

CONTEXT: Interviews conducted as part of an investigation into the barriers to, and opportunities for, achieving Circular Synthetics. Research was funded by Business of Fashion, Textiles and Technology Creative Research & Development Partnership (BFTT CRDP—£5.5 million) led by the University of the Arts London, part of the UK Creative Industries Clusters Programme (CICP) funded by the Industrial Strategy Challenge Fund, and delivered by the Arts and Humanities Research Council (AHRC) on behalf of UK Research and Innovation.

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Interviewee: Director, recycled fibre spinning business

**1: Interviewer**

**2: Interviewee**

**1:** The first question is quite straightforward. Can you tell me a bit about the background of [redacted] Fibers and your role within the company?

**2:** Sure. We started off about 10 years ago, actually. My father and his partners, they have a sourcing company where they're doing supply chain management for one of the big brands and various other companies or retailers sourcing their garments out of Bangladesh, and also Pakistan, China, Vietnam, the other big sourcing hubs. Basically in 2009, because they were working closely with [redacted], somebody over there told them about a factory that was closing down over there, that was taking fabric leftover clips and reprocessing it back into cotton, just mechanically. Just shredding it back to the fiber and without really knowing much about yarn spinning- nothing really about yarn spinning or manufacturing background.

They were a supply chain, but they bought it because for them, they were doing I don't know how many millions of units of t-shirts every year, specifically with [redacted] and various other companies, they were like, "There's a huge untapped resource here." When he explained it to me back then, I was like, "Oh, that's recycling actually." He's like, "Yes, I guess it is." I was always interested in it. And I joined about-- Well, I was doing stuff on and off seven years ago, but I joined and took over full time 2016, so four years ago.

We came up with the name [redacted] at that point because-- I was always pushing, I was like, "Look, this stuff, it might be cost-effective because the resource is there, but we really have to push the environmental aspects of it and the recycle aspects." That's what interested me in the first place. That's the reason I moved here, actually. I'm from New York. I moved here from New York five years ago to take over this project.

[redacted]

**2:** Yes. Basically that was our bread and butter because it saved the dyeing costs, which helped us get into the door for garment [pause] That was one of my key selling points of early on before the environmental craze set in more about three, four years ago. Was because, you were saving the dyeing costs, it actually became a cost effective yarn, as opposed to virgin materials because the yarn might've been slightly

more expensive, but the fabric and the garment was actually less expensive for certain items.

Using that platform and then the inherent water savings involved with not having to dye it-- A lot of research was done. A significant research was done on the recycle of cotton. It's one of the most sustainable environmental friendly because you're know having to grow new cotton, which is also an extremely water intensive crop, and a lot of CO2 emissions during that ginning and whatever phase. Lot of CO2 emissions is from the gin needed to boil the water to dye and everything like that. We sat comfortably on the sustainability spectrum. The thing that we do-- Transitioning over to the synthetics. That's the cotton portion. For us to make yarn counts which are suitable for garments. I don't know if you're familiar with the yarn counts, probably are.

1: A little bit.

2: Yes. For us to make something that is suitable for a t-shirt, we have to use 30% to 50% of a synthetic fiber. Now, usually for us, that's recycled polyester. The fibers that we produce in-house is the recycled cotton, but we are importing 60, 70 tons of polyester every month for the yarn.

1: Okay.

2: [redacted] I get a lot of people asking, "Why can't you go 100% recycled cotton?" I have to explain to them about the fiber, the nature of the fiber. They say, "Well, why can't you plan that with the virgin cotton?" I was like, "Yes, I can, but then you are missing out on the benefit of the dyeing." Because when we do a yarn, let's say a black yarn or a red yarn, for a garment using the recycled cotton, recycled polyester, most of recycled polyester is dope dyed, but it's also less environmentally taxing and cost-effective.

That, again, is in dry blending for making the yarn and without using any dyes in our processes. That's the background of it. Like I said, if you really started taking off about three years ago, and up and down it's growing. Before that it was very difficult. It's very difficult. You were selling something that was inherently inferior in traditional quality standards but we stuck to our guns and stuff like that. What's my role in the company? I handle all the operations of supply chain and marketing, and now, expansions. I guess you could say I'm running it, basically, yes.

1: Okay, brilliant. Thank you. The polyester that you blend in, it's presumably staple fibers?

2: Yes.

1: For sorting- I'm guessing you don't have to do too much sorting because it's post-industrial waste? It all comes- you buy as a color block and--

2: Yes. The sorting is done in a couple different steps. One is in the market because again, there's such a huge volume of the stuff that is produced, there's a market for it. It's not necessarily the most legitimate market, but it's there. That's a whole

different story. It comes sorted in terms of color families. We do sorting like-- My sorting team is, I think-- I have per shift, there are two shifts-- About 40 people.

