



Innover
en mécanique

CETIM JEC INNOVATION AWARDS

in partnership with

ONERA

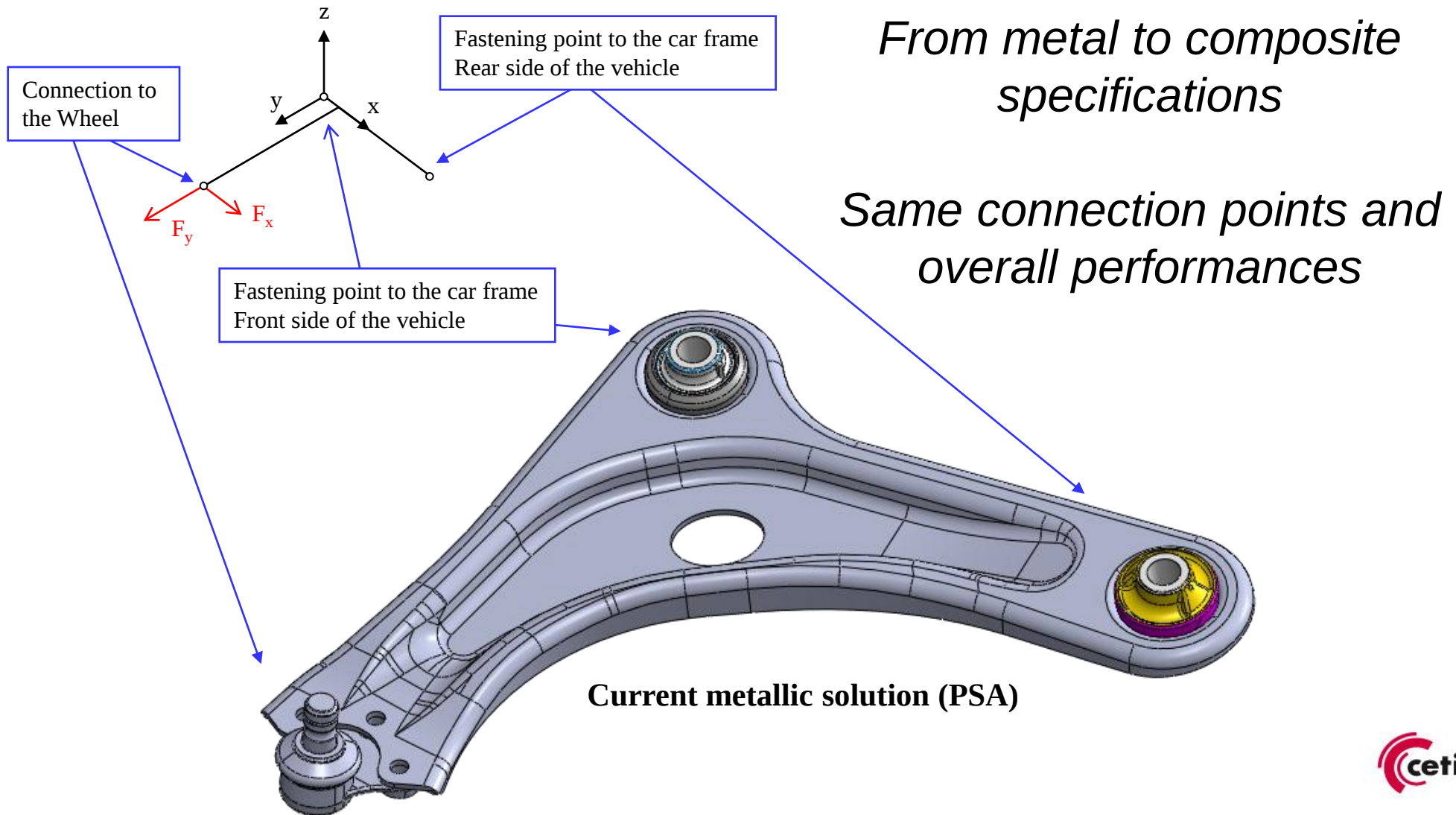
PSA

