

Merino wool: Footwear Treading lightly



THE
WOOLMARK
COMPANY

TREADING LIGHTLY

Thanks to our more active lifestyles and casual approach to dressing, sneakers are undoubtedly one of the most popular items in today's global market. Wool footwear has come a long way since the humble wool slipper, with wool sneakers, loafers and boots putting their best foot forward to offer comfort, support and resistance to odour.

The re-emergence of the use of wool is a relatively new development in footwear that has been prompted by cooperative activity between The Woolmark Company and the manufacturers of performance footwear. Wool was used in the manufacture of footwear for thousands of years before the development of synthetic fibres. Footwear was traditionally made from wool felts or from combinations of wool with leather; the leather giving the footwear good durability in wear and the wool providing both protection from the abrasive action of leather and comfort due to its softness.

FAST FACTS



The footwear industry produces 23.5 billion pairs of shoes annually.¹

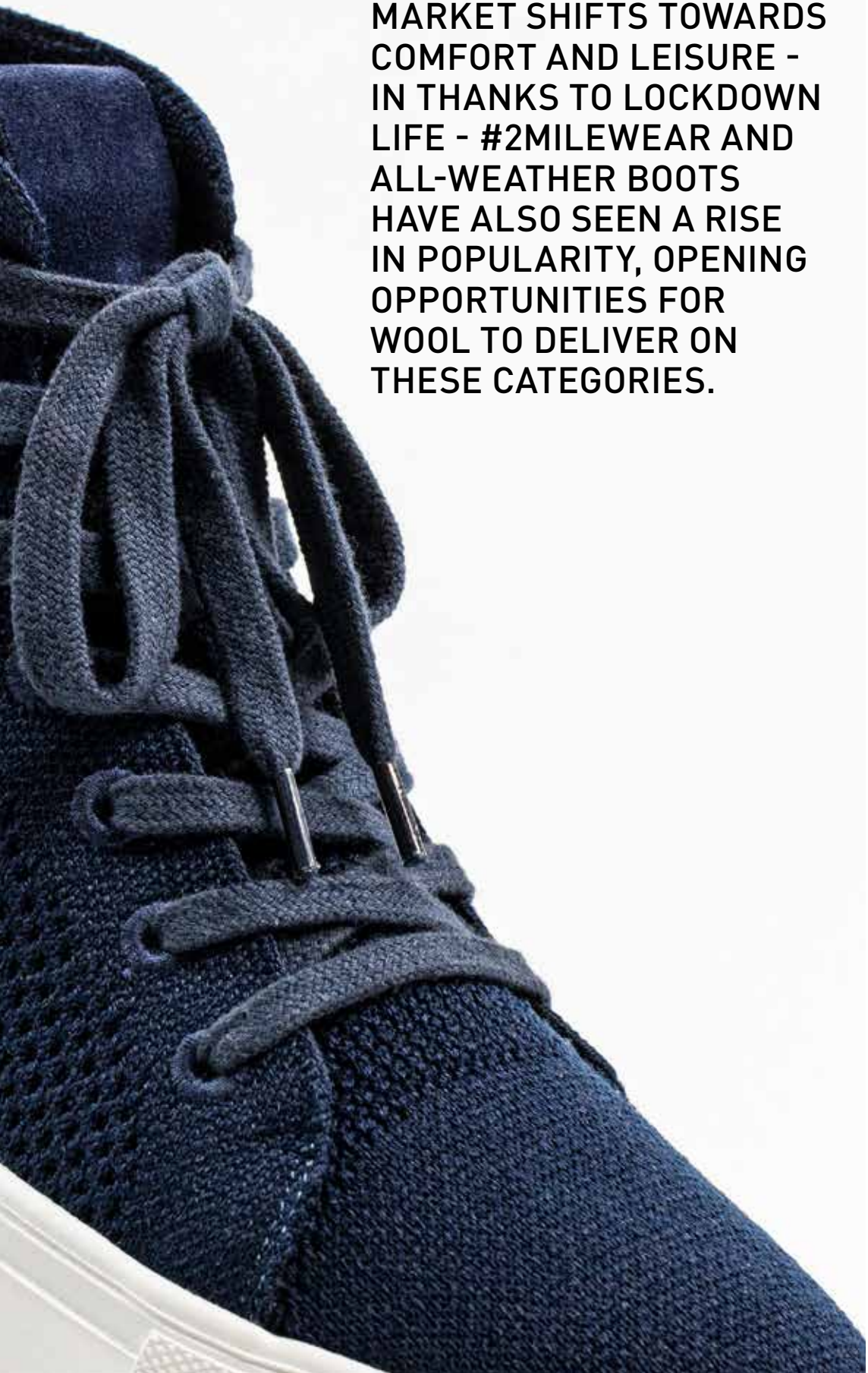


Footwear alone represents about 1.4% of global climate impacts.²



It can take 25-40 years for shoes to decompose.³





AS THE FOOTWEAR MARKET SHIFTS TOWARDS COMFORT AND LEISURE - IN THANKS TO LOCKDOWN LIFE - #2MILEWEAR AND ALL-WEATHER BOOTS HAVE ALSO SEEN A RISE IN POPULARITY, OPENING OPPORTUNITIES FOR WOOL TO DELIVER ON THESE CATEGORIES.

