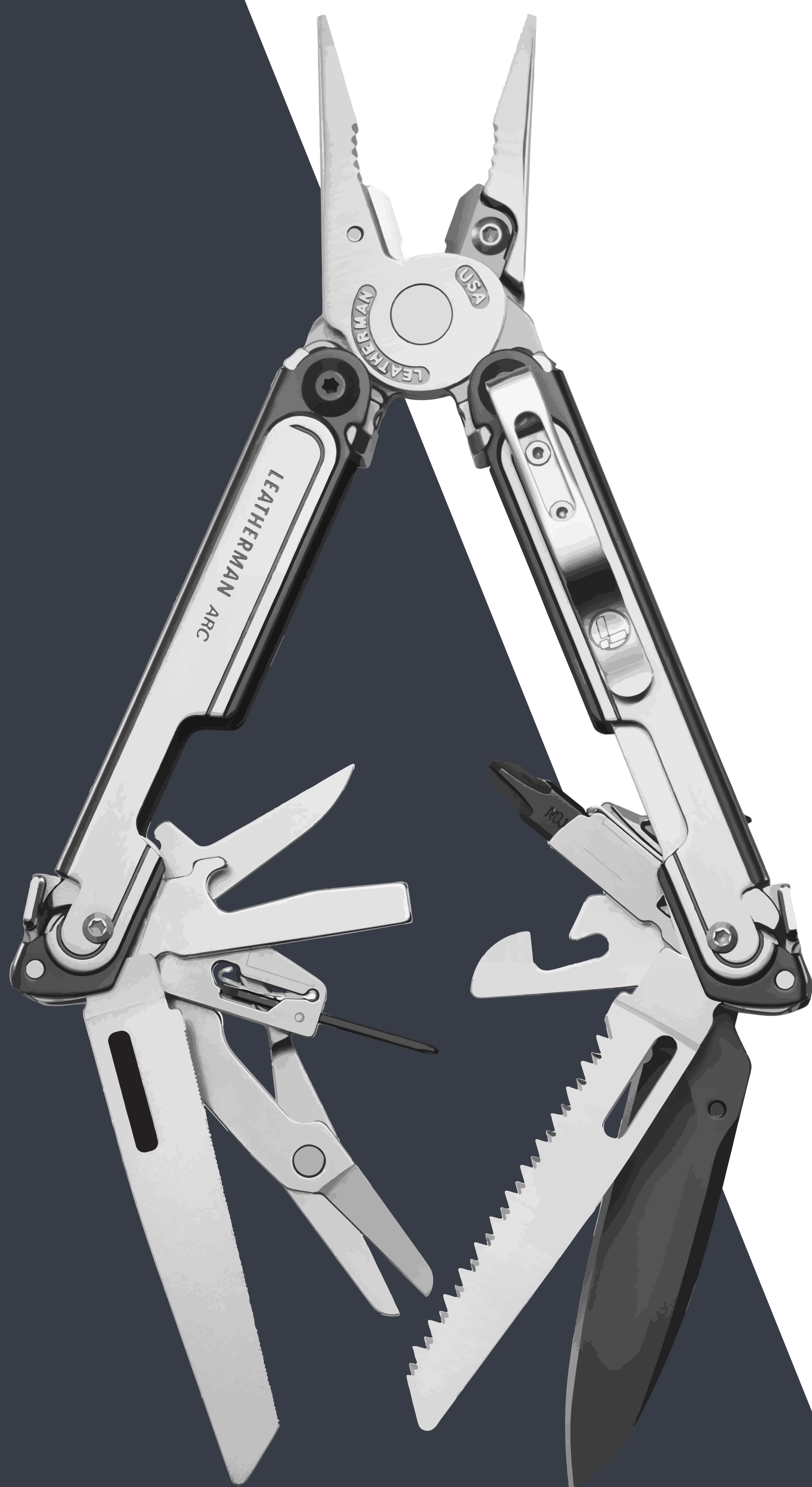
LEATHERMAN®

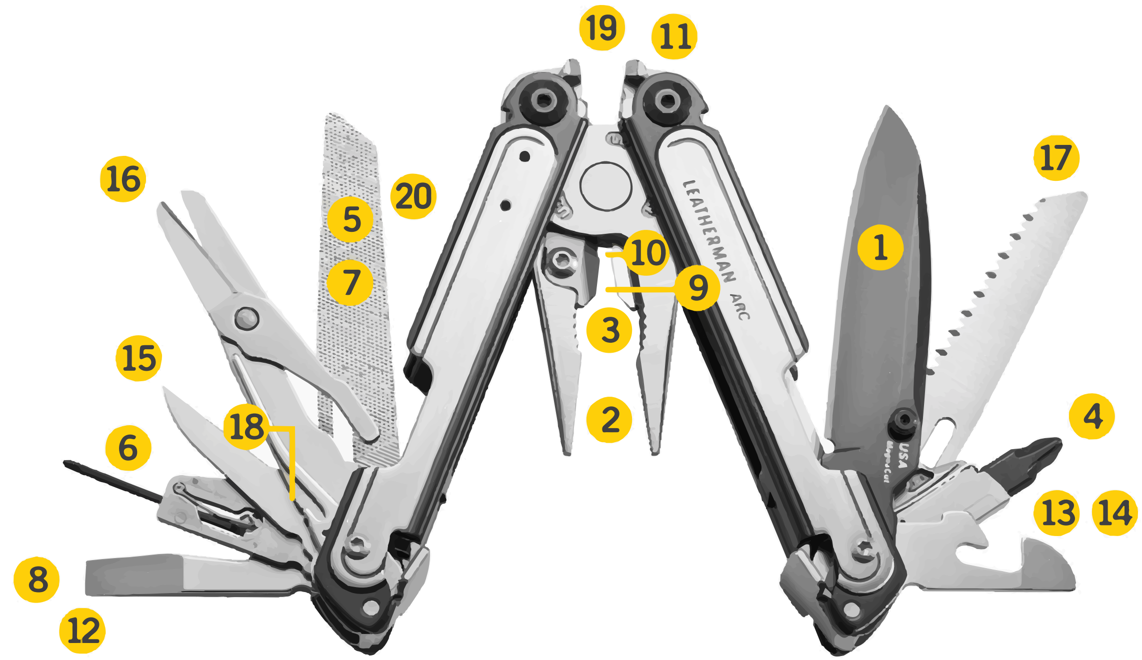
PRODUCT REDESIGN PROCESS
LEATHERMAN ARC MULTI-TOOL

Collaborative Product Design - Fall 2023

Sarah Hashiguchi
Jordan Synnestvedt
Solomon Sanchez
Kate Ithurralde



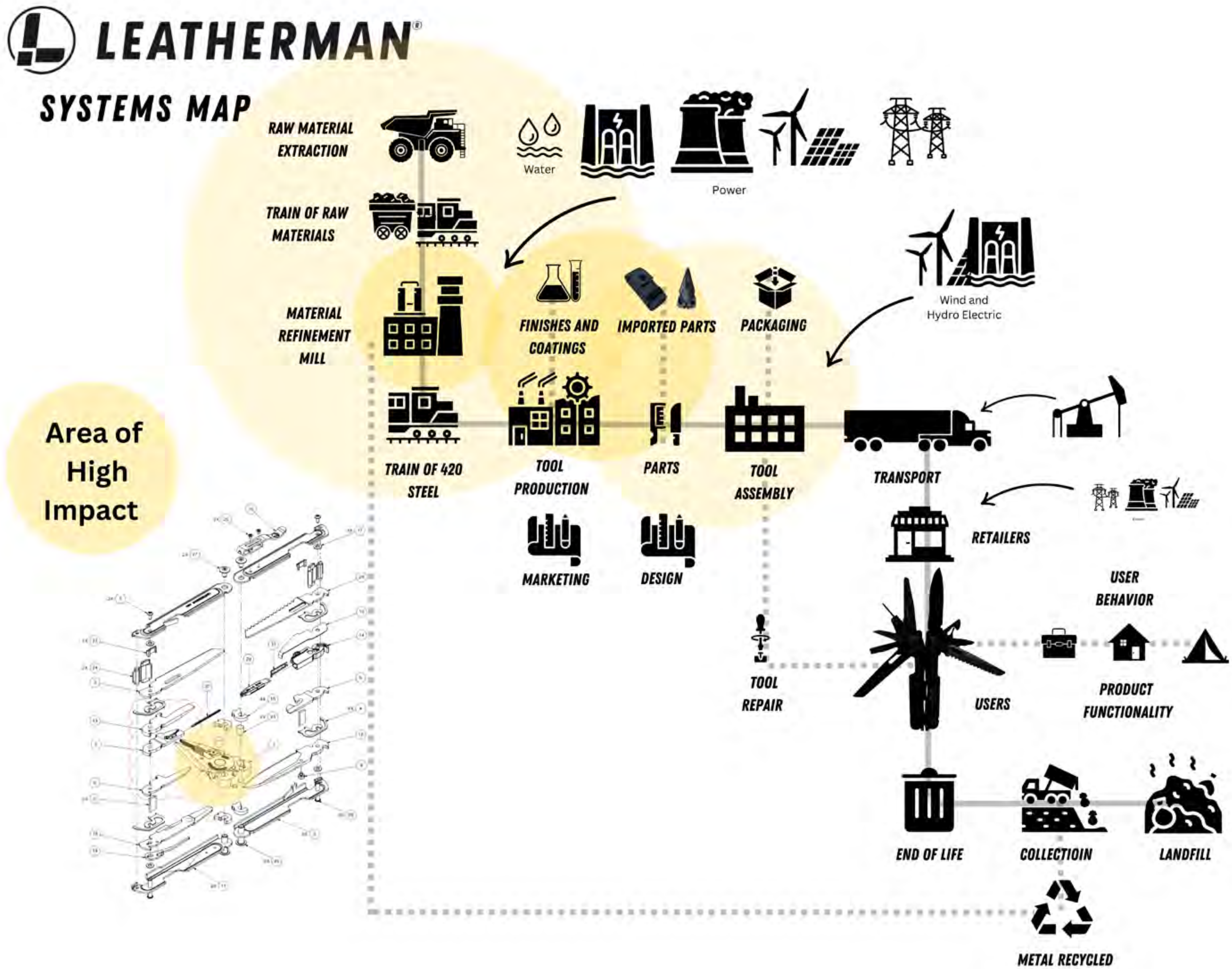
LEATHERMAN ARC



TOOLS INCLUDED

1. MagnaCut Knife Blade
2. Needlenose Pliers
3. Regular Pliers
4. Large Bit Driver
5. Diamond-coated File
6. Small Bit Driver
7. Wood/Metal File
8. Pry Tool
9. Premium Replaceable Wire Cutters
10. Premium Replaceable Hard-wire Cutters
11. Impact Surface
12. Large Screwdriver
13. Bottle Opener
14. Can Opener
15. Awl
16. Spring-action Scissors
17. Saw
18. Wire Stripper
19. Electrical Crimper
20. Edge File

SYSTEM MAP


LEATHERMAN
SYSTEMS MAP
RAW MATERIAL EXTRACTION
TRAIN OF RAW MATERIALS
MATERIAL REFINEMENT MILL
TRAIN OF 420 STEEL
Water
Power
FINISHES AND COATINGS
IMPORTED PARTS
PACKAGING
Wind and Hydro Electric
TOOL PRODUCTION
PARTS
TOOL ASSEMBLY
TRANSPORT
MARKETING
DESIGN
RETAILERS
USER BEHAVIOR
TOOL REPAIR
USERS
PRODUCT FUNCTIONALITY
Area of High Impact
END OF LIFE
COLLECTIOIN
LANDFILL
METAL RECYCLED

DESIGN BRIEF

The first step of our redesign process was to conduct Life Cycle Assessments (LCA's). We prepared for this exercise by defining our boundaries, functional units, priorities and priority reasonings, and metrics for success.

BOUNDARIES

INCLUDE: tool, sheath, sourcing, transportation, manufacturing processes, user behavior (repair and disposal, corporate engagement)

EXCLUDE: packaging, facility/utilities

FUNCTIONAL UNIT

Lifetime of the product (25 years)

PRIORITY REASONING

We initially chose our sustainable design objectives based on their direct impact to human health and safety, and the potential we saw to improve those areas through an LCA sensitivity analysis. We included non-negotiable business objectives that were provided by the client, and therefore are high priorities in our redesign process.

