A World Class leader in Aerospace Composites

An Affiliate of

CRD AEROSPACE

2003

NORTHWEST COMPOSITES

Capacity and Capability

NORTHWEST COMPOSITES

2003

NORTHWEST COMPOSITES

C&D Aerospace – The Partners

Jim Downey *(CEO)*

Clark Valentine *(Chief Industrial Designer)*

Joe Moran *(President)*

C&D Aerospace is a privately held company founded in 1972 by James E. Downey supplying aircraft interior products for 31 years to airframe manufacturers and the world's airlines.

NWC's Relationship with C&D: Common ownership (Partners). NWC is non-dependant on C&D, but both companies utilize resources from one another as needed.

NORTHWEST COMPOSITES

C&D Aerospace – The Growth

All growth has been achieved through retained earnings – *no acquisitions.*

Sales Growth

1999 = 150 M

2000 = 400 M

2001 = 450 M

2002 = 350 M

The C&D family encompasses 16 facilities with over 2500 employees throughout Southern California, Seattle, Europe, Mexico, South America & Canada.

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NORTHWEST COMPOSITES

Overview

James E. Downey
CEO

Joseph Moran
President

Owners/Partners

Clark Valentine
Chief Industrial Designer

C&D Aerospace	Aerocell	Northwest Composites	Plasthec	4 Flight	Aerodesign	C&D Europe
OEM Interiors BFE/SFE Products	Honeycomb & Prepreg Manufacturer	Advanced Composites OEM Interiors	Injection Molded Components	Seats	Sub-Assembly for C&D Aerospace	Airbus Product Support BFE/SFE Products

B737
- Fortified Cockpit Door

B757
- Bin Extension Kits
- Fixed Leading Edge
- Fixed Trailing Edge
- Fortified Cockpit Door

B767
- Complete New Look Interior
- Classic O/B Bins

B777
- Door Bustles & Flight Deck Panels

C-17
- Main Landing Gear Pod

ERJ 135/140/145
- Sidewalls

ERJ 170/190
- Complete Interior

GLOBAL EXPRESS
- Cargo Bay

GLOBAL 5000
- Interior Liners
- Pull Out Table
- Cargo Bay

NORTHWEST COMPOSITES

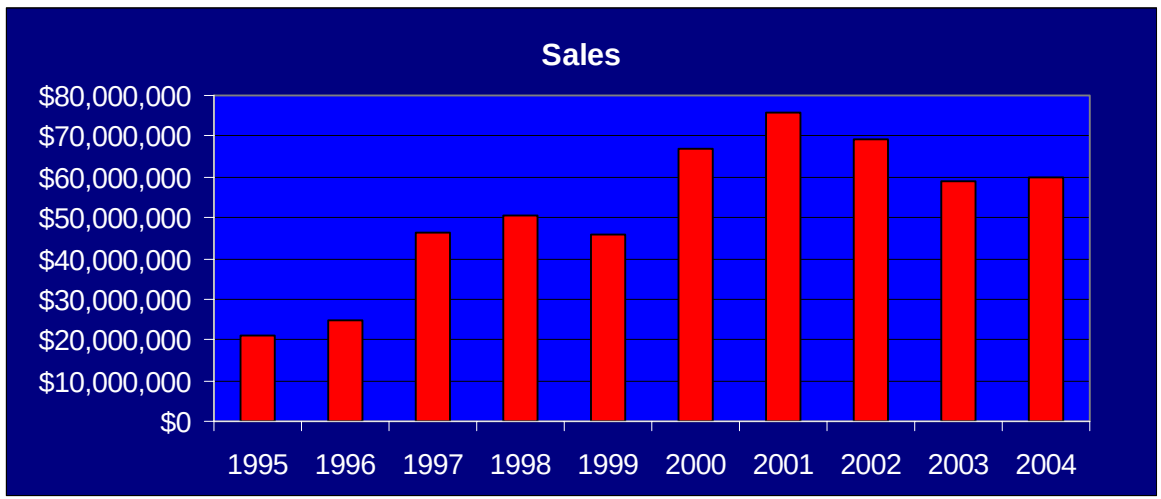
NWC Overview

- Established 1987
- Expand the successful composite technology gained through the supply of interiors into more advanced composite components.
- Privately Held Company
  Non-Union

2003

NWC Overview

- 100% Aerospace
- 235,000 Square Feet of Manufacturing
- 2004 - $60 M Projected Sales
  - 2003 - $59 M Annual Sales
  - 2002 - $69 M Annual Sales
  - 2001 - $76 M Annual Sales



NORTHWEST COMPOSITES

NWC Overview

- 2004 – 430 Employees
  - 2003 - 410 Employees
  - 2002 - 380 Employees
  - 2001 - 510 Employees
- Large Growth Potential
  - Less than 50% Unutilized Capacity

NORTHWEST COMPOSITES

Customer Make Up

- The Boeing Company
  - Everett, Renton, Wichita, Philadelphia, Winnipeg, and St. Louis
- Northrop Grumman
- BAE Systems
- Goodrich Landing Gear
- American Airlines

NORTHWEST COMPOSITES

Customer Make Up

- Delta Airlines
- Bombardier
  - DeHavilland
  - Canadair
- Northwest Airlines
- Embraer
- Gulfstream

