

Compilation of Mechanical Design and CAD Projects

Juan Sebastian SILVA SAAVEDRA

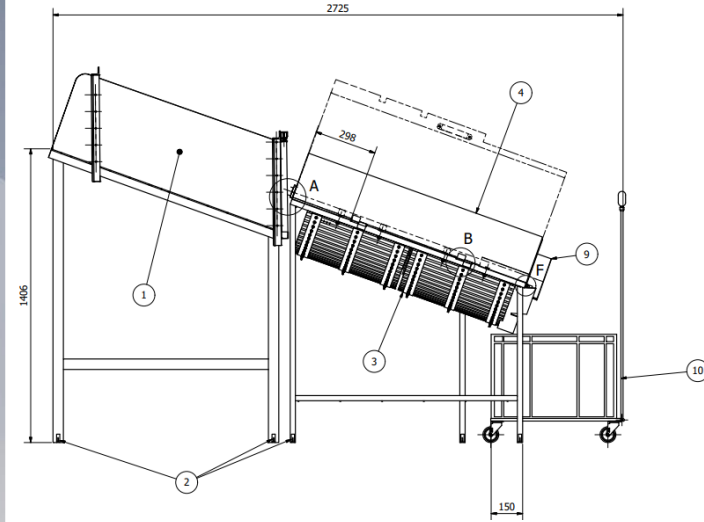
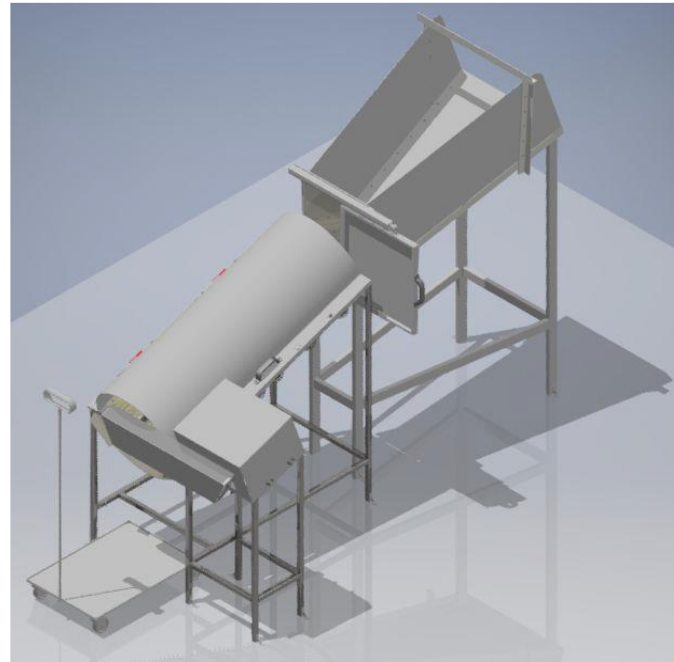
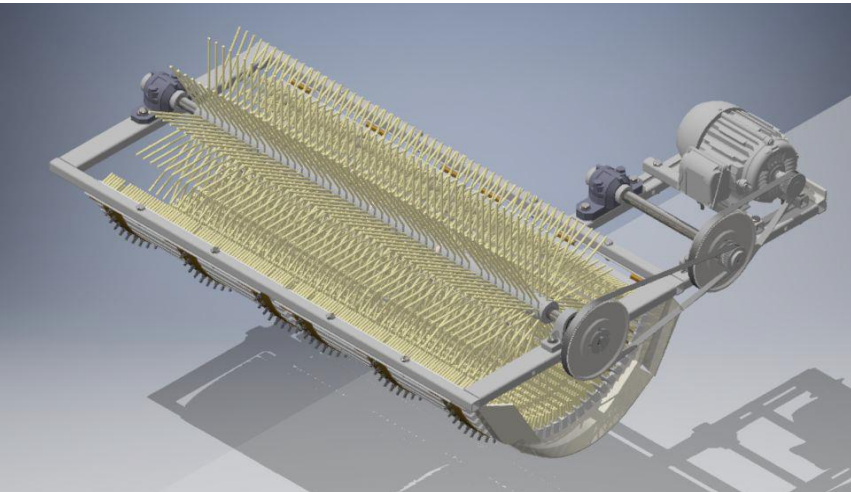
3rd year student of ISAE SUPAERO Engineering program.
Filière d'expertise: "Structure et matériaux"



