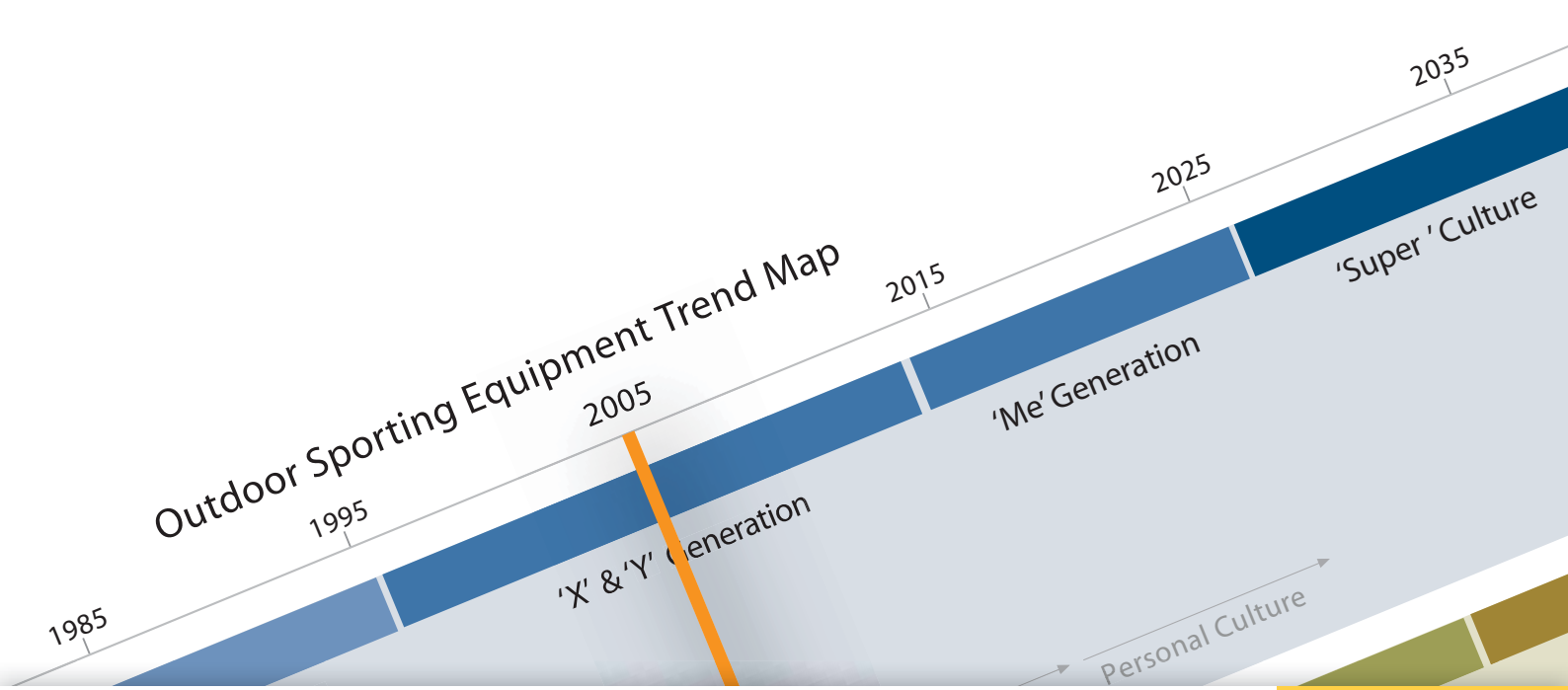


PROJECT : **Transition**

TITLE : **An Industry in Change**

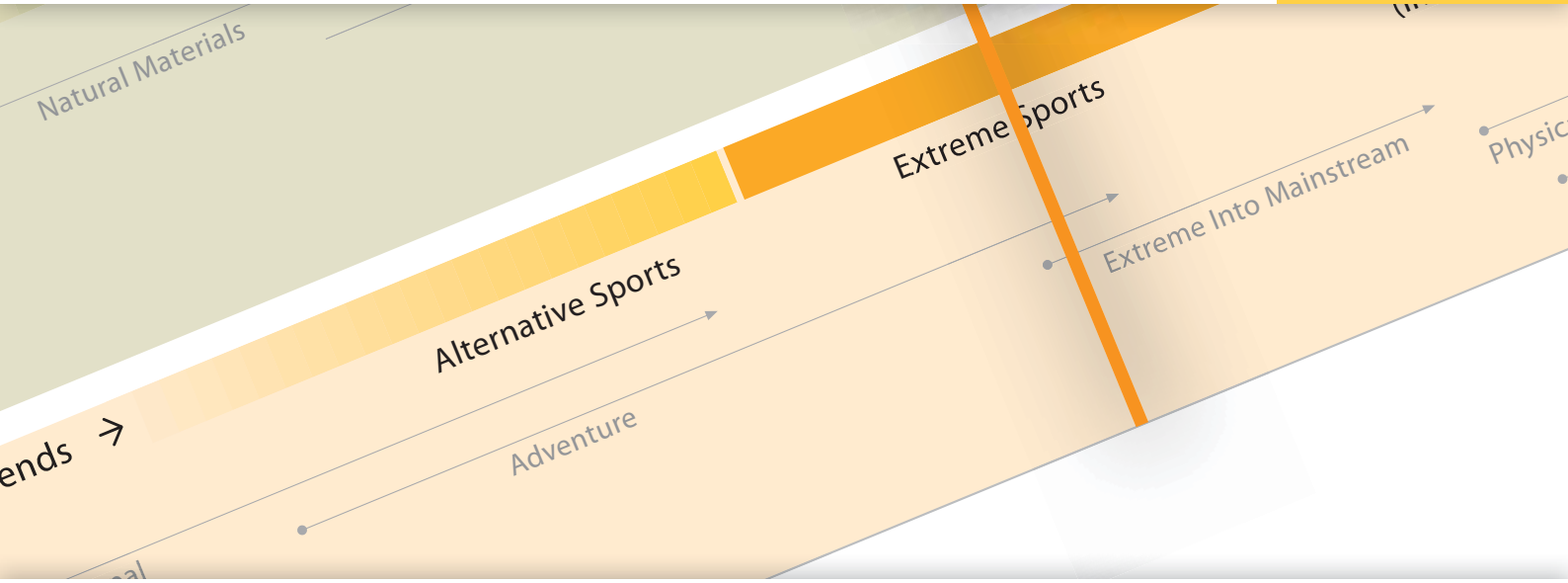
CLIENT : Locus Research

PROJECT CODE : 0120-02

DATE : 17/09/05

AUTHOR : Blythe Rees-Jones

KEYWORDS : Sporting; Equipment; Design; Trends; Global; New Zealand; Locus Research; Physics Lab



DOCUMENT RELEASE : ○ Confidential ◉ Public

locusresearch
Sustainable Design & Development

Client Name/Code: Physics Lab
Project: Physics Lab Research

Job code: 0102
Project Manager: Blythe Rees-Jones

Research Team: Timothy Allan

Document Codes: 0102-02-003 (sequential)

Date initiated: 09/03/2005

Date Completed: 6/03/2008

Circulation List:

Executive Summary

The outdoor sporting and equipment category has undergone significant change over the last 20 years. The changes, which range from the impact of Asian manufacturing, and technological change to the mainstreaming of new alternative sports, have contributed to the rapid evolution of the industry.

Outdoor or 'extreme' sports have become mainstreamed leading to the growth of the industry and the creation of new brands that have been involved in the gestation of these new sports such as Burton. There is also a greater degree of customisation, with gender becoming an increasingly important consideration, gone are the days of the one-size fits all approach. This customisation has become mandatory in many products as the performance requirements have become more demanding.