COMPOSE



Some technical informations

Conception

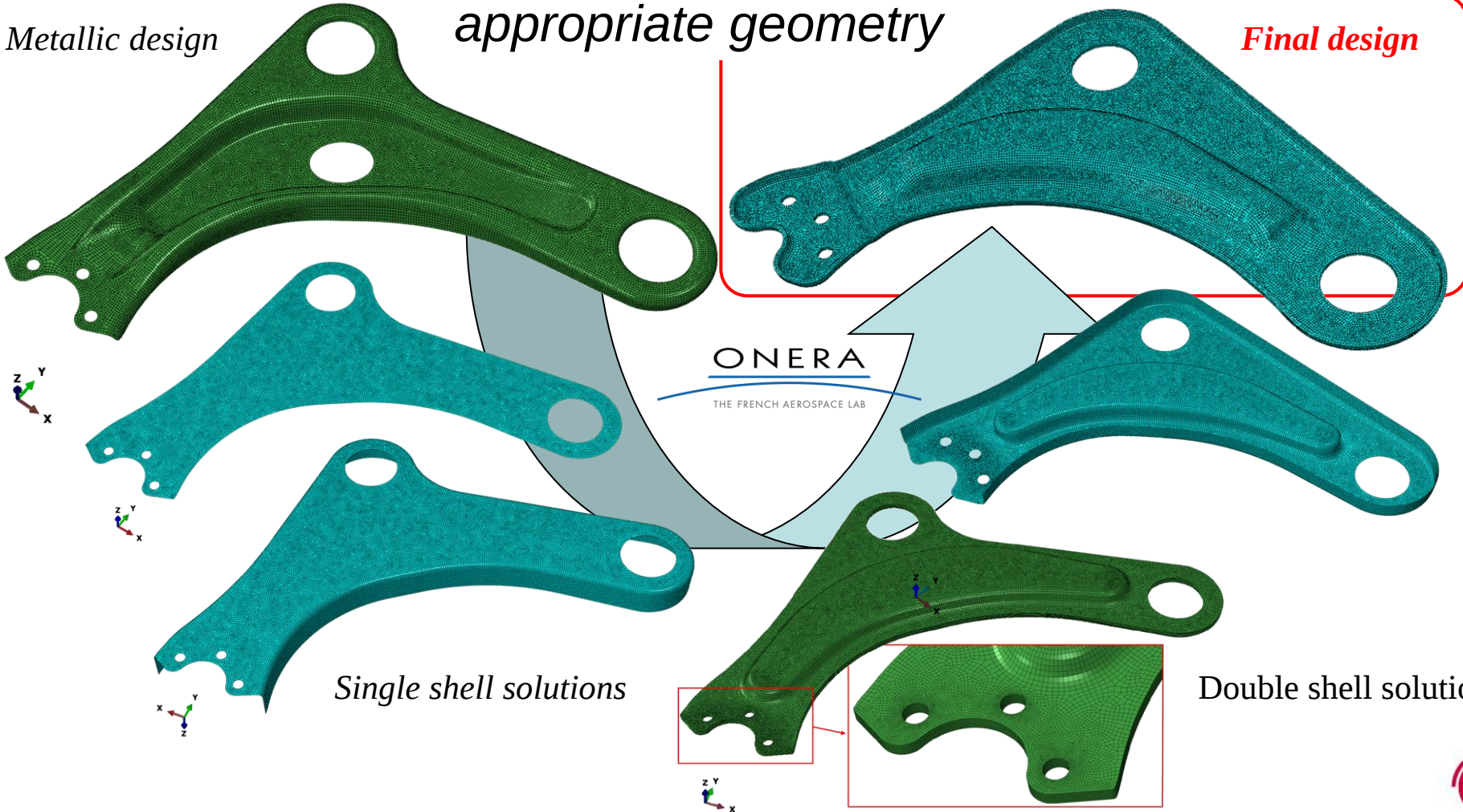


Design and optimization (1/2)