METRICS FOR SUCCESS

1. Reduce carcinogens by **30%**
2. Maintain projected working lifespan of **25 years**
3. Reduce overall CO_2 eq. kg/func unit by **25%**
4. Maintain **majority** customer approval of functionality, desirability, and attractiveness
5. Maintain a **40%** profit margin (while keeping market prices in mind)
6. Improve LCA Impact Score by **50%**

LIFE CYCLE ANALYSIS

LEATHERMAN®

ORIGINAL PRODUCT LCA

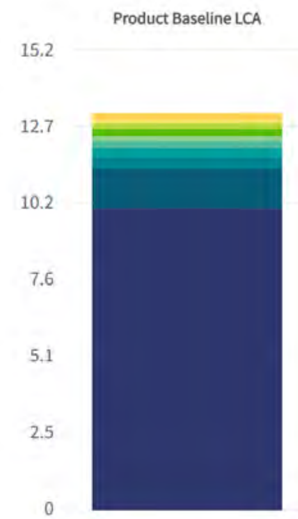
SBOM BASELINE:

Name	Material/Process	Qty	Amt	Unit	mPts	CO_2 eq. kg	MS	Part ID
PLASTIC SLEEVE FOR EXTRA I	Polyethylene, LDPE, granulat	1	9	g	$2.11x10^{-3}$	0.0342	E	34
EXTRA BITS (11)	Stainless steel, austenitic	1	35	g	0.476	0.605	E	33
SHEATH	Nylon 6	1	52	g	0.0601	1.16	E	32
BIT DRIVER, LG, SPRING, STAI	Stainless steel, austenitic	1	0.25	g	$2.08x10^{-3}$	$2.08x10^{-3}$	E	31
BIT, EGSD-EGPSD, FINISHED	Stainless steel, austenitic	1	0.25	g	$3.61x10^{-3}$	$7.52x10^{-3}$	E	30
BIT, PSD 1-2 SD, 3/16, FINISHEI	Stainless steel, austenitic	1	4	g	0.0545	0.0703	E	29
SAW, MPT	Stainless steel, austenitic	1	9	g	0.122	0.151	E	28
SCREW, KB/JAW, BLACK	Stainless steel, austenitic	2	0.4	g	$6.83x10^{-3}$	$8.16x10^{-3}$	E	27
PIN, TOOL END, THICK/MEDIUI	Stainless steel, austenitic	2	0.5	g	$8.32x10^{-3}$	$8.16x10^{-3}$	E	26
PIN, JAW END, THICK, BLACK	Stainless steel, austenitic	2	2	g	0.0333	0.0326	E	25
LOCK, THICK, MPT	Stainless steel, austenitic	2	6	g	0.0999	0.100	E	24
SPRING, JAW/HANDLE, MPT	Polycarbonate, PC	2	0.25	g	$2.30x10^{-4}$	$4.13x10^{-3}$	E	23
PLUG, HANDLE, BLACK	Acrylonitrile-butadiene-styren	2	0.25	g	$2.32x10^{-4}$	$2.42x10^{-3}$	E	22
MAGNET, THICK, MPT	Nickel, primary	2	0.5	g	$2.32x10^{-3}$	0.0160	E	21
SCREW, POCKET CLIP, MPT/PK	Stainless steel, austenitic	2	0.1	g	$1.77x10^{-3}$	$3.04x10^{-3}$	E	20
SCISSOR, SPRING, MOD	Stainless steel, austenitic	1	1	g	0.0160	0.0194	E	19
SCISSOR SUB-ASSY, MPT	Stainless steel, austenitic	1	9	g	10.1	11.1	E	18
WASHER, TOOL END, THICK, M	Stainless steel, austenitic	4	0.1	g	$3.32x10^{-3}$	$3.33x10^{-3}$	E	17
POCKET CLIP, MPT	Stainless steel, austenitic	1	4	g	0.0333	0.0333	E	16
JAW SPACER	Stainless steel, austenitic	4	2	g	0.108	0.133	E	15
BIT DRIVER, LG, BODY, MIM	Stainless steel, austenitic	1	10	g	0.321	0.465	E	14
CAP LIFTER, PRYBAR	Stainless steel, austenitic	1	10	g	0.321	0.465	E	13
KB, MAGNACUT, DLC	Stainless steel, austenitic	1	17	g	0.272	0.330	E	12
HANDLE, POCKET CLIP	Stainless steel, austenitic	2	14	g	0.380	0.476	E	11
SPACER, BIT KEEPER	Stainless steel, austenitic	1	2	g	0.0167	0.0167	E	10
SCREW, TOOL END, MOD	Stainless steel, austenitic	2	0.2	g	$3.82x10^{-3}$	0.0101	E	9
THUMB STUD, FREE, BLACK	Stainless steel, austenitic	1	0.1	g	$6.98x10^{-4}$	$2.22x10^{-3}$	E	8
BIT DRIVER, MICRO, SUB-ASSE	Stainless steel, austenitic	1	7	g	0.0949	0.116	E	7
BORING AWL, WIRE STRIPPER	Stainless steel, austenitic	1	5	g	0.0801	0.0972	E	6
CAN OPENER, MOD	Stainless steel, austenitic	1	5	g	0.0678	0.0838	E	5
LOCK SPRING, TOOL, MOD	Stainless steel, austenitic	4	0.25	g	$8.33x10^{-3}$	$8.33x10^{-3}$	E	4
FILE, EXTERNAL	Stainless steel, austenitic	1	11	g	0.149	0.184	E	3
HANDLE, JAW GUIDE	Stainless steel, austenitic	2	14	g	0.382	0.502	E	2
JAW SUB-ASSY, THICK, MOD	Stainless steel, austenitic	1	62	g	1.99	2.89	E	1
	Manufacturing total				15.2	19.1	E	

Name	Transportation mode	Qty	Amt	Unit	mPts	CO_2 eq. kg	MS	Part ID
Assembled product								
Transportation mode	Transport, combination truck,		600	mi	$2.74x10^{-3}$	0.0307	E	
Transportation mode	Freighter, oceanic		3000	mi	$1.32x10^{-3}$	0.0189	E	
Transportation mode	Train, freight, diesel		600	mi	$1.70x10^{-3}$	0.0174	E	

Impacts by SBOM inputs: Total [mPts/func unit]

Reference

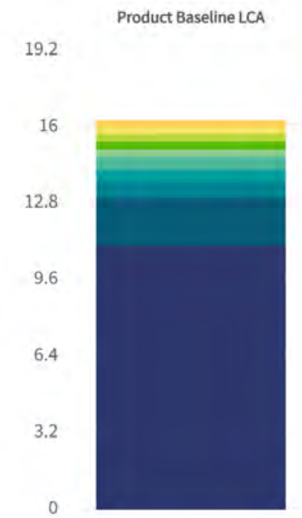


Total = 15mPts/func unit

Input	mPts/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	10.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	1.30
Material - Stainless steel, austenitic	0.364
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.325
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Material - Stainless steel, austenitic	0.206
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.183
Material - Stainless steel, austenitic	0.164
Material - Stainless steel, austenitic	0.164

Impacts by SBOM inputs: Total [CO2 eq. kg/func unit]

Reference



Total = 19 CO2 eq. kg/func unit

Input	CO2 eq. kg/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	11.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	2.02
Process - Nylon 6: Weaving, cotton	0.679
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.522
Material - Nylon 6	0.479
Material - Stainless steel, austenitic	0.339
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.294
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.236

LCA MODEL RESULTS

The following matrix shows how our LCA scenarios scored in comparison to the baseline product, when measured against our original design objectives.

OBJECTIVE	WEIGHT	BASELINE	SHEATH	COATINGS	TRANSPORTATION
	mPts	**15**	**15**	**15**	**15**
	CO_2 eq. kg	**19**	**18**	**19**	**19**
Reduce carcinogenics	**4**	**3 (x4)**	**3 (x4)**	**3 (x4)**	**2 (x4)**
Must last for 25 years • Must be durable • Must be corrosion resistant • Must hold an edge very well	**4**	**3 (x4)**	**2.5 (x4)**	**3 (x4)**	**3 (x4)**
Reduce overall CO_2 eq. kg/functional unit	**3**	**3 (x3)**	**3 (x3)**	**3 (x3)**	**2 (x3)**
Maintain 40% profit margin • Must cover all overhead, remain debt free, and have the ability to fund all of their own projects • Pricing structure = Cost + Margin	**2**	**3 (x2)**	**4 (x2)**	**5 (x2)**	**2 (x2)**
Must be functional, desirable, attractive	**2**	**3 (x2)**	**3 (x2)**	**2 (x2)**	**3 (x2)**
LCA improvement	**1**	**3 (x1)**	**3 (x1)**	**3 (x1)**	**1 (x1)**
	TOTALS	**48**	**48**	**50**	**37**

LCA TAKEAWAYS

LCA CONSULTATIONS AND DIRECTIONS

As seen in the graphs from the initial LCA testing, the processes associated with the stainless steel, as well as the stainless steel itself, appear to be at this stage the largest areas of environmental impacts and carcinogens.

It is our recommendation that we continue to investigate and compare your existing source mill, Niagara Specialty Metals, to other certified mills that are nearer to your factory. With this measure we hope to:

- Ensure that the steel is being processed at the highest ethical and environmental standards possible.
- Shorten the transportation distance, minimizing fossil fuel use.

Here are two mills and their acrediting bodies to look to:.
Big River Steel, Arkansas and Nucor, North Carolina

Accreditation entities and resources:

The second area that produced the most notable environmental impacts was the transportation associated with importing the virgin nylon sheath from Asia.

We suggest that we find alternative ways of sourcing and fabricating these sheaths locally. To follow, we have some suggestions around this effort.

MOVING ON TO BIGGER, BETTER, AND MORE SUBSTATIAL TARGETS

- **TOO EXPENSIVE**
- **TOO EASY**
- **TOO INEFFECTIVE**

We realized that the green steel would fall out of feasibility due to its high price point being 20-30% higher than average steel. So although it would be a smart suggestion for another tool, it seemed to increase the price of this model too far out of reach for most customers.

A redesign of the sheath seemed like a simple project that was way too obvious, and the answers are literally everywhere. After learning that only 30% of the customers use the sheath, it seemed like an ineffective solution to spend the rest of our time on.

We recommend that you make the purchase of the sheath optional, and bring the price of the tool down, and keep 70% of the sheaths from being wasted. Simultaneously, by offering a sustainably made sheath sold separately, might be an expensive litmus test to see customers' response about sustainability made goods from leatherman.

With that exploration behind us, we noticed some interesting opportunities to intensify and accentuate existing attributes that are inherent in your company's DNA, but are also synonymous with sustainability.

So following the LCA exercises, the project took a strategic shift that led towards a new and promising direction. Through meticulous decision-making processes, some of the winning designs fell within the marketing and communication sphere. While we understand that these concepts fall outside the scope of Adam's role as Leatherman's product designer, we are eager to share these innovative ideas with you, in the hopes that you share them with your colleagues.

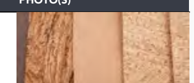
As you will see with our final designs, the marketing campaigns we've developed are inspired by audiences across the political spectrum – encompassing red, blue, and purple affiliations. The primary objective of these campaigns is to ensure the ubiquitous presence of the Leatherman tool in the hands of users at all times. The Leatherman tool stands as a beacon of sustainability and self–sufficiency, empowering users to repair and maintain their products rather than opting for replacements.

DESIGN OBJECTIVES

After conducting our initial LCA's, we established design objectives that would invite design opportunities in other areas of sustainability, outside of just materials and processes.

