

Study on the Definition of Moulded Bra Cup Features and Parametric Modeling

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Abstract

In order to make bra cups meet the needs of female customers, as well as to enhance the efficiency of designing bra products, this paper made a study on the definition of digital moulded bra cup moulding features and parametric modeling by means of parametric features design. The study introduced the concepts of moulded bra cup's shape features and then defined the same. The instructional effects of female breast shape features and size features being involved in designing of moulded bra cups were analyzed. The relationship between the shape features and size features of breasts and the shape features of moulded bra cups were also discussed. Meanwhile, the study made a parametric presentation on the feature points and feature curves of moulded bra cups. It realized that parametric modeling should aim at feature points and curves. The processes of modeling of digital moulded bra cup were mentioned, and were made more visualized adhering to human's designing principles, which enhancing the efficiency of developed moulded bra cup products.

Keywords: Moulded Bra Cup; Shape Features; Parametric; Female Breast Shape

1 Introduction

The Chinese bra field now is turning from “the multi-integration step” to “the quantity to quality transition step”, heading to original designs and own branded [1]. As the digital tide sweeps, the moulded bra cup, which plays a dominant role in the bra market, is a top project in the bra design [2]. The design and manufacture level of moulded bra cup products has been a token of core competition of enterprises, which is also kept as a secret technique [3, 4, 5].

With the increase of age, most females will undergo the change of body, especially their breasts [6]. In that case, the moulded bra cup comes to birth just to make up the shortage of breast shape, which through the changes from inside and outside models the surfaces to beautify the breast shape, remedying and reshaping the body shape. The inside surface modeling of bra cup is quite important, even only if the difference is in sacral millimeters, with the variations in dressing effects.

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It is learned from the research in bra enterprises that most of them employ “the repeating modification” [6, 7] to design the moulded bra cup modeling. However, there are many obvious problems in the production and application.

There is no relevant correlation between the object customers and moulded bra cup modeling. The parameters of bra cup have not been closely fixed according to the data of human body [8]. The designing method of moulded bra cups has not been unified and standardized. The bra cup modeling which needs the bra designer to offer the designing requirements and depends on the computer operator to edit the moulded bra cup, results in vague designing intent in terms of the understanding and delivering process of the bra cup modeling. Fourthly, the most popular software is universal, such as Unigraphics NX, Pro/Engineer, and no specific software that is aimed at moulded bra cup modeling design has been found. Moreover, there is no research and development of relevant computer assisted systems for moulded bra cup modeling design [9, 10].

2 The Definition of Bra Cup Shape Features

Features are known as the signs or characteristics of objective things [11]. J. J. Shan defined the features as: the carrier of complete description of information during the modeling design process of the designing cycle of products. It is a kind of information, including geometry information and non-geometry information. It can help to design, to manufacture or to communicate and to exchange something between other projects [12]. In the field of CAD, the features can be classified variously, such as shape features, material features, process features, etc. Shape features refer to the vital and basic features that are formed by the topological relations of geometry elements [13, 14].

Though the forms of moulded bra cup are various, essentially, there is structural commonness in the modeling variety.

The shape features of bra cup include basic shape features and additional shape features. The basic shape features of bra cup include: the moulded bra cup plastic features, the outside surface features and the inner surface features. The additional shape features of bra cup include: the hole features (such as the bust point hole features), the region features of bra cup (such as the convex pad features of bra cup) and the steel flange features, etc. For example, Fig. 1. presented the classification and hierarchy of moulded bra cup shape features.

2.1 The Definition of Moulded Bra Cup Feature Points

The feature points of moulded bra cup include that Two Gore points; Two Loop points; Two Underarm cup side point; Two BP points as shown in Fig. 2. The feature points of moulded bra cup are the key to the moulded bra cup modeling design.

As shown in Fig. 3, taken the BP feature points as an example, put the value of BP points along with the Y axis moved “ $\pm\Delta y$ ” distance, which may reflect the effect of lifting breast. So, different feature points have different offsets, and also different offsets deliver the different designing intents.