*Looking for the
appropriate geometry*

Metallic design

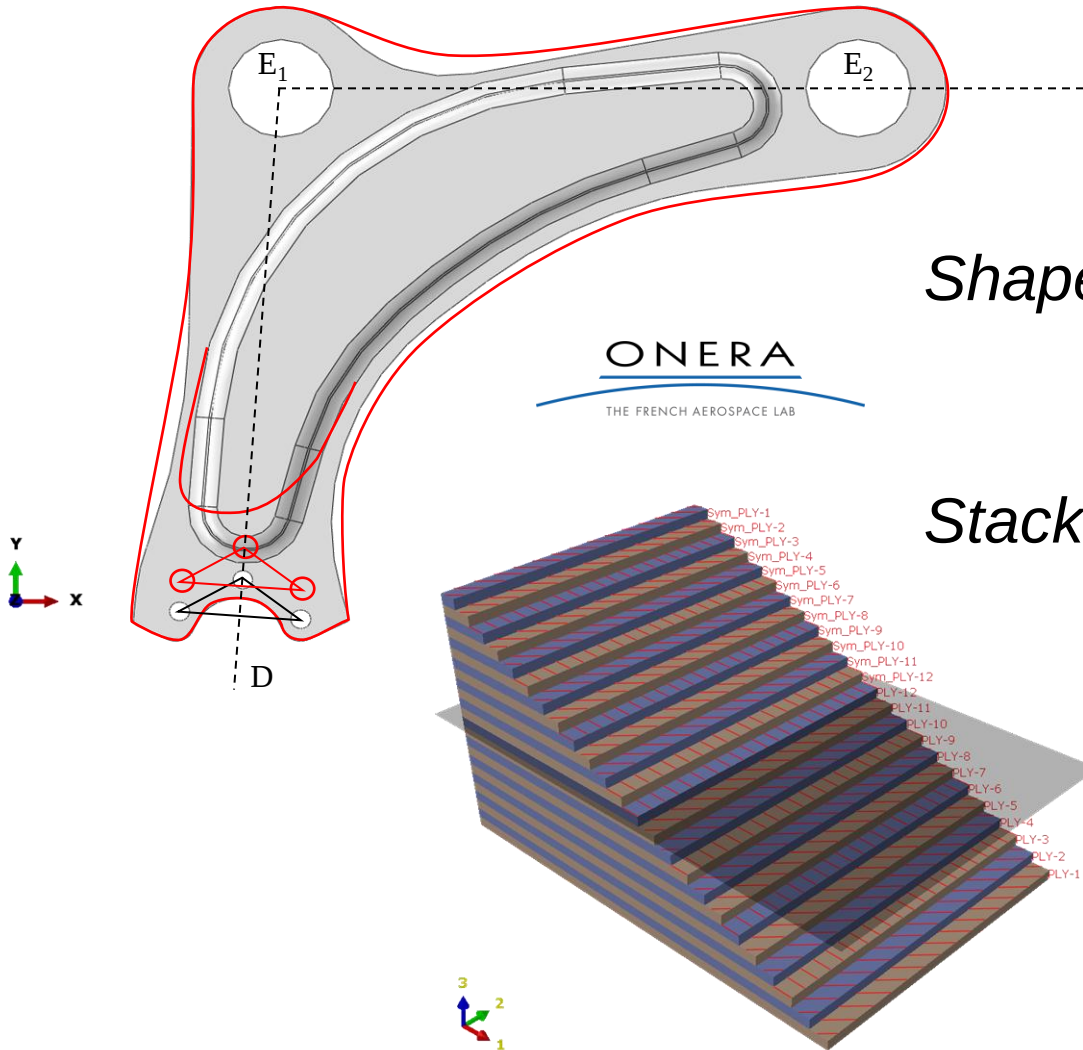
Final design



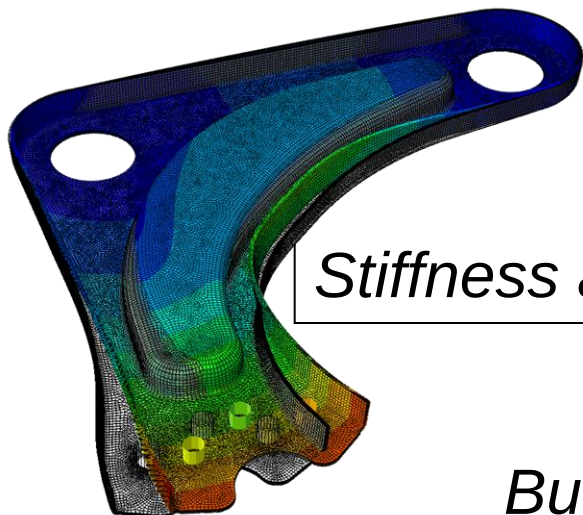
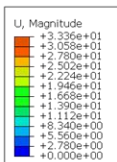
Design and optimization (2/2)

