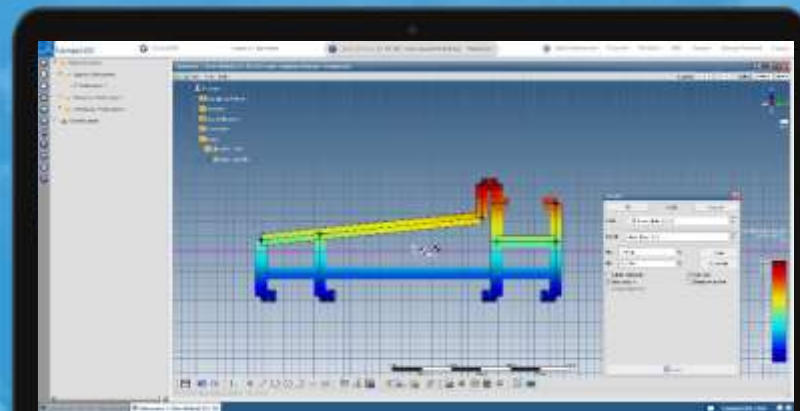


CompoSIDE presents

# Design Cost Effective Composite Components Using Pultrusion



# Agenda



- Introduction to CompoSIDE
- Why Pultrusion?
- Live Demonstration
- Questions & Answers
- Conclusion

# Introduction to CompoSIDE

## ■ Composites

Software

Integrated

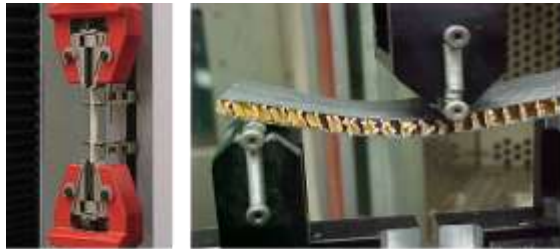
Design

Engineering




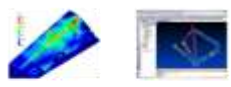
- Answer the need for dedicated software to composites
  - Efficient Process
  - Integrated Approach
  - Automated Reporting
  - Affordable and Scalable



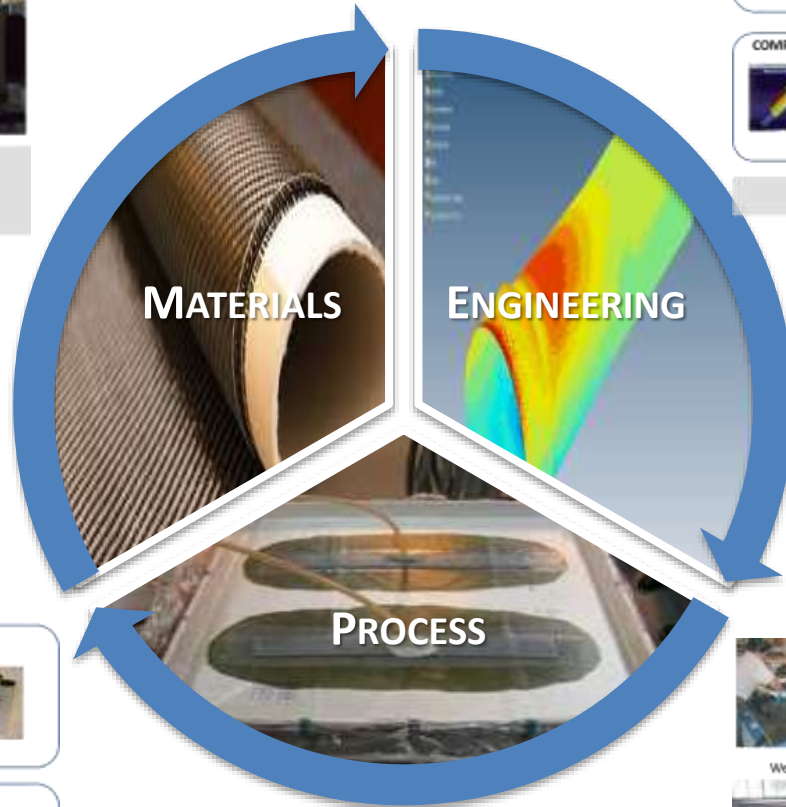
# Working with Composites



How expensive and long is material qualification?

<p><b>CLASSICAL LAMINATE THEORY</b></p> 	<p><b>CONCEPTUAL DESIGN</b></p> 
<p><b>COMPUTER AIDED ENGINEERING</b></p> 	<p><b>FINITE ELEMENT ANALYSIS</b></p> 

Which tools should I use?