With many products manufactured from 'soft' fabric materials and labour intensive processes, cheaper production has seen a significant proportion of global fabric and soft product production move to Asia. This transformation has seen manufacturers become marketers, whilst also enabling the introduction of more elaborate sewn products that would not have been previously feasible.

This move has probably created equity across the range of branded products leading to an increasing emphasis on new materials and alternative points of difference. With many plastic mouldings such as fastlock buckles being generic with limited design options, they have been displaced by proprietary fixtures. These new fitting designs have provided the platform for innovative design solutions such as the Epic Backpack by Nike, or the Bioflex harness from Berghaus. This moves away from the traditional focus on fabric and fabric technology toward fully integrated multi material product systems.

This emphasis on new materials is not restricted to plastics, but extends to new 'wearable' solutions. As technology becomes interwoven with all of our lives electronic and reactive fabrics have presented some unique new design possibilities from an entertainment and performance point of view. Materials are in an exciting transition, a transition from 'passive' to 'intelligent' solutions. These materials are characterised by the ability to interact or adapt to the user or the environment.

New Zealand has traditionally been an innovator in the outdoor arena, but this has diminished in the face of increased research and development in international products. This is partly due to the historic focus on fabric product development, the capital expenditure of tooling, and the lack of the required skills required to undertake technical research and development. New Zealand companies have an international perspective and are often highly innovative, but are not as well resourced as some international companies.

The sporting and equipment industry is a truly global as many outdoor activities implicitly involve travel. This is exemplified by the International Sports Fair (ISPO) in Munich. This event is a showcase for new trends, products and companies and has a range of events, discussions, and awards that recognise achievement in the area of sporting equipment.

The Brand New Awards demonstrate the potential of getting products onto a global stage. In 2003, Blokart, the land yacht company from Tauranga won the right to exhibit at ISPO. An opportunity that proved to be incredibly successful for Blokart as the product went on to win the supreme innovation award at the fair. An achievement that caught the attention of leading Swedish automobile manufacturer

Volvo, which recently saw Blokart forming a lucrative deal with Volvo to sell the land yachts along side Volvos new adventure wagons.

A supported approach to develop new products within New Zealand, which includes design, technology, and technical manufacturing partners, would assist in breaking down some of the impediments to the developing globally responsive and technically sophisticated new products.

Locus Research established an internal project called ‘the Physics Lab’ in 2004, a reference to the forces that govern all movement. Our aim is to work with the leading manufacturers and marketers of outdoor sporting equipment to create exciting new products that are functionally and materially advanced. This report has been compiled to better understand some of the global trends in the outdoor equipment industry and to create a platform for the development of new projects and collaborations with New Zealand companies.

Contents

Background & Introduction

Locus Research (Locus) is a product development company situated in Tauranga, New Zealand.

Locus; means a point of intense focus and concentration, whilst **Research;** means to systematically investigate. These two words embody our approach.

Locus has established itself with a strong focus on research and development projects rather than just design. Locus also has a commitment to sustainable product design research and implementation. The research focus enables an informative and factual platform for good design decisions to be made from.

We have worked extensively with technical and scientific disciplines to achieve more innovative design solutions, such as our ongoing collaboration with Scion's[1] Sustainable Consumer Products group which has created a number of interesting new development frameworks for application to industrial ecology.

Since its formation in 2002, Locus has worked on projects in the sporting & equipment area. In 2004, Locus initiated an internal project called 'The Physics Lab' to extend our involvement in this area. The term 'physics lab' refers to our approach in equipment design, which is to better understand the physical mechanics of an activity in order to be able to directly deliver functional improvements. This project was aimed at learning more about what trends and developments are driving the evolution of the international sporting and equipment industry, with the goal to identify new opportunities for New Zealand companies.

Aims & Objectives

"Research and assess what trends are driving the evolution of the outdoor sporting & equipment market, and identify new opportunities for New Zealand companies wishing to compete internationally"

The research was divided into six key areas of investigation with a particular focus on understanding the changing materials and technologies being used and how these would impact on new products.

1. Examine future trends of the international industry to better map out where it has come from, and where it is heading. In order to understand what was creating these trends,
2. Current industry changes and developments within the industry.
3. International trends that would affect sports and equipment.
4. The New Zealand Context, looking into the countries outdoor heritage, the current industry makeup, and what impediments are associated to producing innovative products from New Zealand.
5. Sustainability & The Environment in relation to sporting and equipment. What new opportunities are being created by the industries shift towards sustainable design?
6. Analyse the international market to better understand how local manufacturers could engage with international markets. Including a visit to ISPO 05 Winter Fair in Germany, to learn more about the global industry from a European vantage point.

[1] Forest Research, formerly a Crown Owned Research Institute.

This document is the synthesis of twelve months research into the sporting industry by Locus Research (Locus). The aim has been to understand what trends and developments will drive the evolution of sporting equipment products. The goal has been to identify new opportunities for how New Zealand companies can become more successful in engaging with international markets by developing moulded technologies for their competitive edge.

Methods & Assumptions

All information in the following document has been summarised by two designers from Locus over a twelve-month research period, which included a week's visit to Munich for the ISPO International Sports Fair.

The report is broad and could form the basis for further enquiries of more detailed areas, its design is just to gain some insight into the potential changes that are occurring internationally.

Glossary of Terms

General	
Snow	All sports activities conducted in snow conditions
Water	Water sports
Wind	Sports that use wind as the driving energy
Earth	Generalisation for all outdoor earth bound sports
Complete	Sports products constructed primarily from moulded parts
Hybrid	Products with a level of structured mouldings
Fixtures	Item which feature small moulding as accessories
ISPO	International Sports Fair & Network
Blokart	New Zealand Manufacturer of portable land yachts
Messe Munchen	ISPO venue in Munich
XGames	Multi disciplinary extreme sports event
Soft	Products which are predominantly produced from fabric materials
CAD	Computer aided design
PAD	Pattern aided design
Sustainability	
Product Service System (PSS)	The combination of a product and a service to create a system. (For example leasing a car is a simple PSS)
Product Life Cycle (PLC)	The cycle of a product from extraction of the raw materials production of the material, manufacture of the product, use, and disposal or recycling of the product.
Biomimicry	Observing the way that natural systems work and then attempting to synthesize them in science and design, also known as Bionics. (A well known example is Velcro)
Upcycled	Term used to define materials that are recycled back into their original use.
Downcycled	Term used to define materials that are recycled into a lower performance product or use.
Cradle to Cradle	Term used by William McDonough and Michael Braungart to describe the no linear methodology behind designing products or materials that can be reused and eco efficient
Materials	
Passive Materials	Traditional materials that cant interact or respond to stimulus.
Intelligent Materials	Materials that are designed to interact and adapt to their environment and/or user.
Moulded Material	Innovative materials that are moulded to form new

Technologies	sophisticated components or items
Monomers	Small molecules that chemically react to link together with other molecules of the same type to form a large molecule called a polymer
Co-moulding	Moulding of two or more different materials together to form a product or detail
Capilene	Patagonia's name for polyester with a hydrophilic surface finish

An industry in change

In the developed world, there has been an increase in wealth and a corresponding proliferation of new sports, many of which have become professional occupations. Many of these new 'extreme' sports have become mainstream, each of these sports has their own unique set of requirements and equipment.

Culture and Materials

Over the last thirty years, since 1973 when Larry Stevenson and Frank Nasworthy invented the urethane skateboard wheel, exotic technologies and plastic mouldings have played an important role in the function of all outdoor sporting and equipment products. These parts have been developed to boost the functional performance, with companies such as Gore-Tex[2], Polartec[3], and cross category composite companies like K2[4] sports leading the way.

