

APEC 3551

Concept Design and Value-Added Entrepreneurship

Final Feasibility Portfolio

T-Tool+



Don't wait to skate use T-tool+

Light-weight, battery-powered tool that helps skateboarders and roller-skaters change their wheels more efficiently

Vladyslav Lobak

12/16/2020

II. Executive Summary

Concept description: The primary objective of T-Tool+ is to design a compact, light-weight, battery-powered tool that helps skateboarders and roller-skaters change their wheels more efficiently. Using the tools currently available, the process of changing one's wheels can take between 5 and 15 minutes. T-tool+ aims to significantly reduce the time to change wheels, and sooth the pain point that slowly changing wheels can create. Currently, the widely used solution for changing the wheels on a skateboard or a roller-skate is a manual T-shaped socket wrench. This tool is known as a T-tool. To compete with the currently available T-tool, T-Tool+ would need to be light-weight, fit in the palm of one's hand, be battery-powered, be competitively priced, and reduce the time to change one's wheels by <50%.

Opportunity: Worldwide there are more than eleven million skateboarders, and the skateboarding industry generates an approximated 4.8 billion dollars of revenue annually⁽²⁾. The estimated 100,000 roller derby players worldwide each spend around \$1,500 annually on their sport⁽³⁾ making for a 1.5-million-dollar market. Taking these facts into account, as well as the rising popularity of skateboarding and roller-skating, and the 2020 debut of skateboarding as an Olympic sport⁽¹⁾, now is the ideal time to develop this product. In order to grow with the market and retain customer loyalty, T-Tool+ plans to create various product pivots, as well as continually seek to improve the current product.

Innovative Solution: Future design iterations for T-Tool+ will follow the product requirements detailed below.

- The weight of this product shall be under 0.9lbs for comfortable precision use⁽⁵⁾
- The size of this product shall adhere to the max specs recommended by the CCOHS *Hand-Tool Ergonomics* specification sheets for precision-use hand tools.⁽⁵⁾
- Motor torque shall exceed 10 ft-lbs. to break and re-engage the seal of a 5/16" lock-nut.
- Motor speed shall exceed 2.8 rev/sec (168rpm), doubling the turning efficiency of a manual wrench.
- This product must reduce the time to change one's wheels— roller-skate or skateboard— by 50%<.
- The automated functions of this product will be battery power and the battery life must support 3+ complete wheel change overs.

Currently, T-Tool+ is in the prototype development phase of production. The product requirements have been solidified, and a production plan has been determined. The production plan is to use the motor, battery, switch, and charging cable from a TECCPO cordless screwdriver which have already been optimized for the desired weight, cost, simplicity, and torque. A custom case has been designed and 3D printed to secure the part and obtain the desired T-shape profile for the product. The casing was designed to be two identical parts that fit together with adhesive. The casing was designed as two identical parts to minimize production costs. The product battery is charged via micro-USB. The micro-USB port can be easily accessed through the product casing. The main factor that differentiates Palm Drill from the currently available and sometimes patented solution is that Palm Drill is electronic whereas all of the current solutions tailored specifically for skaters are manual. This would likely inspire a strong interest in our product because T-Tool+ can reduce their time to change the wheels by 50%.

Value proposition: Today, the vast majority of roller skaters and skateboarders use a manual hand wrench dubbed the T-Tool for its T-shaped profile. To have over benefit with the currently available T-tool, T-Tool+ would be light-weight, fit in the palm of one's hand, be battery-powered, be competitively priced, and reduce the time to change one's wheels by <50%. Our primary target market consists of quad-skaters between the ages of 16-25 who are avid skaters. We came to this conclusion by distributing a market survey. Our survey was distributed over social media accounts, followed mostly by adults who are part of the roller

skate or skateboard community. We assume that we sell our product on Amazon in year one and pay Amazon Seller Fee of \$40 per month ($\$40 \times 12 \text{ months} = \480). We assume that we sell 1000 units of T-Tool+ for \$25 per unit. The actual product will be outsourced to a manufacturer at a lower cost. Customers would buy from us because of our uniqueness and convenience.

Competitive advantage: JETJAT, RIDGID, BOSCH, and Black+Decker hold most of the market share in cordless hand tools, but they provide a significantly lower barrier to entry because they have a hugely wide target market. Those companies' primary markets are consumers looking to improve their homes and current place of residence, while T-Tool+'s target market is active, avid, skateboarders, and roller-skaters. However, electric screwdriver manufacturers are not targeting our target market. Although these companies have a larger market, T-Tool+ will be cheaper than competitors due to reduced manufacturing costs. This will be achieved due to self-manufacturing. T-Tool+ will also target the consumer's resistance to change by purposefully mimicking the size and shape of the current solution. There is currently no competitor marketing towards our target market using this strategy. T-Tool+ is seeking to take all of the good things that exist with current solutions including easy maneuverability, and cordless nature, while making it look physically similar to the solution that consumers are currently using, the manual T-tool. In our research, our surveys show that there is a specific need. Our team realized that skaters currently don't know that there is a solution to their problems, because it isn't meant for them yet. Our solution is to create an automatic device for removing T-shaped wheels, which solves the problems of skaters and eliminates the resistance to changes mentioned earlier. We will sell our product for \$ 25 per unit to cover our expenses and get some profit.

Entrepreneurial team: Prototyper – person who is knowledgeable in the field of engineering and product development was an aid in the prototyping phase. She negated the need to outsource prototyping, and allowed for speedy implementation and testing of design changes. She created multiple prototypes which are valuable to show to investors and potential stakeholders to demonstrate the value in this venture. We already have her in our crew.
CFO – someone who has experience with the financial aspect of running a business. He is majoring in Economics and minoring in Management and Leadership. He has a strong analytical skill; hence, he is in charge of the financial officers and does a large part of the financial calculations and analyses. We already have him in our crew.
CMO - someone who can lead the marketing team in finding the best way to advertise our product and penetrate the target market. Focusing on the market as a whole, she has been very useful in finding the best way to get the T-Tool+ in contact with as many potential customers as possible. She is also part of our crew already.
Accountants - I will be keeping the books but a tax guy is always beneficial.

Financial Highlights and/or MBV Outcomes: Currently, T-Tool+ is in the prototype development phase of production. We assume that we sell 3000 units of T-Tool+ for \$25 per unit. We assume that the actual cost per unit (\$15) will be lower than the cost of a prototype (\$20) because we bought the component of the prototype with a retail price on Amazon. The actual product will be outsourced to a manufacturer at a lower cost. Assuming we can sell to 60% of our target market in year one. We will promote our product is going through popular skate parks around Minneapolis-St Paul and in west coast regions to promote our product. For example, the most well-known skate park is Burnside Skatepark in Portland, Oregon. We would set up a booth and promote our product and give demos to skaters so they understand what our product is and how it would be beneficial for them. We assume that we sell our product on Amazon in year one and pay Amazon Seller Fee of \$40 per month ($\$40 \times 12 \text{ months} = \480). We assume that we will spend \$3000 to build our own website because it helps to develop our brand. We assume product Development Cost \$20. Total start-up cost will be \$3020. My start-up cost seems quite low because I was fortunate enough to manufacture it by myself with my business partner/prototyper. Launch in summer of 2021.

III. Consumer Problem

T-tool+!

Now changing wheels can be fun as it only takes a few seconds to do it.

Roller skaters, skateboarders, roller derby skaters, and ramp skaters all share a common problem: it takes *way too long* to change wheels. Wheels of different hardness and shape are used depending on the application. Someone who wants a smooth ride across the terrain of dubious smoothness would use large soft wheels to minimize the effect of small rocks and cracks. But these very same large soft wheels would make doing tricks at a skatepark almost impossible, as the stickiness of the wheels would drain ramp speed.