PRIORITY	OBJECTIVE	METRIC(S)
1	Must be durable, corrosion resistant, and hold an edge	• Must last for at least 25 years
2	Must be functional, desirable, and attractive	• 85% customer satisfaction of the tool in all categories • Can maintain 40% profit margin without pricing the unit out of scope
3	Encourage sustainable behavior change	• Increase number of tools sold that are sent in for repair by 5% • Survey responses report 99% of users have used their Leatherman Arc to repair another consumer good
4	Market sustainability in an inclusive way	• 95% of consumers approve of communication and execution of the initiative
5	LCA improvement	• LCA improvement of > +25%

Sheath: Alternative Materials Resource Table

MATERIAL	LINK(S)	PROS	CONS	CONTACT (if applicable)	PHOTO(S)
Cork Leather	https://mbcork.com/en-us	• Renewable material - doesn't damage the tree • Flexible and soft • Color options • Produces no waste in extraction, processing, or production • Completely recyclable; can be ground and made into new material	• Grows primarily in Portugal • Not as sturdy as animal hide leather	Email: cs.mbcork@gmail.com (Portugal)	
Mylo	https://mylo-unleather.com/	• Brought to market with Adidas, Lululemon • Grows in weeks (rather than years) • Is compostable • Naturally absorband, antibacterial and antimicrobial	• Not biodegradable • Plastics still included in final product • Chemicals involved in manufacturing process	https://mylo-unleather.com/contact/	
Vegea	https://alternativeleathers.com/pages/grape-leather https://www.vegeacompany.com/	• Renewable material souce (Vegea sources grape skins, seeds, and stalks from wineries across Italy. These are the leftovers from their winemaking process.) • Brought to market with Calvin Klein, Diadora, Bentley	• Not biodegradable • Plastics still included in final product • Chemicals involved in manufacturing process	https://alternativeleathers.com/pages/contact	
Desserto	https://alternativeleathers.com/pages/cactus-leather https://desserto.com.mx/home https://eikenshop.com/en-us/blogs/leather-guide/cactus-leather#H6	• Renewable material souce (The Nopal cacti are grown using rainwater and no artificial fertilizers.) • Brought to market with Adidas, Fossil, Mercedes Benz • Smooth and soft • Abundant in Mexico • Partially biodegradable • Needs very little water to grow	• Not as flexible as animal leather • Partially biodegradable • Only lasts about 10 years • Expensive (targeted to wealty minority)	https://alternativeleathers.com/pages/contact	
Piñatex	https://alternativeleathers.com/pages/pinatex https://www.panaprium.com/blogs/i/pinatex-pineapple-leather https://www.ananas-anam.com/	• Renewable material source (After pineapple harvest, the plant leaves that are left behind are collected in bundles and the long fibres are extracted using semi-automatic machines.) • Brought to market with Hugo Boss, Nike, H&M and more • Uses waste from pineapple farming industry • 30% cheaper than animal leather • Lightweight and durable	• Unlike animal hide leather, pinatex is not biodegradable • Low heat resistance • Low elasticity • Low abrasion resistance • Can dry out over time (doesn't last as long as animal leather)	https://alternativeleathers.com/pages/contact	

IDEA DEVELOPMENT

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CIRCULARITY

THE ADAPTIVE STRATEGY:

Step 1: Observe and Interpret the System

- What's in the system?
- Key actors in the system
- Forces driving a circular paradigm shift
- Forces holding linear system
- Circular economy activity underway
- Building on current efforts and identifying gaps

Step 2: Envision Circular Futures

Step 3: Create the Conditions for Collaboration

Step 4: Build Circular Design Capabilities

- Define the role of the designer
- Analyze the skills gap

Step 5: Rewrite the Rules

- Internally
- Externally

Step 6: Develop Tools to Design and Evaluate

PERSUASIVE DESIGN

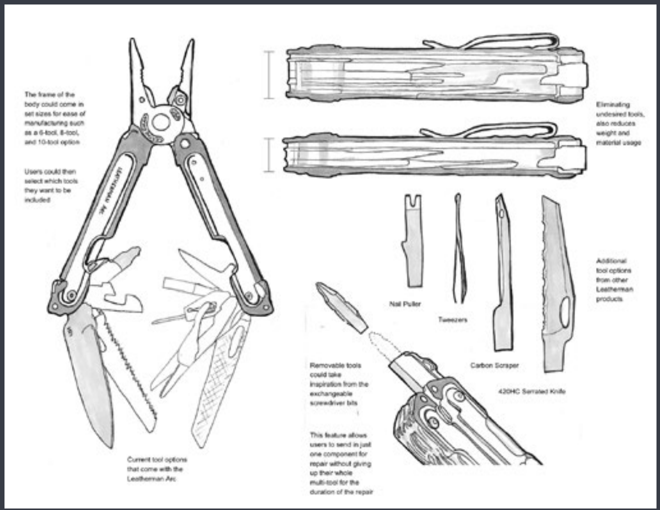
PERSUASIVE DESIGN STRATEGY:

1. To Change Behavior

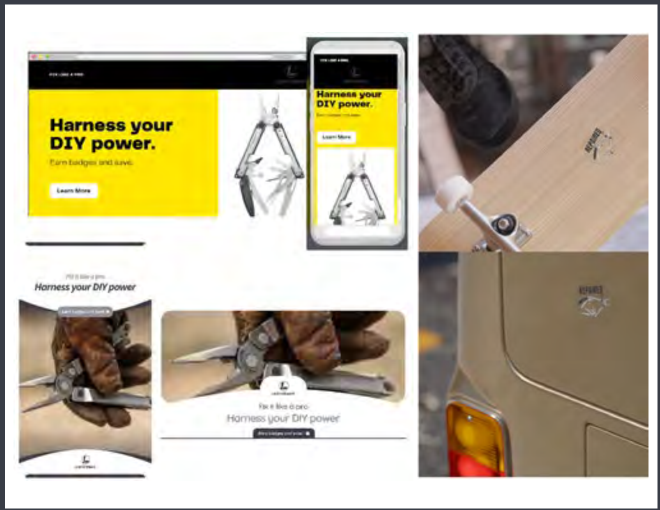
2. Increase Ability

3. Increase Motivation

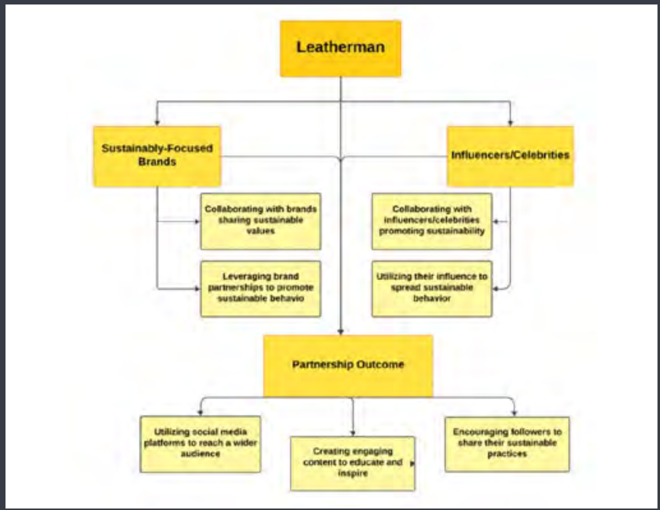
PERSUASIVE TOOL: **MODULAR TOOL**



PERSUASIVE MEDIA / SOCIAL ACTORS: **"REPAIRED BY LEATHERMAN"**



MODELING BEHAVIOR & ATTITUDE: **BRAND PARTNERSHIP**



MARKETING AND COMMUNICATIONS

MARKETING BRIEF

GOALS - What are measurable goals?

PRODUCT - How does the company deliver value?

OBJECTIVE - What is the company working to accomplish?

MISSION - What is the mission of the company?

VISION - What is the vision for the company?

DIFFERENTIATORS - What can no one else do?

AUDIENCE - Demographics

PSYCHOGRAPHICS - Hobbies, interests, beliefs, values

VISIBILITY - What media channels does the audience use?

MOTIVATIONS - Why do people engage with the company?

POSITIONING -

- SWOT (strengths, weaknesses, opportunities, threats) as it pertains to sustainability
- What challenges, opportunities, and changes will the company face in the future?
- What sets this company apart from the competition?

PLATFORM -

- What sustainability messages can the company own, with truth and authenticity?
- What unsustainable practices does the company need to address?
- What improvements to sustainable practices might most appeal to the company's core audience?

UNSDG GOALS - Which of the UNSDG goals best aligns with the company's products and values?

SUGGESTIVE SUSTAINABILITY

1 CONTEXTUAL STORYTELLING

Place the tools in settings where sustainability practices are naturally occurring. For example, show a construction worker using tools in a LEED-certified building or a craftsman repairing tools in a workshop with eco-friendly practices. This creates a story that aligns the tools with sustainable environments.

2 ENVIRONMENTAL INTEGRATION

Choose backgrounds that subtly showcase nature or eco-friendly elements. This could include images of tools being used outdoors in a garden or workshop, subtly implying a connection to the environment without overtly emphasizing it.

3 REPAIR & MAINT. SCENES

Capture moments of repair and maintenance in action. Whether it's hands fixing a tool or someone polishing and maintaining equipment, these scenes convey the message of durability and the importance of extending the lifespan of tools.

4 SUSTAINABLE MATERIALS

Highlight the use of sustainable materials in the visuals. If applicable, showcase tools made from recycled or responsibly sourced materials. This not only communicates a commitment to sustainability but also educates consumers about the eco-friendly aspects of the products.

5 COLLABORATIVE IMAGERY

Include imagery that involves collaboration or community engagement in sustainable activities. For instance, show a group of workers participating in a tree-planting event while using the tools. This associates the brand with collective efforts toward sustainability.

6 ENERGY-EFFICIENT ENVIRONMENTS

Depict tools being used in energy-efficient spaces or settings powered by renewable energy. This indirectly communicates a commitment to sustainable practices and aligns the tools with environmentally conscious actions.

7 NATURAL LIGHT & ECO SETTINGS

Use natural light in photography and showcase tools in eco-friendly settings. This not only creates aesthetically pleasing visuals but also subliminally connects the tools with a natural and sustainable environment.

8 EVERYDAY SUSTAINABILITY

Capture everyday scenarios where tools contribute to sustainable actions, such as a person using a tool to repair household items rather than disposing of them. This normalizes sustainable behavior without explicitly stating it.

9 GREEN SPACES & LANDSCAPES

Incorporate green spaces and landscapes in the background to convey a connection with nature. This can be achieved by featuring tools being used in outdoor environments or settings that emphasize a harmonious relationship with the environment.

10 SUBTLE ECO-FRIENDLY SYMBOLS

Place subtle eco-friendly symbols in the visuals, such as recycling icons or green leaves, to convey an underlying commitment to sustainability without overpowering the main message.

NARROWING DOWN

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TOP 8 DESIGN CONCEPTS

TOP IDEAS:

In the culmination of our research efforts, our team meticulously examined the body of work we had generated. Through comprehensive discussions, several standout ideas emerged, each carrying the potential to significantly enhance our project. In no particular order, our top ideas were as follows:

1. LESS MATERIALS - NO SHEATH:
- Concept of selling the sheath separately, and adjusting the price point accordingly

2. ETHICAL SOURCING:
- Steel - LEED Certified Process / Source
- Reaching out to those companies to deliver some formal cost analysis & key contacts
- Inquiries - Contacts and & resources for Leatherman to follow up on

3. MODULAR DESIGN:
- Interchangeable components

4. FIX IT - REPAIRED BY LEATHERMAN:
- Marketing campaign
- Promote ideal of self-sufficiency
- Online portal / Community "hub"

5. CIRCULARITY COMMITMENT:
- Guidelines for internal teams

6. MATERIAL ALTERNATIVES FOR SHEATH:
- Create a resource matrix for Leatherman
- List company info based on component
- Drive folder of organized brochures / resources we've collected

7. WOMEN/GENDER INCLUSIVITY:
- Social media campaign
- "Girls who Rock"

8. SUGGESTIVE SUSTAINABILITY:
- Example - Carhartt
- Discreet logo utilization

LIFE CYCLE ASSESSMENTS

“IF WE” LCA BRAINSTORM

While we encountered challenges in conducting Life Cycle Assessments (LCAs) for the majority of our concepts, we successfully navigated this limitation by employing a creative brainstorming approach to contemplate each concept's relative impact. Utilizing the guiding phrase "If we," our team generated insightful considerations that provided valuable perspectives on the potential environmental implications of our ideas.

LESS MATERIALS - NO SHEATH:

- If we sold 70% less imported nylon sheaths it would be this much CO_2 and plastic saved.

ETHICAL SOURCING:

- If the steel was sourced by this mill compared to this mill there would be this much CO_2 diverted.

MATERIAL ALTERNATIVES FOR SHEATH:

- If we used this material over this material we would save this much energy/ carbon etc.

CIRCULARITY COMMITMENT:

- If we partnered with this nearby factory to make X and we gave them Y we could avoid this much waste CO_2 etc.
- If the steel was in a closed loop reclaim recycle reuse system, this much virgin material would not be used.

MODULAR DESIGN:

- If every tool left out one or more tool components, made them more specific to the owner, that would save this much steel and CO_2, plus improve their effectiveness, and save more things from being thrown away.

