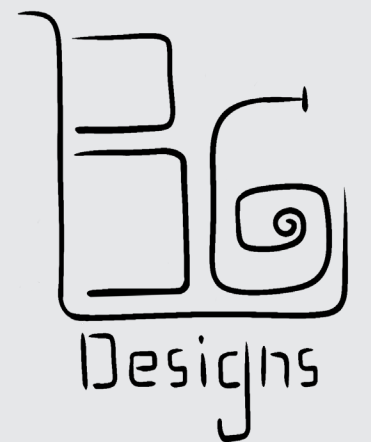
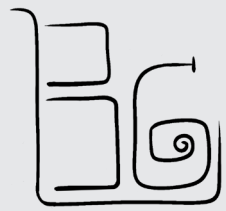


Project 2

Brendan Gill

2023





Bike Hand Guards

Current Use:

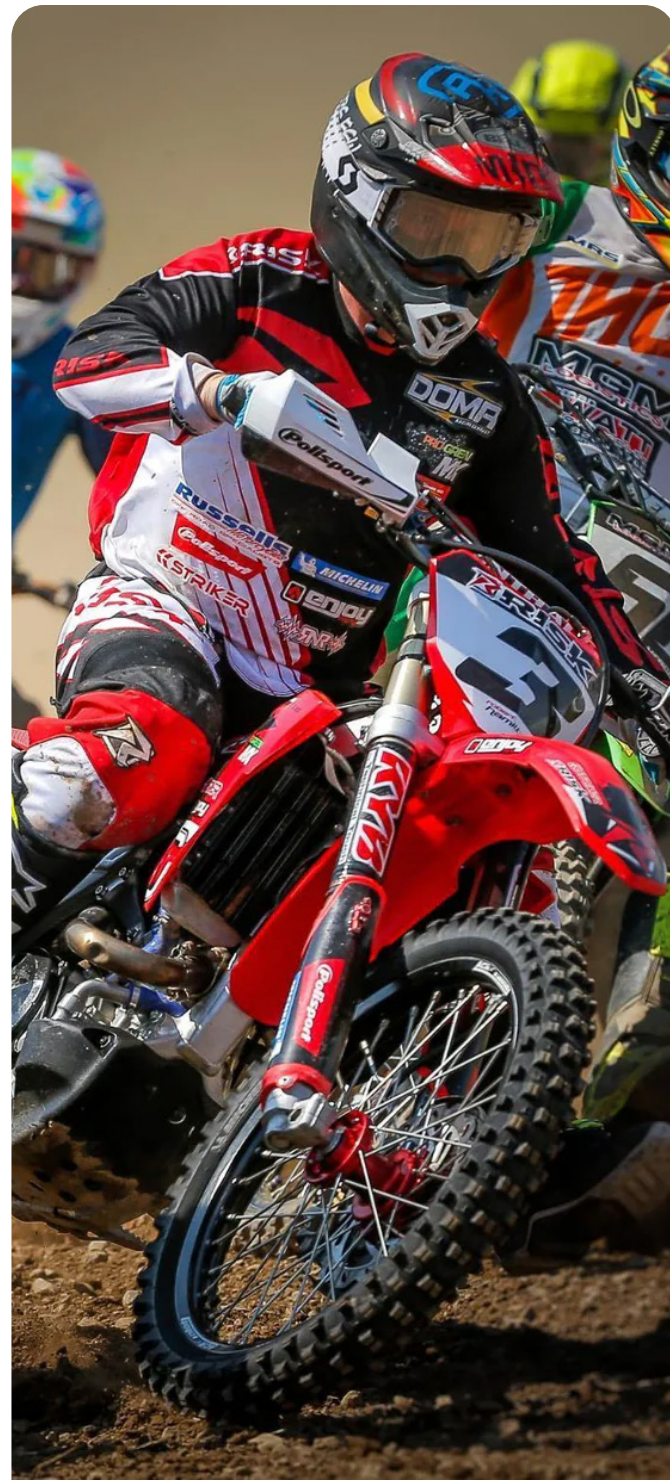
- **Protects** hands from impacts
- Protects cockpit controls
- Clunky, insulated mitts in some cases

Design Goals:

- Must satisfy current needs (hands and control impacts)
- Protect hands from **wind and cold**
- Integrate reflectors or LEDs for safety
- Retain **responsive tactile grip**
- Small mounting footprint



