The freeform design of SMARTree allows the user to build comprehensive material libraries that capture a wide range of material properties. Examples of a tree containing properties are shown on the left for a composite material. By attaching a "Material" SMART Tag to this tree the embedded property data is made available to users for other trees either as reference data or model inputs. Units for each property can also be added to the tree for completeness. Unit definition is also needed when using embedded models.

Drag and drop functionality allows the users to quickly populate material properties and tree logic can be used to ensure properties are entered. Some of the property definitions within the startup libraries are locked in that the definition of that property cannot be changed. This requirement is necessary for models that use these values when solving. Most other property inputs however are editable. The properties within a material library do not have to have any particular order as long as they are within a specific material element or hierarchy. This allows the user to organize

material data to suit their needs without having to conform to a specific formatting. The software will track these values when used in embedded simulations.

APC (PEI) AS4 -12K Prepreg	Type	Value
⊟ ● Material	Material	
⊟ ● Description	Header	
📄 Name	Text	APC (PEI) AS4 -12K
✓ Form	Select	Lamina
✓ Type	Select	Transversely Isotropic
⊟ ● Lamina Specifications	Header	
⊟ ✓ Microstructure	Select	Unidirectional
✎ Fiber Volume Fraction	Value	0.58
✎ Void Content	Value	0.00
⊟ ● Constituents	Header	
⊞ ● Fiber	Header	
⊞ ● Resin	Header	
⊞ ● Filler	Header	
⊟ ● Microstructure type	Header	
⊞ ● Short Fiber	Header	
⊟ ● Physical Properties	Header	
⊟ ✎ Composite density	Value	0.057
✓ Unit of Density	Select	lb/in^3 (pounds per cubic inch)
⊟ ✎ Specific Heat Capacity	Value	0.00
✓ Unit of Specific Heat	Select	Joule/gram Kelvin (J/g-K)
⊟ ✓ Conductivity	Select	Isotropic Conductivity
✎ Value	Value	
⊟ ● Mechanical Properties	Header	
⊟ ● Modulus	Header	
⊟ ✓ Mechanical Property	Select	Longitudinal modulus: E1
⊞ ✎ Value	Value	21.10
⊟ ✓ Mechanical Property	Select	Transverse in-plane modulus: E2
⊞ ✎ Value	Value	1.48
⊟ ✓ Mechanical Property	Select	Transverse out-of-plane modulus: E3
⊞ ✎ Value	Value	1.41
⊟ ✓ Mechanical Property	Select	In-plane shear modulus: G12
⊞ ✎ Value	Value	0.71
⊟ ● Poissons Ratio	Header	
⊟ ✓ Mechanical Property	Select	Major in-plane Poissons ratio: v12
⊞ ✎ Value	Value	0.33
⊞ ✓ Mechanical Property	Select	Minor in-plane Poissons ratio: v21
⊞ ✓ Mechanical Property	Select	Major in-plane Poissons ratio: v13