Swyft Robotics Evaluation

2018-19 Season

Table of Contents

Overview

Introduction

On Sunday, January 27 we were contacted by Swyft Robotics through Chief Delphi and offered a free $500 evaluation kit. We used the link provided to place the order (the cart was pre-populated with items, all of which were discounted to free, along with free shipping). We received a tracking number that same evening, with UPS picking up the package Monday morning in Texas. The parts arrived on Thursday, matching expected shipping times for orders placed over the weekend from Vex, also located in Texas.

Aside from receiving the parts for free, the team was not compensated in any other way. We were, however, encouraged to "post, blog, or tell other teams" and "provide us with feedback on how we can improve our products or other items you'd like to see developed." This document is intended to serve those purposes.

Prior Thoughts on Swyft's Offerings

On Jan 8, mentors for the team did an initial appraisal of Swyft's offerings, as they were a relatively new company that had just come to our attention. We liked what we saw, particularly the JST connector boards, but felt the products were too new to rely on during competition. We wanted to see them used by other teams for a season, to prove that they had the necessary durability and reliability for use over an entire season.

We did, however, place an order for their control system stickers. These were seen as a low-risk area that could help improve on our ability to lay out the electrical system and mount components accurately. Additionally, any issues that may arise from them would be found and corrected well before bagging the robot, and not pose additional risk during competition.

Expected Usage within the Team

Our robot design this year has placed a premium on the "vertical" space extending from our electrical board. As such, there isn't sufficient space to integrate these components at this time. If we had decided to use them earlier in our design process, the board could have been located differently and would have accommodated the space requirements for these products.

This document holds our initial impressions of the products, and will be updated in the future when we get more practical use out of them - likely in the 2019 off-season.

Feedback

This document was provided to Swyft a week prior to its public release. This gave them an opportunity to comment and address some of our thoughts. Where applicable, their response is

listed in red text. As noted inline, some of the changes were updates to the website - links throughout this document have been updated accordingly.

Electrical

A majority of the evaluation package was electrical in nature - breakout boards and wires, mostly.

Boards

The provided breakout boards are designed to add locking connectors for your control system wiring.

Common thoughts:

- The use of different connectors (JST-XH, JST-PH, JST-VH) can introduce compatibility problems. For example, the Advanced Talon Breakout Board uses JST-PH connectors for the CAN bus, while the PCM board uses JST-XH connectors for CAN. This makes wiring these components together much more difficult. The connectors should be standardized better across the product line. Using one type of connector for power, another for signal, and a third for CAN, for example. This would make interoperability simpler, reduce the product line, and make maintaining stock for teams easier.

Core Control System

NI roboRIO JST Board JCB-0001
https://swyftrobotics.com/product/ni-roborio-jst-board/
Thoughts:

- Secures in place with the mounting screws located near the ethernet and USB ports.
    - These screws are also used to secure many of the legal MXP expansion boards, which may pose a challenge integrating with some boards.
- Utilizes the JST-XH connector
- Leaves the CAN, power, NXT, Ethernet, and USB ports clear and unmodified
- Leaves the status LED's and User/Reset buttons clear
    - The status LED's have labeling on the board, as the RoboRIO labels are obscured
    - The User/Reset buttons have no labelling on the board, and the RoboRio labels are partially obscured, making identifying the correct button potentially difficult.
- The location of the connectors, particularly the relay/analog ports, may make larger MXP expansion boards impossible to use.

Room for improvement:

- Given the presence of wiring intended for the CAN bus that utilizes the JST connectors, it would be nice to see those integrated into the CAN port here as well
- In the interest of using the same connectors for everything, extending the JST connectors to the power port would be nice as well
- Extend the board to serve as a passthrough for the MXP port, allowing other expansion boards to sit higher, eliminating the potential size issues with the JST ports. This would require prior approval from FIRST to be compliant with R76 in the 2019 rules.
- Work with one or more of the existing MXP expansion board companies to release a joint board that integrates their offerings with this board.
- Look for opportunities for lower profile connections. If the connectors could be rotated 90 degrees to point out the side of the board, it could help relieve stress on the wiring, facilitate neater wire routing, and reduce the overall vertical space required.