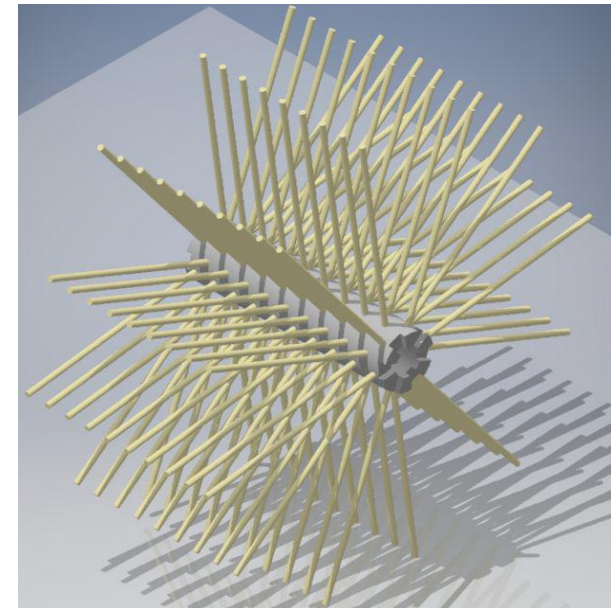
Potato Cleaning Machine

- September 2016

- Modelled as project for the Drawing Machine Class (National University of Colombia).
- **3D modelling and blueprinting** of a machine capable of cleaning potatoes without water, designed by last year students of Mechanical engineer.
- The pieces and general information were given in order to achieve the 3D model and fabrication drawings of each element of the machine.

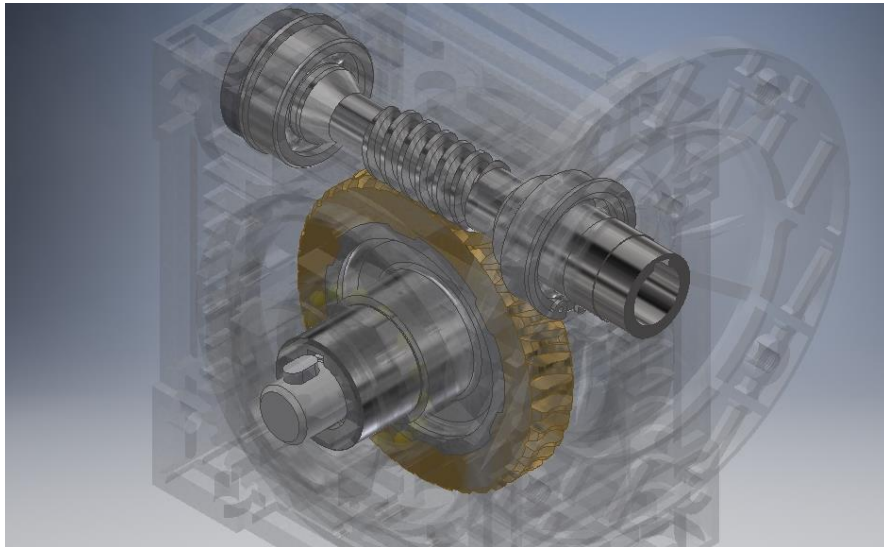


- As part of this project, I was in charge of the modelling, to ensure the assembling of the components.
- At the end of the project, the movement of the mobile parts could be achieved.
- This project was made using *AUTODESK INVENTOR 2016*.

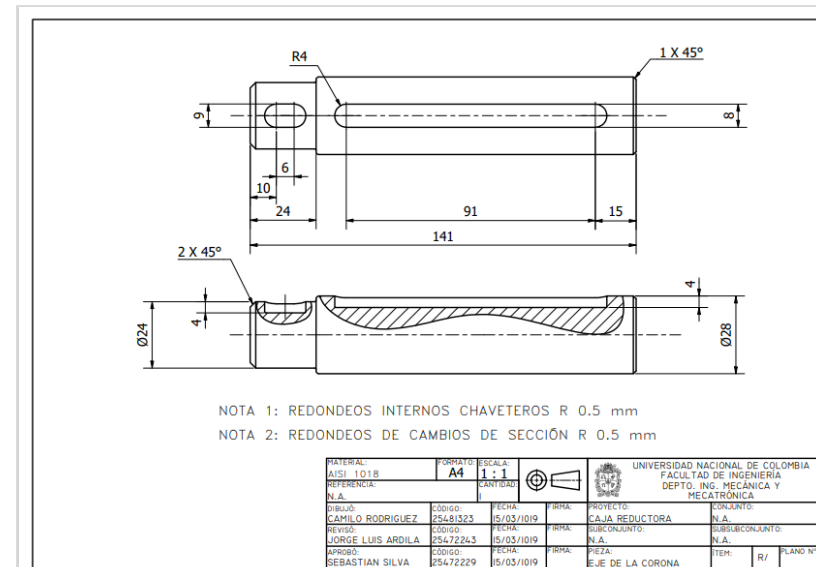


Worm-drive transmission box – September 2018

- Designed as project for the Machine Design I Class (National University of Colombia).
- **3D modelling and design revision** was carried out for this worm-drive + structure assembly.
- The original equipment was used to rise a metallic curtain for a car workshop. It was given to us as a gift by the owner, since the worm gear was broken after failure.



