“One House…One Engine”

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Vincent Dupont **Girardot Thomas**

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2. The engine’s compartment

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4- Command Device

Contents

Introduction

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Design of the compartment										
Design of the tools										
Possible prototype										

Presentation #1

Presentation #2

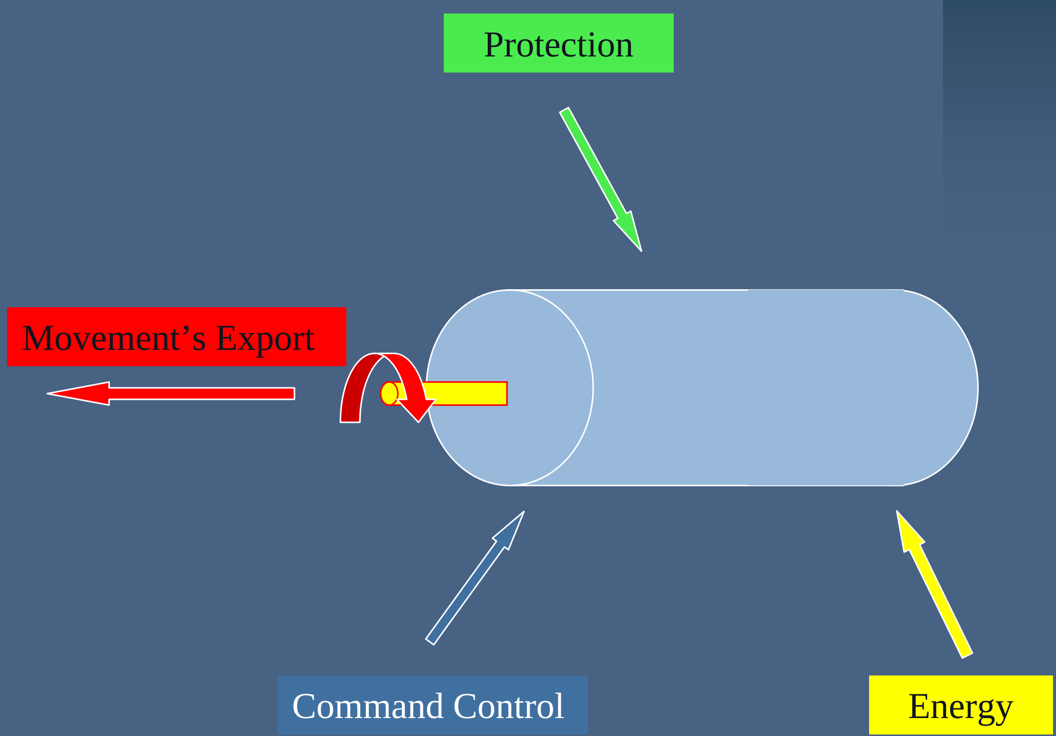
Presentation #3

Final Presentation

Contents

The engine's compartment

The Concept



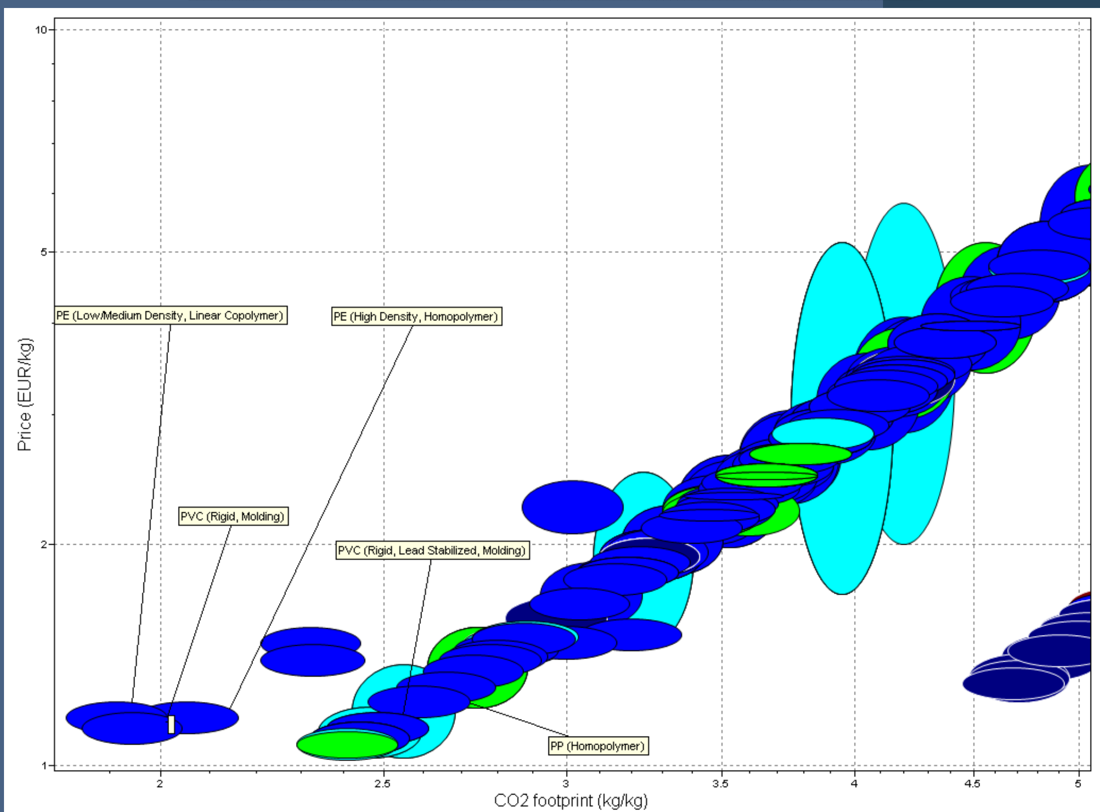
The engine's compartment

Protection

- Must be Eco-Friendly
- Must be Rigid enough to support the weight of the engine
- Must be able to bear high temperatures

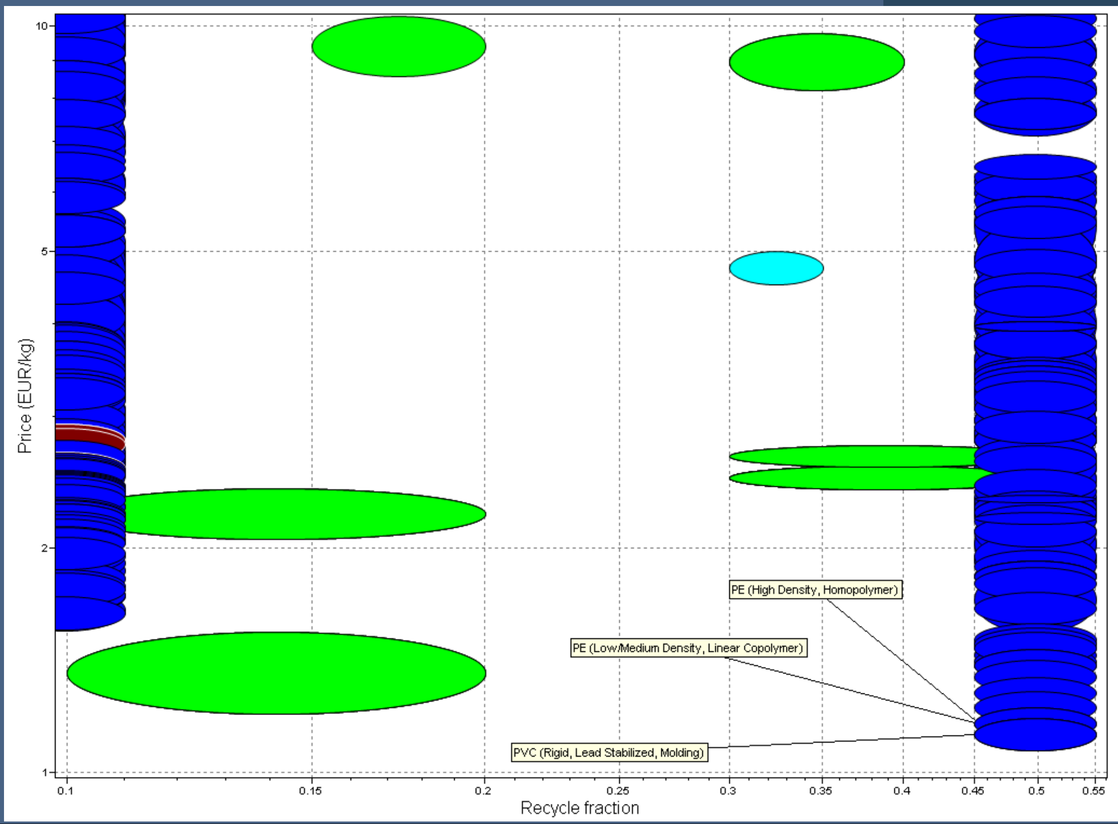
The engine's compartment

Protection



The engine's compartment

Protection



The engine's compartment

Protection

« One House…One Engine »

The engine's compartment

Protection

Polyethylene (PE low density) VS Polyethylene (PE high density)

Polyethylene (PE low density)

Durability

Flammability	Flammable
Fresh water	Very Good
Organic solvents	Average
Oxidation at 500C	Very Poor
Salt water	Very Good
Strong acid	Good
Strong alkalis	Very Good
Sunlight (UV radiation)	Good
Wear resistance	Average
Weak acids	Very Good
Weak alkalis	Very Good

Eco Properties

CO_2 footprint	1.82	-	2.01	kg/kg
Embodied energy	79.8	-	88.1	MJ/kg
Recycle fraction	* 0.45	-	0.55	

Material Processing Energy

Polymer extrusion energy	3.5	-	3.9	MJ/kg
Polymer molding energy	10	-	11	MJ/kg

End of life

Recycle	✓
Downcycle	✓
Biodegrade	✗
Combust for energy recovery	✓
Landfill	✓

Sustainability

A renewable resource?	✗

Notes

Typical uses

Chemically resistant fillings; bowls; lids; gaskets; toys; containers; packaging film; film liners; squeeze bottles; heat sealed films for metal laminates; pipe; cable covering; core in UHF cables.