PCM JST Board JCB-0002
https://swyftrobotics.com/product/pcm-jst-board/

Thoughts:
- Provides a solid connection to the PCM that will not come out unless the removal tool is used
- Uses the JST-XH connectors for signal-level wiring, and JST-VH connectors for power-level wiring, ensuring they won't get confused.
- Has view holes for the Comp and Status lights

Room for improvement:
- The view holes for the Comp and Status lights should be larger. They are not sufficient to view the lights from all angles as they are.
- Once the board is in place, there is no available access to the 12V/24V jumper. There should either be a sufficient access hole to allow this jumper to be changed, or the board should interface with those pins and place a jumper on the board itself.

PCM JST Removal Tool TOL-0001

https://swyftrobotics.com/product/pcm-jst-board-tool/

Thoughts:
- It works as advertised.

Room for improvement:
- ~~This is a simple device - provide the CAD for it on the website so teams can 3D print their own - it seems silly to require an additional $7.49 expenditure to remove the board easily.~~
    - A STEP file has been made available on their website.
- In order to work, all wires need to be removed from the board first. It would be better if a solution were available that allowed the wires to remain plugged in, for several reasons.

This could be accomplished by increasing the footprint of the board and moving the connectors outside of the removal cutouts, or by updating the removal tool to form a U shape so it could be placed around the connectors without removing the wires.
    - Quick swap of a bad PCM with a new one, without worrying about which port each wire needs to plug into
    - Extracting the board in order to change the 12V/24V jumper, given the current design of the board.
- The VRM uses the JST-VH for power input, and JST-VH for power output. Following the same convention here would help ensure the power input went to the correct location. However, it would also allow for the compressor output wires to be confused with the solenoid wires. Coming up with a consistent use of power input, power output, and signal level wire connectors across the product line would be useful, but would require 3 types of connectors over the current 2.

VRM JST Board JCB-0003
https://swyftrobotics.com/product/vrm-jst-board/

Thoughts:
- Provides a solid connection to the VRM that will not come out unless the removal tool is used
- Uses the JST-XH connectors for power output, and JST-VH connectors for power input, ensuring they won't get confused.
- Has view holes for the 12V and 5V status lights

Room for improvement:
- None Noted.

VRM JST Removal Tool TOL-0002

https://swyftrobotics.com/product/vrm-jst-board-tool/

Thoughts:
- It works as advertised.

Room for improvement:
- ~~This is a simple device - provide the CAD for it on the website so teams can 3D print their own - it seems silly to require an additional $7.49 expenditure to remove the board easily.~~
    - A STEP file has been made available on their website.
- In order to work, all wires need to be removed from the board first. It would be better if a solution were available that allowed the wires to remain plugged in, for several reasons. This could be accomplished by increasing the footprint of the board and moving the

connectors outside of the removal cutouts, or by updating the removal tool to form a U shape so it could be placed around the connectors without removing the wires.
    - Quick swap of a bad VRM with a new one, without worrying about which port each wire needs to plug into

Other

Advanced Talon Breakout Board JCB-0004

https://swyftrobotics.com/product/advanced-talon-breakout-board/

Thoughts:

- We are primarily using Spark Max's this year, due to adopting the NEO motor, which makes this board less of a priority for us currently.
- The board seems very complex

Room for improvement

- There is no useful labeling on the board itself. Having each port labeled for its purpose would make wiring significantly easier for teams.
- Consider the use cases for 90% of teams - do all these functions need to be present on a single board? Would reducing complexity of this board by separating it into multiple products intended for specific use cases make it easier on teams?
- Requiring user-terminated CAN wires from the talon in order to fully utilize the board introduces a significant source of potential problems. If not crimped properly, those wires could easily get pulled out, or given their close proximity to each other whiskers could short them out. Having students insert contacts these small into the housings is something we've attempted before and had significant issues with. Having the locking connectors to go between boards is great, but an alternative, more foolproof method should be explored for connecting the Talon CAN wires to the board.

Suggested Additional Products

These are our suggestions for additional products in this category.

RoboRio USB/Ethernet Board

Typical USB and Ethernet cables can stick up a significant distance from the RoboRio, often requiring 3"+ of vertical space from the surface the RoboRio is mounted on. This required space could be significantly reduced, and wire routing improved (relieving stress on the wires) by introducing a board that plugs into those slots and provides matching ports rotated 90 degrees to stick out the side of the RoboRio. We recommend this be implemented as a separate board from the existing RoboRio board, given the geometric complexities between these ports and the other ports on the RoboRio.

