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FLASH OF BRILLIANCE: RECYCLING TURNS OLD FR COVERALLS INTO EVEN-BETTER NEW ONES

By Therese Kehler · May 23, 2018

For decades, protective clothing that is no longer wearable has been trucked to landfills where, for the most part, it remains for all eternity.

But thanks to a bit of out-of-the-box thinking and a whole lot of research and testing, a Vancouver company has developed a process to turn non-biodegradable aramid coveralls into new fabric. It's not just a potential solution to the waste problem; the resulting fabric, a blend of recycled and virgin fibres, is safer and softer than the original.

The idea was born in 2012 when Dan King, vice-president of research and development for Davey Textiles, started brainstorming with a handful of industry colleagues including Ted Parker, CEO of Vancouver-based Sparling Sportswear. King was bothered by the idea of thousands of tonnes of coveralls languishing in municipal dumps, recalls Parker.

Though the original brainstorming group parted ways, Parker, along with Dave Kasper, kept the idea alive with a new company called General Recycled (http://www.sparlingssportswear.com/general_recycled.shtml).

"We worked through five years of getting it to where it is now, of taking end-of-life coveralls, shredding them, turning them into fabric and making new coveralls from that," says Parker. "We've taken Dan's conception and brought it light years away from where it was before."

ONE OF THE BIGGEST POLLUTERS ON THE PLANET

For Kelly Drennan, keynote speaker at Davey's Protective Clothing Systems for Safety seminar in November, turning old coveralls into new is an idea she supports with every fibre — pardon the pun — of her being.

Drennan is the founder of Fashion Takes Action (<https://fashiontakesaction.com/>), Canada's only non-profit organization focused on sustainability issues in the fashion industry.

The clothing industry, she says, has been referred to as the second-largest polluter in the world behind oil, in context of pesticides and fertilizers used to grow cotton, toxic chemicals used to process fabric, and the "fast fashion" frenzy that sends mountains of out-of-date clothing to dumps.

Protective clothing brings a new wrinkle to her perspective, which is normally focused on high fashion.

Different, she says, but also the same.

"When you think about what you put on your body every day, that's apparel. We're even talking about socks and underwear. And yes, uniforms."

Research shows 85 per cent of textiles used in society — including clothing, upholstery, linens and towels — end up in the landfill instead of being recycled.

The synthetic fabrics in fire resistant clothing pose their own special problem, she says: they aren't biodegradable so remain forever in the landfill.

RECYCLED AND REIMAGINED

Aramid, short for aromatic polyamide, is a synthetic fibre invented by DuPont in the 1960s. Among its uses is a fabric called Nomex — durable, lightweight, fire resistant and widely used in the manufacture of protective coveralls and clothing.

This non-biodegradable textile, which can't be safely incinerated, is the focus of General Recycled's efforts.

The recycling logistics are straightforward. Used but no longer usable coveralls are sent to textile facilities in Quebec where they are stripped of metals then shredded into a fibre.

"The fibre is then blended with our 'new recipe', if you will," says Kasper, General Recycled's vice-president of sales and product development.

The blended fibres are spun into yarn and the yarn is woven or knit into fabric. General Recycled's basic twill has about 30 per cent recycled material, while its heavier sweatshirt fleece has between 30 and 50 per cent, Kasper says.

SAFETY AND NUMBERS

The key challenge for General Recycled was meeting safety standards: NFPA 70E for electrical arc flash fire, set by the U.S.-based National Fire Protection Association, and CGSB 155.20-2000 for flash fire, set by the Canadian General Safety Board.

Part of the arc flash standard is based on a fabric's hazard risk category (HRC) rating, ranging from zero to four depending on how many calories of energy it can absorb.

Most of the lightweight coveralls received by General Recycled are Nomex brand with an HRC 1 rating; after processing, General Recycled's new fabric has "virtually the same weight" but meets the higher HRC 2 standard, he says.

In the work-wear world, Kasper says, "If you can be a lightweight fabric and achieve a hazard risk category 2, you're gold."

THE FIVE-SECOND BURN

Parker and Kasper are even prouder of their fabric's performance in flash fire resistance testing.

One of the many tests done on the fabric — abrasion, tensile strength, tear strength, colour — is a simulated three-second burn (<https://youtu.be/4zWuPMeJgJA>) on coveralls worn by a laboratory mannequin outfitted with 122 sensors. The goal of the test is to ensure that the mannequin experiences no more than 40 per cent second- and third-degree body burns.

In tests done at the University of Alberta's certified facility (<http://pcerf.ualberta.ca/home>), the General Recycled fabric came through with flying colours: 7.3 per cent second-degree body burn, and no third-degree burn.

"But we wanted to see, where's our failure?" says Kasper. "Is it four seconds? Is it five seconds, is it eight?"

Despite reservations from the U of A, General Recycled went ahead with a five-second burn (<https://youtu.be/VTMaZhzWtcQ>). The results were impressive: 21.5 per cent second-degree body burn, and no third-degree burn.

"So not only are we recycling, not only is it cost effective, we are giving a level of safety performance with both electrical arc flash and flash fire that is better than anything on the marketplace," says Kasper.

WHAT'S NEXT

General Recycled has entered its early days in the marketplace. They've found manufacturers to create FR coveralls and other clothing, and the products are being worn in the field by a handful of companies who have agreed to try it out.

Lelia Lawson, Davey Textile's R & D specialist, says Davey will be incorporating the fabric into its products in fall of 2018.

"The product will be a high visibility trim with recycled component located in the centre of the woven backing material," Lawson says. "When laminated, the recycled yarn will not be visible."

Drennan says it's not always easy for corporations, with a focus on the bottom line, to agree to greener options and she hopes corporate shareholders will increasingly pressure companies to adopt sustainable practices.

"It's about raising the bar, taking it further," she says.

"Unfortunately we can't sit down and wait for government regulations because that just takes too long. ... Industry kind of has to get ahead of the government and take action."

The eighth annual Davey Protective Clothing Systems for Safety seminar will be held Nov. 5 – 6 in Edmonton. Full information at www.daveyseminar.com. (<http://www.daveyseminar.com/>)

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