Motor Cross



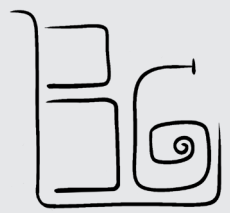
Guards are **tailored for their cycles** and interactions, featuring specific mounting and aesthetics

Mountain Biking



Motorcycles





Motocross

Hand guards originated in MX dirt biking

Protects from other bike impacts, hard landings, and **muddy controls**

Venting **allows airflow** through and less drag at low end speeds



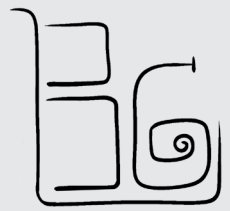
Styles:

MX open style



Full wrap





Mountain Biking

Tailored for high speed tree, branches, and other debris impacts on **downhill trails**

Psychological effect of being able to **commit harder** into tight turns knowing there is protection (DiGiulio)

Lower profile for **maneuverability** and control access



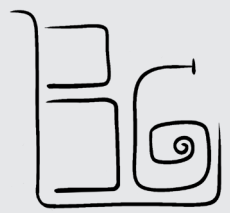
Features:

Foam Inserts



Cockpit Access





Motorcycles

Increased level of **aerodynamics** for use at higher speeds

Integrated turn signals, lights, and reflectors

Tailored for rare crashes like impacts with car mirrors, **not regular impacts**



Styles:

Lighting



Emphasis on Visibility





Homemade Guards

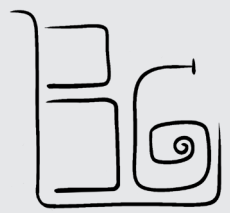
Uses readily available materials to create makeshift wind and cold protection



Less adaptability for different bikes but made specific for each person

Generally lightweight, but can be **flimsy** with rudimentary attachment points





Homemade Guards

- Full encompassing guards
- Accommodates **different grips and angles**
- Cold resistance