For us, what we're actually looking for, which I guess is more pertinent to you, is not only color but also if it has other contaminants in it. For us to ensure the composition, we have to try to minimize the amount that's CVC, or Chief Value Cotton, or polyester cotton. Then a lot of it is also cotton spandex, which is the thing that we hate the most because sometimes you can't look through every single scrap. Then there may be yarn in the spandex portion, it sticks out, and it causes us a contaminant. Yes, I've had to give out a lot of free yarns, and what do you call it? Claims, because of lycra contamination. It's a big pain in the ass that I'd like to find a solution for.

**1:** That's interesting, yes. The processes that you will spin the yarn and then sell it, you sell it as yarn to textile producers?

**2:** Well, that's-- I missed the transactional process. The marketing process is actually- I market directly to retailers mostly. I actually work on nominations almost exclusively. Because like I said, the yarn is not necessarily the best, traditional quality setter. A textile would get it, and it's like, "Who is this?" You have to go over there and be like, "Look, you have to make it work."

**1:** The brands are actually doing this in terms of that they want your yarn because it has a superior sustainability credential, but that the textile mills might not have those values?

**2:** Yes.

**1:** Okay, cool. Thank you. In terms of the polyester that you're shipping in, you're bringing into your textile, it's, I'm presuming at the moment mostly coming from bottle PET?

**2:** Yes, it's going to be transitioning to that portion. We still import a decent amount of virgin also. It depends on the quality standards because the virgin is a slightly better quality. But yes, now, obviously, because most people are asking, if you can get 100% recycled, get 100% recycled and do the DER bottles that recycled polyester. Yes, that's all coming from PET bottles, yes.

**1:** Your process for processing the cotton is a mechanical process right? You don't do any chemical stuff?

**2:** No, I just goes into a process that opens it up into the fiber.

**1:** Cool. And most of the waste that you're using, the cotton waste, is, I'm guessing, pretty easy to source from Bangladesh? There's lots of production there, right?

**2:** Yes, it's all coming from Bangladesh because this is-- I think we've passed China now in terms of T-shirt volume. That's another drawback. Why I'm interested in your research is because that's only a portion of the waste that's being produced here post-industrial, because we are pretty much exclusively buying 100% cotton T-shirt

waste, while as you know, there's a bunch of woven waste here. There's blended waste.

That's why when I joined later, we were doing this but my mind was always like, "What are the other solutions out there?" Because there's so many others, so much other waste being destroyed, that's largely going for incineration, actually. You have been doing some research on some other companies that separate out chemically or things like that.

**1:** Are you thinking that this might be something that you would invest in yourselves as a company or are you looking for other sources of material? How are you looking at it for the future?

**2:** A two-step process. Right now, we set up a holding company in Singapore. The first immediate step is to have licensing deals and joint ventures with other countries, adopt the [redacted] process, because the machinery and technology has been around for decades actually. It's more about the quality process and the branding and marketing and how to do it properly. To cash it away from more commoditized to branded materials, which I think the [unintelligible 00:35:38] of recycle.

The second step is also with this, is going to incorporate more sustainable solutions. We are looking for investments in new technologies that are along the lines of recycling and sustainability to focus on the textile sector. That way, I try to keep in touch with the companies that are more research-based and see what kind of technology is out there. Once you ask maybe we can talk about those other companies as well.

**1:** Yes, you mentioned a couple of companies in your email, who you're working with. We are aware that there are lots of companies who are recycling polyester from bottles to fiber.

**2:** We have people over here also doing it.

**1:** What we're looking at, because require future-forward, we're trying to see where the potential is, and because we have this huge problem with textile waste, we're speaking to people who are transitioning into this fiber to fiber chemical process of which we have one in the UK called [redacted]

**2:** I met them a long time ago, maybe three, four years ago. [inaudible 00:37:14]

**1:** They're at a very exciting stage right now because they've just announced that they've got funding for their next scaling-up process. Also, you may know Perpetual. Do you know Perpetual?

**2:** No, I don't.

**1:** They're also bottle to bottle, but also doubling in the fiber to fiber. If you have anyone else who you think would be interesting for us to talk to, then that would be fantastic. I just want to ask you as well, and the next question relates to what your experience has been with dealing with circular synthetics, recycle synthetics. You mentioned briefly that you've seen some problems with quality. Could you talk a bit

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more about that and what your experiences have been with dealing with those polyesters?

