

Innovations in Modern Blade and Razor Technology

Pamela Zupkosky¹, Kristina Vanoosthuyze Ph.D.²

¹Gillette Shaving Technology Laboratory Boston, Massachusetts, USA, ²Gillette Technology Centre Reading, UK

INTRODUCTION

Cutting-edge Technology in Razors
The relatively simple appearance of modern razors belies their sophistication. They are the products of years of extensive research.

Gillette's long heritage in razor design resulted in a deep understanding of men, their skin and the definition of their ideal shave: improved closeness with optimal comfort. While adding more blades to our three-blade razor ensures improved closeness, the skin bulge between the blades can lead to drag and discomfort.

The latest razor technology optimizes the performance in both areas and ensures great closeness is combined with great comfort and minimal skin irritation.

OBJECTIVE

To optimize our three-blade razor for closeness and comfort through advances in engineering, chemistry, physics and biology.

- Improve the closeness by adding more blades
- Optimize the comfort by spacing the blades closer together
- Achieve thinnest blade edge possible while retaining strength and durability

METHODS

Technology Behind Each Advance

The entire innovation process starts with and is driven by the consumer. The laboratories of the Gillette Technology Centre in Reading (GTCR), U.K. (pictured right) bring together scientists and engineers with expertise in multiple disciplines: from consumer understanding, engineering and design to male skin research.

Microscopic imaging techniques, including high speed filming, allow researchers to study the interaction of the individual blades with hair and skin at high magnification. Scientific insights and consumer needs are translated into new product ideas and concepts. These are converted into working prototypes via concept modeling and engineering capabilities.



This is complemented with high precision assembly and inspection of razors for continuous product evaluation by large scale consumer testing. The Gillette Shaving Technology Laboratory, GTCR's sister laboratory in Boston, further develops the prototypes into commercial, manufacturable designs, through advanced material science, engineering and consumer testing.

RESULTS

Five Blades With Narrow Inter-Blade Span (NIBS)

Technical testing and consumer research highlight the benefits of using five blades spaced closer together compared to three blades.

Technical testing

Replicas were made of the skin bulges that form between the blades of a razor cartridge when it is placed on the face with a controlled load^{1,2}.

Analysis of these replicas by a microscope with fringe projection demonstrated a significant reduction in skin bulge height beneath the blades when using a five-blade razor with narrow span versus a three-blade razor (see Figure 1).

Spacing the blades closer together by 0.45 mm leads to a 40% reduction in bulge height. This reduction is associated with less pressure on the skin which can lead to improved comfort and less skin irritation.

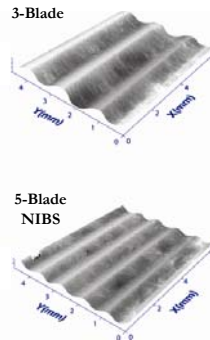


Figure 1. 3-D image of replicas demonstrates five-blade razors with narrow inter-blade span cause reduced skin bulge height compared to three-blade razors.

Consumer testing

A study of more than 200 men shaving more than ten times assessed men's preferences when using either our standard three-blade razor or a prototype five-blade razor with blades spaced close together. A large number of attributes were studied, including the comfort, closeness, and overall shave experience (see Figure 2).

Results show that men significantly ($p < 0.05$) experience improved overall satisfaction with the five-blade razor.

Furthermore, when assessing men's preference in more than 68 attributes, the five-blade razor was significantly preferred in all categories, including closeness and comfort (data not shown).

Overall Preference

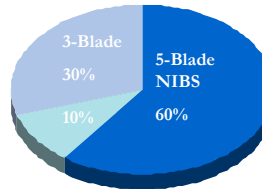


Figure 2. Results of a consumer study demonstrating men's preference for the five-blade razor with narrow inter-blade span compared to our three-blade razor.

Blade Edge Technology

The narrower the blade edge, the more easily it can cut through hard beard hair, leading to a closer, more comfortable shave. Gillette has optimized the sharpness of each blade (see Figure 3).

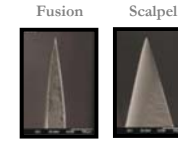


Figure 3. Gillette blade edges (left) are thinner than a surgeon's scalpel (right).



Figure 4. Diagram of blade coatings.

To retain sufficient strength at this sharpness, the stainless steel substrate is treated with thin film coatings such as Diamond-like Carbon (DLC) and Platinum-Chromium for enhanced corrosion resistance (see Figure 4). An outer telomer coating provides a low friction surface, which is associated with improved comfort. This was confirmed by consumer testing.

A study with 65 men showed a significantly ($p < 0.001$) lower preference in overall satisfaction, comfort and closeness when comparing a razor where telomer was absent on the first blade to a razor with all telomer coated blades (see Figure 5).

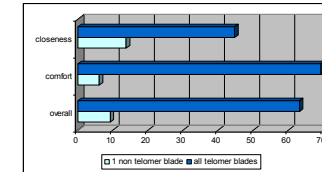


Figure 5. Results of a consumer study demonstrating the effect of telomer coated blades on men's shaving experiences.

CONCLUSIONS

The New Shaving Frontier

The five-blade NIBS razor is a major technological feat for scientists and an improvement for consumers over our 3-blade razor technology. Gillette scientists have developed novel ways to optimize the shave by:

- Optimizing the inter-blade span
- Optimizing the blade edge technology
- Further optimizing cartridge and razor handle technology (data not shown)



References

1. E.O. Bernstein, C.B. Jones, Skin Replication Procedure for the Scanning Electron Microscope, Science (1969).
2. I.M. Hutchings, Tribology, Chapter 2: Surface Topography and Surfaces in Contact, Edward Arnold (1992).

