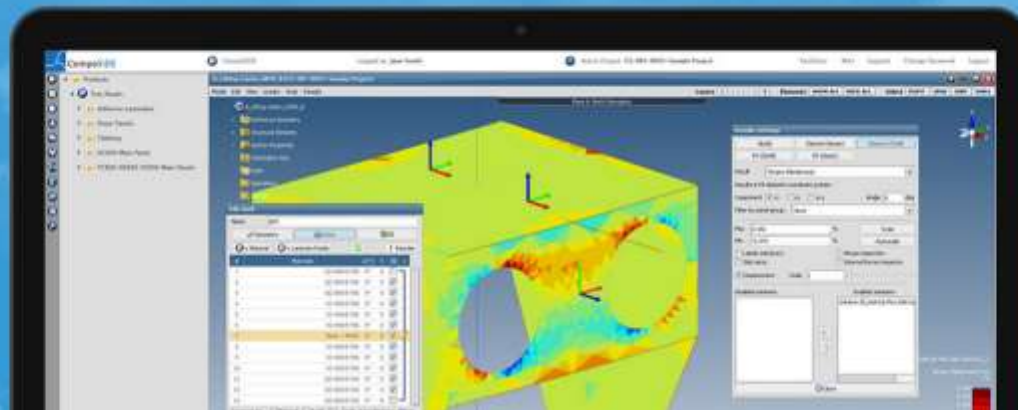


CompoSIDE presents

Composites Materials Data, Plies and Laminates for Design and FEA



Agenda



- Introduction to CompoSIDE
- Working with composites materials
- Pre-Processing for Composites Design & FEA
- Live Demonstration
- Questions & Answers
- Conclusion

Introduction to CompoSIDE

■ Composites

Software

Integrated

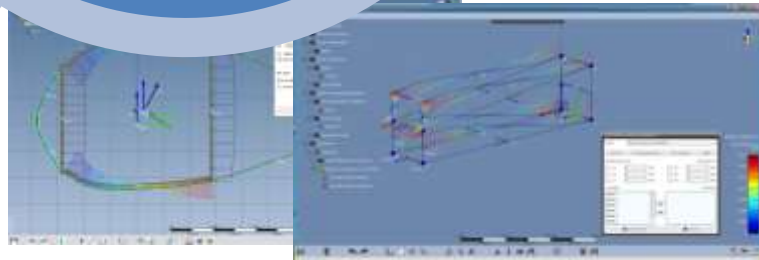
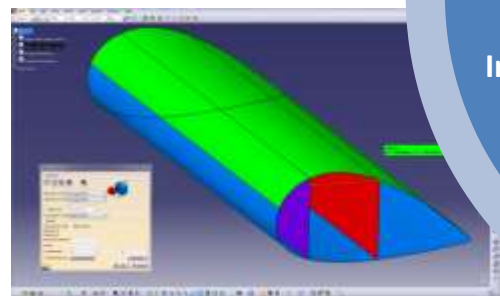
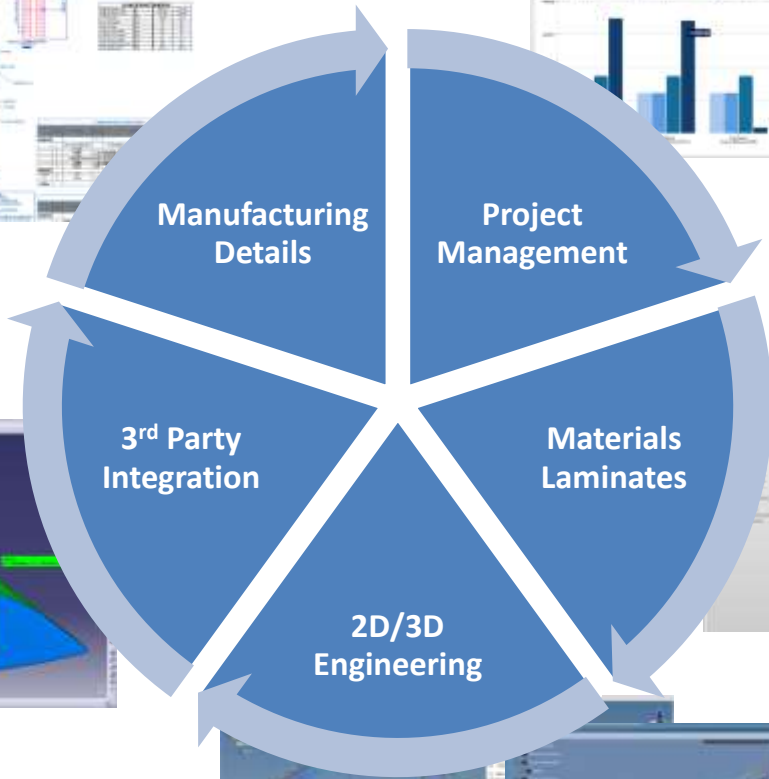
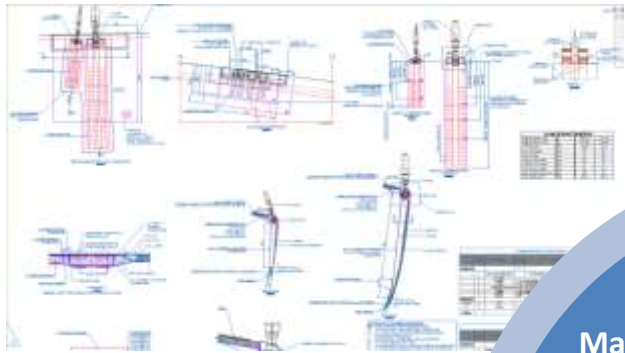
Design

Engineering

- Launched January 2015
- Over 100 Accounts in 2015
- Over 250 Accounts to date
- 150,000+ FEM calculations