**2:** Yes. Essentially, the recycled polyester that we get locally, there is an issue with the tensile strength, basically, of the polyester single fiber. Normally that's fine, people can use it, we use it, but our tensile strength of our recycled cotton is also weak. With that the overall yarn strength becomes weaker. Again, the process is a lot of a marketing offset to deal with. We have technicians that go on the field when we do orders, and we do sample piles and stuff like that.

We can do adjustments to the knitting machines and to the weaving machines and to the flatbed machines that could take on different feedstock, but it does slow down the process in terms of-- We don't have the increased- your wastage emitting is slightly higher and your speed is slightly lower. That doesn't completely offset the cost savings that are associated with the dying process. It's still less expensive or not more expensive when you're using that.

We have gotten recycled polyester batches that are almost unusable unless you were to mix in some virgin polyester as well to help give it strength and then it's more prone to pilling as well. It also depends on the source, and I guess, how much you're paying for it. For [redacted], I have purchased from them but not in big quantities because they're so much more expensive than the recycled polyester I get from India or locally. It's also the benchmark for branding because they're taking- they're off charge for their brand and their quality is quite significant, it's 30% or something like that. [redacted] has better quality that's almost the same as, excuse me, virgin polyester.

For us, it's about the tensile strength, and also the Denier, the finer the Denier the better it is for us as well, because we can use the same mass but because the mass is the same in terms of, if we're doing 30%, 100 kilos used 30 kilos. But because those 30 kilos actually involve- has more fiber because it's less dense, then you have more intersections in the spinning process to help give it strength. It's the reverse, you wouldn't think that finer fibers are stronger but it's just because you have them both and it helps with the intermingling of them. Yes, so that's our experience with that.

**1:** That's really interesting. I guess then in that case you're drive- probably, actually, your personal drive to make this as sustainable as possible is carrying you through this, because you might have given up, I'm guessing, if you didn't have that kind of incentive to continue.

**2:** Yes. But then also the time multiplies time. After five years of the losses and stuff like that, we're like, "Alright, we see some brightness, so let's just keep going, and just keep going." After five years "Oh, wow, we're actually making some profit now."

**1:** Fantastic.

**2:** I freaked when this COVID thing happened also. It was like, "We were doing so well. Now we need to shut down for a moth or whatever. How are we going to survive?" But luckily I had some money saved up because we were expanding for

that, instead of paying for the machinery, we've paid salaries and stuff like that. Luckily, even though we had some cancelations, we were- we didn't have all, because we were actually overbooked, so it's okay.

1: Sounds good.

2: Yes. It's all right.

1: Yes, really good. That's good to hear. What I'm hearing through the other interviews- I was going to ask you about this separately but maybe we covered it just now, is that actually the companies which have sustainable integrity are the ones that are surviving this shut down.

2: Yes, absolutely.

1: Because they have a point of differentiation over the producers. So, that's great to hear.

2: Yes. We were banking on the green start, or green restart, you want to say. When I was in a board meeting with my father, also it was actually just a strategy meeting because he's in textiles resourcing, and he was like-- There was a time where he- when this happened, he's like, "I built this company from nothing over the course of 30 years and this one thing that I'm not in control of could probably bring it down." I was like, "Pops, everybody here is uncertain of how the economy is going to recover and what's going to look like when it comes up."

But in that period of uncertainty, if you come off as certain and confident like, "Look, it's going to restart, whenever way it restarts it's going to restart with a renewed focus on how connected we are because of this thing." Because how the corona virus spread is we all breathe the same air. People are going to be more aware. I think it's time to double down on the sustainability aspect of it and that's what inspired that news letter that we sent out. Instead of taking a step back we're actually becoming more aggressive after this time.

1: That's interesting, really interesting. Thank you. I just wanted to ask you quickly- I'm going to talk in a minute about the barriers and the opportunities within circular synthetics. What are the potential barriers? I'm guessing, sorry on putting the words in your mouth a little bit, but-- We're getting this from our case study as well. How do you know that the polyester that you're getting is recycled? How do you provide that transparency to the end user?

2: That's a good question. Luckily, we have transitioned more to buying the recycled polyester locally. That factory is nearby. That way we actually have a physical transparency that this is what they're doing and they actually- they don't have a refinery, or whatever, to do virgin. That's just clear based on the evidence. To tell you the truth, that was a big benefit on our factory as well when we started up in doing marketing, I was like, "How do we know that your cup is recycled?" He's like, "Just come to the factory, we only do recycled." That's one thing. But the stuff that we import, I don't because I have not seen them and I have heard rumors that some

of these factories, especially in China, and stuff like that, are doing a lot of mixing, and also I even heard rumors that they're making bottles just to recycle them.

1: Yes, I've heard that as well.

2: So, then they're saying the polyester is recycled. I don't know if you heard those as well.

1: Yes.

