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A Review of VBA Technology in Auto CADD

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Abstract: AutoCAD is the most widely used drawing tool among the similar design drawing products. In the process of drawing different types of design drawings of the same product, there are a lot of repetitive and single work contents. The traditional manual method uses a drawing software AutoCAD drawing graphics with low efficiency, high error rate and high input cost shortcomings and many more. In order to solve these problems, the design of the parametric drawing system of various cross-sections are completed by using the VBA development tool and the Access database software with large capacity storage data and the analysis of the functional extension of the plane drawing. For the development of AutoCAD functions, the system drawing work will be simplified and work efficiency also has been greatly improved. The general purpose of this paper is to contribute to various cross-sections of a possibility of Visual Basic Application graphics programming.

Keywords: VBA. CAD, Graphics programming, Database software.

I. INTRODUCTION

The design work in industry is based on the drawing software of the major business and most widely used software is AutoCAD [1]. It usually provides users friendly interface, powerful analytical capabilities, powerful preprocessing and post processing functions, the operation is simple and easy to learn for the user's design graphics work. The development of CAD technology in the direction of intelligent information technology is becomes new trend in manufacturing industry. AutoCAD provides an open architecture that allows developers to use advanced programming language to expand and modify it. VBA (Visual Basic for Application) [2] As one of the development tools is Microsoft's end user-oriented application programming language, to share memory with AutoCAD space and the development of the system program running faster. VBA developed by the program has a strong interactive capacity, easy to manipulate Windows resources, data management capabilities, easy to share data. VBA-based AutoCAD for the secondary development of the technology used [3]. ActiveX technology, ADO database connection technology, ActiveX Automation technology, which fully object oriented programming advantages, so that the choice of language in the development of a great deal of flexibility, with VBA programming operations and control AutoCAD to achieve drawing function. ADO is a set of COM components provided by Microsoft. The automated programming interface based on object-oriented thinking that enables applications to access and modifies a variety of simple, complex, or unqualified data sources, and is a bridge between AutoCAD and Access databases.

II. AUTOCAD VBA PARAMETRIC DRAWING

Parametric drawing system [4] is based on the application of solid voxel by introducing the parametric design in the design system to illustrate the specific process and the functional effect. It has a good reference for the similar system of AutoCAD to develop different products.

III. SYSTEM IMPLEMENTATION

A. System Programming

- 1) This work has implemented in AutoCAD under the ActiveX Automation interface and VBA programming environment. AutoCAD is customized for ActiveX Automation interface which manipulates AutoCAD programmatically using VBA. This coupling of ActiveX Automation and VBA manipulates AutoCAD objects that encapsulate AutoCAD entities, data, and commands. Through ActiveX Automation, AutoCAD exposes programmable objects (lines, circle, arcs, copy, erase, move, mirror, rotate, text, dimensions, line types, dimension styles, layers, groups, blocks, view, viewport, etc.) described by the AutoCAD Object Model that can be created, edited, and manipulated by VBA programming environment. VBA has its own set of objects, keywords, constants, and so forth that provide program flow, control, debugging, and execution. It runs in the same process space as AutoCAD. It sends messages to AutoCAD by the ActiveX Automation interface which establishes communication with AutoCAD objects.

- 2) Establish a connection to the Access database. Using the ADO technology, achieve data source connection of its object-oriented programming interface to. VBA programming first in the project reference ADO object library, the steps for the "Tools" - "Microsoft.Jet.OLEDB.4.0 ",

Part of the code as follows:

Set adoCon = New Connection

adoCon.CursorLocation = adUseClient

adoCon.Open.Provider="Microsoft.Jet.OLEDB.4.0;DataSource=E:\study\Data.mdb"