Polyethylene (PE high density)

Durability

Flammability	Flammable
Fresh water	Very Good
Organic solvents	Average
Oxidation at 500C	Very Poor
Salt water	Very Good
Strong acid	Good
Strong alkalis	Very Good
Sunlight (UV radiation)	Good
Wear resistance	Average
Weak acids	Very Good
Weak alkalis	Very Good

Eco Properties

CO_2 footprint	1.95	-	2.16	kg/kg
Embodied energy	77.9	-	86	MJ/kg
Recycle fraction	* 0.45	-	0.55	

Material Processing Energy

Polymer extrusion energy	3.5	-	3.9	MJ/kg
Polymer molding energy	10	-	11	MJ/kg

End of life

Recycle	✓
Downcycle	✓
Biodegrade	✗
Combust for energy recovery	✓
Landfill	✓

Sustainability

A renewable resource?	✗

Notes

Typical uses

Pipes; toys; bowls; buckets; milk bottles; crates; tanks; containers; film for packaging; blown bottles for food.

The engine's compartment

Protection

Polypropylene (PP) VS Poly Venyl Chloride (PVC Rigid)

Polypropylene (PP)

Durability

Flammability	Flammable
Fresh water	Very Good
Organic solvents	Very Good
Oxidation at 500C	Very Poor
Salt water	Very Good
Strong acid	Very Good
Strong alkalis	Very Good
Sunlight (UV radiation)	Good
Wear resistance	Average
Weak acids	Very Good
Weak alkalis	Very Good

Eco Properties

CO_2 footprint	* 2.46	-	2.72	kg/kg
Embodied energy	* 80.9	-	89.3	MJ/kg
Recycle fraction	* 0.45	-	0.55	

Material Processing Energy

Polymer extrusion energy	3.5	-	3.9	MJ/kg
Polymer molding energy	10	-	11	MJ/kg

End of life

Recycle	✓
Downcycle	✓
Biodegrade	✗
Combust for energy recovery	✓
Landfill	✓

Sustainability

A renewable resource?	✗

Notes

Typical uses

Buckets; bowls; general mechanical parts; bottle crates; toys; medical components; washing machine drums; pipes; battery cases; bottles; bottle caps; bumpers; films for packaging; fibers for carpeting and artificial sports surfaces.

Poly Venyl Chloride (PVC Rigid)

Durability

Flammability	Non-flammable
Fresh water	Very Good
Organic solvents	Average
Oxidation at 500C	Very Poor
Salt water	Very Good
Strong acid	Very Good
Strong alkalis	Very Good
Sunlight (UV radiation)	Very Good
Wear resistance	Average
Weak acids	Very Good
Weak alkalis	Very Good

Eco Properties

CO_2 footprint	1.85	-	2.04	kg/kg
Embodied energy	64.5	-	71.2	MJ/kg
Recycle fraction	* 0.45	-	0.55	

Material Processing Energy

Polymer extrusion energy	3.9	-	4.3	MJ/kg
Polymer molding energy	11	-	12	MJ/kg

End of life

Recycle	✓
Downcycle	✓
Biodegrade	✗
Combust for energy recovery	✗
Landfill	✓

Sustainability

A renewable resource?	✗

Notes

Typical uses

Pipe and pipe fittings; building products; bottles; film; records; floor tiling.

Protection

Polypropylene (PP) **VS** Polyethylene (PE low density)

Polypropylene (PP)

Durability

Flammability	Flammable
Fresh water	Very Good
Organic solvents	Very Good
Oxidation at 500C	Very Poor
Salt water	Very Good
Strong acid	Very Good
Strong alkalis	Very Good
Sunlight (UV radiation)	Good
Wear resistance	Average
Weak acids	Very Good
Weak alkalis	Very Good

Eco Properties

CO_2 footprint	*2.46	-	2.72	kg/kg
Embodied energy	*80.9	-	89.3	MJ/kg
Recycle fraction	*0.45	-	0.55	

Material Processing Energy

Polymer extrusion energy	3.5	-	3.9	MJ/kg
Polymer molding energy	10	-	11	MJ/kg

End of life

Recycle	✓
Downcycle	✓
Biodegrade	✗
Combust for energy recovery	✓
Landfill	✓

Sustainability

A renewable resource?	✗

Notes

Typical uses

Buckets; bowls; general mechanical parts; bottle crates; toys; medical components; washing machine drums; pipes; battery cases; bottles; bottle caps; bumpers; films for packaging; fibers for carpeting and artificial sports surfaces.