Currently, the widely used solution for changing the wheels on a skateboard or a roller-skate is a manual T-shaped socket wrench. This tool is known as a T-tool. T-tool+ is a battery powered palm drill that can screw on/off the nuts that hold on the wheels of roller skates and skateboards with the press of a button. (DD) It is also lighter, fits in the palm of one's hand, battery-powered, competitively priced, and reduces the time to change one's wheels by <50%. (OB) Due to the difficulties the manual tool has, I am more than sure that an automated one not only going to solve timing issue but also will make skateboarders life easier because of efficiency it provides. (RTB)

Using the tools currently available, the process of changing one's wheels can take between 5 and 15 minutes. No more wasting of time with T-tool+. It's time to kick the inefficiency. Don't wait to skate, use T-Tool+, as it is only \$25.

Find T-tool+! Online at Amazon or at your local Skate Warehouse store T-tool+ is always available for you. (SS)

Now every ride can be smoother than ever before, no matter what surface you are using!
Price \$25

What is the consumer problem to solve?

Roller skaters, skateboarders, roller derby skaters, and ramp skaters all share a common problem: it takes way too long to change wheels. Wheels of different hardness and shape are used depending on the application.

How do you know the problem is real?

Using the tools currently available, the process of changing one's wheels can take between 5 and 15 minutes. From a roller skater experience changing wheels four to six times a week to go between outdoor skating and ramp skating, I can say that this is a huge pain.

Reason-to-Believe the solution is feasible and desirable?

Currently, the widely used solution for changing the wheels on a skateboard or a roller-skate is a manual T-shaped socket wrench. This tool is known as a T-tool. Due to the difficulties the manual tool has, I am more than sure that an automated one not only going to solve timing issue but also will

make skateboarders life easier because of efficiency it provides. To compete with the currently available T-tool, my product will have to have these features: be light-weight, fit in the palm of one's hand, be battery-powered, be competitively priced, and reduce the time to change one's wheels by <50%. In all other questions I described how this will be achieved.

All roller-skates, skateboards, and long-boards are designed to use a common nut size (5/16") to hold on their wheels. This allows the target customer base to be anyone who is using their roller skates or skateboards on multiple terrains. Worldwide there are more than eleven million skateboarders, and the skateboarding industry generates an approximated 4.8 billion dollars of revenue annually. The estimated 100,000 roller derby players worldwide each spend around \$1,500 annually on their sport making for a 1.5-million-dollar market. For this reason, as well as from my own personal observations, I believe that this product would be widely desirable.

Our primary target market consists of avid skaters who do multiple styles of skating and skate on different types of surfaces such as street and skate parks. Avid skaters usually change their skate wheels regularly. This would likely inspire a strong interest in our product because T-Tool+ can reduce their time to change the wheels by 50%.



LAURYN HOLDEN

EXAMPLE OF TARGET AUDIENCE

AVID SKATER

WHERE DOES HE GO FOR INFORMATION?

- SOCIAL MEDIA (INSTAGRAM, FACEBOOK, YOUTUBE BLOGGERS)
- WEB-SITES
- FRIENDS/TEAM

21 year

STUDENT

INTERESTS: SPORT, SKATE PARKS, UNIVERSITY, SELF-DEVELOPMENT



SELENA OUTDE

EXAMPLE OF TARGET AUDIENCE

SKATER

WHOERE DOES HE GO FOR INFORMATION?

- INTERNET COMMUNITY
- WEB-SITES

15 years

teenager

INTERESTS: WORK, HOBBIES, BOOKS , SELF-DEVELOPMENT

T-TOOL+

T-Tool+ is a tool that helps skaters do more of what they love most: skate.

TARGET MARKET





\$7 to \$25

Age: 16-26

Sex: male, female

income level:
average, above
average



Our marketing strategy to popularize the T-Tool+ throughout the skate community is to first reach out to local skate shops in regions where skating is the most popular.

Marketing strategy

DISTRIBUTION CHANNELS



+ LOCAL SHOPS

+ SOCIAL MEDIA

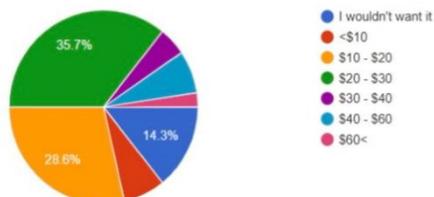


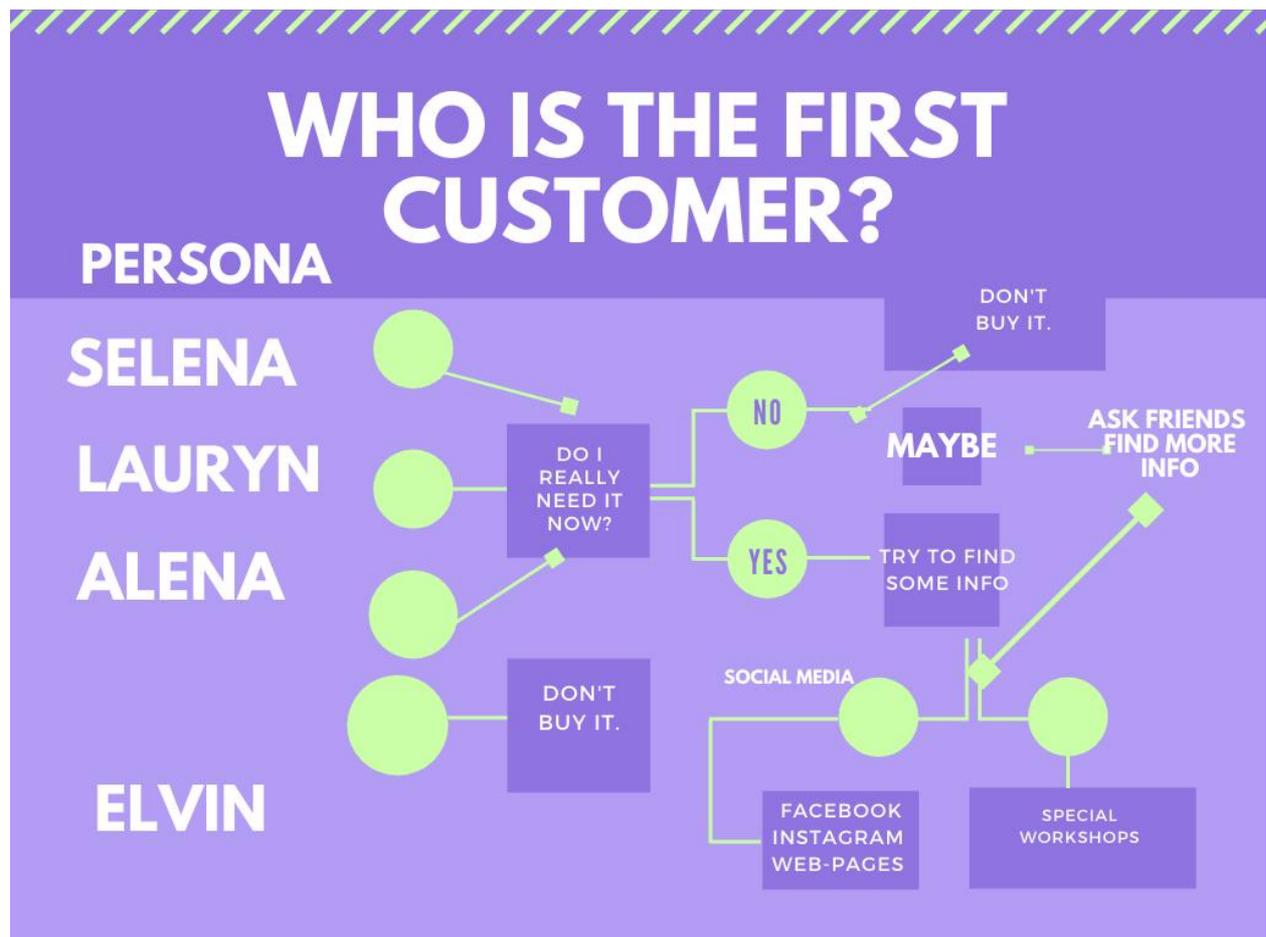
Vlad Lobak
- Head of Marketing

Background
Agricultural business major, experience writing business plans.

If there was a compact product that reduced the time to change your wheels by 60% how much could you see yourself paying for it?

