



MCEN 5055: Applied Product Design
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Business Plan
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EXECUTIVE SUMMARY

A. Goal

Two Tired Solutions is seeking an upfront funding of \$80,000 to develop “The Lumberjack”, a two-in-one tool designed with the every-day cyclist in mind to simplify bike tire replacement and empower users to take bicycle repair into their own hands. This initial set of funds will be used for extended user testing, materials testing, research and development, and injection molding manufacturing of our product. Additional funds of \$200,000 are requested after year one to increase production and expand the team. *Two Tired Solutions* is dedicated to designing quality products for the every-day cyclists: families, older adults, new riders, and commuters. Our goal is to empower these riders to feel confident in basic bike repair skills by using tools they understand and trust. Designing for these groups presents a unique opportunity for our company, as we see an untapped market area with immense potential for growth and improvement.

B. Need

Fixing a flat tire is one of the most common repairs all bike riders will face, regardless of experience. While fixing a flat may be a basic repair for experienced riders and bike mechanics, our team found a lack of solutions readily available for every-day riders. Every-day riders who either do not possess the mechanical knowledge, strength, and/or technique to perform a flat tire repair are left with very few tools and solutions to solve the problem on their own. Most individuals who are unable to fix a flat tire on their own will either take their bike to a professional or get rid of their bike altogether, unaware of how to fix it. *Two Tired Solutions* believes there is a design gap in the cycling industry, one that prevents every-day riders from feeling empowered to take bike repair into their own hands. We want to close this gap by designing bike tools that will make repairing bicycles even more convenient and accessible.

C. Product

“The Lumberjack” is a two in one tool used for tire removal and installation. This tool assists users by providing additional leverage when removing and reinstalling bicycle tires during a flat tire service. The biggest user pain point during flat tire repair is getting enough force to successfully install the final section of tire back over the rim. The tire bead jack is an existing specialty shop tool on the market that is designed to help users with this step. Tire levers, a simple and ubiquitous repair tool, is commonly found in repair kits. Although designed only to remove tires, they are often used unofficially by desperate riders to provide leverage at the described pain point. Our team set out to design a tool that would provide both functionalities, while still being compact, durable, and low-cost. This is how the Lumberjack was born.

The Lumberjack has sleek and comfortable features for bike riders to feel confident when replacing their tires. Our product is designed to be intuitive and straightforward to use, and provides additional mechanical advantage for users to successfully remove and install bike tires on their own.

D. Strategy

Two Tired Solutions plans to market this tool to local bike shops, large bike/tool companies, recreationalists, distributors, and non-profit bike organizations. Personal and smaller orders can be processed online via website and bulk orders can be communicated with the sales team. We plan to manufacture the tool with injection molding. Once the interest and sales of the tool increases, we will negotiate a better contract rate with the injection molding manufacturers and increase production. The team will be expanded by hiring a marketing and sales team to move products and capture more of the market. Startup funds and financial support will be obtained from local bike shops, large bike/tool companies, and crowdfunding.

E. Company

Two Tired Solutions is a group of dedicated engineers who wish to make the experience of bike tire repair more accessible, and ultimately get more people on bikes. Our team believes that “The Lumberjack” is a low-cost solution tool, designed with multi-purposes, that will benefit the bike tire repair experience for all recreational riders.

II. BACKGROUND

As the world focuses on sustainable and long-lasting products, an analysis of the full life cycle of every product assists in pinpointing areas of improvement. At a glance, bikes are the most environmentally friendly mode of transportation. If 20% of Madison, Wisconsin ride bicycles during their daily commute it would save over 16,000 tons of carbon dioxide emissions¹. Many times, bikes even end up in landfills².



Figure 1: Bicycle Landfill².

Cycling has long been one of the fastest, most flexible, and reliable methods of transportation. Even before the pandemic, millions relied on bicycles to do their job or commute to work. But when stay-at-home home orders began, the role of bicycles transformed. One in ten American adults reported to have ridden a bike for the first time in a year or longer since the onset of COVID-19 and in March 2020 ridership on trails in the US has peaked at a three-fold increase³ from 2019. In March 2020, sales of bicycles, equipment and repair services nearly doubled in the US compared to the same period as the year before⁴. If more bikes are being used, then there will be more repairs. For bike riders one of the most common problems they encounter are flats. This particular bike repair, flats, is often the most frustrating, yet important fix to know how to do.

At *Two Tired Solutions*, our team understands the difficulties that come from recreational bike riders without high dexterity in their hands. From our user interviews with bike mechanics and bike shop owners, flat tires are one of the most common bike repair problems that they see daily. Since this is a physically demanding repair, most bike riders take their bicycle to a mechanic to fix it. Our team believes that with a tool that has been designed to address the biggest-pain points of every-day riders, bike tire repair can be simplified significantly.

There are a few tools that exist on the market for simplifying bike tire repair. Currently for tire removal is the Bike Lever and for installation is a Tire Bead Jack. Bike levers are portable and have curved levers for removing tires from bicycle rims. At times, more than one bike lever should be used for the removal of tires. For installation of tires are tire bead jacks where these devices have a rim positioning arm to set a tire bead jack into place and a hook for grabbing a tire bead. The tire bead is the lip of a tire that sets in between the rim of a tire. A tire bead jack is specifically for people without much

dexterity in their hands and who need assistance to set a tire bead back onto a bicycle rim. Both these separate tooling are used separately in tire removal and installation.

Recreational bicycle riders need a convenient method for assembling their tires onto their bicycle rims. Therefore, *Two Tired Solutions* has designed “The Lumberjack” which is a two-in-one tool of the capacities required of bike levers and a tire bead jack. This tool includes two tire levering handles when disassembled and acts as a tire bead jack when assembled. *Two Tired Solutions* believes that this compact and packable tool will give recreational bicycle riders a convenient way to repair their flat tires.

III. PRODUCT

A. Design Evolution

Two Tired Solutions has developed “The Lumberjack” by starting with concept mapping to transition into the final product.

B. Concept Map

In beginning the design process, our group developed a concept map with key features best suited for tire replacement. By identifying our users as recreational bike riders and bike mechanics, our group has been able to identify key features for a repair tool relating to bicycle flats. This concept map below shows different ideas of mechanical features that were brainstormed for multiple different ideas for prototyping.

