Recommendations for Improving
ClipCase Product

RUSSELL PATTON

Engineering 102M
Technical Writing for Mechanical Engineers

EVELIN SULLIVAN/MARY McDEVITT
SCHOOL OF ENGINEERING
To: Karen L. Simmons  
Product Manager  
In-O-Vate Corp.

From: Russell Patton  
R&D Team Lead

Date: December 9, 2008

Subject: Recommendations for Improving ClipCase MP3 Player Holder

Purpose Statement:
Per company policy, our group conducted a six-month evaluation of our new ClipCase MP3 player holder. We examined its positive attributes and well-received features as well as areas where its design can be improved. The purpose of this report is to recommend changes that can be made to the case to improve its reception by the market while making it more profitable for our company.

Summary:
We found two main strengths that must be retained in the second version of the ClipCase.

1. The durability of the product must be maintained. Consumers have come to associate the ClipCase with robust construction, and this is an impression we want our future products to leave.

2. The clip mechanism of the case is convenient for consumers and has withstood extensive testing. Consumers also appreciate the aesthetics of the bicycle mount, and we see no reason to change its design.

Three main issues must be addressed:

1. The weight of the player must be reduced in order to make it more consumer-friendly. This must not be done at the expense of robustness.

2. Access should be improved so that the case can easily be opened to dock the player or to clean out dust.

3. A solution must be found to the friction issues, which we feel will start to appear in warranty claims.

To deal with these issues, we recommend a two-phase solution. The ClipCase should immediately be modified to include a low-friction coating to ensure smooth use, and subsequently a new main case section featuring a hinged plastic design should be developed.
1. Strengths of Current ClipCase
Feedback from our internal testing, market research, and consumer feedback illustrated the strengths and value offered by version 1 of the ClipCase. The observed strengths were the durability of the design, the ease of clipping and removing it from a bicycle, and its easy integration with users’ bicycles.

1.1 ClipCase Provides Excellent Durability
Durability was one of the major areas that we hoped to address with the ClipCase, and our company’s strong focus on this area is illustrated clearly by both our internal testing as well as user feedback. Since shipping the ClipCase, our quality assurance (QA) department has continued to conduct rigorous testing to ensure that the product will provide years of worry-free use. This testing produced several promising results about the ClipCase’s long-term strength.

1. The most rigorous test carried out by our QA department was the repeated drop test. In this test, the product was dropped repeatedly onto a number of different surfaces to see how it would stand up to the most extreme bumps we expected it to see during use. During testing on grass, carpet, wood, rock, and cement, the case suffered no denting, which was the result we had expected. It was undamaged from falls onto carpet, grass, and wood, while suffering minor cosmetic scratching when dropped onto rock and cement. The most vulnerable part of the case in this test proved to be the plastic cover, which suffered slightly more scratching than the aluminum backing.

2. Our internal testing also included a “simulated backpack test,” which was designed to see how our product stood up to scratching and contact with various sharp objects. To perform this test, The ClipCase was placed into a container with various sharp objects, and shaken vigorously. This test produced similar results to those from the drop test. The aluminum backing of the case again suffered no damage except for various superficial scratches. In this test, however, the plastic cover suffered mild-to-moderate damage. The ClipCase sustained several scratches of medium depth during the test, but protected the enclosed player from damage.

In addition to our internal testing, we found that consumers felt the ClipCase provided excellent durability. Our marketing team conducted a survey of owners of the ClipCase and reported that on a scale of 1 to 5, consumers gave the ClipCase an average of 4.76 when asked to rank “The Strength and Durability of the ClipCase.” There were also many comments from users saying that they appreciated the crush-resistance offered by the ClipCase when compared to many other products, especially ones made of silicone or other types of rubber. Based on the results of our internal testing and consumer feedback, we believe it is necessary that all future versions of the ClipCase provide the market-leading durability that consumers have come to expect from the product.

1.2 Strong Functionality of Bike Attachment
The ClipCase’s method of attachment to users’ bicycles is a feature we also believe is necessary to keep. This feature was one of the most rigorously tested prior to shipment, and we have continued to watch its performance now that the product is in the market. Continued testing has shown that the spring-loaded mechanism that holds the case in place can withstand more cycles than the case is likely to see in its lifetime, so we feel no additional strength is needed in this mechanism. This result is corroborated by our warranty information. Of the warranty claims that have been made on the product, less than one percent have been for failure of this mechanism. We therefore recommend that this mechanism undergo minimal changes so as to not take any steps that could jeopardize its excellent performance.

1.3 Bicycle Integration
Another feature that consumers appreciate about the ClipCase is the way that it integrates with the user’s bicycle while still maintaining pleasing aesthetics. We found that there are several reasons consumers appreciate the fact that the case mounts directly in the center of the handlebars. First, the central mounting position maintains a balanced appearance of the bicycle in the way that an asymmetrical location would not. Users also report that they feel safer when they can look down while still maintaining a forward view than when they need to look sideways to see their media player.

2. Deficiencies of Current Design
In contrast to its successes, there were a number of deficiencies that we discovered with the ClipCase. Of these issues, there were three areas that we most commonly noted in our own testing as well as in consumer feedback and warranty information. In order of severity these were weight, frictional sticking, and player access.