42 responses





External Industry Analysis (PEST)

- Political** → Several measures to ensure T-Tool+ follows Government's Standards for Hand and Power Tools (OSHA).
- Economic** → U.S. economy is quite stable that allows new start-up companies to grow.
- Social** → People resist change despite verbally acknowledging the pain points in the current solution.
→ Large skate community in Minnesota (city of skate).
- Technological** → Currently available hand drills and cordless screwdrivers are marketed towards adult handymen and construction workers.

IV. Product Problem

T-Tool+ is a light-weight battery powered hand tool with the sole purpose of quickly taking off and then re-engaging the lock-nut which holds on the wheels of a skateboard or a quad roller-skate. Figure 2 which can be found in the Executive Summary portion of this paper details how the lock-nut and the wheel fit together. Figure 8 shows the final CAD model, and Figure 9 shows the works-like

prototype. The design of this tool went through two additional design iterations before the final design was determined. These additional design iterations can be found with descriptions in Appendix B.

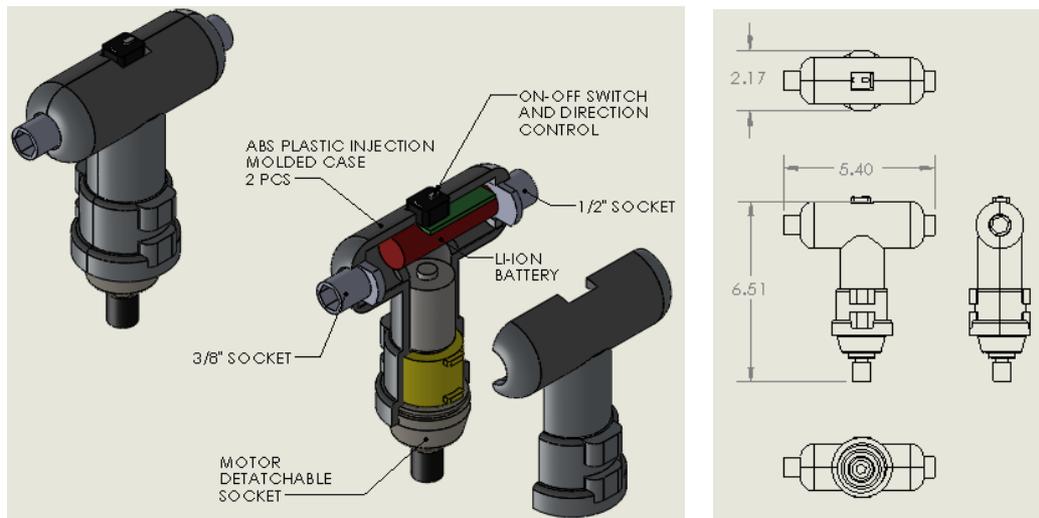


Figure 8: T-Tool+ CAD components



Figure 9: T-Tool+ works-like prototype

Currently, T-Tool+ is in the prototype development phase of production. The product requirements have been solidified, and a production plan has been determined. The production plan is to use the motor, battery, switch, and charging cable from a TECCPO cordless screwdriver which have already been optimized for the desired weight, cost, simplicity, and torque. These components can be seen in Figure 10. When the product moves to mass-production a supplier will need to be located for each of these parts to leverage the benefits that come with buying in bulk. A custom case has been designed and 3D printed to secure the part and obtain the desired T-shape profile for the product. The casing was designed to be two identical parts that fit together with adhesive. The casing was designed as two identical parts to minimize production costs. When the product moves to mass production, this case will be injection molded with a polymer plastic. To do this a relationship with a plastic molding supplier will need to be developed. Additionally, a mold for the molded piece will need to be developed. The product battery is charged via micro-USB. The micro-USB port can be easily accessed through the product casing. It is likely that when the product is sold to the consumer, that a micro-USB cable will be included with the product as is standard for electronically charged devices. A supplier for this cord would need to be identified.

Product Requirements

Future design iterations for T-Tool+ will follow the product requirements detailed below.

- The weight of this product shall be under 0.9lbs for comfortable precision use⁽⁵⁾
- The size of this product shall adhere to the max specs recommended by the CCOHS *Hand-Tool Ergonomics* specification sheets for precision-use hand tools.⁽⁵⁾
- Motor torque shall exceed 10 ft-lbs to break and re-engage the seal of a 5/16” lock-nut.
- Motor speed shall exceed 2.8 rev/sec (168rpm), doubling the turning efficiency of a manual wrench.
- This product must reduce the time to change one’s wheels— roller-skate or skateboard— by 50%<.
- The automated functions of this product will be battery power and the battery life must support 3+ complete wheel change overs.

Production and Handling

For the purpose of inexpensive prototyping, a small cordless battery power screwdriver was taken apart. An image of the taken apart cordless screwdriver can be seen in Figure 10. The motor, battery, I/O switch, and charging cable was taken from the screwdriver to use for the T-Tool+ prototype. A 3D printed casing was designed and printed out of PLA.

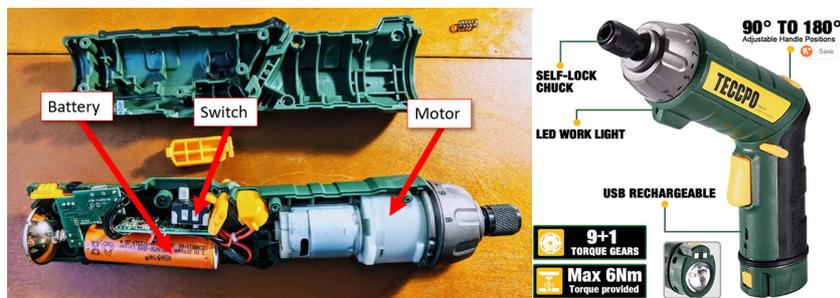


Figure 10: Cordless electric screwdriver from which parts were taken for prototyping

The prototype was assembled created by the process listed below, and the full bill of materials for a single prototype can be seen in Table 1:

Cordless screwdriver purchased from Amazon.com and delivered within two days.

Cordless screwdriver is disassembled. Motor, switch, and battery are extracted.

Using Solidworks CAD software, a custom two-part T-shaped case is designed to house the components taken from the cordless screwdriver.

Custom T-shaped case is 3D printed with PLA.

The custom case is tested and iterated 3 times before a final design is chosen.

Final case is sanded, assembled, and tested against product requirements.

Table 1: Bill of Materials for Single Prototype

Item #	Item	Quantity	Supplier	Cost
1	PLA 3-D Printed Husk	1	A-Labs	\$0
2	Motor	1	TECCPO Cordless Screwdriver	\$20
3	I/O Push Button	1	TECCPO Cordless Screwdriver	N/A

4	Rechargeable Battery	2	TECCPO Cordless Screwdriver	N/A
5	5/16" Socket Head	1	TECCPO Cordless Screwdriver	N/A
6	Micro USB Charging Cable	1	TECCPO Cordless Screwdriver	N/A
			Total Cost	\$20

Intellectual Property Rights/Protections

There are multiple patents currently claimed on non-electronic hand tools for skaters, two of which can be seen in Appendix A. The main factor that differentiates Palm Drill from the currently available and sometimes patented solution is that Palm Drill is electronic whereas all of the current solutions tailored specifically for skaters are manual. Additionally, there are many patents currently available for electric power tools such as drills and electric screwdrivers. Three of these patented products can be seen in Appendix A3 - A5. The key aspect that differentiates T-Tool+ from these products is its T-shaped profile paired with the electronic functionality. If a patent were pursued it would likely be a design patent to protect the T-shape profile of the T-Tool+. A utility patent for the technology that makes the drill portion of the T-Tool+ effective would not be patented as the technology is not novel or non-obvious.

Development Risks

Due to COVID we had hard time accessing a place where were able to prototype, since we are in lockdown at the moment. In order to overcome those hypothesis COVID needs to stop so we will easy access to prototyping, other than that everything else looks pretty straight forward.