NORTHWEST COMPOSITES

Customer Make Up

- Alenia Aeronautica

- Heroux- Dev Tek

- Vought

NORTHWEST COMPOSITES

Major Programs
Autoclaves

2003

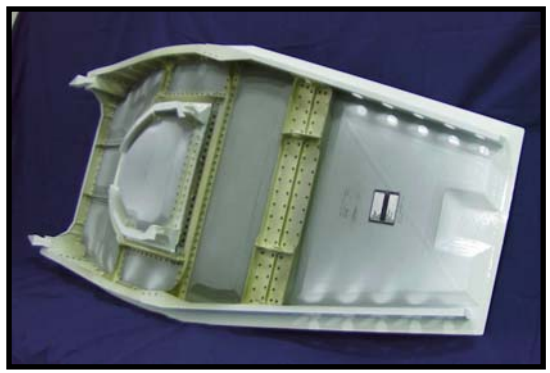
NORTHWEST COMPOSITES

Major Autoclave Programs
C-17 MLGP

C-17 Main Landing Gear Pods & Strut Doors

83 End Item Panels with Hardware

BOEING



2003

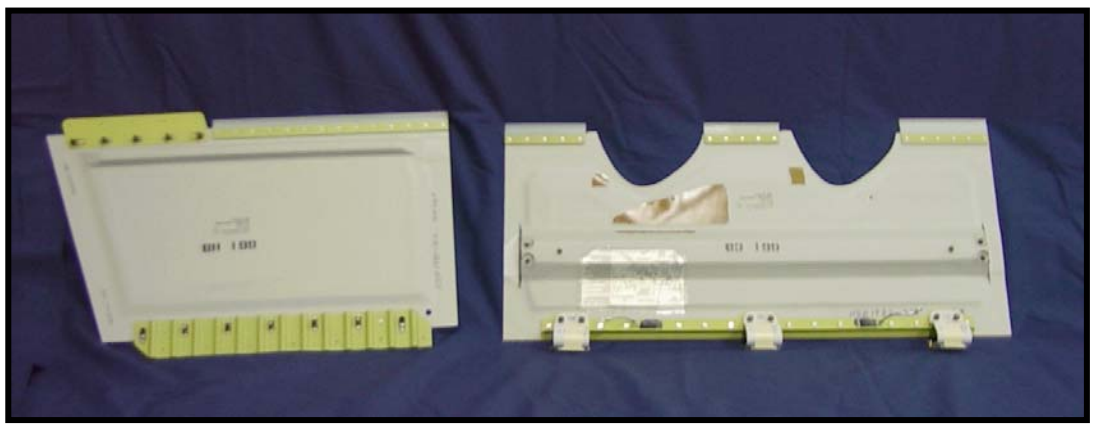
NORTHWEST COMPOSITES

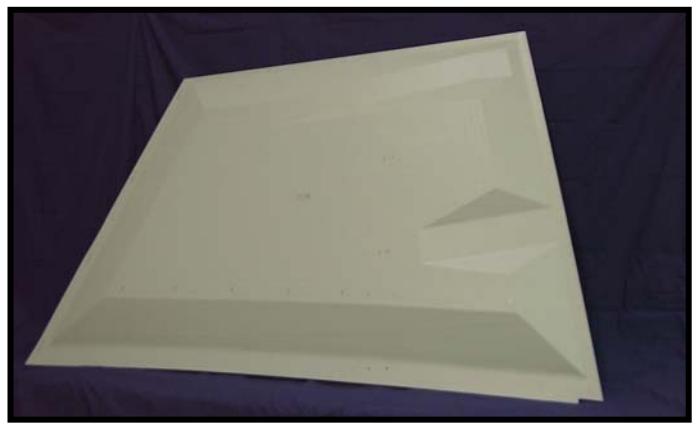
Major Autoclave Programs

757 Fixed Leading Edge & Trailing Edge

86 End Item Composite Panels with Assembly

BOEING





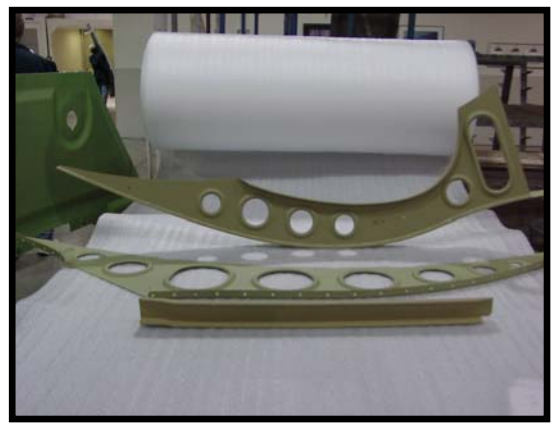
2003

NORTHWEST COMPOSITES

Major Autoclave Programs
MD 80/MD 90

MD 80, MD 90 WTBF & Metal Formers

BOEING



2003

NORTHWEST COMPOSITES

Major Autoclave Programs
737 Components

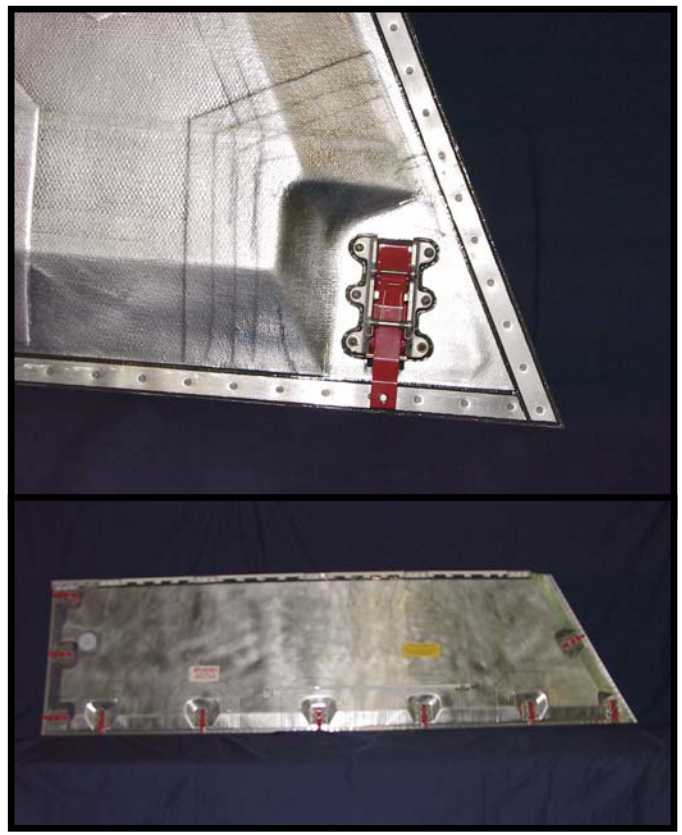
Landing Gear Doors

Air Conditioning Doors

Under Wing Panels

Dorsal Fin

BOEING



2003

NORTHWEST COMPOSITES

Major Autoclave Programs
JSF X-35 / 757 APU Inlet Ducts

NORTHROP GRUMMAN

Joint Strike Fighter X-35

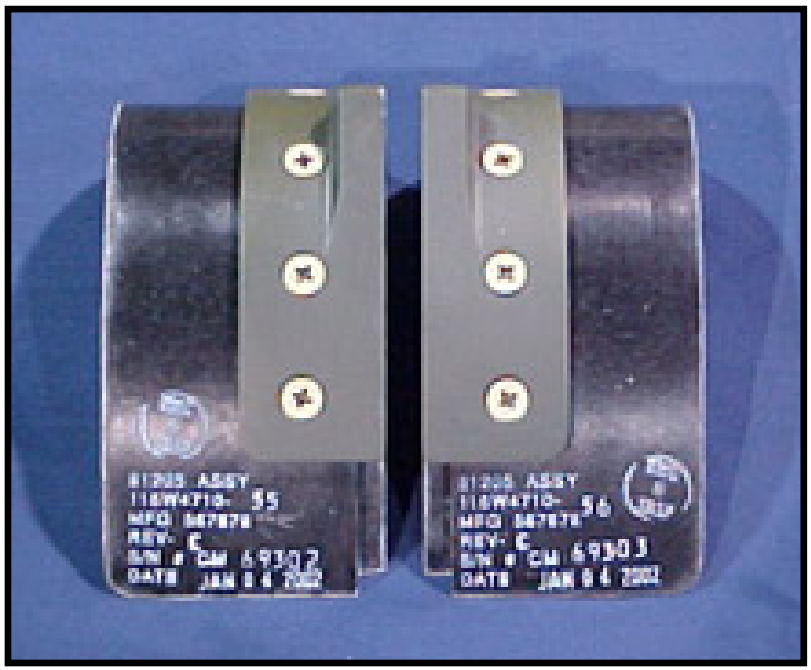
757 APU Inlet Ducts

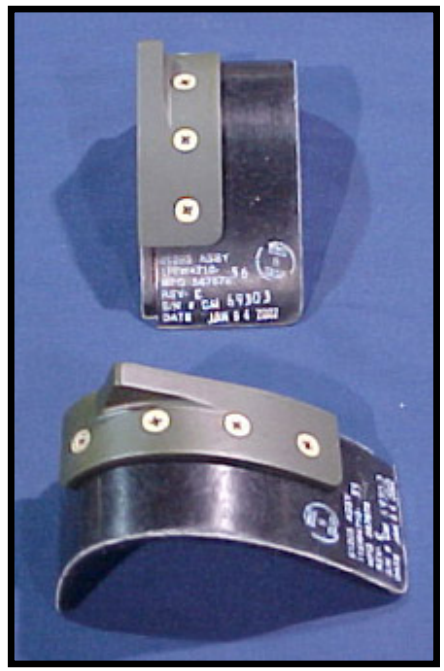
2003

NORTHWEST COMPOSITES

BAE SYSTEMS
777 Track Fairing Assemblies

48 End Item Compression Molded Assemblies





2003

NORTHWEST COMPOSITES

Major Programs
Interiors

- 767 NLI – New Look Interior

NORTHWEST COMPOSITES

Major Interior Programs
767 NLI

BOEING

Full Interior

- Outboard Stowbins
- Inboard Stowbins
- Sidewalls
- Ceiling Panels
- Air Grilles
- Doorway Linings
- PSU's
- Main Cabin Lighting

