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# RE - DEFINING AGILITY

CRAFT/SCIENCE/SPORT

Curated By Matt Blomeley  
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## Nature crafts materials of a complexity and functionality that we can only envy

- Janine Benyus

# RE- DEFINING AGILITY

-Matt Blomeley

The designers and engineers featured in *Redefining Agility* apply contemporary manufacturing processes and materials to the production of specialist sporting equipment. Their objects expand the notion that craftsmanship and new technologies may go hand-in-hand. Henry Petroski has observed that “engineering is the art of compromise.” Many designers and engineers, including those featured in *Redefining Agility*, are fusing new scientific and material developments.

It sometimes appears that life never really changes. The modern Tour De France athlete conquering an alpine pass on a cutting edge carbon composite bicycle could well be an ancient warring Assyrian drawing forth a finely crafted ‘fist of god’ (a composite bow that was constructed of layers of horn, leather and wood) and laying siege to his enemy: both rely on objects made of composite materials. Layering and compositing materials together to build and enhance the performance of functional objects is a key component in contemporary design and engineering, just as it was for the Assyrian bow maker.

In the early 1980s if you asked a bicycle racer to describe his or her dream machine, the response would most likely have been a frame made by an Italian artisan fitting and brazing together double butted steel tubes into custom made arabesque lugs. The fantasy of this period was the delivery to your doorstep of a 3-4lb frame, replete with the logo, from one of a handful of elite European family businesses. A couple of decades on, the brand name and on-road feel remain relatively consistent, yet the resulting frame is likely to be a jewel-like 2lb carbon fibre object of desire.

The last four decades have seen major advances in the development of polymers and manufactured fibres. A 1950s invention originally estimated as potentially costing millions of dollars per pound to manufacture, carbon fibre matting soon found its way into the aerospace industry and was quickly applied to sporting equipment design, an ideal testing ground for carbon composites. Akiko Busch writes, “Objects, like people, can live double lives. And contemporary sports equipment thrives - with subtlety, wit, and pure exuberance - on its rich double life. The new materials and technology of such equipment have redefined the way sports are played, enhancing speed, force, distance, height. At the same time, however, their forms spell out clearly and consistently our cultural profile. For all the energy and vitality this equipment represents, what it may do with the greatest agility and grace is serve these two functions at once.” (Design For Sport, 1998)

One of the most exciting recent developments in equipment design is ‘female moulded composite tubing’, consisting of custom engineered half section tubes which are faultlessly bonded due to precisely interlocking lips. The svelte-looking resulting equipment answers the demand for optimum performance and eye appeal. Southern Spars, an international company founded in New Zealand and based in Freemans Bay, Auckland, is a world leader in carbon fibre yacht componentry. The firm employs ingeniously designed female moulds to create precisely engineered carbon fibre spars with load bearing characteristics specifically tailored to the most high stress sections. The technology is identical to the latest methods employed in bicycle design. The casual observer of these products would not notice anything other than the aerodynamically engineered outer shell of the construction.

Another innovative Auckland based company involved with the marine industry is C-Tech. Founded several years ago by yachting and engineer, Alex Vallings, C-Tech’s carbon fibre sail battens were used by every syndicate in recent America’s Cup and Volvo Ocean Race competitions. Sail battens reside within narrow sleeves built into sails, enabling the sail to maintain optimum shape and

increase speed. The latest developments in this equipment are leaning towards inflatable battens and C-Tech is once more at the forefront, having recently developed inflatable battens made from extremely durable polymers that are reinforced with a manufactured fibre used predominantly in the aerospace industry.

The demand for precision, simplicity, safety and performance is a reflection of the obsession with pushing boundaries. Whenever outright performance is the consideration, form is defined by function and surfing is one pursuit where the form factor hasn’t changed in many years. Several new international companies have been busy promoting alternative construction methods for performance short boards, but the jury remains out on many of these products. However, Whangamata based, Pete Anderson’s surfboards are well proven, the familiar ‘@’ logo having shredded waves around New Zealand beaches for many years. In his latest project, Anderson’s team riders have been strenuously testing the specific handling characteristics of new generation styrene/epoxy short boards featuring carbon fibre outer rails and a PVC stringer that has replaced the traditional narrow wooden strip running down the centre of the board.

The growing appeal of objects that feature a discernible utilitarian aesthetic reflects a desire for quality construction, convenience and outright performance. Hummer recreational vehicles and Leatherman tools are exemplars of this desire. A utilitarian concept also typifies the design of Murray Broom’s high performance foldable kayaks. Broom’s Dunedin based company Firstlight Kayaks produces an award winning range of performance craft. Constructed of interconnected carbon kevlar tube sections, these spring-loaded frames support a durable urethane skin. The lightweight vessel is able to be disassembled into a portable backpack in several minutes. Broom’s foldable kayak design has won numerous awards and since 2004 has been featured in the permanent collection of The Museum of Modern Art in New York.