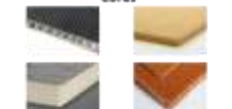
**Fibres**



**Resins**



**Cores**



**Adhesives**

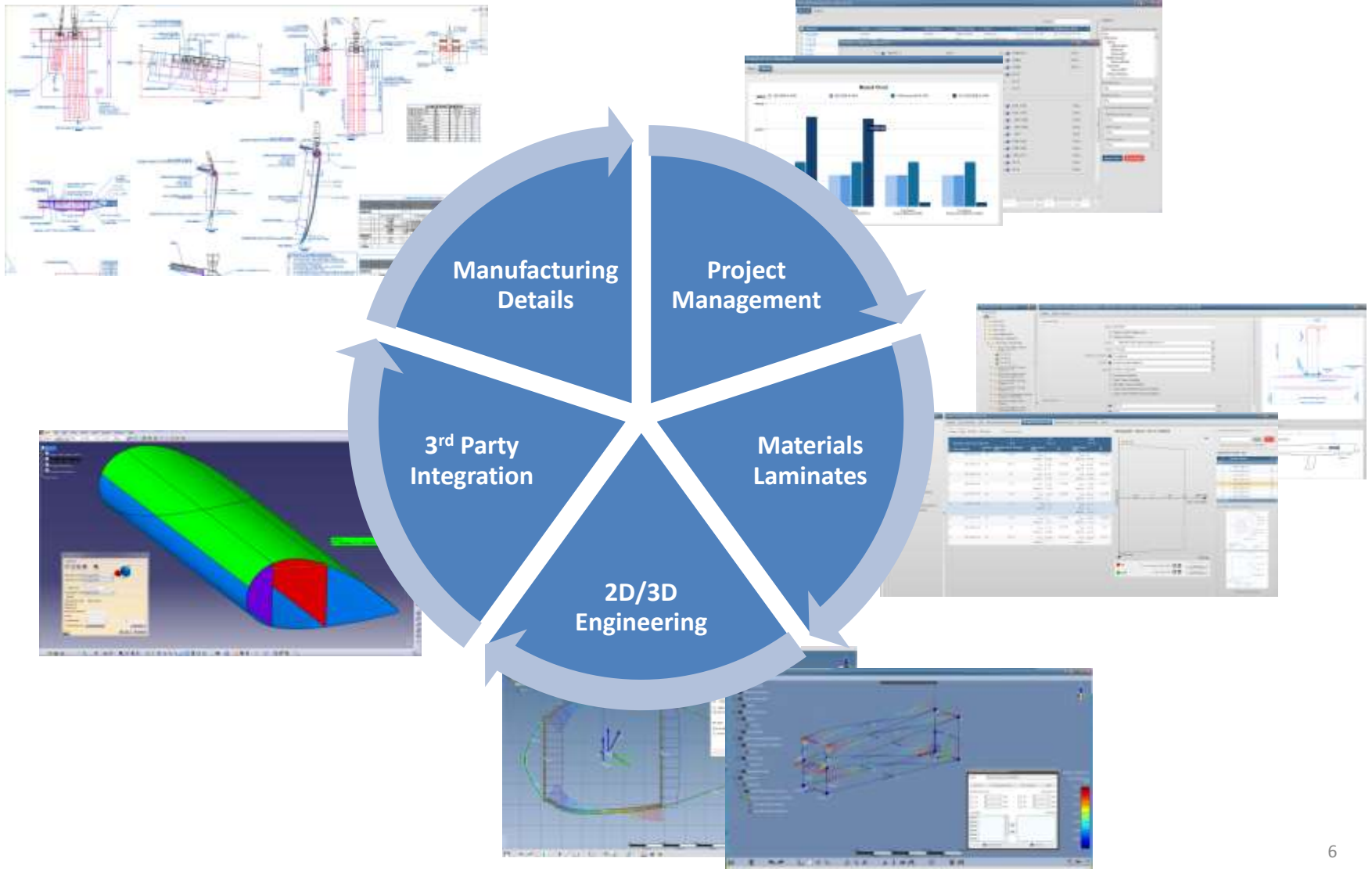


What Materials shall I use?

 <p>Wet lamination</p>	 <p>Press</p>	 <p>Infusion</p>
 <p>Pultrusion</p>	 <p>Prepreg/Resin Film Infusion</p>	 <p>Automation</p>

Which Process shall I use?

# CompoSIDE Environment



# CompoSIDE Modules



The screenshot displays the CompoSIDE web application interface. At the top, the CompoSIDE logo is visible on the left, and the user is logged in as "Lorenzo Bossi". The active project is "CS-11F-007-Marine Academy Webinars". Navigation links include "Admin Dashboard", "Tutorials", "TechDocs", "Wiki", "Support", "Change Password", and "Logout". The main content area features a large CompoSIDE logo and a row of ten module icons with labels: PROJECTspace, CMDB, LAMINAspace, SECTIONspace, FESpace, YACHTScant, BLADEScant, BoMGen, FELink, REPORTspace, and Dashboard.

## Project Management

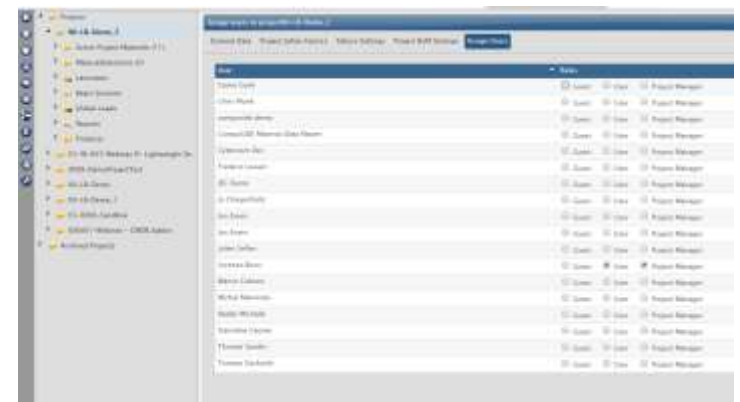
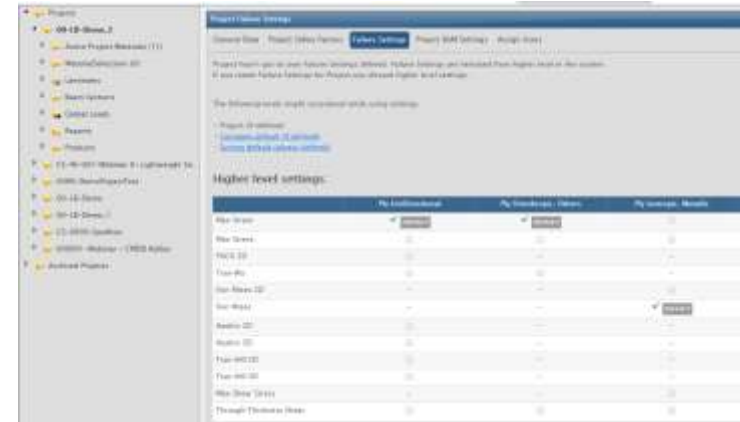
- ✘ Create and Archive Projects
- ✘ Manage Users Rights

