

24-08-16 TheBuzz web

📅 Thu, Aug 15, 2024 10:16AM ⌚ 27:49

SUMMARY KEYWORDS

plastic, tucson, product, material, recycling, process, put, bins, filament, company, waste, christopher conover, wall, transportation, blocks, people, recycle, locally, buzz, project

SPEAKERS

Zac Ziegler, NPR promo, Nicole Cox, Christopher Conover, Ethar Alali, Heidi Kujawa

C Christopher Conover 00:03

Welcome to The Buzz. I'm Christopher Conover. This week, unique ways to recycle plastic in Arizona. Many plastics are notoriously hard to give a second life to. Goods from single use grocery bags to berry containers are frequently on the list of items that recyclers call wish-cycled goods, products that people put into recycling bins but aren't actually recyclable. But a handful of projects in Arizona are making that wish come true, giving hard to recycle plastics a second life. We start today's show with one such company, ByFusion. For years, people have been able to drop off just about any form of plastic at one of the company's collection bins around Tucson. That plastic eventually finds a second life as a construction block. The company's ByBlocks can be found at various spots around town. ByFusion's Heidi Kujawa spoke with the buzz producer, Zac Ziegler.

Z Zac Ziegler 01:08

the former city council member who got this ball rolling. Steve Kozachik, had a planner in front of his office that was built with ByFusion blocks. What kind of projects are these things good for? I mean, if, if you had enough of them, could you build, you know, a wall, or, heck, even maybe a house?

H Heidi Kujawa 01:26

Councilman Kozachik has been amazing. He he clearly understands the value of what we were bringing and and in fact, a lot of council members did too. Mayor Romero was extremely supportive from day one, and she realizes the value, not only in the recycling, but also how the program can touch on a number of areas within the climate action plan that the city is committed to. So, you know, the support from from the government leaders in the community has been overwhelmingly positive, and I'm really excited that to be able to work with such thought leaders in the space. ByBlock is designed to be one of the most versatile building materials on the market. It's not a monolithic building material. It's designed to help us reduce our dependency on cement and lumber, but not necessarily replace it, right? We work in

conjunction with it, so where the engineers might say, 'hey, Heidi, please, you know, you might need some extra support here for this roof load.' We can add that to the wall throughout Tucson. Throughout Tucson, we've developed a number of different we've already built a number of different structures, from utility to park applications. There's a 72 foot wall in the mission gardens, so you can see that at mass. It's a beautiful wall. It displays six tons of plastic waste, of Tucson's plastic waste, from landfill, and it's gorgeous installation. Yes, we've built houses with five block already as well. So I'm looking to do some more of that in Tucson, not in Tucson, but we'll do that in Tucson soon enough.

Z

Zac Ziegler 03:02

One advantage to typical cinder blocks is they're cheap. How does a company compete when the product you're competing against is that cheap? I mean, I can imagine that that part of the industry isn't, isn't too easy to disrupt.

H

Heidi Kujawa 03:19

yeah, you know, it's, some it's interesting. You know, the price, the price points, when we have this discussion, it's always, it's always a fun discussion to have, because everybody thinks of the hollow cement block that's anywhere from \$1 ish to \$2 depending on the time of the year, to a ByBlock, which is about \$3. What they forget about the cement block is the mortars and the rebar and the labor and the skill required to build with that particular material, whereas ByBlock doesn't require all that stuff. You don't need a lot of time to do it. You can stack by blocks very quickly and they just screw together. So anyone can build with a ByBlock, and you need less materials. So when you think about the overarching product or project, you're actually building much cheaper and much faster.

Z

Zac Ziegler 04:09

So with Tucson, you know, one thing you always have to worry about when you're building, especially a structure for a house, R Values, you know how good the insulation is. How do these blocks stack up againsy, you know, your more typical cinder block for Well, in our case, keeping the heat out and keeping the conditioned air in.

H

Heidi Kujawa 04:30

Yeah, we've done a lot of testing on thermal properties of ByBlocks, and the good news is it's actually more insulating than concrete blocks. We get about an R value of eight with a single block. So it provides a nice core starting point for your wall assembly. You can also add additional insulation to ByBlock, and then you've got your interior exterior cladding. So when you think about a wall assembly, you can get to your required R values very quickly with less material in the wall as well. The thing that's really interesting though, that I love about talking about Tucson, because of the high sunlight, there's a there's a thermal property called K factor that we don't really talk about too much in normal, normal conversation when it comes to thermal properties. And k factor is actually that phenomenon of radiating heat back to you. So I'm sure if you walk down the street in the middle of a beautiful Tucson afternoon and you're

walking next to a cement wall or cement building, you can kind of feel that wall next to you radiating some heat back. With Byblock it actually the nature of plastic, it actually dissipates and absorbs that heat. So you don't get that, you don't get that contribution to that urban heat umbrella that you hear about sometimes. So it helps to combat some of that.