Polyethylene (PE low density)

Durability

Flammability	Flammable
Fresh water	Very Good
Organic solvents	Average
Oxidation at 500C	Very Poor
Salt water	Very Good
Strong acid	Good
Strong alkalis	Very Good
Sunlight (UV radiation)	Good
Wear resistance	Average
Weak acids	Very Good
Weak alkalis	Very Good

Eco Properties

CO_2 footprint	1.82	-	2.01	kg/kg
Embodied energy	79.8	-	88.1	MJ/kg
Recycle fraction	*0.45	-	0.55	

Material Processing Energy

Polymer extrusion energy	3.5	-	3.9	MJ/kg
Polymer molding energy	10	-	11	MJ/kg

End of life

Recycle	✓
Downcycle	✓
Biodegrade	✗
Combust for energy recovery	✓
Landfill	✓

Sustainability

A renewable resource?	✗

Notes

Typical uses

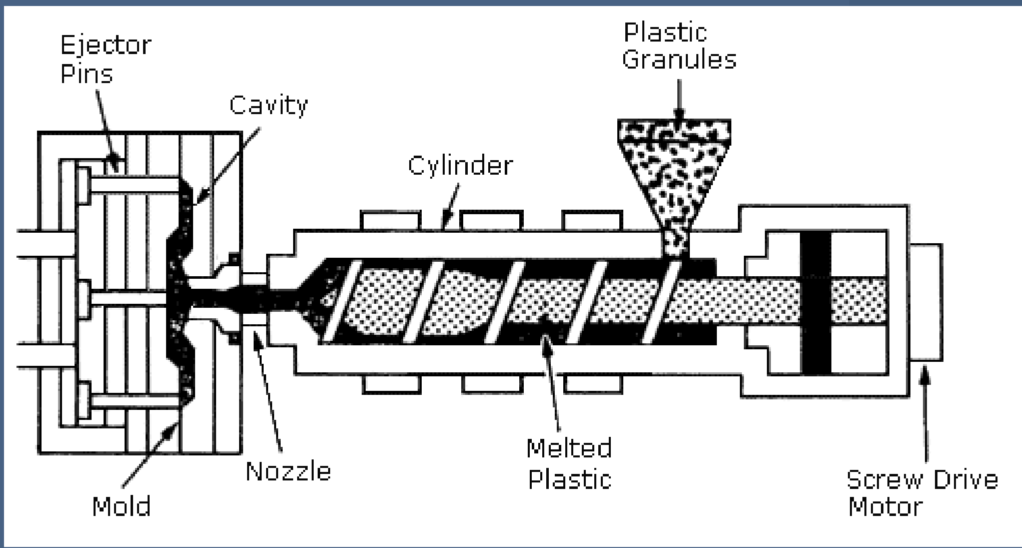
Chemically resistant fillings; bowls; lids; gaskets; toys; containers; packaging film; film liners; squeeze bottles; heat sealed films for metal laminates; pipe; cable covering; core in UHF cables.

Protection

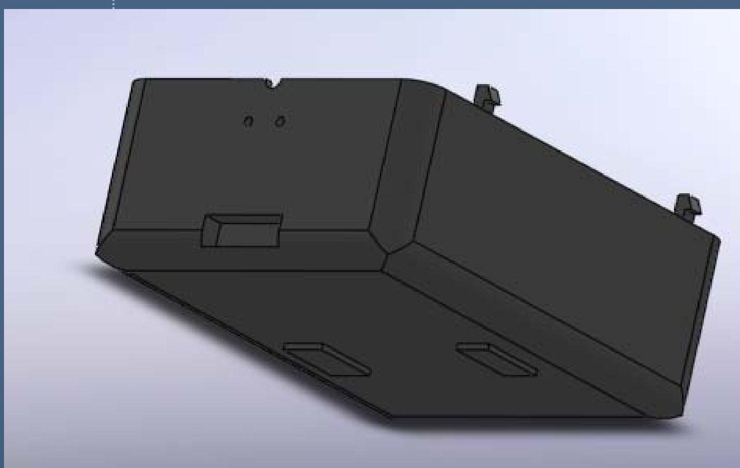
	Maximum Service Temperature(°C)	Melting Temperature(°C)	Young's Modulus(Gpa)
Polypropylene (PP)	**92~107**	**160~175**	**1,14**
Polyethylene (PE)	**77~97**	**122~124**	**0,262**

Protection

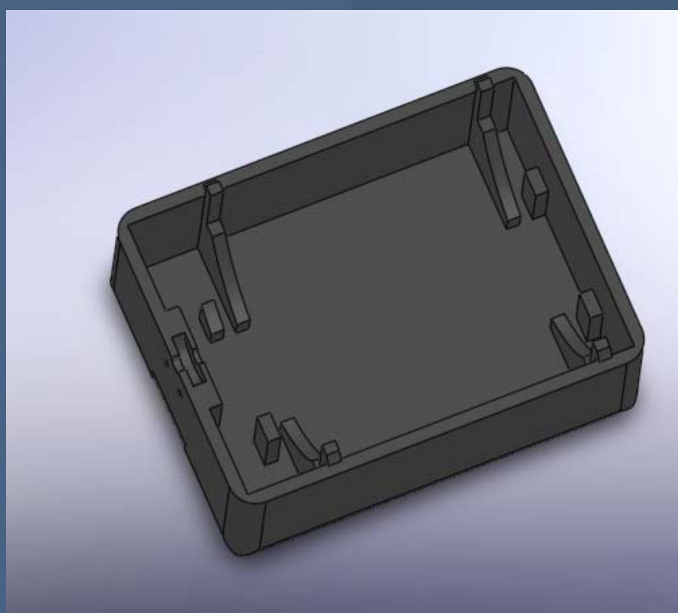
Injection Molding:



Protection



Bottom Case



Length: 160mm

Width: 120mm

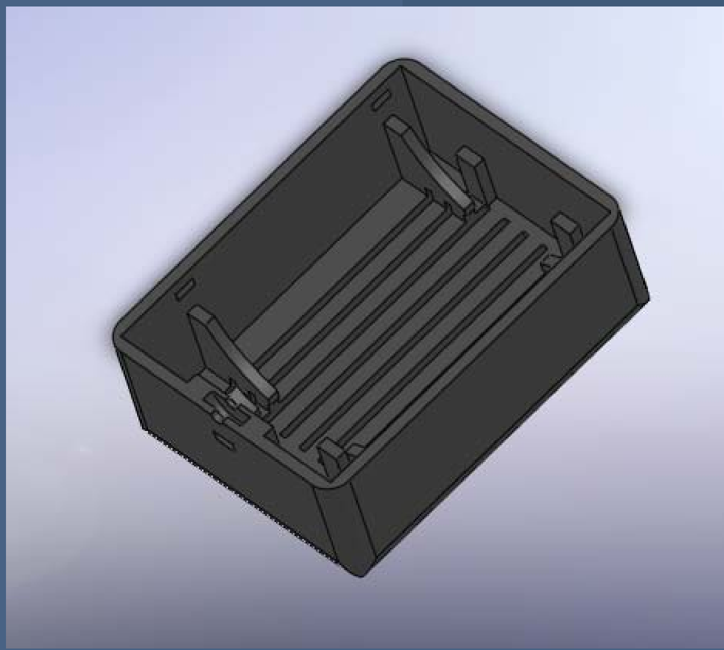
Height: 60mm

Weight: 231,26g.

The engine's compartment

Protection

Top Case



Length: 160mm

Width: 120mm

Height: 60mm

Weight: 214,79g.

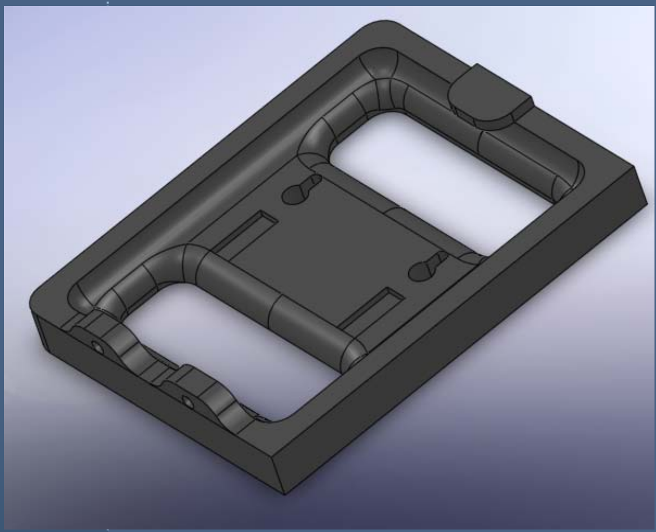
The engine's compartment

Energy

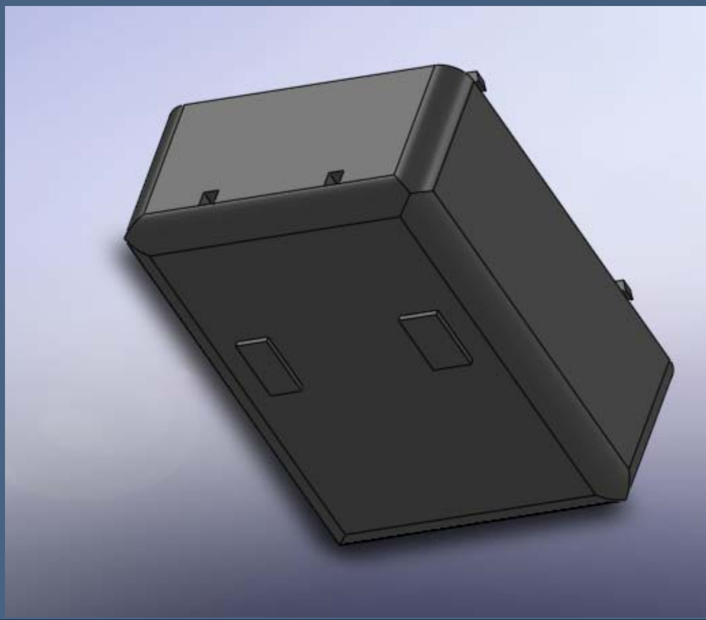
- Easy to transport
- Stowage of the Transformer and the Wire
- Integrated into the dock
- Light