Figure 1 Urethane moulded skateboard wheels & extreme motocross

Technology, design and sport are intertwined, especially in the outdoor equipment area. They influence and stimulate each other. To forecast some of the future trends a diagram was developed to put some of these changes into one form to see how they influence each other (see **Figure 3**). The diagram combines technological, cultural and sporting movements to evaluate the relationships between them.

The increasing domination of the 'individual' in contemporary society demands more customisation of products and services. Products need to be more flexible to meet the needs of their target market as the 'one size fits all' approach becomes increasingly untenable. Digital Mapping is an example of this where three dimensional scanning and parametric computer aided design programs have allowed body scanning and custom fitment a reality. Body scanning is where you stand in front of a screen that record your exact dimensions digitally, which is used to produce perfectly sized products to your body. This development is sometime off, but is particularly of interest with the trend towards custom manufacturing and online shopping. Body scanning combined with personal product design online, such as Nike's: Nike ID (where you design your own shoe), will redefine the way sports products will be sold.

[2] http://www.gore-tex.com/webapp/wcs/stores/servlet/ContentGView?storeId=10001&catalogId=10001&langId=-1&productId=10001
[3] http://www.polartec.com/fabrics/advanced.php
[4] http://www.k2sports.com/US/

Figure 2 Nike ID – an online product personalisation tool for customers wishing to customise their shoes & equipment (Left). Digital Body Scanning from actual to virtual (Right)

The popularity of outdoor and extreme sports will lead to a greater demand for 'protection', which might range from a simple weatherproof jacket to body armour for sports such as mountain biking, motocross, and snowboarding.

Apparel and equipment are already utilised as a means of achieving higher performance, allowing the human body to accomplish things or exist in environments that would not be possible without additional equipment. This will be extended through material and technical innovations that can be effectively controlled by the user.

Another crucial element is the inclusion of entertainment and communication devices and technology into equipment and apparel. Burton team rider JP Solberg's response when asked what he thought snowboarding's next trend would be was "I think high tech gear is definitely something that will be hot. Integrated phone, camera, walkie talkie, music all that stuff in your jacket, something like a James Bond movie[5]". This is driven by the increasingly small and portable communication devices. These technologies also impact on the fashion that surrounds this equipment.

This direction creates the picture of an exciting technology transition or move away from 'Passive' materials toward 'Intelligent' materials that are responsive and capable of changing their properties. This shift is set to have a significant impact on the industry. No longer, will products be static rather they will adapt and change to suit the user and the environment.

As new technology becomes cheaper and common place, athletes and outdoor enthusiasts will look to intelligent products and moulded material technologies for their competitive edge creating a market pull from the technology push.

[5] http://www.burton.com/sh/team/teamMember_bio.asp?teamMemberID=6

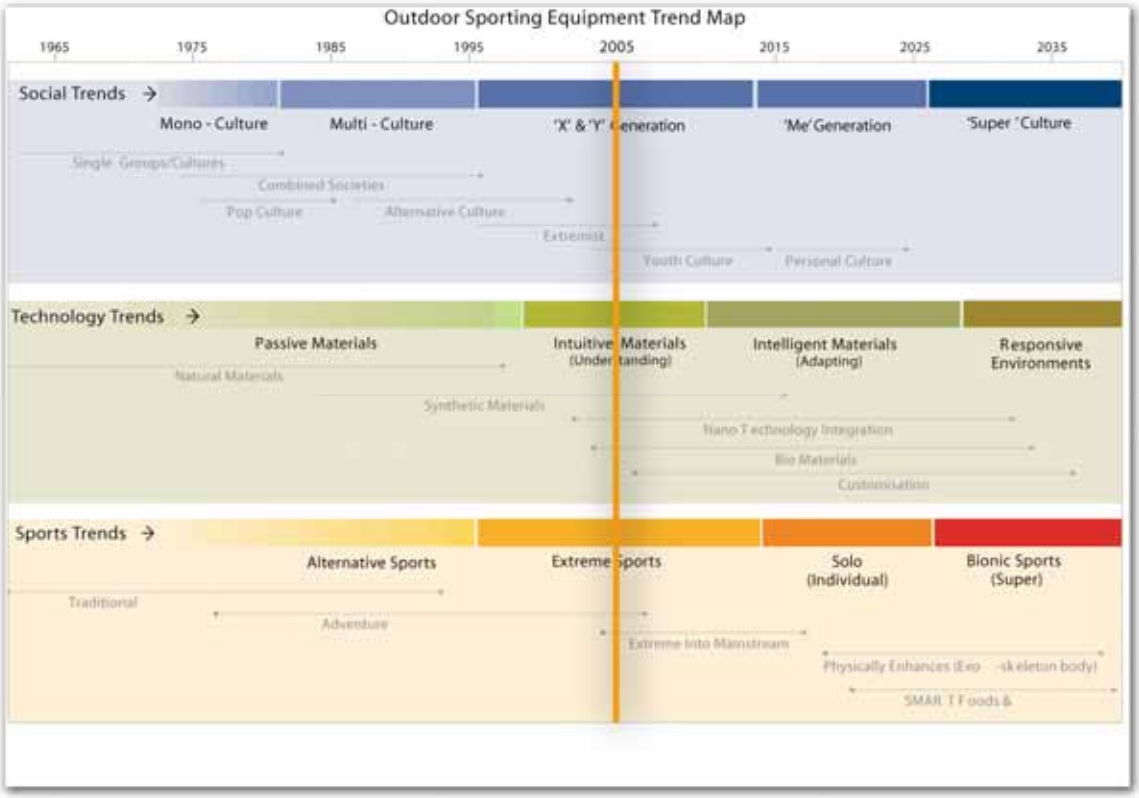


Figure 3 *Forecasting Trend Map (Please Refer to the Appendix for a full view)*

Industry and Manufacturing

The labour intensive nature of 'soft' product has resulted in the outdoor equipment companies being particularly exposed to the phenomenon of Asian production. Today, with intense market competition and the drive for low cost production, many equipment brands have moved production to Asia. Even companies such as Macpac, who occupy a high quality niche, have been forced offshore in order to operate cost effectively.

While production in Asia is cost effective, it can prevent integrated product development due to the distance from technical manufacturing partners, and the language barrier. Another facet of fabric or soft products is that they are easy to mimic. Technology and material innovation can effectively be used to increase the cost of entry and defendability of a product.

Materials & Construction – an opportunity

The protection afforded to GORE by their technical innovation is a key point that can be drawn from their success. Technical innovation creates a market edge.
In effect, the 'brand' was Gore-Tex. The companies that made the product were less of a concern to the consumer, as they equated Gore with quality.

Today we are still seeing the continued development of high performance materials, with more attention on making these materials more adaptive and responsive.

Many leading sports advance the level of technical and material innovation their products. Mouldings can provide the critical structure for functional innovation. Footwear manufacturers have been driving this approach for the last twenty years (**Figure 4**). These companies are using this method to move into new niche markets within the sporting industry. The Epic backpack by Nike (**Figure 5**), which was

recently commended for its level of innovation by the Industrial Design Society of America, is a prime example.

Figure 4 *Mizuno Pebax sports shoe – advanced mouldings in footwear design*

The Epic pack was undertaken in collaboration with the innovative team who pioneered the use of a plastic shell in their '*Boblbee*'[6] pack system. It is a thoughtful integration of moulded foam and plastic in a product that has remained predominately 'soft'. The combination of previously unused materials into a pack creates new facets and design opportunities. In addition, the product has a visual point of difference when placed among other products, notably it also commands a higher price tag for this innovation.