Benefit Map

		Customer Perceived Desirability	Customer Perceived Feasibility	Customer Benefit Consequence	Customer Archetype
Component 1	Feature 1	Currently no similar products on the market. Emotion oh no one has it, why would not I be the first who has it. Feeling exclusivity.	scuff mark resistant being tossed around in a sports bag with water bottles and protective gear.	Won't ruin the look and the work process	Skateboarders
	Feature 2	Light but does all the same features the manual one has and even does it 10 times quicker. Emotion:wonder why	fit in the palm of one's hand	Comfy to use	Roller skaters

		not double check its right			
	Feature 3	Cost isn't too high, so people would not be worried about wasting money on a new product. No adaption hurdles needed.	be lighter than 2 pounds	Not heavy so easy carry	roller derby skaters
	Feature 4	Long-lasting, there is nothing that can break. Only batteries would need to be changed at some point. Emotion: confidence in the product.	cut the time to change wheels in half if not more	Takes 10 times less time than the existente version	ramp skaters
	Feature 5	T-tool+ is a product that helps skaters spend less time doing what they don't want to do, and more time doing what they do.	be battery operated not outlet powered so that it could be used anywhere.	Portable	
	Feature 6		battery life would need to last for 5-10 complete wheel changeovers	Don't need to worry about charging for a while	
	Feature 7				
	Feature 8				
	Feature 9				
	Feature 10				

V. Market Problem

Our primary target market consists of avid skaters who do multiple styles of skating and skate on different types of surfaces such as street and skate parks. Avid skaters, usually change their skate wheels regularly. This would likely inspire a strong interest in our product because T-Tool+ can reduce their time to change the wheels by 50%. Our primary target market consists of quad-skaters between the ages of 16-25 who are avid skaters. We came to this conclusion by distributing a market survey. Our survey was distributed over social media accounts, followed mostly by adults who are part of the roller skate or skateboard community. We also determined that we may have lost a segment of our intended survey respondents due to the age barriers on social media. According to a study in 2017 done by Statista.com, there are currently, “around 6.3 million U.S. participants”⁶ in 2x2 skating or Quad Skating. Our secondary target market is skateboarders and general skaters except for roller-bladders. Skateboarders and general skaters also need to change their wheels although less often compared to professional skaters. Based on our survey, they also indicate interest in buying our product.

A large portion of T-Tool+'s target demographic is under 15 years of age and do not have experience with drills. This could be both a hindrance and an aid to the success of T-Tool+. While the younger demographic may stray away from power tools which represent part of T-Tool+'s competition, they

may also not know what a drill even is. To combat this, in our marketing promotion we plan to advertise how easy it is to use and how consumers of all ages can use the T-Tool+ safely. The societal impact the T-Tool+ has is large. The T-Tool+ provides a more efficient way to change the wheels of a skateboard or roller-skates. Instead of changing by hand, the user can now let the tool do the work for them which saves time and gives them more freedom to do what they love to do— skate.

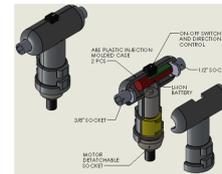
Current Solution: T-Tool

- Manual T-shaped socket wrench
- Pros
 - Widely used proven concept
 - Inexpensive (retails 7\$ - 25\$)
 - Durable
 - Light weight
- Cons
 - Hugely inefficient, 10 - 15 min to change wheels



Our solution: T-Tool+

- Integrate all of the good things about the current solution but lose the inefficiency
- T-tool+ with incorporated 4V motor for fast and easy removal and replacement of skateboard and roller skate wheels



Barriers to Entry and Competition

Our largest barrier to entry will be startup-costs. The research and development process to create such a product that is cheap and accessible due to the expertise of T-Tool+'s founding team members. That being said, manufacturing costs and building relationships with manufacturing suppliers will most likely be expensive as this is a small up-and-coming product targeting a niche market. Suppliers will likely mandate a large upfront cost or large margins to protect themselves against the potential failure of the product. There is currently no funding to outsource our product to large scale manufactures which would make mass production difficult. T-Tool+'s access to patent development resources to protect the design from competitors is limited. This increases the risk that the idea will be copied by a more prominent manufacturer.

The main competitors of T-Tool+ are the T-Tool producers making the current manual T-Tools and electric screwdriver producers. However, the electric screwdriver producers are not targeting our target market. The competing products work similarly to the T-Tool+ but are marketed towards a different audience. The difference between the T-tool+ and similar hand drill products currently in the market is the marketing strategy. The current hand drill market is primarily for "DIY'ers" and others who know how to use power tools in their homes. Through our market research, we have found there are currently no known skaters that use an automated drill to change wheels. In our research, our surveys show that there is a definite need shown in Figure 7a below. Our team realized that skaters currently do not know there is a solution to their problems because it hasn't been marketed towards them yet. Our solution is to create an automated T-shaped wheel remover that solves skaters' issues and addresses the resistance to change stated earlier. Also, in Figure 7b, we found that our target customers' willingness to pay is between \$10-\$20 and \$20-\$30. We will sell our product at \$25 per unit to cover our costs and make some profits out of it.

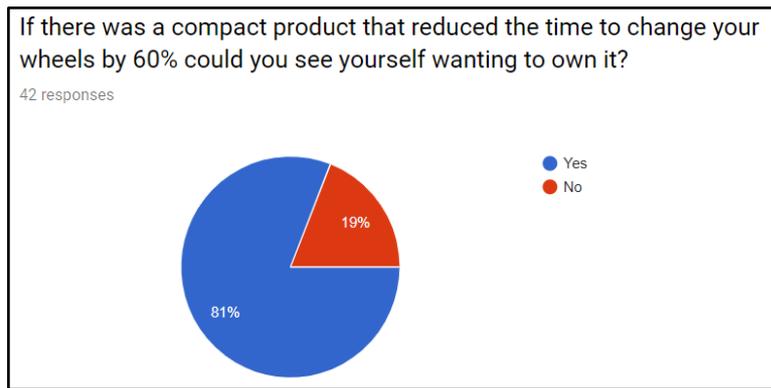


Figure 7a: Survey response displaying market interest in T-Tool+

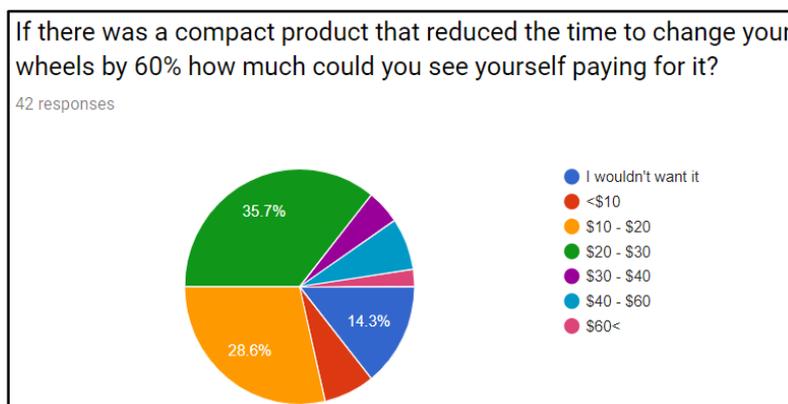


Figure 7b: Survey response displaying the willingness to pay from our target customers

The primary industry for T-Tool+ is the hand-tool industry. The T-Tool+ is a light-weight battery-operated drill that is palm-size and specifically designed to efficiently remove and replace a 5/16" locknut from a threaded axle. The T-Tool+ differs from other handheld tools that remove nuts in that it is designed with a non-removable socket that can only interface with a 5/16" nut. The fact that it is designed for a specific nut and torque would allow it to be manufactured well below the cost of current electric solutions while still maintaining the necessary functionality.

The current solutions to removing nuts include manual wrenches such as that seen in Figure 3 and electric handheld drills. Today, the vast majority of roller skaters and skateboarders use a manual hand wrench dubbed the T-Tool for its T-shaped profile in the style seen below. This tool contains three socket heads of three different sizes to tighten/loosen different parts of a skateboard or roller skate. The price of this tool ranges from \$7 to \$25 depending on the manufacturer. Manufacturers of this style of the tool are numerous ranging from Spitfire (Figure 3) to Unit Co. (Figure 4). Cheap reproductions are widely available on Amazon.com. Regardless of the manufacturer, the tools are all largely identical as can be seen by comparing the tools Figure 3 and Figure 4.