## Project Customization

- ✘ Safety Factors
- ✘ Failure Settings
- ✘ BoM Settings

## Manage Project Items

- ✘ Materials, Plies, Laminates
- ✘ Products, Beams, Panels
- ✘ Loads and Reports





## Building your Material Library

- ✘ Base Materials library
- ✘ Micro-mechanics - PLYGen
- ✘ Reference material data

## Browsing your Materials

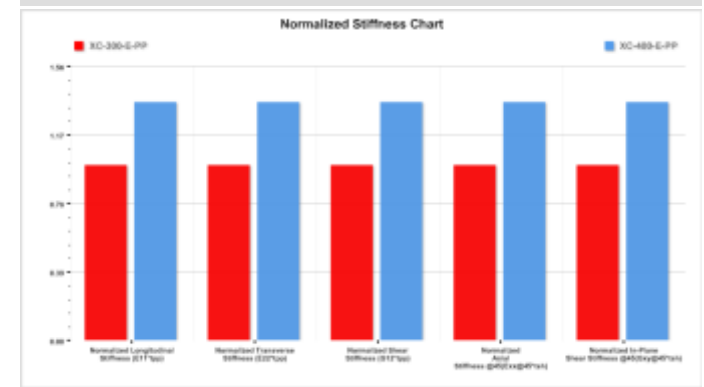
- ✘ Properties for calculation
- ✘ Material Comparison
- ✘ Materials Selection

## Organizing Materials

- ✘ Company vs. Project Materials
- ✘ Material Selections

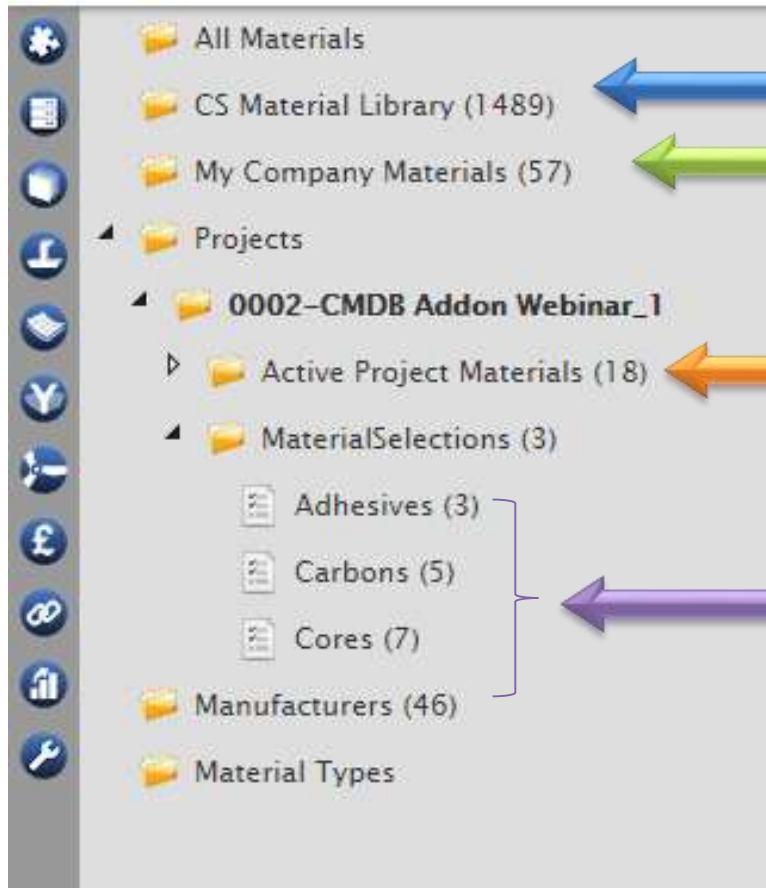
ply Shear Properties

Group	Property	Symbol	Unit	XC-330-G-PP	XC-400-G-PP
	Maximal Tensile	$\sigma_{max}$	MPa	495	495
	Maximal Force	$F_{max}$	Orthogonal	Orthogonal	Orthogonal
Shear Properties	Angle	$\alpha$	°	45	45
	Shear Thickness	$t_s$	mm	9.9	9.9
	Axial Modulus (G <sub>11</sub> )	$E_{11}$	MPa	14970.000	14999.000
	Shear Modulus (G <sub>12</sub> )	$G_{12}$	MPa	8104.200	8094.100
	Poisson Ratio (ν <sub>12</sub> )	$\nu_{12}$		0.790	0.780
	ULT <sub>11</sub>			1.3	1.3
	Longitudinal Shear Strength (τ <sub>12</sub> )	$\tau_{12}$	MPa	290.128	290.127
	Longitudinal Shear Strain (ε <sub>12</sub> )	$\epsilon_{12}$	%	0.024	0.024
	Ultimate Shear Strength (τ <sub>12</sub> )	$\tau_{12}$	MPa	210.507	200.284
	Ultimate Shear Strain (ε <sub>12</sub> )	$\epsilon_{12}$	%	1.804	1.575
	ULT <sub>12</sub> (Global Max)			1.08	1.08
	Axial Stiffness (EA)	$EA$	N/mm	1491.270	1493.410
	In-Plane Shear Stiffness (GA)	$GA$	N/mm	12810.000	12810.000