2: But I even heard [redacted] was doing that but I don't know for sure. But yes, that is a certain issue. What we are doing right now is that we're actually partnering with the fiber company, it's called [redacted]. They're making a traceable fiber that we're going to be mixing into our cloths so that it's traced through-- It's actually traced through Blockchain, which adds a level of complexity but I guess they were thinking three steps ahead, so I was like, "Okay, fine." Then we decided that against the chemical that you would incorporate because it's just capitally intensive. We're trying to push the traceability.

I know [redacted] has the traceable DNA also integrated into their fiber. Lenzing has it for some of theirs. But yes, I can't be certain because-- Well, you see, even now it's a problem because the petrochemical-- Or, the oil prices have dropped so much that virgin polyester now is cheaper than recycled polyester, a little bit, or around the same price while as before the recycled polyester was less expensive than the virgin. It does open up the door for more opportunity for mixing. If only I could tell if I get a batch of recycled polyester from India or something that's performing really well in all the machines, and my factory general manager calls me he's like, "Yes, this batch was amazing." We'd just keep it like that.

1: Yes. To good to be true.

2: Our mentality over here has been like, "Just give this certificate and everything is okay," kind of situation. That has to stop. Again, it's a cultural thing, something we have to do. But again, hopefully with this COVID-19 we're a little bit more intensive into how they look into these things. The amount of green washing-- Now the green washing is being called out as well. Before it was-- All people would talk about is sustainability, in the past couple of years. Now because everyone is talking about it and there's more garments being sold as organic then there was organic cotton produced in a certain amount of time and it's like, "Okay. There's green washing going on right now." And that also has to come to light.

1: Information is really important, isn't it? To the whole- to making sure this all works. I guess, going back to the branded materials thing, even for you that's an incentive to use a brand,

2: Yes. That's the problem. So I sent my price list to textile mills and to retailers, and everybody alike, and in that there's four options. Actually, there's-- [redacted] recycled cotton blended with polyester is one price, [redacted] blended recycled polyester is the same price, [redacted] with [redacted] is 10 cents, 20 cents, more expensive, which in yarn terms is night and day.

1: Yes.

2: So they're like, "Give me the recycled polyester, the generic one. As long as you give me the certificate, also that scenario."

Then obviously I blend with the viscose and the acrylic and stuff like that, but that's separate.

1: Okay. That's interesting. Are there any other barriers that you can think of to getting this fiber to fiber process going?

2: Fiber to fiber, we're talking about textile waste, whether it's post-consumer or pre-consumer, the blends, blended material which is very common. The companies that have done the research and are able to separate chemically the cellulosic portion with the synthetic portion. Now there been several couple that have been able to do that. My concern is about the sustainability of the chemicals used to chemically separate that as well. I have confidence in those companies because of their ethos that they're sourcing it the right way because I'm sure without doing that homework before why would they even do it in the first place?

That's one step, and then the other is the cost of the resulting fiber again. We do sell in Sweden, so they're doing the post-consumer chemically dissolved pulp and then they're sending that out for making essentially viscose fiber but made out of a certain percentage of recycled cotton. That was like \$3.50 per kilo, which I don't even know where to start with that for the fiber price.

First, because of the customers I deal with. I'm dealing with like high fashion. I'm dealing with lot of past fashion discounters and stuff like that. You have to be able to deal with the discounters because that's where the majority of the clothes are being made and gone. In order to make an impact in terms of environmentally you have to deal with bulk, you have to deal with volumes a lot. I was kind of taken aback about that. There's a company that I just talked with last week. Gr3n, G-R-3-N and it's one Italian scientist. Have you heard of him or?

1: It's ringing a bell, but I'm not sure. Carry on.

2: His process I found extremely interesting because-- His input also, it can be bottles for his input, plastic bottles, PET bottles, but can also be textiles that have a polyester percentage. The thing is with his process that it has a multi, so like you can do one line that has PET bottles, what I call as textile poisons, but obviously I was most ly interested in the textile waste. His process actually separates out the polyester and the cotton portion.

I just got to know him because I was watching or I was part of a webinar on post-consumer recycling. He was like, "Yes," so that's why I sell the monomer chip, whatever for the monomer. He sent it out for polymerization and resulting extrusion for the fiber. He's like, "We found it in a way that is economically viable." He said the word that triggered me the most was "economically viable". Then he's like, "Yes." Then we have this cotton portion and I was like, "What are you doing with the cotton



portion?" I was like, "Let me get that." I would recommend you speak to him as well because he's actually a scientist in this so he knows everything.

1: Okay, I'll have a look at that. Thank you.