Z Zac Ziegler 05:53

What are the plans to to scale the operation maybe, and make it so that these things are a little more available to the general public? If, you know, someone just wants to build a planter in their yard, or, you know, wants to build a small retaining while using these.

H Heidi Kujawa 06:09

The thing that we've been extra conscientious about is just it is a building material, and we wanted to make sure that when we opened the availability of the product to the general public, that we have the right kind of tools and resources available to teach people how to properly install it, because that's one thing that's important when it comes to building materials right. So we've been really focused over the last couple years on just working with general contractors, because they know they get it right? So we've got some much more learnings under our belt. We've got a lot of instructions that we've been working on pulling together so that when we're ready for selling to the general public, we've got those resources available. My goal is right around the groundbreaking of the new facility, we're aiming to have that launched so that people can start consuming some of the products locally.

Z Zac Ziegler 07:03

A lot of Tucsonans have dropped off plastics in the bins where it's being collected for ByFusion. Can you give me a quick version of what happens once that plastic makes its way into your company's hands?

H Heidi Kujawa 07:17

We have a diversion report that I'll make sure we get to your audience so you guys can see how much we've diverted, the tonnage that we've diverted, how much was contamination, and, more importantly, where that material went. I'm really proud to share that of the material that we've processed to date, over 50% has already gone back to Tucson into construction projects, which is amazing. The other products have gone to other projects across the country, but Tucson has first priority to their own material. Typically, what happens is, once the material gets into the roll off bins, the roll off bins are then compressed into bales. They're sent to us. We process those into blocks. We stick those blocks back on a truck and headed to the job site, back to Tucson.

Z Zac Ziegler 08:06

You mentioned contamination rates. What is it exactly that can be kind of counted as contaminants? Where are the things that people are putting into those bins that maybe they

contaminants? where are the things that people are putting into those bins that maybe they shouldn't be

H

Heidi Kujawa 08:08

So, contamination is kind of a weird word we like to say, like maybe incompatible materials. Contamination is an industry word, but the contamination or incompatible materials that we see are anything that's non plastic or it's there's a couple of drop off locations that are near industrial sites or scrap yards. So oftentimes we'll get a pallet of material that's basically got a half a car in it, or half of a lawnmower, or crazy stuff, you would be surprised about the crazy stuff that we see. But anything, think about it in terms of anything that's non plastic, or it's very contaminated with food, you know, don't send me, or moldy loaf of bread. Don't do that. I'll take the bag, but put the moldy bread in the black bin, please. That's the kind of contamination that we see.

Z

Zac Ziegler 09:09

Yeah, clear out the stuff on the food that's easy to get out of there. How far are you having to haul that plastic back and forth? And I've heard there is some talk of that distance getting a little shorter.

H

Heidi Kujawa 09:23

Yes. So we are the distance right now is, we're Tucson to LA, which is an eight hour truck ride, which is no not fun for anybody. We are very, very environmentally conscientious. In fact, our process has undergone extensive testing and with with transportation and logistics factored in, so of all of the environmental numbers and that we've shared on our website, that is by us collecting material from as far as 1,200 miles away from Los Angeles. Our goal as a company is not to truck material to us. Our goal as a company is to serve local our goal as a company is to service a 200 mile radius. So when we come to Tucson, we'll be focused on Tucson, and we'll be servicing around that 200 mile radius. It's really where we're focused

Z

Zac Ziegler 10:14

Folks around town have noticed recently by fusion asked that plastics are being placed in those orange Hefty Renew bags. Why was that change necessary?

H

Heidi Kujawa 10:27

Well, that's a really good question. So we have a there's a couple things going on with that. So ByFusion and Hefty have been working together for years. We literally just celebrated our four year anniversary. They're a great company. They're able to capture waste a little bit differently than than we are. I mean, they're really focused on helping consumers in the home capture waste, and we're really focused on business to business, and obviously we help consumers too, with in partnership with city drop off programs and things of that nature. Right now we're in

this interim phase. So when we became, when we signed up to be a partner with the city on this program, we have to find a home. So the city is building us a building at the Los Reales Sustainability Campus for us to operate our equipment there. That construction project is new construction, so it's taking some time for that to come together and the building to be erected. The good news is, the plans are done. The contractor has been selected, and right now, I think we're aiming to do groundbreaking sometime in the early fall. So we're right around the corner. Between now and then, though, we're collecting a lot of material that we want to make sure that we can process. That transportation interim phase is kind of causing some complications, and we don't want to stop the momentum of the city. So where Hefty is coming in is to help us make sure that that stuff stays out of the landfill. It is giving us a couple other avenues to ensure that it's not stockpiled, and that's really what we're focused on. Once we come to the community, then, you know, we'll make some of those adjustments. It's very much an interim phase. Hefty will still be there when we come and we they're just really great partners, and they're really enabled us to keep keep everything moving as we wait for the building and the site to come up.