Shape optimization

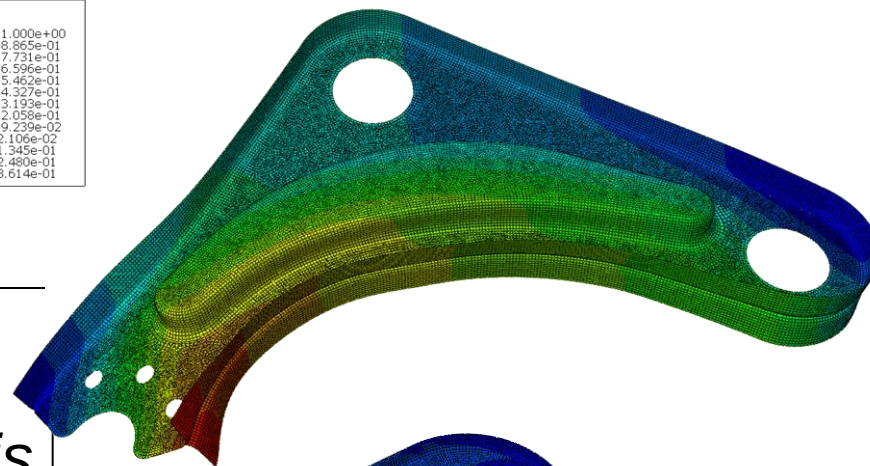
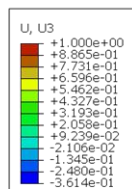
Stacking sequence tailoring



Analysis



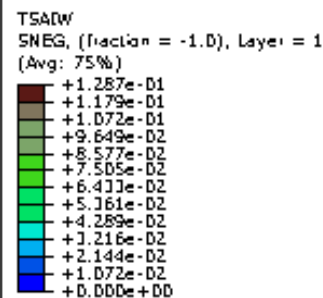
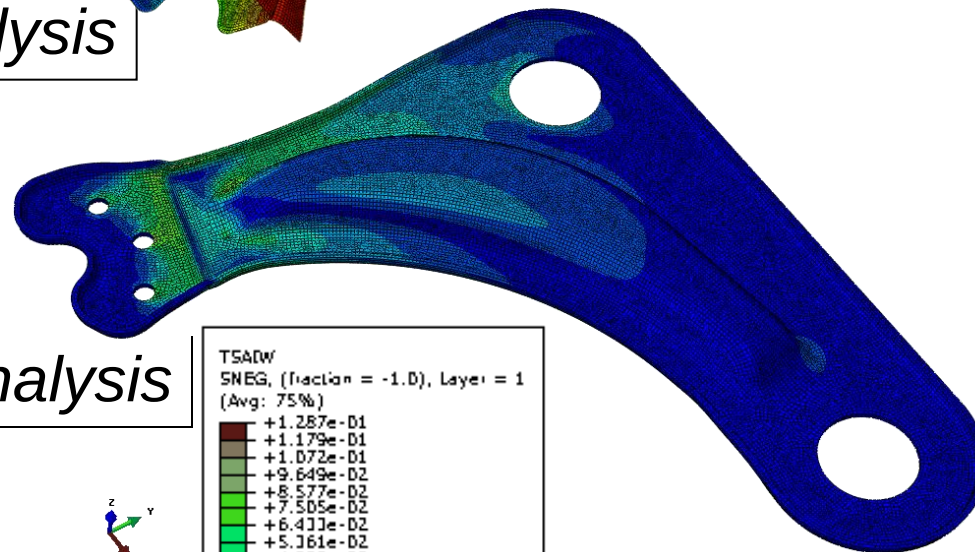
Stiffness analysis