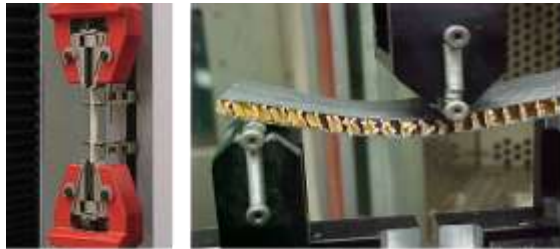


CompoSIDE Environment

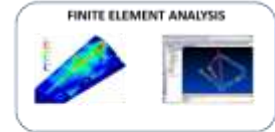
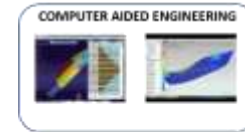
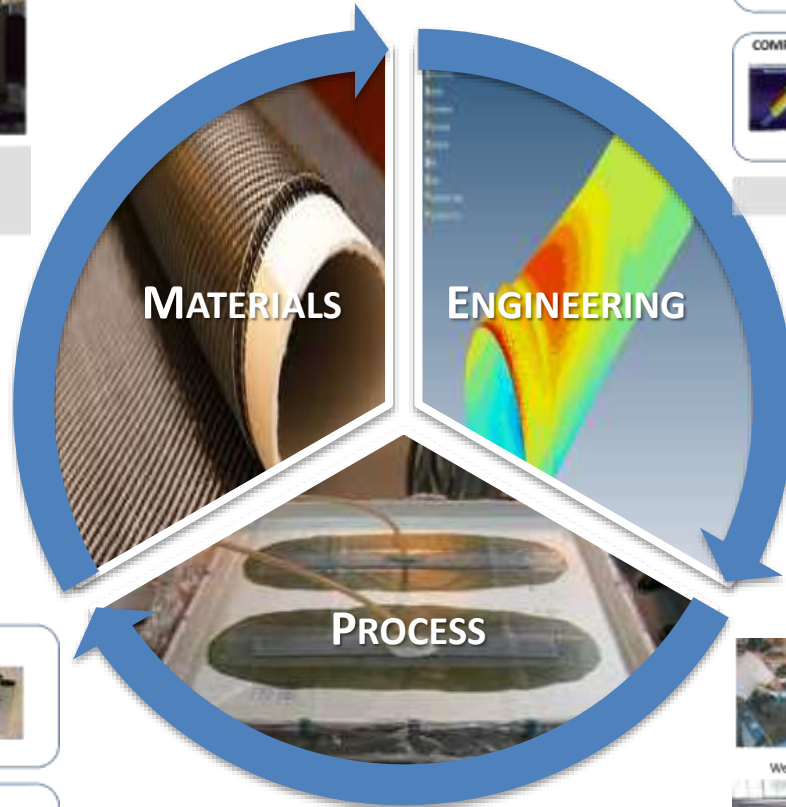


Working with Composite Materials (and the importance of materials data)

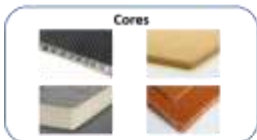
Working with Composites



How expensive and long is material qualification?



Which tools should I use?



What Materials shall I use?



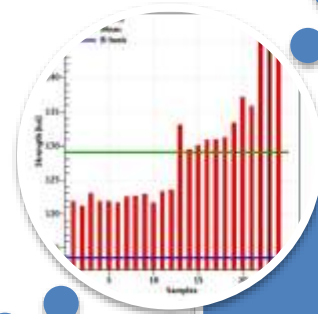
Which Process shall I use?

Materials Data Sourcing

Costs



Materials Testing



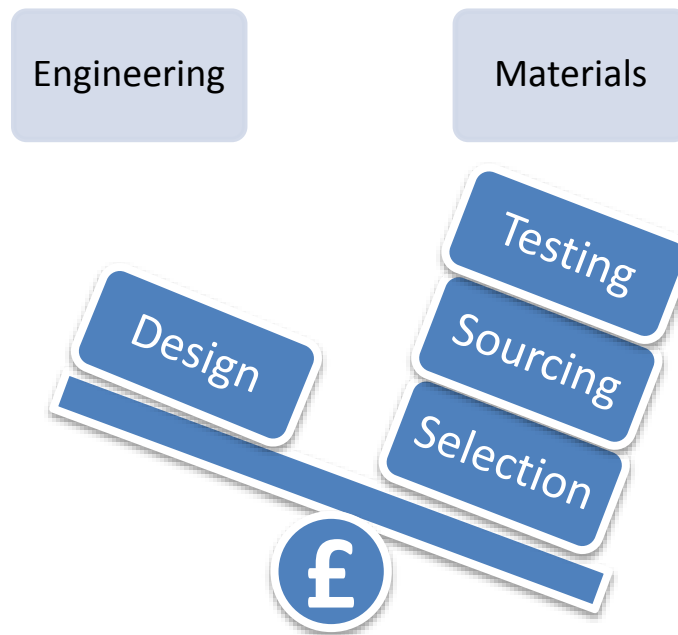
Tested Data

Material	Yield	Tensile Strength	Tensile Modulus	
			Min	Max
303	205	415	193	193
304	215	425	193	193
316	220	435	193	193
316L	205	415	193	193
321	250	505	193	193
347	270	525	193	193
304H	275	550	193	193
316H	290	575	193	193
321H	310	600	193	193
347H	330	625	193	193
304LN	215	425	193	193
316LN	220	435	193	193
321LN	250	505	193	193
347LN	270	525	193	193
304TP	205	415	193	193
316TP	215	425	193	193
321TP	250	505	193	193
347TP	270	525	193	193