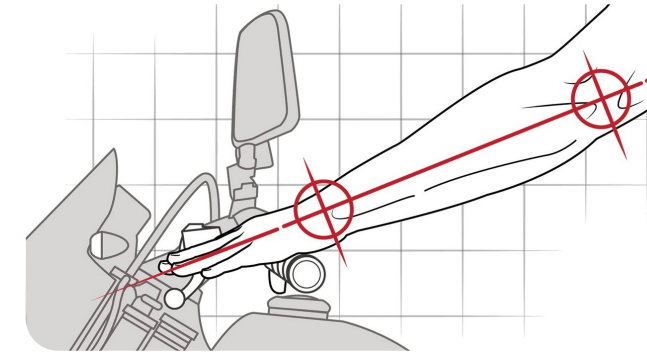


Human - Handlebar Interaction

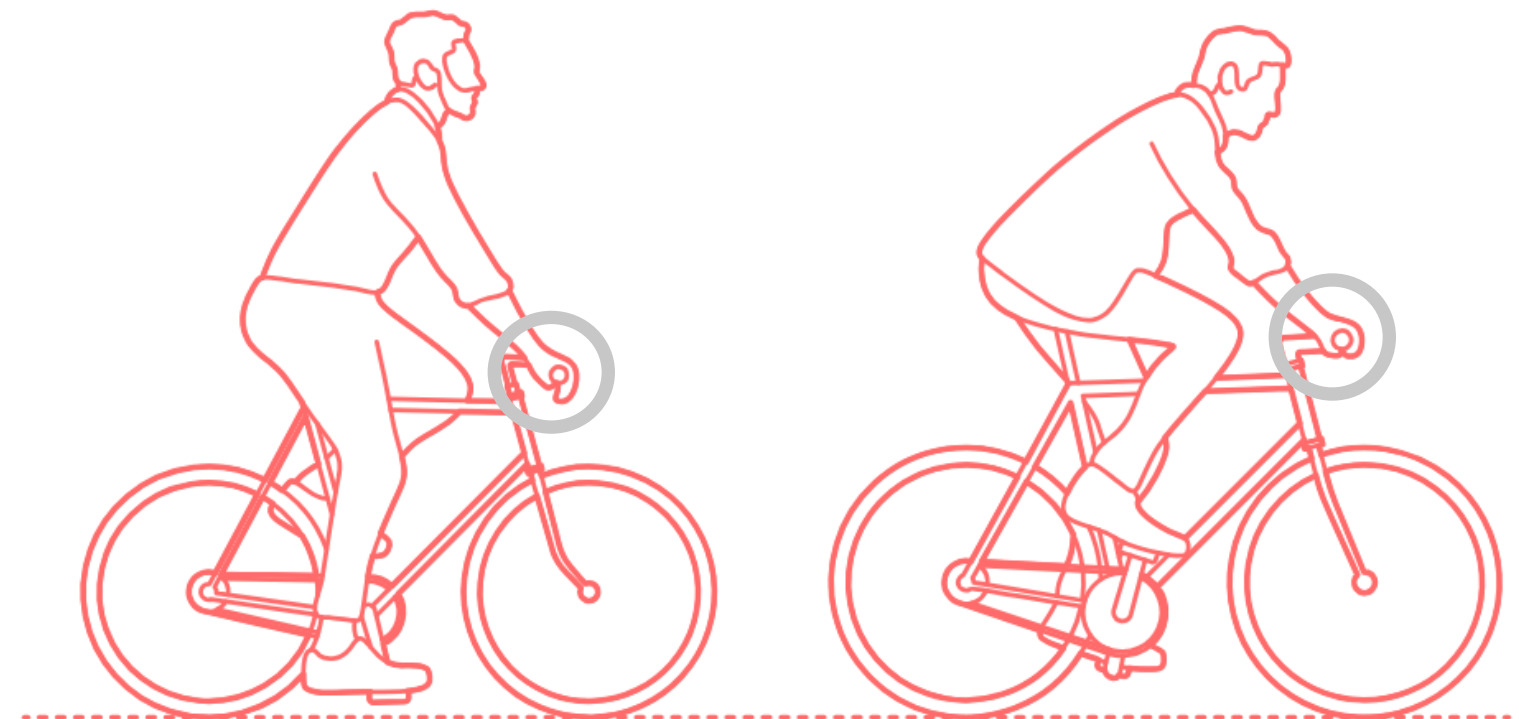
Wrist angles vary depending on bike, person, and adjustments

Going over rough terrain or entering the **climbing position** can also change wrist angles

Different bike styles facilitate different grips



Wrong wrist positions can cause long term damage and inefficient braking/shifting



Users grip handlebars differently

Human - Cockpit Interaction

Need clearance for shifting and braking

Need room for suspension lockouts

Newer bikes only need one or two fingers for hydraulic brakes while **older bikes require more force** to engage disc brake pads



Suspension Lockout



Current User

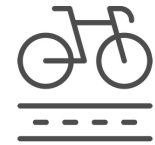
- **Professional** level users
- Large budget for quality
- Large **biking/motorcycle experience**
- Wants protection to commit more





Targeted User

- **Casual everyday riders** of all ages
- Commuters
- Nighttime Riders
- Lives in **cold and windy** environments
- Straight Handlebars
- Doesn't want bulky mitts





Mounts

High-Density Polyethylene

6061-T6 Aluminum



Shields

Cold Protection

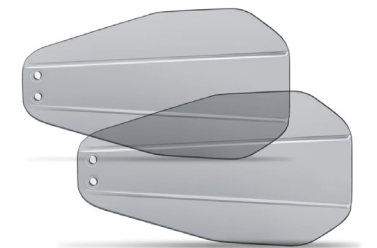
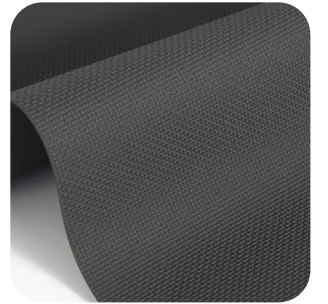
Neoprene with Styrene Butadiene Rubber Core (SBR)