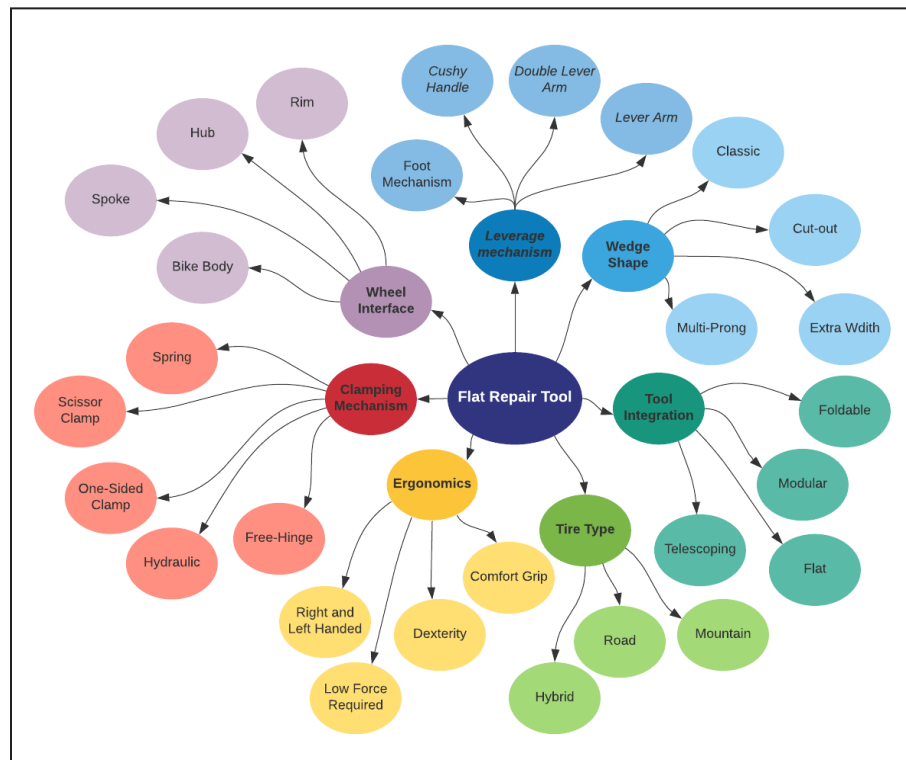


Figure 2: Concept Map

C. Prototyping

Before prototyping, our team developed a couple of preliminary prototypes which are known as prototypes. Our group developed general sketches of ideas to develop thoughts for features in later prototyping. This phase allowed the team to generate ideas through user input and sketching early prototypes to provide our users with convenient tooling. One such example of a prototype is shown in Figure 3 being a sleeve to fit over a bicycle tire to hold air. In this portion of the ideation phase, our team had concluded that recreational bike users need a convenient solution to one of the main issues for bike maintenance being flat bicycle tires.

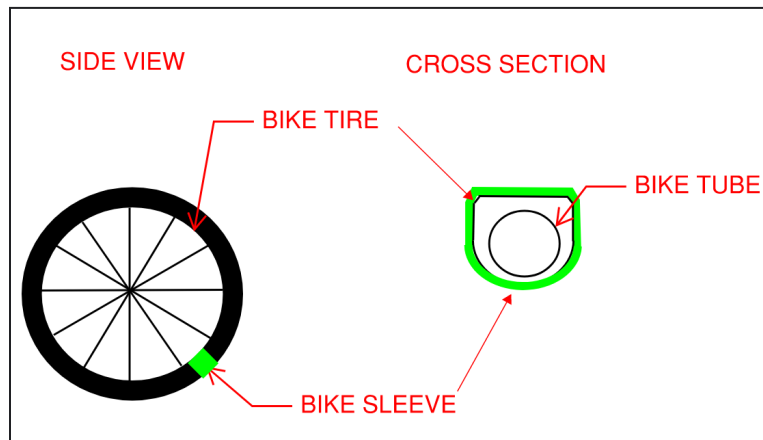


Figure 3: Bike Sleeve

D. Prototyping

1. Prototype 1: Removal and Installation Clamp

In solving our user's need for having a convenient bike tire removal and installation, our team designed a two and one tool with bike levers and a bike bead jack in one tool. The two separate components have added functionality of bike levers for extended leverage in tire removal. Being about six inches in length, this two-in-one tool is compact and lightweight to just carry in a pants/shirt pocket. Our team did decide for this tool to be functional then a redesign would have to be implemented for extending the amount of leverage of the tire removal process.

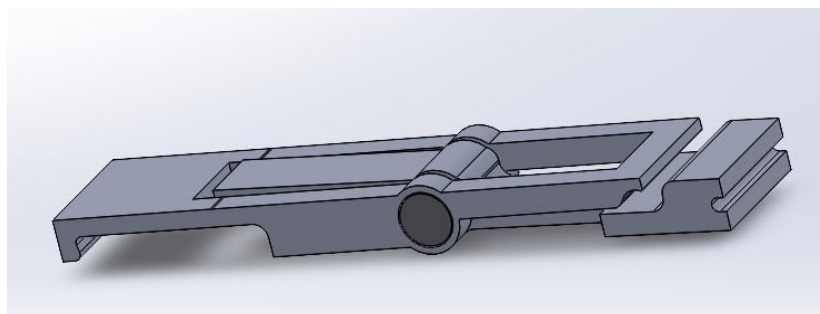


Figure 4: Removal and Installation Clamp

2. Prototype 2: Bike Lever with Extension

In the following two photos is a bike lever with a second attachment with additional leverage. The extra leverage would allow users to remove their bike tires by providing a large range of torque. This tool is ergonomic for users without much dexterity in their hands. The large range of torque would need a highly durable thermoplastic to prevent plastic deformation.

