

GEOMETRICAL SHAPES WITH CAD SYSTEMS

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ABSTRACT

The Solid Edge software is a power computer-aided design (CAD) system of graphics for mechanical assembly, part modeling, and drawing production. In this paper, both the ability in using Solid Edge program and the originality concerning the aesthetical sense for proportion, line and style in realizing decorative forms can be observed. This work allows the user to learn the basic commands of Solid Edge software and to improve her skills in decorative design.

KEYWORDS: Solid Edge, Revolved Protrusion, Axis of Revolution, Color Manager.

1. Introduction

Art occupies an important place in the social life, carrying out a connection between communication and knowledge by aesthetical forms. The decorative design implies the knowledge of basic principles of graphic design, the study of geometrical shapes and colours. The decorative design can be done by using the pencil, the brush or other drawing tools [5].

Solid Edge gives us a variety of tools that allow us to easily document for designs during any stage of drawing production. Solid Edge has four environments, Part, Sheet Metal, Assembly, and Draft. Each of these environments creates a different type of Solid Edge document. Solid Edge Part is used to construct individual part models. Part models are constructed by adding and removing material from a base feature. The purpose of this paper is to give a basic understanding of how to produce decorative shapes using Solid Edge, the module Part.

2. Steps in the execution of the Revolved Protrusion

At the beginning, we create a new Solid Edge Part file. Then, we press the Revolved Protrusion icon, that is located one button below the Protrusion command on the Features Menu [1]. After that, we will create a sketch in the x-z plane. Then, we will draw a close profile to select the Axis of Revolution button that coincides with the vertical axis of symmetry (see figure 1).

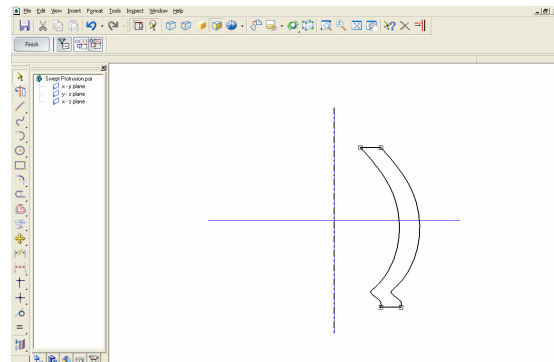


Fig. 1 Creating a profile to select the Axis of Revolution

After this, we will click Finish and select the Revolve 360° option, on the ribbon bar (see figure 2).

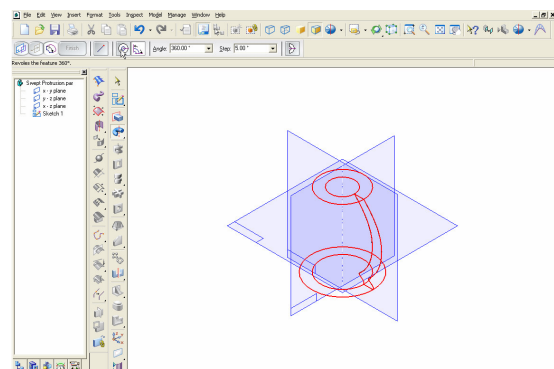


Fig. 2 Selecting the Revolve 360° option

In figure 3, the complete Revolved Protrusion can be seen.

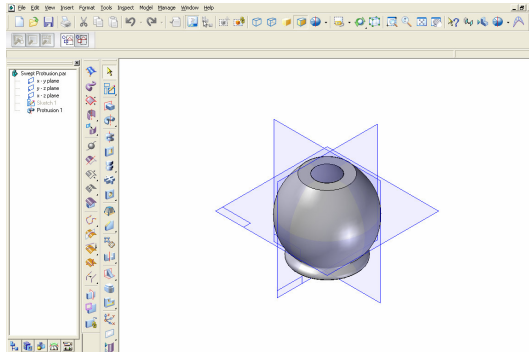


Fig. 3 The constructed profile using the Revolved Protrusion command

3. The Show Polygon, Show Curvature Comb, Shape Edit and Local Edit options

In the Solid Edge program can be added and removed points from the curve. We will activate on the Ribbon bar the Show Polygon option that controls the display of the polygon for the curve (see figure 4).

