NEXTGEN PREFORMS

ENGINEERED FIBER PLACEMENT

Composite preforms built for rate, strength & repeatability

A focused manufacturing platform for structural towpreg TFP, comingled thermoplastics, and co-cure STFP + SMC.

ENGINEERING • PURCHASING • OPERATIONS

Manufacturing leverage—not just a different preform

NextGen converts conventional composite layup work into engineered, repeatable preform operations.

STRUCTURAL TOWPREG TFP

Continuous carbon fiber placed along load paths using thermoset towpreg. Near-net preforms reduce ply count, touch labor and waste.

COMINGLED THERMOPLASTIC

Fiber + matrix fibers are combined into a placement-ready architecture, enabling press-molded, net-shape structures and material flexibility.

CO-CURE STFP + SMC

Add continuous-fiber reinforcement where the SMC alone needs more performance—then consolidate in one molding step.

25 → 2

plies in the aft-cone example

4.5 h → 16 min

touch labor in the aft-cone example

25% → ~0%

waste in the aft-cone example

8–10 min

co-cure SMC cycle time

Source performance examples shown in this deck are taken from the supplied NextGen/PRC TFP presentation; application-specific validation is required.

Three preform platforms. One manufacturing objective.

Place the right material, in the right direction, only where the structure needs it.

DESIGN LOAD PATHS → **PLACE CONTINUOUS FIBER** → **MOLD / CO-CURE**

1

Structural towpreg TFP

Epoxy / carbon or fiberglass • high fiber efficiency • near-net structural preforms

2

Comingled thermoplastic

Carbon / glass + matrix fibers • PA, PP, PA11/12, PEEK and other systems

3

STFP + SMC co-cure

Continuous-fiber reinforcement integrated with SMC in one molding cycle

Design freedom: selective material placement • thickness variation • curvilinear fiber paths • variable stitch density • value-added carrier designs

Structural towpreg TFP: move fiber, not labor.

Continuous reinforcement follows the structure instead of forcing the structure into a conventional ply architecture.

WHAT CHANGES

Ply count

A single engineered preform can replace many conventional NCF/prepreg layers.

Fiber direction

Paths can be designed around the product stress contour.

Kitting + layup

Preform arrives as a near-net reinforcement rather than a stack of cut plies.

Waste

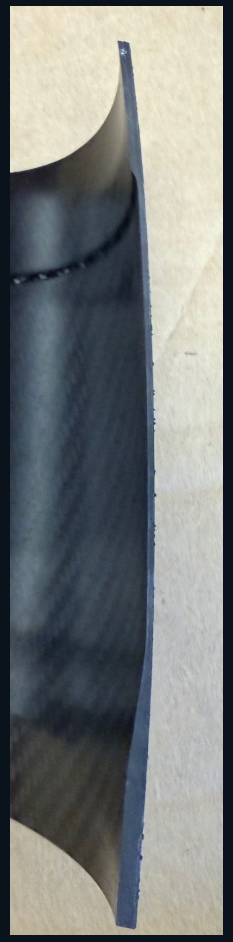
Continuous fiber is placed where needed; source deck reports <1% waste on selected examples.

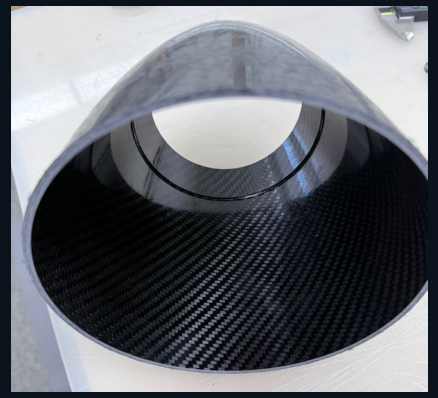
INPUT MATERIALS

12K / 24K thermoset towpreg • dry CF • fiberglass

Aft cone: 25 plies become two structural preforms

A direct example of how TFP can compress labor, waste and production time.





25 → 2

plies → TSFP preforms

4.5 h → 16 min

kitting + layup

25% → ~0%

waste

2 → 10

parts / day

WHY IT MATTERS TO OPERATIONS

Less touch labor, less material handling, less scrap and a much shorter path from fiber input to mold-ready reinforcement.