Additional Breakout Boards

Not every team uses Talons, and some of the other speed controllers have similar ports. Clarify if the existing breakout board can be used with those controllers, or make a board that can be.

PDP Boards

Consider adding two boards for the PDP - one for the Weidmuller connectors where the RoboRio/PCM/VRM plug in, and one for the CAN connectors, including the terminating resistor jumper. These would allow for easier use of locking connectors, and eliminate the risk of improperly terminated wires having “whiskers” at those connectors that short out components.

Wires

CAN

All of these wires are color coded green/yellow to help easily identify them as CAN wires.

2 Pin JST-PH to 2 Pin JST-PH, 2.5”, 6”, and 18” - WRE-0010, WRE-0011, WRE-0012

https://swyftrobotics.com/product/advanced-talon-breakout-board-wires/

Intended to act as CAN wires between adjacent Talons that utilize the Advanced Talon Breakout Board.

Thoughts:

- Having pre-made locking connectors for this use is ideal. Homemade solutions can often run into issues with bad crimps or solder joints, but this takes that out of the equation.
- Having these available in different lengths like this is very useful for planning and executing different layouts.

Room for improvement:

- ~~The way these wires are organized on the website makes it difficult to find what you need. In the default electrical view, they are not all listed next to each other, and unless you’re specifically looking for them it’s not clear you have these length options.~~
    - ~~We recommend taking a page from the AndyMark playbook - list these all as a single product page with a dropdown that lets you select the length you want.~~
    - This change was made on their website
- ~~The product naming, while technically accurate, could be improved to help indicate function and purpose and make it easier to find when you are looking for it. Instead of specifying the intended purposes in the description, include it in the product name - “Talon Breakout CAN wires”, for example. The technical description would then go into more detail, specifying the connector type on each end of the wire.~~
    - This change was made on their website

2 Pin JST-PH to Ferrule, 6” and 12” - WRE-0015, WRE-0017

https://swyftrobotics.com/product/advanced-talon-breakout-board-to-pdp-wires/

Intended to go between the Advanced Talon Breakout Board and the Weidmuller connectors for the CAN bus on the RoboRio or PDP.

Thoughts:

- Having pre-made locking connectors for this use is ideal. Homemade solutions can often run into issues with bad crimps or solder joints, but this takes that out of the equation.
- Having these available in different lengths like this is very useful for planning and executing different layouts.

Room for improvement:

- ~~The way these wires are organized on the website makes it difficult to find what you need. In the default electrical view, they are not all listed next to each other, and unless you’re specifically looking for them it’s not clear you have these length options.~~
    - ~~We recommend taking a page from the AndyMark playbook - list these all as a single product page with a dropdown that lets you select the length you want.~~
    - This change was made on their website
- ~~The product naming, while technically accurate, could be improved to help indicate function and purpose and make it easier to find when you are looking for it. Instead of specifying the intended purposes in the description, include it in the product name - “Talon Breakout to PDP/RoboRio CAN wires”, for example. The technical description would then go into more detail, specifying the connector type on each end of the wire.~~
    - This change was made on their website
- Implementing some of the suggested improvements and additional boards for the PDP and RoboRio would allow use of WRE-0010, WRE-0011 or WRE-0012 for this application, simplifying the product line and simplifying orders/stock teams need to have.

2 Pin JST-XH to Ferrule 6”, 12” - WRE-0016, WRE-0018

https://swyftrobotics.com/product/pcm-jst-board-to-pdp-wires/

Intended to go between the PCM board and the Weidmuller connectors for the CAN bus on the RoboRio or PDP.

Thoughts:

- Having pre-made locking connectors for this use is ideal. Homemade solutions can often run into issues with bad crimps or solder joints, but this takes that out of the equation.
- Having these available in different lengths like this is very useful for planning and executing different layouts.

Room for improvement:

- ~~The way these wires are organized on the website makes it difficult to find what you need. In the default electrical view, they are not all listed next to each other, and unless you're specifically looking for them it's not clear you have these length options.~~
    - ~~We recommend taking a page from the AndyMark playbook - list these all as a single product page with a dropdown that lets you select the length you want.~~
    - This change was made on their website
- ~~The product naming, while technically accurate, could be improved to help indicate function and purpose and make it easier to find when you are looking for it. Instead of specifying the intended purposes in the description, include it in the product name - "PCM Board to PDP/RoboRio CAN wires", for example. The technical description would then go into more detail, specifying the connector type on each end of the wire.~~
    - This change was made on their website
- Implementing some of the suggested improvements and additional boards for the PDP and RoboRio, along with standardizing the connector types, would allow use of WRE-0010, WRE-0011 or WRE-0012 for this application, simplifying the product line and simplifying orders/stock teams need to have.