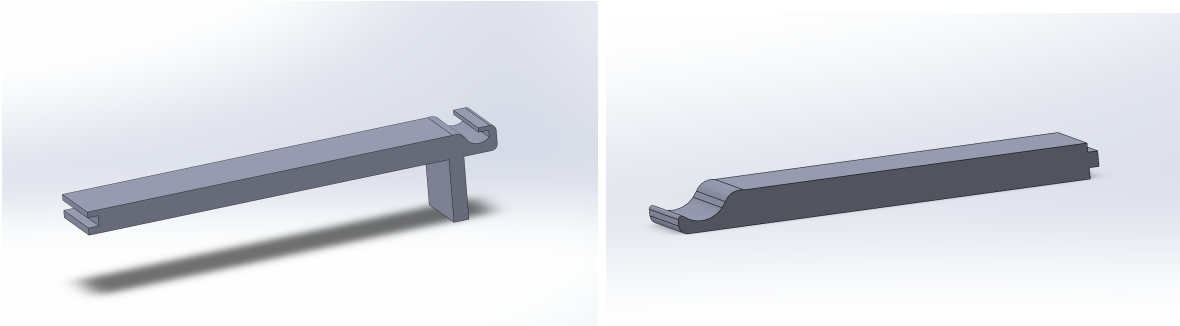


Figure 5: Bike Lever with Extension

3. Prototype 3: Foot Lever

This assembly is a foot-powered lever to help those who have less hand power and mobility. Users would disassemble their bicycle and set the tire on its side to set this foot lever into place. After hooking the bike lever into the bead of a bicycle tire, the foot lever position would be utilized to assemble the tire back onto the rim of a tire. If to be manufactured, the foot handle would be to be redesigned with a reinforced structure for the amount of force that a foot would apply onto this assembly.

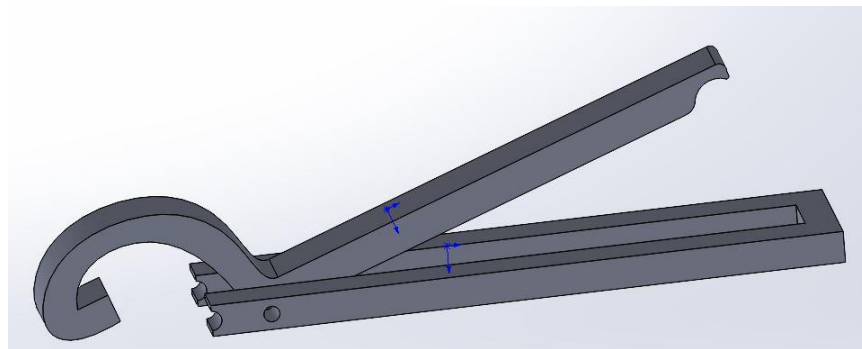


Figure 6: Foot Lever

4. Prototype 4: Pump Tire Jack

In the following sketch is a two in one tool of a portable bike tire pump and tire bead jack. This assembly would clip onto a bicycle as typical portable pumps are attached. As the original portable pump has been redesigned in this sketch below to have features of a tire bead jack for tire installation. The considerations of our group in manufacturing this prototype are the added weight to the existing pump and the risk of damaging the pump when used for tire installation.

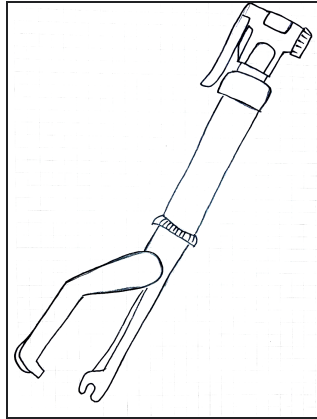


Figure 7: Pump Tire Jack

E. Final Product: The Lumberjack

“The Lumberjack” is *Two Tired Solutions* final design in creating a convenient method to assist in bike tire repair. This product is a redesign of our two-in-one tool for the removal and installation of bicycle tires on tire rims. This product has two defined bike lever hooks for ease of use in tire removal. The hook positioning arm has been curved for better access to grabbing onto tire beads.

In material selection, our team has decided on Nylon since this is a hardened plastic that is of low cost to manufacture. Having this assembly be Nylon will allow our users to have a durable and flexible product for tire replacement. This tool will be manufactured by 3D printed practices in the initial stages, then transition to injection molding for mass production. Included in this assembly will be a shoulder bolt and wing nut for disassembly and multi-tool purposes.

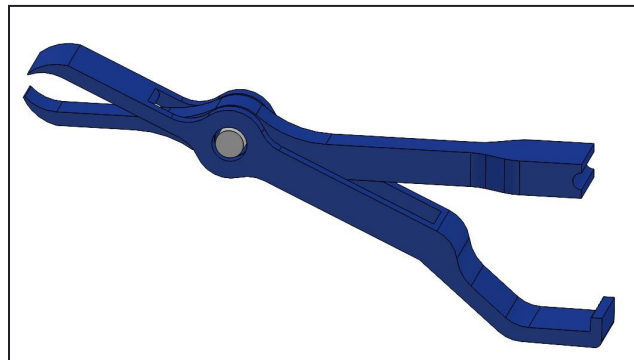


Figure 8: The Lumberjack

F. Impact of User Feedback

Our team’s need statement had been “Bike owners need a convenient way to repair flat tires”. This statement had been inspired by the difficulties that our users had with overall bike tire repair. The prototypes our group designed had been selected to benefit our users by being packable, compact, and convenient for use. As our tooling had been thought to combine two tools into one. The interviews showed how users need

a simple tool for removing and replacing bike tires without professional help from a bike mechanic.

A bike mechanic, Kit, had stated “I like the utilitarian quality of this one tool and how it can split into two.” That interview had been directed to speaking on selecting which prototype fit our users best. The statement is about Prototype 1: Removal and Installation Clamp. The two-in-one feature allows our users to simplify their toolbox for tire repairs. Another bike mechanic, Nick, said in an interview “Off the bat, way more portable”. The functionality of carrying this product around, unlike Prototype 3: Foot Lever, had increased the attractiveness of having a compact tool for bike repair.