# 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.

## ■ Laminate Definition

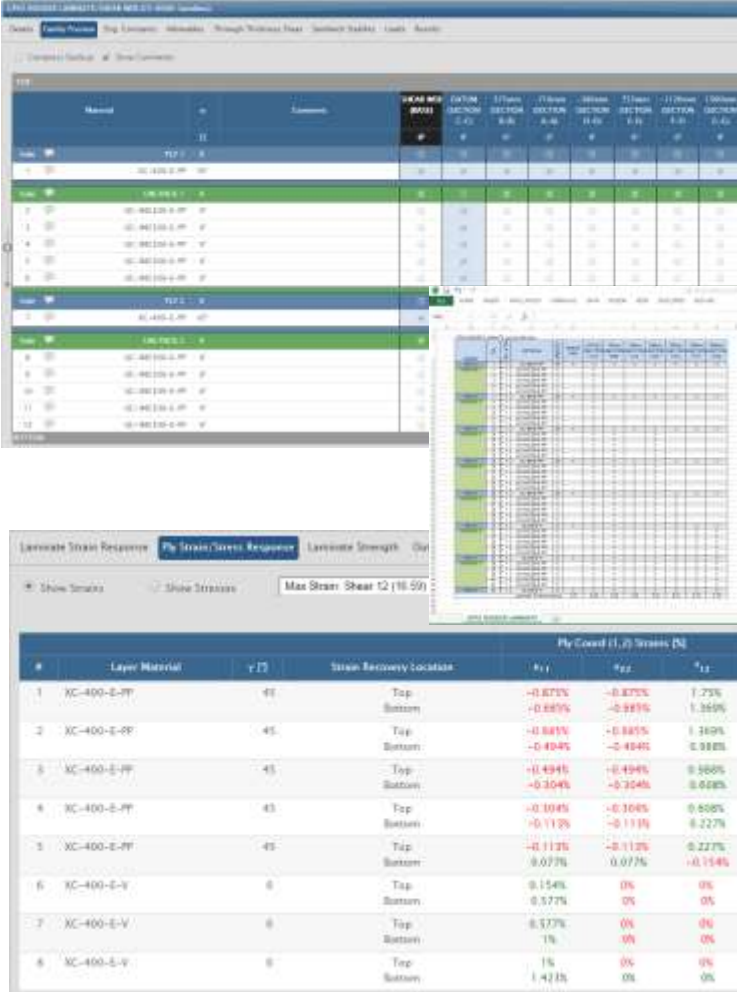
- ❏ Laminate families
- ❏ Base/Sub-Laminate

## ■ 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

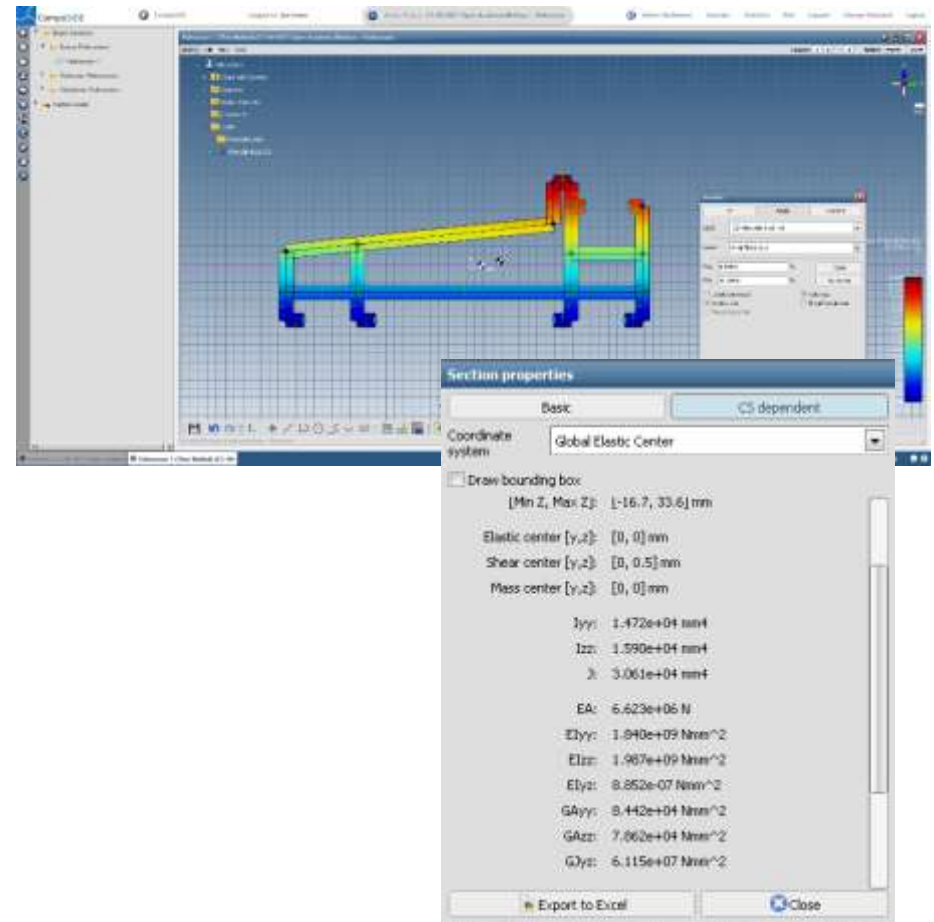


The screenshot displays the CompoSIDE software interface, which is used for defining and managing laminates. The main window shows a table for defining laminate layers, with columns for layer number, material, thickness, and various engineering constants. Below this, there are tabs for 'Laminate Strain Response', 'Ply Stress/Stress Response', and 'Laminate Strength'. The 'Ply Stress/Stress Response' tab is active, showing a detailed table of stress and strain data for each ply, including layer material, thickness, strain recovery location, and stress components (F<sub>11</sub>, F<sub>22</sub>, F<sub>33</sub>).

