Executive Summary: Tong BME Design Award, BME 301

Dental Handpiece Scope

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Crown and bridge replacements are a common procedure performed by dentists in the U.S. Currently, when working on hard to reach teeth, such as the back molars, dentists have to rely on handheld mirrors and their intuition in order to perform the procedure. There are a few designs at this point in time that seek to solve this problem. However, all of these designs focus on designing a drill handpiece that has this optical capability integrated into the handpiece itself. Our team has designed an apparatus that can be easily attached and detached from the drill. The design consists of a mounting mechanism that holds the camera on the drill head with its field of view centered on the end of the drill bit as well as a user interface that displays live video feed from the camera that can be altered with a variety of digital filters. The novelty of this design stems from its modularity in that the camera may be moved to view the operation site from numerous angles and is made to be attached to an existing drill, reducing the product cost and the time needed to acclimate to using a new drill. The target demographic for this product is dentists who perform restorative dentistry procedures. To validate our design, we had our client, a dentist in Madison, conduct procedural simulations on willing volunteers to evaluate its performance in situ. Categories evaluated included visibility of the operation site, interference of the additional wiring with procedure execution, and user interface accessibility. The design addresses the need for increased visibility of inaccessible areas of the mouth by providing a live video feed of said sites and addresses the issues of cost and ease of acclimation through the design modularity. If commercialized, the product will allow more accurate and efficient execution of restorative dentistry procedures and expand the functionality of a fundamental tool of the dentistry trade, with a total cost of $150.