Concerning the final product, “The Lumberjack”, our team had identified a couple of flaws in the original design for Prototype 1: Removal and Installation Clamp. Therefore our group reached out to our users for feedback to see how this design can be improved. Our team had been told that the bike levers were not defined enough and the hook to the arm had to be curved. Listening to our users, our team completed redesigned Prototype 1 for the final product. These redesigns included more defined bike levers, a curved hook for bike tire installation, and a material change. In brief testing, the original prototype fractured when made of PLA. Therefore our prototype tool had been reinforced to add rounding at discontinuities and lengthen for leverage. Our users reported how our tool needed to be durable and flexible, therefore the team selected Nylon as the final choice of material.

IV. MARKET ANALYSIS

A. Addressable Market and Growth Trends

The bicycle market is a varied and expansive market, with an equally varied and expansive rider-base. Our product is designed for the everyday cyclist, which includes commuters, families, elderly populations, novice riders, and e-bike users. While bike mechanics and more advanced cyclists can benefit from the use of our product, this analysis will focus on the market trends related to the aforementioned group.

1. Commuters

Between 2000-2019, the number of bike commuters has increased from 488,000 to 786,000 for a growth of 61% in the United States⁵. Oregon, Montana, Colorado, Wyoming, and Washington ranked in the top 5 of all states with the largest percentage share of bike commuters, ranging from 0.87% - 1.90%⁵. The states with the highest percentage of commuters are attributed to more established bike infrastructure, which is dependent on the state and local funding for such projects. While the percentage of bike commuters is low, it has remained relatively stable over the years. Amongst commuters, there is also a gender gap, with 71% male commuters compared to 29% female⁵. The level of ridership from commuters and women has enormous growth potential.

2. Older Adults

Older adults are an important and growing part of people who bike. According to the 2017 National Household Travel Survey, people aged 65 and older accounted for 6% of all bike trips, and 16% of the US population is 65 and

older⁷. Data suggests that in recent years the number of older adults bicycling to work has increased. Estimates from 2014-2018 show the number of people over the age of 65 biking to work increasing by 29%. Data collected from the same survey show that the journey to work is a small percentage of trips for people aged 65 or older, with the trip to and from home being the most common. Additionally, 29% of people aged 50 and older take three or more bicycling trips for exercise each week, compared to 22% of people 49 and younger⁷. Older adults are an important group of the bicycling industry, one that should be designed for and prioritized as their participation increases ridership and keeps the aging populations in the United States healthy and empowered.

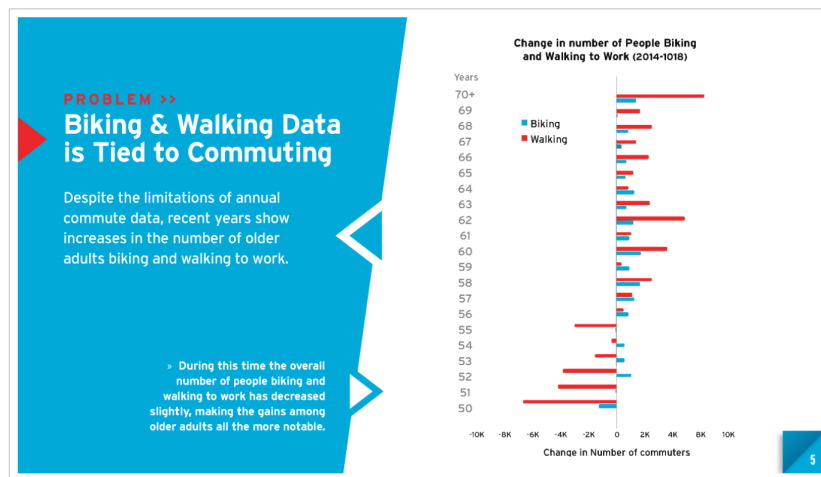


Figure 9: The number of commuters by age and activity⁷.

3. The New Majority

Bicycling is the second most popular outdoor activity for Hispanic and Black Americans and the third most popular outdoor activity for Asian Americans⁶. During the Covid-19 pandemic, 26% of new participants in outdoor activities reported that they started or resumed bicycling outdoors during the pandemic, and 65% reported that they are likely to continue to participate in bicycling outside. Black, Indigenous, People of Color, young people, and people with lower incomes often support bicycling improvements more than any other demographic groups, despite their percentage of ridership being some of the lowest in the current industry⁶. These findings motivate *Two Tired Solutions'* commitment to design for groups that have historically been marginalized and to expand a market area with immense potential for growth and improvement.

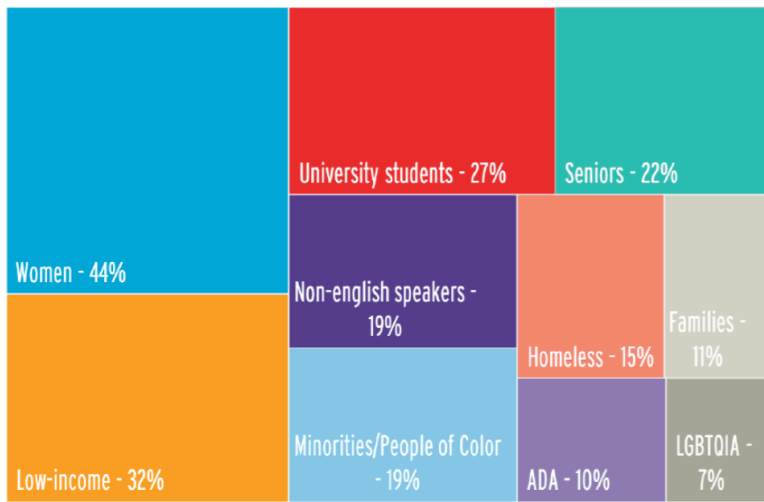


Figure 10: Prevalence of targeted bicyclist education and targeted bicycle event marketing in bicycle-friendly communities⁶.