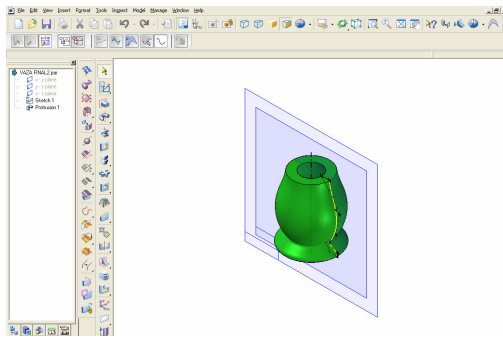


Fig. 4 The effects of the Show Polygon option

Another option on the Ribbon bar is Show Curvature Comb that controls the display of the curvature comb for the curve. This option is only available if the Curvature Combs option on the Inspect menu is checked. In figure 5, are described the effects of the Show Curvature Comb option.

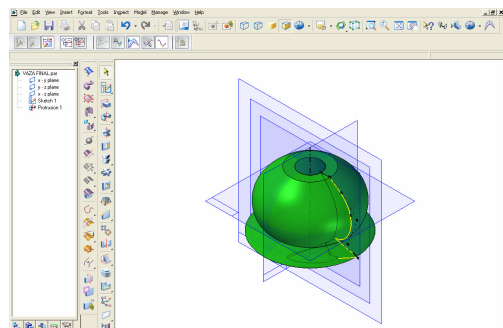


Fig. 5 The constructed profile after using the Show Curvature Comb option

The Shape Edit option affects the shape of the entire curve when we move a point on the curve. This button is available only when we have selected a curve to edit. In figure 6 is shown the effects of the Shape Edit option.

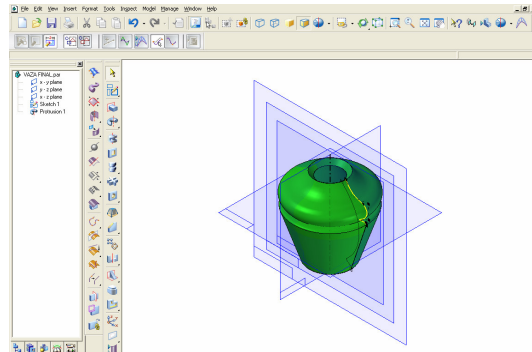


Fig. 6 The Shape Edit option effects

The Local Edit option affects the shape of the curve around the edit point. This button is available only when we have selected a curve to edit, as shown in figure 7.

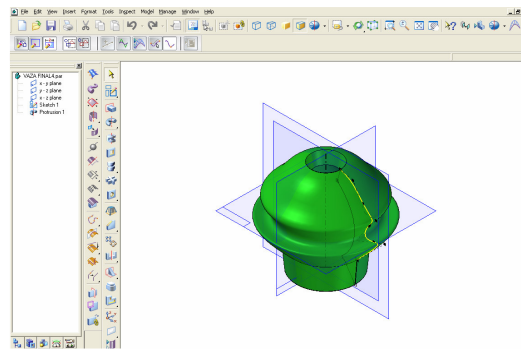


Fig. 7 The effects of the Local Edit option

Solid Edge contains commands that work together in managing part colors and styles [3]. By applying on the entire surface of the model or only on the desired surfaces of textures, color, the final product is obtained. The procedure is the following: from the Format menu, the user chooses the Style option and creates a predefined style with a selected texture from the database. After that, from the View menu he or she chooses the Textures option (see figure 8).

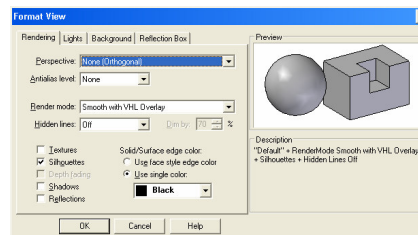


Fig. 8 The Format View dialog box

From the Part Painter one chooses the texture and surface on which one wishes to apply that texture. The texture can be opaque or transparent; at the end special effects will be created. The Color Manager window is opened and the green color is selected as shown in figure 9.