2 Pin JST-XH to 2 Pin JST-PH 6", 18" - WRE-0013, WRE-0014

https://swyftrobotics.com/product/advanced-talon-breakout-board-to-pcm-jst-board/

Intended to go between the PCM board and the Advanced Talon Breakout board.

Thoughts:

- Having pre-made locking connectors for this use is ideal. Homemade solutions can often run into issues with bad crimps or solder joints, but this takes that out of the equation.
- Having these available in different lengths like this is very useful for planning and executing different layouts.

Room for improvement:

- These wires shouldn't be needed. The boards should use the same connector for CAN to make them interoperable. Additionally, requiring teams to purchase a 10-pack when they'll only need 1-2 per robot isn't helping anyone.
- ~~The way these wires are organized on the website makes it difficult to find what you need. In the default electrical view, they are not all listed next to each other, and unless you're specifically looking for them it's not clear you have these length options.~~
    - ~~We recommend taking a page from the AndyMark playbook - list these all as a single product page with a dropdown that lets you select the length you want.~~
    - This change was made on their website

- ~~The product naming, while technically accurate, could be improved to help indicate function and purpose and make it easier to find when you are looking for it. Instead of specifying the intended purposes in the description, include it in the product name - "PDP Board to Talon Breakout CAN wires", for example. The technical description would then go into more detail, specifying the connector type on each end of the wire.~~
    - This change was made on their website

Suggested Additional Products

Notable absent from this list is a JST-XH to JST-XH connector. Teams that utilize a significant amount of pneumatics may find a need for multiple PCM's on their robot. With the current offering, teams would need to terminate their own wires to connect these together, or go back and forth between PCM's and Talon's. Switching the PCM board to use JST-PH connectors for CAN would eliminate this issue entirely, while simplifying the product lines.

Power

All of these wires are color coded red/black to help identify them as power wires.

2 Pin JST-VH to Ferrule 6", 12" (20 AWG) - WRE-0008, WRE-0009

~~https://swyftrobotics.com/product/2-pin-jst-vh-to-ferrule-6-inches-5-pack/~~
~~https://swyftrobotics.com/product/2-pin-jst-vh-to-ferrule-12-inches-5-pack/~~

These are intended to go between the VRM and PCM boards and the Weidmuller connectors on the PDP.

Thoughts:

- Having pre-made locking connectors for this use is ideal. Homemade solutions can often run into issues with bad crimps or solder joints, but this takes that out of the equation.
- Having these available in different lengths like this is very useful for planning and executing different layouts.

Room for improvement:

- ~~Per the 2019 Robot Rules (R60), these need to be 18 gauge or larger, as the Weidmuller connectors are protected by 20A fuses. However, they are 20 gauge, making them illegal for use. The products should be updated immediately, and any teams that purchased them should be notified and offered replacements with appropriately gauged wire.~~
    - These products have been removed from their website due to the wire gauge issue noted above. That makes all of the other items listed here no longer applicable.

- ~~The description on the website states that these wires are intended to go between the VRM/PCM and either the PDP or the RoboRio. However, the only Weidmuller connectors on the RoboRio are for CAN. As both of these boards utilize the VH connector for power connections, hooking them up to the RoboRio would not work, and if done improperly could damage components. This description should be updated immediately.~~
- ~~The way these wires are organized on the website makes it difficult to find what you need. In the default electrical view, they are not all listed next to each other, and unless you're specifically looking for them it's not clear you have these length options.~~
    - ~~We recommend taking a page from the AndyMark playbook - list these all as a single product page with a dropdown that lets you select the length you want.~~
- ~~The product naming, while technically accurate, could be improved to help indicate function and purpose and make it easier to find when you are looking for it. Instead of specifying the intended purposes in the description, include it in the product name - "VRM/PCM Power wire", for example. The technical description would then go into more detail, specifying the connector type on each end of the wire.~~

2 Pin JST-VH to Wire 36" (16 AWG, 22 AWG) - WRE-0004, WRE-0001
https://swyftrobotics.com/product/2-pin-jst-vh-to-bare-wire-36-inches-5-pack/

These are intended to go between the VRM and PCM boards. The bare wire termination allows them to be used with the large WAGO connectors or terminated individually by teams.