Z

Zac Ziegler 12:28

Well, thank you very much for joining me today, Heidi.

H

Heidi Kujawa 12:31

Oh my pleasure. Thank you for having me. It was really wonderful speaking with you.

C

Christopher Conover 12:36

That was Heidi Kujawa of ByFusion, talking with our producer, Zac Ziegler, you're listening to The Buzz. After the break, we hear about another plastic recycling project in a Phoenix suburb. Stay with us.

N

NPR promo 12:50

New from the Embedded podcast, female athletes have always needed grit and talent, but for decades, they've also needed a certificate. There was chit chat about is that really a woman, and even now, they're still being checked and questioned. Their story is the newest series from CBC and NPR's Embedded. It's called tested. Listen wherever you get your podcasts.

C

Christopher Conover 13:17

Welcome back to The Buzz. I'm Christopher Conover. We're looking at new efforts to recycle plastic in Arizona this week. The Phoenix suburb of surprise, will soon have its own recycling partnership to brag about. Late last year, it signed a deal with British company AutoMedi. AutoMedi will help turn plastic waste into filament for special 3d printers that can be available

for residents to use around the city. To learn more about the project, we spoke with automedics managing director Ethar Alali. I started by asking him, what kind of plastics can go through the process. The reason

E

Ethar Alali 13:56

why there's so many different types of plastic, and actually the things you buy in the shops may be made out of different plastics, often by different manufacturers and sometimes by the same manufacturer at different times when they discover something better about plastic. But in general, we will take pretty much any plastic anyway, regardless. So whether it's your garden chairs, your beverage cans or cups or even carrier bags, we will take and what we'll often do is blend them together. And there's a deliberate reason for that, because part of our innovation is how we think about plastics as a resource, and that includes how it's formulated. So believe it or not, we use a lot of the same thinking that goes into creating concrete to create the filaments, right? So the thin plastics are kind of like the slurry type of concrete, while you have the aggregate, which are often buckets or old garden chairs or things like that, because often when you grind them, they grind into different output sized flakes, and that can often make it different to extrude as well. So when you put the softer plastics in it makes a much better grade of filament that makes the thermal properties much better, and as a result, it makes it extrude better through a 3d printer. So what we do is we take any deficiencies in that material, whatever it will be, and it can include the food that's left in it, or whatever else, and actually use it as an advantage by almost over engineering at the manufacturing stage, which, as you know, we use 3d printing for. So by doing that, you get to kind of balance these two worlds of kind of either degrading or defective plastics or contaminated plastics, with the manufacturing capability to actually kind of upscale that plastic to ensure you get a good quality product at the end of it, because at the day, it's the product that matters.

C

Christopher Conover 15:42

It's interesting. You mentioned a couple of things that we don't necessarily hear a lot about recycling here, lawn furniture, garden furniture, old buckets. I think when most people think about recycling, they think about what they get at the shops, So this is a much larger project than maybe people are used to.

E

Ethar Alali 16:02

Totally. it's larger in the sense that we recycle a lot more stuff. And back in the day, when they started talking about recycling, probably remember this problem, people didn't know what to put their bins. It's like, what do I put on a curbside? Is it just the bottles? Is it can I put my garden furniture? Can I put my kind of my car's old bumper in it? Those are the sort of questions. The answer was, most of those cases was no anything that shaped by a bottle is the like a bottle? However, anything that shaped like a bottle is the only thing you can put in that bin. And that's obviously a very restrictive way of doing recycling. And anyway, that stuff only ends up becoming another product, less than 1% of the time. Often it gets burned or it gets dumped in landfill. So we thought the whole system is broke. Let's be honest with you. If you want to do recycling and you're not sure about it, tell you what we'll do. We're going to create a brand new system, closed loop from scratch, that will allow you to put literally any type of

plastic in it. And that was meant to be kind of like the wish cycling dream. That means, if you're not sure, give it to us, we'll find a way, is the short answer. That's basically what we try and do. And that means it is a much bigger project, and some of the solutions we don't know yet, because we haven't received every single possible type of product. So yeah, that's, I mean, I don't think we've received anything like kind of dolls heads yet, on these dolls wigs and all things like that. There's a lot of really weird stuff. You kind of get it. I mean, kind of personal items that we've not received yet, hopefully for the better, but that's another story for another day.