Merino wool: Footwear Treading lightly





100% NATURAL

Wool is 100% natural, grown year-round by Australia's 68 million sheep. Sheep consume a simple blend of water, air, sunshine and grass.



100% RENEWABLE

Every year, Australian sheep produce a new fleece, making wool a completely renewable fibre.



100% BIODEGRADABLE

When a wool fibre is disposed of, it will naturally decompose in soil. When wool degrades, it slowly releases valuable nutrients back into the earth.





100% NATURAL, RENEWABLE
AND BIODEGRADABLE,
AUSTRALIAN WOOL IS NATURE'S
MIRACLE FIBRE, OFFERING A
NATURAL SOLUTION TO THE
GLOBAL FOOTWEAR INDUSTRY.

Merino wool: a natural fibre



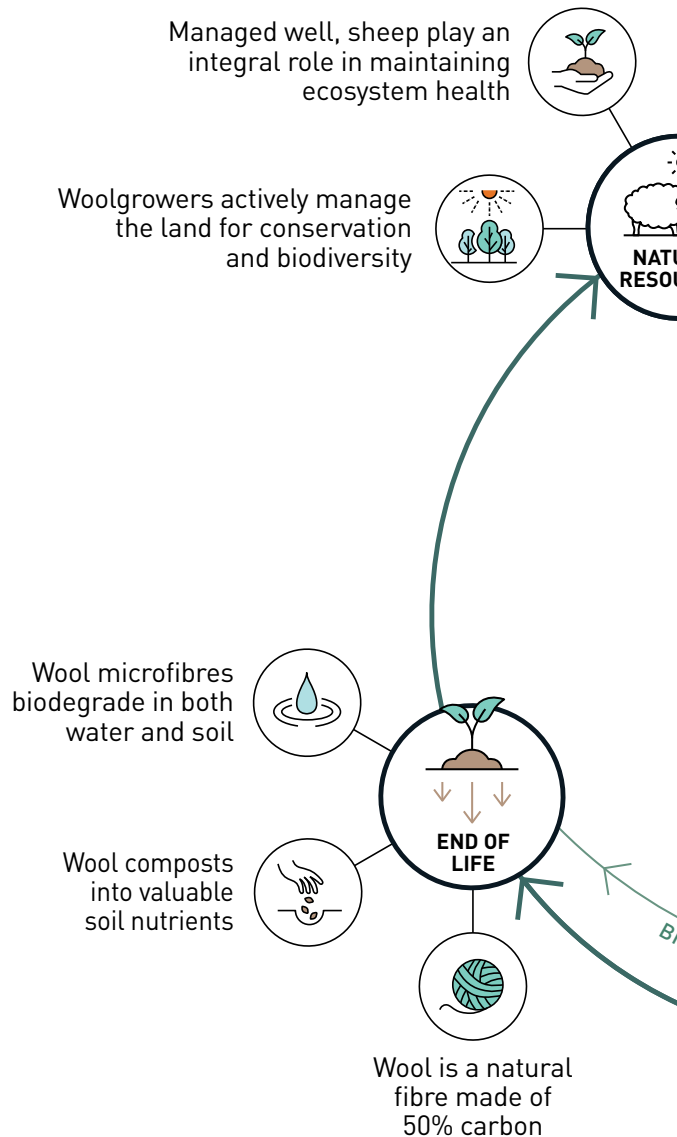
ALIGN TO THE CIRCULAR ECONOMY WITH WOOL

Circular design in the textile industry uses regenerative materials, keeps garments and footwear in use and provides pathways for reuse, recycling and biodegradation at end-of-life. Discover how wool can be used within a circular textile economy.