Thoughts:
- Having pre-made locking connectors for this use is ideal. Homemade solutions can often run into issues with bad crimps or solder joints, but this takes that out of the equation.
- Having different wire gauges can potentially be useful, depending on the application

Room for improvement:
- ~~Given the similarities in these two products, they should be more clearly labeled for their intended purpose. The 16 AWG product can be used to supply power to the VRM or PCM from the WAGO connector on the PDP, but the 22 AWG product would only be applicable in that use case if a team utilized a 5A breaker, which most teams don't.~~
    - ~~The only reason to use the 22 gauge wire is weight - 3 feet of it (with 2 lengths) is 0.01 lbs. 16 gauge, on the other hand, is 0.05 lbs for the same length, according to an online reference chart. Instead of offering wires that would potentially be illegal, offer proper 18 gauge wires, per 2019 rule R60. If teams wish to use a 5A breaker and save 4/100 of a pound in their wires, they can terminate their own wires. Otherwise, you are inviting teams to make a mistake that will cost them time and effort at competition.~~

    - The 22 gauge wire has been removed from their website. This makes the following comment no longer applicable as well.
- ~~The way these wires are organized on the website makes it difficult to find what you need. In the default electrical view, they are not all listed next to each other, and unless you're specifically looking for them it's not clear you have these gauge options.~~
    - ~~We recommend taking a page from the AndyMark playbook - list these all as a single product page with a dropdown that lets you select the length you want.~~
    - ~~These could also be combined with their ferrule-terminated counterparts.~~
- ~~The product naming, while technically accurate, could be improved to help indicate function and purpose and make it easier to find when you are looking for it. Instead of specifying the intended purposes in the description, include it in the product name - "VRM/PCM Power wire", for example. The technical description would then go into more detail, specifying the connector type on each end of the wire.~~
    - This change was made on their website

Other

3/5 Pin JST-PH to Wire 36" - WRE-0005, WRE-0006
https://swyftrobotics.com/product/3-pin-jst-ph-to-bare-wire-36-inches-5-pack/
https://swyftrobotics.com/product/5-pin-jst-ph-to-bare-wire-36-inches-5-pack/

Intended for use between the Advanced Talon Breakout Board and sensors - particularly analog sensors and encoders.

Thoughts:

- Having pre-made locking connectors for this use is ideal. Homemade solutions can often run into issues with bad crimps or solder joints, but this takes that out of the equation.

Room for improvement:

- ~~The product naming, while technically accurate, could be improved to help indicate function and purpose and make it easier to find when you are looking for it. Instead of specifying the intended purposes in the description, include it in the product name - "Talon Breakout Analog Wire" or "Talon Breakout Encoder Wire", for example. The technical description would then go into more detail, specifying the connector type on each end of the wire.~~
    - This change was made on their website
- ~~Having a single page for all of the wires associated with a given board would be very useful for teams, and reduce the amount of effort needed to order all the parts needed to complete their electrical board.~~
    - There is now a link from the breakout board pages that shows all products associated with that board

3/4/10 Pin JST-XH to Wire 36” WRE-0002, WRE-0003, WRE-0007
https://swyftrobotics.com/product/3-pin-jst-xh-to-bare-wire-36-inches-5-pack/
https://swyftrobotics.com/product/4-pin-jst-xh-to-bare-wire-36-inches-5-pack/
https://swyftrobotics.com/product/10-pin-jst-xh-to-bare-wire-24-inches-5-pack/

Intended for use between the RoboRio board and various other components.

Thoughts:

- Having pre-made locking connectors for this use is ideal. Homemade solutions can often run into issues with bad crimps or solder joints, but this takes that out of the equation.

Room for improvement:

- ~~The product naming, while technically accurate, could be improved to help indicate function and purpose and make it easier to find when you are looking for it. Instead of specifying the intended purposes in the description, include it in the product name - “RoboRio SPI Wire”, “RoboRio I2C Wire” or “RoboRio PWM/DIO/Relay/Analog Wire” for example. The technical description would then go into more detail, specifying the connector type on each end of the wire.~~
    - This change was made on their website
- ~~Having a single page for all of the wires associated with a given board would be very useful for teams, and reduce the amount of effort needed to order all the parts needed to complete their electrical board.~~
    - There is now a link from the breakout board pages that shows all products associated with that board

Connectors

The following connector packs were provided. Swyft has additional connector packs for JST-PH and JST-VH connectors that were not provided for evaluation.