The engine's compartment

Energy



Dock



Length: 180mm

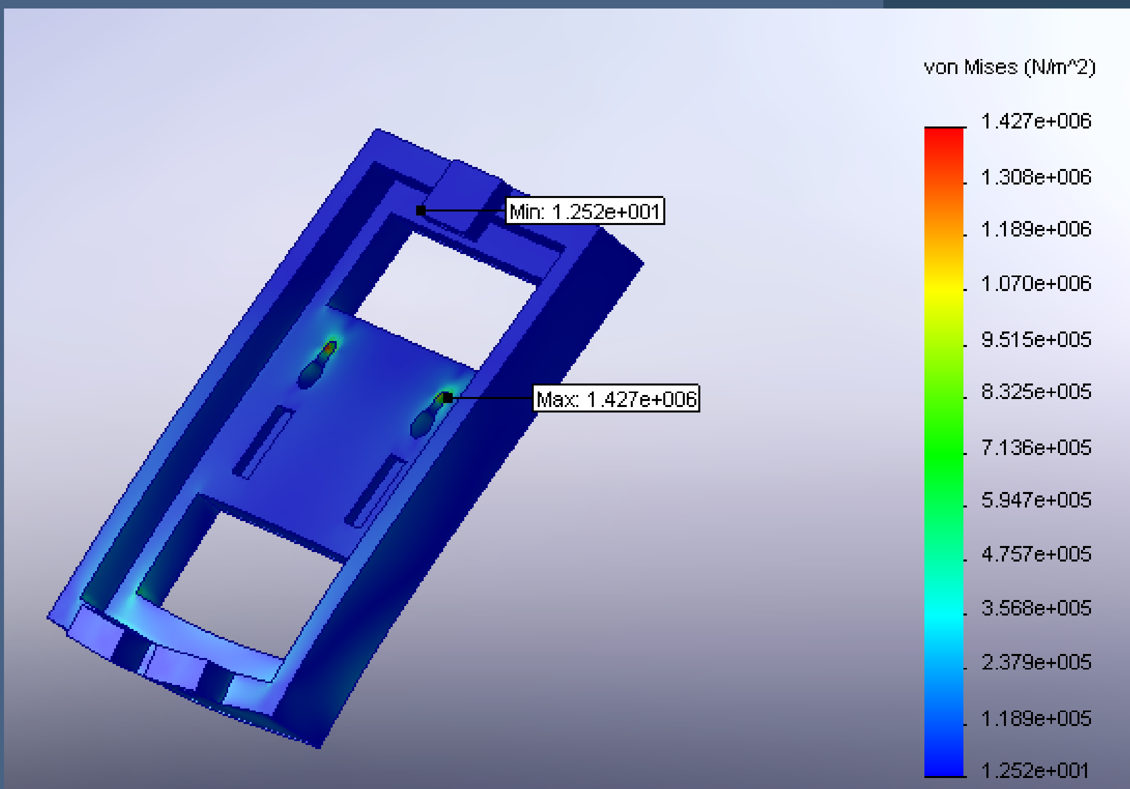
Width: 140mm

Height: 30mm

Weight: 223,65g.