NWC: Design/Certify/Build

NORTHWEST COMPOSITES

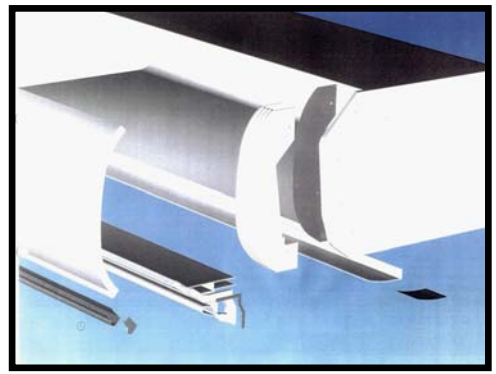
Major Interior Programs

American Airlines Bin Extension Kit

Retrofitted Entire Narrow Bodied Fleet

260 - MD 80

130 - 757



2003

NORTHWEST COMPOSITES

Major Interior Programs
Embraer 170/190

Design/Certify/Build

EMBRAER

Full Up Interior

and

Integrated Systems

2003

NORTHWEST COMPOSITES

Major Interior Programs
Embraer 170/190

NWC Responsible For:

Cockpit Doors, Galleys, Closets, Lavatories, Bins, Sidewalls, Door Surrounds, Air grilles, Ceiling Panels, PSU's, Insulation, Baggage Lining, Restrain Nets, Wire Harness and Lighting

Systems Management:

Smoke Detection/Fire Suppression, Water & Waste, Escape Slides

NORTHWEST COMPOSITES

Major Interior Programs
777 Flight Deck & Door Liners

BOEING

2003

Major Interior Programs
Bombardier Global 5000

NORTHWEST COMPOSITES

NWC Start Up Program – January 2002

BOMBARDIER

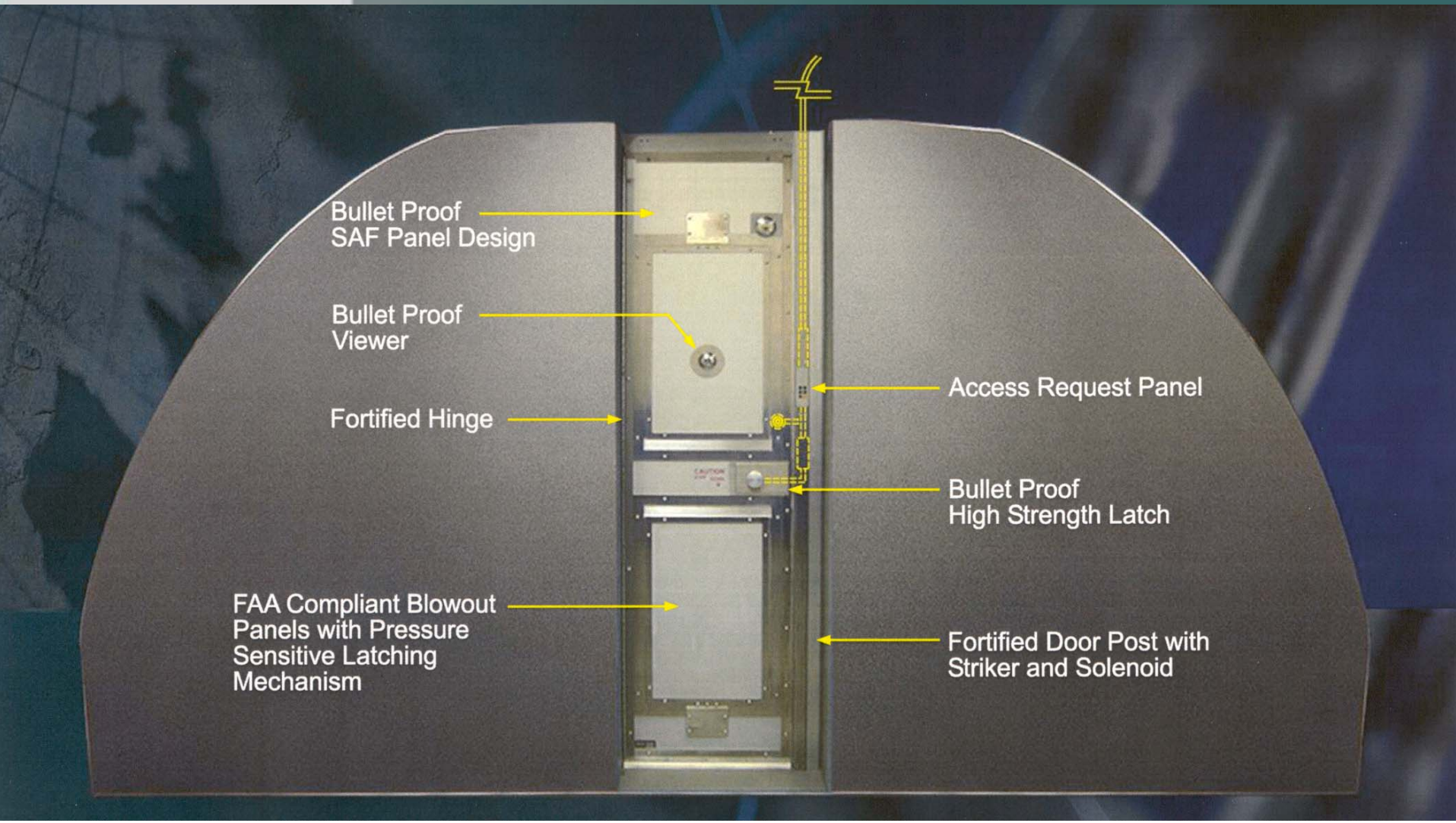
Full Interior

- Ceilings
- Sidewalls
- Dado Panels
- Side Ledge
- Window Reveals
- Cargo Compartment Panels

NWC : Design/Certify/Build

NORTHWEST COMPOSITES

Major Programs
Fortified Ballistic Cockpit Doors



2003

NORTHWEST COMPOSITES

Capability and Capacity

Pre Preg Kit Cutting

(1) 35’ x 72” American GFM

(2) 35’ x 72” Cutting Edge

NORTHWEST COMPOSITES

Capability and Capacity

Hand Lay Up

2003

NORTHWEST COMPOSITES

Capability and Capacity

Autoclaves (Inside Dimensions)

(1) ea 12’ x 45’ 700 degrees, 250 PSI

(3) ea 10’ x 20’ 680 degrees, 220 PSI

(1) ea 6’ x 15’ 550 degrees, 190 PSI

(1) ea 2’ x 4’ 550 degrees, 190 PSI

NORTHWEST COMPOSITES

Capability and Capacity

Oven Cure

(4) ea 550 degree Ovens 9'W x 8'3"H x 20'D

NORTHWEST COMPOSITES

Capability and Capacity

Crushed Core / Compression Molding

(2) 250 T Wabash Press (28”x30” Platten, 24” DL, 24” Stroke)

(1) 400 T W/W Press (36”x38” Platten, 32” DL, 24” Stroke)

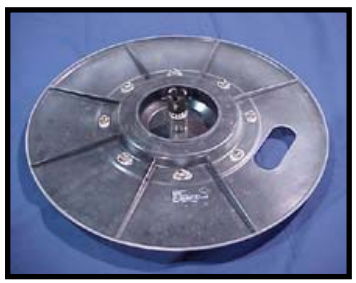
(3) 400 T Wabash Press (48”x72” Platten, 60” DL, 24” Stroke)

(1) 700 T Baldwin Press (70”x106” Platten, 72” DL, 36” Stroke)

(1) 720 T W/W Press (65”x144” Platten, 72” DL, 36” Stroke)

(1) 750 T W/W Press (63”x99” Platten, 72” DL, 36” Stroke)

(1) 300 T Burkle MOP Press (52”x99” Platten, (2) 6” DL)

