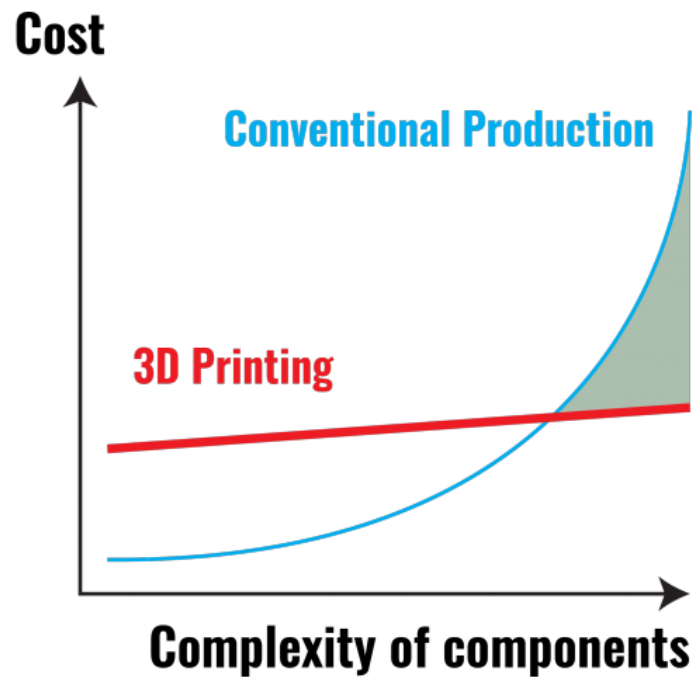


Cost understanding

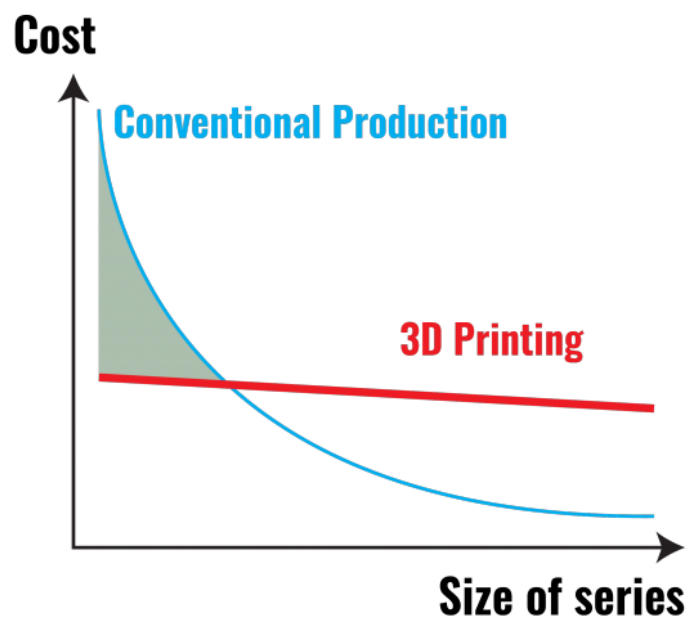
Support document

I. Differences between prototype and mass production

Different types of manufacturing processes: Machining (Milling, Turning), Laser and waterjet cut, 3D printing, Stamping, Foundry, Forging, Broaching, Weldments, Injection molding, ...



Comparison of 3D printing versus conventional production: cost versus complexity



Comparison of 3D printing versus conventional production: cost versus size of series

II. Resource and cost planning

Global resource planning

See V cycle drawing.

End of...	Previsionnal date	Real date	Delay (in days)
High level design	6 sept. 2018	13 sept. 2018	7 days
Detailed design	13 nov. 2018	20 nov. 2018	7 days
Fabrication & unit testing	15 feb. 2019	8 mar. 2019	21 days
System testing & integration	16 mar. 2019	5 apr. 2019	20 days
Roll out	10 apr. 2019	10 apr. 2019	0 days
First testing	20 apr. 2019	27 apr. 2019	7 days

Detailed resource planning

Utilisation of Gantt's to plan and monitor the work.