2: I can introduce you guys. This is the stuff that we're looking forward to, or look to see because if he can successfully work with both aspects of the textiles, the synthetic and the cellulosic, that way we could truly work towards the circular or having to minimize the amount of virgin materials produced for textiles because there's so much waste out there.

1: That's brilliant. You'd spoken a little bit about the opportunities. I'm just going to pick up on one particular thing, that I'm guessing that chemical processing will give you if the cost comes down is a consistent polyester. Something which is going to come--

2: A consistent polyester, a consistent-- Yes, absolutely. Fiber to fiber also there are certain polyesters that can be recycled mechanically as well even in the machines that I'm using. It's just that if I don't know the input blend then my output blend gets off and that results in claims and stuff like that down the line so we have to stay away from it. You can talk to me basically into, we can talk about for me as somebody who's interested in sustainable and environmentally friendly recycle and stuff.

Me as a actual spinner, manufacturing spinners, because we do things differently, we don't necessarily work like spinnings, right now where the whole spinning industry is in the toilet and flushed and already in the sewage right now because people are just dying because cotton prices and everything like that have bottomed out. We were doing things differently survived and are actually doing all right. If you're talking as a pure spinner, you're having a consistent polyester that has consistent staple length and tenacity and dead yarn, that helps the machine goes faster and that helps your cost be reduced. That helps without the variation and all of the counts and unevenness and all that stuff.

The same thing with cotton, like people, because we have recycled cotton, our stuff is so, our fibers are so disparate. We just accounted for that in all the processes. You can't go at 100% speed, you have to slow it down, you have to take care, you have to make adjustments all throughout the process. Every batch is almost different. Anything that helps improve the consistency of it, as a spinner that's interesting. That's pertinent or you can even say very important. Can't find the right word. I'll make an aspect of it. It's extremely important.

1: Okay. It's really interesting how much know-how-- I found this with lots of people who are dealing with recycled materials. That the level of know-how that's developed about how to deal with recycled materials is incredible and really inspiring actually. How important is the local and regional level of this?

2: There's no book on it really. It's all in-field experience on it. When we started off we were not going past 10 count, and now we're at 30. Of course, it took us 10 years to get there but, it's all just trial and error, and having patience is the one thing that I appreciate the most. A little bit too much patience, if I say so myself.

**1:** You obviously have a chopping sort of, and shredding? You have all of those within your factory?

**2:** Yes.

**1:** Okay. Cool. We're taking a bit more time than I said so I'm just going to move on to the next part. Do you have something to go to? Do you have another call to go to or anything? I'll try to be as quick as I can. I'm just pasting into that, no, that's the wrong thing. All right, just going to paste the meeting again into the thing and that's not what I need. Just going to find the link, hold on. In the chat of this team, no, it's done it again. Sorry. I promise it is usually smoother than this.

**2:** We're all dealing with these technological things, Meets, Zoom, Skype, everything.

**1:** We'll get really good at it one day. There should be just a link to Google Docs there in the chat. You see that? In front of you, what you should be able to see is just is these are two garments that we picked out from the case study that we're working with. It's just a pair of polyester leggings, they probably got elastane in them, and a fleece jumper.

Obviously these are not the kind of garments that you would be producing but I'm wondering if you could-- Sorry that your yarn would be feeding into. But I'm wondering if there's anything that you would like to say about what the current pathway for the yarns, for these garments and maybe all the way through to when the material comes to you currently. It may be a little bit away from your experience but I'm just wondering if there's something you got to say about that.

**2:** It's away from my physical experience, but in terms of the mental time that I've put into this stuff it's, I think about it a lot. Where to start? Can you ask me the question again?

**1:** We're just asking people is from their experience what happens with these garments at the moment within the life cycle, and I guess from your perspective it would be nice to hear about the yarn perspective. In terms of the life cycle.

**2:** For these, what happens to them after, the stuff that is made let's say like 100% polyester, even that, a certain amount can be mechanically recycled back into fiber. Those fibers have enough strength to be used and then there's a certain amount that's going to be too short or too stretchy in terms of the elastane to really make the yarns out of, but you can use a certain amount in the yarns.

Like for example we have-- I'm sorry I'm talking a lot but it's just I enjoy these conversations. We have a factory that makes gloves that we've been supplying yarn to for a long time and long story short there's a material shortage for a certain amount of material they want. They actually send us their rejected gloves and some of their stuff so that we recycle it and send it back to them. Even despite we told them not to, they send a lot of stuff that is 100% polyester, and we have managed to put it through the machines and make a polyester fiber out of it. It's not completely hopeless. The problem is the-- I could talk about the problem with spandex for hours.

**1:** Those gloves are 100% polyester, no spandex.

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**2:** Yes.