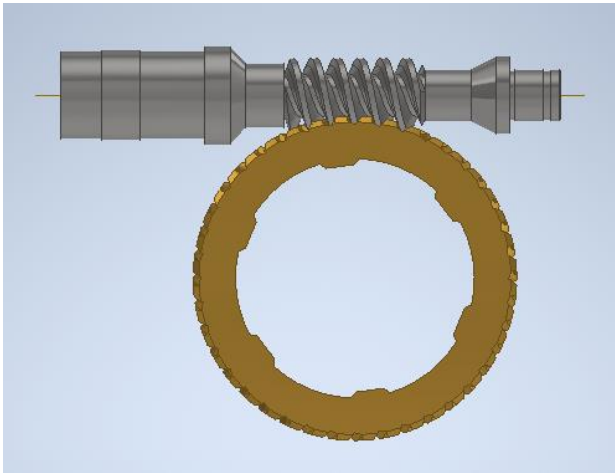
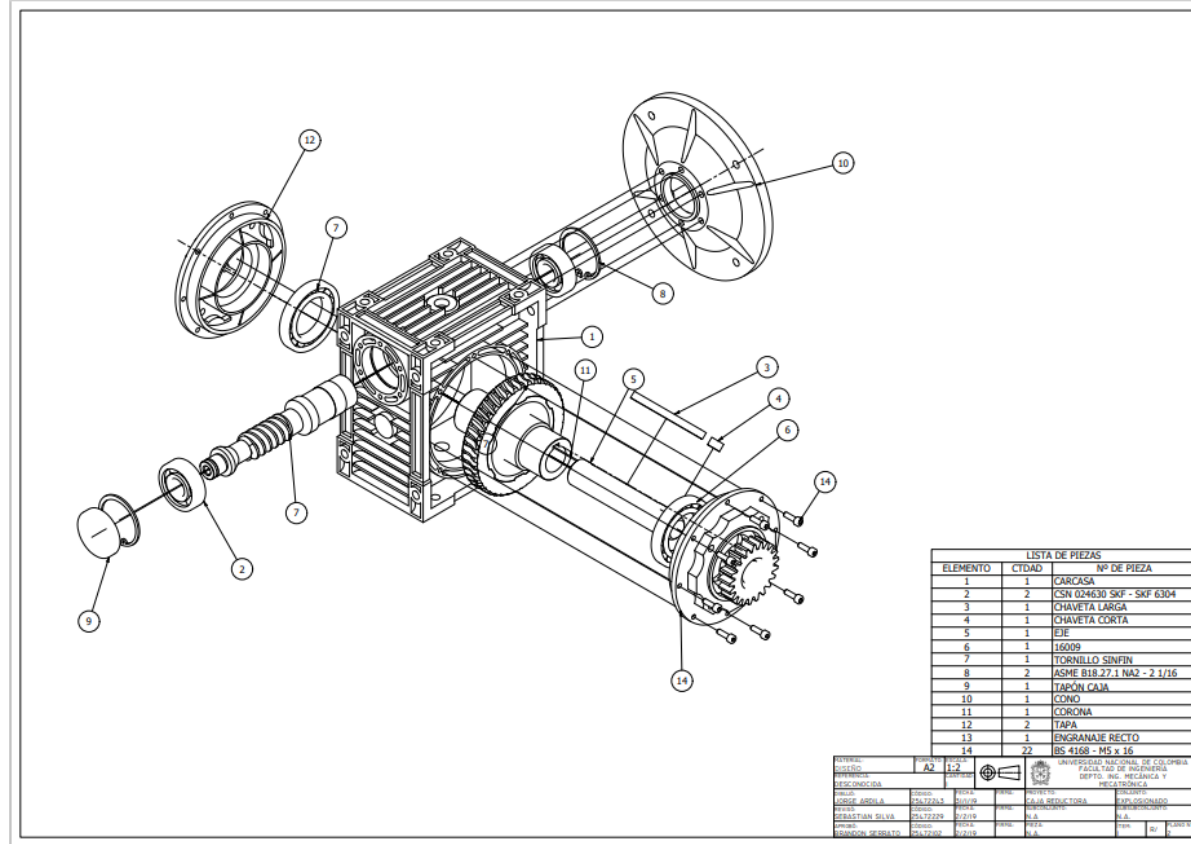
- Blueprinting and design calculations were re-made for the worm-drive, which required us inspect the original assembly with metrology tools.