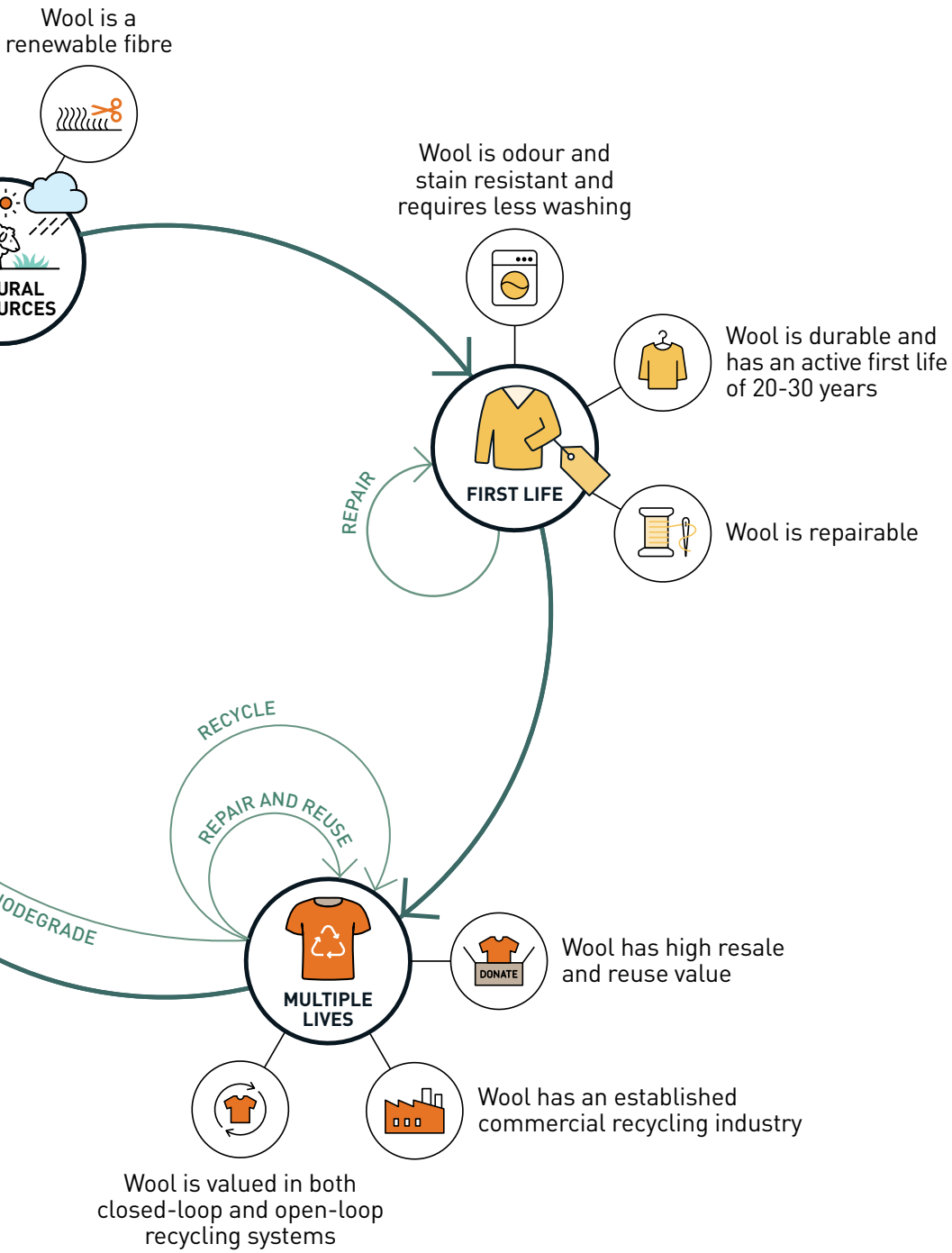
Every year, sheep produce a new fleece, making wool a completely renewable fibre source. Wool is grown by the simple mix of sunshine, water, grass and fresh air. That is, wool grows on a sheep's body because of the proteins, lipids and minerals naturally absorbed through their diet, in much the same way as human's grow hair.

Environmental factors including climate, day length, soil type and feed type all contribute and influence the production of sheep's wool. There is a use for every part of the wool fleece, nothing is wasted.

If a sheep's fleece is not shorn seasonally it can build up and potentially negatively affect the sheep's health.

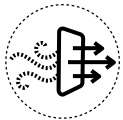


Merino wool: A circular fibre



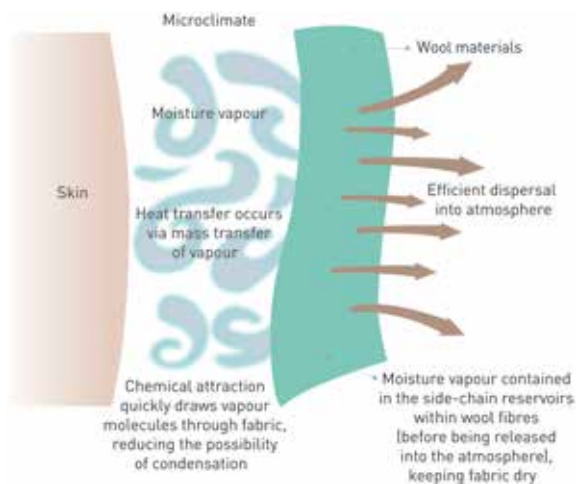
WHY USE WOOL?

Wool's natural properties can provide extra comfort when used in footwear products. The enhanced comfort includes dryness, breathability, freshness (anti-odour) and warmth. Wool is ideal for use in every type of footwear from casual shoes to active sportswear (sneakers and boots).



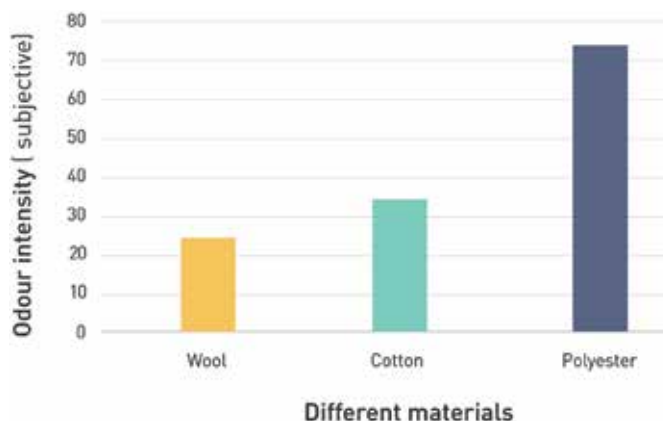
BREATHABILITY

Wool fibres absorb large quantities of moisture vapour, reducing the humidity of the microclimate next to skin so that the skin stays dry and reduces perspiration. Wool's superior moisture management means the fibre's presence in footwear can ensure greater comfort for the wearer with less tendency to clamminess.

