

# Ecoshell : Bio-materials for structural use in car application

de LARMINAT Alain.  
Altran research



# ECOSHELL

# The partners of Altran research in the Ecoshell project



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# The CITI-zen Concept

**Citi-ZEN**

An  
Eco-friendly  
Light  
Electrical  
Urban car



Weight: 400Kg  
Speed : 110 Km/h  
Range : 120 Km  
Passive security :  
Front & side Crashes  
Pedestrian shock



ECO-SHELL



ECO-BODY



ECO-TRAIN



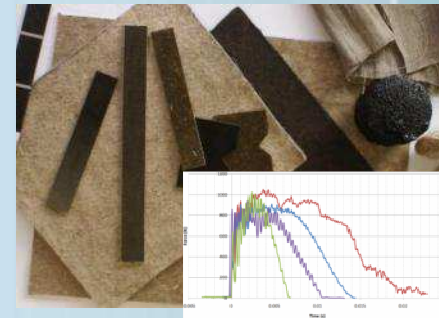
ECO-SEATS

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# Ecoshell objectives

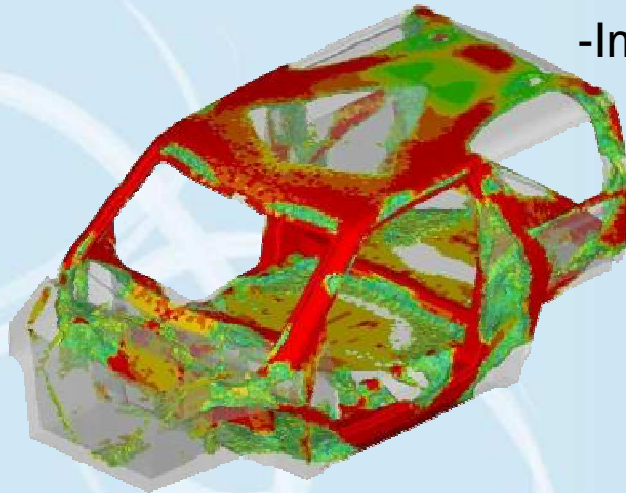
## Environmentally friendly

- Bio-materials
- Less energy to product
- Lower fuel consumption of the car



## Improved mechanical performance

- Weight optimization
- Constraints/materials topological optimization
- Improved global architecture



