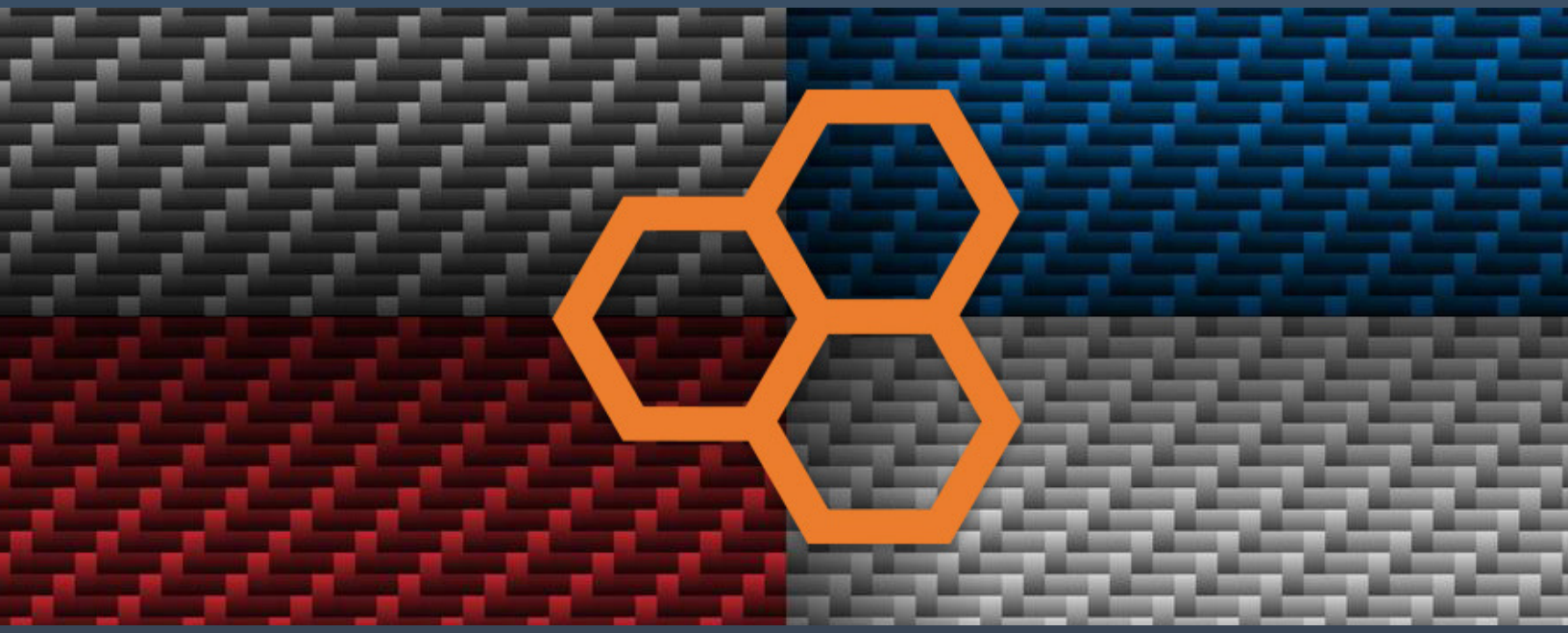
COMPOSITE ENVISIONS KNOWLEDGE HUB
PRACTICAL AND INSIGHTFUL COMPOSITES INFORMATION



KITTING CLOTH & YOUR LAYUP PROCESS

COMPOSITE ENVISIONS

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INTRODUCTION

When it comes to layup processes, attention to each in every minuscule detail can make the difference in a scrap / defective part and one of nearly complete perfection. However, it seems that nothing in the process of layup is ever quick and easy. Between tool maintenance / cleaning, ply cut, resin prep, gel coat application, surface plys, resin mixing, bagging schemes, oven setups...you get it, composite fabrication is time consuming on even the simplest parts. To become more effective in layup, nothing can replace experience and practice. However, everyone must start somewhere. Below is a guide for all experience levels, techniques that can be put in place that will alleviate many of the time heavy tasks and placing the focus on the layup itself.