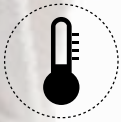


ODOUR RESISTANT

There are two ways wool can reduce odour; the first is to prevent the bacteria from thriving by maintaining a lower humidity within the shoe, the second is by absorbing or locking away the odour until it is released during washing.



Why use wool for footwear?



WARMTH

Wool's unique crimp allows the fibre to trap air, which provides the thermal resistance that inhibits the passage of heat from feet to the cold outside of the footwear. Sheepskin boots provide the greatest protection but, even in classic shoes with wool uppers and insoles, the same type of resistance to heat loss can be found. When used in socks, wool's insulative properties help keep the feet warm.



COMFORT

Using the latest fully-fashioned knitting technology, wool footwear can be knitted to its final shape, reducing the amount of wastage associated with regular cut-and-sew techniques.



RUN SOCK-FREE

Innovative design and manufacture enhance wool's natural breathability, allowing for seamless design for the entire shoe, including a breathable sole, keeping your foot dry and comfortable.

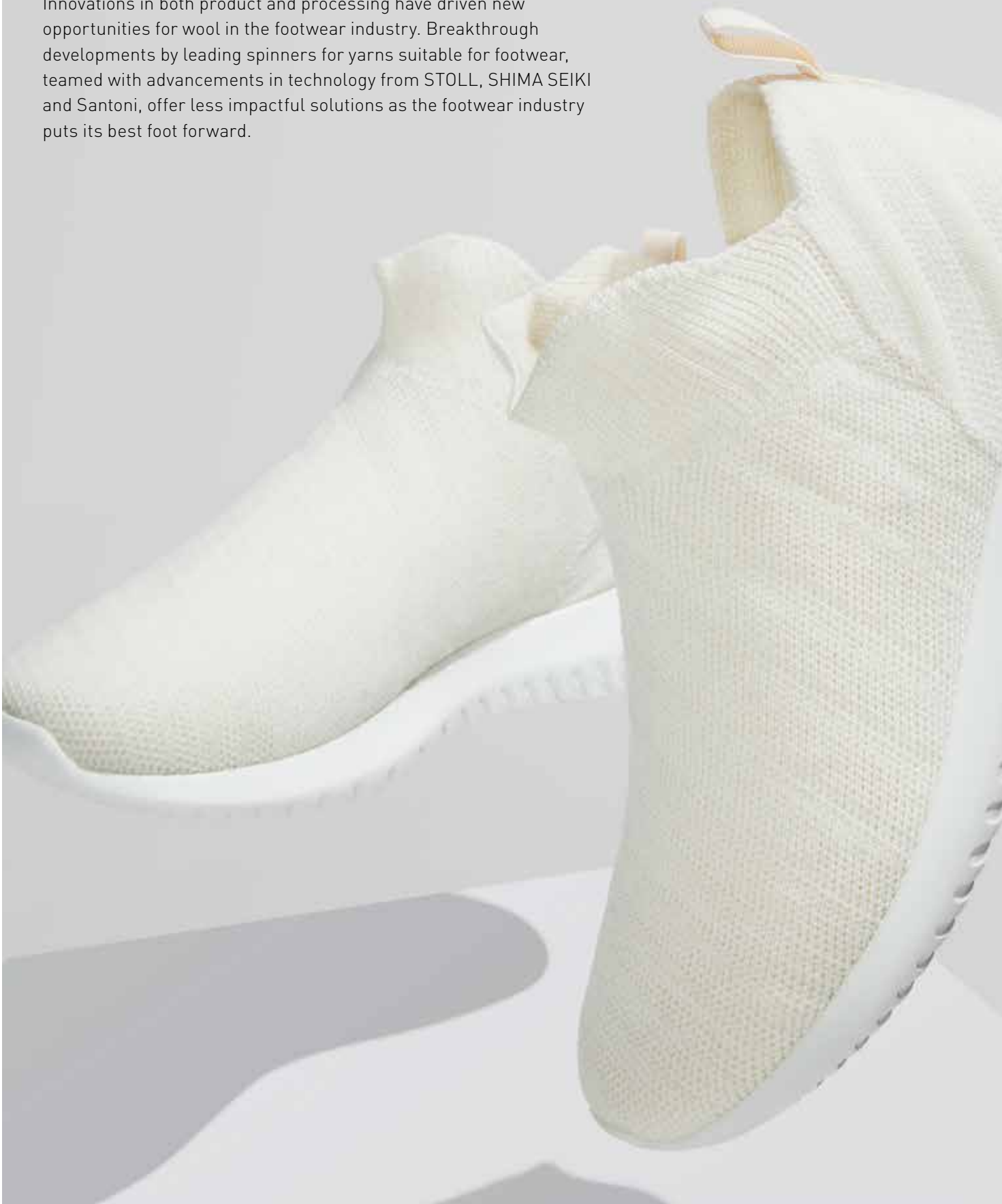


ECO-CREDENTIALS

Wool's inherent benefits, such as being 100% natural, renewable, biodegradable and recyclable make it inherently circular and the ultimate choice when designing for longevity and preventing waste going to landfill.