## Costs reduction

- Manufacturing process re-engineering
- Decrease time cycle using new materials

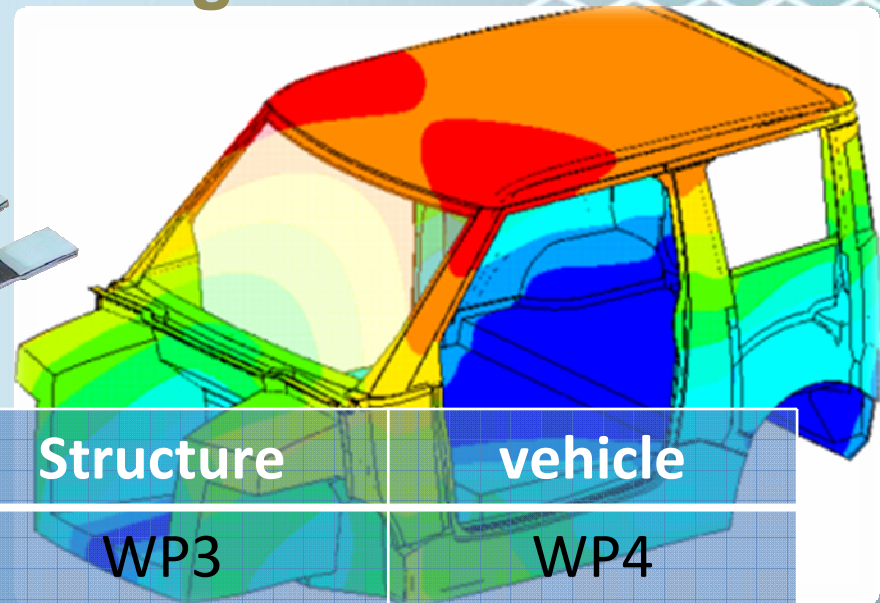
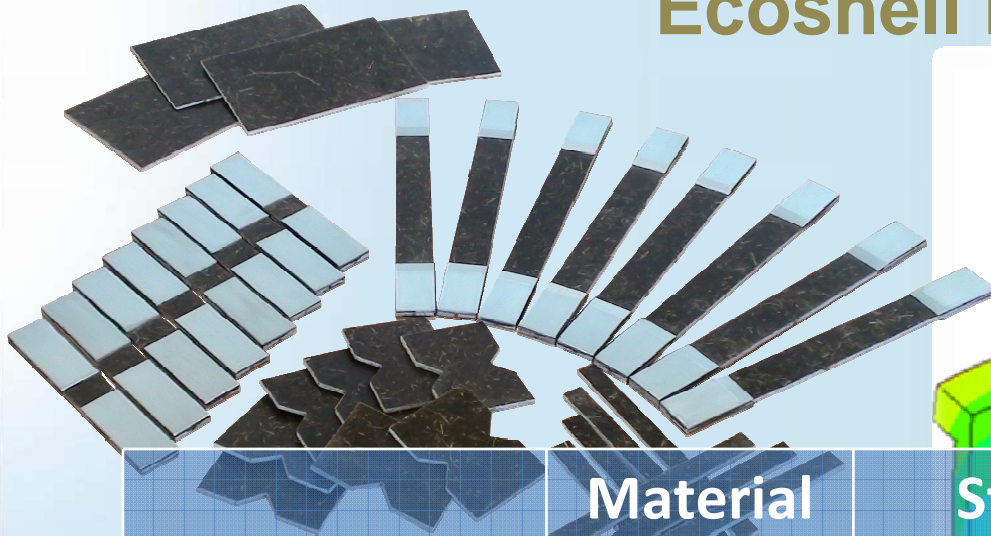
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# Ecoshell philosophy



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# Ecoshell Program



	Material	Structure	vehicle
Manufacturin	WP2	WP3	WP4
Cycle life	WP5	WP6	WP7
End of live	WP8	WP9	WP10



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# Material results

Material production	Live cycle	End of life
In the market solution : Flax /Bio-Epoxy samples produced and tested	Characterisation and numerical simulation of the mechanical behaviour Considered as reference	Research on the management of the and of life for Epoxy flax composite
New material investigation: Flax/Tannin based resin samples production and improvement for RTM and SMS process	Improvement of the mechanical properties Fibbers treatment Formula and protocol optimisation to get better properties	Investigation on the properties regarding the burning behaviour, composting behaviour and possible re-use
New material investigation : foam and glue bio-sourced established with tannin	First samples of foam and glue, available for evaluation.	Similar family of material than previous one .