3M THINSULATE thermal fleece

420D nylon thermoplastic

Polycarbonate

Polypropylene thermoplastic



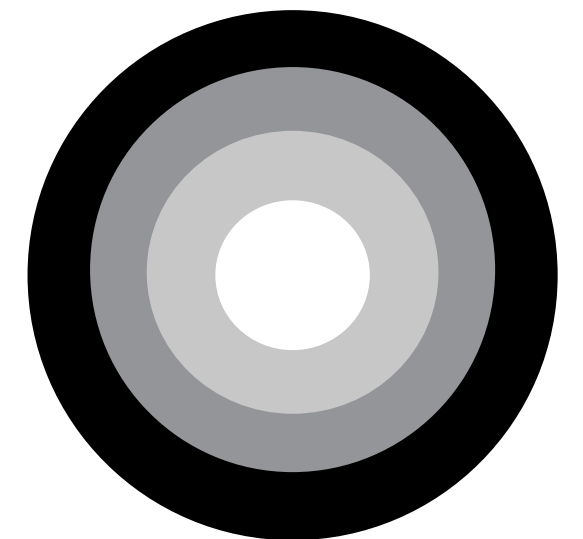
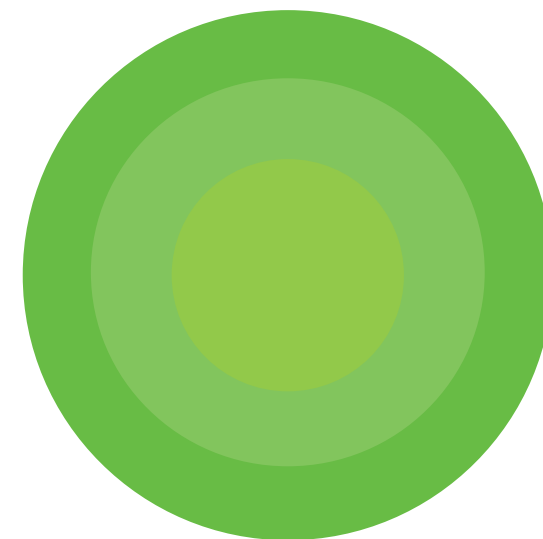
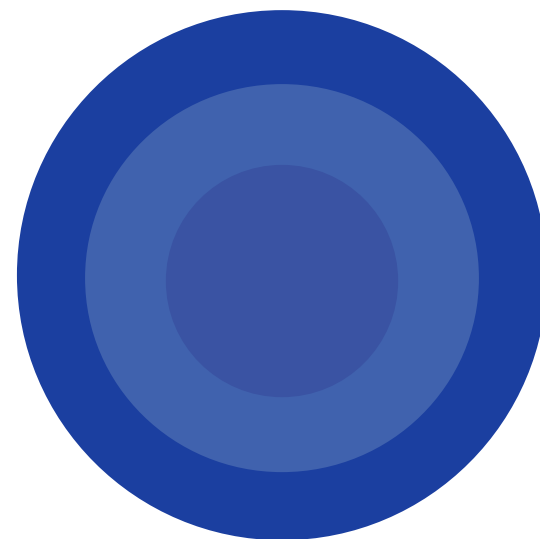
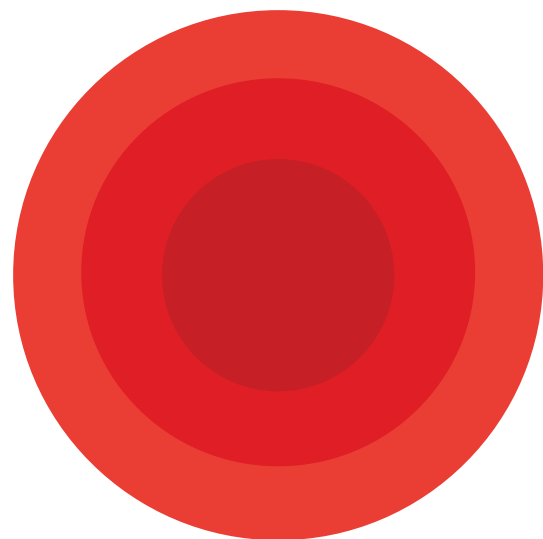


Colors

Bright, highly visible colors

Get peoples attention for **safety**

Sport inspired colors from Motocross and Mountain Biking events,
linked to advertising