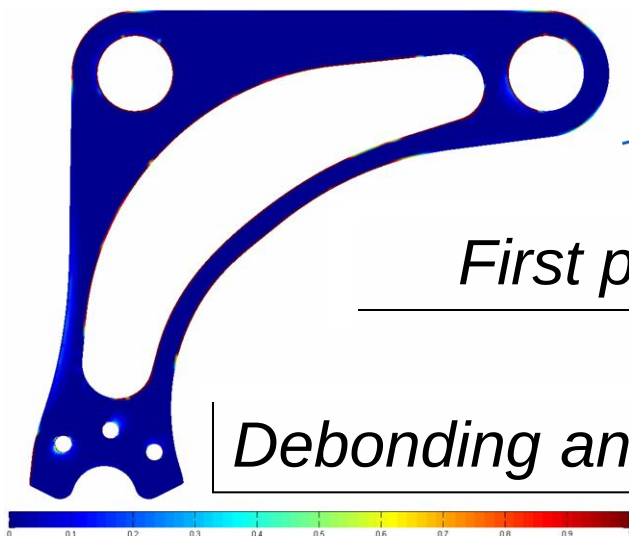
Buckling analysis

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THE FRENCH AEROSPACE LAB

First ply failure analysis

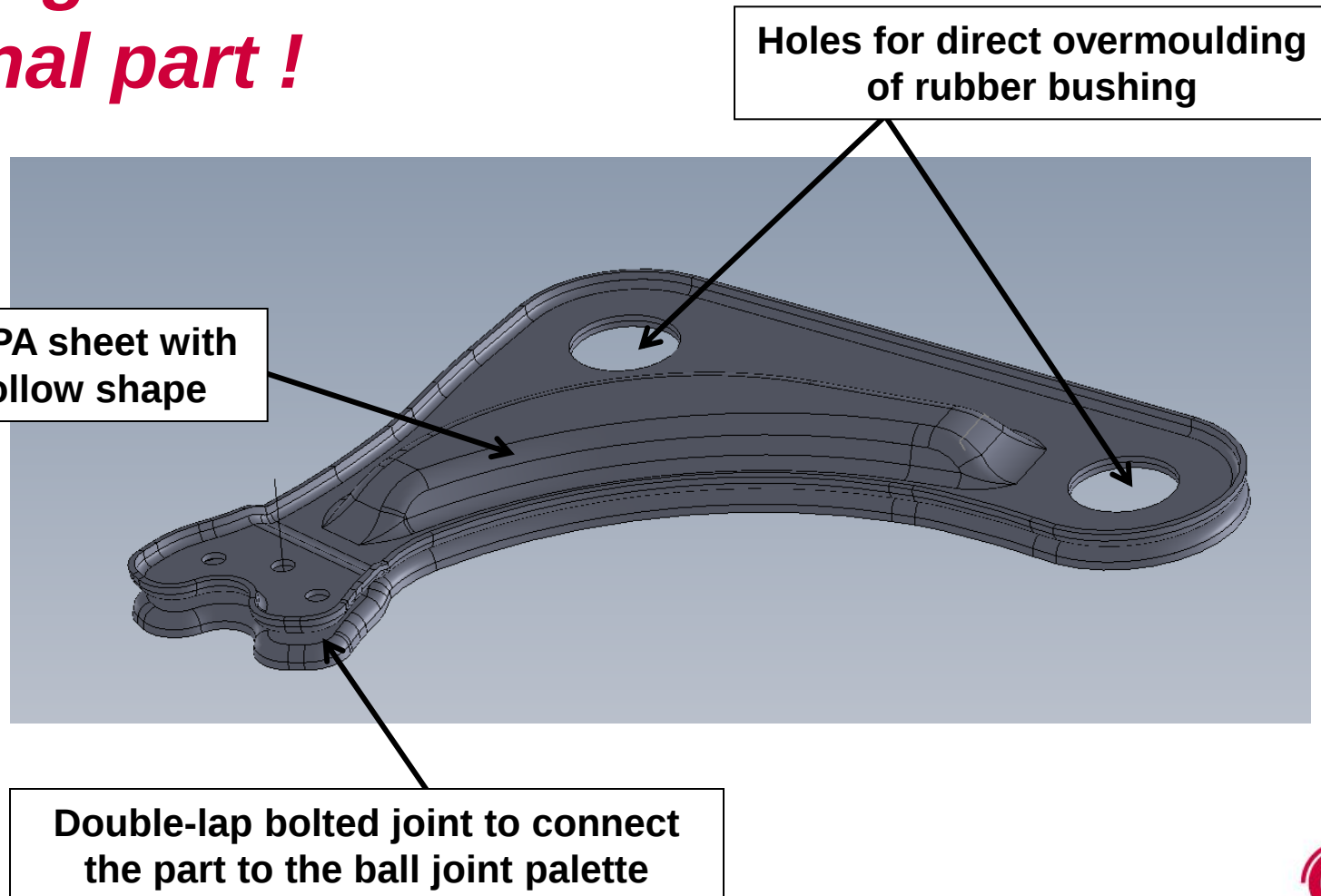


Debonding analysis



Final composite design

***1,2 kg weight reduction
on the final part !***



Process description

General process :

Heating of 2 organosheets
(infra-red oven)

