Steel & Mass Timber Hybrid Structures – The Opportunities in Tall Buildings

Nick Milestone Steel / Mass Timber Expert





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Steel / Timber Hybrid Structures Nick Milestone

> **CTBUH** Chicago





Nick Milestone BSc, Bsc (Hons), MSc.

Senior Advisor-Softwood Lumber Board

Chairman – TRADA (UK) – Vice Chair of the Timber Research and Development Association Project Consultant, NTU, Singapore

Nick has overseen the design and construction of over 550 steel and mass timber structures during his 36+ years in construction.

- Trained as Quantity Surveyor & Project Manager for a General and Structural Steel Contractor (1986 2002)
- Created and managed B&K Structures, now the UK's largest Mass Timber & Hybrid Construction business (2002 2017)
- Created demand for Mass Timber in Singapore (2017 2020)
- Developed a Light Gauge Steel, off-site construction business for Wm Hare Ltd (2018 2020) UK, UAE, Singapore
- Part of the COP26 team to deliver the world Timber Manifesto

Previous Directorships

- Structural Timber Association (UK)
- Katerra (USA)
- B&K Structures (UK), Managing
- Wm Hare (UK, UAE),
- TiongSeng (Singapore),
- Katerra (USA)
- Sigmat (UK)

Current Directorships

- TRADA (Chairman)
- Vice Chair, Timber Development UK
- Mercer Mass Timber (USA) June 1 2022



HYBRID STRUCTURES A DEFINITION

'Hybrid construction systems integrate different materials to carry specific design loads. Connection and joint details are crucial for hybrid structures'

http://newbuildscanada.ca/research/theme-2/

Integrated Digital Delivery – The Digital Twin (VDC)

+

Design for Off-Site Manufacture and Assembly (Off-Site)

+

Green and Sustainably Technologies in the Building Physics (Mass Timber & Steel)

+

Construction Disruption – Vertical Integration



Tesco





THE CARBON CALCULATOR

B&K STR		
Project Carbon Estimator		
Project Name	Believe In Better	
Project Client BSkyB - Mace		
	Enter Value:	Tonnes CO ₂ e
Tonnes of Steel in Project?	98	159.02
Cubic metres of Glulam in Project?	530	-376.49
Cubic metres of X-LAM in Project?	1199	-871.76
Square metres of Casette in Project?	2410	-1416.69
Distance (miles) Travelled on Project?	46000	12.42
Total Tonnes CO:e on Project		-2493.50
Gross Internal Area of Project (m²)?	5300	
Total Tonnes CO ₂ e per m ⁸ of project		-0.47

B&K Structures: Project Carbon Estimator



B & K STRUCTURES (2006) SPLIT STRUCTURAL SOLUTIONS

Structural	Panelised	
frames	construction	
Glulam	CLT	
Steel	Prefabricated	
	Cassettes	

The BIM Integrated solution includes:-

- Cross Laminated Timber (X-LAM)
- Glulam Structures
- Steel/Timber Hybrid Frames
- Structural Cassettes (Load / Non-Load Bearing)
- Modular Build Solutions (Flat pack)



Tenteriterit

MA



RETAIL

FRAME AND ROOF SOLUTION SAINSBURY'S SHEFFIELD













ACADEMIES

Scunthorpe Leisure, UK







VIRTUAL DESIGN AND CONSTRUCTION

Banyan Wharf, London – 'The Cube'



VIRTUAL DESIGN AND CONSTRUCTION



(L) Activate
(M) Gide
(R) Modify
aux lines
"naste"
Previous activation
Ctrl
+
M1: Freehand lassa
Alt
+
(M): Pan











Pinewood Studios – 600,000sqft Structural Timber Panels on a Steel Frame







TRADA Founded in 1934

The Future of Mass Timber

Modular / Volumetric





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POD & PANEL



VASTINT - MOXY HOTEL A load bearing pod and panel solution. BINDERHOLZ - BWOOD SOLUTION A load bearing pod and panel solution.



GOOGLE HQ LONDON

Concrete Cores / Steel Frame / Cross Laminated Timber Floor Decks / Glulam facade



Grenfell Tower and the impact on Mass Timber









Dalston Lane





RESIDENTIAL NEW SOLUTIONS





PANELISED LGSF/CONCRETE METAL DECK MODULAR

Perimeter LGSF walls and internal LGSF walls included

Cladding build up, finishes, M&E not included

Typ. Embodied Carbon Typ. Sequestered carbon

Values above podium level only

376kgCo2e/m2 -0kgco2e/m2

> Values above Perimeter LO

PANELISED LGSF/CLT MODULAR

Typ. Embodied Carbon Typ. Sequestered carbon 269kgCo2e/m2 -87kgco2e/m2

Values above podium level only Perimeter LGSF walls and internal LGSF walls included Cladding build up, finishes, M&E not included

CAN GO ~15 STOREYS INC. PODIUM

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What Are the Opportunities for Steel & Mass Timber?

- •Composite Design?
- Keep it simple, use Cross Laminated Timber as a floor plate, on either a steel frame (Long Span) or on a CFS frame (Short Span)
- •One model for all components......Trimble are working on it, have faith in the IFC's
- Look at the holistic value of CLT as a dry floor plate, speed of build, 20% quicker 11% cheaper.
- National Specifications, standardize the billets, like steel and glulam
- Digitalization & Post processing, the bottle necks of any prefabricated component
- Keep in service class 1 & 2 only, avoid service class 3
- The devil is in the detail, steel and mass timber are symbiotic to each other