Figure 3: Spitfire Produced manual T-Tool



Figure 4: Unit Co. produced manual T-Tool

There are multiple patents currently claimed on this kind of manual hand tool for skaters two of which can be seen in Appendix A. The main factor that differentiates T-Tool+ from the currently available and sometimes patented solution is that T-Tool+ is electronic whereas all of the current solutions tailored specifically for skaters are manual.

In addition to the manual T-Tool, some skaters also choose to use small cordless drills and screwdrivers such as that seen in Figure 5 and Figure 6 below. The cost of these solutions ranges from \$15 to \$200. Although this is an effective solution, our tool is differentiated in both shape (will maintain a T shaped profile) and simplicity. Currently, available hand drills and cordless screwdrivers are marketed towards adult handymen and construction workers, it takes a creative jump to think to apply them to skating which has not yet been made by consumers or the product market. This ostracizes young skaters who may not be familiar or comfortable with power tools. Additionally, T-Tool+ has a unique purpose and will be tailored specifically to skaters both in physical design and marketing which sets it apart from these currently available solutions.



Figure 5: Bosch produced cordless drill



Figure 6: Black+Decker cordless screwdriver

JETJAT, RIDGID, BOSCH, and Black+Decker hold most of the market share in cordless hand tools, but they provide a significantly lower barrier to entry because they have a hugely wide target market. JETJAT, RIDGID, BOSCH and Black+Decker's primary markets are consumers looking to improve their homes and current place of residence, while T-Tool+'s target market is active, avid, skateboarders, and roller-skaters. Although these companies have a larger market, T-Tool+ will be cheaper than competitors due to reduced manufacturing costs. T-Tool+ will also target the consumer's resistance to change by purposefully mimicking the size and shape of the current solution. There is currently no competitor marketing towards our target market using this strategy.

Also, we acknowledged other challenges from adopting PEST Analysis. In terms of Political analysis, there are several measures that we need to follow according to the Government's Standards power-operated hand tool on the Occupational Safety and Health Administration's website (OSHA). For instance, the weight of the power-operated hand tool must not exceed 1 lb. for comfortable precision use. In terms of economics, the U.S. economy is stable which allows new start-up companies to grow their business. In terms of social, many studies on change management have shown that human beings do not easily embrace changes in how they work. In one such report titled *Change is Difficult, But Change Management Can Mitigate the Pain* delivered by Project Manager Paravathi Iyer described how clients using a markedly flawed solution were very resistant to change despite verbally acknowledging the pain points in the current solution. She stated that "When it came to replacing it, most users wanted the new system to be exactly like the old one, flaws and all."^{x7} Results like this show up time and time again. Because of this, T-Tool+ is seeking to take all of the good things that exist with current solutions including easy maneuverability, and cordless nature, while making it look physically similar to the solution that consumers are currently using, the manual T-tool. In terms of technology, there are many currently available hand drills and cordless screwdrivers in the market that can be used to change the wheels, but those products are marketed towards adult handymen and construction workers, instead of skaters. Based on these analyses, we believe that it's a good

opportunity for our product, T-Tool+ to enter the hand tool industry as we have prepared the marketing strategy to overcome the expected challenges.

VI. Business Model Problem

Sales	75 000,00 USD	(3,000*25)					
Bill of Materials	45 000,00 USD	(3,000*15)	This is how I get to 75000				
Gross Margin	30 000,00 USD						
Revenue Sources			2020	2021	2022	2023	2024
Revenue A - T-Tool+			75 000	150 000	225 000	300 000	375 000
Total Revenue			75 000	150 000	225 000	300 000	375 000
Direct Expenses							
Cost of Goods Sold			45 000	90 000	135 000	180 000	225 000
Total Direct Expenses			45 000	90 000	135 000	180 000	225 000

Revenue Assumptions							
<i>Website and Amason assumptions</i>							
Days open per year	365	days					
Open	day and night						
Hours of operation	day and night						
<i>Revenue A - T-Tool+</i>							
Item Price	\$25		2020	2021	2022	2023	2024
Unit Quantity Sold per Year			3 000	6 000	9 000	12 000	15 000
Unit Quantity Sold per Day			8,22	16,44	24,66	32,88	41,10
Units Sold per Hour			0,34	0,68	1,00	1,37	1,75
Direct Expense Assumptions							
T-Tool+ Cost	60%	of sales price		15,00	per unit cost		

Income Statement

Income Statement
For the year ended December 31, 2020

Revenue	
Sales (3,000 * \$25)	\$75,000
Cost of Goods Sold	
Bill of materials (3,000 * \$15)	45,000
Gross Margin	30,000
Operating Expenses	
Advertising and Marketing	6,000
Amazon Seller Fee	480
Total Operating Expenses	6,480
Operating Income	23,520
Other Expenses	
Website Development Cost	3000
Cost of a Prototype	20
Net Income	\$20,500

Assumptions:

We assume that we sell 3000 units of T-Tool+ for \$25 per unit.

We assume that the actual cost per unit (\$15) will be lower than the cost of a prototype (\$20) because we bought the component of the prototype with a retail price on Amazon. The actual product will be outsourced to a manufacturer at a lower cost.

Assuming we can sell to 60% of our target market in year one.

We assume that we sell our product on Amazon in year one and pay Amazon Seller Fee of \$40 per month ($\$40 \times 12 \text{ months} = \480).

We assume that we will spend \$3000 to build our own website because it helps to develop our brand.

Start-up Costs		
		Monthly
Pre-opening wages		
	Designer/Founder	6 666,67 USD
	Accountant	5 000,00 USD
	Financial Analyst	5 000,00 USD
	Marketer/promoter	5 000,00 USD
	Website Development Cost	3 000,00 USD
	Office rent	3 000,00 USD
	Pre-opening advertising	600,00 USD
	Product Development Cost (Prototype)	20,00 USD
	Amazon Seller Fee	40,00 USD
	Total start-up costs	28 326,67 USD

Marketing Start-up Costs			
Website advertising		600	
Price per day		\$2	per day
Run time		30	days
Page-impressions - Facebook			
Unit Quantity		1	million per day
Price per day		200,00 USD	per day
Run time		30	days
Material Startup Costs			
<i>Schedule with rationale</i>		15000	

Cash Flow I: Best Case Scenario
For the first four months of operation (Jan-Apr 2020)

Sources of In-flow	Cash In	Sources of Out-flows	Cash Out
Cash Received from Customers/ Sales (590 * \$25)	\$14,750	Start-up Costs (Prototype, website)	(\$3,020)
		Cost of Goods Sold (590 * \$15)	(\$8,850)
		Advertising/Marketing	(\$2,500)
		Amazon Seller Fee (\$40*4 months)	(\$160)
Total Cash In	\$14,750	Total Cash Out	(\$14,530)
Total Cash Flow: \$220			

Cash Flow II: Best Case Scenario
For the year ended December 31, 2020

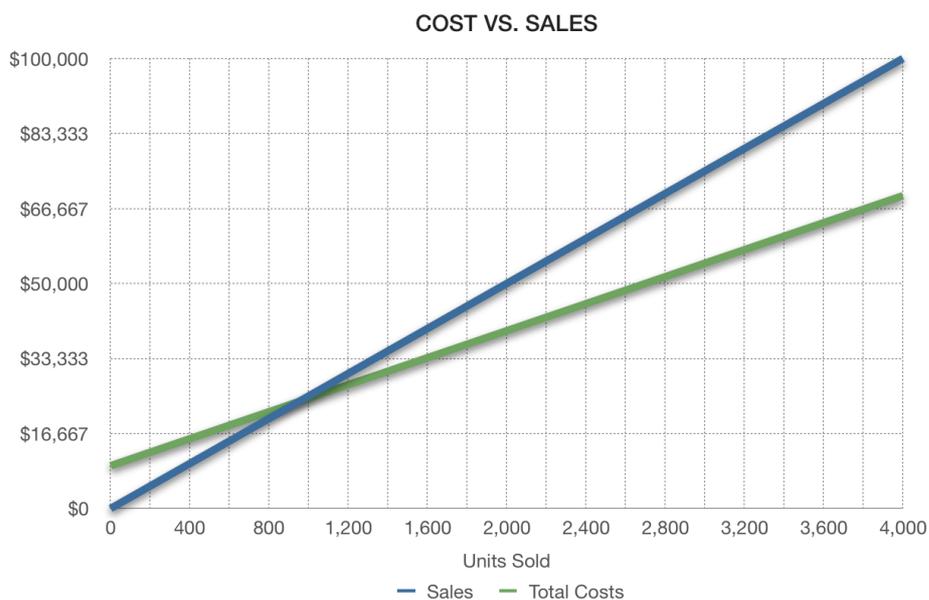
Sources of In-flow	Cash In	Sources of Out-flow	Cash Out
Cash Received from Customers/ Sales	\$75,000	Start-up Costs (Prototype, website)	(\$3,020)
		Cost of Goods Sold	(\$45,000)
		Advertising	(\$6000)