2P Female JST-XH - CON-0001
https://swyftrobotics.com/product/2p-female-jst-xh-25-pack/

Thoughts:

- Makes it possible for teams to make their own custom wires, which makes it a solid offering.

Room for improvement:

- One of the nice parts of the product line is the manufactured cables that are properly terminated. Small connectors like this can pose difficulty for people new to electronics, like many students.

    - They are working on a video to instruct people on proper crimping and usage of these terminals. As this video is not yet available to be evaluated, this comment is not crossed out at this time.
    - ~~Sell the appropriate crimping tool as well. Link to it from the product page, and include a detailed video showing the proper way to prepare these connectors and how to properly test that they were assembled correctly with no lingering issues.~~
        - There is now a link from the product pages to a recommend crimping tool on Amazon

3P Female JST-XH - CON-0002
https://swyftrobotics.com/product/3p-female-jst-xh-25-pack/

Thoughts:

- Makes it possible for teams to make their own custom wires, which makes it a solid offering.

Room for improvement:

- One of the nice parts of the product line is the manufactured cables that are properly terminated. Small connectors like this can pose difficulty for people new to electronics, like many students.
    - They are working on a video to instruct people on proper crimping and usage of these terminals. As this video is not yet available to be evaluated, this comment is not crossed out at this time.
    - ~~Sell the appropriate crimping tool as well. Link to it from the product page, and include a detailed video showing the proper way to prepare these connectors and how to properly test that they were assembled correctly with no lingering issues.~~
        - There is now a link from the product pages to a recommend crimping tool on Amazon

Stickers

These stickers are intended to aid in electrical board layout and provide templates for drilling holes for mounting.

120 Amp Breaker Sticker - TPS-0001
https://swyftrobotics.com/product/120-amp-breaker-template-sticker/

Thoughts:

- Accurate in size and hole locations. Sticks well to a variety of flat, smooth surfaces (Aluminum, Polycarb, ABS).

Room for improvement:

- Provide a PDF template that teams can print at home. It's not as good as a sticker, but can be useful for moving things around prior to having a finalized design. The sticker would then be used when you are ready to drill mounting holes.
    - Our thought behind the workflow of the template stickers was to
      Lay them out with the paper backing attached
      Once the layout is finalized peel the backing and place the sticker down
      Drill the holes in the sticker
      Leave the sticker in place for reference
      Attach electronics

Pneumatic Control Module Sticker - TPS-0002
https://swyftrobotics.com/product/pneumatic-control-module-template-sticker/

Thoughts:

- Accurate in size and hole locations. Sticks well to a variety of flat, smooth surfaces (Aluminum, Polycarb, ABS).

Room for improvement:

- Provide a PDF template that teams can print at home. It's not as good as a sticker, but can be useful for moving things around prior to having a finalized design. The sticker would then be used when you are ready to drill mounting holes.
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      Leave the sticker in place for reference
      Attach electronics

Power Distribution Panel Sticker - TPS-0003
https://swyftrobotics.com/product/power-distribution-panel-template-sticker/

Thoughts:

- Accurate in size and hole locations. Sticks well to a variety of flat, smooth surfaces (Aluminum, Polycarb, ABS).

Room for improvement:

- Provide a PDF template that teams can print at home. It's not as good as a sticker, but can be useful for moving things around prior to having a finalized design. The sticker would then be used when you are ready to drill mounting holes.
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      Lay them out with the paper backing attached
      Once the layout is finalized peel the backing and place the sticker down
      Drill the holes in the sticker

Leave the sticker in place for reference
Attach electronics

NI RoboRIO Sticker - TPS-0004
https://swyftrobotics.com/product/ni-roborio-template-sticker/

Thoughts:

- Accurate in size and hole locations. Sticks well to a variety of flat, smooth surfaces (Aluminum, Polycarb, ABS).