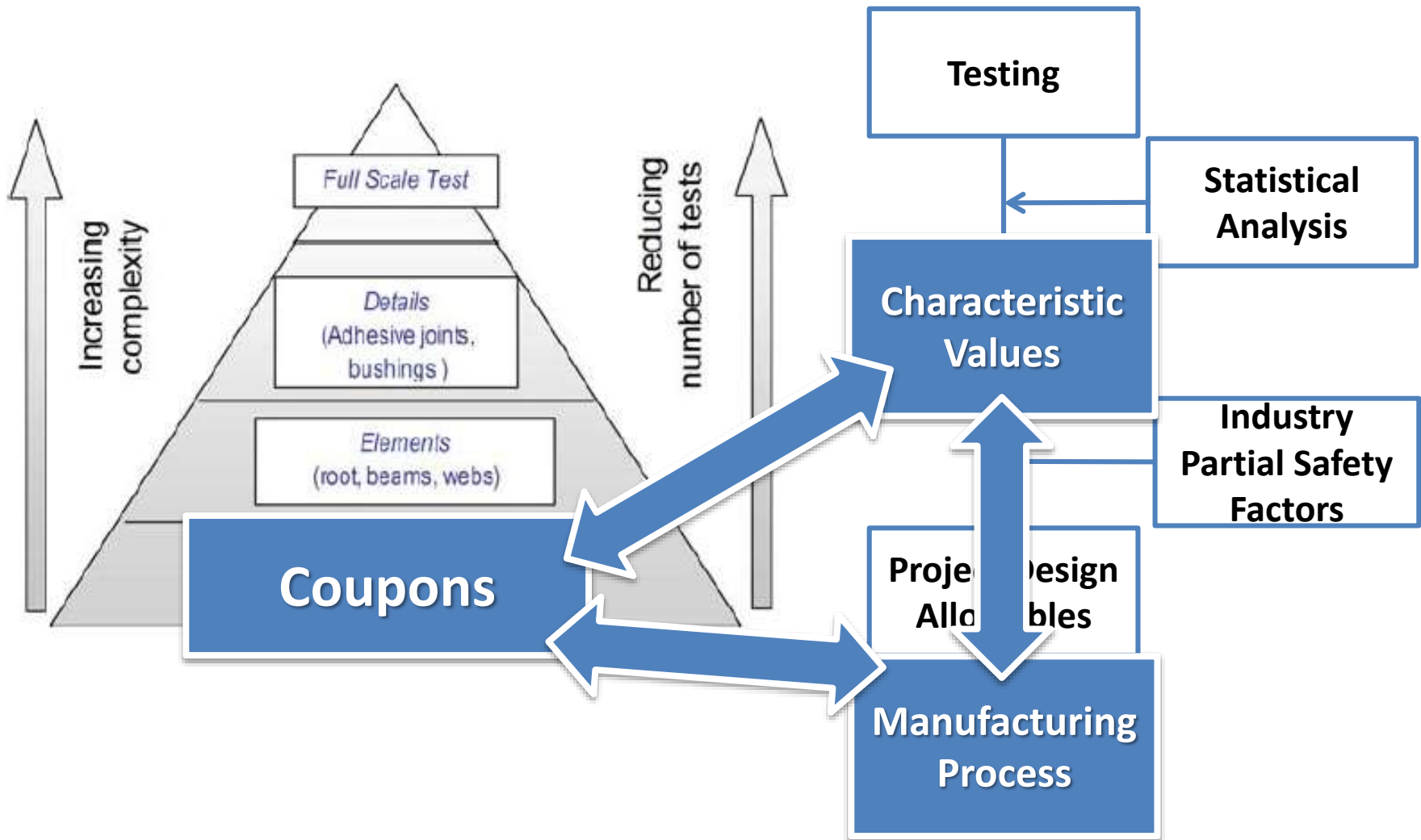
Manufacturer Datasheets

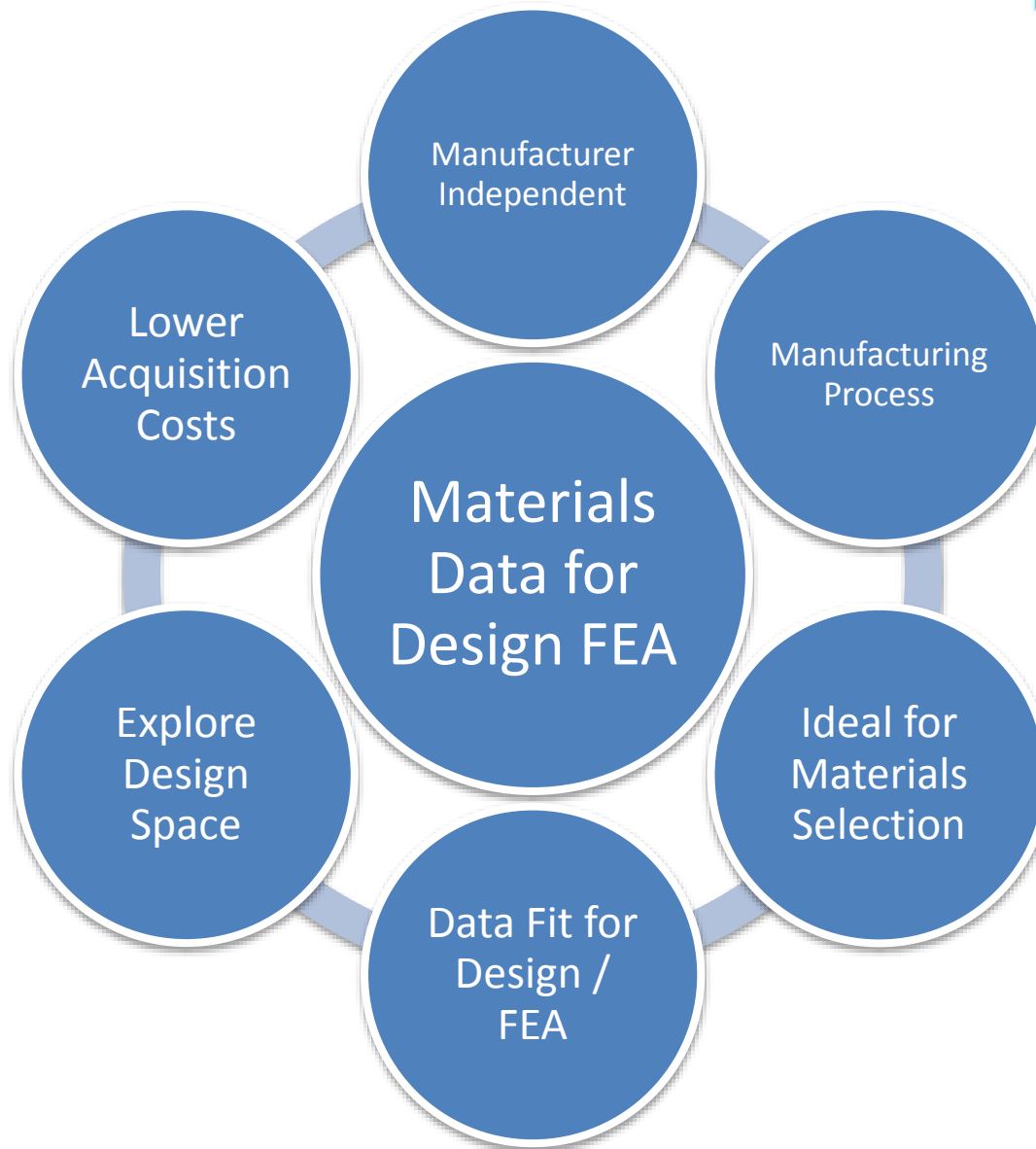
Data

Do you really need to spend tens thousands £ before start designing with composites?



