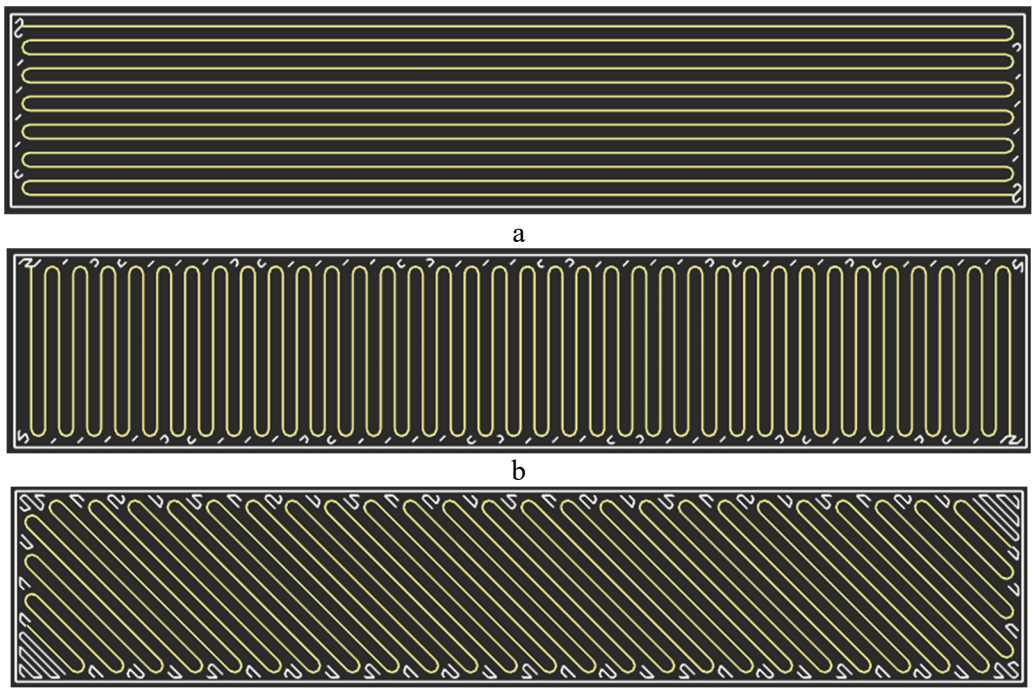
Supporting Materials

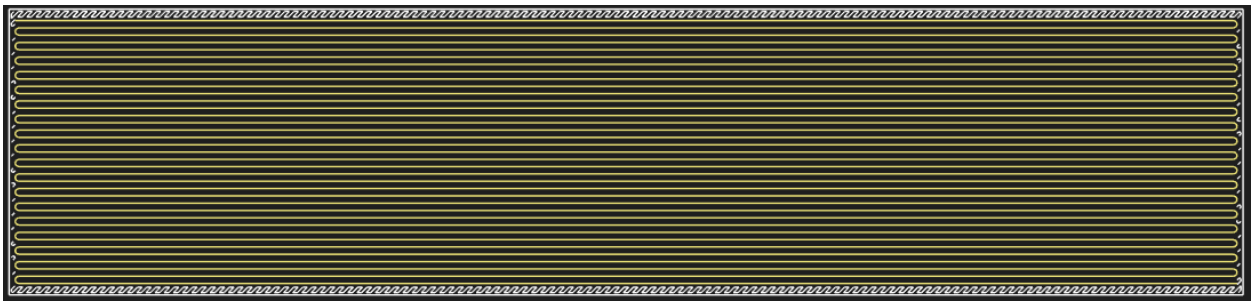


a

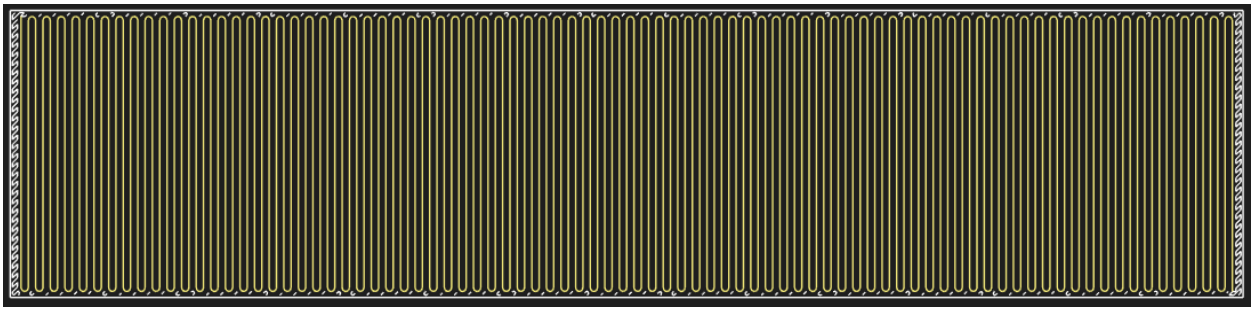
b

c

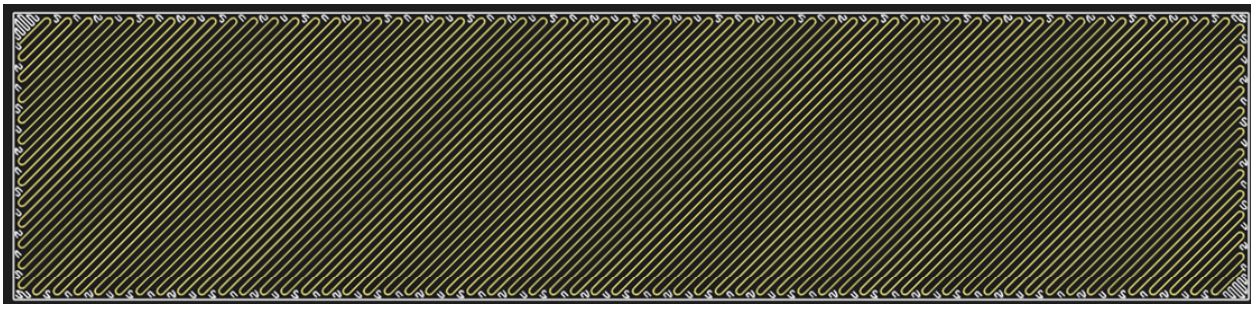
Figure 1. Fiber and plastic paths for different layers with different fiber orientations (availed from the slicer, Eiger of Izod impact specimen with 63.5 mm x 12.7 mm dimension); (a) 0º layer (b) 90º layer and (c) 45º layer.



a



b



c

Figure S2: Fiber and plastic paths for different layers with different fiber orientations (availed from the slicer, Eiger of tensile sample with 152.4 mm x 35.6 mm dimension); (a) 0º layer (b) 90º layer and (c) 45º layer.

