

# Materials Development and Manufacturing Capabilities



*Department of Materials Science & Engineering  
The University of Alabama at Birmingham, Alabama  
& National Composites Center (NCC), Ohio*

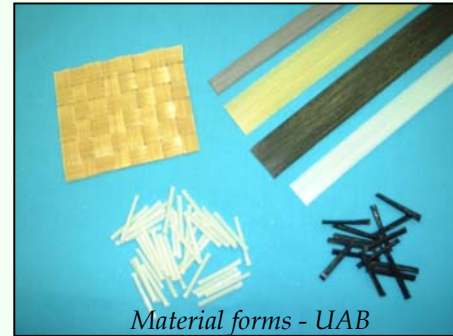
*The University of Alabama at Birmingham (UAB) is pursuing innovative materials development and manufacturing of advanced materials in collaboration with the National Composites Center (NCC), Kettering, Ohio.. This activity is supported by a number of ongoing collaborative research efforts.*

## Material Forms for Thermoplastic Composites



Hot Melt Impregnation line - UAB

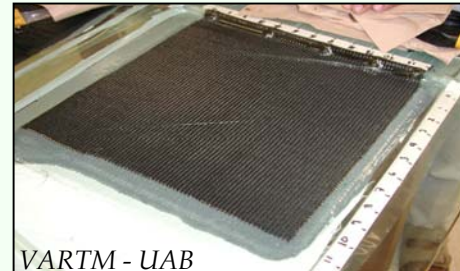
*For the manufacturing of hot-melt impregnated long fiber pellets, tape, rod and woven fabric using thermoplastic resins such as PA, TPU, PP, PE, PPS, and advanced fibers such as: E-glass, S-glass, carbon, and aramid fibers. The dies can be configured to produce various shapes and profiles.*



Material forms - UAB

## Vacuum Assisted Resin Transfer Molding (VARTM)

*Equipment and setup available for fabricating composite plates up to 1.85m<sup>2</sup> in size from both thermoplastic (reactive) and thermoset resins systems. Hands on trained personnel with experience in liquid closed molding for civil, army, marine and aerospace applications*



VARTM - UAB

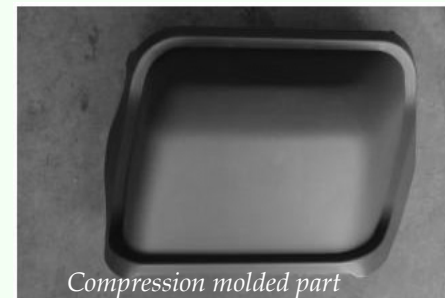
Thermoforming machine-UAB



## Sheet Thermoforming

*MAAC - ASP for thermoforming of polymeric sheets*

- Sheets up to 810 mm x 965 mm
- Air pressure, plug assist
- Maximum forming depth 200 mm
- Maximum sheet thickness 12 mm
- Up to six preprogrammed features



Compression molded part

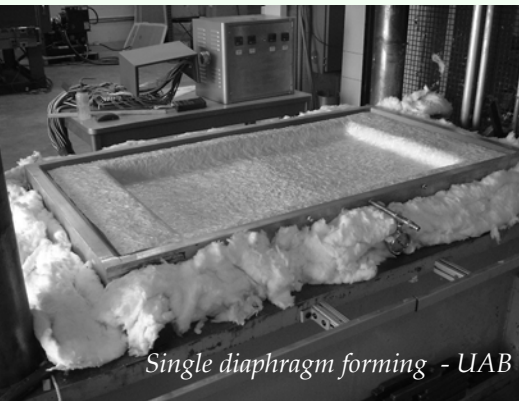
## Extrusion-Compression Molding

*Extrusion-compression molding of thermoplastic composite parts including long fiber reinforced plastics:*

- Mixed recycled plastics
- 150 mm plasticator
- 400 Ton compression molding press
- Additives, glass and neat resins



Extrusion-Compression molding - NCC

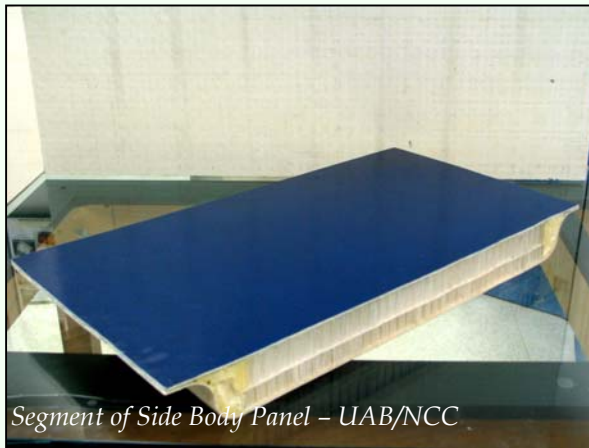


Single diaphragm forming - UAB

## Single Diaphragm Forming

Equipment for the molding of thermoplastic matrix composites using vacuum pressure, overpressure, and temperature

## Representative Thermoplastic Parts Developed by UAB/NCC



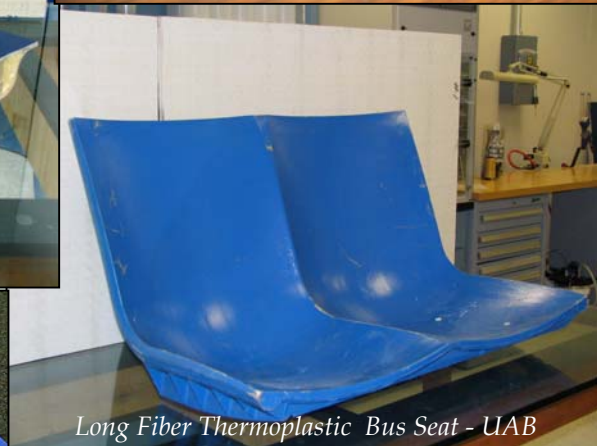
Segment of Side Body Panel - UAB/NCC



Segment of Bus Frame Structure - UAB



Army application - UAB/NCC



Long Fiber Thermoplastic Bus Seat - UAB

The UAB-NCC team has successfully developed thermoplastic products for mass transit and army applications. Examples include - two-passenger glass/polypropylene long fiber thermoplastic bus seat, segments of body and frame structure using carbon & glass/polypropylene & PPS, bus floor segment using woven glass/polypropylene and VARTM nylon systems.

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