

# Cincinnati VIPER® Fiber Placement Systems Automated Composites Processing



The Cincinnati VIPER fiber placement systems are the most versatile and advanced composites manufacturing equipment in production today

The VIPER platform of machines combines the advantages of tape laying and filament winding with advanced computer control and software to achieve unmatched production capabilities for a wide variety of complex composites parts. Offered in a variety of sizes and configurations, the VIPER 1200, 4000, 6000.

- Segmented Compaction Roller offers superior compaction on core and tight radii contour surface features
- Bi-directional Tensioners located in the creel enclosure maintain precise tension control of each tow as well as monitor the individual pay-out of each
- Re-direct Roller Systems reduces the likelihood of twisted tows by maintaining a flat fiber band
- Individual Tow Cut-Clamp-Restart adds versatility by adjusting the width of the fiber band by adding or cutting individual tows on-the-fly

## Get the VIPER® Advantage

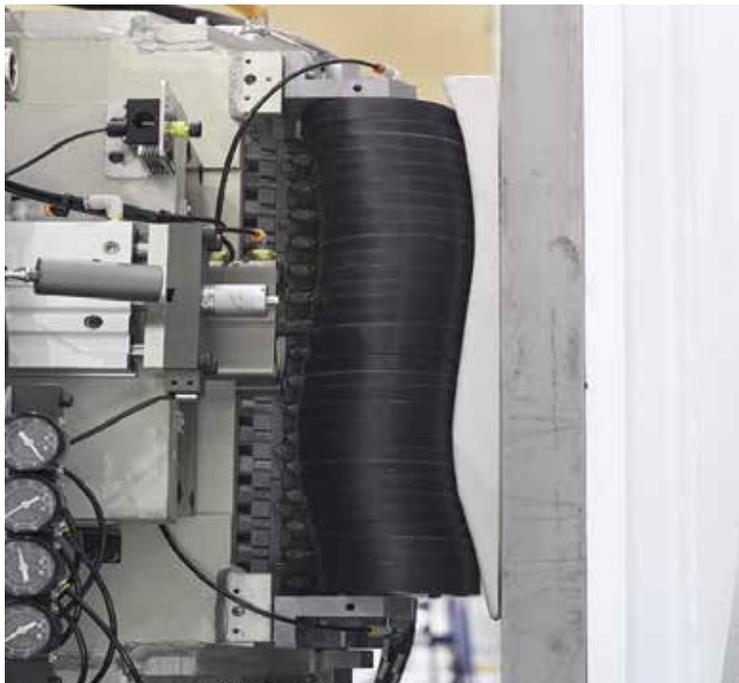
Fiber Placement Systems are designed for dexterity and flexibility for production of wrinkle-free lay-up of convex and concave parts. These highly productive machines are equipped with patented features to produce superior quality while dramatically reducing scrap.

“Cincinnati VIPER Fiber Placement Systems automatically and independently control up to 32 individual tows, or slit tapes, producing a variable bandwidth on-the-fly”

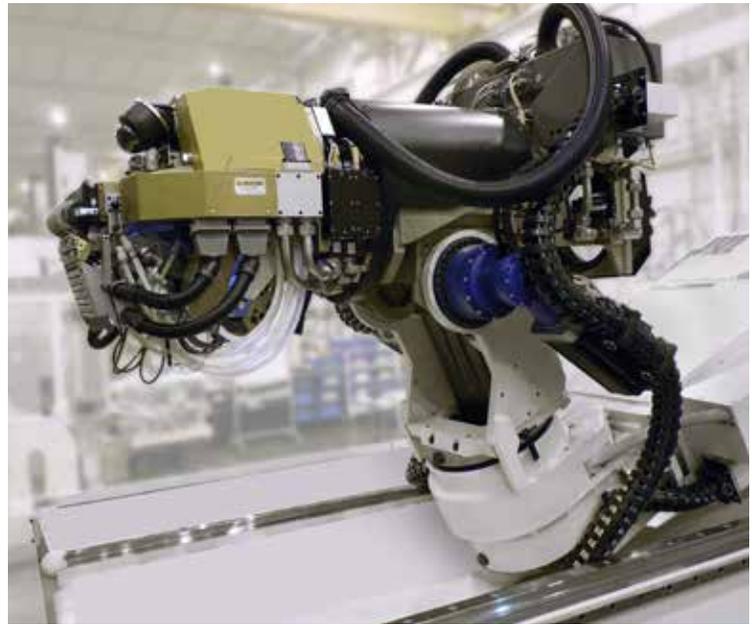
With 7 axes of motion, VIPER Fiber Placement Systems are particularly suited to highly contoured structures. High contour, variable wall thickness, and cut-out sections are all produced to near net configuration which significantly reduces material waste (as low as 2%) in the initial lay-up and post-process machining operations.

The Cincinnati VIPER Fiber Placement Systems automatically and independently control up to 32 individual tows or slit tape producing a variable bandwidth “on-the-fly”. Each tow can be independently dispensed, clamped, cut and restarted during fiber placement. Gaps and overlaps are minimized as the machine precisely lays interior or exterior contoured boundaries.