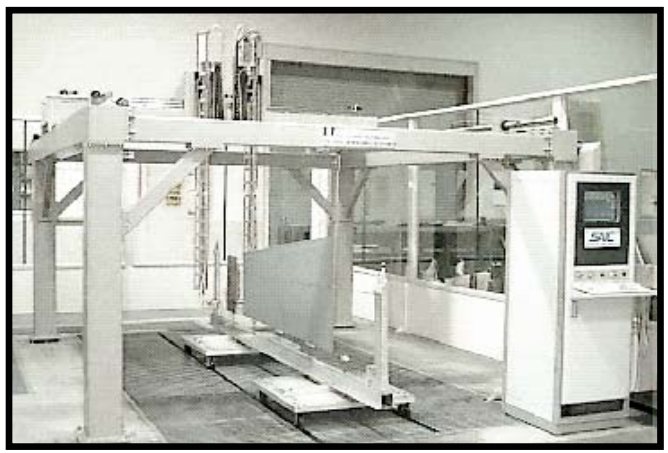


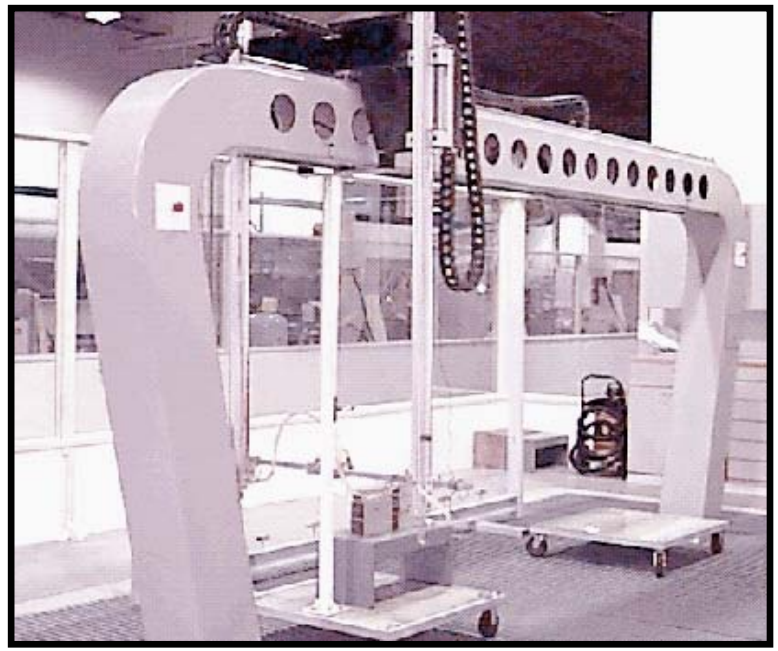
NORTHWEST COMPOSITES

Capability and Capacity

NDT (Non Destructive Testing)

- (1) ea Multi-Axis C-Scan 118” x 58”
- (1) ea 2 Axis C-Scan 107” x 63”
- (1) ea A-Scan
- (1) ea Pulse Echo





NORTHWEST COMPOSITES

Capability and Capacity

CNC Routing

(4) ea 3 Axis Thermwoods 65” x 144” x 12”

(4) ea 5 Axis Thermwoods 65” x 120” x 36”

NORTHWEST COMPOSITES

Capability and Capacity

CNC Machining Center

(1) ea 5 Axis Rambaudi Ramspeed H Mill

177” x 106” x 49” Travel

2003

NORTHWEST COMPOSITES

Sheet Metal & Machining

- (1) Mori Seiki Horizontal CNC Mill
- (2) 3 Axis Cincinnati-Arrow 1500 CNC Mills
- (2) 3 Axis Bridgeport-ZXT CNC Mills
- (1) Bridgeport-EZPATH CNC Lathe

NORTHWEST COMPOSITES

Sheet Metal & Machining

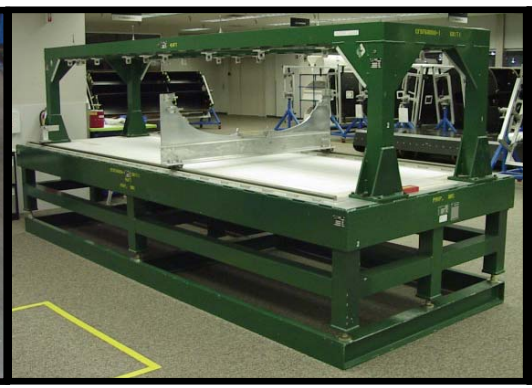
- (1) Strippit 1000XP/20 – 20 Ton/20 Station CNC Turrit Punch
- (1) Diacro 150-10 Hydraulic Press Break – 120" long
- (1) Cincinnati Milacron 1200 Hydraulic Press Break – 60" long

NORTHWEST COMPOSITES

Tooling

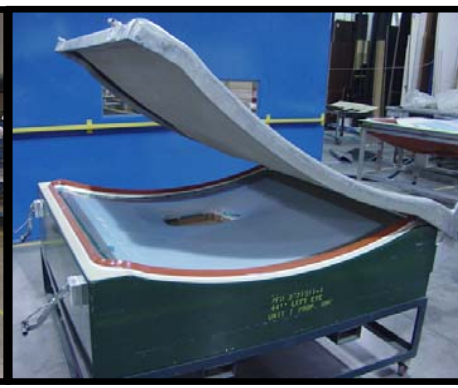
Northwest Composites vast tooling experience and expertise is an invaluable component of our overall capabilities. NWC's tooling capabilities range from simple templates to BMI composite tooling & complex jig & fixtures.

Hi Temp Lay-up Molds



Jig & Fixtures

Bond & Assembly Jigs



Vacuum Form Molds

NORTHWEST COMPOSITES

Tooling

NWC Tooling Capabilities

- Master Models
- High Temp Lay Up Molds
- Vacuum Form Molds
- Matched Metal Dies
- CNC Router Fixtures
- Check Fixtures
- Bonding & Assembly Jigs & Fixtures
- Hand Router Fixtures & Drill Jigs
- Templates

NORTHWEST COMPOSITES

Tooling

- All Tooling Designed and Fabricated In House
- Tool Designs Created in CATIA
- 10 Pattern Makers on Staff
  - All Pattern Makers Rated for Soft Tooling, Hard Tooling and Jig & Fixture Fabrication
  - Average of 18 years experience in high temp epoxy and graphite tool fabrication
  - Theodolite and Laser Tracker Capabilities