Automatic transfer/press closure

Simultaneous
Thermoforming

Tool rotation

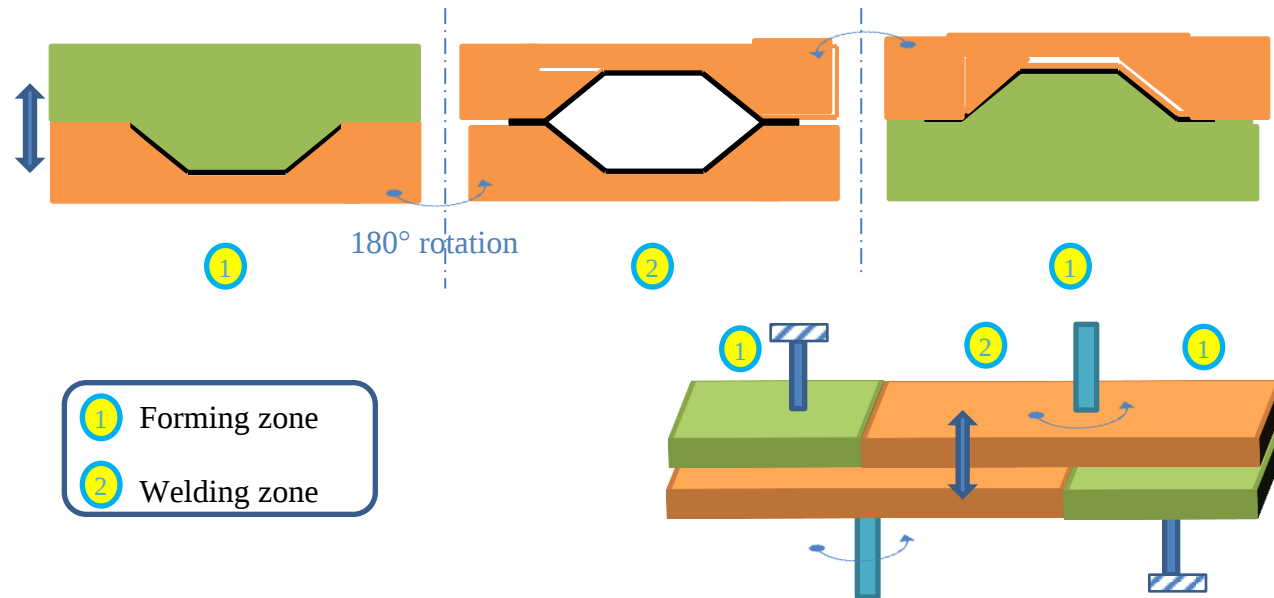
Surface re-heating

Automatic transfer/press closure

Welding

Ejection

Tool concept : To form two organosheets simultaneously, then to put them face to face for welding (principle never used on composite parts reinforced with continuous fibres)



Process description

Parallelization of successive cycles

color signification		
previous cycle	current cycle	next cycle

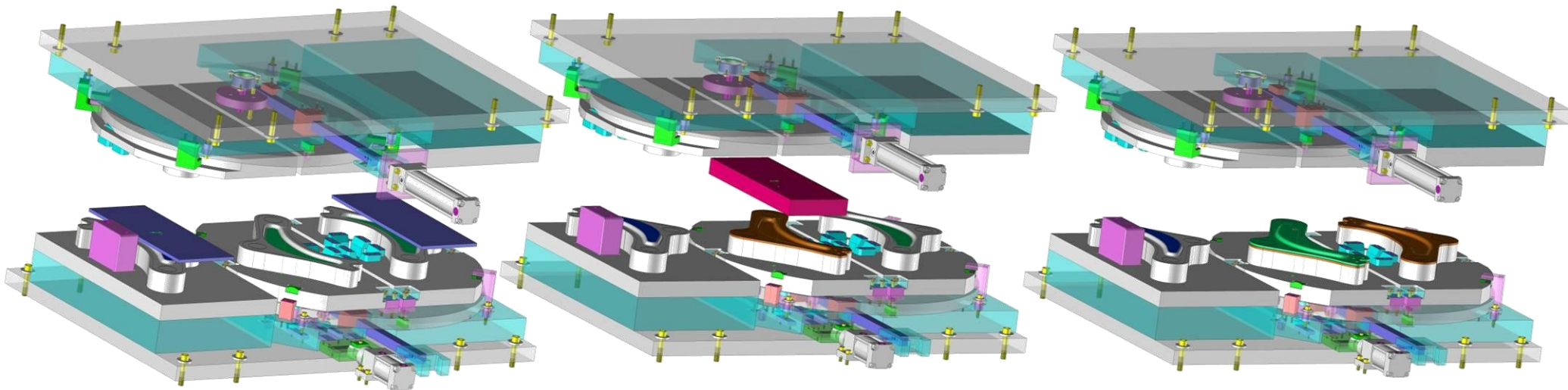
IR Oven		heating								heating			
back frame	sheet installation	heating	go under press				go to back		sheet installation	heating	go under press		
Press				close	Consolidation	open						close	Consolidation
Tool left forming zone				sheet on position				rotation				sheet on position	
Tool right forming zone				sheet on position				rotation		ejection of piece		sheet on position	
Tool welding zone		heating			welding					heating			welding
front frame	go under press	heating	go to front						go under press	heating	go to front		
cycle time (sec)	5	Thickness dependant	5	2	30	2	5	10					