**1:** I just put small scale because what you're talking about there is something where you're able to really respond to the problems that it causes you, in a sense because it's on a small scale?

**2:** Small scale is fine and the real problem with it doing-- The real problem that's holding back from making a larger scale is the spandex elastane element to it. The behavior in the machine is different because if it has some elasticity but it's 100% it's not super stretchy then the-- The machine that we use for recycling is essentially a series of pins, wires, and needles that go into the fabric and just gradually open it up.

If it's 100% polyester yes, it's a little bit stronger so that it wears on the machine a little bit more, but it could still manage to open it up and if you change the settings, or if you're willing to invest in a stronger metal or something like that, change up the design, it can still be opened up back into fiber, mechanically. I believe just in the sense that our machine is older than I am and it managed to open it up. Now granted we can't do all of it onto that machine unless we're going to make some changes.

The problem is that, again with the stretchiness of it is that if the pins and needles are going in and stretchy then it's not going to open up, it's going to stretch and it's going to break and then it's going to cause more wear on the machine itself. That's the only experience I have actually dealing with these types of things. Again that's why I try to encourage as much, even with the retailers that we're working with those circularity projects I'm like, "Just give me the cotton stuff right now and minimize the stuff that has elastane in it."

**1:** Do you get any hardware coming into your process at all? Do you have to deal with that or?

**2:** Buttons and trimmers, the stuff? Yes. That's the next step that we're working on. My setup for it, I'm investing in the machines or looking at the machines right now that it's going to remove some of it because right now I have to do it-- Literally we have our ladies in the factory cutting it out, so it's not that much in terms of volume. I do it with [redacted] just so that we have a platform that let's see where we can go with it just to keep that relationship going and the circularity wallet going. It's like, "All right, don't just [unintelligible 01:05:38] it because it's there. It will tell us. We'll figure out something to do with it."

**1:** Is it very labor-intensive to cut them out?

**2:** Yes. The buttons are like, it's not uniform as in you have buttons and you have the sewing and double stuff up, so there's a lot of stuff going. I'm looking to get the laser cutter or something. It's a different project completely but something that I'm working on right now.

**1:** Okay. Have you dealt with polyester fleece at all? Have you ever had to deal with that or?

**2:** I do with fleece fabrics that are CVC cotton polyester. But not polyester microfleece that's polyester fabric.

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1: Do the cotton-polyester ones, do they cause any problems in your processes, or are they quite easy to deal with?

2: No, they're pretty fine.

1: Okay. Moving on to the next slide. This is more what can happen in the future. From your perspective, we talked about some of these things already. I just was wondering if you could underline some of the things that you would like to see happen in the future in terms of the cycling of these types of garments. You can talk about blended ones as well if that's more appropriate to what you're doing.

2: It's fine because I think the underlying chemistry is the same. It's about these guys that are looking at the chemical recycling of the polyester fabric to convert it into the monomer chips that can then be used for extrusion and to make the fiber out of. Plenty of research being done on that and there are people are starting to come up on it. I've done some research on the chemical process that then enables that to happen and underline chemicals just as much as Google can provide me and my crude undergraduate organic chemistry.

1: Clean chemicals and clean process is what you want to see, isn't it really?

2: Yes, exactly. The Gr3N, he mentioned- If you want to see it's on his website because it was on the PowerPoint that he had- it was extremely interesting because he was using the electrolysis of, I think it was saltwater or something like that. The sodium get separated from the chloride and then the chloride sodium goes to sodium hydroxide chloride, whatever it is. I don't know.

1: It's very clever.

2: Yes, exactly. One of the reasons I ended up in this industry is because I failed in Chemistry, but I was taking it at the same time, so I remember some stuff.

1: You know enough. You know enough to get by.

2: I could be a doctor.

1: What that means for you I guess is this is consistent quality and supply of-- That's the value in this for you, isn't it? A little bit.

2: Exactly. The thing though that maybe I'm speaking more from a capitalist point of view, a selfish point of view now is that what I'm trying to get my head around, this might be kind of off-topic is that the input for this stuff, and the research is all being done in the US. They're setting up the plants over there. The ones that get funding and are trying to scale up.

That's great, but my concern is then reintegrating the supply chain when most of the garments are made in Asia. They would be selling their precursor to China or to whoever to make the fiber, and then that fiber goes into the supply chain in Bangladesh or whatever the garment-producing country. Where does it start? Where does it end? It essentially would take a trip around the world.

It would go to Europe, let's say you're being recycled or broken down over there. You get some precursor to polyester over there. I don't think [unintelligible 01:10:34] those guys are making the fiber. They send the fiber to China, the precursor to chips would go to China, and China makes the fiber. The fiber, I think it's spun in China, and made into a garment in China that goes into actually Europe or the fiber goes to another country to get spun and made into fabric and garment and that goes back to Europe or the US.