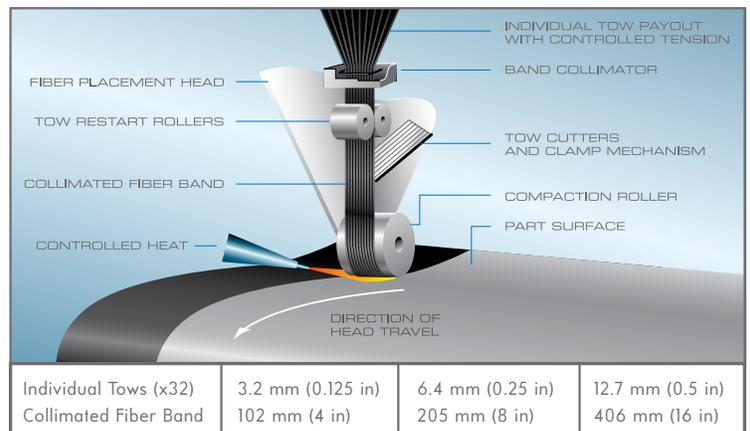
The VIPER’s advanced design delivers other key advantages to automated production including maintaining constant angle on a complex surface, in-process compaction of material and no limits to ply orientations.



Segmented compaction roller



Fiber placement head



### Material Types

- Carbon and Glass Fibers
- Thermoset Epoxies
- BMI
- Dry Fiber
- Out-of-Autoclave

### Material Specifications

Width:	3.175 mm (.125 in), 6.35 mm (.25 in), 12.7 mm (.5 in)
Thickness Uncured:	.152 to .254 mm (.006 in to 0.010 in)
Core Inside Diameter:	74.67 to 82.55 mm ( 2.94 in to 3.25 in) or 150.87 to 158 mm (5.94 in to 6.25 in)
Core Length:	230 to 406 mm (9 to 16 in)
Diameter of Spool (max):	200 mm (10 in)
Weight of Spool (max):	5 lbs (11.34 kg)

### VIPER® 1200

- Part diameters up to 2 m (80 in)
- 12 tows; 3.2, 4.0, 6.4 mm (0.125, 0.157, 0.25 in)

### VIPER® 4000

- Part diameters up to 6 m (236 in)
- 24 or 32 tows; 3.2 or 6.4 mm (0.125 or 0.25 in)

### VIPER® 6000

- Part diameters up to 8 m (315 in)
- 32 tows; 3.2, 6.4 or 12.7 mm (0.125, 0.25 or 0.5 in)

### The Cut, Clamp, Restart (CCR)

The Cut, Clamp, Restart (CCR) docking system can automatically exchange one CCR for another CCR that processes the same width material, thus allowing the service of the CCR to occur offline, while the machine continues in production. Benefits include: Improved productivity via reduced out-of-cycle time, Head maintenance/repair is done off-line and minimal interruption of part lay up.



Docking CCR



Cincinnati VIPER 1200



Cincinnati VIPER 4000



Cincinnati VIPER 6000

“With over 130 installations across the globe, we have more tape layers & fiber placement systems in operation than all other suppliers combined”

### Cincinnati GEMINI - Speed and Flexibility

The Cincinnati GEMINI is the first system to provide both a dockable automated tapelayer and fiber placement system, on a single platform. The GEMINI is one control and programming system, a single ram and multiple interchangeable heads.

### Cincinnati GEMINI Advantages:

- Provides flexibility to process a wider array of parts
- Eliminates parasitic time for material loading
- Flexible platform to improve in-cycle time and material usage
- Utilizes ACES® Offline Programming System
- Minimal capital investment will maximize profits with one machine platform for multiple processes



Cincinnati GEMINI

### VIPER® Applications:

VIPER® Fiber Placement Systems deliver proven fuselage production capabilities from the smallest business jet to the world's largest commercial aircraft. Beechcraft's Premier 1 Business Jet is made of two 360° fuselage sections produced on a VIPER® Fiber Placement System. The composite fuselage design is 20% lighter than aluminum and reduces the number of parts from the original 3000 to two.

### Other VIPER Applications

- Wing skins
- Nacelles
- Inlet ducts
- Launch vehicle components



### CM100 Control

Cincinnati's CM100 Control is the only control designed specifically for automated composites processing. This powerful, yet easy-to-use control features an open-architecture design powered by the latest industrial processor technology and digital servo drives to deliver fast, smooth and accurate machine motion. It is a PC-based with Windows® operating system, CE Mark compliant and does not require a front-end PC

### ACES® - Advanced Composites Environment Suite

ACES is our proprietary programming and simulation software tool for tape laying and fiber placement.

- Simulation capabilities to prove part design and exhaust machine capabilities
- Sophisticated coverage analysis
- Compatible with CATIA V4 and V5, CATIA CWB/CD3 and FiberSIM
- Provides a variety of path generation types
- Multi-core processor support improves throughput x 8



Airbus A380 fuselage



Beechcraft Premier 1 fuselage



V-22 Osprey aft fuselage



**fives** ultimate machines  
ultimate factory

### Contact Us:

**Fives Machining Systems, Inc**  
2200 Litton Lane  
Hebron, KY 41048

T: +1 859 534 4600  
fivesmsi-sales@fivesgroup.com  
www.fivesmsi.com