STFP + SMC co-cure: continuous fiber where SMC needs it

Use SMC for speed and geometry; add placed continuous reinforcement for targeted structural performance.

ONE-STEP MANUFACTURING CONCEPT

8–10 min

reported cycle time

LOWER

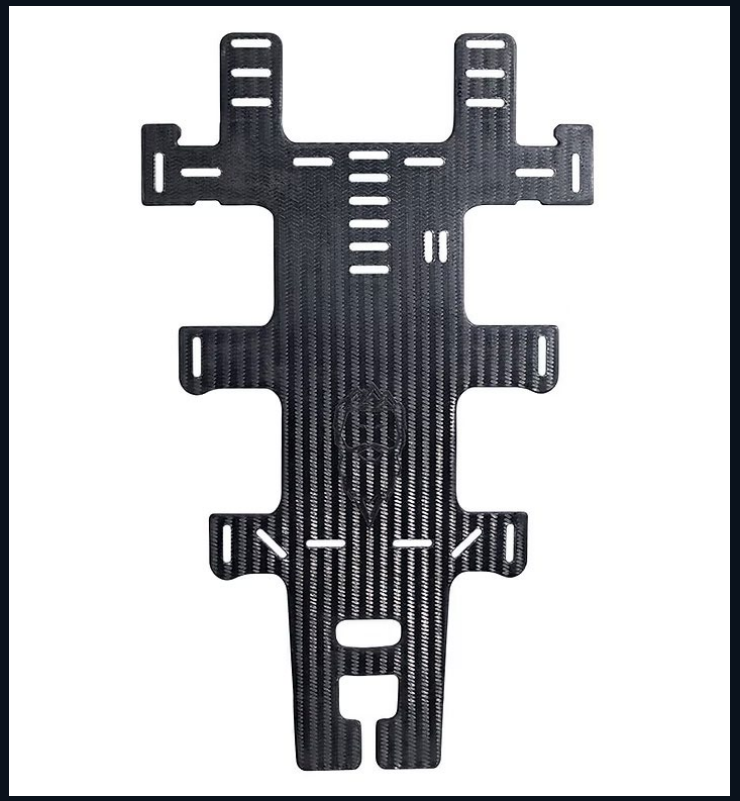
SMC thickness / weight potential

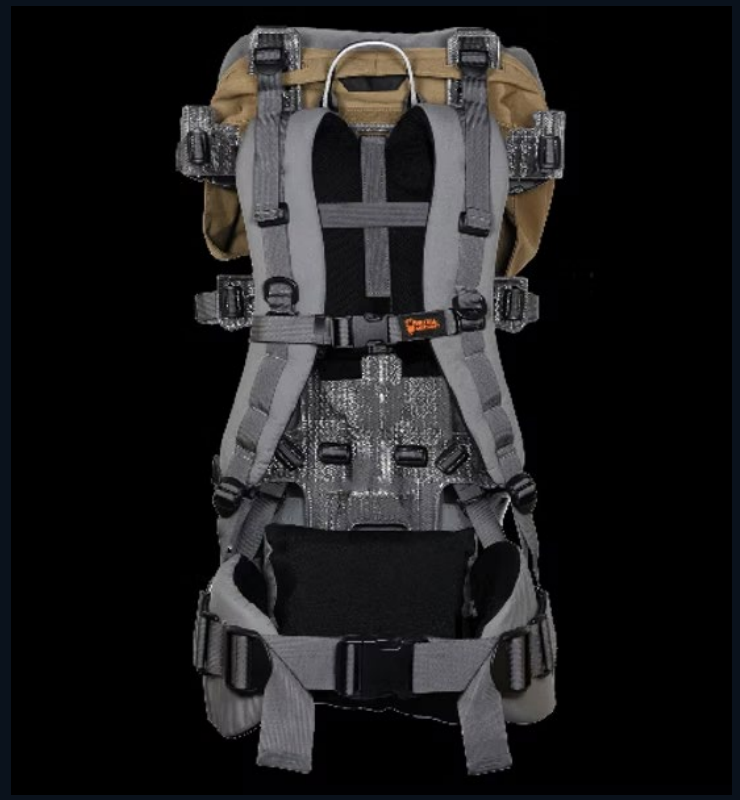
VALUE PROPOSITION

Reduce SMC material while retaining targeted continuous-fiber reinforcement—and consolidate in a single molding operation.