		Amazon Seller Fee	(\$480)
Total Cash In	\$75,000	Total Cash Out	54,500
Total Cash Flow: \$20,500			

Break-even Analysis

Fixed Costs (Website, prototype, advertising, Amazon Seller Fee)	\$9,500
Variable Cost per Unit	\$15
Unit Price	\$25
Unit Increments	200
BREAK-EVEN POINT	950

UNITS SOLD	SALES	TOTAL COSTS	PROFIT/LOSS
0	\$0	\$9,500	-\$9,500
200	\$5,000	\$12,500	-\$7,500
400	\$10,000	\$15,500	-\$5,500
600	\$15,000	\$18,500	-\$3,500
800	\$20,000	\$21,500	-\$1,500
1,000	\$25,000	\$24,500	\$500
1,200	\$30,000	\$27,500	\$2,500
1,400	\$35,000	\$30,500	\$4,500
1,600	\$40,000	\$33,500	\$6,500



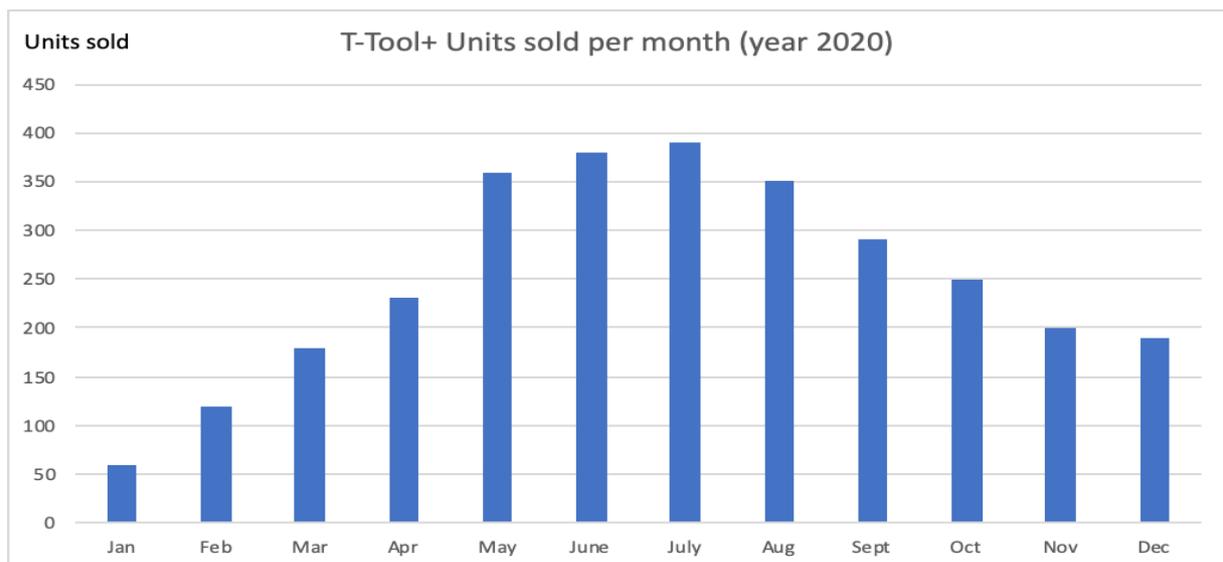
APEC 3551 (001) Fundamentals for Value-Added Rural Businesses (Fall 2020)

Based on our assumptions, our break-even quantity is 950 units. We assume that our venture will break even on the fifth month of operation (May 2020). The table and graph below summarized our expected units sold per month throughout the year 2020.

T-Tool+

Units sold/month for the year 2020 (Best Case Scenario)

Month	Units sold	Total units sold
Jan	60	60
Feb	120	180
Mar	180	360
Apr	230	590
May (summer begins)	360	950 (Break-even)
June	380	1330
July	390	1720
Aug (summer ends)	350	2070
Sept	290	2360
Oct	250	2610
Nov	200	2810
Dec	190	3000



We assume that our sales will boom during the summer season starting from mid-May till the end of August because many people would skate during summer. We also assume that our venture will break even on the fifth month of operation (end of Dec 2020).

VII. Operations/Commercialization Problem

Our marketing strategy to popularize the T-Tool+ throughout the skate community is to first reach out to local skate shops in regions where skating is the most popular. Skate culture is most well embraced across the west coast and this is likely where our company would be based.

Reaching out to local shops in Minneapolis-St. Paul, California, Oregon, Portland, Washington, and getting in popular cities where the skate culture is rich is our first goal in our marketing process. Reaching out to the local skate shops and getting in their brick-and-mortar stores is a great way to market because these shops are frequently visited by local skaters. We would like to build partnerships with local skate shops, skateboard deck producers or quad skate boot producers to promote T-Tool+. We offer equity to these companies for partnership and assistance in marketing.

Our primary target market consists of quad-skaters between the ages of 16-25 who are avid skaters. Avid fans (those who have attended 3 or more bouts in the past year) are also evenly split between genders. Ten percent of the people that we surveyed are 22 years old or younger. The coveted 16- and 25-year-old demographic comprises 41 percent of fans. Only 7 percent are 24 or older. The average fan is just over 22 years old.

Our goal is to get online. Selling our product on Amazon and getting into the most popular online skate store of Skate Warehouse. According to Mint Skate, one of the most well-trusted blogs in the skate community, Skate Warehouse, "started as a small one [store] way back 2002 in California until they got bigger and bigger. Now, they are one of the trusted online stores when it comes to skateboarding items"⁽⁸⁾. Getting into well known, trusted, online skate shops will give our product validity and help aid in its popularity. Also, we are planning to develop our own website to help us build our brand. A lot of other independent skate products sell via a website such as 'heart stopper toe stops' which can be purchased on 'Grindstone Skate Society' website. Our next plan of action is to give out free samples to prominent names in the skate community such as Samara Buscovick (quad-skater) or Alec Majerus (skateboarder) in the hopes that they will like it and promote it.

Similarly, the most popular roller derby team is the USA roller derby team. Giving the entire team tools in hopes they as well will like it and promote it is another way our product will grow in popularity. Another way we will promote our product is going to popular skate parks around Minneapolis-St Paul and in west coast regions to promote our product. For example, the most well-known skate park is Burnside Skatepark in Portland, Oregon. We would set up a booth and promote our product and give demos to skaters so they understand what our product is and how it would be beneficial to their everyday skate experience. Finally, we are planning to create a 'Skate & Fun' Campaign to teach different styles of skating at skate parks around Minneapolis-St. Paul and West Coast region to create skate culture that demands the need of changing the wheels regularly.

We plan on partnering up with skateboard deck producer or quad skate boot producer to promote the product.

Major milestones:

- Marketing survey
- Purchased materials for prototyping
- Began prototyping process
- Continued effective communication

We plan to launch in the summer of 2021, before that we will accomplish customer testing, validation of our product already has been made and be accessed in the Appendix.