#	Layer Material	t [mm]	Strain Recovery Location	F <sub>11</sub>	F <sub>22</sub>	F <sub>33</sub>
1	XC-400-E-PP	45	Top Bottom	-0.827%	-0.827%	1.72%
2	XC-400-E-PP	45	Top Bottom	-0.885%	-0.885%	1.36%
3	XC-400-E-PP	45	Top Bottom	-0.494%	-0.494%	0.988%
4	XC-400-E-PP	45	Top Bottom	-0.104%	-0.104%	0.568%
5	XC-400-E-PP	45	Top Bottom	-0.113%	-0.113%	0.227%
6	XC-400-E-V	0	Top Bottom	0.154%	0%	0%
7	XC-400-E-V	0	Top Bottom	0.577%	0%	0%
8	XC-400-E-V	0	Top Bottom	1%	0%	0%

# SECTIONSpace

- Geometry
  - ⊗ Creation, Import, Modelling
- Section Definition
  - ⊗ Thin-wall/solid section
  - ⊗ Laminates/Materials
  - ⊗ Offsets
- Section Properties
- Section Load Capacity
  - ⊗ Allowable Loads
  - ⊗ RF
- Failure Analysis
- Section Design/Optimization



# FESpace



## ■ Geometry

- ⊗ Creation, Import, Modelling

## ■ FEM / FEA

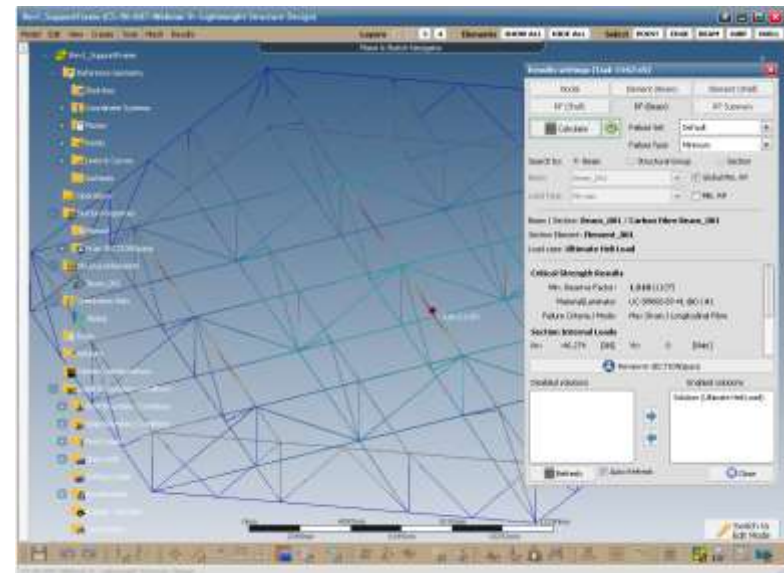
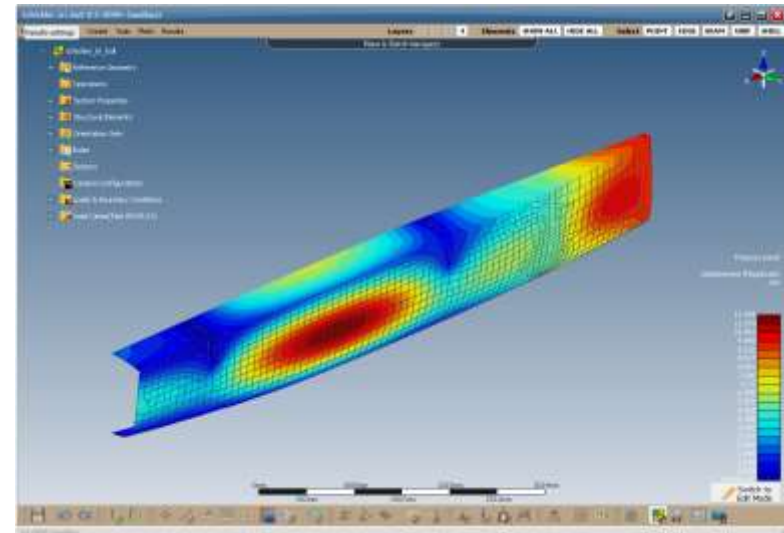
- ⊗ Automatic Mesh, Refinements
- ⊗ Linear, Buckling, Modal
- ⊗ Store and Retrieve Analysis

## ■ Calculations

- ⊗ RF (Beams, Shell)
- ⊗ Element (Beam, Shell)

## ■ Topology Management

## ■ Linked to SECTIONSpace



# REPORTSpace



## Automated Reporting

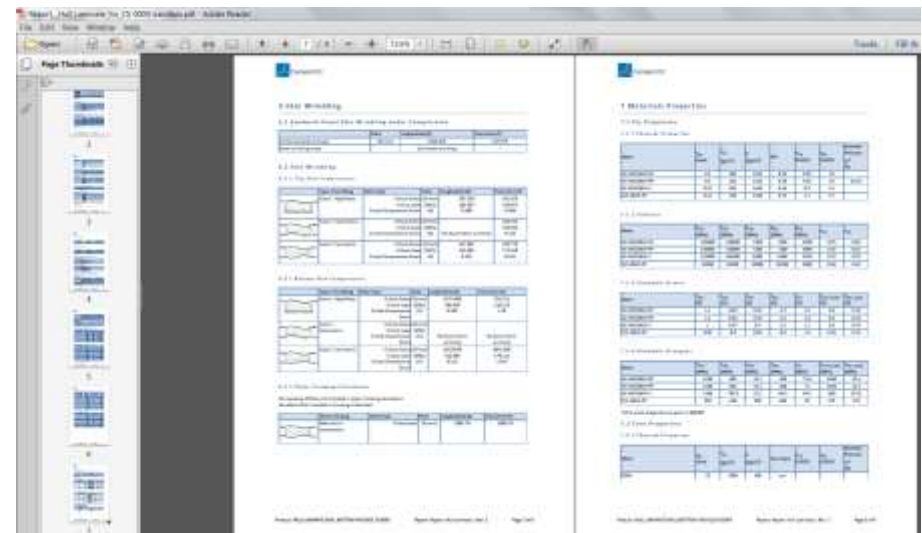
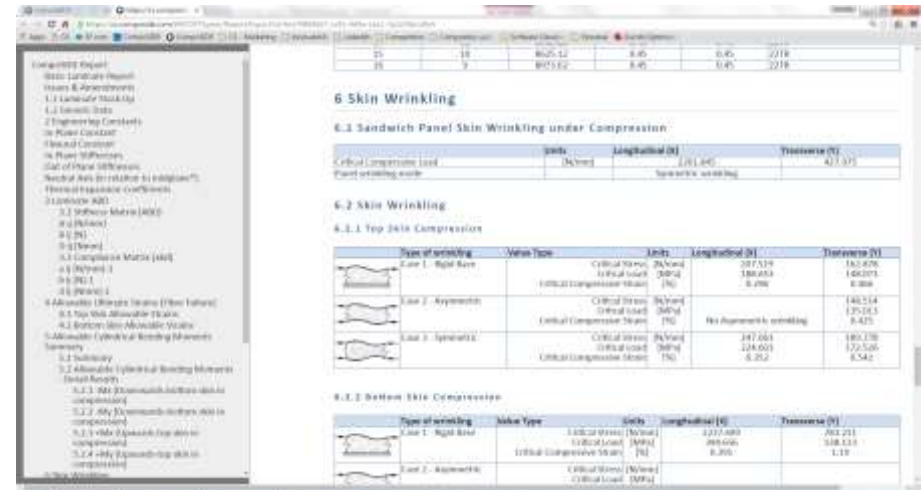
- Standard Templates
- Custom Templates

