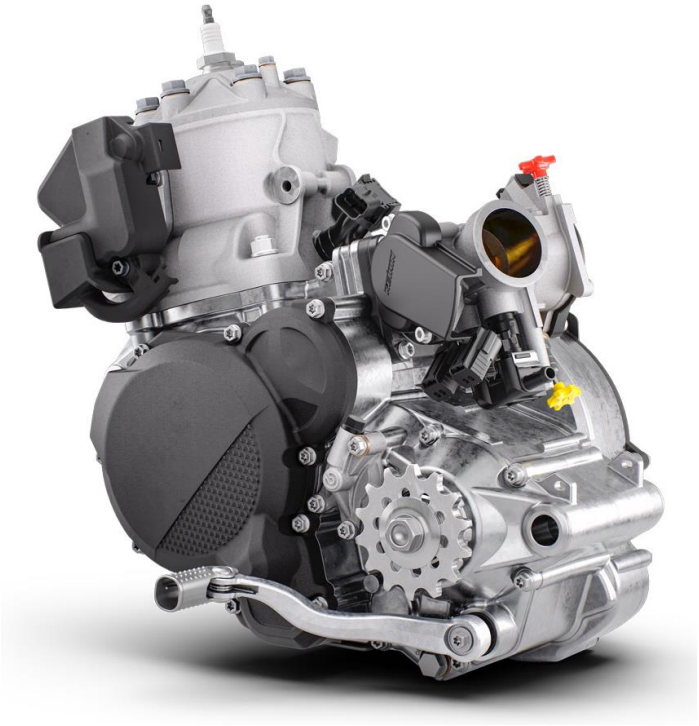
1. Électrification d'une moto

- Conversion d'une moto Enduro thermique en électrique
- Conception du système de la transmission primaire entre le moteur électrique et la chaine
  - Réflexion sur le remplacement du vilebrequin
  - Réflexion sur la conservation de la boite de vitesses
- Intégration du pack de batterie
- Conservation des performances
  - Vitesse, autonomie, poids
- Conservation du design
- Sécurité, coût
- Concept DIY

Moto Enduro

1. Électrification d'une moto

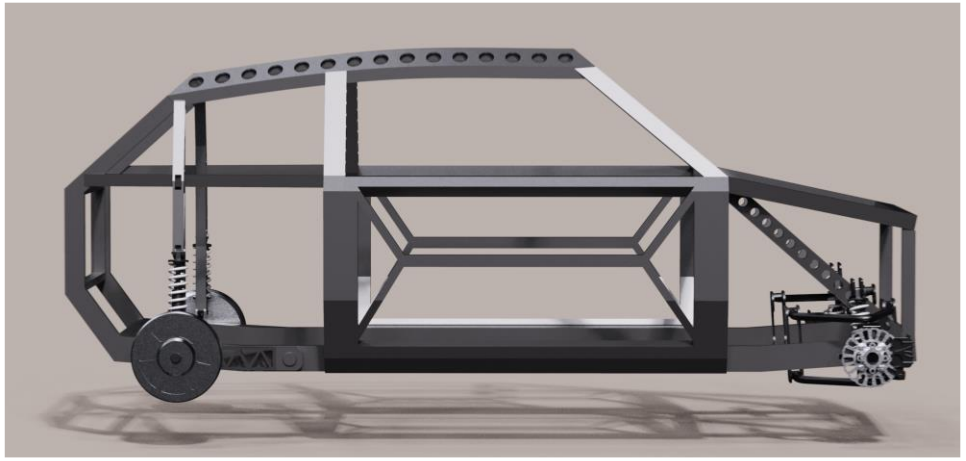
- Remplacement du vilebrequin
- Définir un concept, le dimensionner, le prototyper, le tester.
- Encadrants
  - Pierre Duysinx
  - Romain Vanderbeeken
- Parrain donneur d'ordre
  - Bernard Loly (ULiege, Laboratoire de Thermodynamique)
  - b.loly@uliege.be



Moteur d'origine

2. BUGG_E: Suspension

- Prédimensionnement châssis & suspensions d'un véhicule minimaliste (low-tech)
- Donneur d'ordre: Loïc Claeys (bugg.motion@gmail.com)



BUGG.