		Description	Resources Required	Expertise/Data Needed
Component 1	Theme 1	Create social media buzz on T-tool+	Research needed.	Experience
	Theme 2	Share the simulation video on skate community facebook page	Additional information needed on what facebook page to do it.	After additional information would be collected, data analysis would be needed.
	Theme 3	Free samples to prominent names in the skate community such as Samara Buscovick (quad-skater) or Alec Majerus (skateboarder) in the hope they will promote it	Figuring out what people to choose out of all of them to promote.	Time needed.
	Theme 4	Partner with skateboard deck producer or quad skate boot producer to promote the product.	Research needed.	Past experience in skateboarding needed.
	Theme 5	Offer equity to company for partnership and assistance in marketing.	Faith in product needed.	Financial projections might help on decision making.
	Theme 6	Joining a tight-knit community	Research needed on communities.	Time consuming and experience in doing so would be helpful.
	Theme 7			
	Theme 8			
	Theme 9			
	Theme 10			

PRODUCT	Critical Hypothesis
1	A battery supports 3+ complete wheel change overs before it discharges.
2	T-Tool+ has to have flashlight in it so it can be easily used in the night time.
3	Motor speed exceeds 2.8 rev/sec (168rpm), doubling the turning efficiency of a manual wrench.

CONSUMER	Critical Hypothesis
1	Tool has a motor torque that exceeds 10 ft-lbs to break and re-engage the seal of a 5/16" lock-nut.
2	The size of this product adheres to the max specs recommended by the Hand-Tool Ergonomics specification sheets for precision-use hand tools.
3	The weight of this product is under 0.9lbs for comfortable precision use.

Equipment

3D printer	1000
Batteries	100
Motors	20
Casts	20
husk	300
Push buttons	10
USB Charging Cable	10
Socket Head	10
Broaching machine	2600
Drill press	300
Gear shaper	400
Screw machines	1000
Hobbing machine	1600
Tables	400
Chairs	400
Edge cutting tools	200
Equipment total	\$8,370

Manufacturing infographic and process can be accessed in the Appendix. Features and components are all clearly identified.

VIII. Resource Problem

Intro

T-tool + management philosophy focuses on creativity, teamwork, and enthusiasm all while providing a stimulating environment for employees and customers. Hiring practices will be based off of merit and commitment to the vision T-tool+ is creating.

T-tool+ concept is simply to minimize time wasting on changing wheels but rather dedicate this time towards something more enjoyable, such as riding a skateboard.

Following are the people and resources that I would need:

Senior Management Team

Vladyslav Lobak, Founder and CEO

Responsible for the overall success of the firm, focusing on strategy formulation and upper-level management. Vlad has worked for several entrepreneurs and helped business owners growing their own business, prior to the UMN's Carlson School College internships included trainings in operations management and sales. Vlad's passion for T-tool+ come from years of enjoying intelligent conversation with the clients and how to make it's the best experience for them as a client. Salary \$70,000

Accountants - I will be keeping books for T-tool+.

Prototyper – person who is knowledgeable in the field of engineering and product development was an aid in the prototyping phase. She negated the need to outsource prototyping, and allowed for speedy implementation and testing of design changes. She created multiple prototypes which are valuable to show to investors and potential stakeholders to demonstrate the value in this venture. We already have her in our crew. Salary \$60,000

CFO – someone who has experience with the financial aspect of running a business. He is majoring in Economics and minoring in Management and Leadership. He has a strong analytical skill; hence, he is in charge of the financial officers and does a large part of the financial calculations and analyses. We already have him in our crew. Salary \$60,000

CMO - someone who can lead the marketing team in finding the best way to advertise our product and penetrate the target market. Focusing on the market as a whole, she has been very useful in finding the best way to get the T-Tool+ in contact with as many potential customers as possible. She is also part of our crew already. Salary \$60,000

Board of Advisors – 3 ppl 1 resources, 1 xp/ connections

John Strurgess, – Local business owner and serial entrepreneur. John has founded ADOGO and grown several companies in Minnesota working with the founders. Has access to resources and business connections.

Ilya Dehodyuk – Former tennis player, serial entrepreneur in the skating industry here in Ukraine. He is valuable for his customer experience knowledge and lean operations experience.

TBD- Ideally a current skater so I can be aware of what is going on the skating industry, this person would be helping identify what with whom is best to connect at that moment with. He or she would need to have experience and be well connected in the community and understand operation.

IX. Recommendation

Following is what I need to get started:

After encountering resounding support for the concept among roller skaters and skateboarders in the local community, it was clear that the pain point of slowly changing wheels was not unique to her. As you can likely deduce, this is an exciting opportunity for investors. The economic potential of the skateboarding industry, as well as the opportunity to help a community in need, makes this venture an attractive one. As a nascent startup, investors (like you!) are a critical piece of the puzzle. Investors are needed to assist in the development of crucial relationships with suppliers, as well as generating the capital necessary to go through the product development process. I will need to expand my board of advisors as I evolve, so that we develop as a company.

T-tool+					
Financial Performance					
	2021	2022	2023	2024	2025
Total Revenue	87 500	175 000	350 000	700 000	1 050 000
Cost of Goods Sold	26 250	52 500	105 000	210 000	315 000
Gross Margin	61 250	122 500	245 000	490 000	735 000
Total Operating Expenses	140 090	134 840	138 340	145 340	152 340
Net Income retained	(288 498)	(218 016)	(97 016)	140 984	378 984
EBITDA	(272 840)	(202 340)	(81 340)	156 660	394 660

T-tool+					
Capital Requirements Schedule					
Contributed Capital requirements:		\$ 14 350,00	<i>Common stock</i>		
Preferred Capital requirements:		\$ 250 000	<i>25% dividend per year for 5 years</i>		
			<i>40% Year 5 to common conversion option</i>		

X. Concept Portfolio/Appendices

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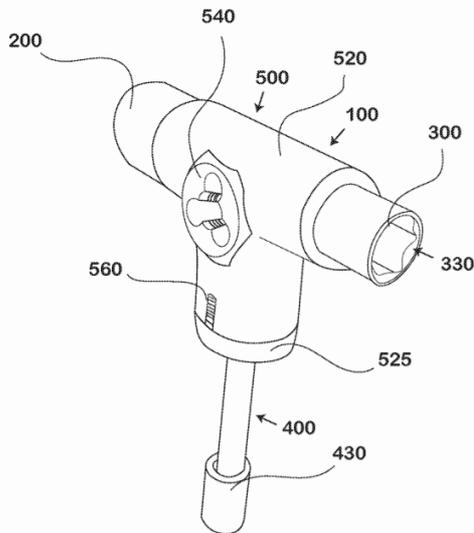
Appendix A: Preliminary Patent Search

Appendix A1: Standard T-Tool

Davis, R. S. (2018) United States Patent No. US 10,040,185 B2. Retrieved from

<https://patentimages.storage.googleapis.com/e7/e5/e8/bd4b5e2165545e/US10040185.pdf>

Sample Image of Patent No. US 10,040,185 B2

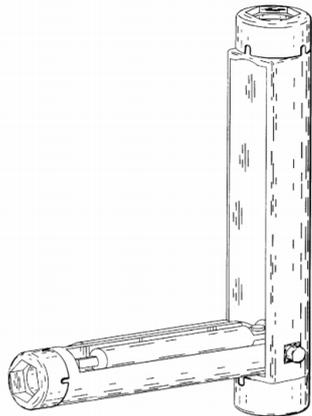


Appendix A2: L-Shaped Skate Tool

McElligott, S. (2004) United States Patent No. US D490,284 S. Retrieved from

<https://patentimages.storage.googleapis.com/ee/af/dd/b4d5082a23b5a0/USD490284.pdf>

Sample Image of Patent No. US D490,284 S

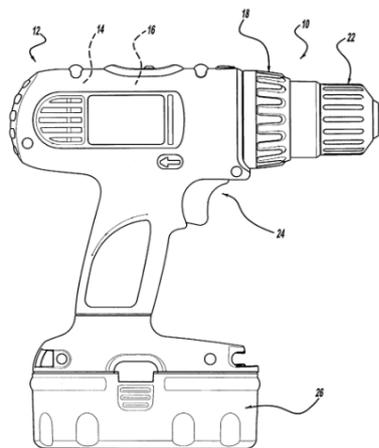


Appendix A3: Hand Drill

Doyle, M. (2006) United States Patent No. US 7,066,691 B2. Retrieved from

<https://patentimages.storage.googleapis.com/d5/ec/97/64a2134f993568/US7066691.pdf>