## Integrated Reporting

- Laminate
- Section (+RF)
- BoMGen
- YACHTScant

## Reports Management

- Issue and Revise
- Share HTML / PDF



## Automated BoM Generation

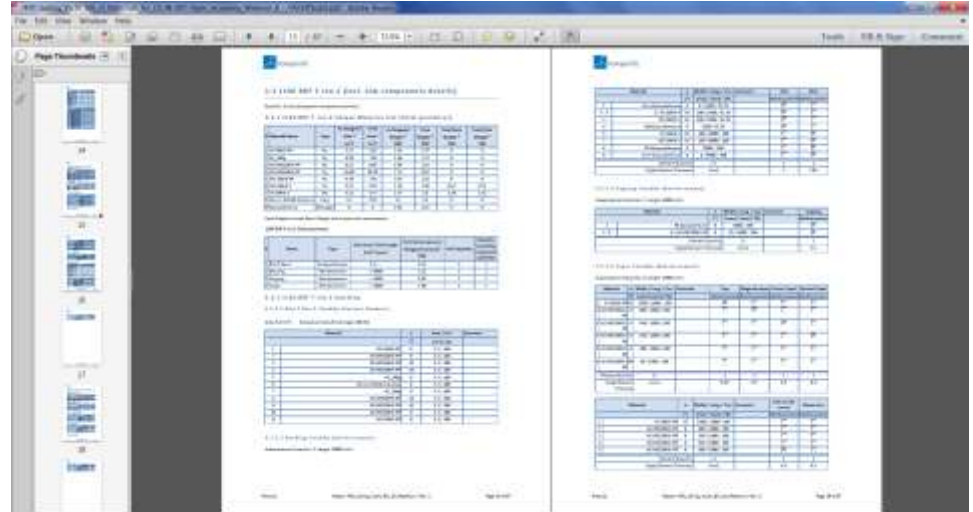
- ✘ Materials, Plies, Laminates
- ✘ Sections, FE Models
- ✘ Update modifications

## BoM Prices

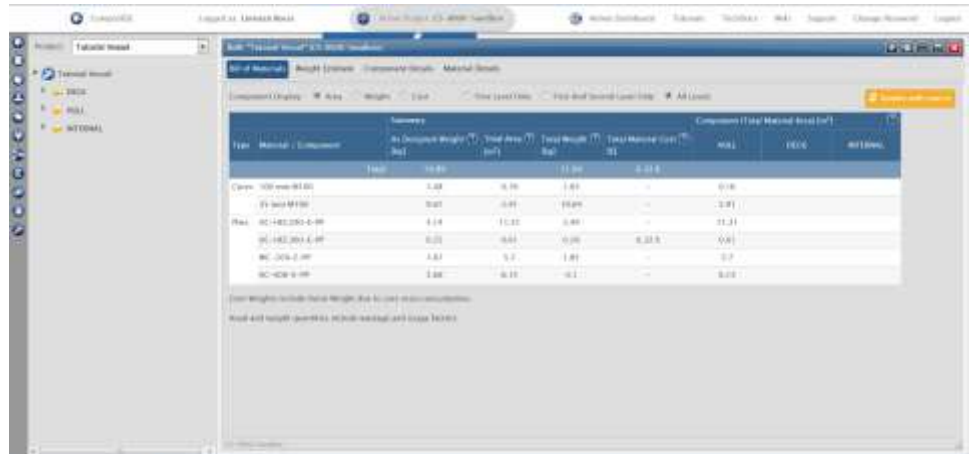
- ✘ Material Costs
- ✘ Usage / Wastage Factors

## BoM Issue

- ✘ PDF / HTML
- ✘ Revisions



The screenshot displays a software interface with a central table of material data. The table is organized into several sections, each with a title and a corresponding data table. The data includes material names, weights, and other technical specifications. The interface also features a sidebar on the left with navigation options and a top menu bar.