FIX IT - REPAIRED BY LEATHERMAN:

- If a repair video from their “fix it” campaign can prevent X amount of leathermans being returned to the factory for repair.
- If the average leatherman repaired one X, there would be this many Xs that were not thrown away.

WOMEN/GENDER INCLUSIVITY:

- If more women carried leatherman tools, more things could be fixed, and women would be more empowered (#5 UNSDGs).

SUGGESTIVE SUSTAINABILITY:

- If more people thought of sustainability as a design achievement, rather than a political ideology, it might open the doors to new perspectives, collaborators, and participants.

LCA’S FOR RELEVANT CONCEPTS

Impacts by SBOM Inputs: Total [CO2 eq. kg/func unit]

Baseline

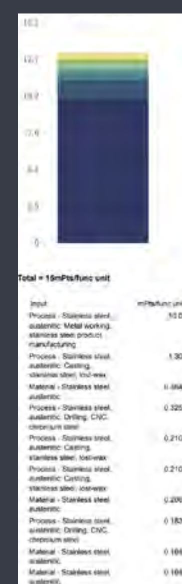
No Sheath

Material Alternate

Impacts by SBOM Inputs: Total [mPts/func unit]

Baseline

No Sheath



Material Alternate

DECISION MATRIX

DECISION MATRIX

			1	2	3	4	5	6	7	8
		WEIGHT	**Less Materials - No Sheath**	**Ethical Sourcing**	**Material Alternatives - Sheath**	**Circular Design Commitment**	**Modular Design**	**Fix-It Campaign**	**Gender Inclusivity**	**Suggestive Sustainability**
Objectives / Metrics ***1- Significant negative impact / 2 - Some negative impact / 3 - No change from current product / 4 - Some positive improvement / 5 - Significant positive improvement***										
Must last for 25 years > Must be durable, corrosion resistant, and hold an edge	Would the concept last for at least 25 years?	4	2.5 (x4)(less protection without sheath)	3 (x4)	3 (x4)	4.5 (x4)	4 (x4)	3 (x4)	3 (x4)	3 (x4)
Must be functional, desirable and attractive	Would the concept detract from an 85% satisfaction rate of the product? Would the concept impact profit margins?	2	3 (x2)	3 (x2)	4 (x2)	4 (x2)	4.5 (x2)	3.5 (x2)	3.5 (x2)	3.5 (x2)
Encourage sustainable behavior change	Would the concept increase the number of tools repaired? Would the concept increase the likelihood of consumers using their tool to repair other goods?	5	2.5 (x5) (slightly less likely to carry it on you?)	3.5 (x5) does encourage... but not directly related to our 2 metrics. Maybe a higher price point for an ethically sourced tool would encourage users to repair vs. re-buy	3.5 (x5) does encourage... but not directly related to our 2 metrics. Maybe a higher price point for an ethically sourced tool would encourage users to repair vs. re-buy	4.5 (x5)	4.5 (x5)	5 (x5)	5 (x5)	5 (x5)
Market sustainability in an inclusive way	Would the concept detract from a 95% satisfaction rate of the brand?	3	3.5 (x3)	4 (x3) > Made in USA > Made responsibly > Worker's health	4 (x3) > Made responsibly > Environmental / ecosystem health	4 (x3)	4 (x3)	5 (x3)	5 (x5)	5 (x5)
LCA Improvement	Would the concept have an enhanced LCA score from the unit's baseline: 45	1	4 (x1)	4 (x1)	3.5 (x1)	4.5 (x1)	3.5 (x1)	3 (x1)	3 (x1)	3 (x1)
TOTALS	BASELINE: 45		**43**	**51.5**	**53**	**65**	**63**	**62**	**62**	**62**

FINAL CONCEPTS

Upon completing the decision matrix, the prevailing concepts swiftly emerged as clear winners. We found that these concepts are not only the most useful and impactful designs for Leatherman as they stand today, but have the most opportunity for expansion and development over time.

1. CIRCULARITY COMMITMENT:

Through thoughtful consideration of materials, recycling processes, and product end-of-life management, the revised design ensures a closed-loop system that minimizes waste and fosters a culture of sustainability.

2. MODULAR DESIGN:

This approach promotes longevity and reduces environmental footprint through extended product lifespan, enhanced repairability, and the potential for future upgrades, embodying a more sustainable and resource-efficient solution.

3. EXTERNAL MARKETING CAMPAIGN:

Recognizing their collective strength, we strategically amalgamated these three ideas into a more expansive and cohesive “Marketing Campaign”.

- Fix It - Repaired by Leatherman
- Women/Gender Inclusivity
- Suggestive Sustainability

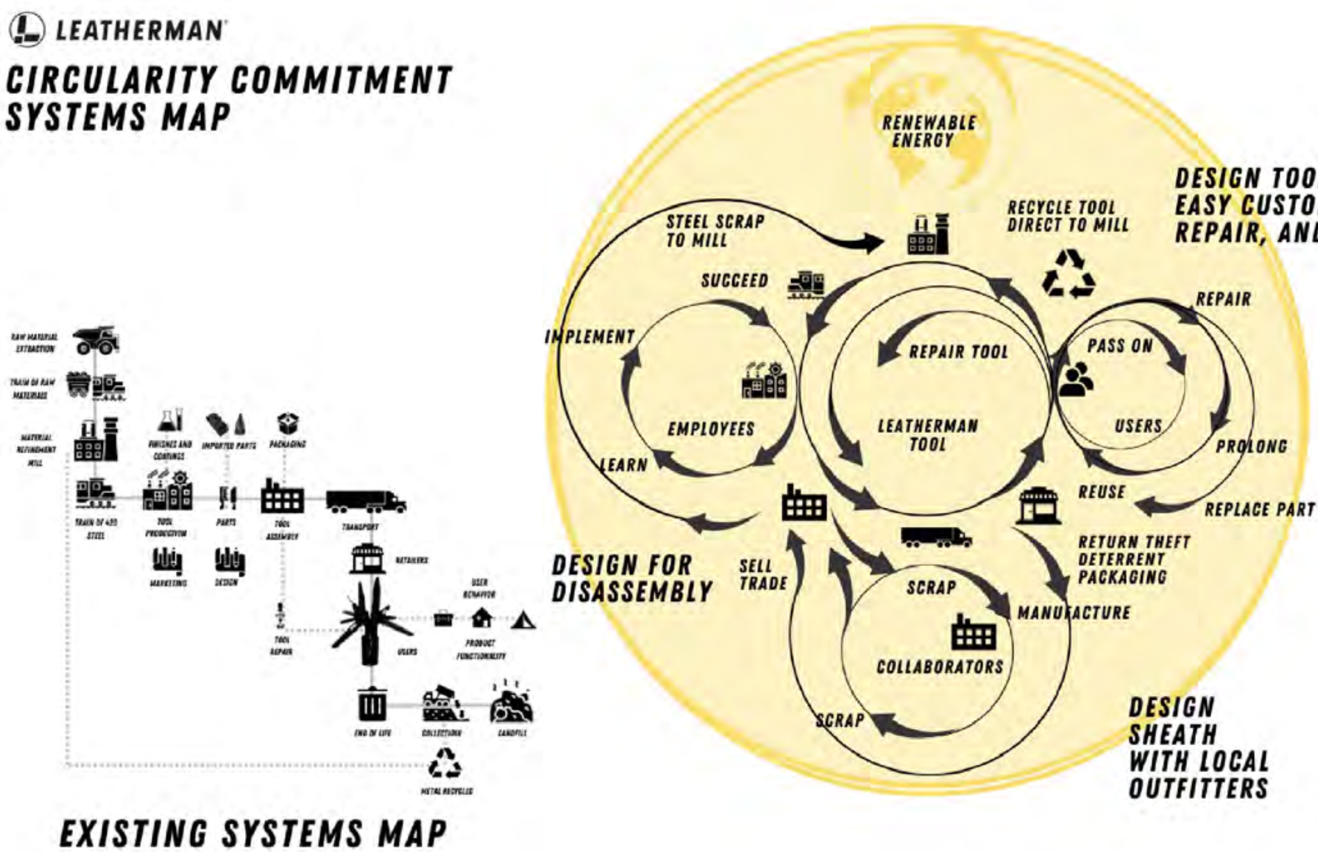
The consolidated Marketing Campagn demonstrates a marked improvement in ecological impact by fostering awareness and responsible consumer behavior.

FINAL CONCEPTS

LEATHERMAN®

FINAL CONCEPT #1 - CIRCULARITY COMMITMENT

The below illustration demonstrates how an upfront commitment to circularity would impact the tool's full life cycle. A circularity commitment can be made by Leatherman as a brand, and by internal teams including design, sourcing, marketing, and engineering.



DESIGN TOOL FOR EASY CUSTOM MODIFICATION, REPAIR, AND RECYCLING

COLLABORATIVE SHEATH DESIGN FROM SCRAPS

FINAL CONCEPT #1 - CIRCULARITY COMMITMENT (CONT.)

There are numerous options and methods to establishing a commitment to circularity. The below demonstrates an example outline of commitments Leatherman could make:

GUIDING PRINCIPLES:

1. Design for Durability
2. Modularity and Repairability
3. Sustainable Material Selection
4. Closed-Loop Manufacturing
5. End-of-Life Responsibility

OPERATIONAL GUIDELINES:

1. Cross-Functional Collaboration
2. Life Cycle Assessments (LCAs)
3. Consumer Education
4. Supplier Engagagment
5. Continuous Improvement

Circularity

Resources

Ellen MacArthur Foundation

- Methods → https://www.circulardesignguide.com/methods
- Circulytics → https://www.ellenmacarthurfoundation.org/resources/circulytics/resources
- Circular Business Design: A practical guide → https://www2.paconsulting.com/Sustainability-EMF-BDG-2020-download.html?_ga=2.239392259.1250902504.1611316505-978887778.1606939987

[Sample] Circular Design Commitment

This is intended to serve as an example of what a Circular Design Commitment might look like for the Leatherman Product Design Team. To be most effective, each principle could be accompanied by specific time-bound goals to drive progress and measure success.

Introduction

At Leatherman, we recognize the crucial role we play in shaping a sustainable future. As innovators and creators, our Product Design Team is at the forefront of this journey. Through this Circular Design Commitment, we aim to integrate circular economy principles into our daily design practices, ensuring our products contribute positively to both our customers' experiences and the environment.

Guiding Principles

1. Design for Durability: Commit to creating multi-tools that withstand the test of time, focusing on quality, robustness, and longevity. Prioritize materials and construction methods that enhance the product lifespan.

2. Modularity and Repairability: Embrace modularity in design, allowing users to easily replace components and repair their multi-tools. Design products with disassembly in mind, ensuring straightforward access to components for repair purposes.

3. Sustainable Material Selection: Prioritize the use of responsibly sourced and recycled materials in our designs. Investigate and adopt materials with lower environmental impact, considering their entire lifecycle, from extraction to end-of-life.

4. Closed-Loop Manufacturing: Strive for a closed-loop manufacturing process where waste is minimized, and materials are reused or recycled within our production systems. Work towards circular material flows to reduce our ecological footprint.

5. End-of-Life Responsibility: Develop strategies for the end-of-life phase of our products. Encourage users to return their multi-tools for responsible recycling. Explore take-back programs and initiatives to extend product life.

Operational Guidelines

1. Cross-Functional Collaboration: Foster collaboration with other departments, such as Marketing, Supply Chain, and Customer Support, to ensure a holistic approach to circular design. Promote knowledge sharing and cross-functional problem-solving.

2. Life Cycle Assessments (LCAs): Conduct comprehensive LCAs for our products, evaluating environmental impacts throughout their lifecycle. Utilize this data to inform design decisions and continuously improve our sustainability performance.

3. Consumer Education: Develop educational materials for customers, informing them about the repairability, recyclability, and sustainability features of our multi-tools. Empower users to make environmentally conscious choices.