NORTHWEST COMPOSITES

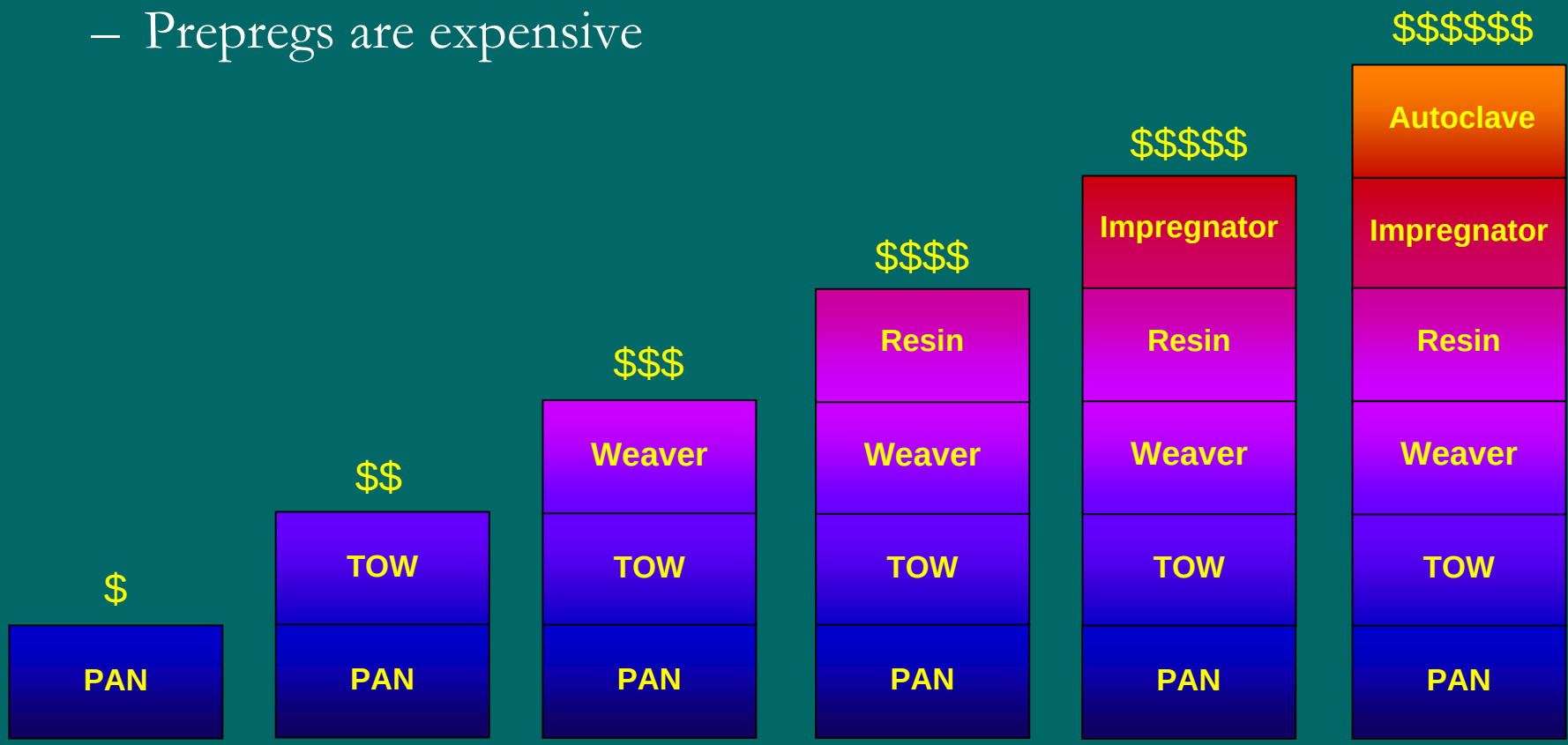
Research & Development

- Strong Commitment to Research and Development of new composite materials and processes
- 5000 Square Feet dedicated R&D area
- Specializing in
  - VARTM (Vacuum Assisted Resin Transfer Molding)

NORTHWEST COMPOSITES

Research & Development
New Materials and Processes

- Raw Material Value Chain
  - Prepregs are expensive



NORTHWEST COMPOSITES

Research & Development
New Materials and Processes

- Current size of parts is limited by industry autoclave size (Larger parts equal less configurations)
- Industry is calling for larger parts

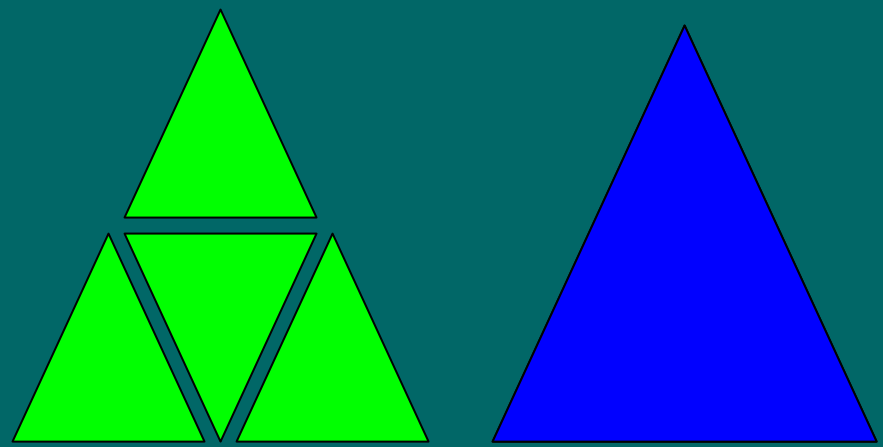
Numerous parts become one

Requires less fasteners

Less Weight

Less Processing

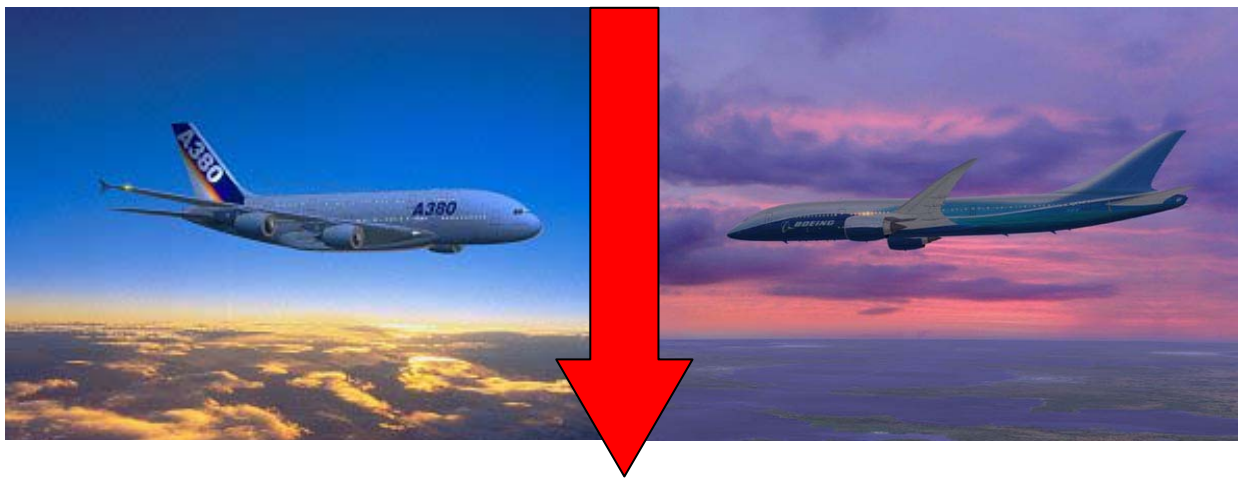
Less Drop Off



NORTHWEST COMPOSITES

Research & Development

- Future programs – Exploring less expensive materials and processing which has been driven by competition (Airbus / Boeing)

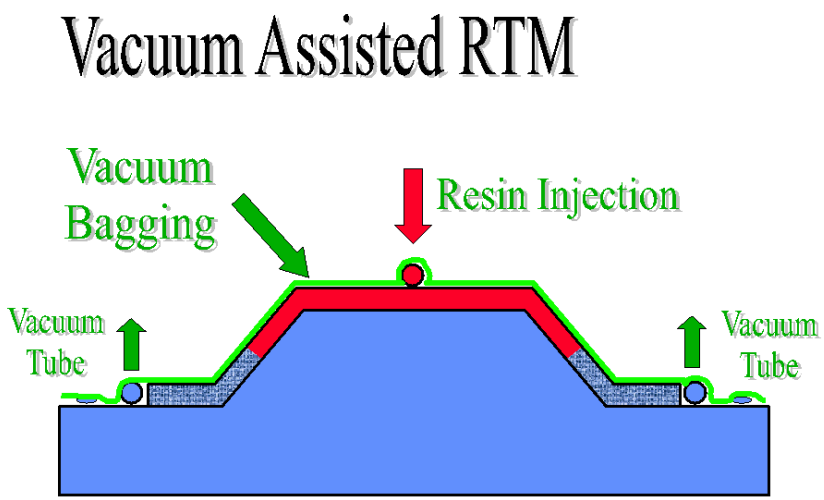


Competition demands lower cost technology

NORTHWEST COMPOSITES

Research & Development

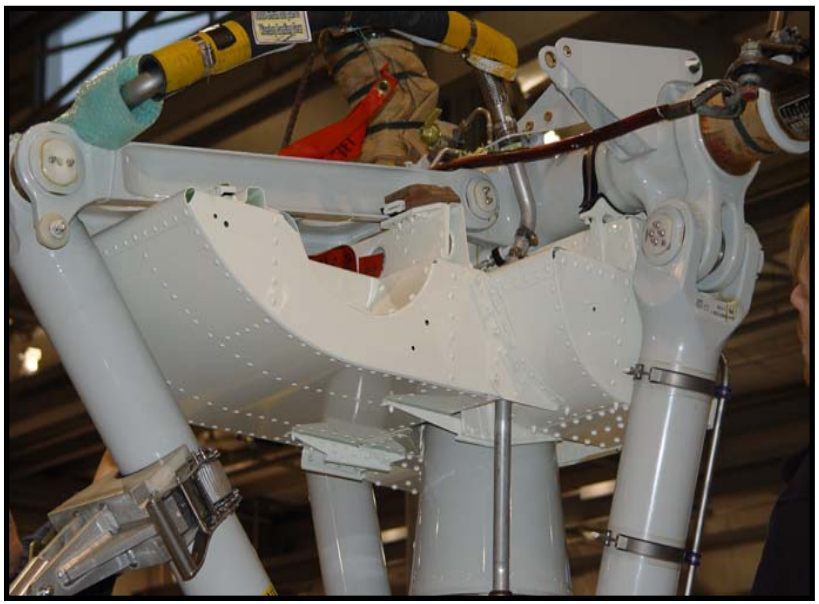
- VARTM – Vacuum Assisted Resin Transfer Molding
  - Utilizing typical lay up mold (High-temp materials not req'd)
  - Place dry fabric on lay up mold with ply orientation
  - Premixed resins are drawn across dry fabric utilizing vacuum pressure
  - Oven or room temperature cure