B. Market Dynamics

1. Covid-19 Impact

The Covid-19 brought a dramatic change to the bike industry. Even before the pandemic, millions across the globe relied on bicycles to do their jobs or get to work. One in 10 American adults reported having ridden a bike for the first time in a year (or longer) since the onset of Covid-19⁸. In March 2020, at the beginning of the pandemic, ridership on trails in the US peaked at a threefold increase compared to the same period in 2019. While the impact of the pandemic is significant, it is difficult to determine if the bike boom is a short-term market response. The sharp growth has been attributed to recreation cycling, “which is a gateway to transportation biking”⁸. Market analysis must consider the factors that will help riders maintain ridership, and how urban design changes brought about during the pandemic may affect cyclists. The most notable area of concern is whether the demand will remain at such elevated levels, and if supply will be able to keep up.

2. Global Supply and Demand

In April 2020, U.S. cycling sales through all retail channels grew by 75% to a total of approximately \$1 billion in retail sales for the month. Typically, sales fall between \$550-\$575 million⁹. Bikes for family use, neighborhood riding, and lower price-points showed the strongest year-over-year sales gains. Lifestyle/leisure bikes grew by 203%, front suspension mountain bikes were up by more than 150%, and children’s bikes by 107% for the month. In addition to the increase in bike sales, bicycle accessory sales also increased with helmet sales increasing by 49%, bottle cages by 60%, and bike baskets up to 85%.

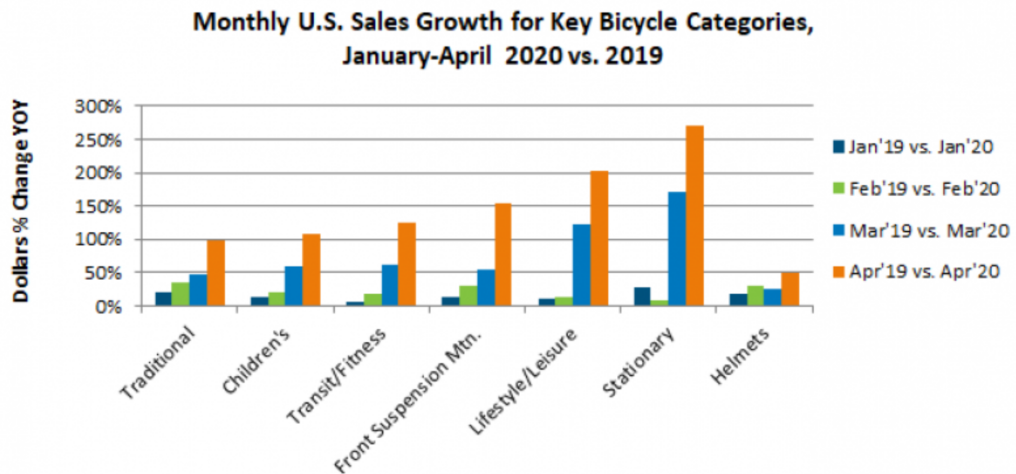


Figure 11: Monthly U.S. sales growth for key bicycle categories, 2020 vs 2019⁹.

While there has been a boom in the bicycling industry, the sharp and unexpected increase in demand has forced the global supply chain to adapt, and has exposed weaknesses in the existing process. These changes are proving to have a lasting effect on the industry. A shortage of raw-materials like steel and high-grade aluminum has resulted in a huge delay in various components and bikes by many months¹⁰. Bicycle businesses in Europe and the U.S. have become more and more import-dependent as production shifted to Asian countries like Taiwan or China in the 1980s¹⁰. Bike companies who worked with mainly pre-orders to keep stock numbers low were strained by the lockdown and production stoppages in China and other Asian countries at the beginning of the pandemic. The pandemic has helped expose the risk that is involved with a global supply chain, associated with plant shutdowns, port and border closures and long lead times. Learning from these insights, *Two Tired Solutions* will incorporate a highly visible supply-demand pathway, with integrated planning processes and a diverse business network.

3. E-bikes

E-bikes are the fastest-growing segment of bicycle sales in the United States, with sales jumping 112% in the last 12 months¹¹. E-bikes have an electrical pedal assistance and can be ridden on roads and bicycle lanes, transforming commuting and transportation logistics in urban areas². Ridership and engagement have increased, and people across many demographics are using e-bikes to replace motor vehicle trips or make existing bike trips more accessible. However, in line with the global supply/demand chain in the section above, tariffs have been proposed on these machines as most e-bikes sold in the U.S. are manufactured in China. The rise of tariffs would result in higher costs for retailers, suppliers, and customers¹¹. As *Two Tired Solutions* assesses how to enter the bike industry, our holistic and comprehensive analysis of national and

global trends, supply-demand chains, and market readiness will inform our course of action.

C. Competitive Analysis

Our market analysis will examine the operating details of three top bike tool companies in the United States:

1. Park Tool

- a) Manufacturing Location: In-House, Minneapolis, MN
- b) Headquarter Location: St. Paul, MN
- c) Products: Bike Tools, Bike Stands, Park Tool Gear, Education Series
- d) Company Size: 51-200 employees
- e) Annual Earnings: [not disclosed]

2. Abbey Bike Tool

- a) Manufacturing Location: Bend, OR
- b) Headquarter Location: Bend, OR
- c) Products: Precision Bike Tool, High End Bike Tools
- d) Company Size: [not disclosed]
- e) Annual Earnings: [not disclosed]

3. Wolf Tooth Components

- a) Manufacturing Location: Primarily In-House, Burnsville, MN, some international and national manufacturing locations
- b) Headquarter Location: Minneapolis, MN
- c) Products: Bike Chainrings, Bike Components, Bike Accessories
- d) Company Size: 11-50 employees
- e) Annual Earnings: [not disclosed]

V. INTELLECTUAL PROPERTY

A. Closest IP

Bike repair as a whole has many needs for specific tools that cater to a specific use or are designed to be a one for all tool. After reviewing several tools that are focused on tire repair, very few tools are designed to provide additional leverage during the tire assembly stage. There currently exists a patent that satisfies the same function as our tool which is installing and removing a bike tire. United States Patent US9656524B2 for a "Tire Lever" was granted on 05-23-2017 which can be seen below in Figure 11¹².