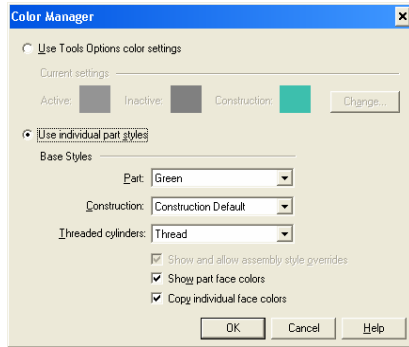


Fig. 9 The Color Manager window

In order to make the drawing clearer, the planes will be turned invisible. The drawing increase is done with Fit command.

After the Color Manager command is used we will reach figure 10.

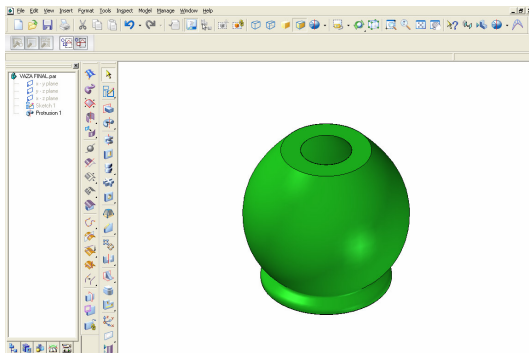



Fig. 10 The effects of the Color Manager command

We will click on the Shaded button  and the pattern is removed as shown in figure 11.

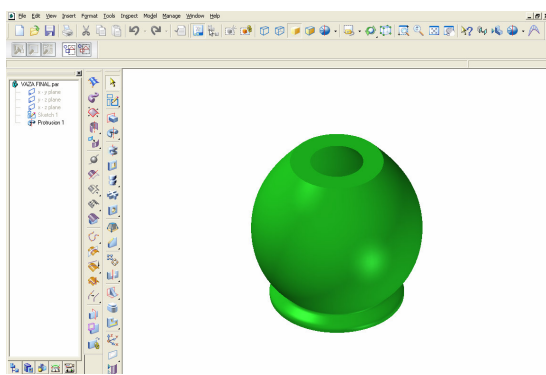


Fig. 11 The Shaded command effects

In the Solid Edge program there is a Zebra Stripes command. This is necessary for visualizing the curvature of surfaces to determine if there are surface discontinuities and inflections.

In figure 12, we can use the Zebra Stripes dialog box to control the zebra stripe properties, such as color, spacing and mapping method.



Fig. 12 The Zebra Stripes dialog box

Thus, the Show Stripes option specifies whether zebra stripes are displayed in the active window as shown in figure 13.

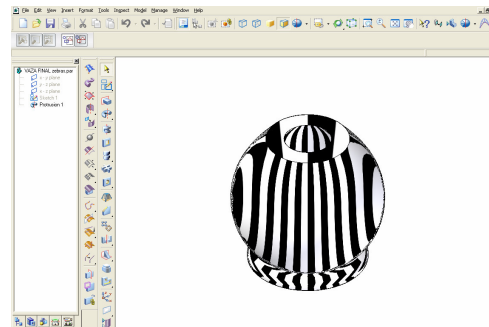


Fig. 13 The Show Stripes option

Next, we will use the Stripe Color and the Background Color options that specify the stripe color and indicate the background color between the stripes (see figure 14).

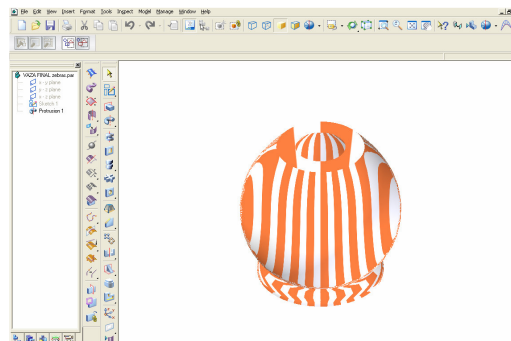


Fig. 14 The Stripe Color and Background Color options

The stripes number is another option that there is in the Zebra Stripes dialog box. This option specifies the number of stripes. In this case we will choose only 30 stripes, as shown in figure 15.

