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Generation Scrap:
Designing with Waste to Transform the Carpet Industry

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Abstract: This paper presents the explorative design process and proposed concepts from the project "Generation Scrap" project at The Ohio State University's Department of Design. This project is positioned within an Interior Finish Materials and Methods course in partnership with the flooring and carpet manufacturer Mohawk Group, part of the global Mohawk Industries. Building upon the work of Mohawk's A&D Design Director, this project first looks at "Scrap Culture," understanding the world today through the lens of the Anthropocene and Plastic Age. GenZ students explore innovative concepts to mitigate waste, proposing new carpet designs that reduce, reuse, or recycle waste to create a more sustainably built and natural environment. Mohawk's extensive knowledge and advancements within sustainable manufacturing and the circular economy provides students with resources to develop innovative solutions for a realistic carpet design that would have a positive impact on the environment. This partnership project highlights the importance of collaboration between sustainability organizations, both educational and industry, to create designs that emotionally resonate with end users who demand sustainable products in the marketplace. Outcomes included concepts ranging from new carpet fibers or backing solutions created from agricultural, industrial, and consumer waste to new patterns based on biophilia, demonstrating the ingenuity and creative problem solving that GenZ possess.

Introduction – A World of Waste

We live in a world that creates more waste than it does reduce, reuse, or recycle. This era, referred to as the Anthropocene, is defined by human's effect on the earth (Merriam-Webster, 2019). Carbon emissions, overpopulation, loss of natural resources, pollution and debris, climate change, biological and chemical influencers impact the planet in devastating ways. Much of this has happened since the Industrial Revolution, but more crucially since the advent of plastics.

Currently, over 5 trillion pieces of plastic litter the ocean, primarily from plastic containers and bottles, fishing nets, and shopping bags (The Ocean Cleanup, 2019). As a marker for environmental impact, plastics are reshaping ecosystems, cohabitating with natural phenomena in a new form of pollution. One such example is "Plastiglomerate," a term created to describe a stone that contains mixtures of natural debris that is held together by fragmented plastic debris (Corcoran, Moore, Jazyac, 2014) (Figure 1).

Figure 1. Image of Plastiglomerate from the *Broken Nature : Design Takes on Human Survival* exhibit during the XXII Triennale di Milano. © Royce Epstein.

Designers and manufacturers are innovating new ways to utilize waste for materials in interiors, architecture, products, fashion, and the arts. These industries are addressing humanity's waste through material innovations

and production processes, creating a new design language that moves beyond industry or craft. Taking a proactive stance, designers are using waste and scrap materials, as well as connecting with other social issues, to find solutions in favor of sustainability. Lithoplast (Figure 2), created by Israeli designer Shahar Livne, is another new material emblematic of the Anthropocene. Livne speculates how future generations could react to plastic, envisioning Lithpolast as a valued material mined when virgin plastic ceases production (Chawla, 2019) (Figure 2). Companies such as Adidas are partnering with programs like PARLEY, a collective bringing together different industries that upcycle ocean plastic and fishing nets to replace virgin plastic, transforming them into fibers for shoes or molded into objects (Adidas, 2018).

Figure 2. Image of Lithpolast from the *New Material Award 2018* exhibit at Dutch Design Week, Eindhoven. © Royce Epstein.

Textile waste is also contributing to the Anthropocene. In 2015, over 16 million tons of textile waste was generated in the United States alone. Of this, only 2.62 million tons were recycled and 10.46 million tons were sent to landfills (EPA, 2019). Eileen Fisher is another corporate innovator working under a philosophy of "where others see waste, we see possibility." Introduced in 2018, her "Waste No More" exhibit showcased new ways to utilize reclaimed clothing waste to create a new textile for fashion and commercial interiors (Fisher, 2018).

Figure 3. Image from Fisher's *Waste No More* exhibition during Ventura Centrale, FuoriSalone, Milan 2018. © Royce Epstein.

The interior design industry has witnessed major innovations for interior finishes that reduce waste and contribute to the circular economy. The "Cradle to Cradle" movement by William McDonough charged designers to consider "everything is a resource for something else," that waste is food for new materials and methods (McDonaugh, 2002). Going even further to address the circular economy, creating closed-loop systems for manufacturing allow for industrial waste to become a new valued resource.