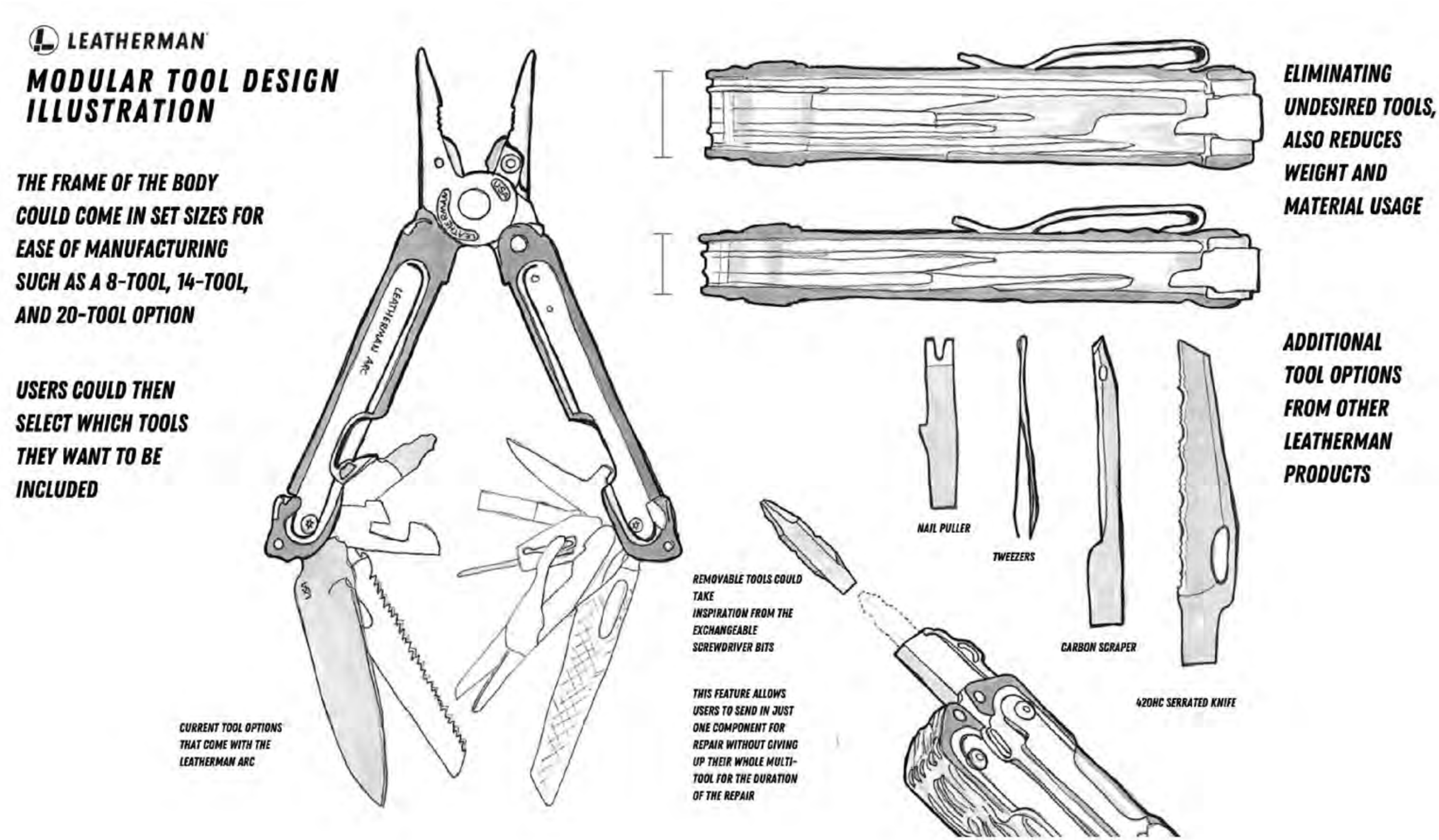
4. Supplier Engagement: Collaborate with suppliers to ensure they align with our circular design commitment. Prioritize suppliers who share our values of sustainability, ethical practices, and innovation.

5. Continuous Improvement: Regularly review and update our circular design practices based on emerging technologies, materials, and best practices. Encourage a culture of continuous improvement and innovation within the Product Design Team.

By adhering to these principles and guidelines, we, the Leatherman Product Design Team, pledge to lead the way in circular design excellence. Through our commitment, we seek not only to create exceptional multi-tools, but also to contribute positively to the planet and inspire a more sustainable future.

FINAL CONCEPT #2 - MODULAR TOOL

A modular tool allows for flexibility on the consumer's end, and encourges users to take advantage of Leatherman's existing repairs program, by allowing them to send off only a single component for repair / replacement.



FINAL CONCEPT #3 - MARKETING CAMPAIGN

SUGGESTIVE SUSTAINABILITY

A "suggestive sustainability" marketing campaign gives Leatherman a voice in sustainability in an ownable, authentic and inclusive way.

LEATHERMAN

SUGGESTIVE SUSTAINABILITY

BY SUPPORTING AND CULTIVATING EXISTING SUSTAINABLE BEHAVIOR THAT THE TOOL POSSESS, THEY CAN AVOID ALIENATING PEOPLE THAT DO NOT AGREE WITH SUSTAINABLE GOALS. BY FOCUSING THE MESSAGING ON REPAIR, REUSE, AND DURABILITY, THE COMPANY CAN EMBODY SUSTAINABILITY, WITHOUT SAYING IT.

EXAMPLES OF DISCRETE CERTIFICATION LOGOS USING NEUTRAL COLORS

EXAMPLE OF SUGGESTIVE ICONOGRAPHY IN SUBTLE CHANGES TO THEIR EXISTING LOGO, SYMBOLIZING CIRCULARITY

USING PHOTOGRAPHY THAT SUPPORTS SUSTAINABLE BEHAVIOR WITHOUT MAKING SUSTAINABILITY CLAIMS

FINAL CONCEPT #3 - MARKETING CAMPAIGN (CONT.)

FIX-IT CAMPAIGN

By harnessing the power of social influence, Leatherman has an opportunity to encourage its' loyal consumers to engage in sustainability in a fun and inspiring way. An online forum platform gives users the opportunity to share their experiences and be influenced by others to give back to their community and environment.

LEATHERMAN

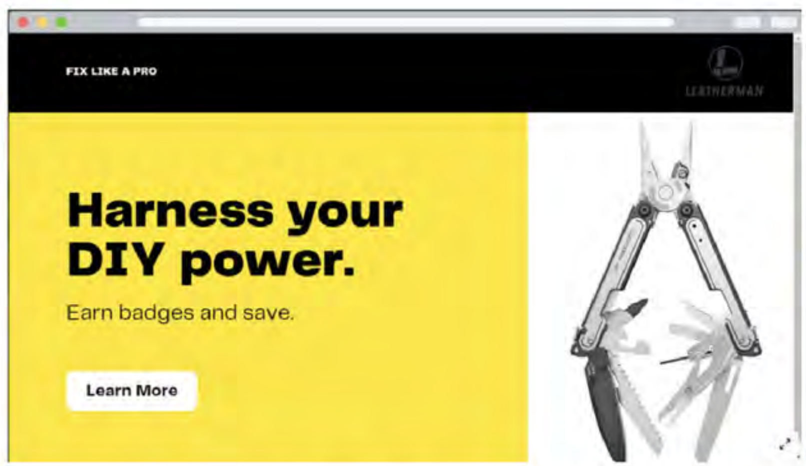
FIX-IT CAMPAIGN ONLINE FORUM

ONLINE PORTAL

THE CORNERSTONE OF THIS CAMPAIGN IS THE "REPAIRED WITH LEATHERMAN" ONLINE PORTAL, WHICH EMPOWERS USERS TO DOCUMENT AND SHARE THEIR SUCCESSFUL REPAIRS OF HOUSEHOLD, WORK, AND OUTDOOR ITEMS USING LEATHERMAN TOOLS. BY ENCOURAGING FRIENDLY COMPETITION, POINT SYSTEMS, AND THE EXCHANGE OF TIPS AND ADVICE, THIS PLATFORM NOT ONLY REINFORCES THE UTILITY OF LEATHERMAN PRODUCTS BUT ALSO NURTURES A COMMUNITY OF LIKE-MINDED ENTHUSIASTS.

BLOG AND SOCIAL MEDIA CAMPAIGN

COMPLEMENTING THIS ONLINE PORTAL IS A DEDICATED BLOG AND SOCIAL MEDIA CAMPAIGN, ALLOWING THE "REPAIRED BY LEATHERMAN" NETWORK TO SHOWCASE THEIR SUCCESSFUL REPAIR PROJECTS. FURTHERMORE, THIS BLOG AND SOCIAL MEDIA POSTS SERVES AS AN EDUCATIONAL RESOURCE, TEACHING USERS HOW TO TACKLE VARIOUS REPAIR CHALLENGES USING THEIR LEATHERMAN TOOLS. IT POSITIONS LEATHERMAN AS MORE THAN JUST A BRAND BUT AS A VALUABLE PARTNER IN THEIR CUSTOMERS' DIY ENDEAVORS.



THIS CAMPAIGN SHOWCASES THE PERSUASIVE POWER OF MEDIA AND SOCIAL ACTORS, REINFORCING LEATHERMAN'S IMAGE AS A BRAND THAT NOT ONLY PROVIDES TOP-NOTCH TOOLS BUT ALSO PROMOTES A CULTURE OF SELF-SUFFICIENCY AND COMMUNITY INVOLVEMENT.

FINAL CONCEPT #3 - MARKETING CAMPAIGN (CONT.)

FIX-IT CAMPAIGN (CONT.)

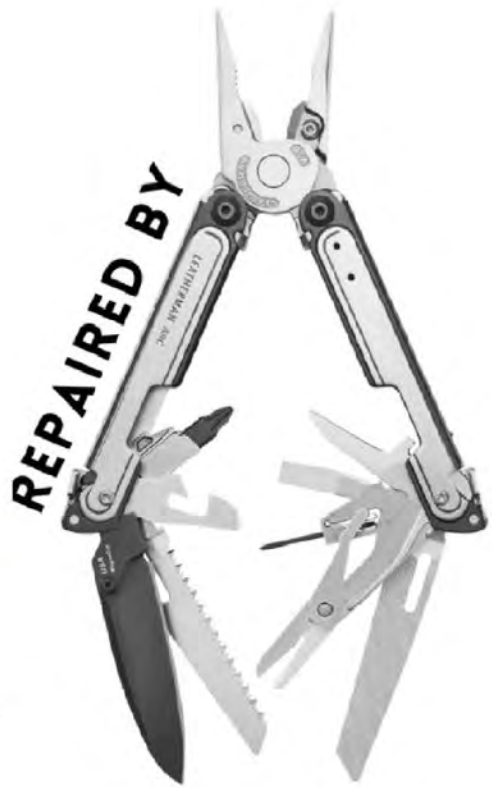
Engagement in the Fix-It Campaign can be amplified through the use of branding - Encouraging DIY-ers to leave their mark, both literally and figuratively.

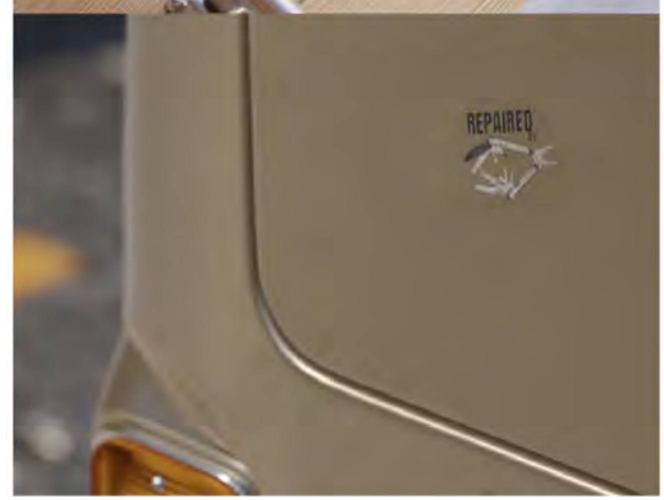
LEATHERMAN

FIX-IT CAMPAIGN

REPAIRED BY LEATHERMAN STICKERS!!!

TO SOLIDIFY THE EMOTIONAL CONNECTION BETWEEN USERS AND LEATHERMAN, THE CONCEPT INTRODUCES "REPAIRED BY LEATHERMAN" STICKERS, A TACTILE REPRESENTATION OF ACCOMPLISHMENT. THESE STICKERS, INCLUDED WITH THE MULTITOOL, CAN BE PROUDLY AFFIXED TO ITEMS THAT USERS HAVE SUCCESSFULLY REPAIRED WITH THEIR LEATHERMAN TOOL. THIS NOT ONLY SERVES AS A SUBTLE ENDORSEMENT OF THE BRAND BUT ALSO SPREADS THE MESSAGE OF SUSTAINABILITY AND SELF-RELIANCE IN AN ORGANIC AND PERSUASIVE MANNER.
***ALL STICKERS WOULD BE MADE OUT OF OCEAN PLASTIC.**





FINAL CONCEPT #3 - MARKETING CAMPAIGN (CONT.)