Minimalist vehicle

Start-up VentureLab

BUGG_E V_01			
Weight_ **450kg**	Range_ **70/140km**	Consumption_ **7kWh/100**	Speed max_ **90km/h**

Prédimensionnement châssis & suspensions :

1) Etat de l'art

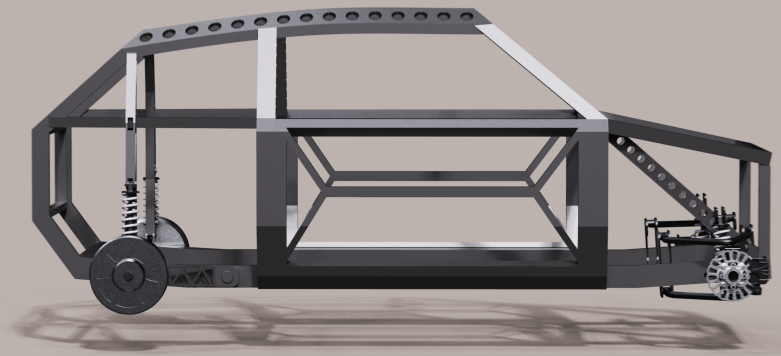
2) Bilan masse

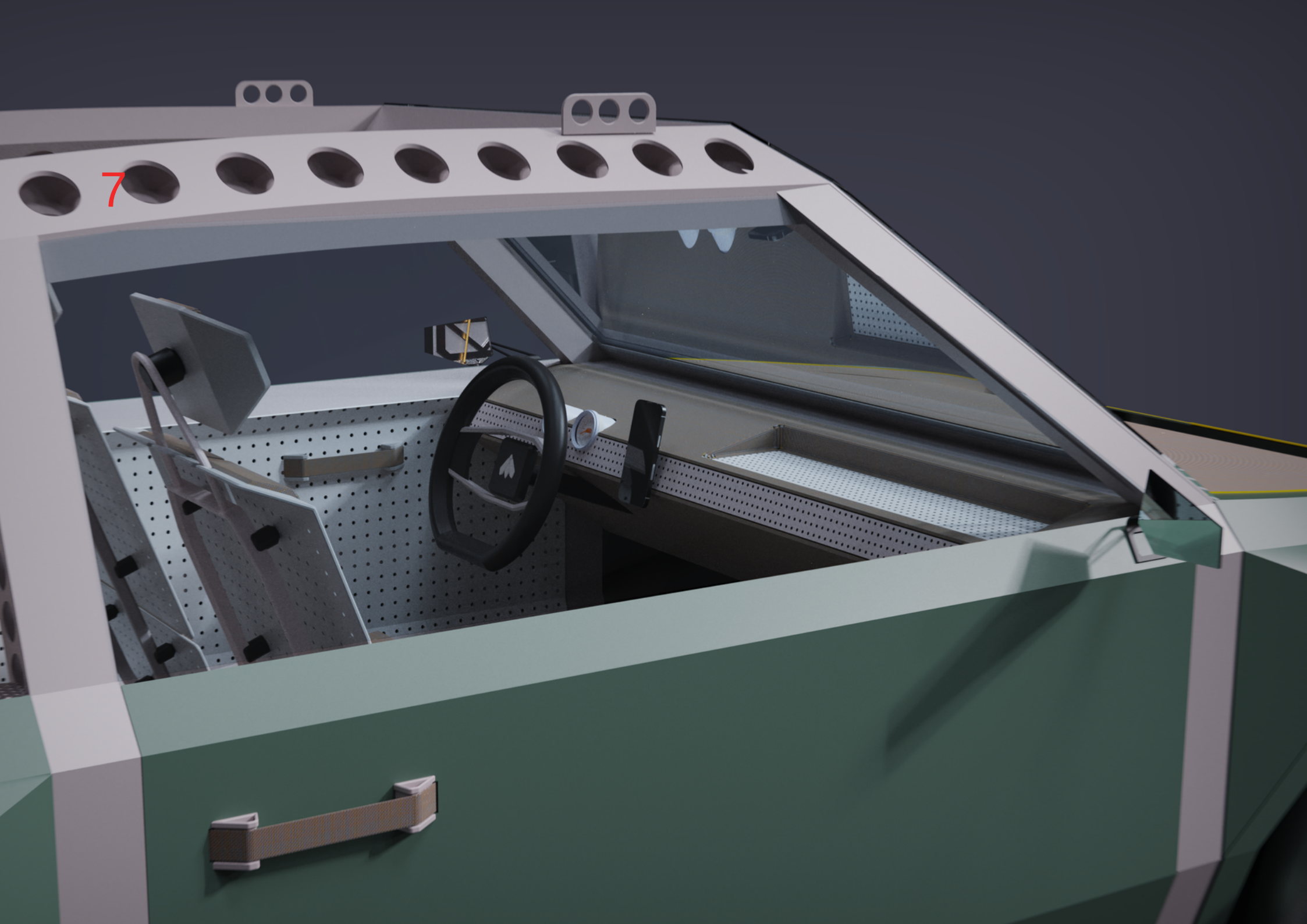
3) Pré-design châssis/suspensions

4) Analyse coûts de revient

5) Prototypage (partenariat ac *Superwelding*)

6) Tests et validation




7

Agoria Additive Manufacturing Student challenge

What is this AM Challenge all about?

This challenge is about **connecting** students with the manufacturing industry through AM Technology. The Agoria AM Design & Engineering Challenge is a **one-of-a-kind** competition challenging you, students or young graduates, to demonstrate the enormous potential of **Additive Manufacturing technologies for product/process optimisation and innovation**. Additive Manufacturing is the tool to use for **solving the problem** that each of these companies bring forward.

Sign up for this challenge and solve real business challenges brought to you by real industrial companies, specifically : **ZF Windpower**, **Safran Aero Boosters**, **Continental** and **Reynaers Aluminium**.

https://www.agoria.be/am-student-challenge

Agoria Additive Manufacturing Student challenge

What makes this challenge so unique?

- You will get the opportunity to **design/develop a practical solution for a real business issue**. This is definitely not a text book exercise! Each team will be challenged to **deliver a valuable concept and a tangible, working prototype** for your chosen customer application within the proposed time frame. Which AM technology to use? Which material? Which finishing? That is up to you to define and part of your solution development journey. Finding the best possible 'Design-Material-AM Technology' fit is a true challenge!
- You will be invited by your (chosen) industrial customer and briefed in depth on the **application (context, technical and commercial information)**. This **briefing** happens at the customer's facility and in group with your direct competitors (students/graduates who have chosen the same challenge).
- **Communication** is an important aspect in this challenge. You will have to communicate (verbally, visually, digitally, physically) with your customer, partners and others. Don't underestimate the way you present your intermediate concepts and final solution.
- You will get some important intermediate feedback moments from involved professionals in order to **guide and challenge you in your thinking**. Guidelines on these interaction moments will be communicated at the start of the challenge.
- In your CV, you will be able to **demonstrate hands-on experience** in creating a practical solution for a real business issue, even if you don't win an award.
- Throughout the experience, you will meet a lot of **interesting contacts**, not in the least at the challenge's official award ceremony. Maybe find connections that will help you secure your first job ?
- A bonus for those who win an award: total **prize money of € 1600**.

More info in the Terms & Conditions document

ZIGGZAGG Focus. Value. Manufacturing.