Figure 5 *Nike Epic Pack Systems*

The Epic pack and the original Boblbee pack (Figure 6) illustrate the use of proprietary plastic mouldings in a traditionally 'soft' product. These designs are more complex from both a design and production perspective, but the technical and material innovation creates more identifiable and defendable designs.

[6] http://www.boblbee.com

Figure 6 Boblbee Rigid Plastic Sports Pack

This 'technology' focussed approach is evident Leap Frog programme. The European textile and clothing industry is embarking on a £23 million, four-year research and development programme to achieve a technology breakthrough in garment manufacturing. The LEAPFROG project brings together 35 partners from industry and academia from 11 European countries, and aims to achieve a step-change in garment productivity, quality and cost efficiency. It envisages a radical move towards rapid customised manufacturing and a paradigm change in customer service and customer relationships.

Intelligent Materials

The following is a list of material and construction methods being developed within the sporting industry. The case studies selected for discussion are expected to have a profound affect on the design of sporting products when full commercialised.

- **Shape Memory**
  Biomimetic research is developing smart materials that can be customised through senses. Thermoplastic polymers have been developed to create what is termed 'shape-memory' or 'self tightening' materials. These are materials, which change shape through a change in temperature. These smart materials can be designed into sports products to stretch or change size or shape. Adidas has recently released its '1 Shoe' (Figure 7), which they believe is the first intelligent shoe that responds to the wearer's motion and weight impact.

Figure 7 Adidas new intelligent Self-adjusting '1 Shoe'

- **Conductive Polymers**
  The advent of polymers and crystalline organic electronic plastics that conduct electricity is allowing products to become sensitive to respond against temperature, impact, pressure, colour, global positioning, time, motion, and signal when a region of the materials has been damaged (Figure 8). Alan

Heiger; Alan MacDiarmid; and Hideki Shirakawa developed these conductive plastics in the 1970's. The three scientists were awarded the 2000 Noble prize for this technology break through, and are largely responsible for what is being termed 'wearable electronics', which is the integration of traditionally 'hard' consumer electronic devices into 'soft' material products.

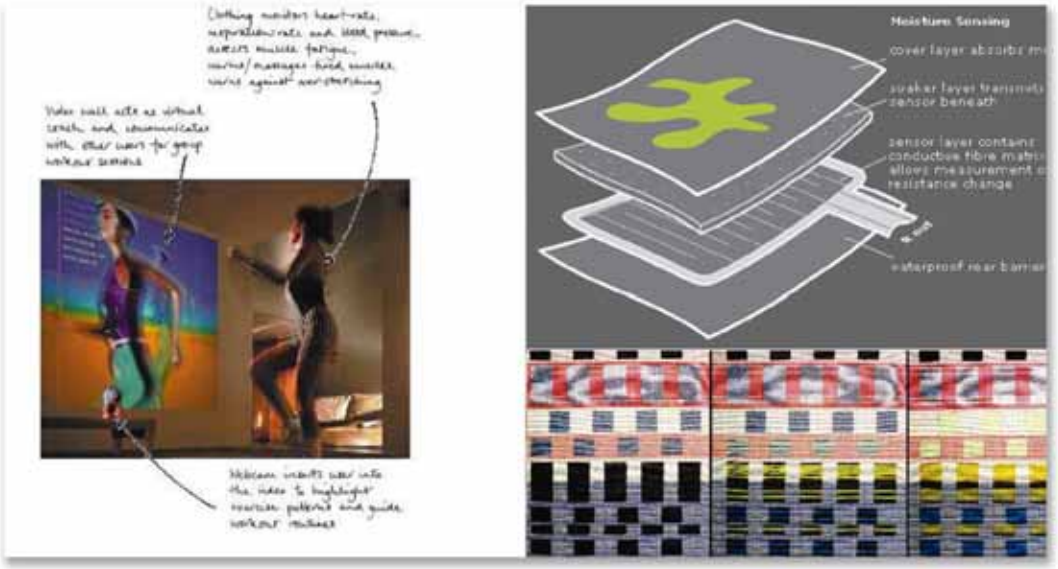


Figure 8 Philips motion recording (Left) Elektex moisture sensing electronic fabrics and chameleon colour change materials (Right)

Figure 9 SOFT Switch integrated electronic fabrics

SOFT Switch (Figure 9) is a wearable electronic textile textile-based pressure sensing technology developed by Canesis in Christchurch. SOFT Switch is one of the first technologies that integrate a user interface, such as the controls for an electronic device into soft fabric materials. Burton Snowboards has been one of the first apparel companies to utilise SOFT switch technology. Their product, which uses a SOFT switch sleeve panel to control an integrated

personal stereo, was named by TIME Magazine as “one of the coolest inventions of 2002”. This technology is enabling electronic devices to be worn instead of being carried

- **Self Repairing Plastics (SRP)**
  At the University of Illinois at Urbana Scott White has designed self-repairing plastics. SRP (Figure 10) work by incorporating microcapsules that are full resin monomers. Upon rupture or damage, these monomers spreads through a cracked area and link up as they come in contact with the catalyst dispersed in the polymer, to bond the fractured areas together. According to testing results of this process, these self-healing plastic can be used anywhere where polymer is now used. Imagine the possibilities of this material moulded into a high performance sports product.

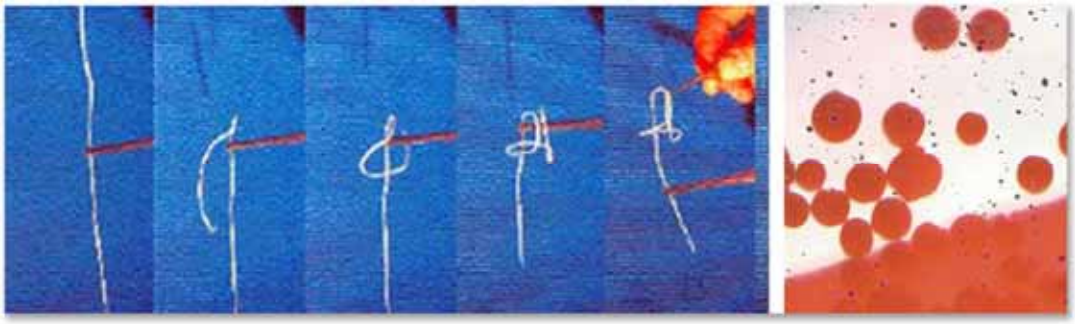


Figure 10 Self-tightening fabrics and shape memory polymers (Left): An optical microscope image of self-healing plastic. The microcapsules are coloured red and the catalyst is black. The dark specs in the image (Right).

- **Phase Changing Materials (PCM)**

  Phase Change Materials (PCM) contain encapsulated substances that can change their physical state when exposed to a change in temperature. PCM technology was originally developed in the 60's for use in NASA space suits and has since been developed for consumer applications in sporting equipment and apparel. In clothing, when the body temperature rises above a specified level, PCM’s automatically absorb and store the excess body heat, creating a cooling effect to help return the users body temperature back to normal. In return, when the outside temperature drops below a specific level, the PCM automatically releases the stored heat back to the body, causing a warming effect. Because PCM’s can either be designed to respond automatically to changes in the temperature, or manually at the request of the user, they present innovative opportunities for all outdoor and survival applications This is an interesting material development that benefit from other technology developments such as Soft Switch to make it more user focused.