Selecting the Right Material Data



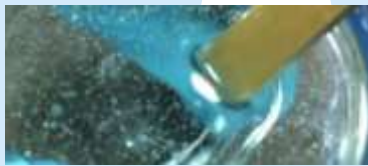


1,250+ Materials

Fibres



Resins



Cores



Adhesives



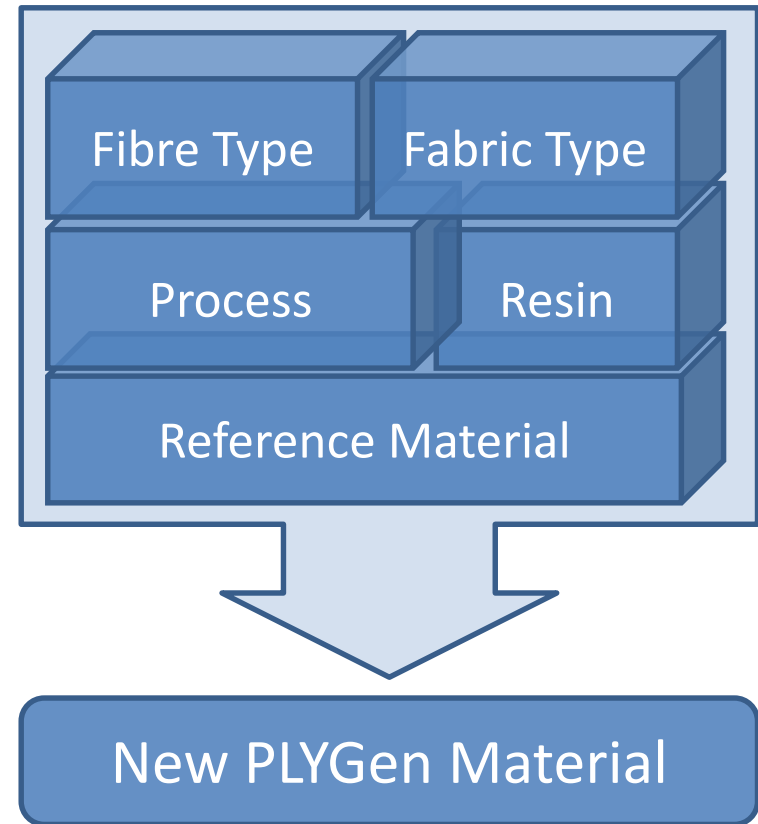
Woods & Plywoods



Metals



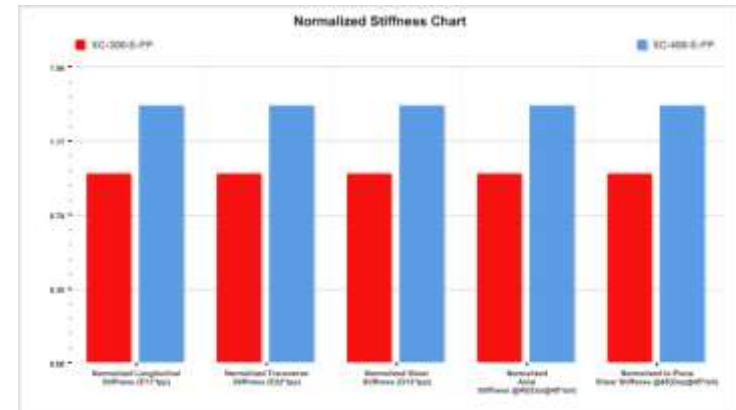
890+ Plies



CompoSIDE Modules Details

Building your Material Library

- Material library
- Micro-mechanics - PLYGen
- Reference material data



Browsing your Materials

- Properties for calculation
- Material Comparison (Normalization)

Organizing Materials

- Company vs. Project Materials
- Material Selections

Ply Shear Properties				2 x UC-100200-C-PP #45°	2 x UC-100200-C-PP #45°
Group	Property	Symbol	Unit	UC-100	UC-100
	Material Type	--	--	UC-100	UC-100
	Material Form	--	--	Orthotropic	Orthotropic
Shear Properties	Angle	--	--	45	45
	Shear Thickness	t_k	mm	0.6	0.6
	Axial Modulus (E_{11})	E_{11}/ρ_{1111}	MPa	14678.332	14339.031
	Shear Modulus (G_{12})	G_{12}/ρ_{1212}	MPa	32025.235	32026.171
	Poisson's Ratio (ν_{12})	ν_{12}/ρ_{1212}		0.783	0.792
	(ULT LIM)			1.5	1.5
	Lower Shear Strength (τ_{12})	τ_{12}/ρ_{1212} MPa	MPa	299.128	298.157
	Lower Shear Strain (γ_{12})	γ_{12}/ρ_{1212} %	%	0.954	0.934
	Ultimate Shear Strength (τ_{12})	τ_{12}/ρ_{1212} MPa	MPa	313.707	303.384
	Ultimate Shear Strain (γ_{12})	γ_{12}/ρ_{1212} %	%	1.504	1.378
	ULT LIM Critical Flag		LIM	LIM	LIM
	Axial Stiffness (E_{11})	$E_{11}/\rho_{1111}^2 t_k$	N/mm	1001.123	8803.418
	In-Plane Shear Stiffness (G_{12})	$G_{12}/\rho_{1212}^2 t_k$	N/mm	12810.094	19215.703

CMDB⁺ (Addon)



- 1,250+ Materials Data
 - ❖ Cores, Fibres, Adhesives, Resins
 - ❖ Woods, Plywoods, Plastics, Metals
 - ❖ 890+ Plies

- Manufacturer Independent

- ❖ Characteristic Values
- ❖ Multiple sources

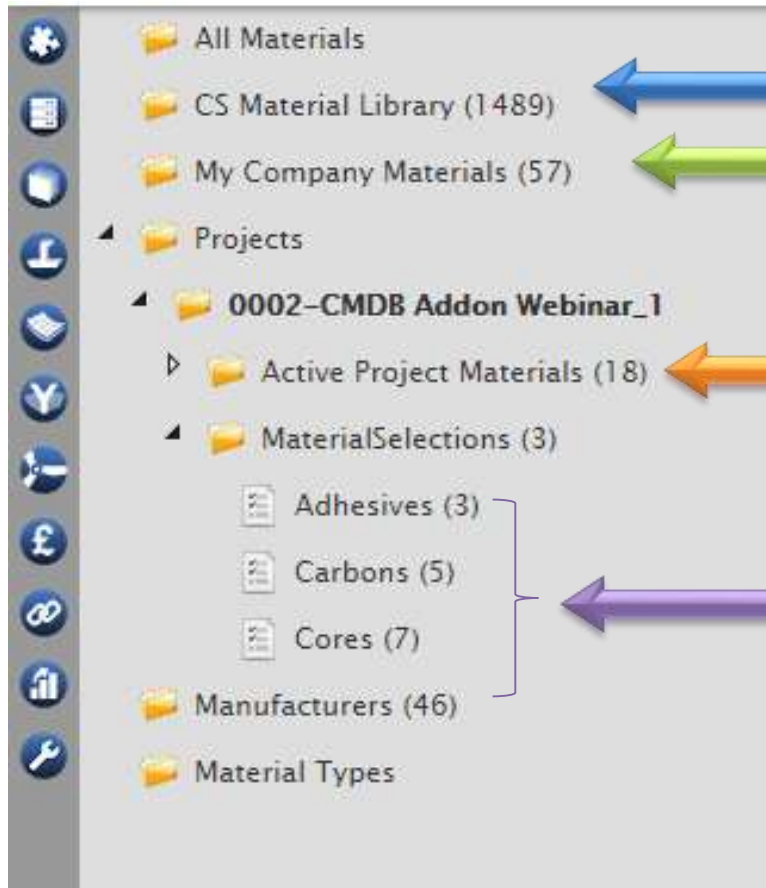
- Fir for Design / FEA

- ❖ Export to FEA: Materials, Plies, Laminates
- ❖ Ansys, Nastran, OptiStruct, Radioss
- ❖ Export to Excel / API