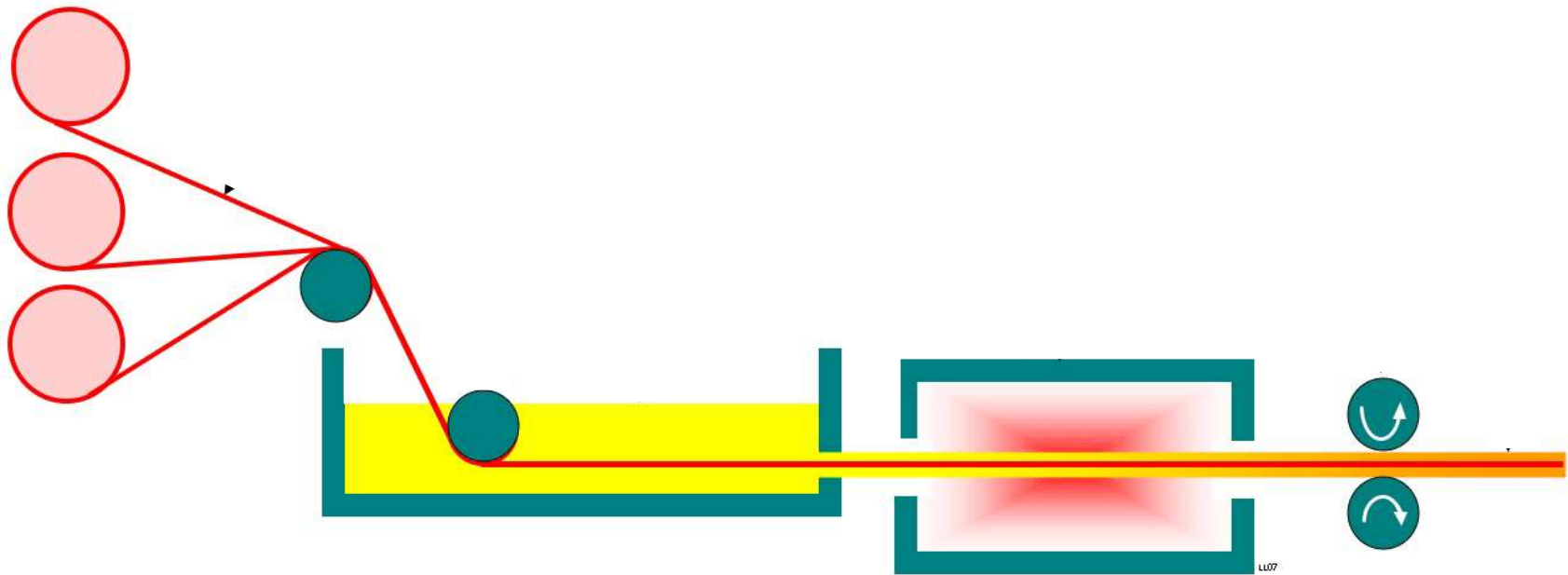


The screenshot shows a summary view of the Bill of Materials (BoM) in the CompoSIDE software. The table lists materials with their respective weights and costs. The columns include Material, Component, Weight, Total Area, Total Weight, Total Volume, Total Material Cost, and Comments. The data is summarized for various materials like Carbon, FR-4, and others.

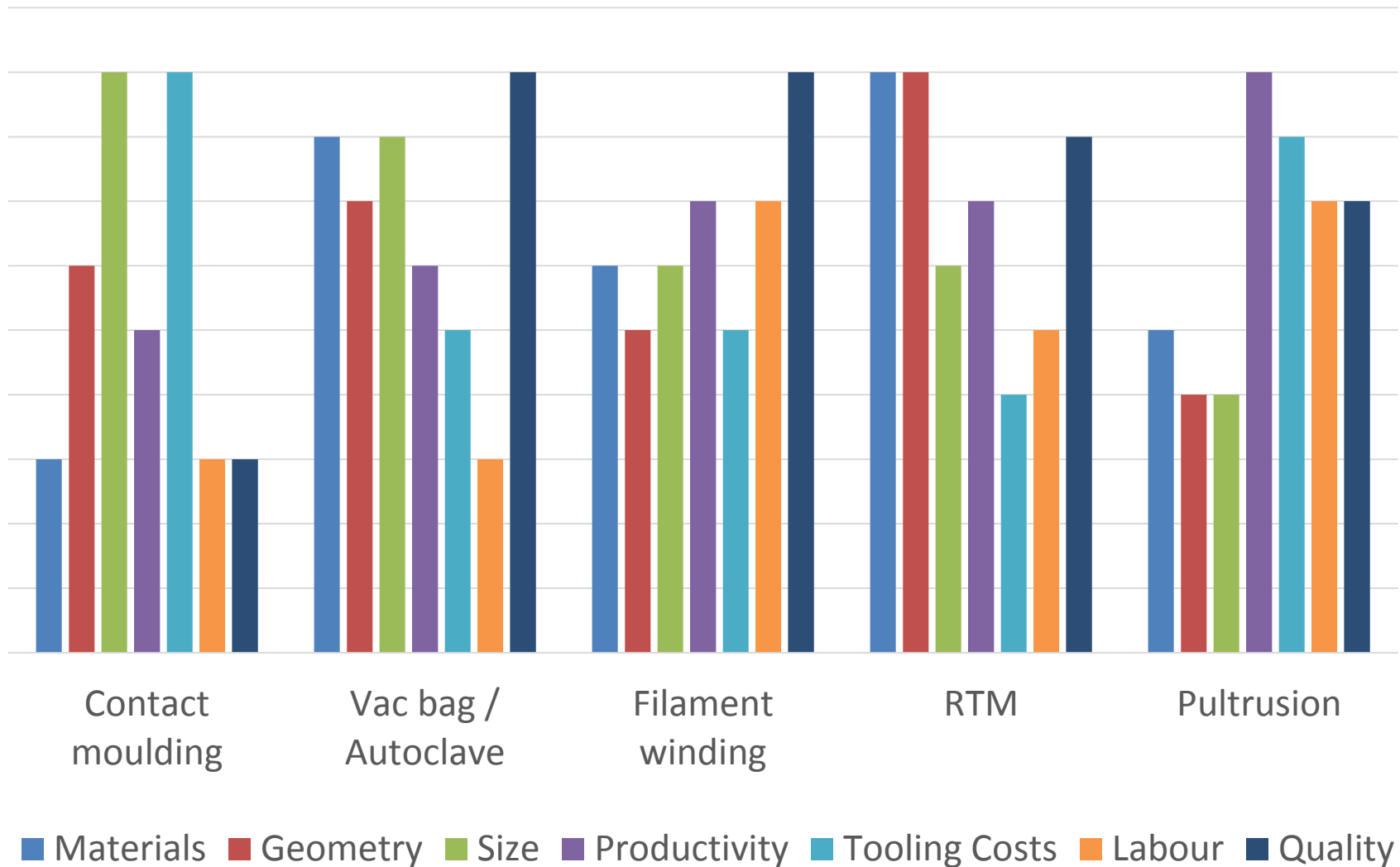
Material	Component	Weight	Total Area	Total Weight	Total Volume	Total Material Cost	Comments
Carbon	100 mm x 50 mm	0.02	0.76	1.03	0.18	0.18	
FR-4	100 mm x 50 mm	0.02	0.01	0.02	0.01	0.01	
FR-4	100 mm x 50 mm	1.14	11.01	0.88	0.11	11.11	
FR-4	100 mm x 50 mm	0.25	0.01	0.06	0.01	0.01	
FR-4	100 mm x 50 mm	1.87	0.0	1.81	0.0	0.0	
FR-4	100 mm x 50 mm	1.88	0.10	0.1	0.0	0.0	