HOW TO USE WOOL FOR FOOTWEAR

Innovations in both product and processing have driven new opportunities for wool in the footwear industry. Breakthrough developments by leading spinners for yarns suitable for footwear, teamed with advancements in technology from STOLL, SHIMA SEIKI and Santoni, offer less impactful solutions as the footwear industry puts its best foot forward.



How to use wool for footwear

WOOL YARNS

- Many design and functionality possibilities can be created by using different blend yarns in shoe uppers. By using wool as the inner-layer, its natural benefits such as dryness, breathability, odour adsorption, softness and warmth that can add value to the products.
- Filament-wrapped wool yarns add strength and resistance to abrasion to the fabric and extend the wear of the shoe while maintaining the benefits of wool.
- Fusible yarn is required to keep the shape of the shoe. A yarn count at 100 denier is preferred as it can keep the shape without impairing the soft touch conferred by the wool.
- There are many different types of yarn which are suitable for footwear in flat-bed knitting. Wool yarns blended with other fibres can achieve benefits such as extra strength or added eco-credentials.

KNITTING ADVANCEMENTS FOR FOOTWEAR

Advancements in knitting technology by different machinery suppliers have facilitated the use of wool in footwear. Examples include STOLL (flat-bed knitting), SHIMA SEIKI (flat-bed knitting) and Santoni (circular knitting). With the sophisticated knitting technology from the machinery suppliers, it has become possible to create unlimited knit structures and designs in 2D or 3D structures for both outdoor performance shoes, as well as urban and lifestyle shoes. It is now possible to create 3D whole shoes without seams.

In fully-fashioned knitwear uppers, waste is reduced by directly mounting the shaped piece onto the sole, offering a more sustainable design practice for footwear manufacturers.