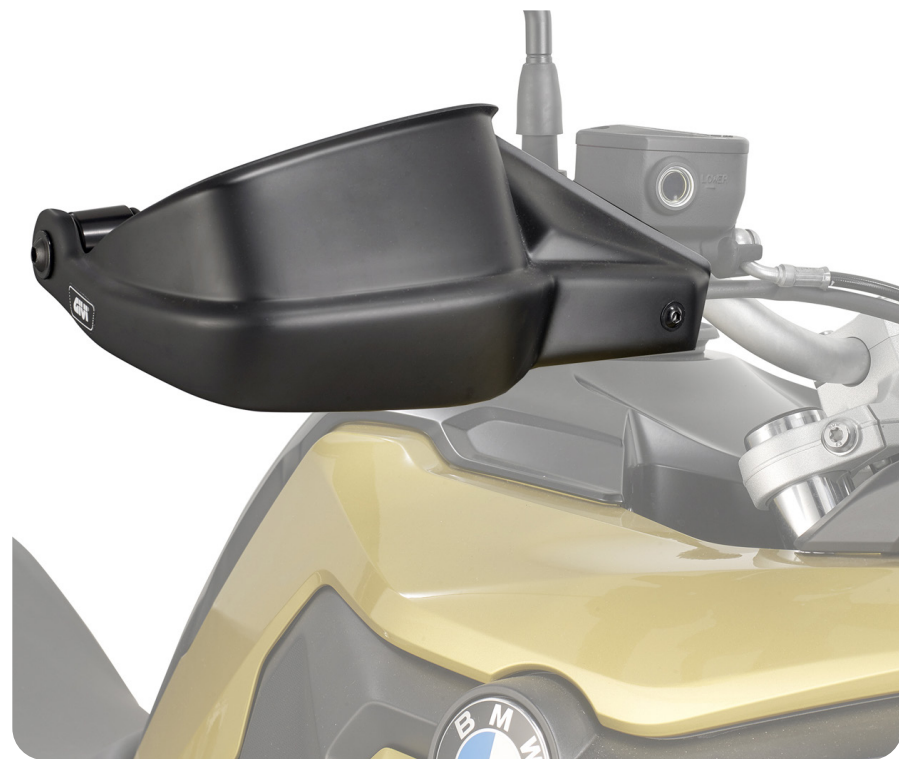


Form Trends

Mountain and Motocross - more angular and **greater surface area on ends**

Wing shaped (smaller at base then expands)