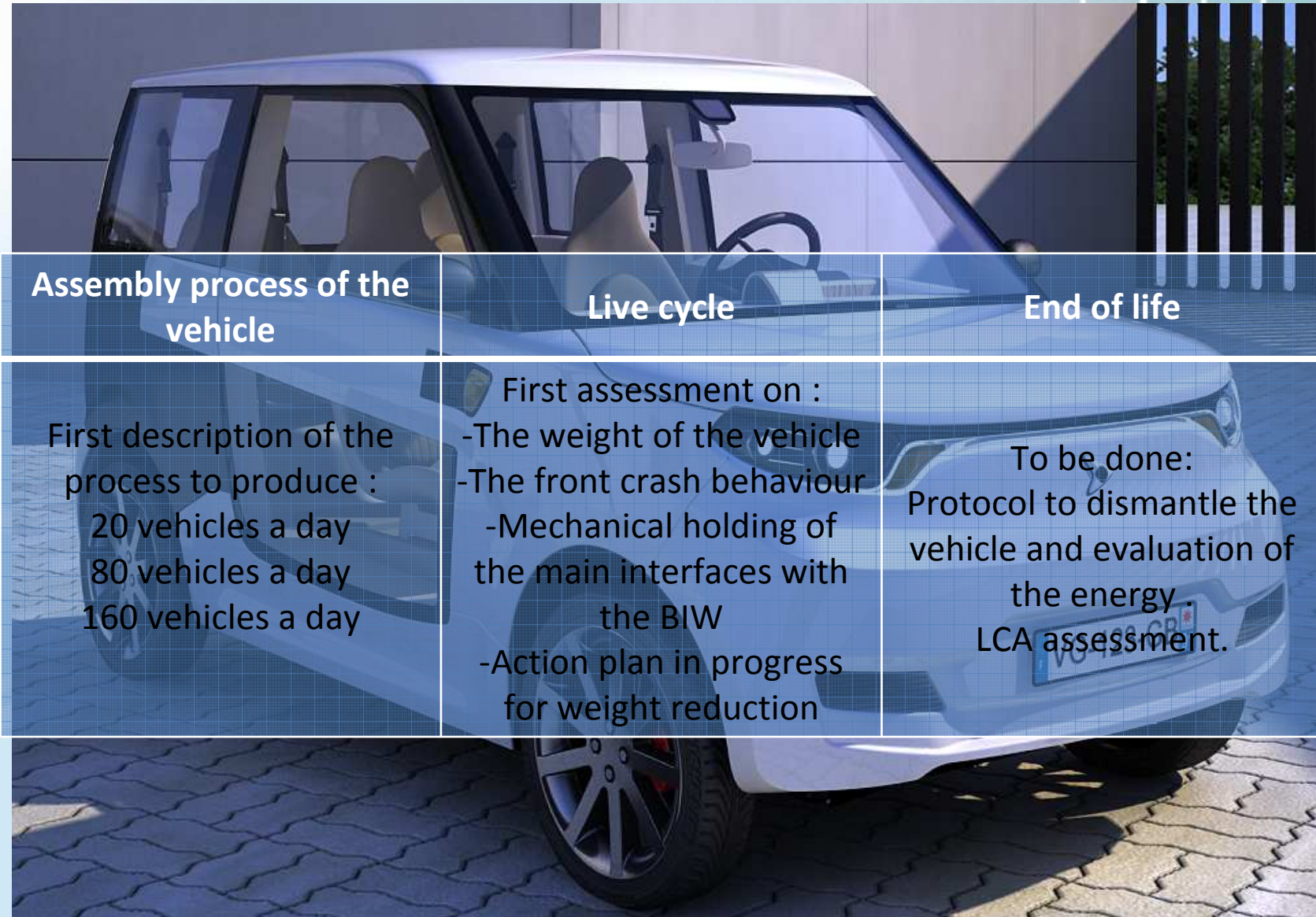
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# Structure results

Parts feasibility and assembly process	Live cycle	End of life
<p>Feasibility of a BIW made with 7 RTM Parts for low rate of production</p>	<p>First weight assessment : 100 Kg                      First assessment on the behaviour of the BIW regarding : bending and twist constraints</p>	<p>In progress : process to remove the metallic insert and evaluation of the energy to reduce the BIW in powder</p>
<p>Feasibility of a BIW made with 18 SMC parts for high rate of production.</p>	<p>First weight assessment : 100 Kg                      First assessment on the behaviour of the BIW regarding : bending and twist constraints</p>	<p>In progress : process to remove the metallic insert and evaluation of the energy to reduce the BIW in powder</p>
<p>Feasibility of an Evolutionary process from less than 20 parts a day to about 300 parts a day mixing the two technologies.</p>	<p>Mixed solution to be define for evaluation</p>	<p>To be done: process to remove the metallic insert and evaluation of the energy to reduce the BIW in powder</p>



# Vehicle results



Assembly process of the vehicle	Live cycle	End of life
First description of the process to produce : 20 vehicles a day 80 vehicles a day 160 vehicles a day	First assessment on : -The weight of the vehicle -The front crash behaviour -Mechanical holding of the main interfaces with the BIW -Action plan in progress for weight reduction	To be done: Protocol to dismantle the vehicle and evaluation of the energy . LCA assessment.

**Further potential researches to be perform**

**Energy: One vehicle to evaluate different energies**



**Hydrogen/ bio-gasoline/ electric+range extender/ gas**

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**Further potential researches to be perform**

**Material: One vehicle to evaluate different materials**



**Adapted materials to different countries**

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**Thank you for attention**

[www.ecoshell.eu](http://www.ecoshell.eu)



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