That I think about as well. The carbon impact of shipping via sea I guess it's not that much in terms of carbon per kg but it's still a lengthy process. That's why I think what these people are doing, which is good, is they're trying to make it as uniform as possible so there's less variance, which is what you talked about in terms of consistency of fiber. My concern about that is the cost because each shift in location is an added cost.

**1:** How do you see that? This has come up quite a few times. Obviously, the challenge with the UK is that we have textile waste, but we don't have the manufacturing. How do you see this? If we're looking like there's an ideal vision of what it could be like in the future? How does this work?

**2:** I don't know if it's ideal because I am somewhat biased here. It's that because I would like to see the stuff being done in Asia. I would like to do it myself somehow if I were to partner somebody who could help with the funding, make a partner. My ideal is actually having this-- Right now, I have 11 acres and I have five acres of that is my factory right now. I have six acres of land that's ready to build on. I've been holding all my partners as much as possible, don't build yet, don't build yet, because I'm waiting for that next technology that goes to the next level.

Why also that? Because sorting of the post-consumer is also labor-intensive and if you're in the UK and Europe, is more expensive as well. Of course, economically it provides jobs and things like that, but it's still not having that people are willing to pay more for recycled or sustainable garments. People will see a T-shirt for \$20, that's regular and \$25 that's organic.

Regardless, what were we talking about?

**1:** Can you hear me okay? Because you were breaking up a little bit then. That's really interesting. I guess that it can happen that little pockets of manufacturing, sorting, the technology itself can happen in different locations, can't they, globally? It's the economics that have to sort themselves out.

**2:** Yes. Economies of scale, it's about, again, the supply chain. Quite frankly, I don't see textile bulk manufacturing moving back to the west in the next decade or two, up until there's huge leaps made for in terms of technology. This is what's in my mind.

**1:** That's perfect. Really makes a lot of sense. I'm just going to move on because we are running out of time a little bit. On the third slide, I've just got this really simple roadmap for the next five to 10 years. What would you pick up from what we've discussed or just whatever you feel needs to happen really crucially within the next five to 10 years?

**2:** Now I think it's going to be the scaling up portion of the technologies, If you want to talk about specifically synthetics or you want to talk about the overall?

**1:** Let's talk about the overall and then we'll drill down if there's something missing.

**2:** Right now, I guess the focus is shifting on to organic cotton, recycled polyester, recycled cotton. These are the main ones. The volume of that being integrated into the supply chain is increasing quite a bit. Demand is increasing quite a bit as well. Bringing that to economically viable scale is where we are at currently.

At least our raw material supply base is increasing and shifting more towards more sustainable solutions. Then you can say what's happening between now and 2025 is that more integration between that and it gives the time for the research that is being done in Europe and whatever with these newer technologies to fine-tune and to get into scale, which would give the more sustainable, which is actually not producing I guess proof of concept of these textile to textile, fiber to fiber which we were talking about.

This in the next five years has to- we have to see a proof of concept to see what's happening in bulk where the economic of it is going. That would lead us to the far 2030, which is 10 years. Maybe that's not far enough but 20 years, maybe we're hoping that we don't have to use any virgin material and we have enough in terms of post-consumer and the economic of it makes sense [unintelligible 01:17:59] we have a shift in industry, but I don't think that's going to happen by 2030. That's probably 2040, 2050.

**1:** That's where the ideal scenario is in? That would be fantastic, wouldn't it?

**2:** It is a bit optimistic but let's see.

**1:** You've got to have goals. In terms of mechanisms to make this happen, obviously there's the technology is one, is there anything else that you would say needs to happen from different angles? I don't know, policy or the way people behave. I don't know. Anything else that springs to mind.

**2:** I have a fair amount of confidence in your children's generation that they are going to be super aware of these stuff, and maybe their behaviors in terms of commodity. For example, I got asked a question is recycled cotton is thought to be as inferior, low quality all this stuff, so how does your factory overcome these barriers? I was like, "We just redefine quality."

**1:** That's really interesting. Redefine quality.

**2:** Maybe that when people look at a garment and see, oh, it's super soft and super lush and stuff like that. That's one way of thinking of in terms of quality. If you see a similar garment that looks similar, but maybe it's not as soft, but is made from recycled materials and it's much more beneficial for the environment in terms of production, its environmental impact is relatively low], would that Gen Z make decisions like I'd rather go for that than the one that's just super soft and lush.

