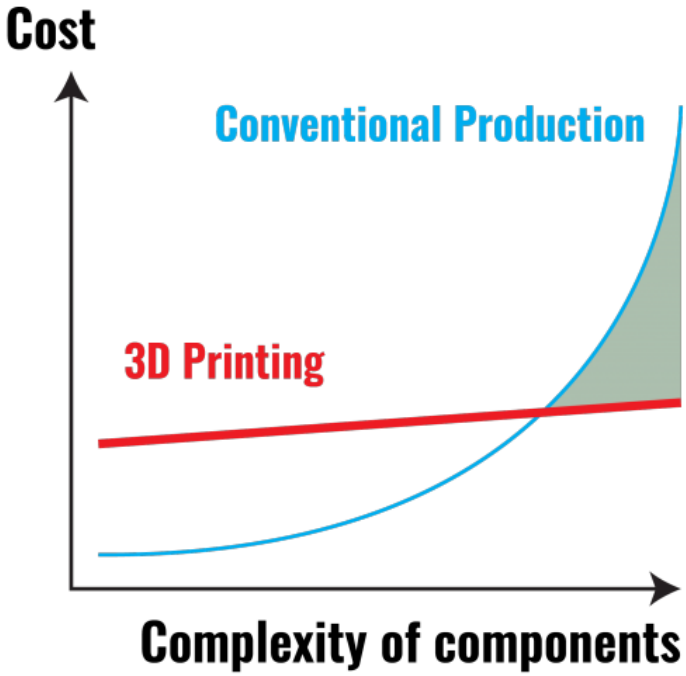
Cost understanding

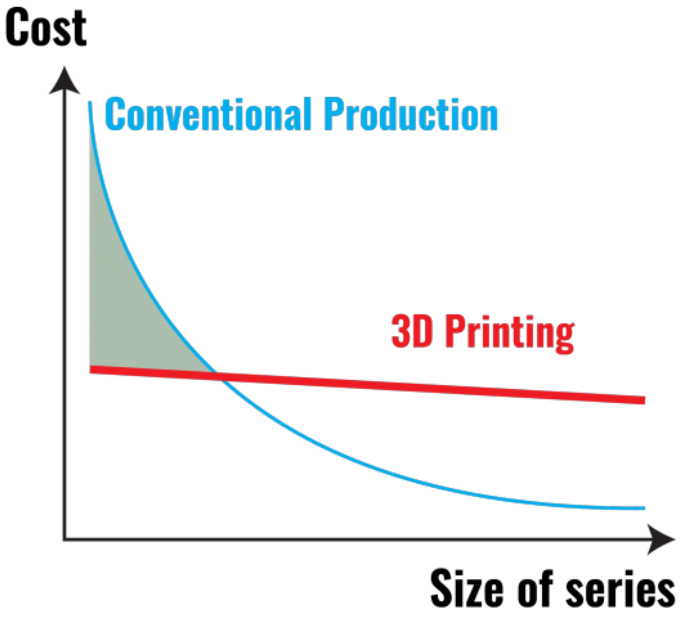
Support document

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 Gantts to plan and monitor the work.

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

System/ Project	Phase	Actions	Supervisor	Lead	WK 44	Nov. WK 45	WK 46	WK 47	WK 48	Dec WK 49
INTAKE	Design	Contacter Romain G. pour explorer les pistes d'amélioration	CEE							
		Discuter les pistes d'amélioration avec Emilien et Clément C	CEE							
		Maquette Plenum	CEE							
		Validation par Romain G.	CEE							
		Calculs éléments finis et CFD	CEE							
		Validation par les académiciens	CEE							
	Production & Supply	Prévoir créneau de production	CEE			0	0			
		Lancer la phase de fabrication	CEE					0	2	
		Processus de vérification	CEE					0	0	
		Intégration sur Vulcanix	CEE							
		Test sur banc	CEE							
		Intégration sur Optimus	CEE							
		Exploration de pistes d'amélioration	LDR / MBX							

Example of Gantt layout

- 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:

BOISARD école de production

		Phone	E-mail
Supervisor EPSA:	Maxime Proriol	0637499240	maxime.proriol@ecl17.ec-lyon.fr
Contact:	[redacted]		