Item	Type	Sequence Type	Thick	Core	Layers
WEE (WEE)	Single Skin	Total	0	0	1
Laminate Family to Excel					
L1 (Laminate Family to Excel)		Total	0	0	10
L2 (Laminate Family to Excel)		Total	0	0	10
L3 (Laminate Family to Excel)		Total	0	0	10
L4 (Laminate Family to Excel)		Total	0	0	10
L5 (Laminate Family to Excel)		Total	0	0	10
L6 (Laminate Family to Excel)		Total	0	0	10
L7 (Laminate Family to Excel)		Total	0	0	10
L8 (Laminate Family to Excel)		Total	0	0	10
L9 (Laminate Family to Excel)		Total	0	0	10
L10 (Laminate Family to Excel)		Total	0	0	10
Laminate Family to Nastran					
N1 (Laminate Family to Nastran)		Total	0	0	10
N2 (Laminate Family to Nastran)		Total	0	0	10
N3 (Laminate Family to Nastran)		Total	0	0	10
N4 (Laminate Family to Nastran)		Total	0	0	10
N5 (Laminate Family to Nastran)		Total	0	0	10
N6 (Laminate Family to Nastran)		Total	0	0	10
N7 (Laminate Family to Nastran)		Total	0	0	10
N8 (Laminate Family to Nastran)		Total	0	0	10
N9 (Laminate Family to Nastran)		Total	0	0	10
N10 (Laminate Family to Nastran)		Total	0	0	10
Laminate Family to OptiStruct					
O1 (Laminate Family to OptiStruct)		Total	0	1	9
O2 (Laminate Family to OptiStruct)		Total	0	1	10
O3 (Laminate Family to OptiStruct)		Total	0	1	9
O4 (Laminate Family to OptiStruct)		Total	0	1	9
O5 (Laminate Family to OptiStruct)		Total	0	1	9
O6 (Laminate Family to OptiStruct)		Total	0	1	9
O7 (Laminate Family to OptiStruct)		Total	0	1	9
O8 (Laminate Family to OptiStruct)		Total	0	1	9
O9 (Laminate Family to OptiStruct)		Total	0	1	9
O10 (Laminate Family to OptiStruct)		Total	0	1	9
Laminate Family to ACP					
A1 (Laminate Family to ACP)		Total	0	0	40
A2 (Laminate Family to ACP)		Total	0	0	40
A3 (Laminate Family to ACP)		Total	0	0	40
A4 (Laminate Family to ACP)		Total	0	0	40
A5 (Laminate Family to ACP)		Total	0	0	40
A6 (Laminate Family to ACP)		Total	0	0	40
A7 (Laminate Family to ACP)		Total	0	0	40
A8 (Laminate Family to ACP)		Total	0	0	40
A9 (Laminate Family to ACP)		Total	0	0	40
A10 (Laminate Family to ACP)		Total	0	0	40
Failure Settings					
F1 (Failure Settings)		Total	0	0	10
F2 (Failure Settings)		Total	0	0	10
F3 (Failure Settings)		Total	0	0	10
F4 (Failure Settings)		Total	0	0	10
F5 (Failure Settings)		Total	0	0	10
F6 (Failure Settings)		Total	0	0	10
F7 (Failure Settings)		Total	0	0	10
F8 (Failure Settings)		Total	0	0	10
F9 (Failure Settings)		Total	0	0	10
F10 (Failure Settings)		Total	0	0	10
Replace Stacks					
R1 (Replace Stacks)		Total	0	1	9
R2 (Replace Stacks)		Total	0	1	9
R3 (Replace Stacks)		Total	0	1	9
R4 (Replace Stacks)		Total	0	1	9
R5 (Replace Stacks)		Total	0	1	9
R6 (Replace Stacks)		Total	0	1	9
R7 (Replace Stacks)		Total	0	1	9
R8 (Replace Stacks)		Total	0	1	9
R9 (Replace Stacks)		Total	0	1	9
R10 (Replace Stacks)		Total	0	1	9
Replace Materials					
M1 (Replace Materials)		Total	0	1	9
M2 (Replace Materials)		Total	0	1	9
M3 (Replace Materials)		Total	0	1	9
M4 (Replace Materials)		Total	0	1	9
M5 (Replace Materials)		Total	0	1	9
M6 (Replace Materials)		Total	0	1	9
M7 (Replace Materials)		Total	0	1	9
M8 (Replace Materials)		Total	0	1	9
M9 (Replace Materials)		Total	0	1	9
M10 (Replace Materials)		Total	0	1	9
Show Logs					
L1 (Show Logs)		Total	0	0	9
L2 (Show Logs)		Total	0	0	9
L3 (Show Logs)		Total	0	0	9
L4 (Show Logs)		Total	0	0	9
L5 (Show Logs)		Total	0	0	9
L6 (Show Logs)		Total	0	0	9
L7 (Show Logs)		Total	0	0	9
L8 (Show Logs)		Total	0	0	9
L9 (Show Logs)		Total	0	0	9
L10 (Show Logs)		Total	0	0	9
Show dependent objects					
D1 (Show dependent objects)		Total	0	0	9
D2 (Show dependent objects)		Total	0	0	9
D3 (Show dependent objects)		Total	0	0	9
D4 (Show dependent objects)		Total	0	0	9
D5 (Show dependent objects)		Total	0	0	9
D6 (Show dependent objects)		Total	0	0	9
D7 (Show dependent objects)		Total	0	0	9
D8 (Show dependent objects)		Total	0	0	9
D9 (Show dependent objects)		Total	0	0	9
D10 (Show dependent objects)		Total	0	0	9
Delete					