The collaborative nature of equipment design is exemplified by highly specialized performance projects. The legs Wayne Alexander created for double amputee climber and athlete Mark Inglis’ successful 2006 Mt Everest climb, along with the team responsible for Sarah Ulmer’s 2004 Olympic gold medal pursuit bicycle are examples of equipment placed under high stress that must perform exactly as designed, with no exceptions. Milton Bloomfield, of Christchurch based Dynamic Composites, was part of the team that developed Ulmer’s bike, together with Mark Hildesley of Auckland consultancy Materials Optimization, Ulmer’s partner Brendon Cameron, SPARC and The University of Canterbury. In these design collaborations each member contributes to the highly specific attributes required of the end product.

Sport is a global spectacle and equipment is responsible for around 15% of the sporting industry’s international revenue. In a market with total annual sales figures in the hundreds of billions, the trickle down to the mass market of new technology from elite athletes is inevitable. Carbon composites are no longer exclusive to large budget high performance objects. Product and furniture designers have taken advantage of the many unique characteristics of this material, just as aerospace, sport and medicine were able to draw upon and inadvertently share the original discovery.

The innovative New Zealand based designers and engineers featured in *Redefining Agility* are part of a new generation of ‘craftspeople’, actively utilizing the characteristics of fibres and polymers to create highly specialized bespoke objects. Prototyping new equipment for unforgiving scenarios, they are applying their skills wherever boundaries of agility need to be redefined.

1-*Everest Legs*, Wayne Alexander, 2006  
2-*Zeus 04*, Dynamic Composites, Materials Optimization, Brendon Cameron, SPARC, the University of Canterbury, 2004

3-*420 Kayak*, Murray Broom (Firstlight Kayaks), 2002

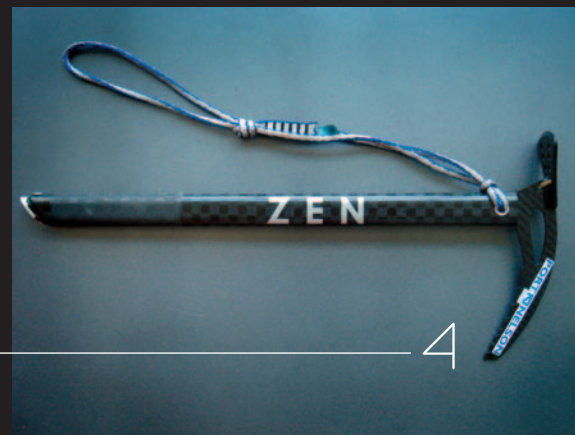
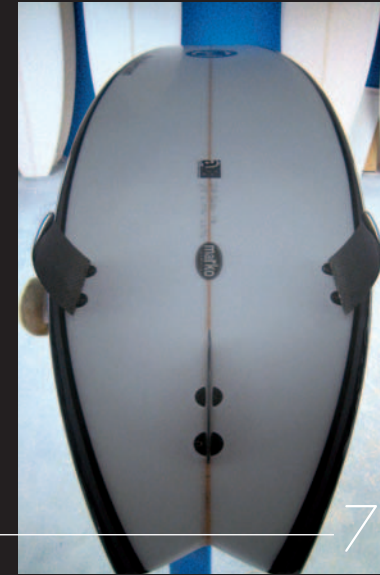
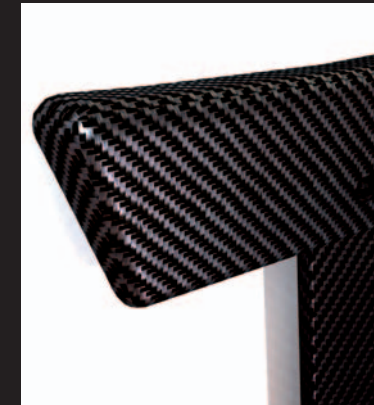
4-*Zen Ice Axe*, Milton Bloomfield (Dynamic Composites), 2006

5-*Kiwi Tiller*, Milton Bloomfield (Dynamic Composites), 1998

6-*Dytrab Back Brace* (detail), Mark Hildesley (Materials Optimization), 2008

7-*Carbon Rail Surfboard* (detail), Pete Anderson (Anderson Surfboards), 2008

8-*Wally Y3K*, mast, spreaders and rigging by Southern Spars, 2006  
(all images courtesy of the makers)



Exhibitors:

- Wayne Alexander
- Pete Anderson (Anderson Surfboards)  
[www.surfboard.co.nz](http://www.surfboard.co.nz)
- Milton Bloomfield (Dynamic Composites)  
[www.dynamic-composites.co.nz](http://www.dynamic-composites.co.nz)
- Murray Broom (Firstlight Kayaks)  
[www.firstlightkayaks.com](http://www.firstlightkayaks.com)
- Mark Hildesley (Materials Optimization)  
[www.matopt.com](http://www.matopt.com)
- Southern Spars  
[www.southernspars.com](http://www.southernspars.com)
- Alex Vallings (C-Tech)  
[www.sailbattens.com](http://www.sailbattens.com)