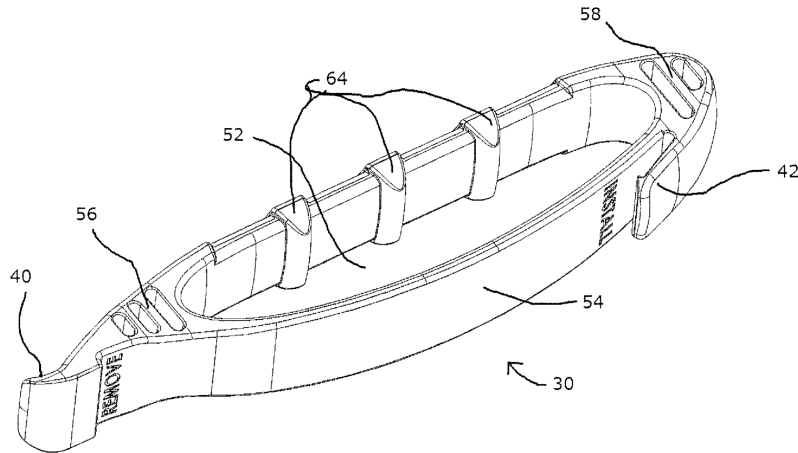


Figure 12: US9656524B2 Patent for a “Tire Lever”

The previous patent mentions the use of two hooks that directly interface with the tire rim to remove and install the tire. Our product incorporates two tire levers with wedges that can be attached together. The two products take two different approaches to satisfy the same function. “The Lumberjack” acts more as a tire bead jack in comparison to the mentioned patent that uses hooks to slide the tire on and off. Currently we do not think any action is needed to avoid patent infringement.

B. IP Strategy

In order to protect the integrity of “The Lumberjack”, we have identified the IP that would work best for our product. No patents have been identified that our product could infringe on. In addition, our product includes distinguishing features such two unique tire levers and the it’s ability to fold and be compact. Based on this we have decided to file a provisional patent to protect these distinguishing features from current and future competitors as we continue to develop this product.

Our business strategy will identify which countries would be worth filing a patent in based on licensing costs and the costs to enforce the patent.

VI. OPERATING PLAN

The operating plan includes research and development, funding, marketing, production, product upgrade, and scaling. Figure 13 shows the schedule for the operating plan.

Two Tired Solutions Operating Plan

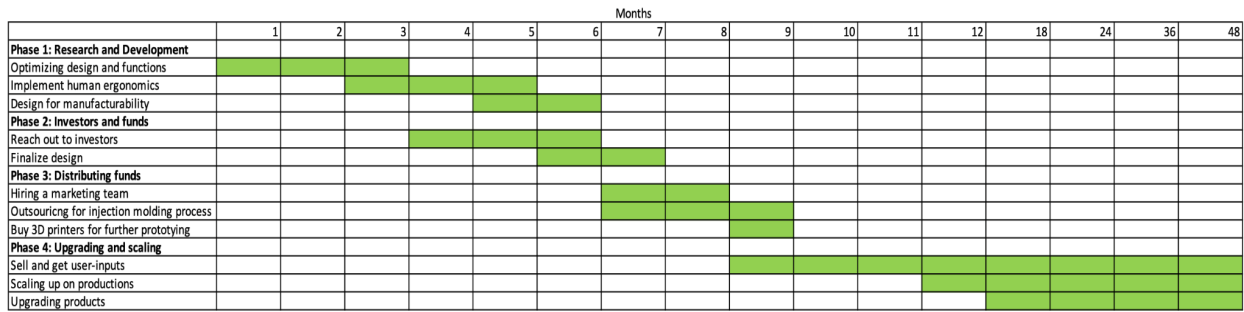


Figure 13: Gantt chart of operating plan

A. Phase 1

For research and development, the design will be optimized along with functionalities, human ergonomics, and design for manufacturability. This will take approximately 6 months.

B. Phase 2

When the design and testing is close to being completed, the team will reach out to investors to gain capital. This includes reaching out to local bike shops, large bike manufacturing companies, and crowdfunding. This can take place approximately 4 months after the start of phase 1.

C. Phase 3

Once more capital is gained, a marketing team will be hired to reach out to distributors, retailers, bike shops, and the consumer. This portion will also include setting up a website and social media to reach the general public. The capital will also be used to buy 3D printers for prototyping and outsourcing for injection molding processes to manufacture the product. Depending on the market, the production scale may be increased or decreased so that we do not have an overflow of inventory. This phase occurs after we gain capital from investors and can start as early as month 7.

D. Phase 4

Finally, when the product reaches the market, online reviews and other forms of user-input methods will be gathered to analyze, so improvements can be made on the product. If there are high interests in the product, and there is a substantial amount of capital, we can buy higher-end 3D printers with faster production capabilities and better material usage in order to produce consumer ready parts in-house. The team will also get a better contract deal with injection molding manufacturers for mass productions. The products can reach the consumer by month 9, and we can gather feedback by the end of the first year.

By Year 1, *Two Tired Solutions* can either start developing upgraded versions and/or increase our productions. The marketing team will be expanded by hiring two sales representatives. One sales representative for new technologies and another sales representative for shipping. The sales and marketing team will also work on reaching out

to non-for-profit bike repair shops for providing inventory at a reasonable price of large quantities.

VII. FINANCIAL ANALYSIS

The first year is focused on research and development, manufacturing, and marketing with some expectations of sales. The goal is to start selling during the first year, but with no expectations for high volume. The goal for the second year is to sell at least 15,600 units or about a 30% increase from the initial year's goal of 12,000 units. For an average selling price of \$20 and a profit of approximately \$17, this will generate \$312,000 in revenue and about \$265,200 in profit (accounting only for material costs and manufacturing of product).

Once more people know about the product in the coming years, there will be exponential growth in sales and production. The cost will be relatively low as 3D printers become more efficient and mass production costs are lowered for injection molding. The goal is to reduce the production cost with time. This development breaks even in 5.5 years of operation. The total financial requirement is about \$80,000 in year 1, \$200,000 in year 2, and \$100,000 in year 3. We are hoping to receive this sum in the form of investments or grants. For each sub-sections, the financial estimates of the company will be briefly explained with details in the form of tables.