With this mindset and advances in technology, new techniques for designing and manufacturing textiles and carpet for have emerged. Addressing textile waste, Kvadrat initiated *Really* in 2013. By 2017, they had created two new materials: Solid Textile Board and Acoustic Tile Felt, both readily made from Kvadrat's own waste stream of wool discards combined with cotton and denim from the fashion industry (Kvadrat, 2017).

Figure 4. Image of textile waste for new acoustic products from *Kvadrat Really* exhibition during FuoriSalone, Milan 2018. © Royce Epstein.

Within the carpet industry, Mohawk Industries is one of the largest recyclers of plastic bottles, diverting over 6 billion bottles yearly into PET carpet fibers which produces 135 million square yards of carpet. Contributing to the circular economy, their ReCover recycling program donates removed carpet to nonprofit organizations, rather than sending it to landfills (Mohawk Group, 2017). Mohawk prides itself as innovators on every level from developing new sustainable and dematerialized backings and fibers to educating their clients and students on the value of sustainable design thinking and making. They believe in an all-encompassing sustainability strategy, handprints over footprints, giving more than they take from the earth while still creating well designed products (Shulman, 2018).

Figure 5. Image of recycling bales of PET water bottles intended for new carpet fiber. © Mohawk Industries.

Scrap Culture

These efforts towards a more sustainable future strongly resonate with the values of younger generations. Millennials and GenZ are driven by their ethical responsibility toward environmental and social sustainability, focusing heavily on a company's purpose towards environmental and social impact (MLSGroup, 2014). In a survey of GenZ, 76% reported that they are concerned about humanity's impact on the planet and that it's the number one issue plaguing the world (Sparks & Honey, 2014). If the Oxford Dictionary defines "Pop Culture" as "modern popular culture aimed particularly at younger people" (2019), one might define this current Anthropocene moment amongst Millennials and GenZ, that of grappling with society's abundance of waste with the aspiration to reduce their ecological footprint, as "Scrap Culture."

Within design, this notion is about looking at waste as currency, a commodity and resource for inventing materials and products. This appreciation and demand for waste spreads across industries and design practices that want to participate in sustainability and the circular economy. Embracing a Scrap Culture mindset, more people can learn to embrace waste as an asset, foreseeing potential implementations for waste streams. As generations who have only known a "Scrap Culture," one could refer to them as "Generation Scrap."

Generation Scrap – A Pedagogical Approach

The building industry is one of the largest consumers of plastic-derived materials and products, thus interior design education is positioned to transform Generation Scrap's relationship with plastic and other waste materials. In order to create a more sustainable built environment, it is critical that a pedagogical approach to interior finish materials include projects that encourage life cycle analysis and exploration of waste reduction. By establishing a sustainable design mindset early on in interior design education, particularly within the Interior Finish Materials course, sustainability will become a building block for all subsequent design decisions.

Mohawk believes that in order to create a more sustainable future, education of sustainability and textile design must go hand in hand by engaging designers of the future. In this spirit, a project was developed in partnership with Mohawk Group, a division of Mohawk Industries. Positioned within an introductory level Interior Finish Materials course at The Ohio State University, this project explores the design process and theoretical design concepts for a carpet that would mitigate waste. This project leverages Mohawk's extensive knowledge and advancements within sustainable manufacturing and the circular economy to improve student outcomes.

Research and Trend Forecast

When you combine design thinking and sustainability, you can solve big problems. Inspired by emerging designers, this asked students to develop a trend forecast report positioning sustainability alongside societal issues, conceptualizing a future that is both environmentally and socially sustainable.

Launching the project, Mohawk's A&D Design Director, Royce Epstein, presented her authored CEU presentation "Scrap Culture." Diving deeper, students individually researched scrap culture to understand how all design industries are addressing waste. Students then looked at the world through their own lens, contemplating personal ethics, social movements globally and locally, art, fashion, and technology to discover what they foresee as leading to the future of design, resulting in their final trend forecast.

Design Concepts

Applying their trend forecast, students designed a carpet concept for a commercial application (workplace, hospitality, retail, higher education, etc.) that would positively impact the natural environment and the human experience of space. Taking longevity into consideration, the design addressed durability, meeting industry high traffic standards. Designs also considered the overall aesthetic, including patterns, colors, and textures that are relevant today and ten years from now. As a theoretical project, students were encouraged to propose new manufacturing materials and methods, such as solutions for backing or fibers. The design concepts needed to create a meaningful dialogue between industry, craft, sustainability, and social challenges.