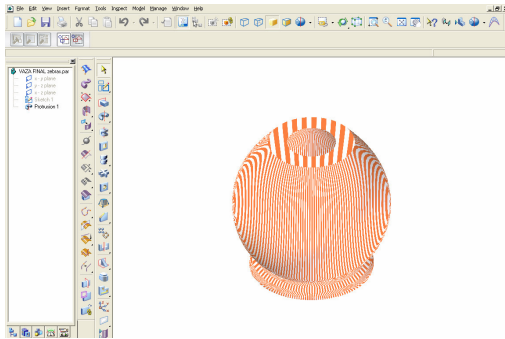


Fig. 15 The Number of Stripes option

In the following figure (see figure 16), we will show the Stripe Thickness option that specifies the thickness of the stripes. In this case, we will choose a value of 0,81.

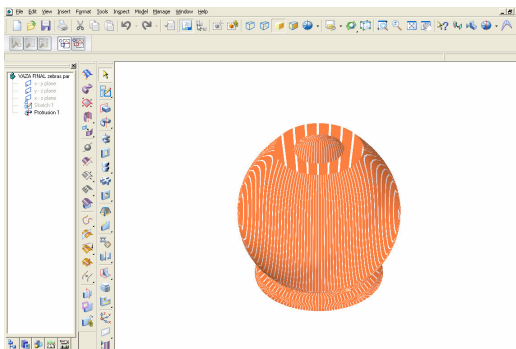


Fig. 16 The Stripe Thickness option

The quality is specified using the option Quality. In this case we will choose Fine option. The Mapping option specifies the mapping method. For this, we will specify a linear mapping method, as is shown in figure 17.

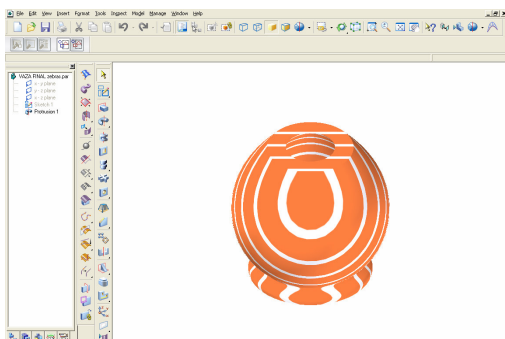


Fig. 17 The Mapping option

Save the document as Worm par. and close the document.

As a final conclusion, when constructing a revolved protrusion using more than one profile, all the profiles must be closed. All profiles must share a common axis of revolution. An object can be produced to satisfy a certain need.

In this paper we remark the ability in easily using the Solid Edge program in the case of the Show Polygon, Show Curvature Comb, Shape Edit and Local Edit options. The drawing can be changed in an interactive mode with the help of all the options that have been presented in the present paper.

4. Conclusions

Art expresses the people's thinking in artistic images, in painting, sculpture, literature, etc. An object can be produced to satisfy a certain need. The creation and drawing activity presupposes the cognition of the object component parts, of the relations among the parts of the same object, of the relations among objects and forms, or among groups of forms and objects. In the process creation it is necessary the correct understanding and the rendition of the colored forms and spaces and the relations among them, as well as of the relations among the forms composing a whole object [4].

The field of solid modeling has developed a variety of techniques for unambiguous representations of three-dimensional objects [2]. Examples of this manufacturing information include features such as Revolved Protrusion, that can be created on modern computer. For each approach, we present a detailed description of the commands available along with some assessments of the technology. We suggest the use of the Part module of Solid Edge software for 3D object modeling and the guided development of the execution drawing.

In this paper we observe both the ability in using Solid Edge program and the originality concerning the aesthetical sense for proportion, line and style in realizing decorative forms.

References

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