One House, One Engine

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Objectives

- To use a single engine for all the applications at home

Idea

Common appliances used at home

Single Engine

+

Flexible Transmission

+

Evolved Appliances

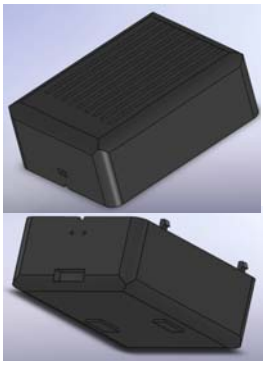
Advantages

- **No lost of Material: save of costs**
- **No lost of Material: Eco-Friendly**
- **Light Appliances: Easy to handle for the user**
- **No integration of the engine in the appliances: more freedom in the Design**

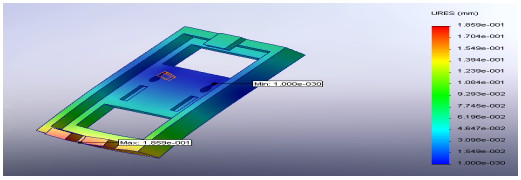
Concept Design

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	
CO2 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.	

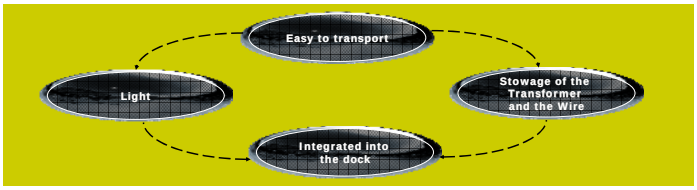
Polypropylene (PP) Properties



Top and Bottom of the protection case



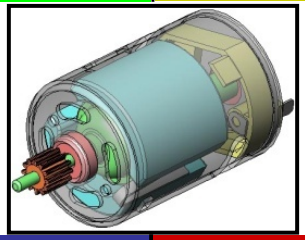
Study of Structure for the dock designed



Advantages for using a dock

Protection of the Engine

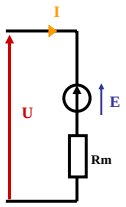
Energy



Command Control System

Movement Export

Engine Circuit

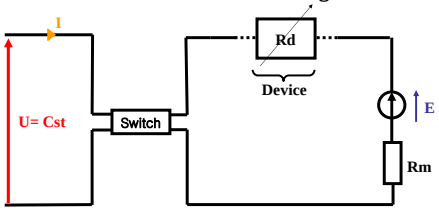


Phi: Inductor Flux

k: Engine Constant

C: Torque of the engine

Command Control for the Engine



• **Relation between Speed and Electromotrice force:**

$E = U - R*I$

$E = k * Phi * w$

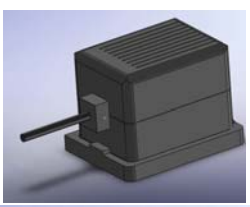
• **Relation between Torque and Flux:**

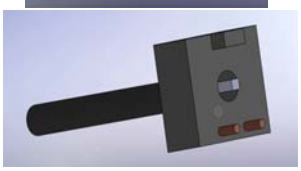
$C = k * I * Phi$

Flexible Transmission Properties

Diameter	Torque	Speed	Weight
4 mm	4 cm/kg	25000 rpm	0,08 kg/m
5 mm	8 cm/kg	25000 rpm	0,12 kg/m
6 mm	10 cm/kg	15000 rpm	0,17 kg/m
8mm	15 cm/kg	10000 rpm	0,30 kg/m

Flexible Transmission Designed





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Objectives

- To check the viability of the concept by building a prototype

Idea

Usual Drilling Machine

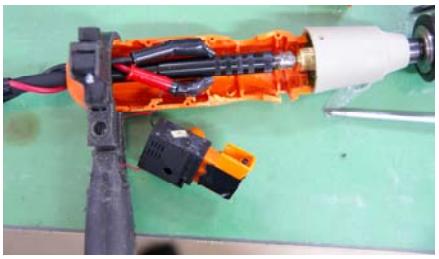
Single Engine

Dremel© Flexible Transmission

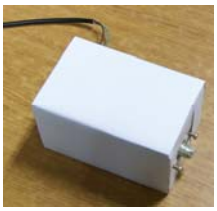
Drilling Machine Body

Prototype Design

Rotation Guidance



Inside the Drilling Machine Prototype



Final Box for the Engine

Anti-Vibration System

Final Drilling Machine Prototype

Protection of the Engine

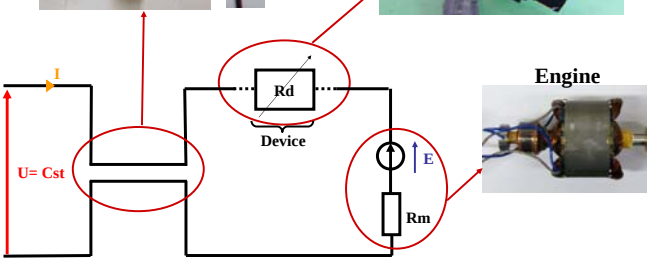
Drilling Machine Prototype

Command Control System

Movement Export

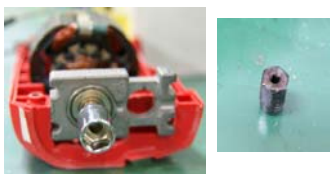
Connection between the engine and the tool

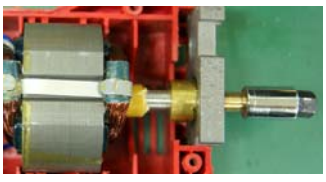
Potentiometer



Engine

At the Engine Exit





At the Drilling Machine Entrance Chuck