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Conceptual Design of "Lotos" Motorcar

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Abstract: *This work presents conceptual design of new "Lotos" motorcar. Brief review of analogue prototypes of different world-known motorcar manufacturers was made. When body concept design was created, bionic form of lotus petals was used. The prototypes of body outlines were developed in the form of sketch projects. Polygonal extrusion method was used for 3D-modeling of car structural parts. The developed car concept is presented by three-dimensional computer model. For illustrative purposes the variants of car shaded model rendering is provided.*

Keywords : *conceptual design, motorcar, bionics, natural forms, car body, polygonal extrusion, shaded model, rendering.*

I. Introduction

Today there are a lot of automotive giants in the world that produce new range of transportation means with new technologies and possibilities each year. The companies embody the best solutions proposed by the designers. Design is the very beginning in modern automotive industry. Each part of the car – from symbol to steering wheel – is carefully designed in creative hands of the de-signers. It is body concept that gives birth to internal characteristics of the vehicle. The vehicle's outlook defines its "character".

Among the existing works on conceptual design we would like to note the articles [1, 2]. These works examine the importance of sketching stage in the process of conceptual design of vehicles. Article [3] is dedicated to mo-torcar conceptual design, the stages of sketching, three-dimensional computer-aided modeling and final rendering of the scene are provided. The issues of initial stage of conceptual designing are de-scribed in detail in the book [4]. There provided is the methodological basis of idea generation stage, determination of initial requirements for future structure.

This work is dedicated to three-dimensional computer-aided modeling of vehicle new con-cept. It shall be noted that the issues of computer-aided modeling of airborne transportation means were reviewed by the authors in the works [5, 6]. The work [6] proposes conceptual visual-graphical solutions of new aircraft on the base of bionic forms analysis.

II. Development Of The Concept

The process of conceptual designing and modeling of transportation means takes several stages. At the first stage the sketch is created, future model general view is drawn: composition solution; proportion of component parts relatively each other; main stylistic solutions. The concept of future prototype is chosen on the base of analysis of natural forms visualization.

The concept of developed model design was determined by lotus flower. Lotus (lat. nelumbo) refers to the kind of dicotyledonous plants, the only representative of Nelumbonaceae family [7, 8]. Considering that the car design was inspired by this nice flower, the vehicle's outlook reveals the bionic form of lotus petals. In the culture of many ancient civilizations lotus meant immortality and the Divine, degeneration and Sun, exhaustless energy and spiritual power.

When we talk about automotive industry, people have different associations, for some people they are quick, for other people they are compact, for thirds – spacious. But the first and basic thing is the company and its mark that is directly associated with the car. If we think about such trademarks as Lamborghini and Ferrari, we imagine their symbols at once in the form of a bull for the first and a horse for the second one, at that both animals are depicted in rather dynamic aspects. The success of many companies depends much upon the good quality design that predetermines the success due to recognition. Fig.1 provides the sketches of initial bionic forms and variants of creative quest of graphical symbol.

Many modern car makers have series with special characteristics. We are interested in series of fast high-performance cars that are powerful and graceful, such as: Maserati Quattroporte, Audi A7, BMW 5-series, Jaguar XF, Lexus LS [9]. These very models are close to "Lotos" model by ideology.

III. Simulation Method

At the next stage the model is drawn with reference to man's biometric parameters considering the requirements of ergonomics. Fig. 2 shows the final variant of future model sketch. Then the stage of modeling

on the base of sketch project begins [10, 11]. In this work the graphical system of three-dimensional modeling 3ds Max will be used for modeling. 3ds Max graphical system is flexible and multiplex software product that provides the user with a wide scope of operations [12].