Outcomes

Juried by a team of design professionals at Mohawk Group, the following projects were awarded first, second, and third place amongst the students in the class. These examples demonstrate a breath of theoretical approaches for how carpet design can be both beautiful and meaningful while contributing to the reduction of global waste.

Example 1: Terra Haven Trail

Trend Forecast

Concerned for the plight of refugees facing displacement due to global warming, Katherine Hunter's design addressed the sustainability and humanitarian challenges surrounding the mass migration crisis. Her trend research focused on climate refugees, highlighting a subset of refugees that are forced to migrate due to inhabitable conditions related to climate change, which includes rising sea levels, hurricanes, drought, rising temperatures, and the melting arctic ice.

Figure 6. Image of Hunter's trend forecast from her final presentation. © Katherine Hunter and The Ohio State University.

Design Translation

Hunter's design objective was to bring Climate Migration to the surface, literally, through pattern language and fiber construction. Inspired by forging a trail to a new beginning, the design started by understanding the physical and emotional journey of a refugee. Translating migration maps, the surface pattern become a means for wayfinding within an interior. The color collection was derived by two paths of travel, across water and land. These natural color palettes, based on biophilia, create a sense of calm. The application is intended for healthcare spaces where refugees seeking a new life would feel at home in their new environment.

Figure 7. Image of Hunter's carpet design from her final presentation. © Katherine Hunter and The Ohio State University.

Sustainable Strategy

In further researching the waste stream caused by the refugee crisis, Hunter discovered that lifejackets are polluting beaches and oceans along migration paths. Thus, Hunter's sustainable strategy uses discarded life jackets as raw material for a new carpet material. Commercial carpet is made from nylon – instead of using virgin nylon, Hunter proposes

recycling the nylon from refugee's lifejackets for new carpet fiber and the foam interior as a backing material. Once again physically connecting to the refugee story, each 24" carpet tile would metaphorically represent one refugee whose life was forever affected by climate change.

Figure 8. Image of Hunter's sustainability strategy from her final presentation. © Katherine Hunter and The Ohio State University.

Example 2: Bending Lines

Trend Forecast

The sharing economy and technology have enabled the demolition of many boundaries. As GenZ looks to the future, they envision a more evolved society, one that is cross cultural and more accepting of differences in race, age, and gender. They desire a society that is fluid, a term that speaks to people who are not of a single place but part of many, not defined by a preconceived idea of identity but one that moves between previously defined boundaries. Definitions and depictions of male and female are being transformed and even erased through gender bending as design and fashion is embracing androgyny, gay rights and acceptance of transgendered people. Abigail Bouton explored these ideas for her trend forecast.

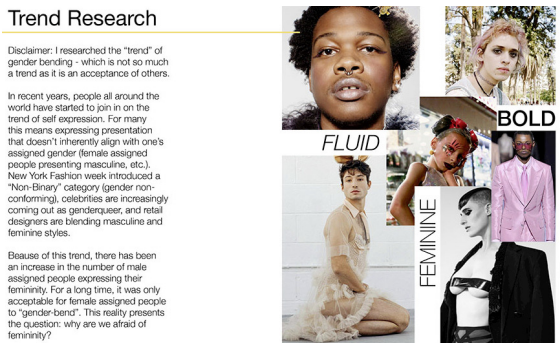

Figure 9. Image of Bouton's trend forecast from her final presentation. © Abigail Bouton and The Ohio State University.

Design Translation

Interpreting this cultural trend, Bouton explored gender as binary and non-binary, translating these concepts into pattern-work using line, hierarchy, and space. The gridded pattern moves from heavy to thinner lines, creating a fluid pattern that can be seen as blurring the boundaries between what is traditionally male vs. female. This collection was designed as modular tile and broadloom, showing the versatility and fluidity of installation types. Seeking to further push the idea of non-binary and redefine perceptions of feminity, the monochromatic color palette is in shades of pink as well as black and white.

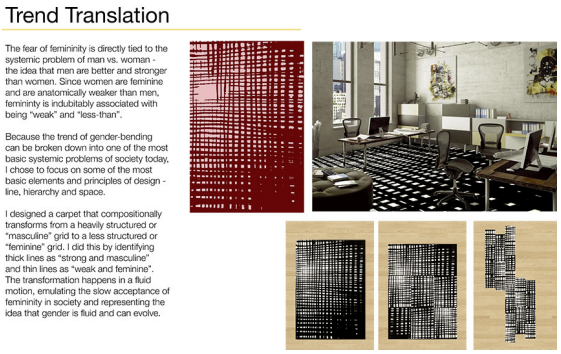

Figure 10. Image of Bouton's carpet design from her final presentation. © Abigail Bouton and The Ohio State University.