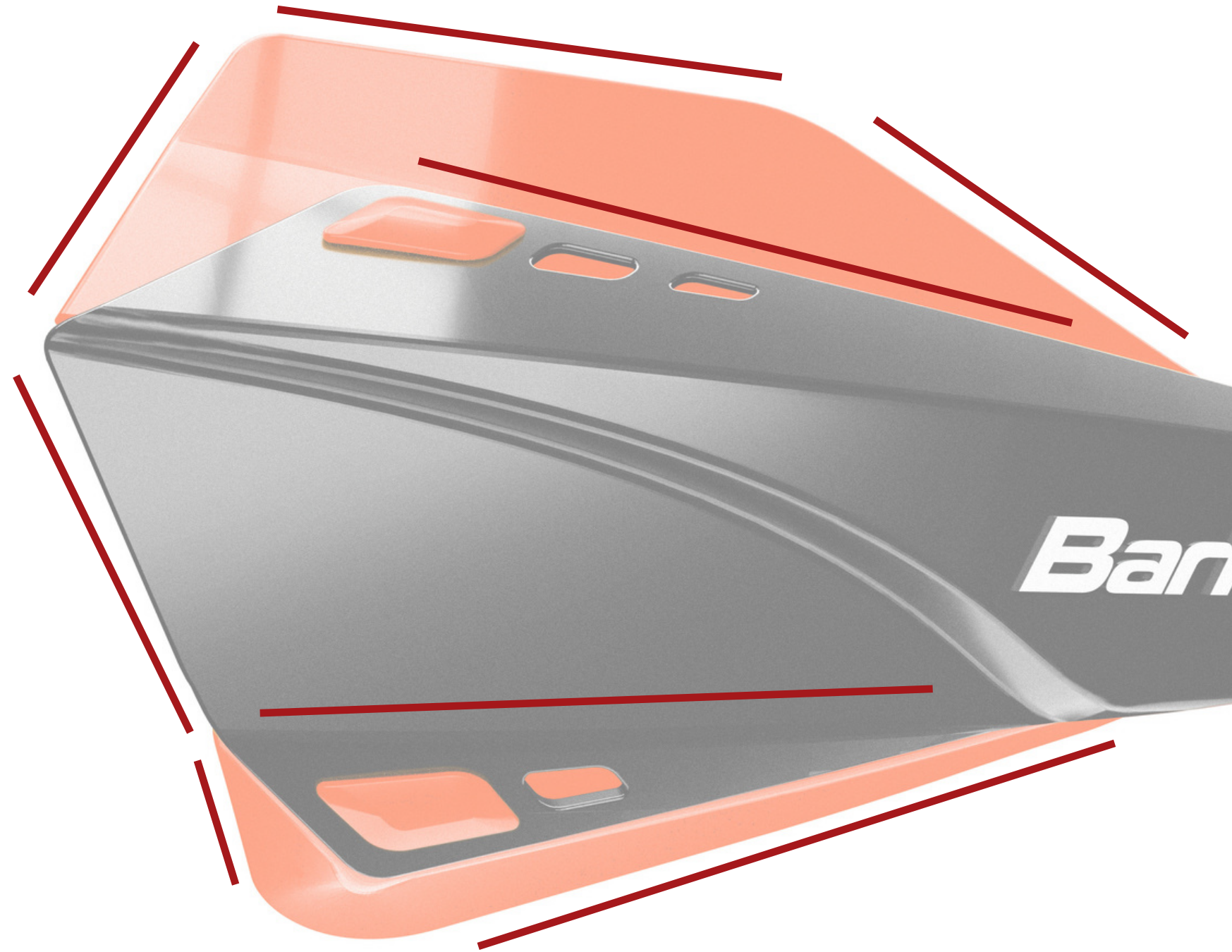
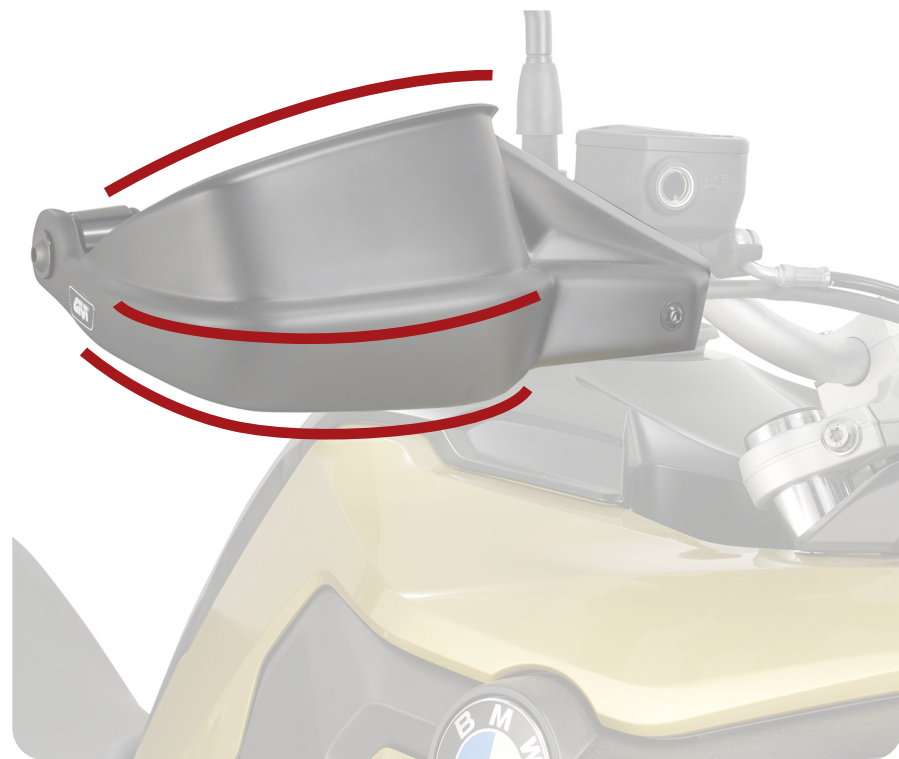
Removable vents