C Christopher Conover 17:24

Yes, now I'm picturing just this line of doll heads rolling down.

E Ethar Alali 17:29

Yeah, it feels like Chucky, yeah. That's what.

C Christopher Conover 17:33

That's an image that's going to keep some people up at night, I think.

E Ethar Alali 17:36

I'm so sorry. It keeps me up at night

C Christopher Conover 17:42

So without getting too technical or spilling any trade secrets, how do you turn plastic into filament? You said it sort of gets grind up and reheated, but walk us through that a little bit.

E Ethar Alali 17:54

Yeah, sure, no problem. So what we do is we basically get a load of stuff. And you can imagine, the bin of stuff that we get is very diverse. There's a lot of differences in it. Normally what happens is that you'll grind it up, and then at that point you'll you'll float it in a bath of water. But you can imagine that the traditional way of doing that, which is meant to separate out the heavier plastics from the lighter stuff, usually the heavier ones are the valuable PET, the kind of drinks bottles that you get, from all the other plastics. The problem with that is that creates more pollution, because the water itself is a pollutant, right? So what we try and do is we've got developed a process which basically dry sorts it by object size, believe it or not. And the reason why is because when you look at what what organizations and companies manufacture, they choose their plastics typically for the size of product that they have, right? So as a bit of a secret, we therefore, by sorting it by size, we're able to then effectively get about 70% or 80% of the the sorting posts and segmentation process done, because it's basically done by size

anyway. So we'll then grind that stuff down, often mix it together as a bit of a recipe with other plastics of the same type, but maybe different grades and certainly different ages. So that allows us to reuse all the plastics time and time again, and then we more or less heat it in the normal extrusion way and extrude the filament out of it at that point. Once we've done that, we then spool that into what we call spools, basically, and those spools are effectively the consumable, refillable parts of the 3d printing process. So we'll often put those in our 3d print vending machines, and those vending machines are located where customers want to buy the product, not where we can put a factory. So that removes all the typical transportation and logistics vans and lorries typically that will often move things around from a factory or a warehouse to the retail store. You can put these in retail stores. You can even put them in service stations or places like that. So the idea behind it is it removes a lot of the transportation, which is usually the bottleneck in trying to remove emissions from the from the atmosphere.

C Christopher Conover 19:54

We were talking about as you dry, sort by sizes and things like that. Are plastic structurally different, and can they all hold up to the same use? And as you said, you haven't found something yet, and maybe someone will put something in.

E Ethar Alali 20:11

There's a challenge right there?

C Christopher Conover 20:13

Exactly. Somebody listened to this and said Challenge accepted. Are they structurally different, or once you've processed them, Plastic is plastic,

E Ethar Alali 20:24

no so they are structurally different, and that's often why the choices are made at manufacturing level to make the product sort of this particular size with a particular type of plastic. And all it all depends on mechanical performance. So some plastics, you want them to be more rigid and have less flexibility in them. Others, you'll want exactly the opposite. So they choose plastics appropriately, and we do the same, but what we're able to do with 3d printing that you can't normally do with injection molding is you can effectively mold the inside of those plastics in a way that you can't do with like the void of an injection-molded mold, because by doing it that way, you can create plastics that change shape. You can create plastic that you can fold up. You can and in fact, some of our larger products are actually made on much smaller format machines, because we fold it in 3d space into the little cube that it will fit into. And then once you finished, you literally take it off the bed, crack it open, and then unfold it to its full size. And that's how we can do things that other manufacturing processes can't. So you can sort of see that we can start to create overlapping, let's call it use cases, between the

plastics that are normally done or used in a particular way under normal manufacture or conventional manufacturing ranges. And that's one of the benefits for us. So although it's not Plastic is plastic, what we're able to do is to overlap the purposes for which that plastic is used.

C Christopher Conover 21:41

So when it comes to the filaments, does the recycled filament that you all are working with act differently than the virgin plastic filament?