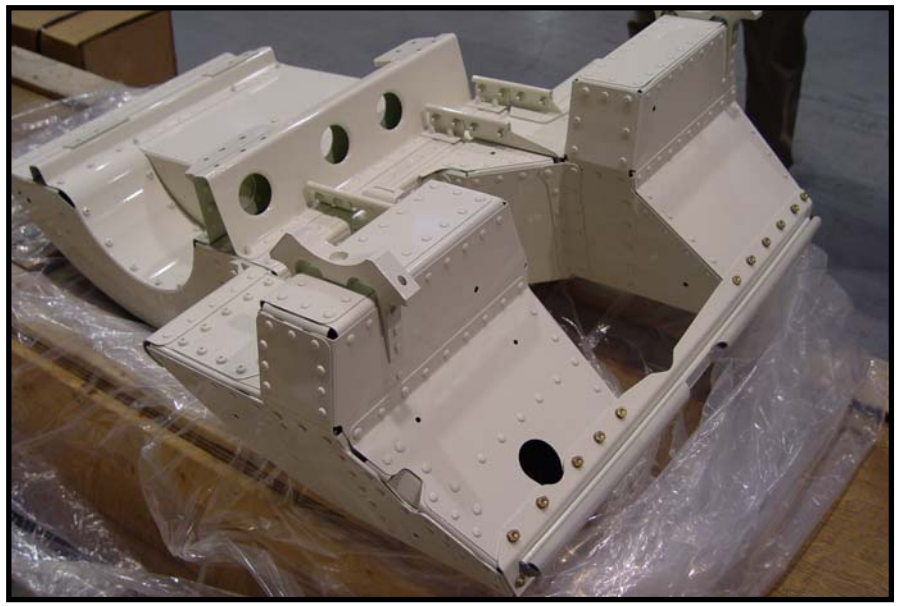


NORTHWEST COMPOSITES

Research & Development

747 Bull Nose Assembly



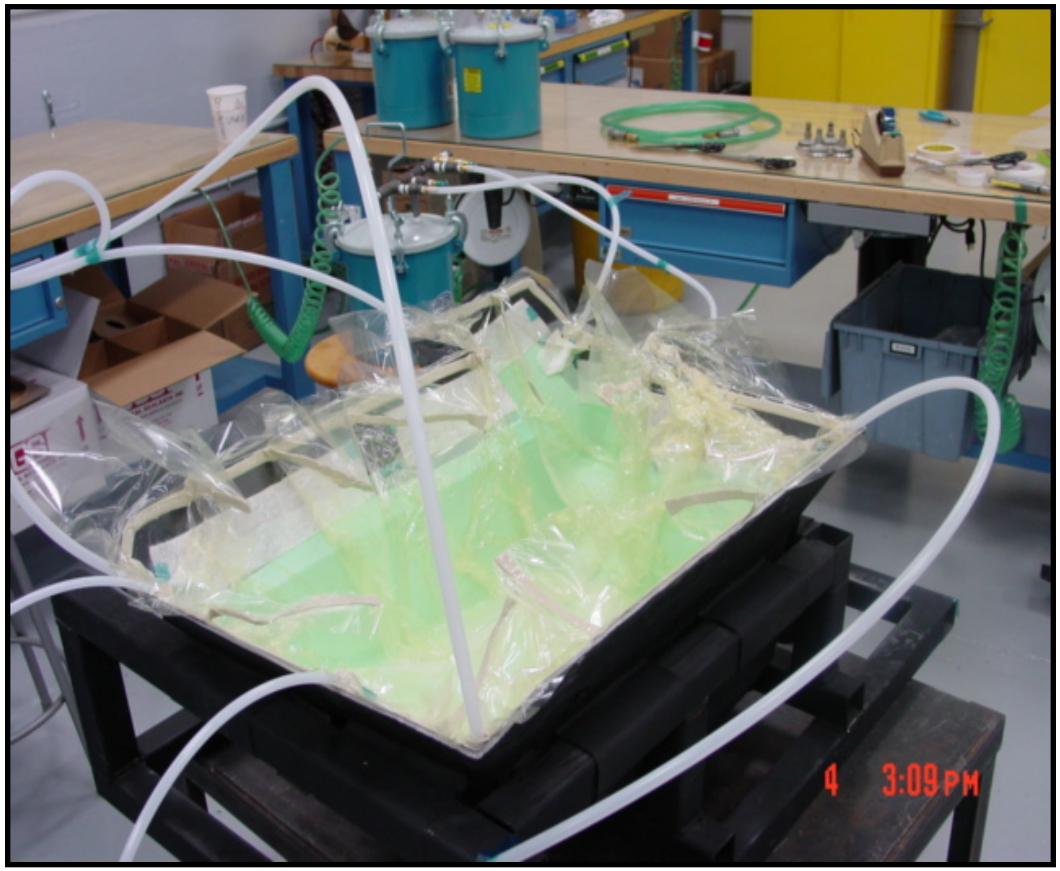


747 Bullnose - Existing Metallic Design

NORTHWEST COMPOSITES

Research & Development

747 Bull Nose Assembly (VARTM)

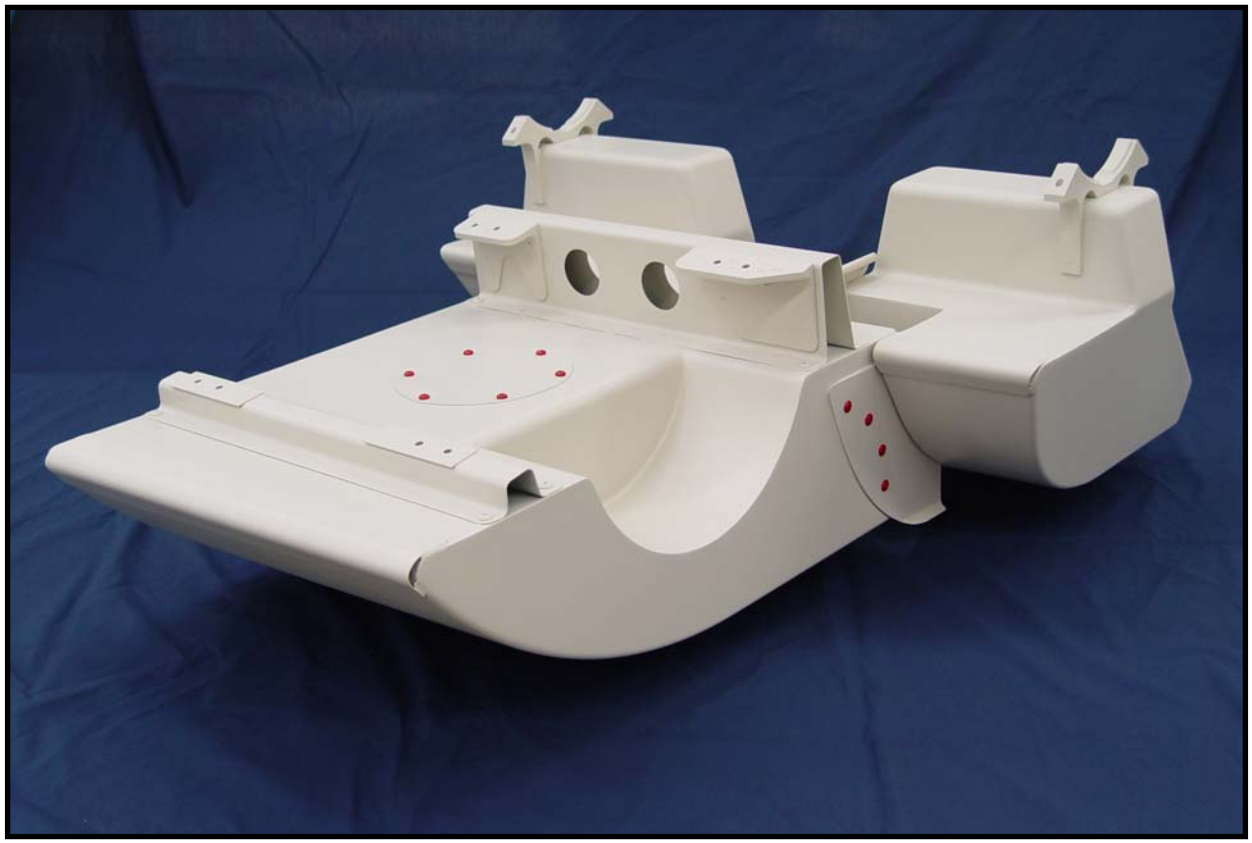


Infusion Process

2003

NORTHWEST COMPOSITES

Research & Development
747 Bull Nose Assembly (VARTM)



747 Bullnose
VARTM Composite Design

2003

NORTHWEST COMPOSITES

Research & Development
747 Bull Nose Assembly (VARTM)

747 Nose Gear Bullnose Summary

Attribute	Metallic (Existing)	VARTM (New)	% Reduction
Weight (lbs)	28	16.35	41.61%
Part Count (Excluding Rivets)	523	197	62.33%