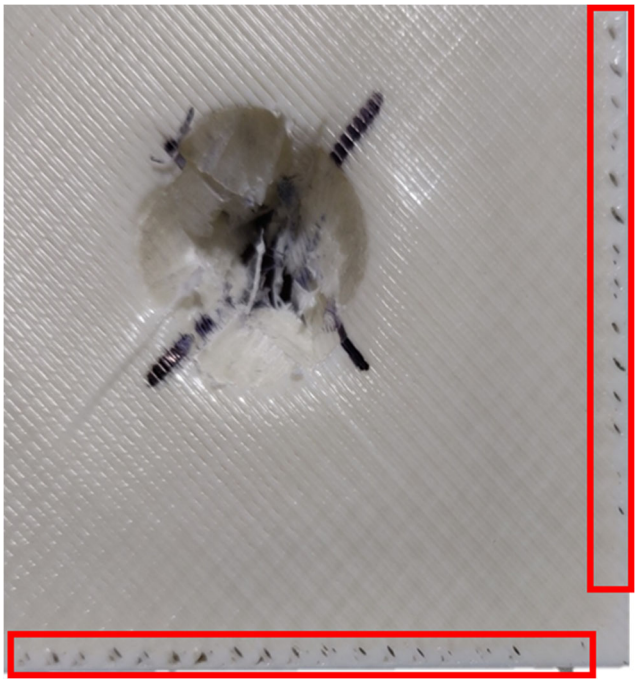


Figure S3: Voids (red marked) between wall and infill rasters. These voids are generated when the infill rasters do not completely cover the whole area (as raster density is fixed) or using 1 wall layer (as Eiger slicer recommends using two wall layers to obtain watertight surface finish).