Sustainable Strategy

While the fashion industry is a leader in forging a non-binary world, Bouton recognizes that textile waste from their industry is negatively impacting the environment. Thus, striving to reduce fashion's waste as well as greenhouse gas emitions from virgin polyester production (a fiber used for carpet), Bouton's strategy reclaims polyester textiles destined for the landfill to be recycled into new carpet fibers.

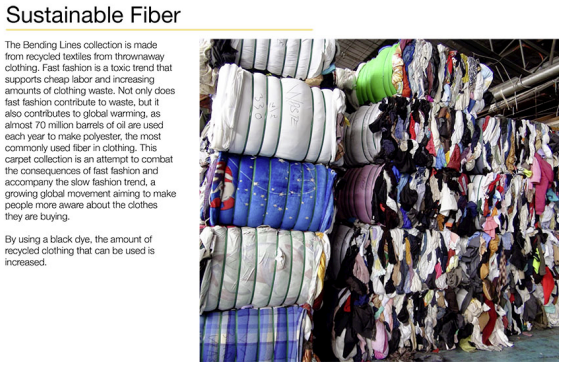

Figure 11. Image of Bouton's sustainability strategy from her final presentation. © Abigail Bouton and The Ohio State University.

Example 3: Ocean Floors
Trend Forecast

One of the greatest sustainability challenges today is the volume of non-biodegradable plastics polluting our oceans. As humanity understands the consequences of their throwaway lifestyle, as evident in the Great Pacific Garbage Patch and other such occurrences around the world, efforts to swiftly patch our ecosystem must be addressed by all industries. Scientists and designers alike are tackling this through new material explorations using ocean plastic as a raw material for new products. As a global issue, it will take industries collaborating to make a major change. Thus, Serena Schwallie's forecast builds on the notion of "team work to make the dream work."

Figure 12. Image of Schwallie's trend forecast from her final presentation. © Serena Schwallie and The Ohio State University.

Design Translation

Schwallie's Mohawk + Parley Ocean Floors carpet collection reflects the eight primary regions around the world (Hawaii, Maine, the UK, Jamaica, Alaska, Maldives, Indonesia, and Australia) whose beaches and surrounding oceans are most impacted by plastic waste. Highlighting that this is indeed a global problem, the pattern and colors relate to each other but each colorway is unique to the beaches of the specific regions. Applied within an office interior, each colorway defines a conference room or brainstorming area where the polluted beach and its story becomes the room identity and environmental graphics. This concept further illustrates the power of interior finish materials to transform a space into a more meaningful and impactful place.

Figure 13. Image of Schwallie's carpet design from her final presentation. © Serena Schwallie and The Ohio State University.

Sustainable Strategy

Conceived as a partnership between Mohawk with Parley, the collection would leverage Parley's work to recycle debris from the eight beaches to create carpet fibers. Each color/pattern in the collection would be made from reclaimed ocean plastic from that specific region, directly linking people standing on the carpet to the beach where the raw material originated. This sustainability story is relevant as everyone can relate to oceans and plastic waste, and feel they are contributing to circularity.

Figure 14. Image of Schwallie's sustainability strategy from her final presentation. © Serena Schwallie and The Ohio State University.

Conclusions

From proposals of new carpet fibers or backing solutions created from agricultural, industrial, and consumer waste to new patterns based on biophilia, this project demonstrates the ingenuity and creative problem solving that GenZ possess. This partnership highlights the importance of industry collaboration between sustainability organizations, both educational and industry, to create designs that emotionally connect to end users who demand sustainable products in the marketplace. By incorporating

projects such as this into our university curriculums, we can make a tangible impact on the environment. As experienced practitioners of interior and product design in a sustainability context, Mohawk believes it is imperative to inspire the next generation of designers and design thinkers to tackle the dire environmental and social challenges of our time. Generation Scrap aims to do just that – instill a combination of global insight, cultural context, current and future sustainability initiatives, and design practice into a cohesive project that redefines the scope of materials for the built environment.

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