Material Libraries



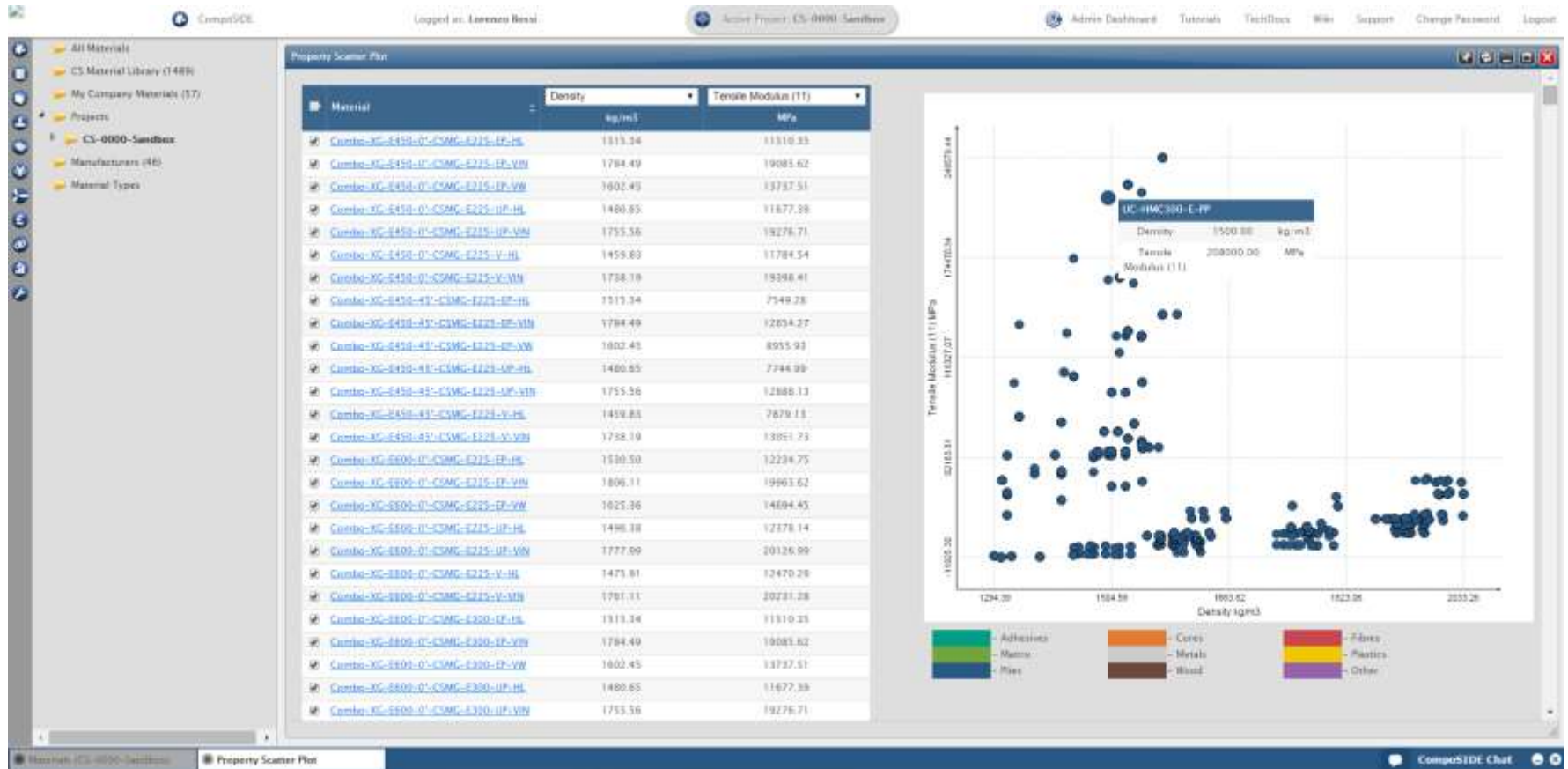
CS Material Library: The CMDB Addon with Design & FEA ready materials.

My Company Materials: Your own private materials library.

Active Project Materials: All materials used within your active project.

Project materials can be grouped into selections for easier material data management.

Materials Selection



Laminate Definition

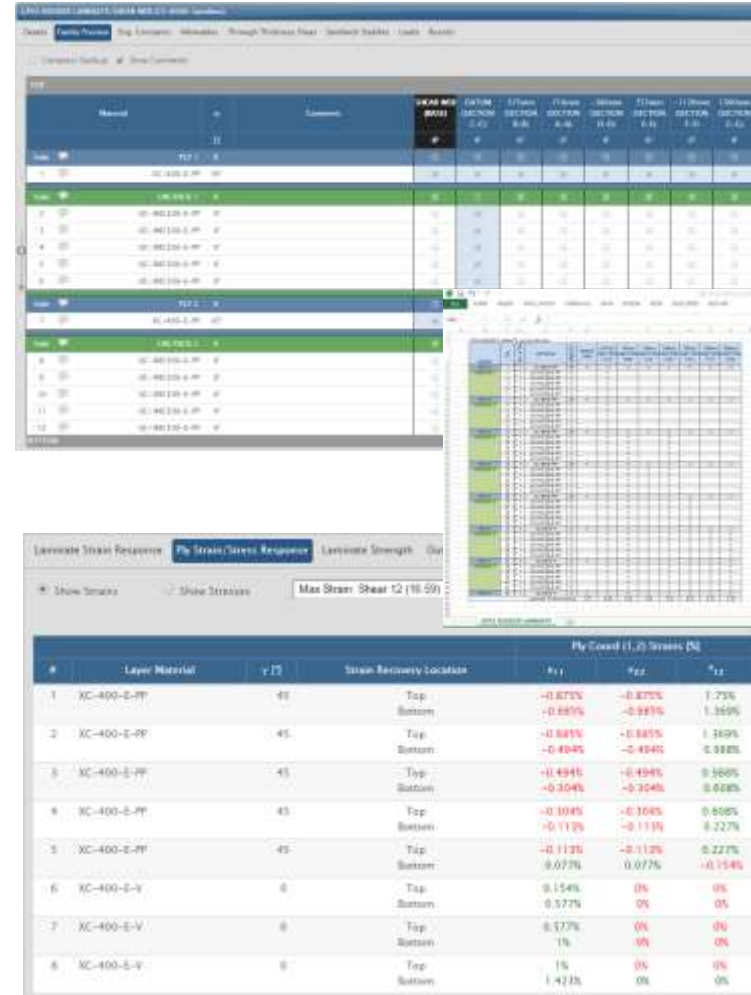
- ✘ Laminate families
- ✘ Base/Sub-Laminate

Extended CLT

- ✘ Eng. Constants, Allowables, Through Thickness Shear, Sandwich Stability, Loads
- ✘ Coefficients of Thermal Expansion (CTE)

Laminate Management

- ✘ Review and Store Laminate
- ✘ Automatic Detailed Reports
- ✘ Create Shells
- ✘ Export Laminate Tables (Excel)
- ✘ Export to FEA



The screenshot displays the CompoSIDE software interface, showing a detailed view of laminate properties and a summary table of ply-level stress and strain responses.

Laminate Properties Table:

Layer	Material	Thickness (mm)	z1 (mm)	z2 (mm)	z3 (mm)	z4 (mm)	z5 (mm)	z6 (mm)	z7 (mm)	z8 (mm)	z9 (mm)	z10 (mm)	z11 (mm)	z12 (mm)
1	XC-400-E-PP	45	-22.5	0										
2	XC-400-E-RP	45	0	45										
3	XC-400-E-PP	45	45	90										
4	XC-400-E-PP	45	90	135										
5	XC-400-E-RP	45	135	180										
6	XC-400-E-V	0	180	180										
7	XC-400-E-V	0	180	180										
8	XC-400-E-V	0	180	180										

Ply Level (i, j) Strains (%) Table:

#	Layer Material	r (%)	Strain Recovery Location	ϵ_{11}	ϵ_{22}	ϵ_{33}
1	XC-400-E-PP	45	Top	-0.871%	-0.871%	1.72%
1	XC-400-E-PP	45	Bottom	-0.885%	-0.885%	1.365%
2	XC-400-E-RP	45	Top	-0.885%	-0.885%	1.365%
2	XC-400-E-RP	45	Bottom	-0.494%	-0.494%	0.988%
3	XC-400-E-PP	45	Top	-0.494%	-0.494%	0.988%
3	XC-400-E-PP	45	Bottom	-0.304%	-0.304%	0.608%
4	XC-400-E-PP	45	Top	-0.304%	-0.304%	0.608%
4	XC-400-E-PP	45	Bottom	-0.113%	-0.113%	0.227%
5	XC-400-E-RP	45	Top	-0.113%	-0.113%	0.227%
5	XC-400-E-RP	45	Bottom	0.073%	0.073%	-0.146%
6	XC-400-E-V	0	Top	0.154%	0%	0%
6	XC-400-E-V	0	Bottom	0.577%	0%	0%
7	XC-400-E-V	0	Top	0.577%	0%	0%
7	XC-400-E-V	0	Bottom	1%	0%	0%
8	XC-400-E-V	0	Top	1%	0%	0%
8	XC-400-E-V	0	Bottom	1.421%	0%	0%