Sample Image of Patent No. US 7,066,691 B2

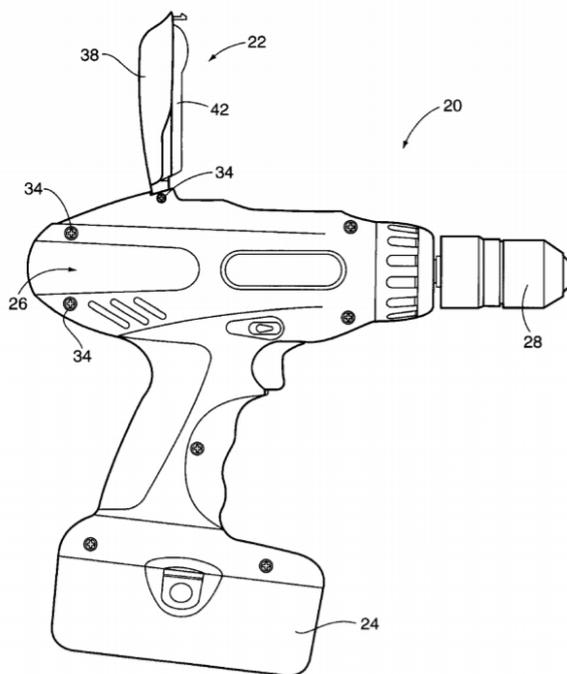


Appendix A4: Hand Drill

Lee, J. (1999) United States Patent No. US 5,954,458. Retrieved from

<https://patentimages.storage.googleapis.com/89/0a/50/14f1cdd34afbc4/US5954458.pdf>

Sample Image of Patent No. US 5,954,458

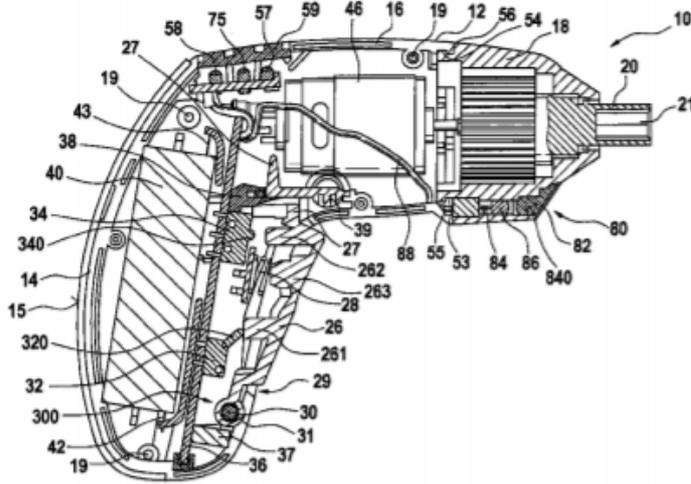


Appendix A5: Cordless Screwdriver

Lohr, G. (2009) United States Patent No. US 7,498,526 B2. Retrieved from

<https://patentimages.storage.googleapis.com/dc/fd/6f/3d2ed95e551164/US7498526.pdf>

Sample Image of Patent No. US 7,498,526 B2



Appendix B: Design Iterations

Appendix B1: Design I

The purpose of this Design I was to experiment with tolerances necessary to keep the motor rigidly secured within the T-Tool+ casing. This model was 3D printed as can be seen in Figure B1.2. These pieces were then altered with a Dremel tool where the tolerances were too snug to fit the motor. The model was then redesigned to better fit the motor. See Figure B1.1 for the Design I CAD model. The full casing would consist of two of these identical parts.

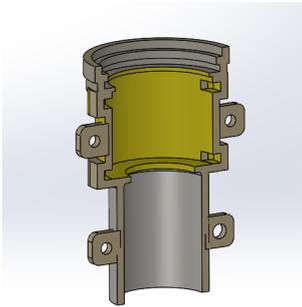


Figure B1.1: First CAD T-Tool+ casing design

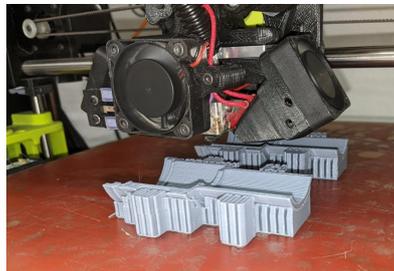


Figure B1.2: 3D printing Design I

Appendix B2: Design II

The purpose of Design II was to take the lessons learned from Design I and design a casing that both kept the casing rigidly attached and housed the battery, switch, and charging port. It was designed to be overly large so that it could be scaled back in the final model. See Figure B2.1 for the Design II physical model. The full casing consists of two of two identical parts.

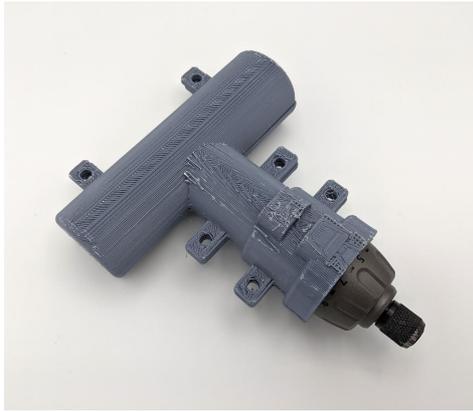


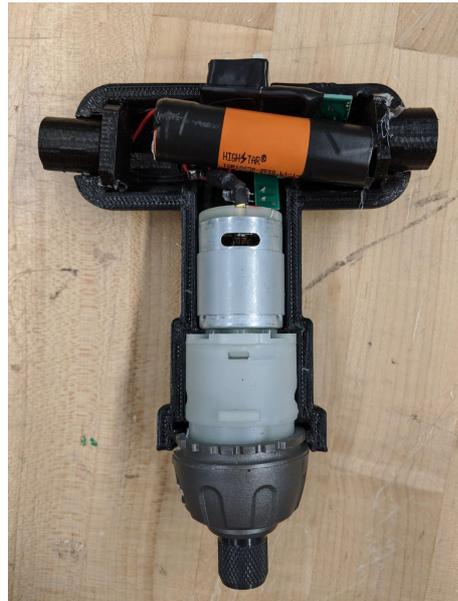
Figure B2.1: Design II physical prototype

Appendix B3: Design III

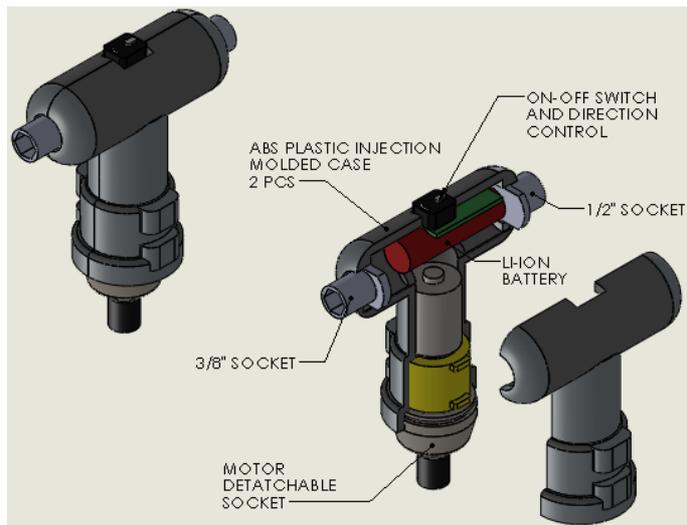
The final prototype for the T-Tool+ aimed to take everything that worked from Design II but make the model more compact. Design III also incorporated a more accessible charging port, and more ergonomic hold. It was light weight, at around 0.9lbs, and performs well above the success metrics defined by the team at the onset of the project. Additional functionalities of standard T-Tool manual sockets were added to the sides of the T-Tool+ so that the user could still change their wheels even if their tool were to run out of battery. This assembly can be seen in Figure B3.3.



B3.1: Final Design III prototype



B3.2: Section view of Design III prototype



B3.3: Labeled CAD Assembly of Design III



Samara Buscovick (quad-skater)

Alec Majerus (skateboarder)