2.1 Weight Issues
When developing the product, we believed that consumers would be willing to accept a heavier product for enhanced durability. What we have observed, however, is that the process was taken too far. As noted earlier, our internal testing has demonstrated the ClipCase to be extremely resilient to nearly all types of damage that it could be expected to see during use. What has become apparent, however, is that the case is overdesigned for the purpose it serves. When consumers were surveyed about which attributes of the case they liked the least, nearly three quarters of them said that it was too heavy and bulky and that they would like a lower-profile option instead. Despite this, nearly 85 percent of the people with this complaint said that on the whole they were satisfied with the case. Taking this into consideration, we feel that sales can be greatly expanded if the ClipCase can be redesigned to have a lower weight while retaining top-of-the-market durability. After consulting with our in-house testing department, we feel there are two ways that this can best be accomplished.

1. A possible way to decrease the bulk and weight of the ClipCase is to employ a similar design while making certain dimensions smaller. We feel that approximately 1/32\textsuperscript{nd} to 1/16\textsuperscript{th} of an inch can be removed from the side and back of the main section of the case (Appendix Figure 1) without sacrificing much of the durability it offers. This change alone could serve to reduce the weight of the case by approximately 30%.
2. We can also reduce the weight of the ClipCase by changing the material from which it is made. After observing the success of the polycarbonate cover during durability testing, we feel that it would be a suitable material for the construction of the main section of the case. By switching to polycarbonate, which is less than half as dense as aluminum, we can reduce the weight of the case by 50% without changing its dimensions.

Because of the margin of safety our testing has illustrated is built into the product, our testing department is confident that either of these methods will produce a sufficiently durable product.

2.2 Friction Issues
During our in house testing, an issue with friction arose as an unexpected consequence of both the drop test as well as the backpack test. As these tests were conducted, various scratches were formed on the back of the case. The problem arose during clip-on testing of a scratched case. These scratches that were formed on the material were found to cause excessive friction with the bicycle mount section of the ClipCase, causing scratches on it also. The problem was self-perpetuating, and eventually it became difficult to clip and remove the case. Despite this, the issue has not yet been noted in warranty claims. We think that this is because the severity of our in-house testing brought the issue to light sooner than it will manifest itself during normal use. We believe this issue can be dealt with simply by applying a low-friction coating to either the case itself, or, more preferably, to the bike mount. By doing this, we can avoid further problems with friction. This process would be easy for us to integrate with our current manufacturing line and could be enacted almost immediately.

2.3 Player Access Issues
During the initial design of the ClipCase, we decided that a screw-on front cover would be the best choice due to its durability and mechanical simplicity. With this design, our team overlooked several factors that have been brought to our attention by consumer feedback and market research. One issue is the frequency with which consumers use their media players in docking stations. When we designed the case to offer access to all of the important functions of the player, the ability to plug in a sync cable was provided but the ability to dock the player in the case was not. Our marketing team noted that even within the last year, sales of media player docks have grown tremendously. We have decided that version 2 of the ClipCase should include the ability to easily remove the media player either through a snap-on front cover or a hinged assembly. The second issue that was brought to our attention was the fact that with the current design, it is time consuming to clean out dust which gets under the screen. The previous solutions would also address this issue.

3. Proposed Two-Phase Solution
To improve the market position of the ClipCase, we suggest that our company take a two-stage approach to addressing the issues with our current product. We believe that immediate action
is needed to avoid unnecessary warranty claims, but also believe that long-term action on a
version 2 design will strengthen the product.

3.1 Solve Friction Issue
In the short term, we should address the friction issue. While the other areas for improvement
that we found can lead to improved sales, not solving this issue immediately will expose the
company to future warranty claims and monetary loss. We suggest that our factory
immediately be equipped to apply an anti-friction coating, possibly Teflon, to the bike-mounted
section of the case (Figure 2.) Our preliminary testing indicates that this will satisfactorily
resolve the issue.

3.2 Version Two Case Design
Following this manufacturing change, we should begin the steps to bring version 2 of the case
to market. Taking into account all of the concerns we hope to address, we believe that the
second version of the main case piece should be manufactured from polycarbonate. It should
be constructed of a front and back section that hinge with each other in order to provide
improved access (Figure 3.) The switch to polycarbonate will also address the other two main
problems we identified. The weight of the case will be reduced, and, along with the new
coating, polycarbonate construction will help reduce friction. While making these changes, the
company should retain the existing design for the case’s bike attachment mechanism in order
to preserve its positive qualities. By manufacturing the case out of polycarbonate, we will be
able to use lower cost injection molding compared to our current aluminum milling process.
Injection molding will also lead to less wasted material, and give us to opportunity to generate
more profit while providing our consumer with additional value.

Conclusion
Based on our review of testing, warranty, and consumer data for the ClipCase, we successfully
identified areas where the product excelled and areas where it could be improved. We decided
which of these issues should be addressed, and have proposed a two-stage plan for doing so.
We proposed a manufacturing process change for our current process, as well as a design for a
new polycarbonate case. We hope that management will act immediately on our suggested
manufacturing change and will approve further development of version 2 of the ClipCase. We
look forward to developing a new product that will provide our consumers with more value
while increasing company profit by lowering manufacturing costs and reducing warranty claims.