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

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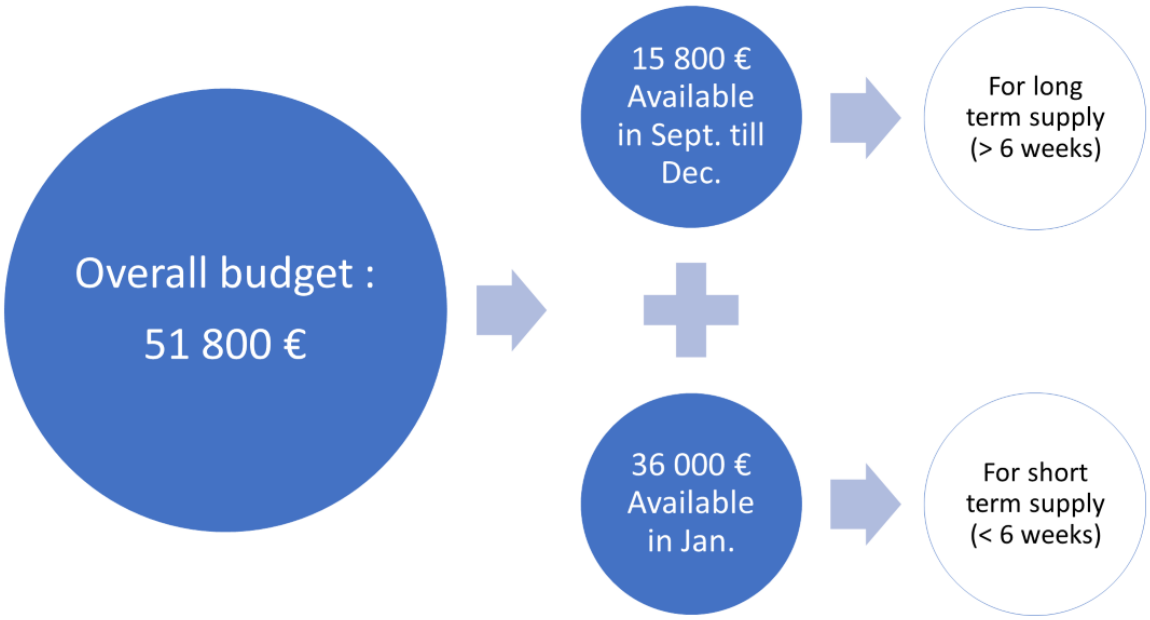
Production framework layout

Cost planning

See *Previsionnal Expenses* drawing.



Availability of budget during the year

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 from a partnership 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.

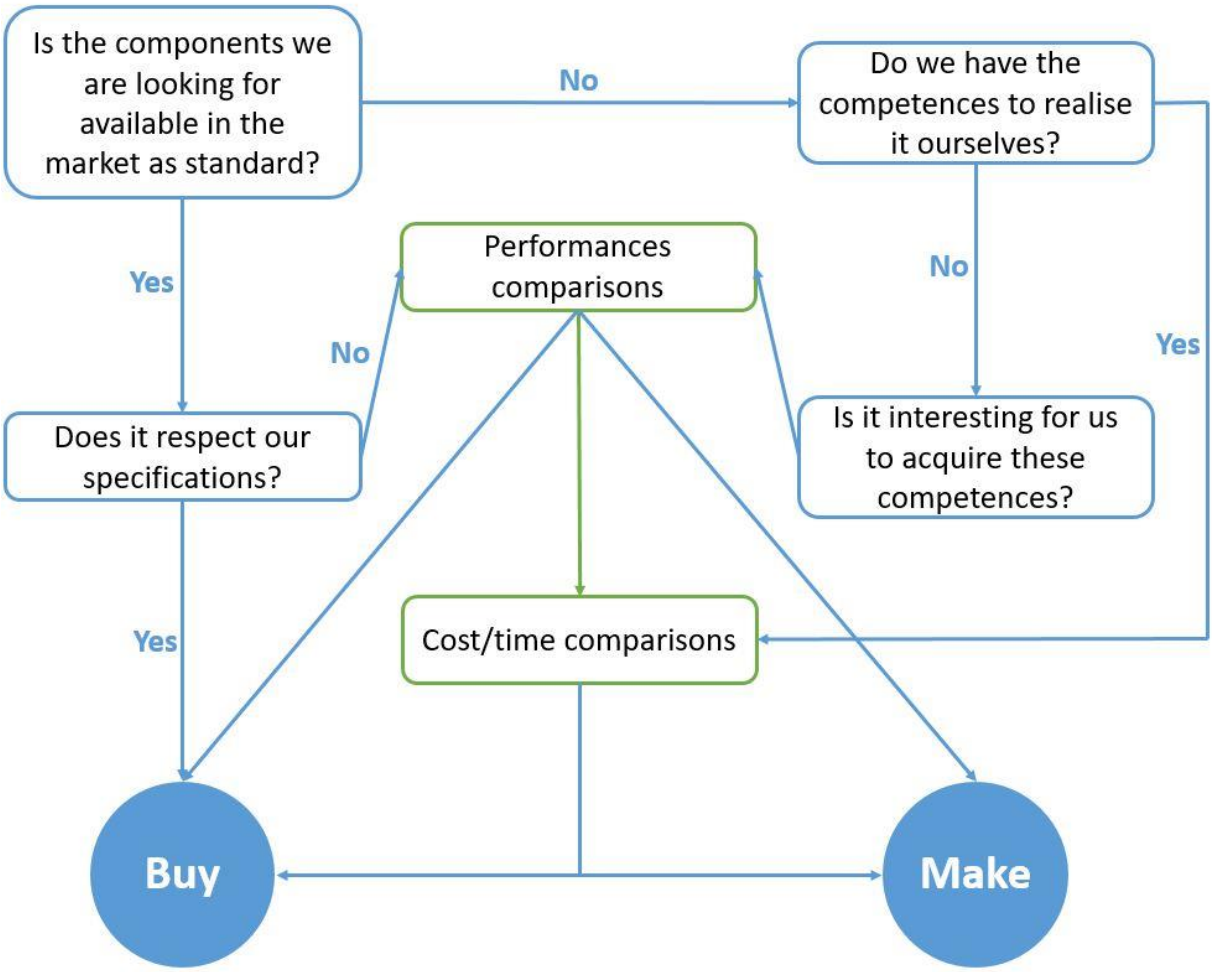


Diagram to illustrate buy and made decisions