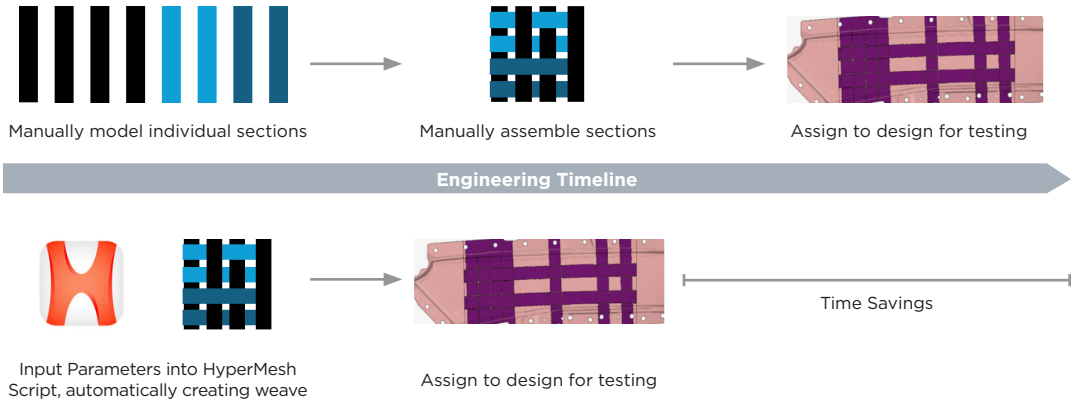
PUSHING MATERIAL DESIGN LIMITS

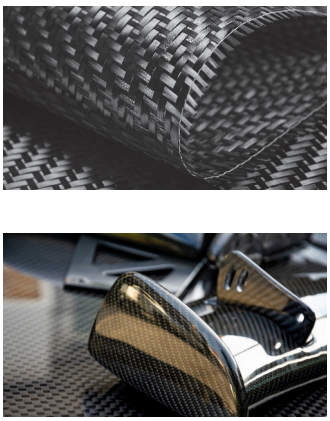
WEAV3D USES ALTAIR® HYPERMESH® TO AUTOMATE SIMULATION WORKFLOW

About the Customer

Headquartered in Norcross, GA., WEAV3D specializes in the development of advanced composite materials and manufacturing processes, especially in composite lattice structures. Their innovative technology, known as “Rebar for Plastics,” integrates woven composite lattices with traditional manufacturing methods like thermoforming, compression molding, and injection overmolding. The goal is to make incorporating composite designs for the automotive, construction, and transportation industries more efficient and cost effective.

> WEAV3D selected HyperMesh because of its broad capabilities and Altair’s support in developing new workflows and optimization tools to accurately simulate the performance of our novel Rebar for Plastics® reinforcements. Altair’s collaborative approach and the flexibility of its HyperWorks platform helped us truly push the limits of material design.
>
> Christopher Oberste, President, WEAV3D





LEFT: Comparison of process with timeline **RIGHT:** Composite material examples

Their Challenge

Composite materials help engineers create lighter, stronger, more innovative designs. However, it can be challenging to understand how composite materials behave. This is because their properties depend on direction (anisotropic properties), are made from a mix of different materials, and require more complex models to simulate accurately. As such, engineering goods that incorporate these materials at scale can be complex and labor-intensive.

Typically, engineers use finite element analysis (FEA) technology to simulate and test advanced materials for structural applications. Since composite materials are heterogenous anisotropic materials, it can be difficult to simulate how they'll handle loads and stresses. WEAV3D's Rebar for Plastics® process adds another layer of complexity beyond traditional composites because the layout and orientation of its composite lattice structures – made from thermoplastic unidirectional tapes – can be adjusted to optimize for each design requirement.

With traditional FEA tools, modeling WEAV3D lattice structures is an extremely labor- and time-intensive process, requiring engineers to perform numerous manual steps. WEAV3D desired a solution to minimize the time, effort, and cost of this manual process.

Our Solution

To meet their goals, WEAV3D partnered with Altair and TrueInsight, an Altair channel partner. Using Altair® HyperMesh® – part of the Altair® HyperWorks® design and simulation platform – WEAV3D developed a process to generate composite lattice structure models efficiently by adding the lattice parameters into an input file and importing that file into HyperMesh. This allowed WEAV3D to create models in a fraction of the time it took to model composite lattice structures manually.

This enhanced modeling process equipped WEAV3D with a repeatable workflow to test and simulate unique Rebar for Plastics® optimal designs to meet structural requirements. Thanks to HyperMesh, users no longer need to follow a manual process to accurately simulate composite lattice structure designs. Moreover, users can now run their analyses much earlier in the design cycle.

This integration allows users to input customizable dimensions for the lattice, panel definitions, and orthotropic material properties to create a more accurate, ready-to-analyze representations which can be used in structural design optimizations within Altair® OptiStruct®, a finite element solver for structural analysis and optimization. Users can adjust tape parameters (such as type and spacing) for each iteration, convert these settings into WEAV3D definitions, and apply them to the panels.

Results

HyperMesh empowered WEAV3D to develop new workflows and optimization tools to better simulate the performance of its Rebar for Plastics® lattice which acts as a reinforcement within a molded plastic component. Most notably, this new process helped WEAV3D users slash costs by up to 87% and has become an integral part of the simulation and design life cycle. Thanks to this time and cost savings, the WEAV3D process became much more efficient, driving competitive advantages in an ever more intense global landscape.

COST REDUCTION UP TO

87%

TIME REDUCTION OVER

50%

TRUEINSIGHT

ALTAIR CHANNEL PARTNER

To learn more about Altair software solutions, please visit us at: www.trueinsight.io