Form Trends

- Low speeds yield angular designs
- Highway speeds yield smoother aero





RockBros



BarkBusters



Acerbis



G2 Ergonomics



GEO



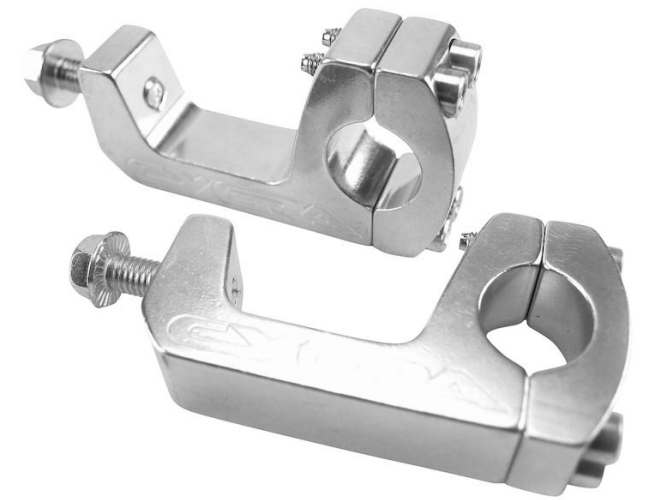


Handlebar Mounting

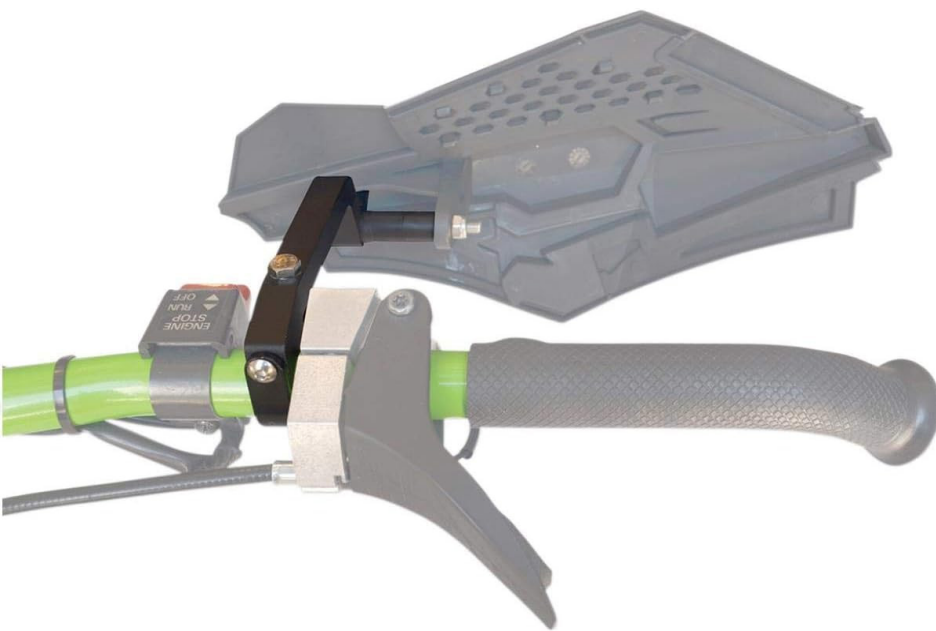
Mounts made of 6061 Aluminum or plastic polymer like polyethylene

Most rely on **screws and two piece clamps** or insets into the hollow handlebar ends