A. Sales Projections

Two Tired Solutions will start selling "The Lumberjack" in the last quarter of the year. The team hopes to sell 12k units during the first year with a 30% annual growth. With an average selling price of \$20 per unit, the estimated profit is \$17 per unit sold (accounting only for material costs and manufacturing of product). This will generate \$312,000 in revenue and about \$265,200 in profit. In 2021, the bicycle accessories industry is about \$900M in revenue¹³. The team wants to capture 1% of that market or about \$9M. Figure 14 shows the key assumptions and sales projections with a US Market Model.

Key Assumptions		
Assumption	#	Sources
# of units sold yearly after year 1	12000.00	Market Research
Sales Growth Rate	0.30	Estimation
Average Selling Price	20.00	Market Research
Number of bicycle riders initial	49000000.00	Statista
Number of bicycle riders growth	0.01	Statista
% People that work on their bike	0.10	Estimate

US Market Model								
Year	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Number of bicycle riders	49000000.00	49490000.00	49984900.00	50484749.00	50989596.49	51499492.45	52014487.38	52534632.25
Number of bicycle riders who fix their bikes	4900000.00	4949000.00	4998490.00	5048474.90	5098959.65	5149949.25	5201448.74	5253463.23
Total Market Size	49000.00	49490.00	49984.90	50484.75	50989.60	51499.49	52014.49	52534.63
Units Sold	-	12000.00	15600.00	20280.00	26364.00	34273.20	44555.16	57921.71
Average Selling Price	-	20.00	20.00	20.00	20.00	20.00	22.00	22.00
Revenue	-	240000.00	312000.00	405600.00	527280.00	685464.00	980213.52	1274277.58

Figure 14: Key assumptions (top) and US market model

B. Cost Projections

Two Tired Solutions overall cost is relatively low, with main costs in injection molding and R&D. To start, the team will only consist of four engineers to develop the product. This will cost \$200,000 in the first year. With each additional employee, there will be an added cost of \$50,000 per year. As "The Lumberjack" becomes more refined, the team will hire someone to do marketing, where they will market the product and reach out to potential customers. Depending on the success of the product launch, costs may exponentially increase due to expansion of team, manufacturing, and material costs. Figure 15 shows cash flow in 7 years. *Two Tired Solutions* will be in the red or negative for 5 years until we start to realize profits from all the capital invested.

Employee Information							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Engineering Team							
Design Engineer	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Marketing							
Marketing Lead	0.50	1.00	1.00	1.00	1.00	1.00	1.00
Sales							
Sales Rep		2.00	2.00	2.00	2.00	2.00	2.00

Salary Assumptions	Factor	Salary
Engineering Team	1.00	50000.00
Marketing Lead	1.00	50000.00
Sales Rep	1.00	50000.00
Yearly Salary Increase	0.04	

Fully Burdened Salary	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Engineering Team	200000.00	208000.00	216320.00	224972.80	233971.71	243330.58	253063.80
Marketing Lead	25000.00	52000.00	54080.00	56243.20	58492.93	60832.65	63265.95
Sales Rep	0.00	100000.00	104000.00	108160.00	112486.40	116985.86	121665.29

Product Related Expenses	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Manufacturing Outsourcing Cost per Unit	2.60						
Packaging Cost Per unit	0.25						
Units Manufactured factor	0.05						
Units sold	-	12000.00	15600.00	20280.00	26364.00	34273.20	44555.16
Units Manufactured	-	12600.00	16380.00	21294.00	27682.20	35986.86	46782.92
Manufacturing Cost		32760.00	42588.00	55364.40	71973.72	93565.84	121635.59
Packaging Cost		3000.00	3900.00	5070.00	6591.00	8568.30	11138.79
Facility Cost		48000.00	48000.00	48000.00	48000.00	48000.00	48000.00
Total Cost of Goods		35760.00	46488.00	60434.40	78564.72	102134.14	132774.38

Operating Expenses							
Salary	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Engineering Team	200000.00	208000.00	216320.00	224972.80	233971.71	243330.58	253063.80
Marketing Lead	25000.00	52000.00	54080.00	56243.20	58492.93	60832.65	63265.95
Sales Rep	0.00	100000.00	104000.00	108160.00	112486.40	116985.86	121665.29
Product Related Expenses							
Manufacturing Cost	32760.00	36036.00	39639.60	43603.56	47963.92	52760.31	58036.34
Packaging Cost	3000.00	3900.00	5070.00	6591.00	8568.30	11138.79	14480.43

Annual Salary Costs	225000.00	360000.00	374400.00	389376.00	404951.04	421149.08	437995.04
Annual Cost of Goods	35760.00	46488.00	60434.40	78564.72	102134.14	132774.38	172606.69
Annual Facility Costs	48000.00	48000.00	48000.00	48000.00	48000.00	48000.00	48000.00
Total Operating Expenses	308760.00	454488.00	482834.40	515940.72	555085.18	601923.46	658601.73

Figure 15: Employee Information, Assumptions, and Operating Expenses

C. Break Even

Two Tired Solutions will break even in 5.5 years shown in figure 16. After this period, *Two Tired Solutions* will see exponential growth in profit and become sustainable. This break even time is normal, which will help ease investors and provide the opportunity for more fundings as the company grows. The bike industry has a growing trend due to its popularity as a sport, appeal as a viable form of transportation, and the desire to reduce carbon footprint. With more bikes on the road, "The Lumberjack" will be a necessity for repair. *Two Tired Solutions* will attack this growing market and meet its

demand for bike repairs with mass production and distribution. Figure 17 shows the income statement and operating expenses with margins.

