Presented by: Norm Watt AM
Special Projects Co-ordinator

FIBRE COMPOSITES
BRIDGES, BOARDWALKS
AND DECKING

PEDESTRIAN, CYCLE, VEHICULAR

ROAD

PILES, GIRDERS, CROSSARMS
HEADSTOCKS

BOARDWALK
SUCCESSFUL PROJECTS

- EMU PARK MEMORIAL BOARDWALK (180 METRES)
- MAROOCHY WETLANDS BOARDWALK (400 METRES)
- DIGGERS DRIVE PEDESTRIAN/VEHICLE BRIDGE (12 METRES)
- SHAWS ROAD BRIDGE (11 METRES)
- HARDGRAVE ROAD ROAD BRIDGE (10 METRES)
- JOHN W. MOTT PEDESTRIAN/CYCLE BRIDGE (11 METRES)
- SHORNCLIFFE PIER PILE REPLACEMENT (30 PILES)
- MIRABOOKA ROAD BRIDGE GIRDER (11 METRES)
- JOSLING STREET GIRDER/PILES
- WESTERN CREEK PEDESTRIAN/VEHICLE/CYCLE BRIDGES (22 METRES)
- RIPLEY ROAD BRIDGE (10 METRES)
FELCO/BAC COMPANY ARRANGEMENT

FELCO MANUFACTURING
Fibre Composite Road Tankers

WENROSS Pty Ltd, Trading as BUCHANAN ADVANCED COMPOSITES
(Defence – submarines, MIRF, Aeronautical)

WENROSS Holdings Pty Ltd,
Trading as Creative Advanced Build
(Maritime, CNC, MNRS)

BAC Technologies Pty Ltd,
Trading as BAC Advanced Composites Technologies
(R&D for products/processes, Civil)

IP agreement on MIRF and Submarine work
BAC Advanced Composites Technologies
Design, Stressing, Tooling and Manufacture of Composites

- ISO 9001 Certified by Lloyd's Register of Quality Assurance
- Civil Aviation Safety Authority (CASA) Certified
- Winner 1997 Defence Industry Quality and Achievement Award

FINITE ELEMENT ANALYSIS

BAC Advanced Composites Technologies
Tel: +61 7 46331856
Email: bac@bac.net.au

The Vision
“...To provide affordable, value-added and engineered composite solutions to meet our customers needs.”
BAC Advanced Composites Technologies

CORROSION
- Electromagnetically Transparent for Electrical/Sensitive Equipment

AERONAUTICAL
- All composite light aircraft
- MIRF

CIVIL/TRANSPORT
- Train/Bus Panels Corrosion Resistant
- Light Weight Bridges Car or Pedestrian
- Submarine Casings

MARITIME
- T Foils - Structural
- Ferry Deck & Superstructure
- Submarine

AEROMEDICAL RETRIEVAL UNIT
- Self Contained - Own Power and Oxygen
- Remote locations (Mines, Oil Rigs, Ships)
- Inter & Intra Hospital Transfer
- Air Transport Certified
For Better Roads
JUST ADD WATER!

FELCO
MANUFACTURING PTY LTD

STRONGER SAFER SOLUTIONS
www.felco.net.au
ADVANTAGES OF FIBRE COMPOSITES

• CORROSION RESISTANCE
• ROT RESISTANCE
• TERMITE, MARINE BORER AND VERMIN RESISTANCE
• LOW WEIGHT/HIGH STRENGTH-TO-WEIGHT
• EXCELLENT DURABILITY (UP TO 100 YEARS)
• LOW MAINTENANCE REQUIREMENTS
• EASE OF REPAIRS
• EXCELLENT FORMABILITY
• FIRE RETARDANCY CAN BE INCORPORATED
• LOW ENVIROMENTAL AND SITE IMPACT
• EASE OF INSTALLATION/HANDLING
• INSULATING/ELECTROMAGNETICALLY TRANSPARENT
• RECYCLE/REUSE
SOME ADVANTAGES OF FIBRE COMPOSITES

ROT RESISTANCE

TERMITE AND MARINE BORER RESISTANCE

CORROSION RESISTANCE
Fibre Composite Casings Sections – 25 Years Old with Virtually Zero Maintenance in Harsh Salt Water/Exposed Environment

Collins Class Submarine Casing Sections
25 Years Operation

Corrosion, Rot and Vermin Resistance
LOW WEIGHT / HIGH STRENGTH - TO-WEIGHT

LENGTH – 7 METRES
LOAD LIMIT – 55 TONNE
WEIGHT – 3.7 TONNE

LENGTH – 11 METRES
LOAD LIMIT – 5KPa
WEIGHT – 4.2 TONNE

LENGTH – 10 METRES
LOAD LIMIT – 5KPa
WEIGHT – 2 TONNE
TRANSPORT & HANDLING – EASY & LOW COST

TWO 12-METRE BRIDGES
SUBMARINE CASING
IMPACT DAMAGE

REPAIRED TO AS-NEW CONDITION AFTER 25 YEARS OF SERVICE

EASE OF REPAIR
FORMABILITY – SHAPE UNLIMITED WITH INCLUDED STRUCTURAL STRENGTH
FIRE RETARDANCY
RURAL FIRE FIGHTING TRUCK.