PLANNING & PRACTICE

Having a plan before layup alleviates possible issues during any process. While the exact details vary for each layup process, the following details should be known ahead of even prepping a tool for layup.

- Ply Order & Orientation
- Resin Needed, Estimated Amount and Working Time
- Layup Tools Needed

BAGGING PROCESS DETAILS

To aid in planning, check out Composite Envisions Printable Ply Table. This Ply Table template can be modified to fit all layup processes according to any parts need. Filling this sheet out ahead of time will aid in making sure each ply is planned, cut, and laid out accordingly.

ORGANIZATION OF WORKSPACE

To ensure efficient layups, all tools related to layup should be accounted for and placed for easy access during fabrication. This will ensure needed tools available right away and one is not stuck backtracking looking for scissors, bagging tape, gloves, heat gun, etc while resin may be possibly setting up.

INDUSTRIAL PRACTICES

In many industrial composite practices, Plys may be pre-cut on a Gerber Table, which optimizes ply utilization and saves the most time for a layup process. A Gerber table is

roughly a CNC machine, just instead of a milling or drill bit, there is a razor blade or rolling knife used to cut plys. Plys are cut in tight tolerances according to the shapes or files generated by various ply cut software used. As useful as they are, Gerber Tables are rather expensive and require a lot of setup time / fine tuning to run optimally. Many small-scale fabricators may not have quick access to one. Luckily, a good pair of composite scissors will cut through even the toughest fabrics and still provide the fabricator with an effective process going into layup.

PLYCUT & KITTING

One of the most helpful processes for layup is ply-cut and kitting. Plys are cut and then "kitted" according to the layup sequences needed. Kitting is a process of putting each cut ply in order of material and/or that plys' placement within the specific layup. Completing these two steps ahead of layup will save time help, keep order, and place focus on the layup process's details.

If cutting by hand, ply shapes should at least be a rough figure of the shapes they will be conforming to in the tool. To optimize Ply Shapes and Ply Cutting operations, reference the "Making Cutting Templates for Molds" writeup. This writeup details the processes behind creating quick and easy ply templates for mold surfaces. It should also be noted that when the cut plys do go into layup, the less cutting and working the plys go through, the quicker the layup will be, and the quality reflected in the part will be higher.

Once cut, each ply may be labeled with a number and the ply orientation as needed. This may be done by physically marking the ply or placing a sticker on the ply. A White Pentel 100WS will mark dark fabrics well for identification and labeling but clean it off with IPA on the surface ply(s). (It will show on the cured part surface) Once plys are marked accordingly, place them in an ordered stack or lay each of them out as the shapes allow for quick availability in the layup process. Once in layup, be sure to remove the stickers. They don't always bond well inside the laminated part.

Ply cut and Kitting may occur well ahead of time vs the layup. (days or even weeks) For that reason, plys are often cut and then stored for later use. Depending on the size of the plys or number of plys in the layup, cut plys can be placed into bag(s), sealed off, and stored as needed. Larger plys may be placed on a roll and bagged to ensure quality during the storage time. It is important to keep stored plys flat to mitigate any handling damage and to ensure ply quality. It is best practice to place stored kits in a designated area that clean away from heavy traffic areas. Once plys are needed for the layup, simply grab the needed bag and / or roll and layout the plys as needed.

BAGGING

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Bagging schemes may vary heavily from a layup or tooling perspective just as much as a curing technique. However, the kitting concept and initial setup for ply prep can be applied to bagging schemes. Items such as (but limited to) breather, sealing tape, vacuum sources, bagging film, separating film, intensifiers all can be identified and mocked up ahead of layup. It may not be an exact science with an empty tool, but one should have a good idea of the supplies needed.

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