Part Numbers (Excluding Rivets)	203	62	69.46%

NORTHWEST COMPOSITES

Research & Development

C-17 Main Landing Gear Pod (VARTM)

Core lay up Process

Dry Fiber lay up Process

Resin Infusion Process

Finished Product

2003

NORTHWEST COMPOSITES

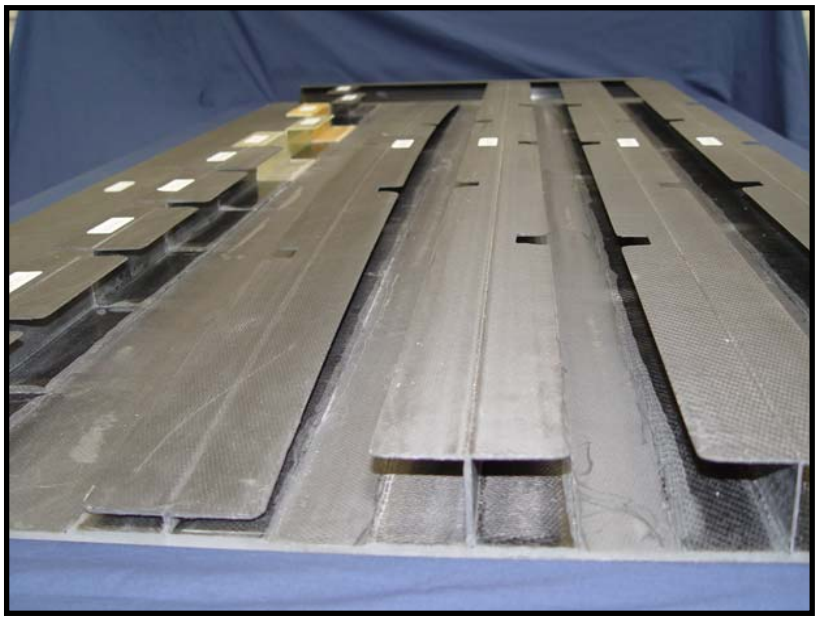
Research & Development
C-17 Main Landing Gear Pod (VARTM)

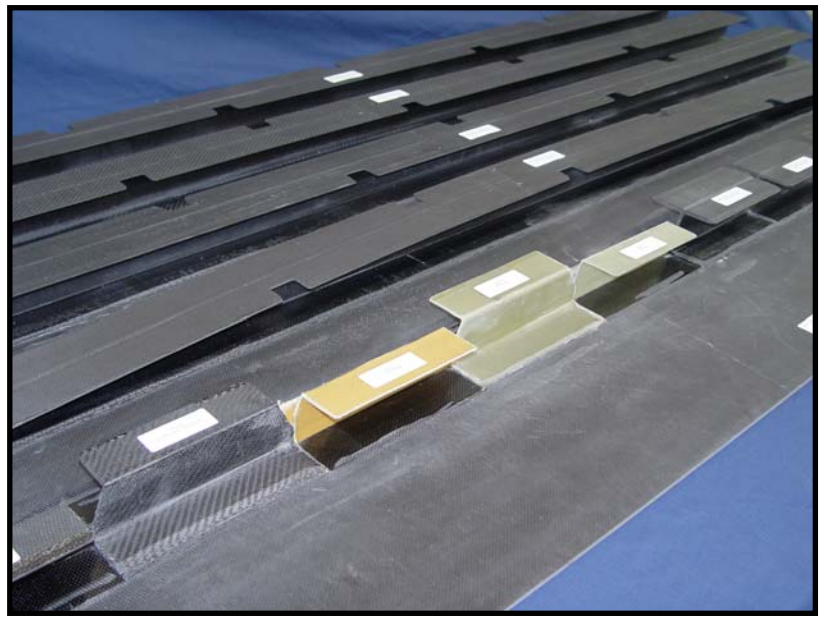
17P2A5093-3 Raw Material Cost Comparison

Autoclave Prepregs Dollars per ft2	VARTM (Resin Infusion) Dollars per ft2	% Reduction
$108.70	$69.57	36%

NORTHWEST COMPOSITES

Research & Development
VARTM Infusion W/ Integral Stringers

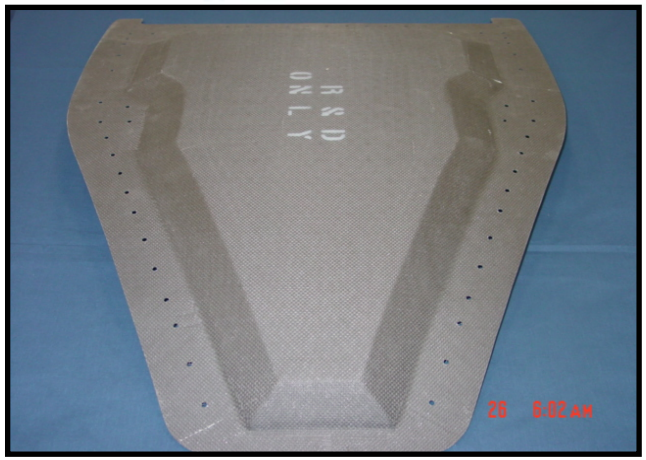




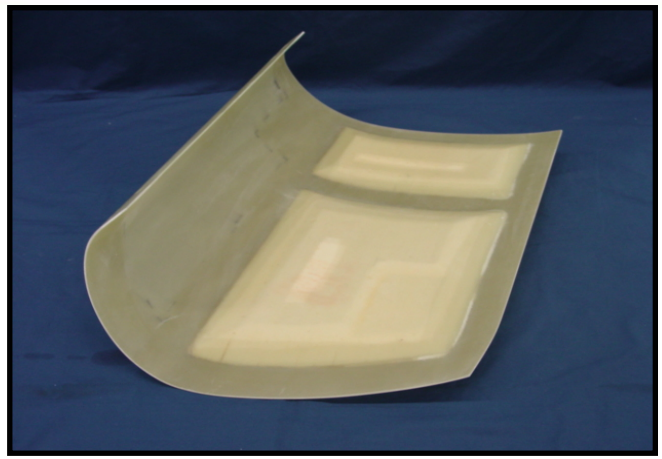
VARTM Infused Panel With Integral Stringers