Total cycle time of 1 minute + heating time :

- Heating for welding < 60 sec (only the surface)
- Heating of sheet 5-10min for t=3mm, avoidable with multi-sheet oven

Process description

Design of the rotative tool



*Sheet in stamping
position*

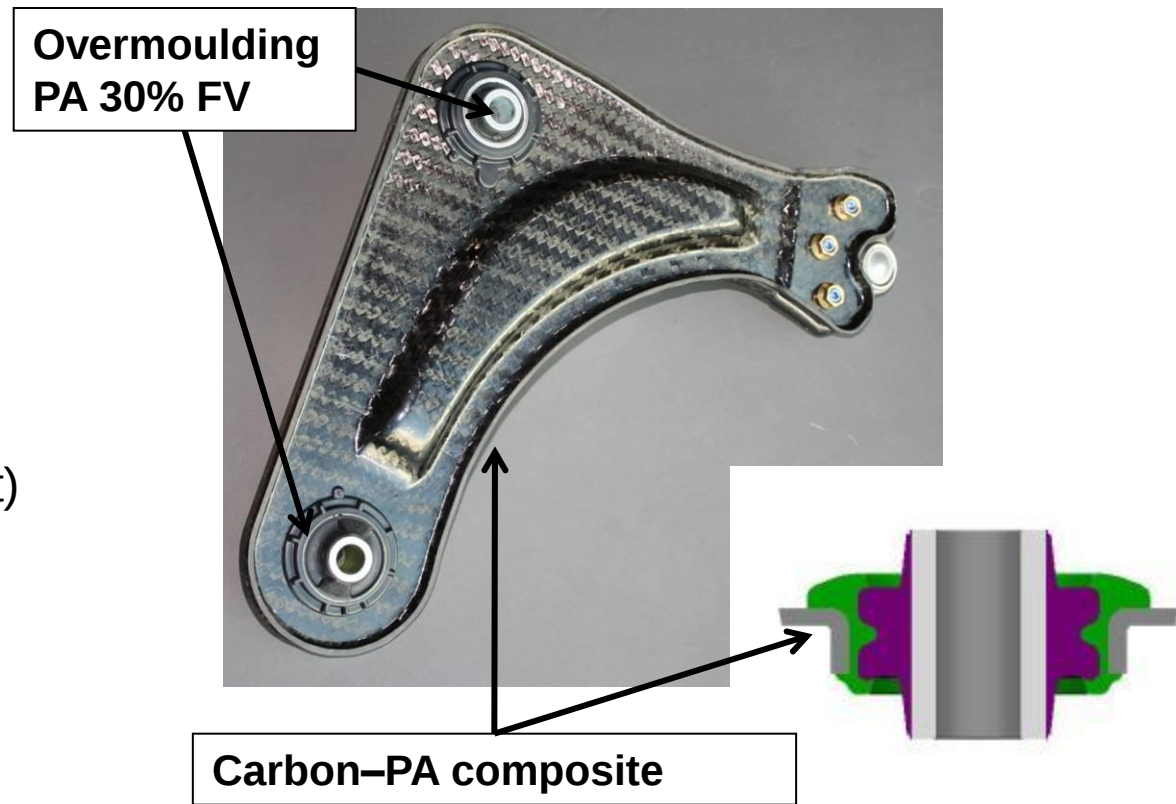
*Heating for welding thanks to
the front frame after rotation*

*After a new press closure, the
final piece on the centre and
two new stamped sheet ready
for the next tool rotation.*