Comingled thermoplastic preforms: a flexible path to net-shape parts

Fiber and matrix fibers are combined into a placement-ready architecture for press molding and high-throughput structures.





MATERIAL FLEXIBILITY

Carbon or fiberglass reinforcement with matrix fibers including PA6, PP, bio-based PA11/PA12, recycled PET and PEEK.

NET-SHAPE PRESS MOLDING

The source examples show reduced post-machining and lower waste versus conventional approaches.

Representative applications in source deck: backpack frame • cane arm

Engineering freedom is the product.

TFP is not a fixed laminate. It is a programmable fiber architecture.

SELECTIVE PLACEMENT

Reinforcement can be concentrated in load-critical zones.

THICKNESS VARIATION

Build local thickness where structure requires it.

CURVILINEAR PATHS

Continuous fibers can follow complex geometry and load paths.

STITCH + CARRIER DESIGN

Stitch density and carrier features can be engineered around the application.

PART GEOMETRY ⇨ NEAR NET PREFORM DESIGN ⇨ MOLDED PART

What changes on the factory floor

The value is measurable at the work-center level: fewer touch operations, less scrap, simpler kitting and more repeatable reinforcement.

OPERATIONS

Move fiber placement upstream and present the mold cell with a repeatable reinforcement package.

Preform as a controlled input

PURCHASING

Reduce dependence on broad-area ply kits and the waste / handling associated with conventional cut-ply processes.

Buy fiber architecture—not excess laminate

QUALITY

The source deck reports improved repeatability in selected preform applications and continuous fiber retained around holes.

Repeatable placement

SOURCE-DECK BENCHMARKS

20% → <1%

waste example

20 h → 1.5 h

layup example

150%

capacity increase example

A practical path from candidate part to production

Start with a focused opportunity, prove value in the actual process, then scale.

IDENTIFY 01

Part + current process + pain point

GAP ANALYSIS 02

Material, geometry, cycle and volume

SAMPLE 03

Initial preforms in ~4–6 weeks depending on material requirements

TEST 04

Run the preform in the intended manufacturing process

VALIDATE 05

Compare labor, waste, cycle, quality and performance

SCALE 06

Finalize design → firm quote → PO → production

Best first candidates: high-touch ply layups • high scrap • local reinforcement needs • short molding cycles • high-rate production

Where NextGen can add value at Anduril

Three archetypes to screen with Engineering, Purchasing and Operations.

01 STRUCTURAL PREFORMS

Cones, hoops, stiffeners, spars, skins and other structures where continuous fiber can replace broad-area cut-ply stacks.

Look for: high ply count • labor-heavy layup • waste • local load paths.

02 STFP + SMC

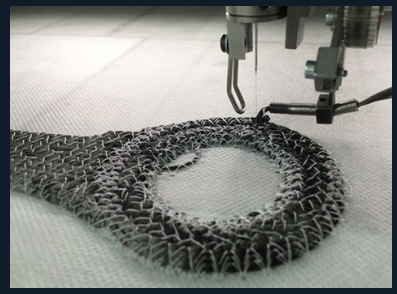
Use continuous-fiber reinforcement to upgrade targeted SMC structures while preserving the speed of a press-molded process.

Look for: SMC thickness / weight pressure • localized performance requirements • 8–10 minute cycle opportunities.

03 THERMOPLASTIC

Comingled thermoplastic preforms for lightweight, net-shape press-molded structures and simplified secondary operations.

Look for: high-rate press molding • post-machining • scrap • thermoplastic material strategy.



Recommended workshop: select 2–3 candidate parts and build a side-by-side TFP / thermoplastic / co-cure manufacturing and cost case.

NEXT STEP

Bring us a part that is expensive to build.

We will map the current process, identify where engineered fiber placement can remove work, and define a validation path.

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ENGINEERED FIBER PLACEMENT FOR HIGH-PERFORMANCE COMPOSITES