NORTHWEST COMPOSITES

VARTM Samples

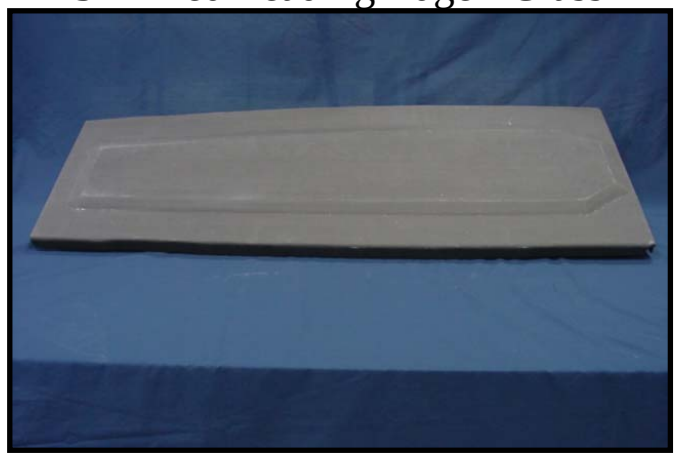


C-17 Post Door - Carbon



757 Fixed Leading Edge - Glass

7E7 Integrated Bulk Head (Conceptual)



777 Horizontal Stabilizer Rib

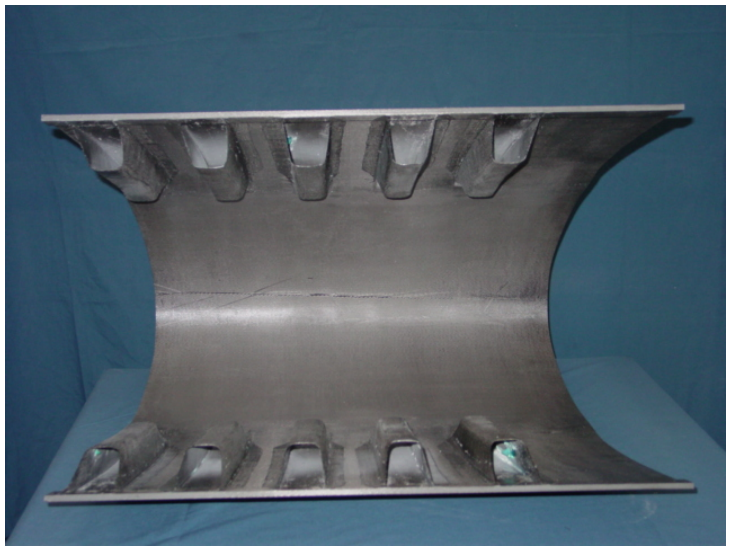
NORTHWEST COMPOSITES

VARTM Samples

7E7 Horizontal Stabilizer

Leading Edge

(Conceptual)



7E7 Horizontal Stabilizer

Leading Edge

(Conceptual)

2003

NORTHWEST COMPOSITES

Engineering

- 62 Engineers
  - 43 Design
  - 8 Stress & Certification
  - 8 Process
  - 3 Tool Design
  - Experience averages over 12 years

NORTHWEST COMPOSITES

Design Engineering

- CAD Systems
  - CATIA – 46 Work Stations
    - (10) Version 5
    - (36) Version 4.2.4
  - Capability of setting up separate environments to suit our customers CATIA requirements
    - CATIA used for 3 Dimensional Models
  - AutoCAD 40 Work Stations
    - AutoCAD 2000 used for 2 Dimensional Details

NORTHWEST COMPOSITES

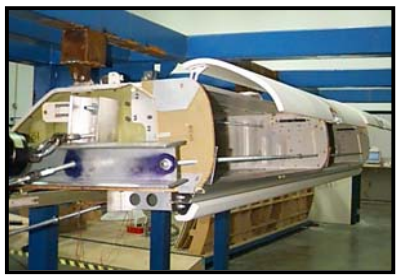
Stress Engineering

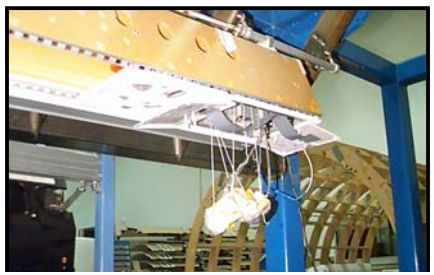
- FEMAP and Nastran
  - FEMAP for Pre and Post Processor
  - Nastran as the Solver
- All Stress Engineers have Experience within Primary and Secondary Aircraft Structures
- Generation of FAA Approved Material Allowables
  - Sandwich Panels, Laminates, Inserts, Joint Testing, In Plane Shears, etc.

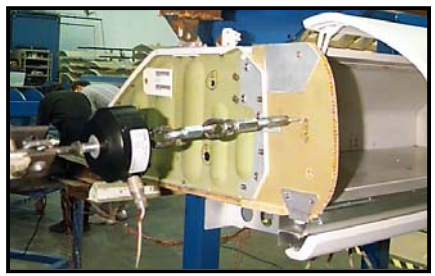
NORTHWEST COMPOSITES

Certification

- Stress
  - Interface Load Testing
  - FEA Validation
  - Static Testing
  - Cycle Testing
  - Functional Testing
  - DER on site



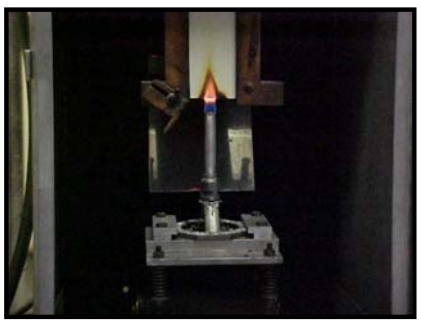


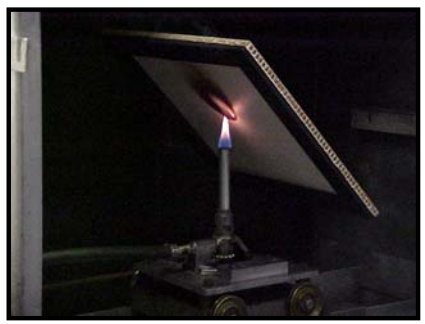


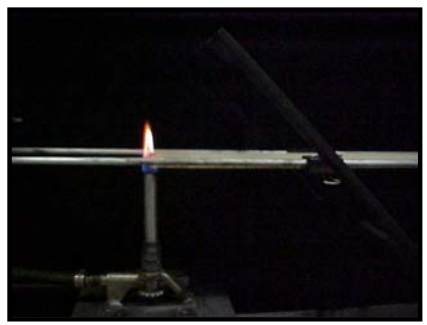
NORTHWEST COMPOSITES

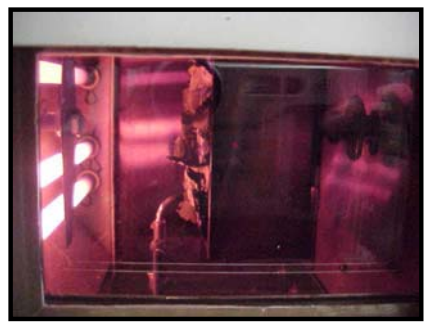
Certification

- Flammability
  - OSU Chamber
  - Conditioning Chamber
  - Smoke Density & Toxicity
  - Vertical/Horizontal/45° Burn









NORTHWEST COMPOSITES

Summary

- Northwest Composites is an industry leader in aircraft composites manufacturing
- Structural composites to full interiors
- High quality standards
- Excellent on time delivery performance
- Engineering design and certification capabilities
- Just In Time (JIT) Supplier
- Cost Competitive

NORTHWEST COMPOSITES

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