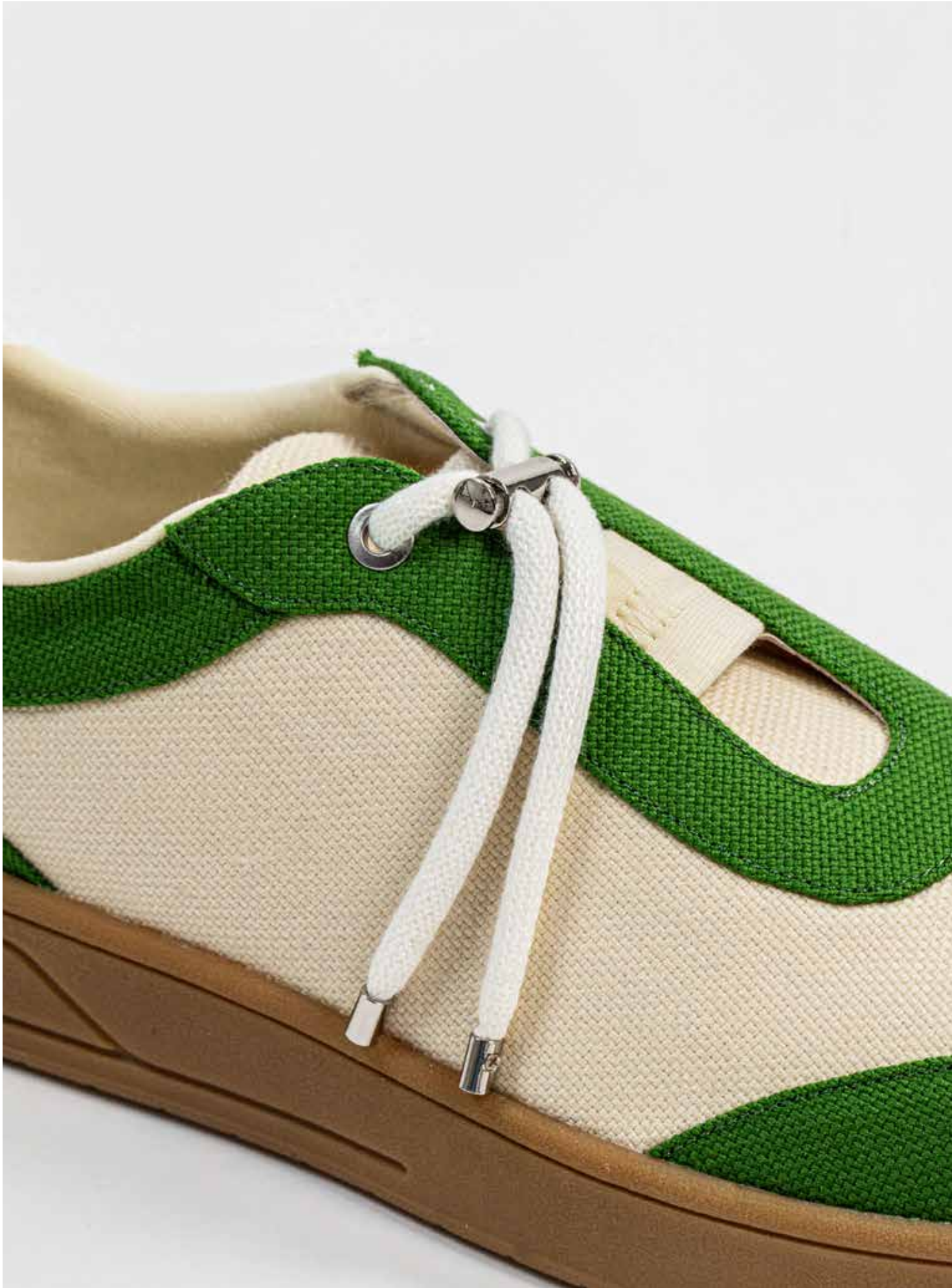
How to use wool for footwear



SHAPED FOOTWEAR UPPERS FORMED BY KNITTING:

- Uppers formed by flat-bed knitting machines (STOLL or SHIMA SEIKI machines)
- 3-dimensional uppers formed by Santoni Sock machine, SHIMA SEIKI whole-garment machine and STOLL knit-and-wear technology.





How to use wool for footwear

CUT-AND-SEWN UPPERS

There are a number of types of wool fabric that can be used in cut-and-sewn uppers of footwear:

- Woven fabric
- Circular knitted fabric boiled to induce felting which, in turn, increases the thickness of the fabric and reduces its air permeability
- Milled (felted) woven wool fabric
- Non-woven wool fabric formed by felting. This type of fabric can be felted in a way that allows the fabric to conform to the shape required for the component of the shoe.
- Sheepskin 'fabrics'.





WATER-RESISTANCE

Creating an all-weather shoe allows for increased versatility to the wearer and durability for the product. Adding water-resistance can be done in the following ways:

- Treatment with a fluorocarbon at yarn or fabric stage.
- Use of high-density Optim™ fabric to achieve a natural water-resistant function: Using the latest Optim™ fibre stretching technology, wool fibres are pre-stretched and spun before being wet-finished, releasing the stretch and causing the yarns to contract.
- Merino fabric lining onto a water repellent coating and calf leather outer.

Application of wool in footwear

3D PRINTING

The latest 3D printing technology is very suitable for application on wool shoes. Footwear designers can combine the aesthetic freedom of 3D printing while maintaining the technical performance benefits wool and wool blend yarns offer.

- Flexible design
- Minimise waste
- Infinite potential

DIGITAL PRINTING

New technology has made way for digital printing on wool footwear, revealing new design opportunities and markets for wool shoes.

- More flexibility in design
- Environmentally friendly dye
- Less water
- Excess dye is recycled

WOOL INSOLES

Crucial to the comfort and performance of shoes, the insole is responsible for a number of performance attributes. Wool insole inserts are available for performance and casual shoes. The insoles can be made a number of ways, most innovatively using circular and warp knitting techniques. By incorporating wool into the insole of the shoe, performance benefits include:



Odour management



Enhanced comfort



Temperature regulation



Application of wool in footwear

LINING

There are a number of fabric types that are suitable as shoe linings:

- As lining for the upper material –
 - woven fabric
 - sliver-knitted wool (simulated fur) fabric
- A traditional leather tongue or collar in a hiking/all-weather boot can also be lined with wool felt or wool fur to enhance the comfort, protection and warmth in extremely cold weather.
- As lining for insole (inner sole). The lining fabric can be attached to the outer part of the insole using a bonding method (gluing) or attached to the insole during the injection moulding process used to form the sole.
 - wool woven fabric
 - boiled (felted) wool fabric
 - non-woven wool felt fabric
 - sliver-knitted wool fur fabric



EMU Australia
Orica Hi boot



Levi's® Torsten Quilted boot

A photograph of a person wearing a brown wool sweater, looking at a red LED sign that reads "SHOES" and "HOES AN". The sign is mounted on a grey wall. The person's shoulder and back are visible in the foreground on the right side of the frame.

SHOES


HOES AN

WE PARTNER WITH LIKE-MINDED BRANDS TO CHALLENGE THE CONVENTIONAL USES OF WOOL AND CHANGE THE VOCABULARY OF THE FIBRE TO BRING INNOVATIVE WOOL PRODUCT TO MARKET.

INNOVATIVE PRODUCT DEVELOPMENTS WITH OUR BRAND PARTNERS REAFFIRM MERINO WOOL AS THE VERSATILE, CUTTING EDGE AND CLEVER ALTERNATIVE TO OTHER FIBRES.

Footwear innovation





VIVOBAREFOOT

Global minimalist footwear company Vivobarefoot is at the forefront of sustainable footwear innovation and is renowned for pioneering the barefoot movement. Australian Merino wool became the champion of VBF's natural category, contributing to its now B-Corp status. To create these barefoot shoes, the Merino wool fibre is spun into a special highly twisted yarn and then knitted with an advanced flatbed knitting machine to create the 3D stitch effects and shape (also largely reduces material waste). Wool's natural breathability and softness is enhanced through knitted channel pipes that act as a vent along the sock-like upper of the shoe. The products allow feet to move, breathe and perform in a way that synthetic or petroleum-based shoes cannot. The collection was tested under strict Woolmark standards and has been certified with the Wool Blend Performance trademark.