1: That's really interesting. Brilliant. That's great. There's some really great ideas there, so thank you for that. I just want to bring it back to the yarn your specific company's role in all of this. Is there anything that you would like to see in terms of how you collaborate with people or how you communicate with people? Thinking also about the branding of materials? Is there anything you'd like to say about that in here?

2: It's happening in the sense where I had to push for a lot on-- collaborations with brands like I said we're doing some collaborations with [redacted] and stuff like that. Collaborations of materials I keep in touch with Lenzing on what we're doing and how to incorporate them because they have a material that's inherently slightly more expensive while my material is slightly less expensive. Blending them and coming with something between that right is on the highest end of sustainability and is still at a reasonable cost is really my goal in this stuff.

I don't know if yarn spinning mills are doing this or just waiting for somebody to call them to do this. I had to do this just out of necessity because for the longest time just getting orders and stuff like that building a market it's not easy. Which way I would find it outrageous so with that meeting which are whatever they didn't like or I had. That forced me to go and find different blends and materials to go so that we can talk again. It's like, "Oh, I have something new, let's keep the conversation going."

Maybe I sell it, maybe I don't, but that helps push the conversation forward and let's us see what is available out there. The communication when you can't raise policy there-- Maybe some incentives and stuff like that. The government-- are you talking about the idea like government policy or talking about retail's policy or whatever.

1: Anything really, I don't want to force you to say something, I'm just prompting if there's anything that came to--

2: I can say on both ends. It's like specifically for me, one problem that I had in Bangladesh is that I understand both perspectives that if we actually don't allow the import of used clothing into the country, which is something that every brand has, for me it's like we have all this buyback. They did do it in Asia and stuff like that, can we send you to recycle? I would like to but this is not allowed right now, so yes. Specifically a Bangladeshi policy but in terms of retailer policies, they all have their goals by 2030 to have X amount recycled or sustainable which is all great because that's driving they're buying towards these materials.

I'm not an advocate of too much forced policy by governments because I do believe that these companies and what's happening right now, I do believe that the people who are forward-thinking and know what they're making and the environmental effects and focusing on it, these are the companies that are eventually going to be more profitable down the line. That's how the market is going to shape up. I don't know about it in terms of government policy, because I do believe in this consumer behavior because that's how it's worked out for me.

1: That's pretty interesting. We'll leave at that, so many great ideas there thank you and then-- [crosstalk]

2: Yes, if you want to, follow-up anytime. I'm sorry, I don't talk much normally but once you got me talking about this stuff, then I can go for a bit.

1: That's the whole point of an interview is to give you that voice. There's just one more slide, which is to do with the definitions, I'm just wondering if you hadn't had any thoughts on this? It's fine if you don't it's just in case you do then we can finish--

[pause 01:24:31]

2: It goes back to in the first definition. You're appraising equal or higher value. That goes back to what I was saying about how do you find value? It's a personal thing. It is because our product, I don't know if it's of equal or higher value because some consider it downcycled or shit quality or whatever, but people are buying it and it is less expensive. My demand has gone up while the industry has gone down. That's the only thing about that, it's like how do you define like what is? Sorry, I'm not articulating particularly well right now.

1: No, I understand what you're saying and this is something that quite a few people have highlighted as well. The nuance here with the your particular yarn is that you could still recover that cotton with the chemical process at a later date. It could be a temporary shift in, if you want to say quality, but in change of properties, material properties which could still be part of a cycle late run. It doesn't follow that it's not-- [crosstalk]

2: Yes, absolutely. If the goal is also to minimize environmental impact, I don't see a world which-- or I don't see a situation where the mechanical shredding of the fabric would have a higher environmental impact than the chemical decomposition of the fabric. You know what I'm saying? Just in terms of raw numbers, there should be a path because the end result was simple, it's not rocket science at all. It's more just trying to aid and care.

That's also the good thing about the market we're talking about because how are we going to be successful [unintelligible 01:27:26] market because it's not as soft or as brightly be colored or whatever, but it was economically less expensive.

(inaud)

You can have higher tier, the middle or whatever companies who want to spend more to buy these recycled or whatever. Because there's always going to be people who're willing spend more for something, and people willing to spend less.

1: Yes, there's lots of different-- I understand what you're saying. Perfect okay well thank you so much for that, is there anything else that you wanted to say on that or are you--

Thank you so much. Really useful to talk to you and get your perspective. It adds a new dimension

It's been really useful. What we're going to do is we're going to go back and process all of the interviews and try to see what the themes are and then produce something from it, which will hopefully summarize some of the opinions that people have about

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it. Then if we could share that with you, that would be fantastic to get your feedback on what we come up with.

**2:** Yes, absolutely that will be great.

**1:** Thank you so much, thanks for all your time.

**2:** Thank you.

**[END OF AUDIO]**