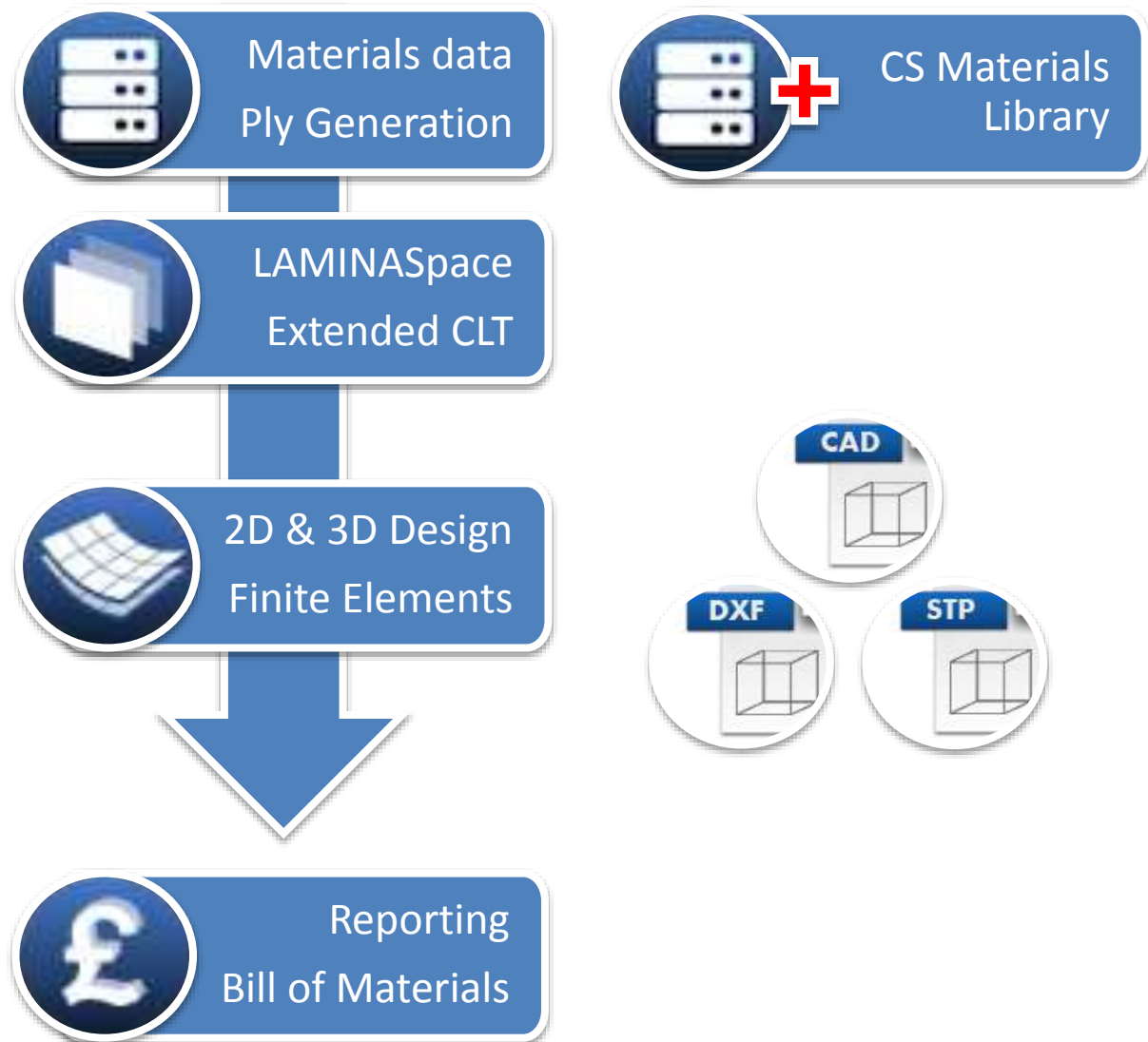


Import your Materials and Plies via Excel
Complement Library with CMDB⁺

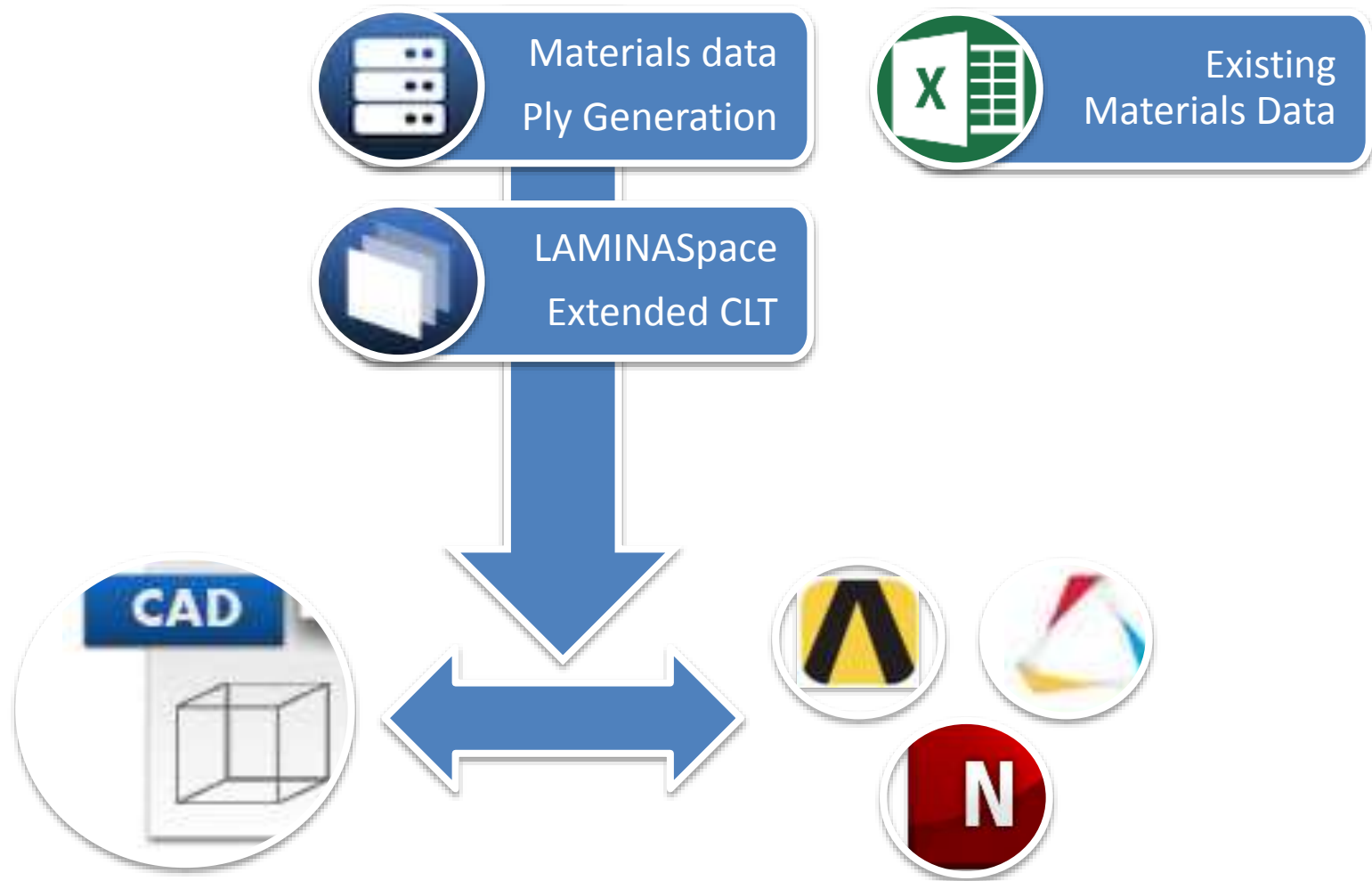
Export to FEA
Compare / Export to Excel

Live Demonstration

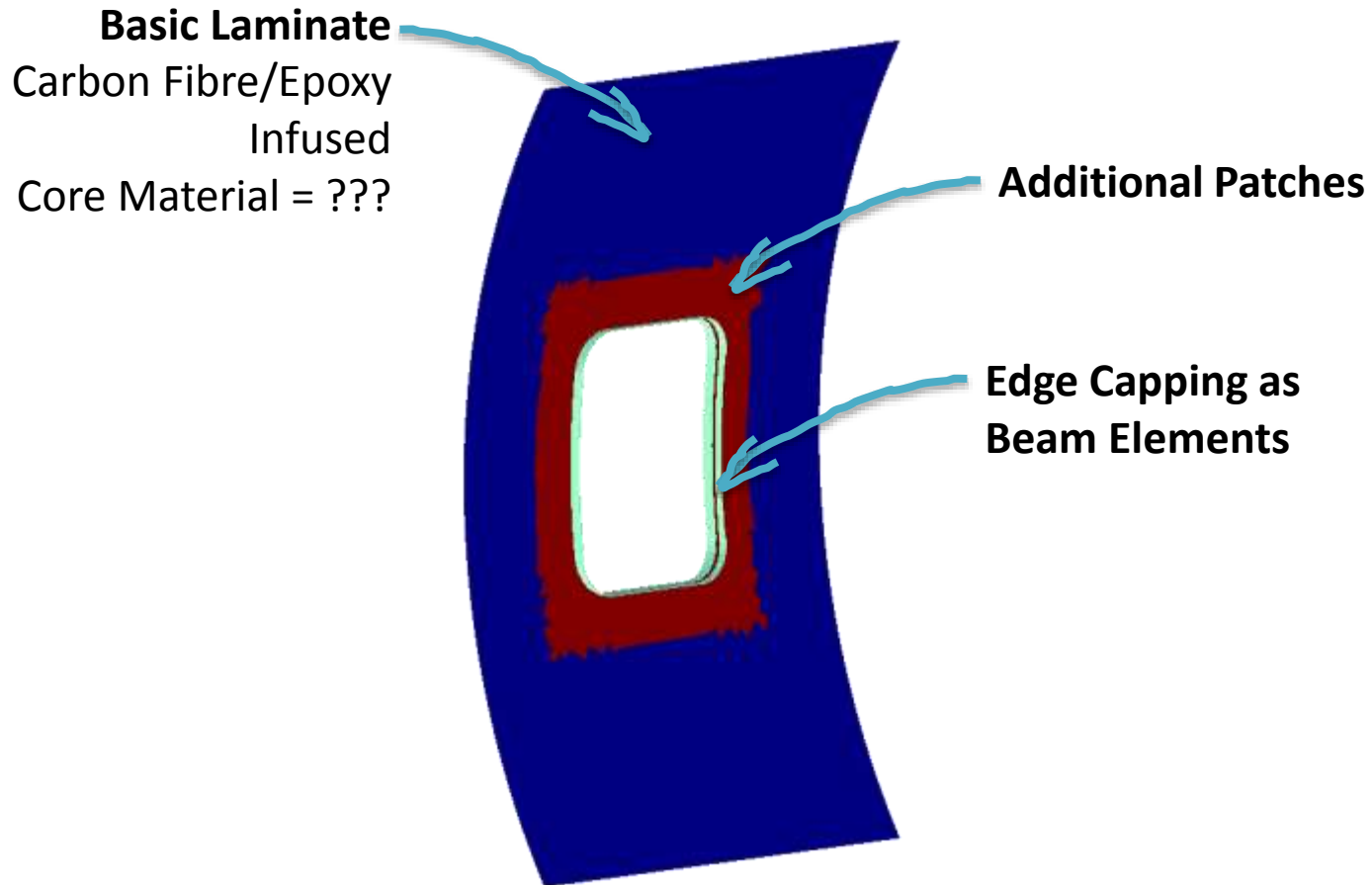
Design Workflow 1: CompoSIDE



Design Workflow 2: External Tools



Case Study – Lightweight Panel



Conclusion

Value of Material Data

- Material testing is needed but expensive



**CMDB
Addon**



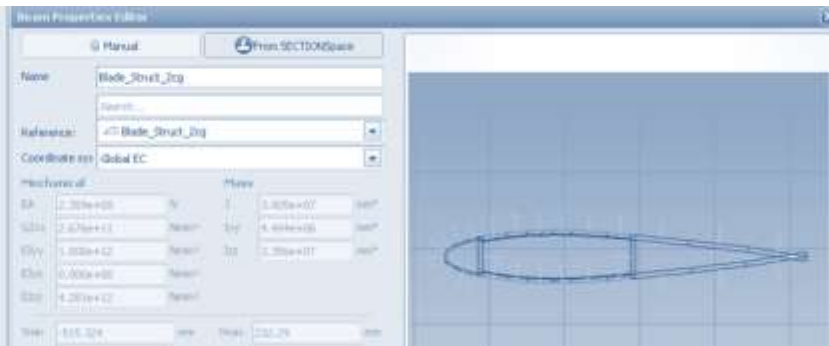
**Saves
time & money
on testing**



- Generic Material Data (60)
 - Supplied to all CompoSIDE Customers
- CMDB Addon (1,250+)
 - Based on existing data, experience and testing

Tangible Benefits

- Improved efficiency
- Easily Accessible & Scalable
- Saving days of engineering resources
- Improved quality and consistency of deliverables
- Reduced project costs



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Questions & Answers

Thank you

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