Room for improvement:

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      Leave the sticker in place for reference
      Attach electronics

Talon SRX Sticker - TPS-0006
https://swyftrobotics.com/product/talon-srx-template-sticker/

Thoughts:

- Accurate in size and hole locations. Sticks well to a variety of flat, smooth surfaces (Aluminum, Polycarb, ABS).

Room for improvement:

- Provide a PDF template that teams can print at home. It's not as good as a sticker, but can be useful for moving things around prior to having a finalized design. The sticker would then be used when you are ready to drill mounting holes.
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      Drill the holes in the sticker
      Leave the sticker in place for reference
      Attach electronics

Victor SPX Sticker - TPS-0010
https://swyftrobotics.com/product/victor-spx-motor-controller-template-sticker/

Thoughts:

- Accurate in size and hole locations. Sticks well to a variety of flat, smooth surfaces (Aluminum, Polycarb, ABS).

Room for improvement:

- Provide a PDF template that teams can print at home. It's not as good as a sticker, but can be useful for moving things around prior to having a finalized design. The sticker would then be used when you are ready to drill mounting holes.
    - Our thought behind the workflow of the template stickers was to
      Lay them out with the paper backing attached
      Once the layout is finalized peel the backing and place the sticker down
      Drill the holes in the sticker
      Leave the sticker in place for reference
      Attach electronics

Voltage Regulator Module Sticker - TPS-0011
https://swyftrobotics.com/product/voltage-regulator-module-template-sticker/

Thoughts:

- Accurate in size and hole locations. Sticks well to a variety of flat, smooth surfaces (Aluminum, Polycarb, ABS).

Room for improvement:

- Provide a PDF template that teams can print at home. It's not as good as a sticker, but can be useful for moving things around prior to having a finalized design. The sticker would then be used when you are ready to drill mounting holes.
    - Our thought behind the workflow of the template stickers was to
      Lay them out with the paper backing attached
      Once the layout is finalized peel the backing and place the sticker down
      Drill the holes in the sticker
      Leave the sticker in place for reference
      Attach electronics

Radio Template Sticker - TPS-0012
https://swyftrobotics.com/product/router-template-sticker-40-pack/

Thoughts:

- Accurate in size and hole locations. Sticks well to a variety of flat, smooth surfaces (Aluminum, Polycarb, ABS).

Room for improvement:

- With the possibility of FIRST introducing a new legal radio in any given year, this sticker pack would need to be able to be updated quickly in January.

    - ~~Improving the naming of the sticker pack would help eliminate confusion should the legal radio change. Include "OM5P-AN" in the product name and/or description.~~
    - This change was made on their website
- Provide a PDF template that teams can print at home. It's not as good as a sticker, but can be useful for moving things around prior to having a finalized design. The sticker would then be used when you are ready to drill mounting holes.
    - Our thought behind the workflow of the template stickers was to
      Lay them out with the paper backing attached
      Once the layout is finalized peel the backing and place the sticker down
      Drill the holes in the sticker
      Leave the sticker in place for reference
      Attach electronics

Mechanical

These products generally apply to the mechanical aspects of the robot.

Pneumatics

Straight, ¼" Tube, ⅛" NPT Male - PNF-0003
https://swyftrobotics.com/product/straight-1-4-tube-1-8-npt-male-5-pack/

Thoughts:

- This seems to be a standard push to connect fitting, there's nothing to distinguish it over other fittings.
- Appears to be the same quality as the other fittings we've used in the past.

Room for improvement:

-

Straight, 5/32" Tube, ⅛" NPT Male - PNF-0003
https://swyftrobotics.com/product/straight-5-32-tube-1-8-npt-male-5-pack/

Thoughts:

- This seems to be a standard push to connect fitting, there's nothing to distinguish it over other fittings.
- Appears to be the same quality as the other fittings we've used in the past.
- Our team has not used 5/32" tubing in the past, and has no other stock of fittings or tubing at that size.

Room for improvement:

-

Bearings

Flanged ½" Hex 1.125" OD Bearing - BRG-0001
https://swyftrobotics.com/product/flanged-1-2-hex-1-125-od-bearing/

Thoughts:

- Visually similar to offerings from AndyMark and Vex

Room for improvement:

- Noticeably more resistance than new AndyMark/Vex hex bearings. We would want to test running one of these bearings in to see if that goes away, stays the same, or gets worse.
    - The reason the bearings have noticeable more resistance is that we use more grease than our competitors, to increase the life of the bearing and prevent "clicking" or ceasing.