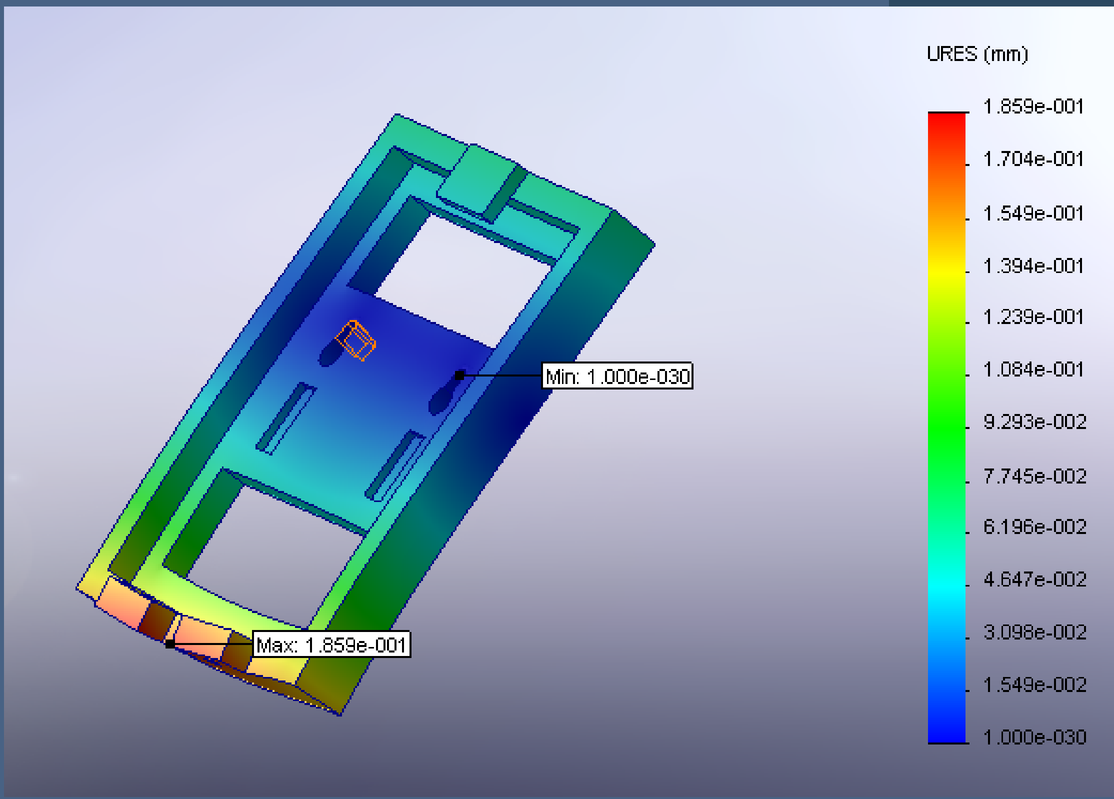
The engine's compartment

Energy



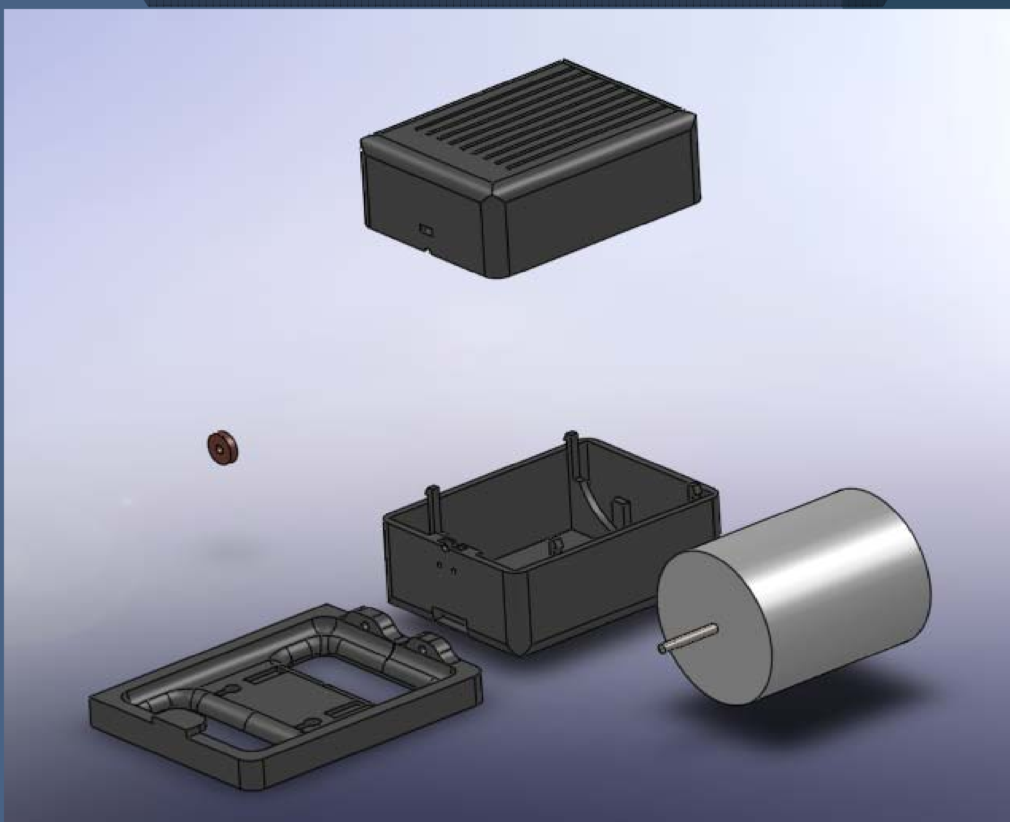
The engine's compartment

Energy



The engine's compartment

Energy



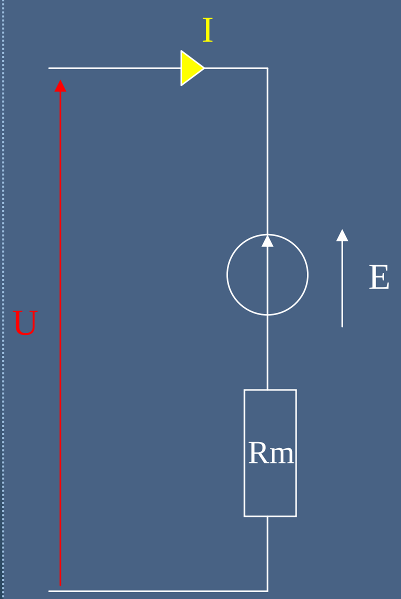
The engine's compartment

Command Device

Device	Model	Output Power (W)	Unload speed (rpm)
Drill	Hitachi D-10VC2	460	2300
	Facom V.102MC	370	2750
	BOSCH GBM 13	475	660
	Dewalt D21520	560	550
	Métabo SBE 705	410	3000
	BE 1020	620	2600
Blender	Equip Blender RPM	900	20000
	Gold Mill Multi Mix Blender	480	18000
Meat slicer	Siemens MS-46000	110	50 to 110
	MAGIMIX 11098	120	120
	MAS9101 - BOSCH	140	90 to 130
Mixer	ELTA STM 250	200	18000

The engine's compartment

Command Device



Phi: Inductor Flux k: Engine Constant

C: Torque of the engine

Relation between Speed and Electromotrice force:

$$E = U - R \times I$$

$$E = k * Phi * w$$

- Relation between Torque and Flux:

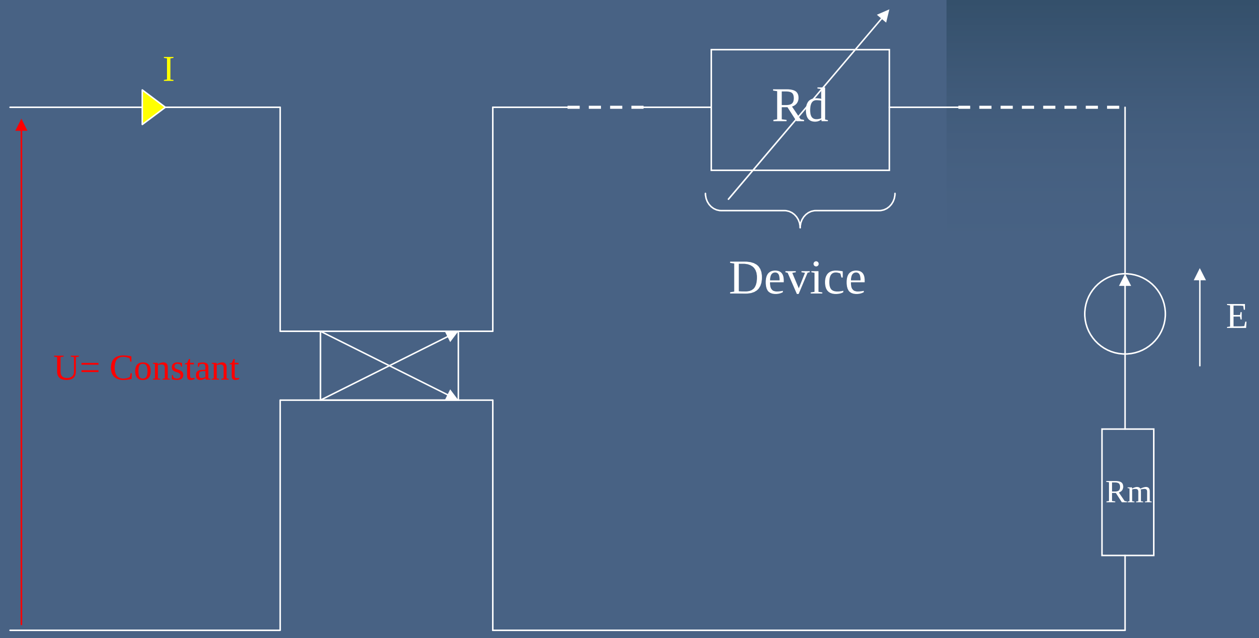
$$C = k * I * Phi$$

In order to increase the speed of the engine:

- Increase E with a I constant → C is constant too
- Decrease I → C is decreasing

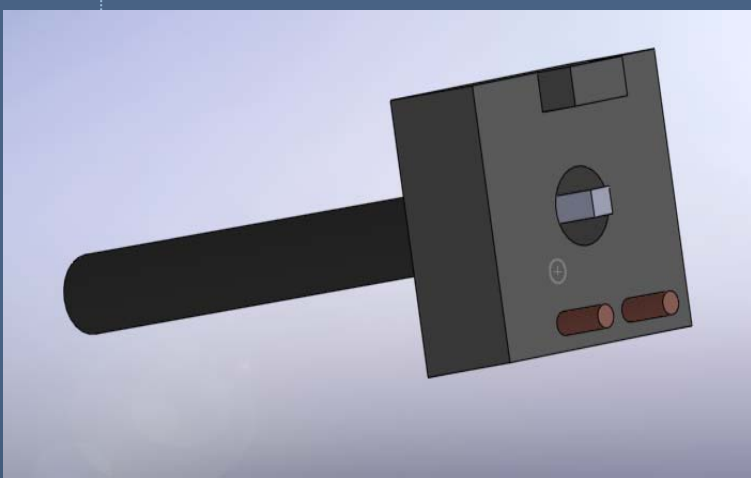
The engine's compartment

Command Device

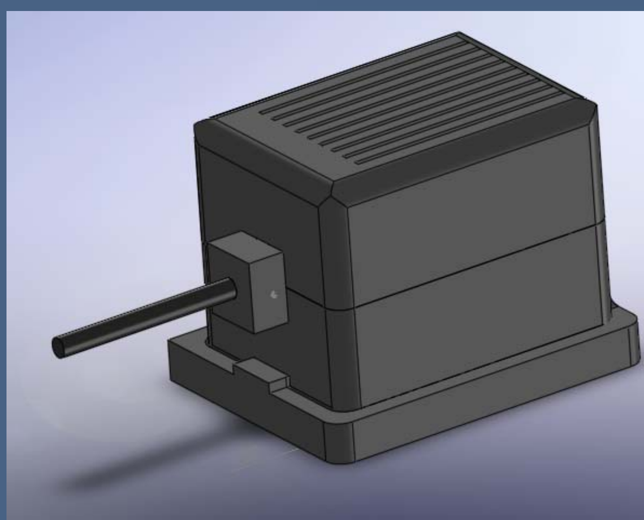


The engine's compartment

Command Device



Mechanical & Electric Connexion



Length: 35mm

Width: 35mm

Height: 38mm

Weight: 25g + 500g/m

Conclusion

➡ Design and Conception of a compartment for the engine

➡ Next Step: Design and Conception of tools

	April				May				June	
	1	2	3	4	1	2	3	4	1	2
Design of the compartment										
Design of the tools										
Possible prototype										

Thank you for your attention!!