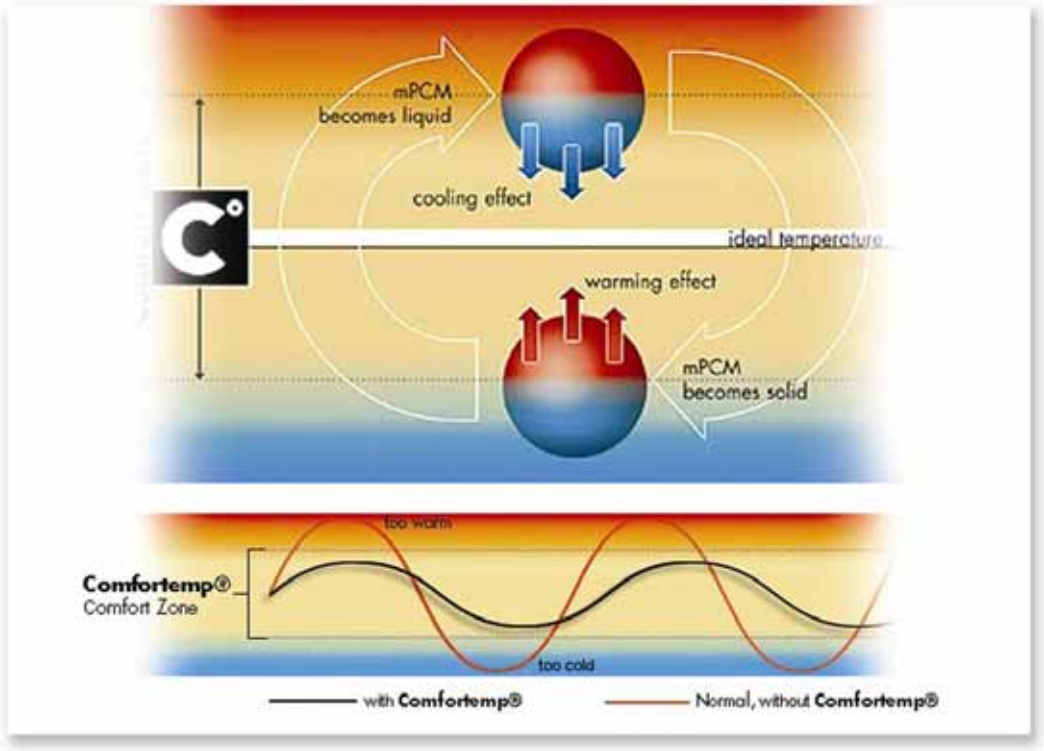


Figure 11 ComfortTemp Phase Change Technology

- **Super-light Super-strong**

  Nexia of Canada is developing BioSteel Bio-Polymers, which is an equivalent synthesis of spider silk. BioSteel development has focused on spinning protein derived from goat's milk into nanometre fibres, to create superfine, super lightweight fibres that have high performance material properties. BioSteel is of great interest simply because sporting products in almost every aspect need to be as lightweight but extremely strong and agile as possible. Products produced of such materials would create new 'extreme sports' opportunities and would prolong the life of sports equipment by being more resistant to fatigue. This development is set to redefine our current comprehension of strong materials.

  Significant research and development has been undertaken to develop our 'second skin' (Figure 12). This area has seen intense exploration of 'soft' moulded materials over the last decade. Significant second skin innovations include the Speedo Fast Skin and the Adidas Swift Suit, both items developed to increase speed while reducing drag and the threat of injury.

Figure 12 Speedo Fast Skin

- **Environmental Textiles**

  Over the last ten years there has been significant, push towards more environmentally friendly or environmentally intelligent materials. This development has been focused on closing the manufacturing loop of materials that previously have ended up in landfills. Materials that are recollected for reuse are not just being recycled, but technically 'upcycled' or enhanced to out perform and be more efficient than virgin materials.

  DesignTex is an American based textile company leading the development in this area of 'Cradle to Cradle' materials. DesignTex has developed several environmentally intelligent materials, which are set to have a huge impact on the sport equipment industry. These textiles include: *Climatex Lifecycle™,* A biological textile which is a completely compostable nutrient designed to turn back into soil at the end of its useful life; *Eco Intelligent Polyester™,* the first fully environmentally defined synthetic textile designed to be perpetually recycled into a product of equal or greater value without the use of antimony; and *Recycled Polyester Terratex®,* which is made of 100% recycled fibre from post-consumer and post-industrial recycled yarns.

Figure 13 DesignTex eco textiles

The New Zealand Context

New Zealand has a unique geography and a distance from international markets that has forged a unique and original outlook. New Zealanders have embraced a wide range of outdoor sports and created innovative products in many of them.

This geography is a great natural asset to any equipment manufacturer, but it is only useful when it is utilised with a sophisticated product that provides people with demonstrable benefits.

The New Zealand outdoor industry is diverse but small scale by comparison to many international outdoor companies. The Australian surfing industry has been far more successful in harnessing the perception of their country and their sport to create multinational companies such as Billabong. They have seamlessly combined technical development with evolving surf trends to maintain an edge.

Outdoor Heritage

In the 1960's Fairydown equipment assisted in carrying Edmund Hillary and Tenzing Norgay to the peak of Everest, a feat of incredible endurance, with the help of innovative, reliable equipment (*Figure 14*). New Zealanders' love of adventure and the great outdoors has been the catalyst for an industry that has produced exceptional equipment, accessories and apparel.

However, over the last decade, New Zealand's pioneering spirit and aspiration for invention in the outdoor area seems to have waned in the face of sophisticated alternative sports companies such as Burton Snowboards, Arc Terryx, K2, Berghaus, and the migration of multinationals such as Nike and Adidas into the outdoor arena from more conventional sporting backgrounds.

Figure 14 Conquering Mt Everest – Fairydown equipment supported Hillary & Norgay

There is the real need for the sporting equipment manufacturing and design base to engage with the international community and develop responsive and technically sophisticated new products that proactively meet emerging needs. This requires embracing a range of new technologies not previously explored to any great degree within the industry in New Zealand, and where possible using New Zealand

technology, manufacturing, and the geographical landscape to create a greater point of difference.

Australia and its surfing industry is a good example of what the New Zealand outdoor industry needs to become. Australia has successfully positioned itself as the focal point for the international surfing industry, with many of the leading international surfing companies having their origins there. This has been achieved simply by local design innovation and branding, that draws reference from the countries social and geographical attributes.

The dramatic rise in adventure tourism to New Zealand over the last decade is boosting the awareness of the outdoor industry, and it is providing local designers and manufacturers an incredible opportunity to expose innovations to international consumers.

The Sports Industry in New Zealand

New Zealand trade and enterprise has determined that "Outdoor apparel has been identified as a sector where New Zealand is globally competitive[7]". They also go on to state that "Companies succeeding internationally in the outdoors equipment and apparel export sector have flourished since New Zealand's economic reforms and restructuring of the industry in the 1980s".

There are several geographical clusters of companies in this sector, based in Auckland and the Bay of Plenty in the North Island and Canterbury in the South Island of New Zealand. Companies are cooperating to compete internationally, for example participating at trade fairs under a 'New Zealand' banner, or working together to provide overseas retailers with complementary products that offer a 'one-stop-shop' solution[8].

The sporting industry in New Zealand is made up of over sixty sporting equipment and apparel companies. These companies are exporting a diverse selection of products into niche markets around the world, estimated to be worth more than $40 million per annum to the New Zealand economy. Outdoor sporting equipment exports constituted $22 million of this value annually in 2003 (Figure 15). Although Figure 16 includes toys and games it generally illustrates there has been growth in this area to $39 million. It is difficult to gauge whether apparel includes manufactured garments for outdoor sports, as the total apparel-footwear sales are $203 million.

Major export markets include Australia, the United Kingdom, United States, Canada and Germany. The most successful export products listed by Trade NZ are: specialist outdoor backpacks; technical outdoor high performance and survival clothing, tents, sleeping bags, and water craft such as kayaks and white water rafts.