Shaft Collars

½" Hex Single Split Shaft Collar - SHC-0001
https://swyftrobotics.com/product/1-2-hex-single-split-shaft-collar/

Thoughts:

- Larger than the other shaft collars we typically use these days - similar to ones we used to use before the thinner variety became commonplace.
- Decent sized locking bolt, has a smaller chance of stripping out than the small 4-40 found on the smaller offerings that are typically used.

Room for improvement:

-

½" Hex Double Split Shaft Collar - SHC-0002
https://swyftrobotics.com/product/1-2-hex-double-split-shaft-collar/

Thoughts:

- Larger than the other shaft collars we typically use these days - similar to ones we used to use before the thinner variety became commonplace.
- Decent sized locking bolt, has a smaller chance of stripping out than the small 4-40 found on the smaller offerings that are typically used.

Room for improvement:

-

½” Round Single Split Shaft Collar - SHC-0003
https://swyftrobotics.com/product/1-2-round-single-split-shaft-collar/

Thoughts:
- Larger than the other shaft collars we typically use these days - similar to ones we used to use before the thinner variety became commonplace.
- Decent sized locking bolt, has a smaller chance of stripping out than the small 4-40 found on the smaller offerings that are typically used.

Room for improvement:
-

⅜” Round Single Split Shaft Collar - SHC-0004
https://swyftrobotics.com/product/3-8-round-single-split-shaft-collar/

Thoughts:
- Larger than the other shaft collars we typically use these days - similar to ones we used to use before the thinner variety became commonplace.
- Decent sized locking bolt, has a smaller chance of stripping out than the small 4-40 found on the smaller offerings that are typically used.

Room for improvement:
-

⅜” Hex Single Split Shaft Collar - SHC-0005
https://swyftrobotics.com/product/3-8-round-single-split-shaft-collar/

Thoughts:
- Larger than the other shaft collars we typically use these days - similar to ones we used to use before the thinner variety became commonplace.
- Decent sized locking bolt, has a smaller chance of stripping out than the small 4-40 found on the smaller offerings that are typically used.

Room for improvement:
-

Other
These products don’t fit into the above sections.

“S” Sticker - APP-0006
https://swyftrobotics.com/product/s-die-cut-logo-sticker/

This is a brand sticker highlighting Swyft Robotics. Useful for teams that may be sponsored by Swyft, or utilize a significant number of their products and want to highlight that fact.

Thoughts:

- Sticks well to a variety of flat, smooth surfaces (Aluminum, Polycarb, ABS).

Room for improvement:

- Provide this in a vector graphics format so teams can also incorporate it into their shirts or sponsor panels on their robot
    - This is now available on their website.

"Swyft" Sticker - APP-0007

https://swyftrobotics.com/product/swyft-die-cut-logo-sticker/

This is a brand sticker highlighting Swyft Robotics. Useful for teams that may be sponsored by Swyft, or utilize a significant number of their products and want to highlight that fact.

Thoughts:

- Sticks well to a variety of flat, smooth surfaces (Aluminum, Polycarb, ABS).

Room for improvement:

- Provide this in a vector graphics format so teams can also incorporate it into their shirts or sponsor panels on their robot
    - This is now available on their website.

SWYFT T-Shirt - N/A

https://swyftrobotics.com/product/swyft-t-shirt/

A simple T-shirt highlighting the Swyft brand

Thoughts:

- Appreciated by one of the mentors - the shirt provided was too large for most of the team.

Room for improvement:

-

Other Thoughts

- Make it simpler to find specific products on your website. For example, finding WRE-0010 currently requires you to know where it is and what the product name is, not just the SKU. Having URLs like "/product/WRE-0010" would simplify this, as would

being able to search by the SKU. Currently a search for “WRE-0010” turns up no results. Simply searching for “0010” returns sticker pack TPS-1001, as it references TPS-0010 in the description.
    - Search by SKU is currently functional for many products. However, those that were joined together onto common pages (where multiple lengths of the same wire is available) is not working at this time. Leaving this comment in place until all products are searchable by SKU.
- Focus on simplifying the product lines, making things more interoperable with fewer required variations.
- Ensure all products are rules compliant, and make it difficult for teams to assemble them in a way that would violate the rules.
    - Wires with the wrong gauge were removed, but leaving this in place as a note for future products