WOMEN AND GENDER INCLUSIVITY

Women empowerment is already peppered throughout Leatherman's marketing materials, but we believe it can be taken one step further. Encouraging young women to express their creativity and bad-ass nature is a message that feels sincere and aligned with existing Leatherman values.

LEATHERMAN

FIX-IT CAMPAIGN ONLINE FORUM

WOMEN AND GENDER INCLUSIVITY

JOIN THE REVOLUTION! LEATHERMAN MULTITOOL ISN'T JUST FOR THE OUTDOORSY GUYS; IT'S A VERSATILE COMPANION FOR THE BOLD AND BADASS GIRLS WHO ROCK. EMBRACE THE TRUE SPIRIT OF EMPOWERMENT.

KEY MESSAGING

- LEATHERMAN MULTITOOL IS A TOOL FOR EVERYONE, BREAKING STEREOTYPES AND EMPOWERING GIRLS WHO ROCK.
- MUSIC AND CRAFTSWOMANSHIP GO HAND IN HAND, AND LEATHERMAN IS THERE TO SUPPORT EVERY CHORD AND EVERY FIX.
- ENCOURAGE SELF-EXPRESSION, CREATIVITY, AND INDEPENDENCE THROUGH THE #ROCKANDTOOLCHALLENGE

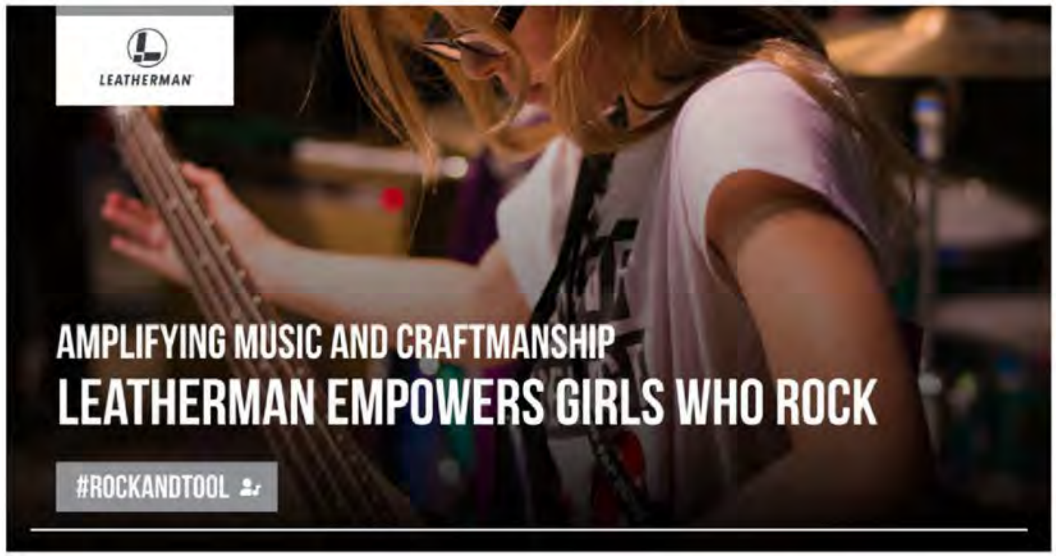


Image Source: https://werock.la/summer-camp/

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CITATIONS

LEATHERMAN®

CITATIONS

CITATIONS BY PAGE

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APPENDIX

LEATHERMAN®

LCA PROCESS

PRODUCT TEARDOWN

First we broke down the product and weighed each component. We used the weights of each part to complete the baseline LCA.

BREAKDOWN OF MULTI-TOOL COMPONENTS

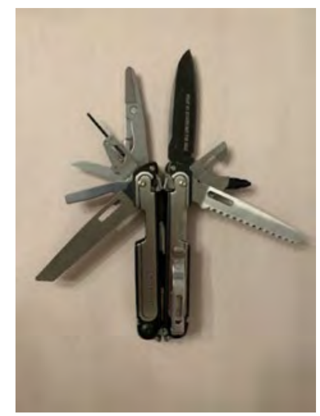
Leatherman nylon sheath with multi-tool and screwdriver bit kit enclosed

Top view of Leatherman nylon sheath with tool and screwdriver bit kit enclosed

Screwdriver bits kit with one Flat Tip Eyeglasses Screwdriver and 10 double headed bits

Multi-tool folded

Multi-tool with needlenose pliers displayed



Multi-tool with various tools displayed

LCA PROCESS

LCA BASELINE

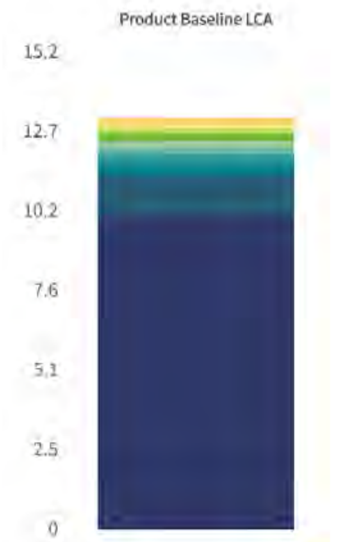
Second we created a product baseline in Sustainable Minds, then compared the following concepts again that baseline

Name	Material/Process	Qty	Amt	Unit	mPts	CO_2 eq. kg	MS	Part ID
PLASTIC SLEEVE FOR EXTRA I	Polyethylene, LDPE, granulat	1	9	g	2.11×10^{-3}	0.0342	E	34
EXTRA BITS (11)	Stainless steel, austenitic	1	35	g	0.476	0.605	E	33
SHEATH	Nylon 6	1	52	g	0.0601	1.16	E	32
BIT DRIVER, LG, SPRING, STAI	Stainless steel, austenitic	1	0.25	g	2.08×10^{-3}	2.08×10^{-3}	E	31
BIT, EGSD-EGPSD, FINISHED	Stainless steel, austenitic	1	0.25	g	3.61×10^{-3}	7.52×10^{-3}	E	30
BIT, PSD 1-2 SD, 3/16, FINISHEI	Stainless steel, austenitic	1	4	g	0.0545	0.0703	E	29
SAW, MPT	Stainless steel, austenitic	1	9	g	0.122	0.151	E	28
SCREW, KB/JAW, BLACK	Stainless steel, austenitic	2	0.4	g	6.83×10^{-3}	8.16×10^{-3}	E	27
PIN, TOOL END, THICK/MEDIUI	Stainless steel, austenitic	2	0.5	g	8.32×10^{-3}	8.16×10^{-3}	E	26
PIN, JAW END, THICK, BLACK	Stainless steel, austenitic	2	2	g	0.0333	0.0326	E	25
LOCK, THICK, MPT	Stainless steel, austenitic	2	6	g	0.0999	0.100	E	24
SPRING, JAW/HANDLE, MPT	Polycarbonate, PC	2	0.25	g	2.30×10^{-4}	4.13×10^{-3}	E	23
PLUG, HANDLE, BLACK	Acrylonitrile-butadiene-styren	2	0.25	g	2.32×10^{-4}	2.42×10^{-3}	E	22
MAGNET, THICK, MPT	Nickel, primary	2	0.5	g	2.32×10^{-3}	0.0160	E	21
SCREW, POCKET CLIP, MPT/PK	Stainless steel, austenitic	2	0.1	g	1.77×10^{-3}	3.04×10^{-3}	E	20
SCISSOR, SPRING, MOD	Stainless steel, austenitic	1	1	g	0.0160	0.0194	E	19
SCISSOR SUB-ASSY, MPT	Stainless steel, austenitic	1	9	g	10.1	11.1	E	18
WASHER, TOOL END, THICK, M	Stainless steel, austenitic	4	0.1	g	3.32×10^{-3}	3.33×10^{-3}	E	17
POCKET CLIP, MPT	Stainless steel, austenitic	1	4	g	0.0333	0.0333	E	16
JAW SPACER	Stainless steel, austenitic	4	2	g	0.108	0.133	E	15
BIT DRIVER, LG, BODY, MIM	Stainless steel, austenitic	1	10	g	0.321	0.465	E	14
CAP LIFTER, PRYBAR	Stainless steel, austenitic	1	10	g	0.321	0.465	E	13
KB, MAGNACUT, DLC	Stainless steel, austenitic	1	17	g	0.272	0.330	E	12
HANDLE, POCKET CLIP	Stainless steel, austenitic	2	14	g	0.380	0.476	E	11
SPACER, BIT KEEPER	Stainless steel, austenitic	1	2	g	0.0167	0.0167	E	10
SCREW, TOOL END, MOD	Stainless steel, austenitic	2	0.2	g	3.82×10^{-3}	0.0101	E	9
THUMB STUD, FREE, BLACK	Stainless steel, austenitic	1	0.1	g	6.98×10^{-4}	2.22×10^{-3}	E	8
BIT DRIVER, MICRO, SUB-ASSE	Stainless steel, austenitic	1	7	g	0.0949	0.116	E	7
BORING AWL, WIRE STRIPPER	Stainless steel, austenitic	1	5	g	0.0801	0.0972	E	6
CAN OPENER, MOD	Stainless steel, austenitic	1	5	g	0.0678	0.0838	E	5
LOCK SPRING, TOOL, MOD	Stainless steel, austenitic	4	0.25	g	8.33×10^{-3}	8.33×10^{-3}	E	4
FILE, EXTERNAL	Stainless steel, austenitic	1	11	g	0.149	0.184	E	3
HANDLE, JAW GUIDE	Stainless steel, austenitic	2	14	g	0.382	0.502	E	2
JAW SUB-ASSY, THICK, MOD	Stainless steel, austenitic	1	62	g	1.99	2.89	E	1
	Manufacturing total				15.2	19.1	E	

Name	Transportation mode	Qty	Amt	Unit	mPts	CO_2 eq. kg	MS	Part ID
Assembled product								
Transportation mode	Transport, combination truck,		600	mi	2.74×10^{-3}	0.0307	E	
Transportation mode	Freighter, oceanic		3000	mi	1.32×10^{-3}	0.0189	E	
Transportation mode	Train, freight, diesel		600	mi	1.70×10^{-3}	0.0174	E	

Add trans. mode

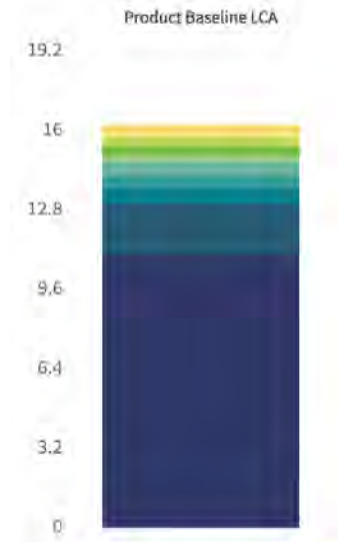
Impacts by SBOM inputs: Total [mPts/func unit]



Total = 15mPts/func unit

Input	mPts/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	10.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	1.30
Material - Stainless steel, austenitic	0.364
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.325
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Material - Stainless steel, austenitic	0.206
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.183
Material - Stainless steel, austenitic	0.164
Material - Stainless steel, austenitic	0.164

Impacts by SBOM inputs: Total [CO2 eq. kg/func unit]



Total = 19 CO2 eq. kg/func unit

Input	CO2 eq. kg/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	11.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	2.02
Process - Nylon 6: Weaving, cotton	0.679
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.522
Material - Nylon 6	0.479
Material - Stainless steel, austenitic	0.339
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.294
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.236

LCA PROCESS

COATINGS: REMOVAL OF COATINGS

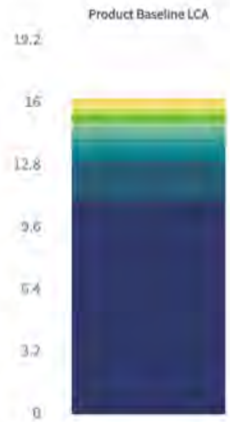
Scorecard

0.033% performance improvement

Baseline	Removal of Powder Coatings
15 mPts per 1 year of use	**15** mPts per 1 year of use
1 x 25 years of use	**1 x 25 years of use**
15 mPts	15 mPts
Estimate	Estimate
Metal working, stainless steel product manufacturing	Metal working, stainless steel product manufacturing
Carcinogenics	Carcinogenics
Manufacturing	Manufacturing