Footwear change-makers using wool

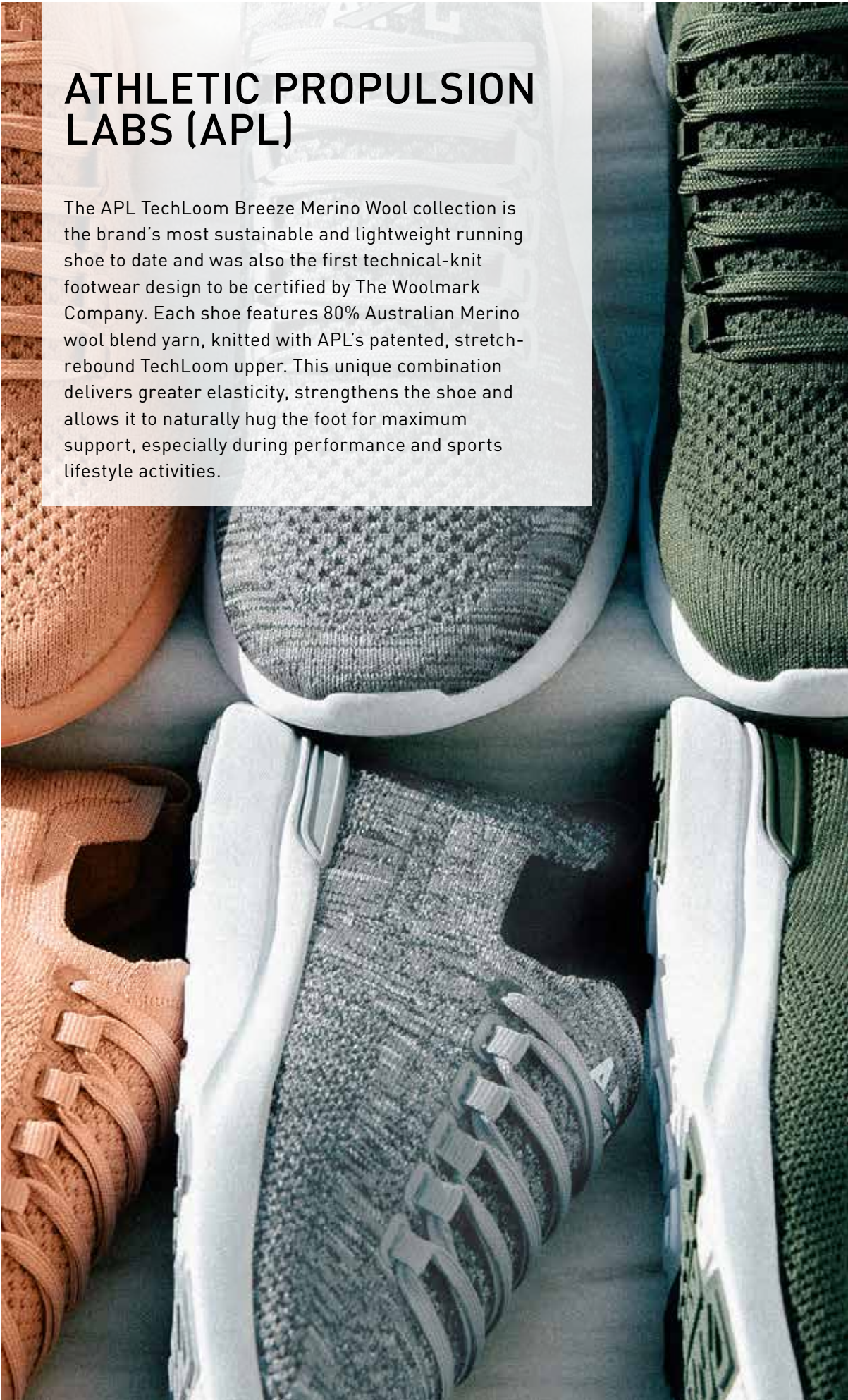
LEVI'S®

Levi's® has redesigned its iconic Torsten Quilted boot in a sustainable way. The updated boot now has a Merino wool felt lining, allowing better performance and reducing its environmental impact. This all-weather casual boot is just at home in the city as it is in the great outdoors. No matter the terrain, your feet will feel fresh and comfortable thanks to wool's intrinsic qualities of breathability, moisture management and odour resistance. The wool felt lining is Woolmark certified, giving you confidence this boot will be hard-wearing and long-lasting, whilst wicking away moisture and regulating your foot's temperature.



ATHLETIC PROPULSION LABS (APL)

The APL TechLoom Breeze Merino Wool collection is the brand's most sustainable and lightweight running shoe to date and was also the first technical-knit footwear design to be certified by The Woolmark Company. Each shoe features 80% Australian Merino wool blend yarn, knitted with APL's patented, stretch-rebound TechLoom upper. This unique combination delivers greater elasticity, strengthens the shoe and allows it to naturally hug the foot for maximum support, especially during performance and sports lifestyle activities.



