

GOLF CLUB CLEANER DESIGN

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Introduction

Tiffany Terrier was a 4th year mechanical engineering student and varsity athlete at the University of Waterloo (Waterloo). On May 5th, 2010, she met with Oscar Nespoli and Professor John McPhee to propose a project idea for her final design project course. Tiffany noticed that golf courses around the world have golf ball cleaners located on many of their tee boxes; however, golf club cleaners are rarely ever found. Her golf competition experience revealed a need for an effective on-course golf club cleaner that was as easy to use as existing golf ball cleaners (Figure 1). Tiffany concluded that the available market within the United States for golf club cleaners is approximately 95,000 cleaners [1]. She noticed that currently available cleaners were ineffective or very expensive. She was interested in designing an on-course golf club cleaner that was effective and affordable. These club cleaners are to be placed alongside existing ball cleaners.



Figure 1: Typical Golf Ball Cleaner

Tiffany Terrier, Dillon Baratta, Oscar Nespoli and John McPhee prepared this design case for classroom use. The authors do not intend to illustrate either effective or ineffective handling of an engineering situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

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Available Club Cleaners

The club cleaners currently available are either ineffective or too expensive to be used throughout the majority of golf courses. The simplest and least expensive club cleaning method can be achieved using a toothbrush and a bucket of soap. This option may be inexpensive and reasonably effective, however, the amount of time and level of maintenance required if it were to be placed along a course make this option not practical for use. Several designs exist that require the user to force the club between bristles and rub the club face on the bristles until clean. This option is inexpensive, however, it is not effective as it is difficult to properly clean the club with this method and can become time consuming to achieve an acceptable level of cleanliness. A similar but more expensive and improved method incorporates a spring to assist in pressing the club face against the bristles. The additional costs of this method reflect improved effectiveness, however, not enough to make this option an appropriate solution. The highest end club cleaners use ultrasonic technology to clean the club and are highly effective and very expensive. The high cost of these cleaners renders them inappropriate for use along a golf course. The following are club cleaning solutions that are available on the market today:

Table 1: Available Club Cleaners

 <p style="text-align: center;">golf.about.com</p>	<p>This first solution is the cheapest alternative because all of its contents can be found around the home. It simply consists of a bucket of soapy water and a toothbrush. The user dips or soaks the club faces in the soapy water and then scrubs the club face with the toothbrush.</p>
 <p style="text-align: center;">brookstone.com</p>	<p>The second solution is called the “Club Tub” and it costs approximately \$40 [2]. This device has two linear brushes and is enclosed by a tub of soapy water. The user holds the device in place with one foot as seen in the picture and then pushes the club face in and out of the space between the bristles until the club face is clean.</p>

 <p>mygolfproshop.com</p>	<p>The third solution is a combined club and ball cleaner that attaches to a golf cart. It has an approximate cost of \$50 [3]. The club cleaner portion of this unit uses the same concept as the “Club Tub” with two linear brushes. However, It exists on a smaller scale.</p>
 <p>kirbybuilt.com</p>	<p>The fourth solution is the elegant club cleaning solution for golf courses. This cleaner is using the two linear brushes like the “Club Tub” but has added a springing mechanism to produce a constant force on the club during cleaning. This club cleaner costs approximately \$225 [4].</p>
 <p>maveneat.com</p>	<p>The final solution is the most extravagant. It costs at least \$8000 [5]. It uses ultrasonic technology to clean the club face and grip. There are different settings for different clubs and materials.</p>



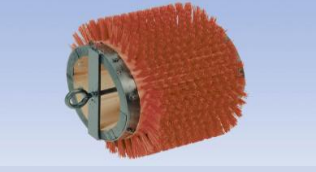
Problem Statement

The goal of Tiffany’s design project was to design a golf club cleaner that could be used at golf courses across the world. Several constraints had to be identified to ensure the club cleaner was properly designed. In order to ensure the club face is properly cleaned it is required that water is used to loosen the bonds between the dirt particles and the club face. Tiffany identified the amount of time the cleaning process should take to be less than 5 seconds, based upon the time it takes to use a ball washer. It is also necessary that all mud and dirt is removed from the club face without any damage being done to any part of the club. In order to take full advantage of the market it is required that the club cleaner accommodates left and right hand golf clubs.

Exhibit A is a video interview by Dillon Baratta from Waterloo Cases in Design Engineering with Tiffany Terrier and Chris Miranda, manager of Cambridge Golf Club.

Tiffany was able to identify the three most appropriate designs for the cleaning mechanism, being rectangular, cylindrical, and circular brushes as shown in Table 2. The two options for loading the club into the mechanism are from the top or the side and it was necessary to determine the most appropriate option. In order to decide upon a design, Tiffany was required to devise a set of criteria to determine the most appropriate option. This set of criteria was then used to analyze existing methods as well as any new designs she considered.

Table 2: Preliminary Design Parameters

Brush Motion	Brush Shape		Approx. Cost
Horizontal (against the grooves)	Circular		\$60
Vertical (with the grooves)	Rectangular		\$10
Circular (partially with and against the grooves)	Cylindrical		\$300

Based on the criteria and constraints, Tiffany must now prepare a final design for the golf club cleaner.

Reference

1. “Golf Courses in the United States”, <http://www.thegolfcourses.net/>
2. “Clubtub”, www.brookstone.com/sl/reviews/index4.html
3. “My Golf Pro Shop Accessories” www.mygolfproshop.com/golf-accessories_club_c...
4. “Club Washer” , <http://www.kirbybuilt.com/products/Golf-Tee-Area/Round-Club-Washer.cfm>
5. “Ultrasonic Golf Club Cleaner” <http://www.nextag.com/ultrasonic-golf-club-cleaner/shop-html>
6. Terrier, Tiffany, “Golf Club Cleaner”, ME 481 Final Report, Department of Mechanical Engineering, University of Waterloo, Waterloo, ON, Canada, July 28, 2010.

EXHIBIT A

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