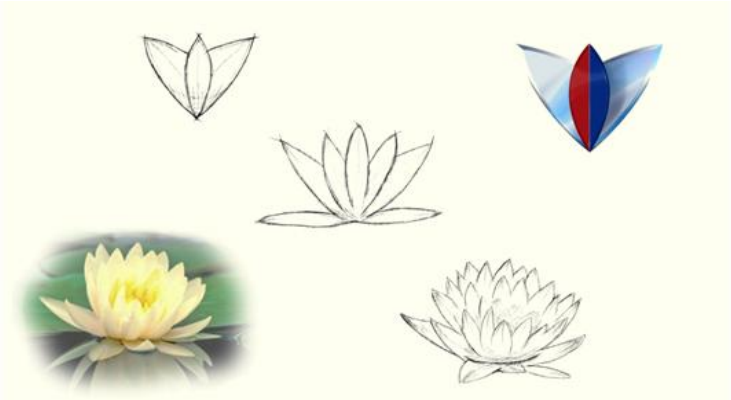

Fig.1: Creative quest

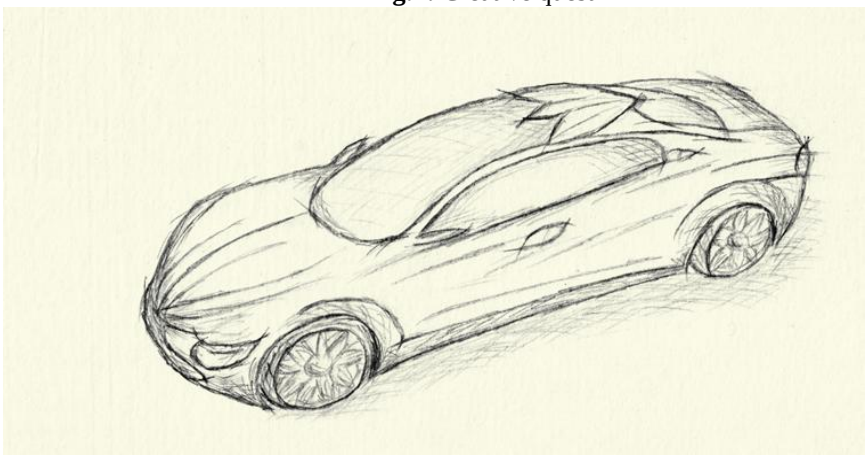

Fig. 2: Final variant of vehicle sketch

Polygonal extrusion method is used for car model creation. Orthographic schematic drawings of conceptual model are located on projecting planes, as in Fig. 3. Object surface is created according to the car body projection.

Fig. 3: Construction of body 3D model on the base of sketches

Initially all component parts of the model are faceted (Fig. 3). The abilities of 3ds Max graphical system allow smoothing faceted objects by various methods. One of the variants is the application of smoothing method NURMS (Non-Uniform Rational Mesh Smooth). When car structural parts are constructed, the smoothing of polygons surfaces is performed (Fig. 4).

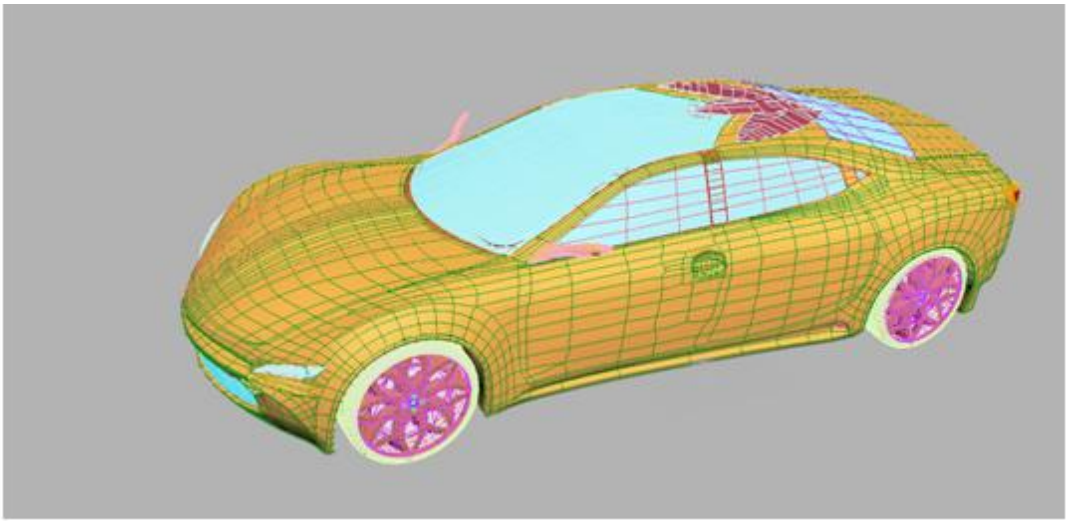

Fig. 4: Three-dimensional smoothed surface of body

IV. Shading And Rendering

Next step of designing is shading and rendering of constructed three-dimensional model. The process of material assigning to separate structural parts of the vehicle is made on the level of polygons. When the operations are fulfilled, one can obtain finished model for further rendering via realistic models of lighting. Integrated V-Ray module is used for rendering. Fig. 5 (a), (b) show final rendering scenes of shaded conceptual model of "Lotos" motorcar.

V. Conclusion

Manufacturing of items and objects in our environment starts with the development of concept, prototype creation [13, 14]. In the result of modeling we can say that the concept of "Lotos" with the help of modern modeling systems was realized, starting from sketches to realistic rendering.

(a)

(b)

Fig. 5: (a), (b), Rendering of "Lotos" conceptual model

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