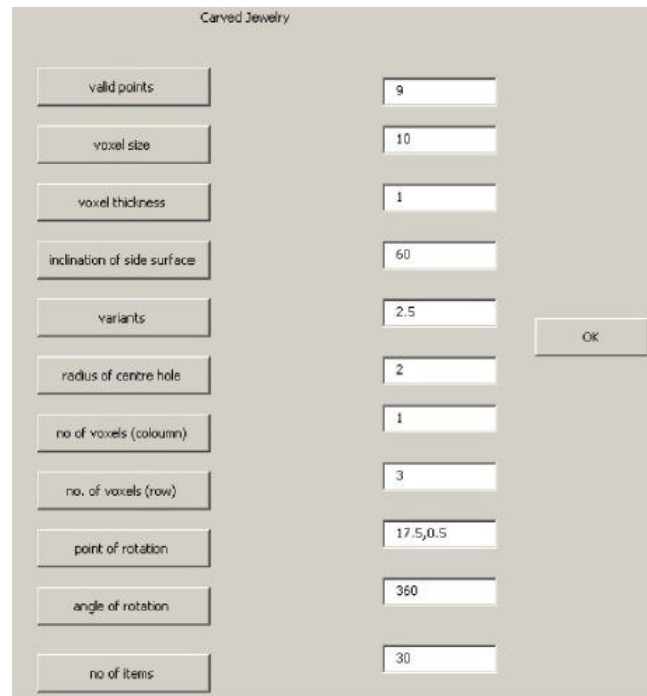
- 3) Graphics drawing. The main parameter information of the steel beam is obtained from step1. which is designed as the main variable parameter in the interface, and the drawing function is realized according to the programmed drawing program. Here are some examples of steel beam drawing function, as follows:

```
.....
Dim ptBase(0 To 2) As Double
ptBase(0) = 0: ptBase(1) = 0: ptBase(2) = 0
Dim pt1(0 To 2) , pt4(0 To 2) As Double
Dim pt3, pt2 As Variant
pt1(0) = ptBase(0) + d / 2: pt1(1) = ptBase(0): pt1(2) = ptBase(2)
pt4(0) = ptBase(0) + b / 2 - r1 * (1 - Sin(Atn(1 / 6)))
pt4(1) = ptBase(1) + h / 2 - r1 * Cos(Atn(1 / 6))
pt4(2) = 0
.....
Dim objPline As AcadLWPolyline
SetobjPline=ThisDrawing.ModelSpace.AddLightWeightPolyline(ptArr)
objPline.Closed = True
objPline.SetBulge 0, -Tan((2 * Atn(1) - Atn(1 / 6)) / 4)
objPline.SetBulge 2, Tan((2 * Atn(1) - Atn(1 / 6)) / 4)
objPline.SetBulge 4, Tan((2 * Atn(1) - Atn(1 / 6)) / 4)
objPline.SetBulge 6, -Tan((2 * Atn(1) - Atn(1 / 6)) / 4)
objPline.SetBulge 8, -Tan((2 * Atn(1) - Atn(1 / 6)) / 4)
objPline.SetBulge 10, Tan((2 * Atn(1) - Atn(1 / 6)) / 4)
objPline.SetBulge 12, Tan((2 * Atn(1) - Atn(1 / 6)) / 4)
objPline.SetBulge 14, -Tan((2 * Atn(1) - Atn(1 / 6)) / 4)
ZoomExtents
.....
Private Sub ExchangeData(ByVal bSave As Boolean)
If bSave Then
adoRs.Fields("h") = txtH.Text
adoRs.Fields("b") = txtB.Text
adoRs.Fields("d") = txtD.Text
adoRs.Fields("t") = txtT.Text
adoRs.Fields("r") = txtR.Text
adoRs.Fields("r1") = txtR1.Text
adoRs.Fields("area") = txtArea.Text
adoRs.Fields("weight") = txtWeight.Text
Else
txtH.Text = adoRs.Fields("h")
txtB.Text = adoRs.Fields("b")
txtD.Text = adoRs.Fields("d")
txtT.Text = adoRs.Fields("t")
txtR.Text = adoRs.Fields("r")
txtR1.Text = adoRs.Fields("r1")
```

```
txtWeight.Text = adoRs.Fields("weight")
txtArea.Text = adoRs.Fields("area")
End If
End Sub
```