Car :	Department :	Supervisor :	Version	1	On time					
STUF'2019 - Optimus	S2 : Powertrain	Clement Emerique CEE	V1.5 of 22/11/18	0	Late					
				2	Completed					

Example of Gantt layout

Manufacturing planning

- Gantt of the production phase (Manufacturing_Gantt)
- Excel of the repartition of the production between our partners, sponsors and suppliers (Manufacturing_framework)

Production framework

Supplier/partner:



Supervisor EPSA:	Maxime Proriot	Phone	0637 499240	E-mail	maxime.proriot@ec117.ec-lyon.fr
Contact:					

Version: V2.0
Date: 3/7/2019

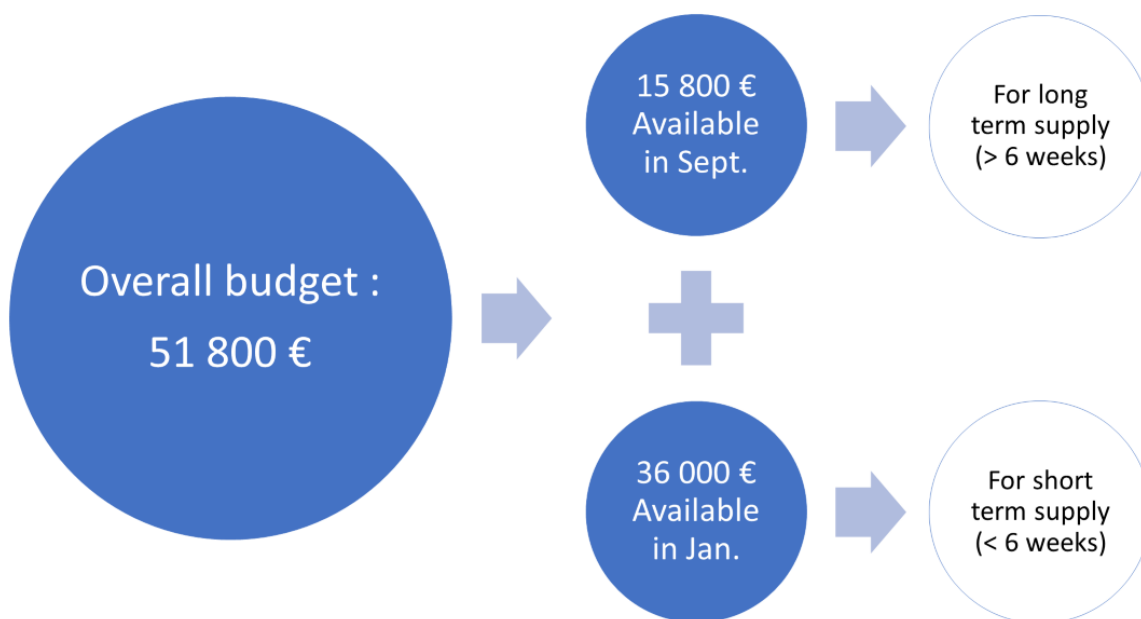
Number of parts **16**

System	Material	Description	Quantity	Dimensions	Operations	Type of material	Status	Supervisor
LASMECA	ACIER	Manchon de direction exté	1		Tournage	S235	Pièce pesée	MPL
LASMECA	ALUMINIUM	Chape rapporté triangle supérieur	5	40x45x65	Fraisage	7075 T6	Pièce pesée	APU
LASMECA	ALUMINIUM	Base cale de carrossage chape rapporté avant	2	40x65x8	Fraisage	2017 T4	Pièce pesée	APU
LASMECA	ALUMINIUM	Entretoise roulement avant	2	D75x20	Tournage	2017 T4	Pièce pesée	APU
LASMECA	ALUMINIUM	Entretoise roulement arrière	2	D75x25	Tournage	2017 T4	Pièce pesée	APU
Introduction	Statistiques	BOISARD	LA MACHE LASER	LA MACHE PRODUCTIQUE	ALPEN TECH	CENTRALE	HPC	AQUACLU

Production framework layout

Cost planning

See Previsionnal Expenses drawing.



Example of Gantt layout

System	Previsionnal	Real	Differences (€)	Differences (%)
Suspension	12 630,00 €	19 480,00 €	6 850,00 €	35%
Powertrain	14 680,00 €	14 046,00 €	-634,00 €	-5%
Electrical	6 810,00 €	6 893,00 €	83,00 €	1%
Frame & body	880,00 €	2 005,00 €	1 125,00 €	56%
Miscellaneous	11 400,00 €	9 994,00 €	-1 406,00 €	-14%
Total	46 400,00 €	52 418,00 €	6 018,00 €	11%
Budget	51 800,00 €	52 600,00 €		
Financial provisions	5 400,00 €	182,00 €		

Summary of previsionnal and real expenses

III. Financial and production risk management

An example of a financial risk

Supply of wheels' bearings:

- Delay of delivery due to absence of stock
 - Initially planned on March
 - Delivery delayed to the beginning of June
- To respect the roll-out deadline, wheels bearings supplied with the budget
 - Diminution of the financial provision

An example of a production risk

A fire destroyed the workshops of our partner during the manufacturing of the uprights and hubs. The team reacted quickly to move the production to another partner and to the university workshop.