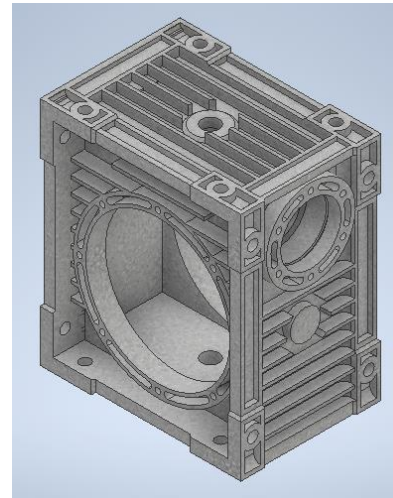
Worm-drive transmission box – September 2018

- In this project I was fully in charge of the assembly of all components in the CAD file.
- At the end of the project, the movement of the mobile parts could be achieved. I uploaded two videos to prove the correct assembly and the movement:

https://youtu.be/KL_H3qBAQ34 <https://youtu.be/u91hCk-ds4U>



Worm-drive partially modelled with Autodesk Inventor's design accelerator modulus.

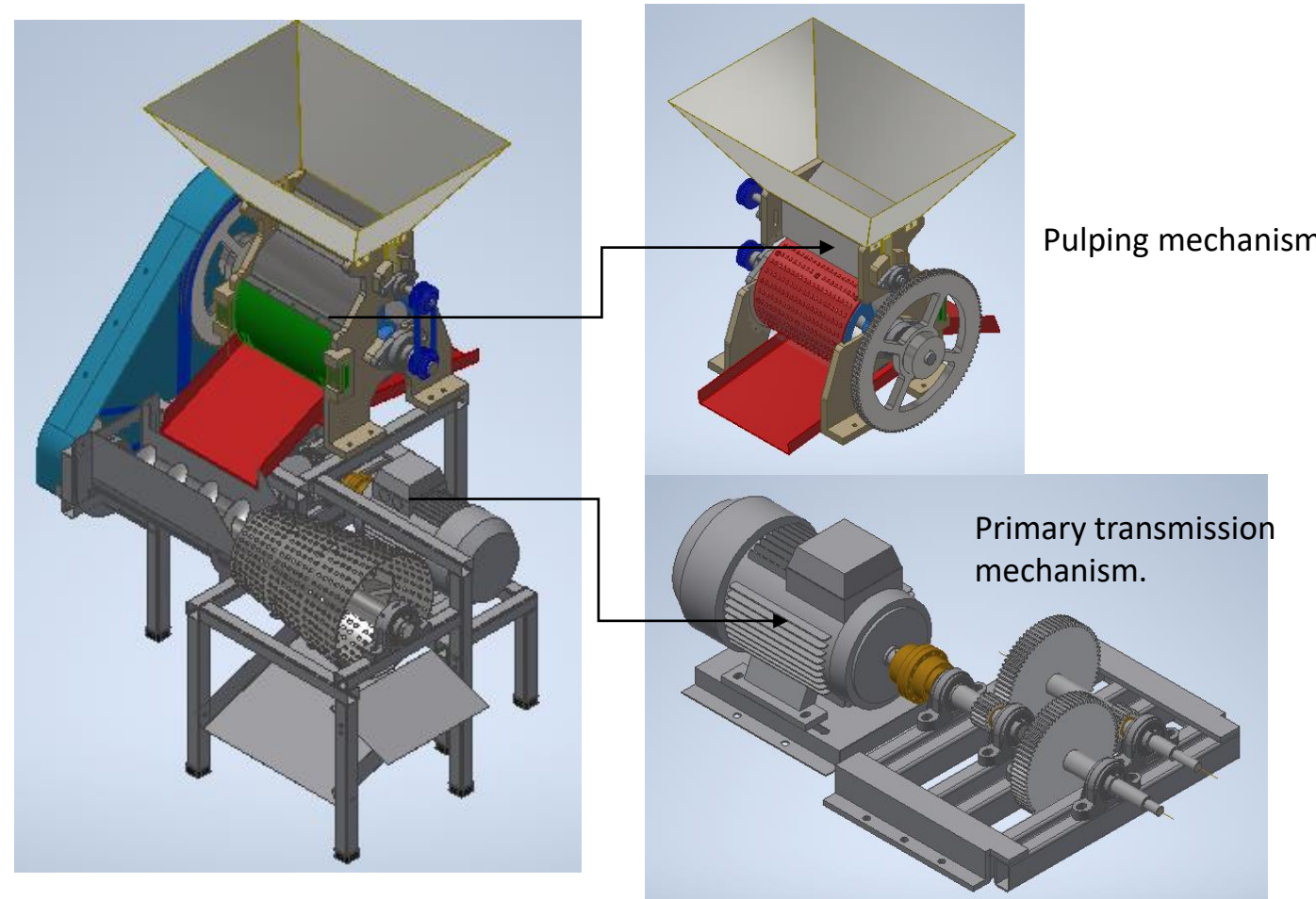
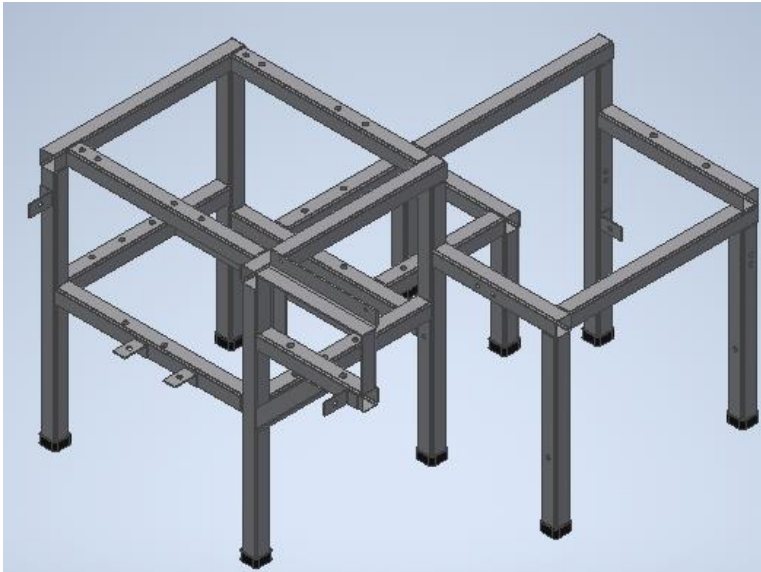