# Why Pultrusion?



# Comparison Manufacturing Processes



# Summary on Pultrusion



- Very fast
- Economic / high productivity
- Accurate control over resins contents
- Minimal fibre wastage
- Very high longitudinal strength
- No length restrictions
- Limited cross-section size
- Restricted constant thickness
- Difficult to control shrinkage
- Quick curing lowers mechanical properties

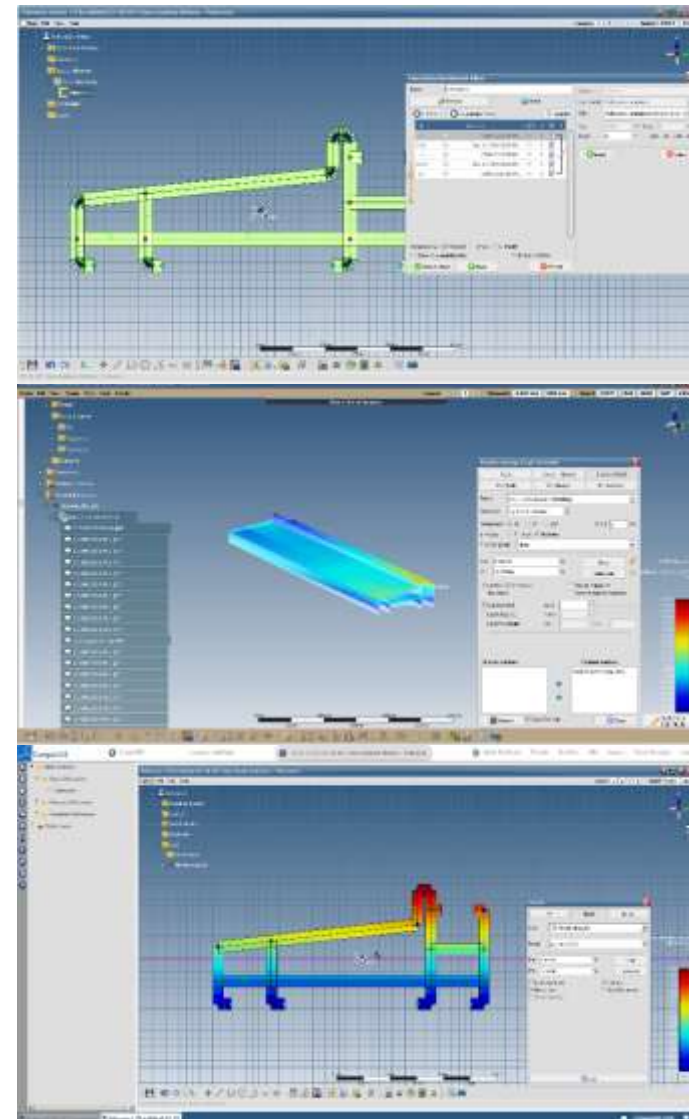
# Live Demonstration

# Conclusion

# CompoSIDE for Pultrusion



- Ideal platform for development of pultruded profiles
- Features pultrusion specific materials data
- Multi-materials support for composites, metals, woods...
- Centralises data and projects
- Shareable with Distributors / Clients



# CompoSIDE Usages

- For Engineering Management: as a secured, centralised platform
- For Engineers: as a development tool for pultruded profiles or materials manufacturers
- For Distributors: as a central library and demonstration tool
- For Sales: in support to sales activities, as a demonstration tool
- For Clients: to tighten the ties supplier / client





## CompoSIDE | 3A AIREX BALTEK BANOVA



### Automated Bill of Materials Generation for Marine Vessels

Lorenzo Bossi  
Sales & Marketing Manager  
CompoSIDE Ltd.

19/01/2016

Eric Gauthier  
President Global Key Accounts  
3A Core Composites



“

To maintain its ongoing evolution, the global marine market requires value-adding partners that provide rapid access to professional support. Our partnership with CompoSIDE aims to offer the marine industry a unique and independent design solution, beneficial for boat builders and designers at the very early stages of their designs.

”

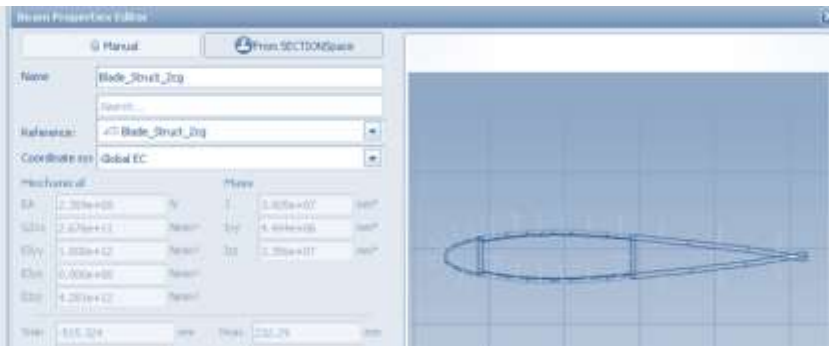
Eric Gauthier, President Global Key Accounts  
of 3A Composites Core Materials

<https://youtu.be/uqURCt3t0os>



## 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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