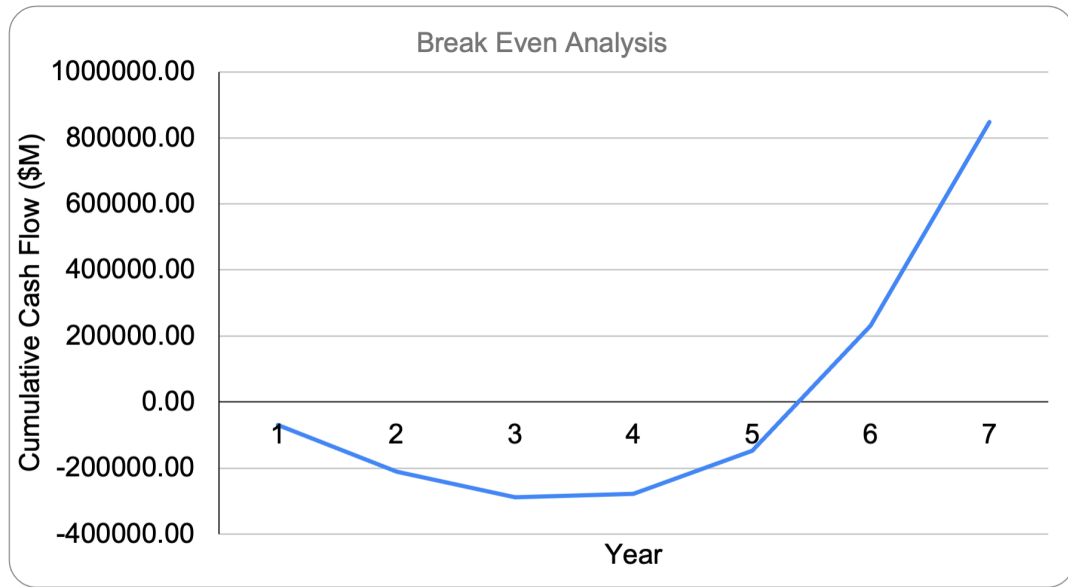


Figure 16: Break Even Analysis

Two-Tired Solutions							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Revenue	240000.00	312000.00	405600.00	527280.00	685464.00	980213.52	1274277.58
Cost of Goods	35760.00	46488.00	60434.40	78564.72	102134.14	132774.38	172606.69
Gross Margin	204240.00	265512.00	345165.60	448715.28	583329.86	847439.14	1101670.89
Gross Margin (% of Sales)	0.85	0.85	0.85	0.85	0.85	0.86	0.86

Operating Expenses							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Annual Salary Costs	225000.00	360000.00	374400.00	389376.00	404951.04	421149.08	437995.04
% of Sales	18.75	23.08	18.46	14.77	11.82	9.45	7.56
Annual Cost of Goods	35760.00	46488.00	60434.40	78564.72	102134.14	132774.38	172606.69
% of Sales	2.98	2.98	2.98	2.98	2.98	2.98	2.98
Annual Facility Costs	48000.00	48000.00	48000.00	48000.00	48000.00	48000.00	48000.00
% of Sales	4.00	3.08	2.37	1.82	1.40	1.08	0.83
Pre-Tax Operating Profit	-68760.00	-142488.00	-77234.40	11339.28	130378.82	378290.06	615675.84
Operating Margin	-0.29	-0.46	-0.19	0.02	0.19	0.39	0.48
Cumulative Cash Flow	-68760.00	-211248.00	-288482.40	-277143.12	-146764.30	231525.77	847201.61
Year	1	2	3	4	5	6	7

Figure 17: Income statement and Operating Expenses

D. Financial Requirements

Two Tired Solutions is seeking \$80,000 in the first year to ensure that all costs are covered including R&D, growth of team, and manufacturing. Once the design is more mature, we are requesting \$200,000 in year 2 to increase production and have it mass shipped to the customers. In order to minimize the initial costs, the team will keep the inventory low and gauge the market interest with reviews. If this phase is successful, \$100,000 more will be requested to increase capacity. The company will be self-sustainable after year 3.

Two Tired Solutions will obtain the funds through local bike shops, large bike or tool manufacturing companies, interested parties, and crowdfunding. To start, the team will get in contact with interested parties, and raise a capital of \$70,000. Crowdfunding

will be marketed online, and the public interest can be observed. We are expecting around \$10,000 from this source. These two funds will help jumpstart the project and cover basic expenses.

Then, as the design is refined, the team will pitch the product to local bike shops and large bike/tool manufacturing companies. Here, capital of \$200,000+ is requested to start mass production and prepare to sell to the customers. Once success is shown, an additional \$100,000 will be requested. After this investment, *Two Tired Solutions* is expected to grow exponentially and to break even in 5 years due to high volume and large profit margins. Figure 18 shows the cash flow and suggested amount to be financed.

Two-Tired Solutions							
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Pre-Tax Operating Profit (Loss)	-68760.00	-142488.00	-77234.40	11339.28	130378.82	378290.06	615675.84
Cumulative Cash Flow	-68760.00	-211248.00	-288482.40	-277143.12	-146764.30	231525.77	847201.61
Cash Needs	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Cash Balance	-68760.00	-131248.00	-8482.40	102856.88	233235.70	611525.77	1227201.61
Suggested Amount Financed	80000.00	200000.00	100000.00	0.00	0.00	0.00	0.00
Post-Financing Cash in the Bank	11240.00	68752.00	91517.60	102856.88	233235.70	611525.77	1227201.61

Figure 18: Cash Requirements

VIII. TEAM

Two Tired Solutions is a group of four driven engineers that wish to create a situation where bicycle tire replacement is accessible to any bicycle rider. Going forward in driving this assignment is to begin with by extending our manufacturing team to a local partnership of an additive manufacturing company. Locating expertise in the additive manufacturing environment will allow *Two Tired Solutions* to research and develop the most durable materials in user cases. For organizing funds and updates with our investors, *Two Tired Solutions* will be hiring a marketing director to keep our network, customers, and social media platforms up to date on public news released by the research and development sub-team, being the original four engineers of *Two Tired Solutions*. Expanding our social outreach will allow *Two Tired Solutions* to connect with small-scale bicycle shops that provide a large number of bicycle repairs to their local communities.

Long term, *Two Tired Solutions* hopes to deliver a product to the public that meets the experience to create an ease of use environment for all recreational bicycle riders. Over time, our team would plan to see "The Lumberjack" sold in widespread bike shops so our users could purchase a tool that would allow them to feel confident in repairing their tube/tubeless tires. For continued research into user feedback, future iterations will be designed to expand functionality and provide the most comfortable hand positions to increase ergonomic handling. Going forward, *Two Tired Solutions's* research and development team will continue to investigate the most durable and flexible thermoplastics to improve our product for our users to experience an extended lifespan of use.

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