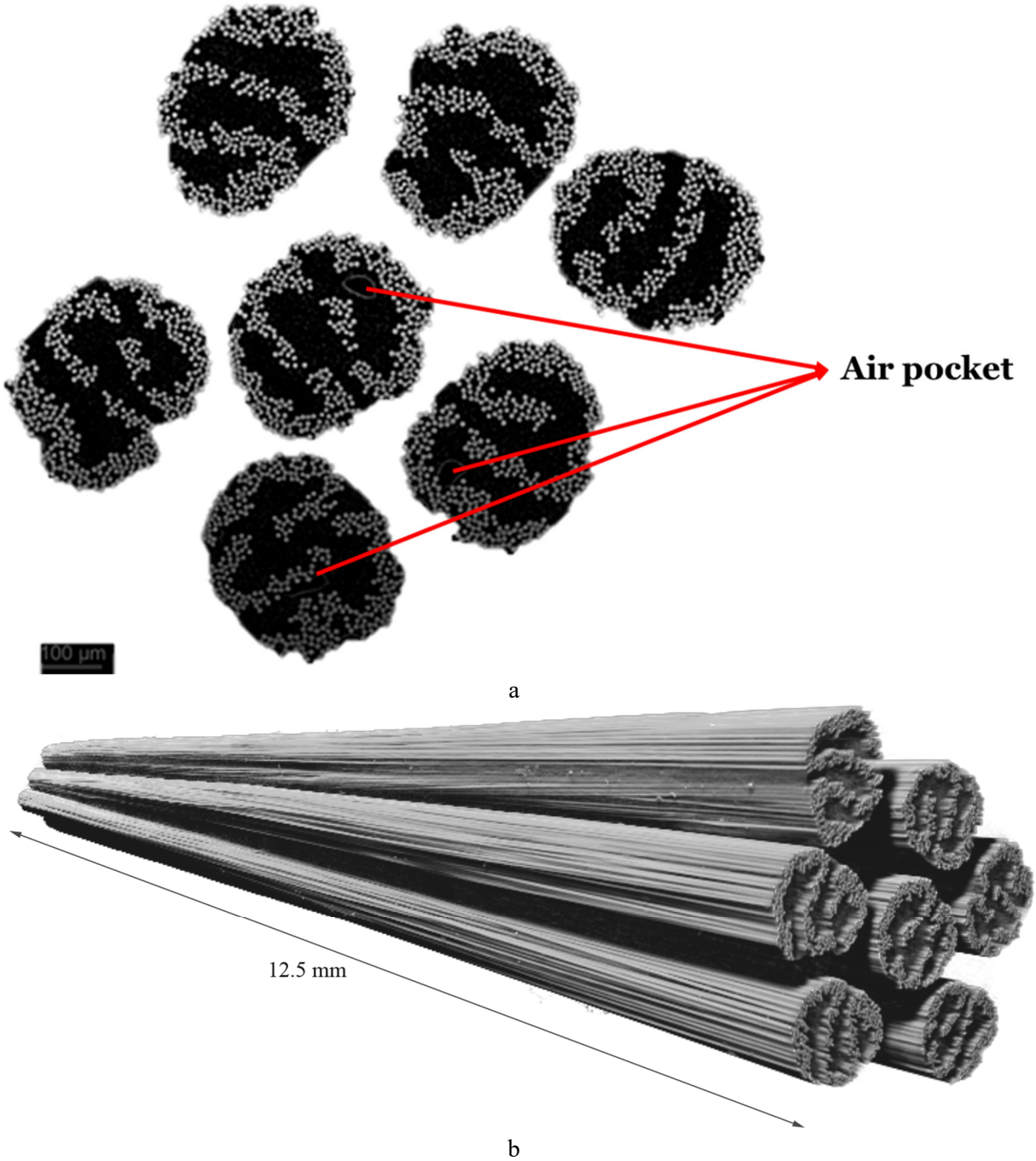


Figure S4: Internal structure of composite filament; (a) cross-section showing dark background, white dots, and air pocket representing matrix (Nylon 6), fiberglass filament and void, respectively; (b) 3D longitudinal view of fiber in the composite filament exhibiting fibers are pretty straight. Additionally, the X-ray tomography analysis measured fiber content of approximately 33% (with approximately 10 µm diameter of individual filament), which are in agreement with the authors' previous finding in [3]. Here, the authors followed the fiber content value obtained by thermal analysis (approximately 38%).

Table S1: Tensile properties of 3DOW (sample 28 from Midani et al. [28])) and 3DP (sample 0/0) composites

Attributes		3DOW	3DP
Composite properties	Matrix tensile strength, MPa	76	54
	Fiber tensile strength, MPa	2230 (both X and Y)[a]	590
	Composite areal weight, kg/m^2	5	4.25
	Fiber areal weight, kg/m^2	1.6841475 (Y-yarn) 1.697875 (X-yarn)	2.028405
	FVF, %	22.5 (Y-yarn) 23.5 (X-yarn)	31.5
	Composite thickness, mm	2.89	3 mm
Tensile strength of composites	Tensile strength of composites, MPa	382 (Y-direction, Warp) 347 (X-direction, Filling) *	392 (0/0, test direction)
Normalized tensile strength of composites	By composite areal weight, MPa/kg/m^2	76.4 (Y-direction, Warp) 68.4 (X-direction, Filling)	92.23