E Ethar Alali 21:51

So sometimes it does absolutely and sometimes very deliberately. So one example of what we more or less deliberately engineer filaments like that is we will introduce additives into it for one reason or another. Now, what is an additive? Probably the most obvious one is we introduce things like carbon fiber or fiberglass into a plastic deliberately for the purpose of strengthening the plastic. Now, we found ways of doing that with the food contaminants that often come with the plastic itself, believe it or not, so one example, or one of those classic examples that we often have is where we will take a milk bottle with often, let's just say, overly-exposed milk (laughs) still involved in it, and we'll even use that as a way to strengthen some of the older versions of that plastic within that process. It's very, very unique. We didn't actually expect to do that. We just did it one day and thought, well, what's the worst good that could happen? It removed the smell, which, as you can imagine, was terrible then, but it also strengthened the plastic for our purpose. So when we then combined it with the softer film version of the same plastic, we got a really good filament out of it, despite the fact that, well, it was probably 30% cheese by that point. So yes, it's a very interesting sort of approach to kind of look at ways of changing the plastics very deliberately, but there are certainly other cases where structurally, the plastics are not the same, even by accident or at least through generational degradation, and that latter case, what we will deliberately do is over engineer the product at manufacture so it makes up for the weaknesses in the filament itself.

C Christopher Conover 23:19

You mentioned earlier, some of the costs of transportation, which now you don't have to worry about. That's always seemed to be when the consumer wants to buy recycled products, oh, they're more expensive. Does this process keep the price down for the consumer?

E Ethar Alali 23:37

100% and the reason why, believe it or not is we're, I'm giving away my trade secrets here if anyone else wants to know, we're making money on both sides of the connection. We get paid to take waste away, and that subsidizes the cost of the recycling locally when we manufacture the products. So yes, it does keep the price down because it keeps much of that "supply chain" out of the supply chain, but also it makes us money on the waste collection side of that situation, kind of each side subsidizes the other. That's why it's often just as cheap as buying virgin plastic products from the shops.

C Christopher Conover 24:10

It's interesting. You just mentioned that it's being collected and processed locally. Earlier in the show, we heard about a plastic recycling effort here in Tucson, which is a couple hours south of Surprise, Arizona, and that one requires plastics be sent to Los Angeles. It's a seven, eight hour drive away. It sounds like your plan. Nope, it's all right locally. I mean, it might not be next door, but it's pretty close.

E Ethar Alali 24:39

Pretty close. I mean, oh, that's the plan. Because, as you can imagine, you can buy a product in the shops, and the packaging for that product was made thousands of miles away. And then what you'll do is you'll throw that packaging in the waste, and that waste will be taken to, as you say, LA, to be processed. And what you've then got is you've got thousands of miles just for, I don't know, a peach cup, really. So you can imagine that that's not a very effective way of using transportation. It's very costly. It requires a lot of licensing, and a lot of things get lost in translation in transit. So for example, you might end up losing how much, how many people are involved in that post. You might end up losing the emissions because you've decided to export them to another country. You might even have lost the packaging, because that packaging might end up on a beach somewhere in a country which doesn't have any waste collection and purchasing facilities. So there's a lot that can go wrong. So one of the reasons why we try to do that is that, well, listen, you're transporting products from thousands of miles away to wherever you are, and you're throwing waste away only to take 1000 miles in the other direction. So you may as well just combine those two bits together and do it locally, and actually keep the kind of economic value local as well, for sure.

C Christopher Conover 25:50

So this is consumer grade printing, and keeping in mind, you know that this is a family show. What are people printing with 3d printers?

E Ethar Alali 26:01

Yeah, well, listen, we're not going to talk about the other sorts of stuff we might get in our garbage one day, but certainly it could be awesome. What we find a lot of people do is they end up making stationery, and they often do home improvement tools. So the little knickknacks, the kind of fixes and fittings that you often get, ideal to be used there, you might find people do customized stuff. So we often sell a frame where you get to customize a slot in, and that slot in you get is actually a picture that we've turned to a 3d printable, almost silhouette. Behind it is an LED lamp that lights up and shows that picture basically to any of the viewers. So that's another thing that people get. We find also, if you've got the best part of 700 different products in different products in different catalogs across the piece. So in essence, it's, it's a hardware store in the space of a desktop machine, basically, and on the manufacturing side, at least.

C Christopher Conover 26:10



Christopher Conover 26:49

That all sounds really great. Well, thanks for spending some time with us. No, it's been a pleasure. Thanks for having me. That was AutoMedi's. Ether Alali, and that's The Buzz for this week. You can find all our episodes online at azpm.org and subscribe to our show wherever you get your podcast, just search for The Buzz Arizona. We're also on the NPR app. Zac Ziegler is our producer, with production help from Desarae Tucker, Our music is by Enter the Haggis. I'm Christopher Conover, thanks for listening.



Nicole Cox 27:35

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