Outer casing modelled completely from scratch.

Coffee Pulping Machine

– November 2019

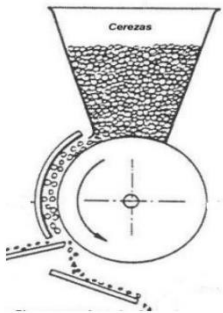
- Designed as project for the Machine Design II Class (National University of Colombia).
- Required to have flexible (V belts, toothed belts) and rigid elements (straight gears).
- Structure design was required.
- The purpose of this project was to **design** a functional **machine** and **all the components** in order to improve the efficiency of coffee farms in Colombia.



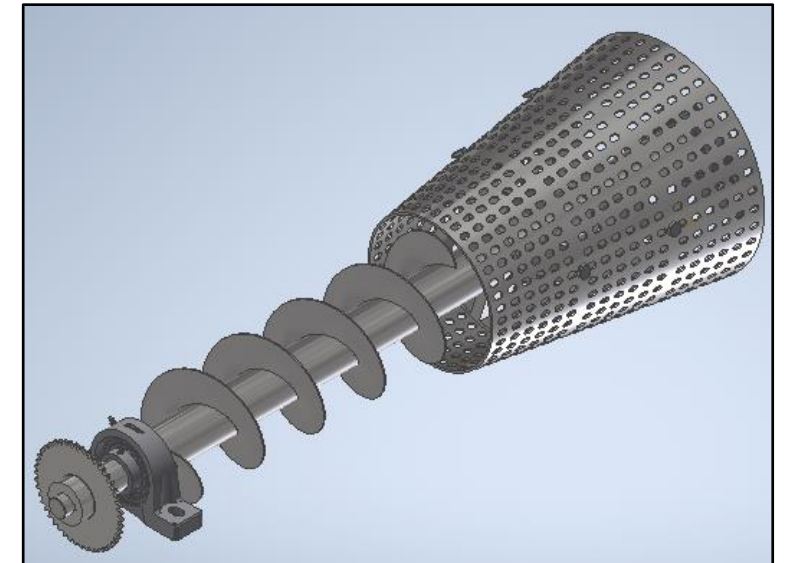
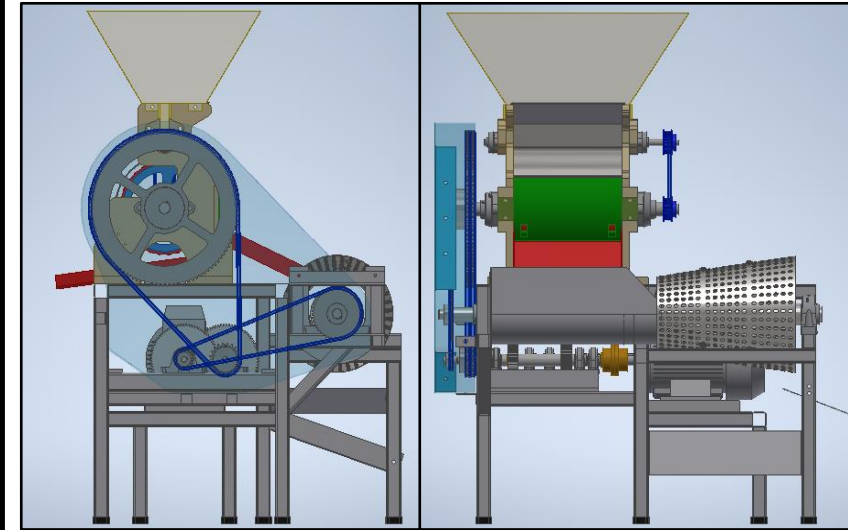
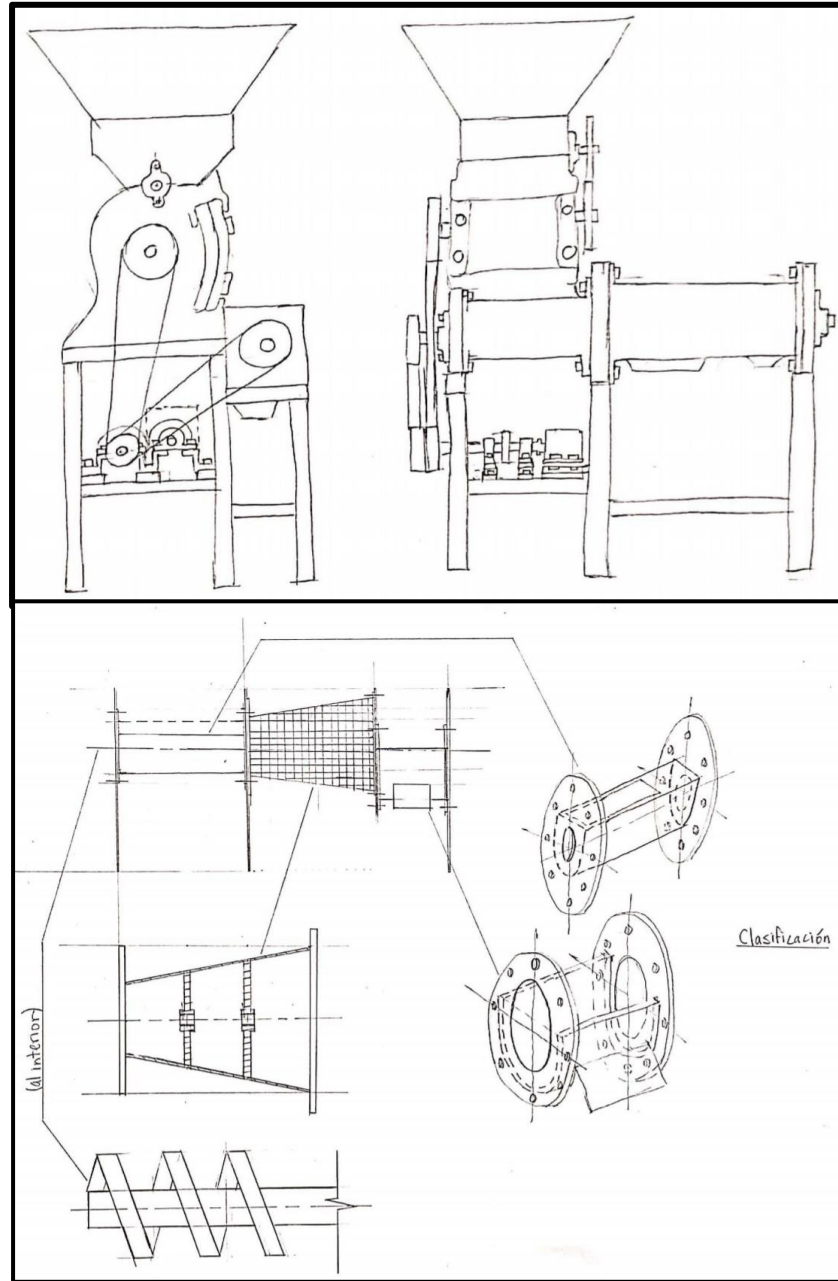
- As part of this project, I was enrolled with the design as well as the 3D modelling of the machine.
- At the end of the project, the movement of the mobile parts could be achieved.
- This project was made using *AUTODESK INVENTOR 2019*.