Product	Exports (NZ$ million)
Outdoor sporting equipment	22.7
Track suits, ski suits, swim suits	4.42
Fishing related equipment	4.63
Water & sailboards	3.24
Gym & other athletic equipment	2.38
Golf equipment, including clubs & balls	1.83

Figure 15 NZ Export Products Table – Trade NZ (June 2003)

[7] http://www.marketnewzealand.com/MNZ/MarketIntelligence/sectors/4586/3557.aspx
[8] http://www.marketnewzealand.com/MNZ/MarketIntelligence/sectors/4586/3557.aspx

	Net month of June 2004	Net month of June 2005	% Change	Twelve months ended June 2004	Twelve months ended June 2005	% Change
MANUFACTURED PRODUCTS:						
Textiles	20.83	17.54	-15.79	232.24	216.01	-6.99
Apparel/Footwear	13.35	11.33	-15.13	203.53	197.09	-3.16
Marine Equipment	6.55	18.82	187.26	273.11	244.18	-10.59
Toys, Games & Sporting Equipment	2.96	3.71	25.4	28.21	39.01	38.28
Other Manufactured Products	39.12	34.3	-12.32	477.33	431.75	-9.55

Figure 16 Total NZ Exports (FOB in $millions)

The outdoor category is a large component of the New Zealand sporting industry. Figure 17 forms a cross section of the local outdoor industry. Companies have been grouped into four categories (natural elements) in which they are manufacturing products. These categories are Snow, Wind, Water, and Earth.

The diagram shows that there is an interesting relationship between Macpac; Kathmandu; Cactus Climbing; and Fairydown, as these leading companies are individually producing similar products in many areas. It may be possible to pool resources with several of these companies to create some fundamental innovations that could be shared.

Figure 17 NZ Outdoor Equipment Industry Cross Section

Local Manufacturing Issues

Companies such as Icebreaker have successfully designed and marketed product in natural materials forming close relationships with Marino suppliers based in New Zealand even though many of the garments are manufactured in Asia. They have managed to get scale through international sales and a compelling story about the

source of their material. By creating relationships with New Zealand materials and technology, it could enhance the overall brand perception as well as creating higher value new products.

The lack of scale has been a contributing factor in the lag behind international technology over the last 20 years. The capital investment required for research, development and tooling has created a hurdle for local companies wishing to develop innovative materials and mouldings in New Zealand. Tools that produce sophisticated three-dimensional components can be very expensive, and form a significant upfront cost to any such project.

The full potential and value of moulded materials seems to have been overlooked by New Zealand manufacturers. The traditional focus within the industry has been on Soft fabric product development, with any metal or plastics playing just a supporting role in the product. This has however restricted early exploration of advanced moulded materials and technical production methods, which has become the hallmark of today's outdoor products.

Although New Zealand companies have been highly innovative, scaling these concepts up into mass produced, international products have been problematic. This may be due to the fact there has not been an experienced team or framework to systematically design and develop the complex interaction between the human factors, hard and soft materials. A process, that forms a fusion between research , parametric Computer Aided Design (CAD) three-dimensional modelling, and Pattern Aided Design (PAD) tools.

The shift of production to Asia has probably diminished the interaction between industries that traditionally fosters innovation in materials and new combinations. This in turn inhibits the development fundamentally new products. Local partnerships enable fluid discussion, accurate prototyping and pre-production testing, two very important aspects required to create innovations.

For New Zealand to become more successful and position itself as an important focal point for the outdoor sport category it needs strong research, design and manufacturing partners working together.

Sustainability vs. Environment

Many people involved in the outdoor industry and participating in Outdoor activities and sports profess a deep respect for the environment. There is however, a large gap between caring for the environment and being sustainable. In this section, the two are separated for frank discussion.

Many of the products that are produced in the outdoor industry are combinations of a number of very different materials that are unlikely to be recycled. With the exception of some key producers such as Patagonia, many do not have environmental programmes for their organisations or the products they produce.

Benchmarking the environmental characteristics and having a greater understanding of the supply chain would enable innovative products and product services systems to be employed.

Michael Braungart of MDBC[9], the author of Cradle-to-Cradle, defined two spheres that production operate in, the 'Biosphere', which is organic and natural, and the 'Technosphere', which is synthetic. In Braungart's view, materials need to be thought of as 'Technical Nutrients' that can be used by either the biosphere or the Technosphere. He also illustrated the difficulty when products from the Technosphere go into the Biosphere or vice versa. Many outdoor products combine materials from both spheres, which then are dumped into the biosphere, creating a growing waste problem.

Sustainability as an Opportunity

Generally those who are involved in sport, particularly outdoor sports, have a close affinity with the environment. Yet, currently an estimated 400,000 – 700,000 tonnes from textiles ends up in the landfill each year in the United Kingdom[10] alone.

Environmental issues are becoming an important aspect to all outdoors sports activities, and it's critical the sporting industry demonstrate leadership on this issue to enable economic growth. The sports industry needs to shift its mindset and from being 'environmental' to being 'sustainable'. This means developing an understanding of the 'product life cycle' (PLC) from the material extraction through its manufacture, use and disposal. It is estimated that the average garment life is 3 years, which is likely to decrease with fashion moving at a faster pace. This needs to be thought about in the production and construction of garments.

Figure 18 Recollection and recycling of old shoes

[9] www.mbdc.com
[10] www.wrap.org.uk

The simple fact is that sustainability within the sports industry is not only a positive shift for the environment; it also holds significant commercial value for companies wishing to become more cost effective. Using less virgin materials, re using and re integrating old materials, and employing efficient manufacturing techniques, products can become extremely cost effective. This is a business model where eco efficiency equals waste avoidance, which results in savings.

It starts with the acceptance that the products they produce do pollute the environment, so then you can start the process of closing the loop and reducing the impact of the products that are produced.

Several multinational companies are sensing the value with this approach. In 2000, Nike launched its 'Re-Use a Shoe' program (Figure 18), an initiative to promote the recollection and reuse of old sports shoes. In the four-years since its introduction, the 'Re-Use A Shoe' program has recycled more than thirteen million pairs of old athletic shoes and is taking Nike one step closer towards closing the loop on their manufacturing product.

Patagonia, the leading outdoor clothing manufacturer has recently partnered with Japanese textile firm Teijin to implement a polyester product-recycling program that will re collect Capilene undergarment products from its customers. Teijin will recycle them as polyester materials at a "fibre-to-fibre" recycling facility in Teijin Fibres' Matsuyama plant. This new partnership closes the manufacturing loop on post-consumer recycled (PCR) textiles already in use by Patagonia (Figure 19).

Figure 19 Patagonia's closed loop on post-consumer recycled (PCR) textiles

In 1993, Patagonia incorporated into its product line fleece made from PCR plastic soda bottles. The company now uses PCR materials in about 30 of its products, and believes it has saved some 26 million plastic bottles from landfill. This year, Patagonia began using a new PCR filament yarn containing 30%-50% post-consumer

feedstock made from discarded soda bottles, polyester uniforms, tents, and garments. "We're constantly trying to innovate our supply chain," says Jill Vlahos, Patagonia's director of environmental analysis. "Everything we make pollutes, but we're trying to improve every step of the way. We're excited to create our own supply rather than pulling from raw virgin resources." In Patagonia's case, the added expense of recycling is offset by the fact that the company does not have to purchase or create raw virgin polyester materials.