	By fiber content (areal weight), MPa/kg/m^2	227 (Y-direction, Warp) 204 (X-direction, Filling)	193.255
	By fiber content (FVF), MPa/FVF	17.97 (Y-direction, Warp) 14.77 (X-direction, Filling)	12.44
	By thickness, MPa/mm	132.18 (Y-direction, Warp) 120.07 (X-direction, Filling)	130.66

[a]Hybrid Anisotropic Materials for Wind Power Turbine Blades (Page 61) and
https://www.900gpa.com/en/product/fiber/GF_009729965F?u=metric
https://www.900gpa.com/en/product/fiber/GF_00C1F65E75?u=metric

*Comparison of 3DP with 3DOW composite in X-direction is more reasonable as Y-direction has some effect of Z-yarn.

Table S2: Comparison of tensile and impact properties between authors present and previous research [16]

Attributes of composites		Tensile sample		Impact sample	
		This paper (0/0 composite)	Previous research (S0/0 composite [18])	This paper (0/90 composite)	Previous research (S0/90 composite) [17]
Composite properties	Thickness, mm	3	3	3	3
	Number of fiber layers	28	8	28	8
	Composite areal weight, kg/m^2	4.25	3.64	4.03	3.55
	Fiber areal weight, kg/m^2	2.03	0.583	2.07	0.565
	FVF, %	31.5	8.94	32	8.75
Tensile and impact properties	Tensile strength (in MPa) and impact energy (in J)	392	225	99.2	29
Normalized tensile and impact properties	By composite areal weight, J/kg/m^2	92.23	61.81	24.62	8.17
	By fiber content (areal weight), J/kg/m^2	193.255	386	47.93	51.327
	By fiber content (FVF), J/FVF	12.44	25.16	3.1	3.31