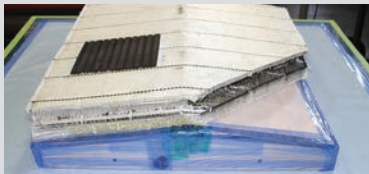
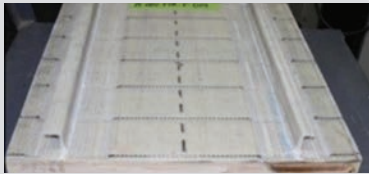


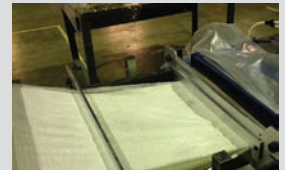
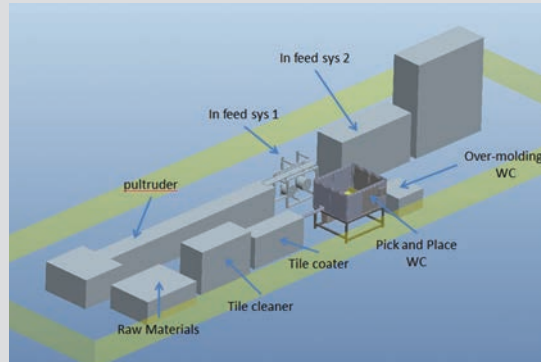
Automated Armor Manufacturing

OBJECTIVE/SOLUTION:

Develop an improved manufacturing process for both 2-dimensional weave, and 3-dimensional weave ceramic composite armors, with the goal of reducing production cost and increasing throughput.



VARTM manufacturing process for 3D armor



Pultrusion manufacturing process for 2D armor



Stryker, ASV, Bradley & JLTV

Achievements:

- Developed small scale pultrusion process for laminates up to 2 inches thick
- Currently incorporating ceramic tiles to create an asymmetric cross section.
- Leveraged ARL's build-to-print equipment to allow for automated tile preparation. Tile prep station currently feeds into pick and place robot.
- Fabricated over-molding station that will prepare tile assemblies for the infeed system
- Developed model to predict resin curing profile inside the pultruder die
- Conducted resin and resin flow analyses that will help generate system parameters, to increase throughput of both pultrusion and VARTM (vacuum assisted resin transfer molding) processes

Benefits:

- Approximately 45% cost reduction for 2D ceramic composite armor
- A production ready 3D TTR (through-thickness reinforcement) process resulting in a net shape part, including integration provisions, that is ready to be attached to the platform
- Cost effective, and consistent production process for 3D TTR armor

Transition and Weapon Systems/Secondary Items Impacted:

- Applicable to all systems with B-kit armor packages. Including Bradley, Stryker, Armored Security Vehicle (ASV).

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