Important Points on Sustainability

The situation for New Zealand companies is that they operate in niche markets, and quite simply need to be more environmentally sustainable to survive. The following is a list of important points that can help New Zealand companies boost their awareness of sustainability:

- It is important to understand the entire Product Life Cycle of the product.
- Life Cycle assessment of products and services can help companies understand and benchmark the environmental impact of their products. To develop sustainable product, one must understand the products impact on the environment first, then work towards reducing its harmful aspects through design. Life cycle thinking, when employed within the design and development process, at the front end, can create innovative products that are sustainable.
- Recycling and the reuse of old materials present a cost saving opportunity. If employed correctly within a sustainable business model, recycling and reusing old materials has an associated value that could rule out the need to manufacture in Asia.
- New legislation is being passed in Europe and the United Kingdom to reduce the volume of waste in landfills from manufacturing industries. These legislations make producers responsible for the life cycle of their products, and it requires producers to have sound processes in place to re collect and correctly dispose of their products.
- New Zealand companies can acquire significant sustainable brand value and greater point of difference in the market by producing products locally, being transparent to the consumers, leveraging themselves off New Zealand's geographical position and outdoor heritage; an attribute that is unique to New Zealand.
- New smart materials, particularly biomaterials, constitute an opportunity to develop sustainable products. Many of which are produced from organic properties, as petroleum in some cases cannot provide for high enough levels cost effectively, as mentioned by Knut Meyer of DuPont.

International Market

ISPO International Sports Fair

In February 2005, Locus travelled to Munich to visit the ISPO 05 Winter Fair. The aim was to witness first hand the state of the international sporting industry to validate several conceptual ideas and to identify new opportunities that could boost the awareness of the New Zealand industry, internationally.

ISPO is one of the key sporting design and manufacturing fairs in the world today. It encourages the convergence of sports disciplines and brands to share in the rapid evolution of sports design and the development of our international sporting community. The fair is the centre point for the ISPO global sports network, attracting 57,000 visitors to the 17,000 exhibits, daily seminars, presentations; and fashion shows.

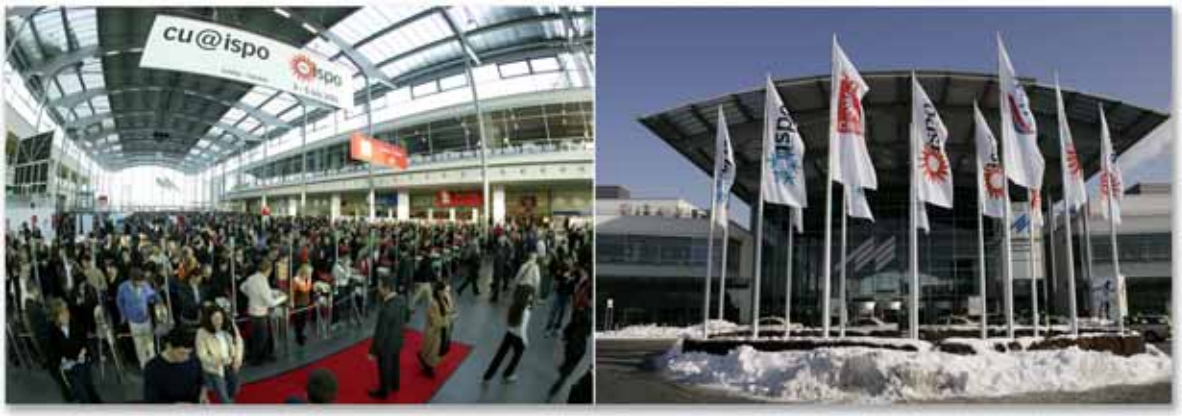


Figure 20 ISPO Messe Munchen

ISPO Initiatives

ISPO runs several unique initiatives and awards schemes to encourage and foster new design innovation. The following is a list of programs directed at exposing new ideas from both emerging and mature design organisations. Each initiative represents a public platform for releasing new product internationally, and should be considered seriously by New Zealand companies wishing to export offshore. These initiatives are as follows:

ISPO Volvo Design Forum

Every year Volvo presents the ISPO Sports Design Forum[11]. This forum provides a creative introduction for the fair with industry representatives and special guests presenting on various topics. The forum aims to publicly discussing new trends and conceptual ideas to develop the industry. The forum is televised across all European and American media networks and has a wide following.

[11] http://www.ispo-sportsdesign.com/

Volvo Design Awards

Supporting the Volvo Design Forum is the ISPO Sports Design Awards[12]. The awards competition is open to the whole sports industry so being successful at this level is a huge accomplishment. Each year a judging panel is selected (which generally consists of the Forum guest speakers) and the works are judged on a set of criteria. In 2005, the competition theme was “Woman’s Hardware” in sporting equipment. ISPO received 281 applications. On behalf of Rossignol, Claudia Riegler, New Zealand’s Ski Team coach and three times Olympic games and world championships slalom skier, accepted the top award in the ISPO Ski category for their Axion Women’s Ski System.

Figure 21 Speaker Jake Burton Capenter and the: Volvo Forum.

Brand-New Awards

The Brand-New Awards[13] is a category set up to promote new ideas, innovations, and brands of young start up companies. The concept of this competition is to encourage and promote new ideas at the fair by providing the chance for companies to win the right to exhibit free of cost. Leading up to the fair, ISPO invites the industry to submit its new ideas. Submissions are judged and the most successful ideas win themselves a stand space within the Brand-New Village.

From the forty-one companies who won the right to exhibit at this winters Brand-New Awards, Flink[14] (Figure 22) a new backpack system designed Remo Frei from Switzerland caught the interest of the visitors to the village and won the overall ISPO Brand-New Accessories Award.

The Flink is a backpack and harness consisting of a rigid exoskeleton with the fabric baggage component that forms an inner layer between the frame and the body. The harness features a single ball joint mount at the top located between the shoulder blades that allow the pack to move freely on your back while the weight is transferred onto the hips via a hip belt connection.

[12] http://www.ispo-sportsdesign.com/english/award/index.html
[13] http://www.ispo-brandnew.com/
[14] http://www.ispo-brandnew.com/winter05/winner/flink/index.html

Figure 22 Flink backpack – Winter 05 Brand-New Accessories Winner

Outdoor Awards

The ISPO Outdoor Award is an open competition for any company releasing a new outdoor product for the first time at ISPO. From the group of new products released at the fair, ISPO judges select and award the most innovative new outdoor sporting product.

This ISPO Winter 05, Berghaus[15] from Newcastle in England, was awarded with the Outdoor Award for the companies Bioflex backpack and harness design (Figure 23). Berghaus worked with QinetiQ, Europe's largest science and technology solutions provider, to design and develop the Bioflex backpack.

The BioFlex is a completely new harness designed around the concept of a pack move with you in your walking motion. The harness essentially consists of a set of shoulder straps that are designed to pivot independently of the backpack, while several innovative injection moulded plastic and santoprene parts are co-moulded together truly integrate the harness with the storage component.

Figure 23 Berghaus Bioflex Backpack

[15] http://www.berghaus.co.uk/

New Zealand at ISPO

While New Zealand has had a limited showing in the exhibition halls at ISPO, three New Zealand individuals have provided a strong association with the ISPO Volvo Design Forum.

In 2003 at the summer Volvo Design Forum, Dr Scott Champion (Product Innovation Manager at The New Zealand Wool Company in Christchurch) was invited to present on the development of Merino wool within sporting equipment.

Blokart's Paul Beckett was invited as a guest speaker at the 2003 winter forum after the company's profound success at the ISPO Summer 2003 Brand-New Awards six months earlier. Paul's presentation discussed the difficulties Blokart faced by developing a land yacht capable of sailing on frozen ice from an isolated country where its lakes do not freeze.

This year Claudia Riegler was among leading international guest speakers such as Jake Burton Carpenter (CEO Burton Snowboards) Moni Wolf (Director of Motorola iDen) and Anna Rosen (Volvo Car Design). Claudia has been appointed women's design ambassador for Rossignol on the back of her world championship success. Rossignol is one of the largest international ski equipment manufacturers. Claudia was invited to talk about the sport of slalom skiing and how Rossignol are meeting the growing needs and demands of female skiers.