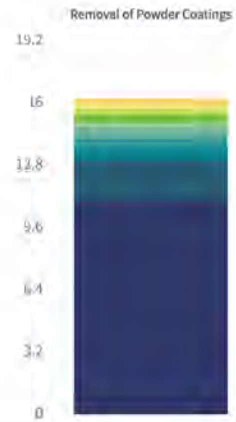
Impact category	%	Impact category	%
Ecological damage		**Ecological damage**	
Acidification	0.23	Acidification	0.22
Ecotoxicity	4.41	Ecotoxicity	4.41
Eutrophication	0.23	Eutrophication	0.23
Global warming	1.82	Global warming	1.81
Ozone depletion	0	Ozone depletion	0
Resource depletion		**Resource depletion**	
Fossil fuel depletion	0.81	Fossil fuel depletion	0.8
Human health damage		**Human health damage**	
Carcinogenics	89.32	Carcinogenics	89.33
Non carcinogenics	2.01	Non carcinogenics	2.01
Respiratory effects	0.96	Respiratory effects	0.96
Smog	0.23	Smog	0.23

Impacts by SBOM inputs: Total [CO eq. kg/func unit]



Total = 19 CO2 eq. kg/func unit

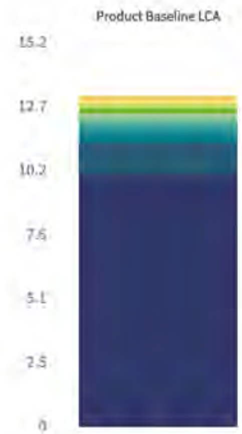
Input	CO2 eq. kg/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	11.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	2.02
Process - Nylon 6: Weaving, cotton	0.679
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.522
Material - Nylon 6	0.479
Material - Stainless steel, austenitic	0.339
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.294
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.236



Total = 19 CO2 eq. kg/func unit

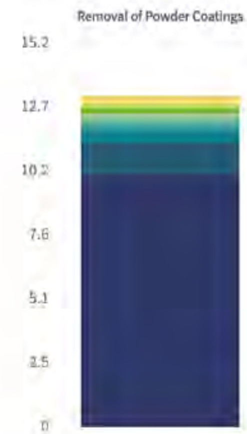
Input	CO2 eq. kg/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	11.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	2.02
Process - Nylon 6: Weaving, cotton	0.679
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.522
Material - Nylon 6	0.479
Material - Stainless steel, austenitic	0.339
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.294
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.236

Impacts by SBOM inputs: Total [mPts/func unit]



Total = 15mPts/func unit

Input	mPts/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	10.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	1.30
Material - Stainless steel, austenitic	0.364
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.325
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Material - Stainless steel, austenitic	0.206
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.183
Material - Stainless steel, austenitic	0.164
Material - Stainless steel, austenitic	0.164



Total = 15mPts/func unit

Input	mPts/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	10.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	1.30
Material - Stainless steel, austenitic	0.364
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.325
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Material - Stainless steel, austenitic	0.206
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.183
Material - Stainless steel, austenitic	0.164
Material - Stainless steel, austenitic	0.164

LCA PROCESS

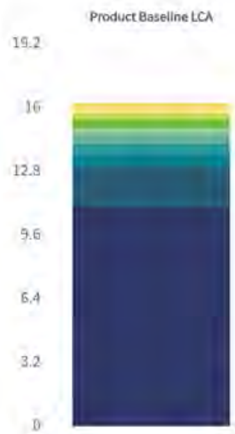
SHEATH: KENAF FIBER

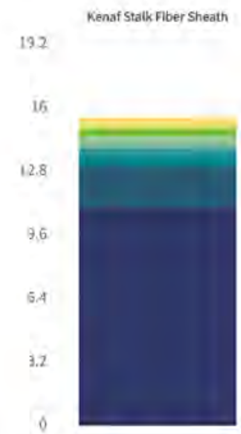
Scorecard

Product Baseline	0.39% performance improvement
15 mPts per 1 year of use	**15** mPts per 1 year of use
1 x 25 years of use	**1 x 25 years of use**
15 mPts	15 mPts
Estimate	Estimate
Metal working, stainless steel product manufacturing	Metal working, stainless steel product manufacturing
Carcinogenics	Carcinogenics
Manufacturing	Manufacturing

Impact category	%	Impact category	%
Ecological damage		**Ecological damage**	
Acidification	0.23	Acidification	0.21
Ecotoxicity	4.41	Ecotoxicity	4.41
Eutrophication	0.23	Eutrophication	0.22
Global warming	1.82	Global warming	1.71
Ozone depletion	0	Ozone depletion	0
Resource depletion		**Resource depletion**	
Fossil fuel depletion	0.81	Fossil fuel depletion	0.77
Human health damage		**Human health damage**	
Carcinogenics	89.32	Carcinogenics	89.55
Non carcinogenics	2.01	Non carcinogenics	1.98
Respiratory effects	0.96	Respiratory effects	0.94
Smog	0.23	Smog	0.21

Impacts by SBOM inputs: Total [CO eq. kg/func unit]





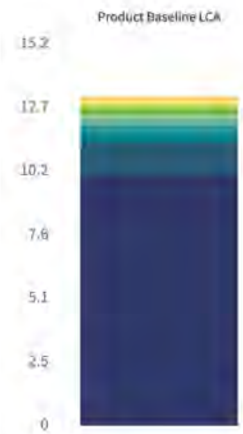
Total = 19 CO2 eq. kg/func unit

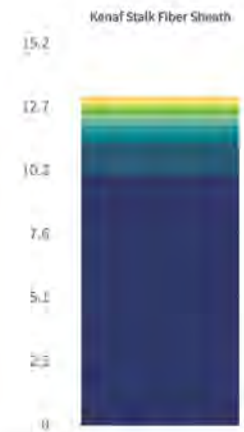
Input	CO2 eq. kg/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	11.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	2.02
Process - Nylon 6: Weaving, cotton	0.679
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.522
Material - Nylon 6	0.479
Material - Stainless steel, austenitic	0.339
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.294
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.236

Total = 18 CO2 eq. kg/func unit

Input	CO2 eq. kg/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	11.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	2.02
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.522
Material - Stainless steel, austenitic	0.339
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.294
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.236
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.236
Material - Stainless steel, austenitic	0.192

Impacts by SBOM inputs: Total [mPts/func unit]





Total = 15mPts/func unit

Input	mPts/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	10.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	1.30
Material - Stainless steel, austenitic	0.364
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.325
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Material - Stainless steel, austenitic	0.206
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.183
Material - Stainless steel, austenitic	0.164
Material - Stainless steel, austenitic	0.164

Total = 15mPts/func unit

Input	mPts/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	10.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	1.30
Material - Stainless steel, austenitic	0.364
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.325
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Material - Stainless steel, austenitic	0.206
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.183
Material - Stainless steel, austenitic	0.164
Material - Stainless steel, austenitic	0.164

LCA PROCESS

SHEATH: NO SHEATH

Scorecard

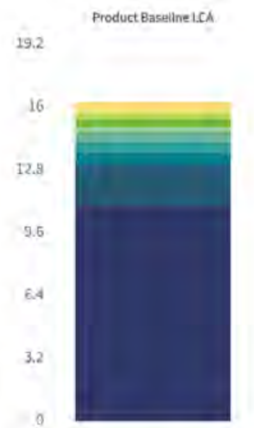
0.40% performance improvement

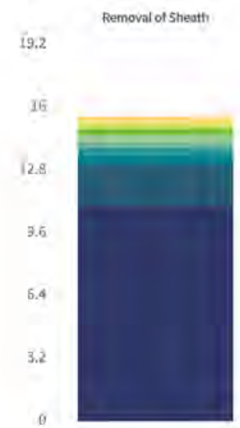
Product Baseline LCA	Removal of Sheath
15 mPts per 1 year of use	**15** mPts per 1 year of use
1 x 25 years of use 15 mPts Estimate	1 x 25 years of use 15 mPts Estimate
Metal working, stainless steel product manufacturing Carcinogenics Manufacturing	Metal working, stainless steel product manufacturing Carcinogenics Manufacturing

Impact category	%
Ecological damage	
Acidification	0.23
Ecotoxicity	4.41
Eutrophication	0.23
Global warming	1.82
Ozone depletion	0
Resource depletion	
Fossil fuel depletion	0.81
Human health damage	
Carcinogenics	89.32
Non carcinogenics	2.01
Respiratory effects	0.96
Smog	0.23

Impact category	%
Ecological damage	
Acidification	0.21
Ecotoxicity	4.41
Eutrophication	0.22
Global warming	1.71
Ozone depletion	0
Resource depletion	
Fossil fuel depletion	0.77
Human health damage	
Carcinogenics	89.54
Non carcinogenics	1.99
Respiratory effects	0.94
Smog	0.21

Impacts by SBOM inputs: Total [CO eq. kg/func unit]





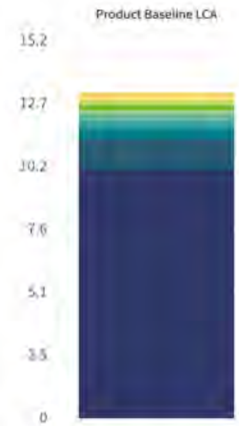
Total = 19 CO2 eq. kg/func unit

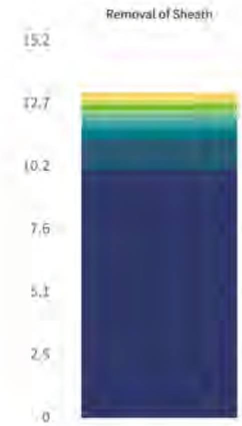
Input	CO2 eq. kg/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	11.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	2.02
Process - Nylon 6: Weaving, cotton	0.679
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.522
Material - Nylon 6	0.479
Material - Stainless steel, austenitic	0.339
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.294
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.236

Total = 18 CO2 eq. kg/func unit

Input	CO2 eq. kg/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufactuning	11.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	2.02
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.522
Material - Stainless steel, austenitic	0.339
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.294
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.236
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.236
Material - Stainless steel, austenitic	0.192

Impacts by SBOM inputs: Total [mPts/func unit]





Total = 15mPts/func unit

Input	mPts/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	10.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	1.30
Material - Stainless steel, austenitic	0.364
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.325
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Material - Stainless steel, austenitic	0.206
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.183
Material - Stainless steel, austenitic	0.164
Material - Stainless steel, austenitic	0.164

Total = 15mPts/func unit

Input	mPts/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	10.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	1.30
Material - Stainless steel, austenitic	0.364
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.325
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Material - Stainless steel, austenitic	0.206
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.183
Material - Stainless steel, austenitic	0.164
Material - Stainless steel, austenitic	0.164

LCA PROCESS

SHEATH: RECYCLED COTTON

Scorecard

Product Baseline LCA

15 **mPts per 1 year of use**

1 x 25 years of use
15 mPts
Estimate

Metal working, stainless steel product manufacturing
Carcinogenics
Manufacturing

Impact category	%
Ecological damage	
Acidification	0.23
Ecotoxicity	4.41
Eutrophication	0.23
Global warming	1.82
Ozone depletion	0
Resource depletion	
Fossil fuel depletion	0.81
Human health damage	
Carcinogenics	89.32
Non carcinogenics	2.01
Respiratory effects	0.96
Smog	0.23

Recycled Cotton Sheath

0.14% performance improvement

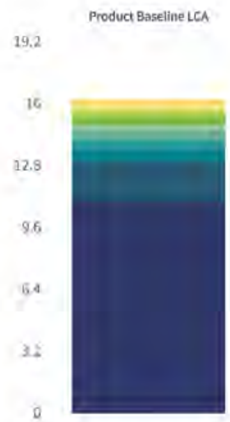
15 **mPts per 1 year of use**

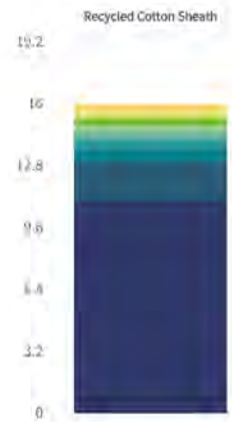
1 x 25 years of use
15 mPts
Estimate

Metal working, stainless steel product manufacturing
Carcinogenics
Manufacturing

Impact category	%
Ecological damage	
Acidification	0.22
Ecotoxicity	4.41
Eutrophication	0.22
Global warming	1.77
Ozone depletion	0
Resource depletion	
Fossil fuel depletion	0.78
Human health damage	
Carcinogenics	89.41
Non carcinogenics	2.01
Respiratory effects	0.95
Smog	0.22