Coffee Pulping Machine

- The whole design was made by us, starting from nothing but our own sketches and inspiration from already-existing commercial machines.
- Supporting design calculations for shafts, gears and chains (American standards), as well as finite element analysis for the structure, and bearing selection diagrams are readily available.

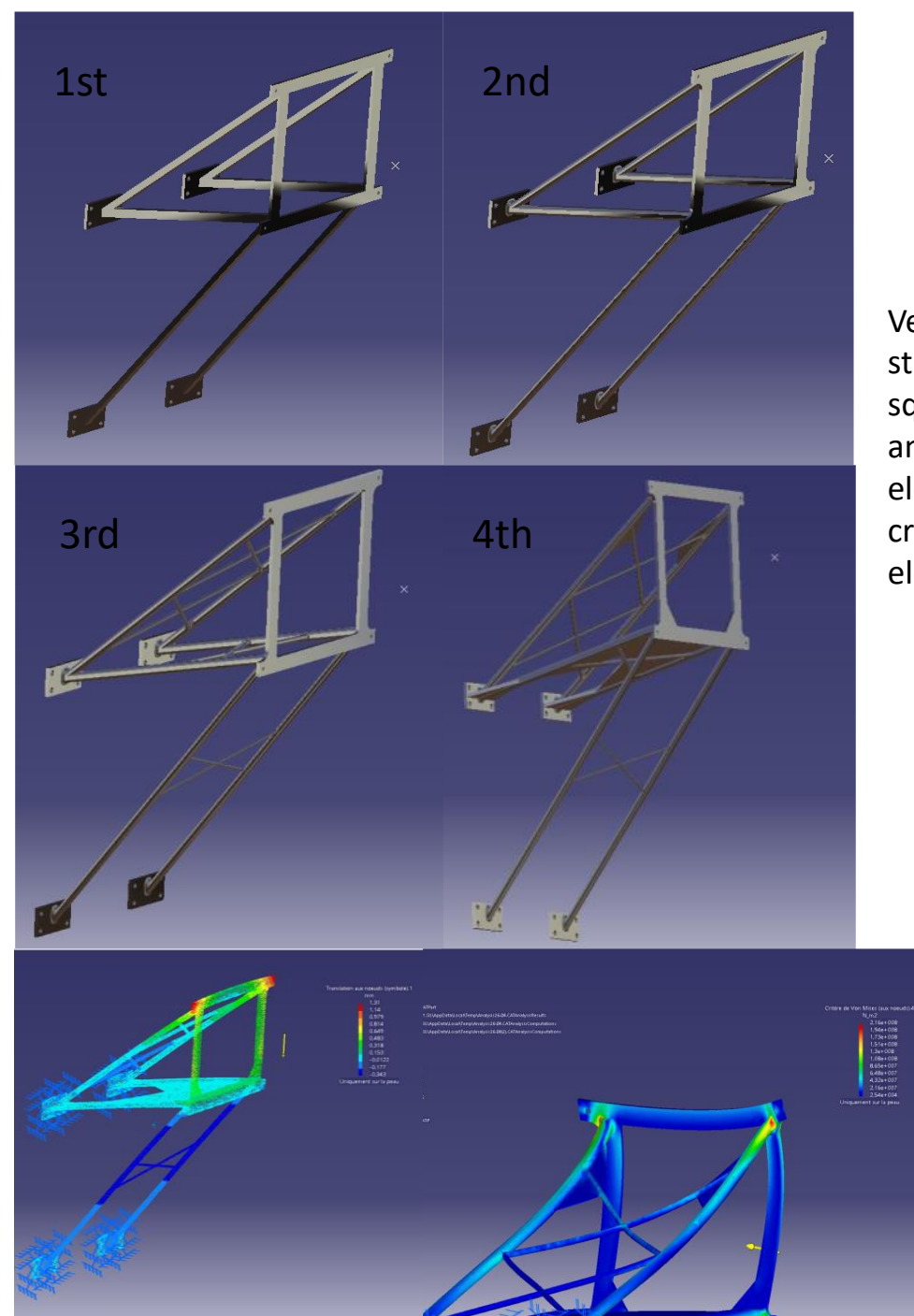


Pulping process description.



Optimization of the mechanical strength of a structure - May 2021.

- Designed as project for the Optimization of mechanical strength class with Finite Elements analysis FEA (ISAE-SUPAERO).
- Required to support an equipment of an airplane type A340. Maximum displacements of the equipment were given as well as the accelerations that it will be submitted.
- The purpose of this project was to **design** a functional **structure** to support a mass and **minimize** its own **weight**.
- It was said that the additive manufacturing could be used to build this structure, which allows to design more complex geometry than just beam elements.
- Material for the structure was Aluminium 2024.
- At the end, a structure of 521 gr was obtained to support the equipment of 25 kg.
- This project was made using CATIA V5.