Figure 24 Guest Speaker Claudia Riegler at ISPO

Successful New Zealand Products

Blokart[16] (Figure 25), the land yacht design and manufacturing company from Tauranga not only won the opportunity to exhibit at the BrandNew Village, but also went on to win the ISPO Brand-New Innovation Award. This exposed Blokart to the international sporting industry and has helped establish Blokarting as a recognized niche sport. Blokart made such an incredible impact at the fair that, after being awarded the top prize, Volvo, the Swedish Automobile giant approached the company with a lucrative licensing opportunity for Blokart products to be sold in combination with Volvos new sports cars. A successful opportunity made possible through a unique ISPO initiative.

[16] http://www.blokart.co.nz/

Figure 25 BrandNew Summer 03 Winner: Blokart Land Yacht

New Zealand Exhibitors

For a country that is internationally recognised as an outdoor nation, supported with a group of elite world champion sportsmen and women, only two companies (Ice Breaker and Wool Tec) were actively promoting themselves in the exhibition halls at ISPO this winter. Both companies are manufacturers of merino-based garments, and while they have successfully embraced this unique raw material and are exploiting its opportunities internationally, they are not manufacturers of technically sophisticated products that have a great deal of defendable intellectual property built into them.

The long list of New Zealand equipment brands was not exhibiting new product concepts at ISPO. This suggests whilst these equipment companies have a strong following within New Zealand they maybe lacking brand awareness internationally, or have not been producing significantly different products worth releasing at such a fair.

ISPO Insights & Conclusions

The majority of New Zealand outdoor sporting brands and are, as Ray Labone recently stated in the New Zealand Herald, not “world famous brands” but are ‘world famous in New Zealand’. This was evident with only Blokart, Ice Breaker and Wool Tec represented at the premiere international sporting goods event.

New Zealand has a developing connection with ISPO, achieved through individual success at the Volvo Design Forum and the Brand-New Awards. Since it began in 2003, the Volvo Design Forum has invited three leading New Zealanders to present in front of the international sporting community. This has provided a sound foundation for other individuals and companies to follow suit.

ISPO has several programs that could help young New Zealand companies launch internationally. Both the ‘Brand-New Award[17]’ and the ‘Green House’[18] project encourage the development of new products and companies by offering them the chance to win an exhibition space. Whilst the Volvo Sports Design Awards and the

[17] http://www.ispo.com/
[18] http://www.ispo-brandnew.com/

Outdoor Awards are ideal targets for more established companies to launch innovative new products.

New Zealand designers and manufacturers could work collectively to boost the awareness of the ‘local’ industry. If people perceive that innovative outdoor equipment comes from this region, it would benefit the wider industry and encourage new companies to develop products. Taken a step further companies could also collaborate on projects to achieve the scale required to create technically sophisticated products in New Zealand.

With New Zealand’s geographic assets and history it could become a global force in the outdoor industry like Australia has become with surfing. A collective event in the vein of New Zealand fashion week would provide an excellent platform to present exciting new products ‘in location’. Fashion week annually brings important fashion industry players to New Zealand to show the best of the local talent. These shows are important to experienced companies like Zambesi, and Karen Walker and allow young designers an opportunity to get onto the global stage.

Opportunity vs. Cost

There has been a real evolution of the outdoor sports category with increased customisation, more demanding performance requirements, the growth of new sports, and the integration of rapidly developing new materials and technology.

The huge swing of manufacturing to Asia has changed the industry, although offered the ability to create products that are more complex and still be price effective. This has however, diluted the potential of inter-industry collaboration within New Zealand. This has been detrimental to companies working together to share knowledge, and develop innovative new solutions.

Many international companies have dramatically increased the use of new technology in their products, both as a means of innovating and creating a point of difference. Companies succeeding with new products on the international stage like Berghaus Bioflex harness, are combining a range of new material and manufacturing processes to create more effective products.

The lack of scale in New Zealand has created an impediment to the uptake of advanced technology because of cost of research, development and productionisation. A more collaborative approach with research, design and technology partners working together with end-product manufacturers and marketers would enable the creation of sophisticated, globally relevant products.

New Zealand has the geographic and historical credentials to be a force in the international sports and equipment category. Creating an event in the same vein as New Zealand Fashion Week modelled on ISPO would create unique opportunities for the wider industry and encourage new companies to enter the market.

In the outdoor industry, people have confused being ‘environmental’ with being ‘sustainable’. There is a huge amount of waste generated to landfill by the industry and a relative absence of discussion about this impact and how it can be reduced. Both organic and inorganic materials are regularly used together in a way, which makes them inseparable, which further exacerbates the environmental impact. Patagonia, is an exception, they have tackled sustainability in a comprehensive and objective manner. They have created a full product service system to close the loop by remanufacturing garments through ‘upcycling’ the users original garment.

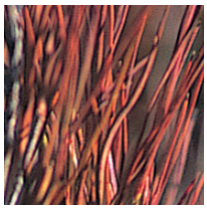
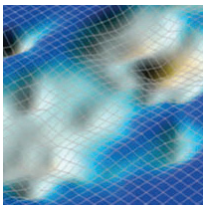
Sustainability is a potent prospect within Outdoor design, as the target market cares about the environment and often spends a great deal of time in it. A more sustainable product would also generate efficiency and savings for the manufacturer.

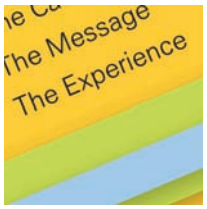
The international fair ISPO is a real hub for sports design and offers a range of opportunities for new and existing companies to release products globally. Blokart’s success at ISPO is an example of this as it has been able to build an international presence and very useful relationships with other companies such as Volvo through its success in the BrandNew awards.

Physics Lab is an initiative established within design company Locus Research to research and develop new products in the sporting and equipment category. Its objective is to work with innovative New Zealand companies to create products that are materially and technically sophisticated enough to succeed internationally.

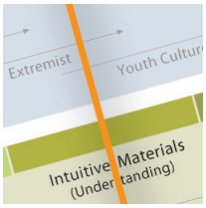
The sports industry is in an exciting transition towards more intelligent and sustainable products and it is creating new opportunities for the outdoor category and sports industry. It is a position that requires new approaches, ideas and collaborations for New Zealand companies to be competitive.

locusresearch
Sustainable Design & Development








locusresearch™ is a design company with fresh ideas on design and research. We operate in the four broad areas of Design, Applied Research, Sustainability, and Manufacturing.

In the six years since Locus was started we have built a reputation for deep research, original design and effective implementation. Our approach to sustainability has been pragmatic and practical, we simply aim to address these issues on a daily basis for both ourselves and our clients benefit.

This is achieved with simple design strategies, through to more advanced analysis using life cycle assessment and systemic analysis. As a team we have an overarching commitment to sustainable product design (SPD) from research into SPD through to commercial applications of the products that we design.

Our focus has been on research and development rather than just design; we drive to deliver a basic point of difference by using research to build a platform for product development and engineering. We believe in the strategic use of design on a short, medium and long term basis.

Locus has a client base that extends from New Zealand to the UK and has an informed international outlook.

Product Design
Applied Research
Sustainablitiy
Manufacturing

Studio Mauao
1st Floor, 4A Grove Avenue
P O Box 4141, Mt Maunganui Sth
Tauranga 3149
Aotearoa - New Zealand

Phone: +64 (07) 571 5007
Mobile: 027 240 5781
Fax: +64 (07) 927 3133
enquiries@locusresearch.com
www.locusresearch.com