Impacts by SBOM inputs: Total [CO eq. kg/func unit]





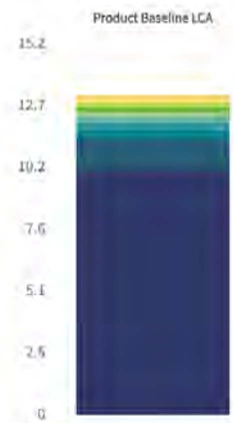
Total = 19 CO2 eq. kg/func unit

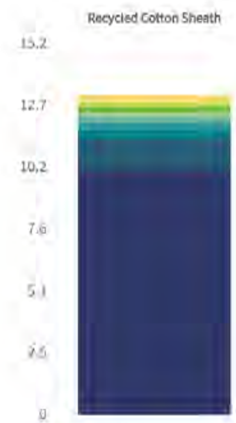
Input	CO2 eq. kg/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	11.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	2.02
Process - Nylon 6: Weaving, cotton	0.679
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.522
Material - Nylon 6	0.479
Material - Stainless steel, austenitic	0.339
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.294
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.236

Total = 19 CO2 eq. kg/func unit

Input	CO2 eq. kg/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	11.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	2.02
Process - Recycled cotton: Weaving, cotton	0.679
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.522
Material - Stainless steel austenitic	0.339
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.294
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.236
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.236

Impacts by SBOM inputs: Total [mPts/func unit]





Total = 15mPts/func unit

Input	mPts/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	10.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	1.30
Material - Stainless steel, austenitic	0.364
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.325
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Material - Stainless steel, austenitic	0.206
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.183
Material - Stainless steel, austenitic	0.164
Material - Stainless steel, austenitic	0.164

Total = 15mPts/func unit

Input	mPts/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	10.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	1.30
Material - Stainless steel, austenitic	0.364
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.325
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Material - Stainless steel, austenitic	0.206
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.183
Material - Stainless steel, austenitic	0.164
Material - Stainless steel, austenitic	0.164

LCA PROCESS

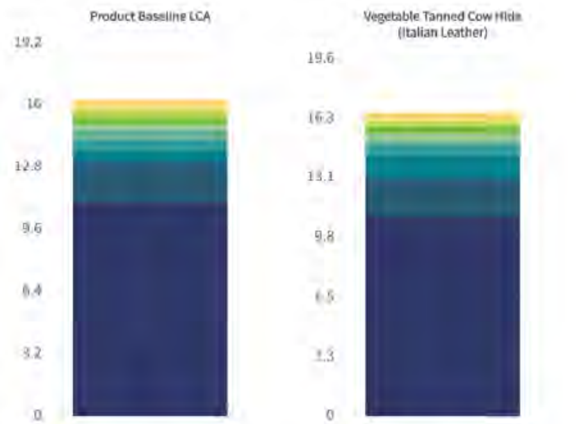
SHEATH: VEGETABLE TANNED LEATHER

Scorecard

15 mPts per 1 year of use	0.87% performance reduction 15 mPts per 1 year of use
1 x 25 years of use 15 mPts Estimate	**1 x 25 years of use** 15 mPts Estimate
Metal working, stainless steel product manufacturing Carcinogenics Manufacturing	Metal working, stainless steel product manufacturing Carcinogenics Manufacturing

Impact category	%	Impact category	%
Ecological damage		**Ecological damage**	
Acidification	0.23	Acidification	0.23
Ecotoxicity	4.41	Ecotoxicity	4.94
Eutrophication	0.23	Eutrophication	0.47
Global warming	1.82	Global warming	1.84
Ozone depletion	0	Ozone depletion	0
Resource depletion		**Resource depletion**	
Fossil fuel depletion	0.81	Fossil fuel depletion	0.79
Human health damage		**Human health damage**	
Carcinogenics	89.32	Carcinogenics	88.57
Non carcinogenics	2.01	Non carcinogenics	1.99
Respiratory effects	0.96	Respiratory effects	0.95
Smog	0.23	Smog	0.22

Impacts by SBOM inputs: Total [CO eq. kg/func unit]



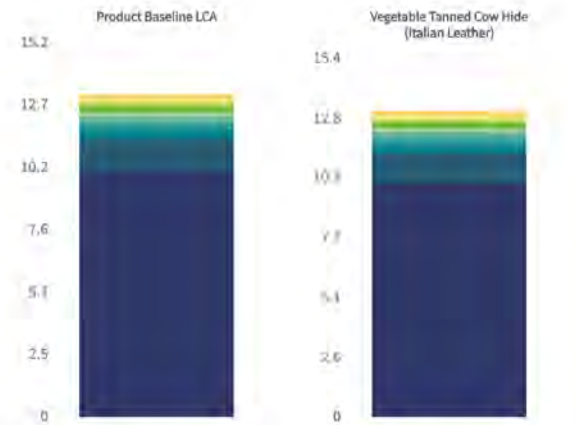
Total = 19 CO2 eq. kg/func unit

Input	CO2 eq. kg/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	11.0
Process - Stainless steel austenitic: Casting, stainless steel, lost-wax	2.02
Process - Nylon 6: Weaving, cotton	0.679
Process - Stainless steel austenitic: Drilling, CNC, chromium steel	0.522
Material - Nylon 6	0.479
Material - Stainless steel, austenitic	0.339
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel austenitic: Drilling, CNC, chromium steel	0.294
Process - Stainless steel austenitic: Drilling, CNC, chromium steel	0.236

Total = 20 CO2 eq. kg/func unit

Input	CO2 eq. kg/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	11.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	2.02
Process - Cowskin (cow hide): Vegetable tanning, leather, Italy, industry sources	1.29
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.522
Material - Stainless steel, austenitic	0.339
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.294
Material - Cowskin (cow hide)	0.275
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.236

Impacts by SBOM inputs: Total [mPts/func unit]



Total = 15mPts/func unit

Input	mPts/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	10.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	1.30
Material - Stainless steel, austenitic	0.364
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.325
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Material - Stainless steel, austenitic	0.206
Process - Stainless steel, austenitic, Drilling, CNC, chromium steel	0.183
Material - Stainless steel, austenitic	0.164
Material - Stainless steel, austenitic	0.164

Total = 15mPts/func unit

Input	mPts/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	10.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	1.30
Material - Stainless steel, austenitic	0.364
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.325
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Material - Stainless steel, austenitic	0.206
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.183
Material - Stainless steel, austenitic	0.164
Material - Stainless steel, austenitic	0.164

LCA PROCESS

TRANSPORTATION: LOCALIZED STEEL SOURCING

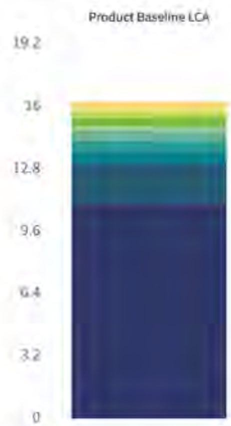
Scorecard

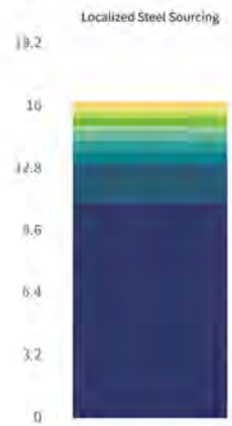
2.5x10^-3 % performance reduction

Product Baseline LCA	Localized Steel Sourcing
15 mPts per 1 year of use	**15** mPts per 1 year of use
1 x 25 years of use 15 mPts Estimate	**1 x 25 years of use** 15 mPts Estimate
Metal working, stainless steel product manufacturing Carcinogenics Manufacturing	Metal working, stainless steel product manufacturing Carcinogenics Manufacturing

Impact category	%	Impact category	%
Ecological damage		**Ecological damage**	
Acidification	0.23	Acidification	0.22
Ecotoxicity	4.41	Ecotoxicity	4.41
Eutrophication	0.23	Eutrophication	0.23
Global warming	1.82	Global warming	1.82
Ozone depletion	0	Ozone depletion	0
Resource depletion		**Resource depletion**	
Fossil fuel depletion	0.81	Fossil fuel depletion	0.81
Human health damage		**Human health damage**	
Carcinogenics	89.32	Carcinogenics	89.32
Non carcinogenics	2.01	Non carcinogenics	2.01
Respiratory effects	0.96	Respiratory effects	0.96
Smog	0.23	Smog	0.23

Impacts by SBOM inputs: Total [CO eq. kg/func unit]





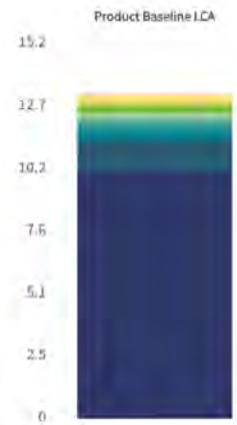
Total = 19 CO2 eq. kg/func unit

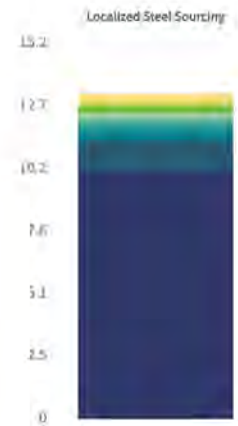
Input	CO2 eq. kg/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	11.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	2.02
Process - Nylon 6: Weaving, cotton	0.679
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.522
Material - Nylon 6	0.479
Material - Stainless steel, austenitic	0.339
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.294
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.236

Total = 19 CO2 eq. kg/func unit

Input	CO2 eq. kg/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	11.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	2.02
Process - Nylon 6: Weaving, cotton	0.679
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.522
Material - Nylon 6	0.479
Material - Stainless steel, austenitic	0.339
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.326
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.294
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.236

Impacts by SBOM inputs: Total [mPts/func unit]





Total = 15mPts/func unit

Input	mPts/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	10.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	1.30
Material - Stainless steel, austenitic	0.364
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.325
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Material - Stainless steel, austenitic	0.206
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.183
Material - Stainless steel, austenitic	0.164
Material - Stainless steel, austenitic	0.164

Total = 15mPts/func unit

Input	mPts/func unit
Process - Stainless steel, austenitic: Metal working, stainless steel product manufacturing	10.0
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	1.30
Material - Stainless steel, austenitic	0.364
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.325
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Process - Stainless steel, austenitic: Casting, stainless steel, lost-wax	0.210
Material - Stainless steel, austenitic	0.206
Process - Stainless steel, austenitic: Drilling, CNC, chromium steel	0.183
Material - Stainless steel, austenitic	0.164
Material - Stainless steel, austenitic	0.164

LCA PROCESS

FINAL LCA CONCEPT COMPARISON

Functional unit: 25 years of use

Create a new Concept +

Concept	Impacts / functional unit **mPts/func unit**	CO_2 eq. kg / functional unit **CO_2 eq. kg/func unit**	Performance improvement from reference **mPts**	Performance improvement from reference **%**	Units of svc delivered **Svc. Units**	Assessment type
Reference Product Baseline LCA Copy Declare as: | Final	15	19			1	Estimate
Lowest impact Removal of Sheath Copy | Delete Declare as: Reference | Final	15	18	+0.061	+0.40%	1	Estimate
Kenaf Stalk Fiber Sheath Copy | Delete Declare as: Reference | Final	15	18	+0.059	+0.39%	1	Estimate
Recycled Cotton Sheath Copy | Delete Declare as: Reference | Final	15	19	+0.022	+0.14%	1	Estimate
Removal of Powder Coatings Copy | Delete Declare as: Reference | Final	15	19	$+5.1\times10^{-3}$	+0.033%	1	Estimate
Localized Steel Sourcing Copy | Delete Declare as: Reference | Final	15	19	-4.0×10^{-4}	-2.5×10^{-3} %	1	Estimate
Vegetable Tanned Cow Hide (Italian Leather) Copy | Delete Declare as: Reference | Final	15	20	-0.13	-0.87%	1	Estimate