Footwear change-makers using wool



EMU AUSTRALIA

Wool is an intrinsic part of EMU Australia's DNA. World-renowned for its wool slipper collections, the Woolmark licensee has a range of casual footwear to boot. EMU Australia's new Barkly trainer has a 100% wool outer, making this a lightweight, comfortable and machine washable shoe. This is a shoe with boundless spirit as its heart. The use of wool makes it a trans-seasonal sneaker that offers a clever mix of comfort and function for both performance and casual use.



ANGEL CHEN

International Woolmark Prize finalist Angel Chen created a knitted shoe made with 87% ultrafine Merino wool stretch-knit upper, allowing for the shoe to breathe, retain lightness, warmth and antibacterial effect. By combining wool on the inside of the upper shoe to provide softness and comfort next to the skin with an elastomeric TPU based polyester on the outer side of the fabric, Chen also achieved a high level of flame retardancy.



Footwear change-makers using wool

NEEMAN'S

We partnered with Indian footwear brand Neeman's to launch the first wool shoes in India. The collection combines Merino wool with a plant-based castor bean oil and recycled rubber – it is the first time any Indian brand has taken an eco-conscious route in footwear. They are designed to be sock-free, drawing on the natural odour resistance, flexibility and lightweight feeling of Merino wool. The collection comprises joggers (multi-functional lightweight running shoes), classic sneakers, and a simple yet elegant loafer – the latter achieved boiled wool fabric with a sophisticated double-wrapping yarn by Lincspun technology to achieve a high performance as well as a comfortable material.



INTERESTED IN SOURCING FOR PERFORMANCE-DRIVEN FOOTWEAR? WE WORK DIRECTLY WITH HUNDREDS OF SUPPLY CHAIN PARTNERS TO PROVIDE SOURCING SUPPORT AND SUPPLY CHAIN CONNECTIONS.

Our dedicated textile technical team of experts have specialist knowledge in all areas of the supply chain and are available to assist our partners with technical transfer, troubleshooting, process and product development, along with supply chain optimisation. Together, we can develop new processes and products bespoke to your market and consumer demands.



Sourcing wool for footwear



OUR SERVICES

R&D | SOURCING | MARKETING | EDUCATION | CERTIFICATION

The Woolmark Company highlights Australian Merino wool as the ultimate natural fibre and premier ingredient for the textile and fashion industry through research, development, marketing and product certification.



RESEARCH & DEVELOPMENT

World leader in funding and delivering innovative research in wool production and processing from on-farm practices, manufacturing to design and post-consumer use.



SOURCING

Sourcing support for all tiers of the supply chain with direct access to the global wool manufacturing industry, The Wool Lab and bespoke material sourcing.



SUPPLY CHAIN OPTIMISATION

Our dedicated technical team has specialist knowledge in all areas of the supply chain and is available to assist our partners with technical transfer, troubleshooting, and process and product development.



TRAINING & EDUCATION

Wool Education programs for the entire wool supply chain, including free online learning via the Woolmark Learning Centre, custom training programs delivered by The Woolmark Company including staff training for brands and retailers.



MARKETING

Marketing the performance and environmental benefits of wool to ensure industry and consumers are informed and inspired to make better purchasing choices.



CERTIFICATION

Independent certification for quality wool products and the world's most iconic textile fibre brand – the Woolmark logo.

CERTIFICATION

The Woolmark licensing program is a quality assurance and product certification program for wool textiles. Products with our logo certify the quality of wool fibre content to both consumers and the supply chain.



PURE NEW WOOL



WOOL RICH BLEND



WOOL BLEND
PERFORMANCE

WOOLMARK LICENSEES

We promote our Woolmark licensees throughout our global network and support them with supply chain assistance, quality assurance, technical consultation, product innovation, marketing and promote their product throughout our network. Woolmark licensees have been awarded the Woolmark logo to signify the quality assurance of their product.



**TO ENQUIRE ABOUT OUR
SUPPORT AND SERVICES,
CONTACT YOUR LOCAL
WOOLMARK REPRESENTATIVE.**

REFERENCES

¹ <https://www.concept-21.com/thoughts/foot-wears-sustainability-problem/>

² https://quantis-intl.com/wp-content/uploads/2018/03/measuringfashion_globalimpactstudy_full-report_quantis_cwf_2018a.pdf

³ <https://stacker.com/stories/2682/how-long-it-takes-50-common-items-decompose>



woolmarkonline



thewoolmarkcompany



woolmark



thewoolmarkcompany



thewoolmarkcompany

WOOLMARK.COM

This publication should only be used as a general aid and is not a substitute for specific advice. All illustrations are courtesy of Australian Wool Innovation and The Woolmark Company. To the extent permitted by law, we exclude all liability for loss or damage arising from the use of the information in this publication.

The Woolmark symbol is a Certification mark in many countries. © 2021 The Woolmark Company Pty Ltd. All rights reserved. GD4385



THE
WOOLMARK
COMPANY