THE TANK SURVIVED FULL OF WATER – THE TRUCK DIDN’T!
LOW ENVIRONMENTAL AND SITE IMPACT

• LESS ENERGY TO PRODUCE THAN METAL/CONCRETE
• NO PARK REPAIRS REQUIRED IN THIS PROJECT
• LIFTED EASILY OVER TREES WITH NO VEGETATION DAMAGE
• COMPLETED IN PROTECTED BAT NESTING AREA
MINIMAL DISRUPTION – 1 DAY INSTALLATION
1pm
3pm
LOW ENVIRONMENTAL AND SITE IMPACT – MAROOCHY WETLANDS

• ENVIRONMENTALLY PROTECTED AREA REQUIRED MINIMAL FAUNA DISRUPTION – ALL MATERIALS WALKED OUT AND IN – NO HEAVY MACHINERY
SO HOW DO WE DO IT?

- CONCEPT
- DESIGN
- MATERIAL TESTING
- FEA (AS DEEMED NECESSARY)
- COMPONENT TESTING
- PROTOTYPE/FIELD TESTING AS REQUIRED
- PRODUCTION
ANALYSIS & TESTING

3D Modelling capabilities

FEA analysis of bridge structures
ANALYSIS & TESTING CONT.

Full-scale testing of future piles

Compression Load Test – 230tonne

Road Bridge Girder Load Test
TIMBER REHABILITATION WORK CONT.
FIBRE COMPOSITES BRIDGES, BOARDWALKS AND DECKING

ROAD

BOARDWALK

PEDESTRIAN, CYCLE, VEHICULAR
TIMBER REHABILITATION WORK

Before

After
BRIDGE REHABILITATION WORK
SINGLE LANE BRIDGE – LOAD RESTRICTIONS

BEFORE - Severe Cracking, Waisting, Severe Piping
BRIDGE REHABILITATION

AFTER – 2 New Fibre Composite Piles, Whalers, Headstock and Cross-Bracing. Full Load Capacity
ROAD BRIDGE PILE DRIVING -9 TONNE HAMMER – VERIFIED BY PDA
PEDESTRIAN/CYCLIST/ BRIDGES

Kallangur

Noble Street – 1 Day removal & installation
PEDESTRIAN/CYCLIST/ VEHICULAR BRIDGES

Bikeway/Vehicle
(9 tonne, 2x12 metres)

Road (55 tonne)
<table>
<thead>
<tr>
<th>Bridge Type</th>
<th>Clear Span Length (m)</th>
<th>Width between barriers (m)</th>
<th>Depth of structure (mm)</th>
<th>Loading</th>
<th>Concentrated wheel Load (kN)</th>
<th>Weight of composite deck (kg)</th>
<th>Weight of Barrier (kg)</th>
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</thead>
<tbody>
<tr>
<td>Bikeway</td>
<td>10</td>
<td>2</td>
<td>450</td>
<td>5kPa</td>
<td>20</td>
<td>1,600</td>
<td>800</td>
</tr>
<tr>
<td>Pedestrian</td>
<td>10</td>
<td>3</td>
<td>360</td>
<td>5kPa</td>
<td>20</td>
<td>1,800</td>
<td>800</td>
</tr>
<tr>
<td>Bikeway</td>
<td>14</td>
<td>2</td>
<td>650</td>
<td>5kPa</td>
<td>20</td>
<td>2,600</td>
<td>1,100</td>
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<tr>
<td>Road -1 lane</td>
<td>6</td>
<td>4.2</td>
<td>550</td>
<td>4x120kN axles</td>
<td>80</td>
<td>3,200</td>
<td>500 (kerb only)</td>
</tr>
<tr>
<td>Road -1 lane</td>
<td>10</td>
<td>4.2</td>
<td>800</td>
<td>6x120kN axles</td>
<td>80</td>
<td>5,800</td>
<td>1,000</td>
</tr>
<tr>
<td>Road -1 lane</td>
<td>14</td>
<td>4.2</td>
<td>900</td>
<td>6x120kN axles</td>
<td>80</td>
<td>11,000</td>
<td>1,300</td>
</tr>
</tbody>
</table>
The retrofit of facades to existing buildings is problematic due to the inability of the structure to take the additional weight. Fibre composites offers a solution for this problem given its high strength-to-weight. BAC was approached to conduct such a project for a building in Canberra to upgrade the energy efficiency of the building. The result was over 90 facades built as window surrounds using foam-cored panels and purpose built moulds.
“NO LIMITATIONS”

INSULATED FOLDABLE BUILDING

STRUCTURAL BLADES AND FOILS

POWER/LIGHT POLES

16-METRE WIND GENERATOR POLE
“OZ GER” FOLDABLE BUILDING – 10 MINUTE ERECTION, STACKABLE
INFANT AND ADULT MEDICAL RETRIEVAL SYSTEMS – AIR AND AMBULANCE