Direct integration of the bushing in the composite sheet

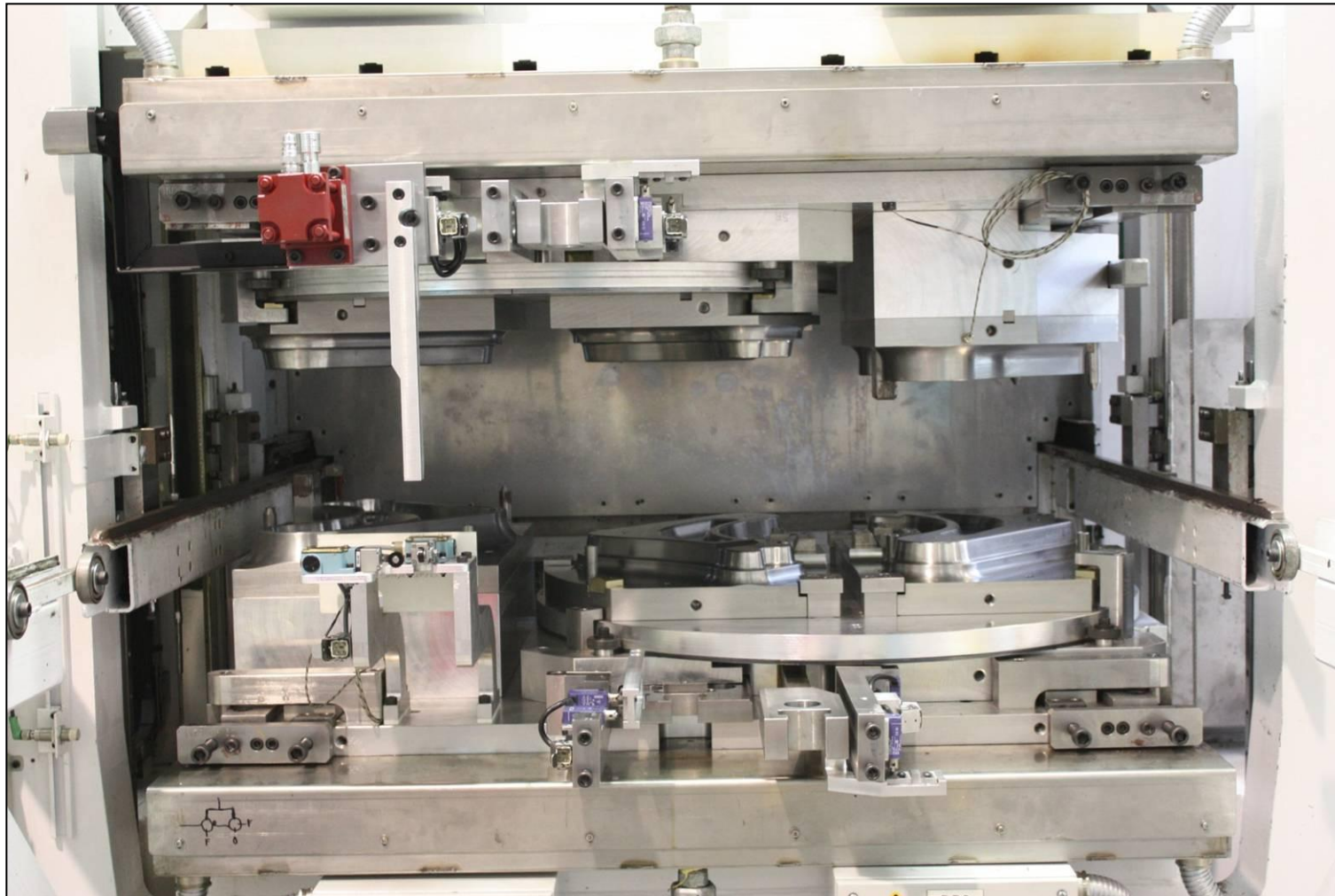
Simultaneous overmoulding of the two bushings on the composite sheet

- Control of center distances
- Manufacturing in line with low cost/highly controlled process
- Pre-compression of rubber by the injection pressure of the plastic (increase of the lifetime of the joint)
- Assembly with good mechanical performance and without process constraint on the sheet (unlike mounting by force)



Realisation

The innovative tool installed on the CETIM automated press



Realisation

The innovative thermoplastic composite suspension arm





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