Damage Proof iPhone Case With Integrated Storage

Abstract
Water, dust, and impact. These are the three main killers of smart phones today. Oftentimes it is essential to carry an ID and some form of payment, as well as a phone, and there is currently no efficient way to protect the phone while carrying the above items. The purpose for the design was to blend the best of what is currently on the market for iPhone cases into a single product that would be beneficial to anyone.

Design Requirements

<table>
<thead>
<tr>
<th>Feature</th>
<th>Requirement</th>
<th>Compliance</th>
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</thead>
<tbody>
<tr>
<td>Waterproof</td>
<td>IP-68</td>
<td>Seals/gaskets</td>
</tr>
<tr>
<td>Shockproof</td>
<td>MIL STD 810F-516</td>
<td>Polycarbonate shell/inner elastomeric layer</td>
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<tr>
<td>Dustproof</td>
<td>IP-68</td>
<td>Seals/gaskets</td>
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<tr>
<td>Storage</td>
<td>Min. 3 cards</td>
<td>90.0x57.1x2.4 mm</td>
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Design Objectives
- Protect phone and stored items from the elements, shock, and scratch damage.
- Allow the user to carry ID and payment cards in a compact design.

Design Development
In order for production using the rapid prototype machine, modifications needed to be made to the original design. Some of the intricate geometries associated with the hinged door had to be simplified. Contrary to initial thought, market research concluded that the card storage compartment should open such that cards would be removed with the right hand, while holding the device with the left. Hence, the door is hinged as shown in figures 3 and 5.

Results
The locking mechanism for the storage door is a simple clipping mechanism. For production, the door would have seals at the edges in order to keep the compartment waterproof.

A simulated drop test conducted in SolidWorks showed high stress concentrations at the two hinge locations.

Conclusions
The model created is simply a proof of concept and demonstrates a simplified version of the sought after design. Further iterations of the design are needed before the product could be taken to market. This would include research into the optimal materials, waterproof testing of the case, strengthening of the support for the hinges, and improving the locking mechanism for the storage hinge. However, due to the tight time constraints placed on the project, the prototype shown represents a strong preliminary design.

Acknowledgments
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References
IP-68: International standard for dust and water protection
MIL STD 810F-516: U.S. Military standard for functional drop of an electronic device