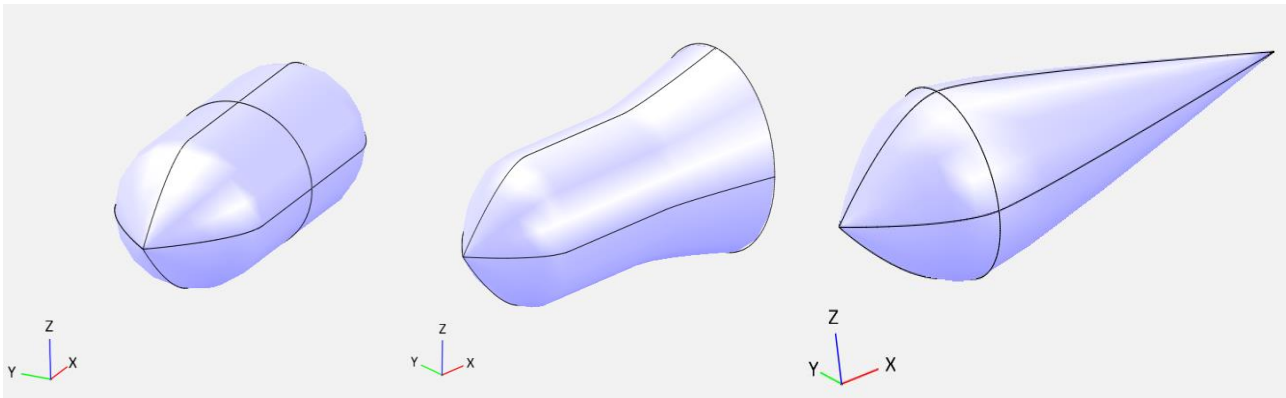


Versioning of the structure starting with squared beam elements and ending with tubular elements reinforced with cross elements and planar elements.

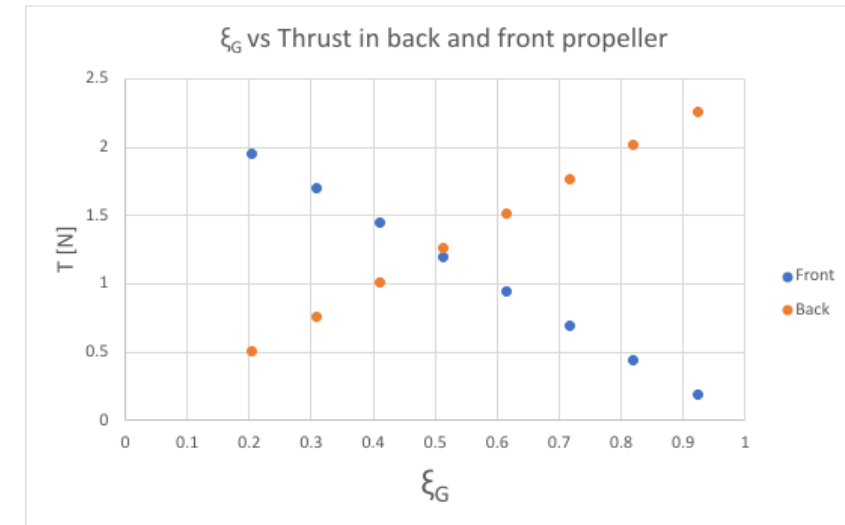
FE analysis to obtain displacements, stress and safety factor of the structure

Optimization of NARcOTic's body- June 2021

- Part of the “Projets Innovation et Recherche” (PIE) class. The idea of this project was to optimize the main body of the drone and study the influence of the centre of gravity on the performances of the drone.
- Three bodies were proposed. Then in the open-source software OpenVSP, the polar charts were obtained.
- The conclusion of this study was to use the third body proposed (Eiffel Body). Moreover, a centred gravity body in order to have the same thrust at the front and back of the drone.



NARcOTic drone



- Later the bodies were modelled in CATIA V5 with a parameter formulation to change easily the characteristics such length or cross area.
- The final idea was to 3D print the body and arrange the interior equipment. But such task was outside the PIR's objective.



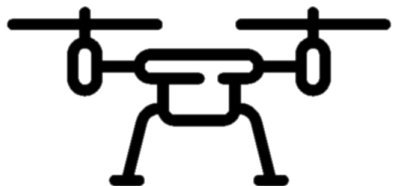
Thank you very much for reading my cover notebook! :)

If you require further information, please contact me through my e-mail address or my telephone number:

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