Fire in the workshops of our partner Boisard

IV. Make or buy decisions

See ratio of price versus weight saved.

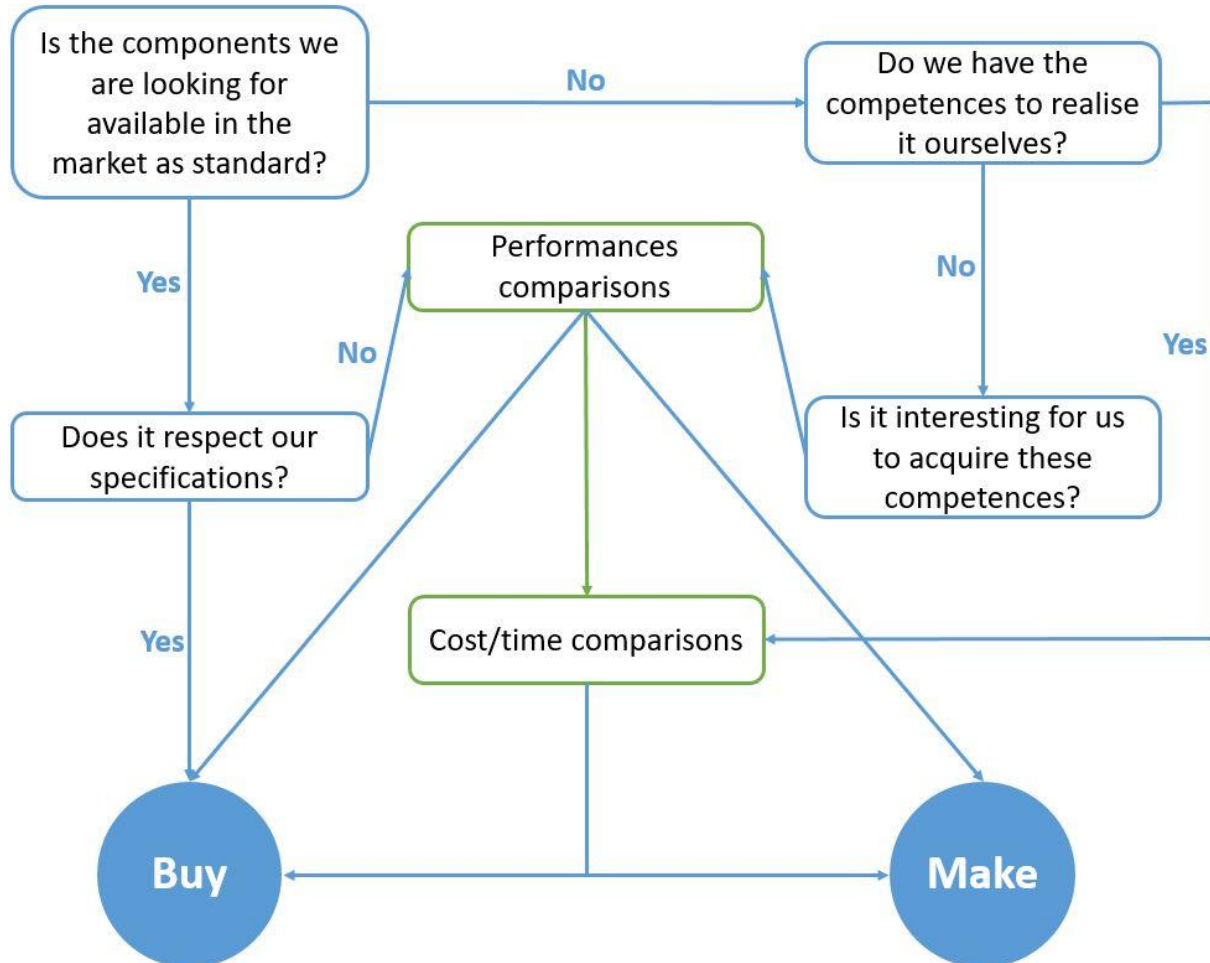


Diagram to illustrate buy and made decisions