Melotte High Precision Manufacturing & 3D Metal Printing

aerosint

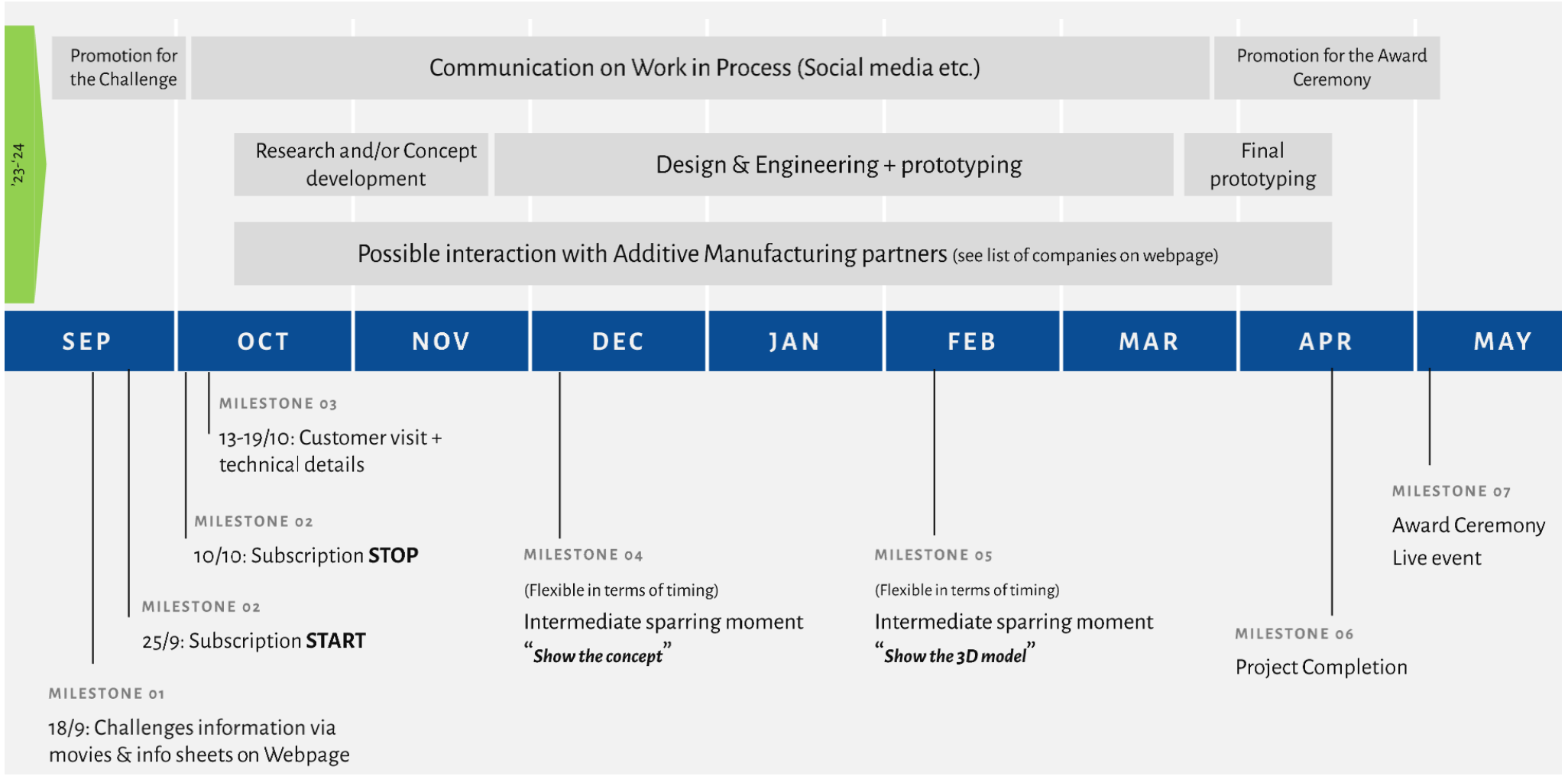
RAYTECH more than precision

3iD 3D idea printing

BUHLMANN

AnyShape

Agoria Additive Manufacturing Student challenge

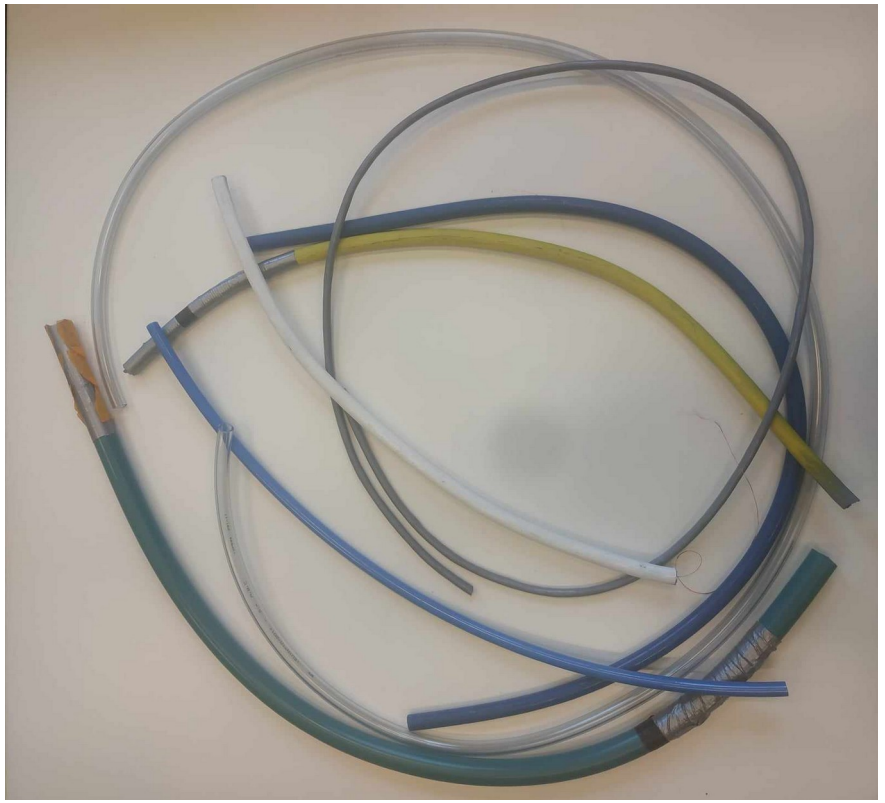


Contact

- Agoria & involved companies
- Anne Mertens, Olivier Brüls and Eric Béchet

Mechanical properties measurement system for slender structures

- At the automation & robotics lab, we do research on the robotic manipulation of cables, ropes, etc.
- We use a wide variety of objects, made of different materials and cross sections



- **Problem**: the mechanical properties of these objects are unknown. Hence, it is difficult to model the object and to anticipate future deformations, making trajectory planning challenging

Mechanical properties measurement system for slender structures

Goal : design an affordable machine that measures the bending stiffness (EI) of objects

Tasks involved:

- Mechanical design:
  - Compare the different testing methods that exist, and make a review of the machines available in the market
  - Design a system to fix correctly the ends of the sample being measured
  - Design a system that deforms the object as needed for the test.
  - Integration of transmission systems if necessary
  - CAD model + simulations

- Electronics & software:
  - Integrate the right actuators (motors, servos, …) and control them precisely
  - Choose the right sensors to measure the deflections and integrate them
  - Make the code that calculate the stiffness based on the data provided by the sensors
  - Display the results
  - Use statistics to obtain a more accurate value of the stiffness if several measurements are done

- Tests & comparison:
  - Benchmark your solution: compare the results of your machine to the values of an object whose properties are known (either through a test with a commercial machine or because the data is provided by the manufacturer)

Challenges:

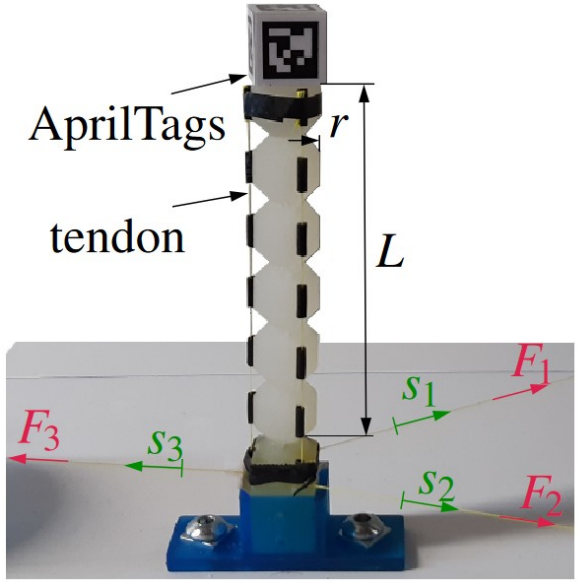
- A neat mechanical design is necessary to ensure accuracy of the measurements
- There already exists some expensive machines that can do that job available in the market. But we do not need the accuracy of these machines. The goal is to design a much less expensive one, and rely if necessary on several measurements to increase the accuracy
- Multidisciplinary project (mechanics + electronics / control)
- ? Add a system to measure the friction coefficient between two objects ?

Contacts:

- Olivier Brüls
- Louis Dehaybe

Development of a 6 dof cable actuated soft robot

Soft robot technologies offer low cost and lightweight solutions for manipulations
We currently a research project on the modelling of cable-actuated soft robots and we want to initiate some experimental work at the Robotics & Automation Lab of ULiège.



Example of a 3 dof soft robots designed by TUHamburg

Goal : develop a 6 dof soft robot with cable actuation

Development of a 6 dof cable actuated soft robot

Tasks

- Evaluate state-of-the-art soft robot solutions with cable actuation
- Global design of the robot
- Mechanical design of the structural element
- Design of the cable actuation system (including actuators and sensors)
- Design of the control system
- Development of a prototype
- Experimental tests and evaluation of the solution

An intermediate objective could be to develop a first prototype of a 1, 2 or 3 dof robot

Contacts

- Olivier Brüls
- Olivier Devigne