Handlebar Clamp



Over Controls



Under Controls



Full Wrap



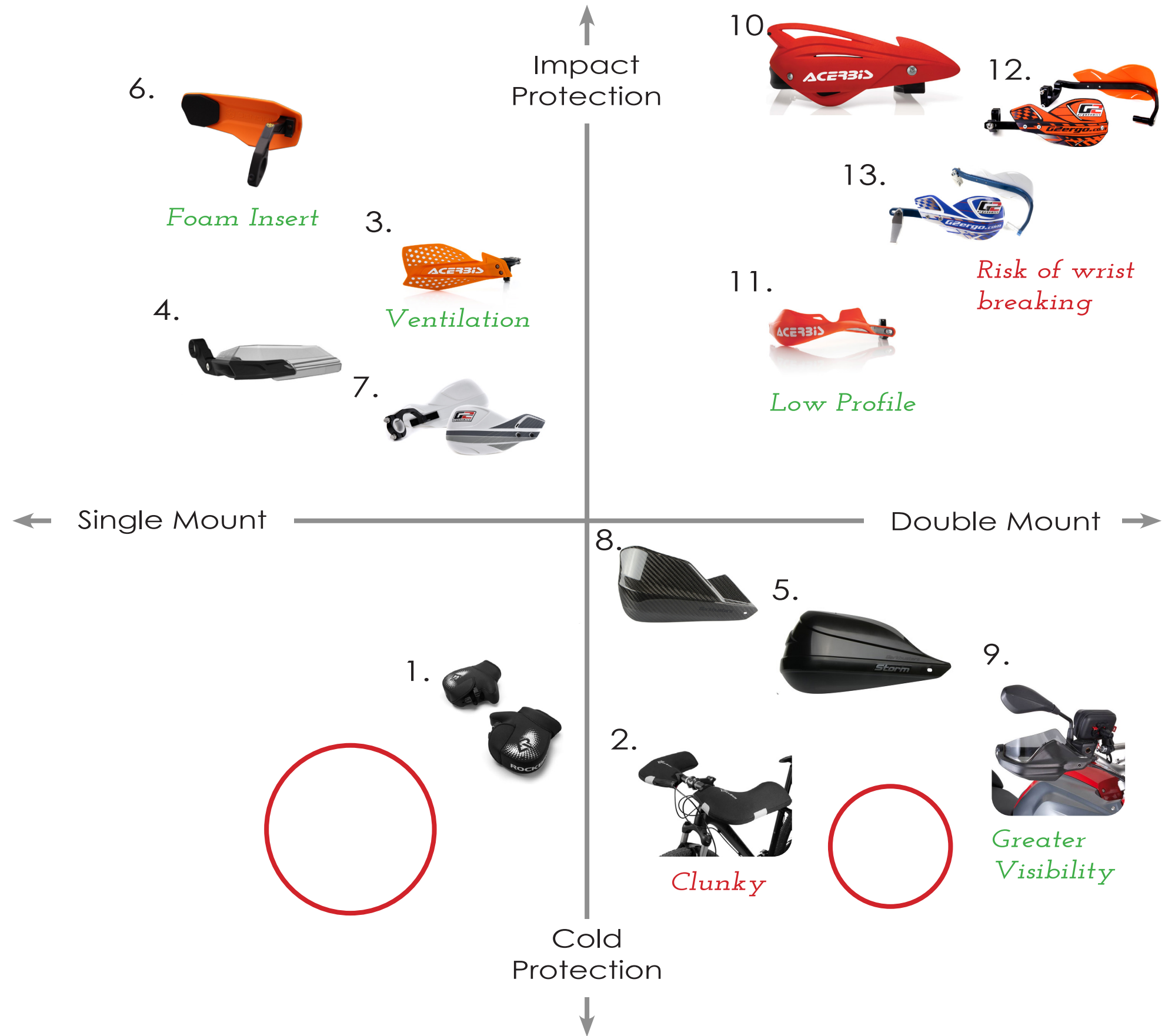


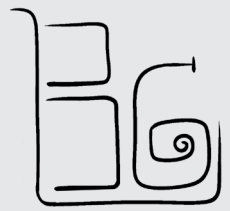
Opportunity Quadrant

Opportunity exists in **easily installed** guards that primarily protect from the **cold and wind** as well as **smaller impacts**

- 1. RockBros Round Mitt \$20
- 2. Rockbros Mitt \$23
- 3. Acerbis X-Ultimate \$40
- 4. BarkBuster Aero \$50
- 5. BarkBusters Storm \$55
- 6. Nock MTB \$68
- 7. G2 XC1 \$70
- 8. BarkBusters Carbon \$90
- 9. Givi BMW \$95
- 10. Acerbis Tri Fit \$100
- 11. Acerbis Rally Pro \$105
- 12. G2 Full Wrap \$115
- 13. G2 Fork Mounted \$120

↑
-
Cost
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+

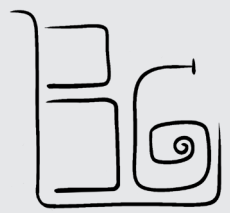




Create a **low profile** hand guard that protects primarily from the **wind and cold** for everyday bikers

Secondary needs include

- Protecting from **minor impacts** like bushes and branches **NOT** recurring tree impacts
- Increased safety considerations like risk of wrist getting caught and breaking during crashes
- LED and Reflector integration
- Strong connection to straight or semi-straight handlebars (mountain, hybrid, road, etc.)



DiGiulio, Dario. "Review: 3 Mountain Bike Handguards Ridden & Rated." Pinkbike, 18 Nov. 2022, www.pinkbike.com/news/review-3-handguards-ridden-and-rated-2022.html.

Mercer, L. (2022, April 2). Buyer's Guide to Mountain Bike Handguards. offroad.cc. <https://off.road.cc/content/buying/buyers-guide-to-mountain-bike-handguards-8525>

Alff, D. (2017, March 6). Why color is so important on a bicycle tour. Bicycle Touring Pro. <https://bicycletouringpro.com/why-color-is-so-important-on-a-bicycle-tour/#:~:text=These%20colors%20get%20drivers%20to,to%20help%20in%20these%20regards.>