B. User Interface Design

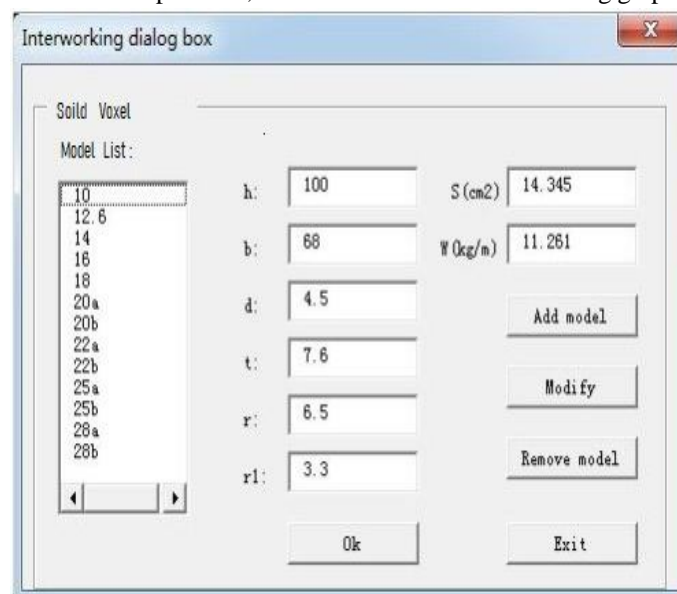
- 1) Solid voxel interface. The main function is to understand the characteristics of steel products during entering the system to operate interface at the first time.



A dialog box titled "Carved Jewelry" with a light beige background. It contains ten input fields arranged vertically on the left, each with a corresponding value in a text box on the right. The fields and their values are: "valid points" (9), "voxel size" (10), "voxel thickness" (1), "inclination of side surface" (60), "variants" (2.5), "radius of centre hole" (2), "no of voxels (column)" (1), "no. of voxels (row)" (3), "point of rotation" (17.5,0.5), and "angle of rotation" (360). At the bottom right, there is an "OK" button. The "no of items" field at the very bottom has a value of 30.

Fig 1.Carved jewelry dimensions

- 2) Interactive dialog interface. The main function is the main parameters of the box with the corresponding parameters of the information after the model selection of the products, which can determine the drawing graphics.



A dialog box titled "Interworking dialog box" with a blue title bar and a standard Windows window border. It contains a "Solid Voxel" section with a "Model List" list box on the left. The list box contains the following items: 10, 12.6, 14, 16, 18, 20a, 20b, 22a, 22b, 25a, 25b, 28a, and 28b. To the right of the list box are several input fields: "h:" (100), "b:" (68), "d:" (4.5), "t:" (7.6), "r:" (6.5), and "r1:" (3.3). To the right of these fields are two calculated values: "S (cm2)" (14.345) and "W (kg/m)" (11.261). Below these fields are three buttons: "Add model", "Modify", and "Remove model". At the bottom of the dialog box are two buttons: "Ok" and "Exit".

Fig 2. Interworking dialog box

C. Example Renderings

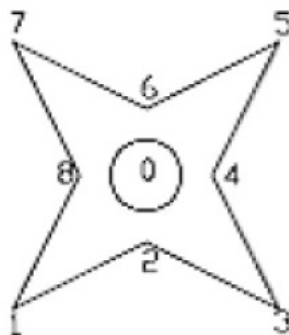
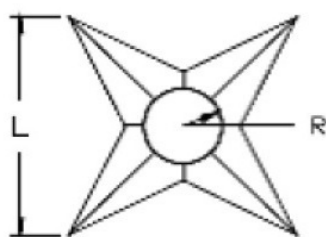
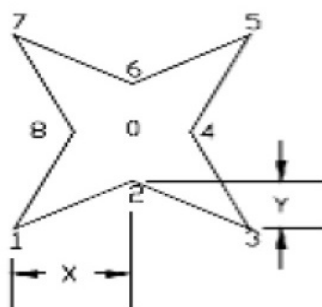
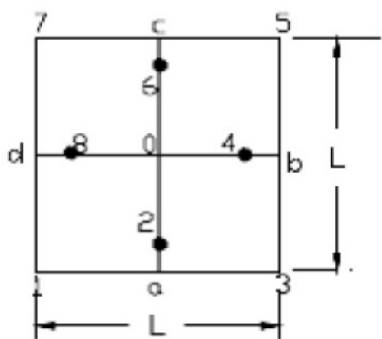


Fig 3. 2D diagram models

IV. DIMENSIONING

The annotation refers to increase the size to the graph, the geometry of the display object, the distance between the objects and the angle. Create a dimension with VBA programming. Which functions include AddDimRotated, AddDimAligned, AddDimAngular, AddDimRadial, AddDimDiametric, and AddDimOrdinate. In this paper, the significance of the application of dimensioning is that can run the program on the I-shaped steel scale function when the design engineers need to draw the dimensions of the drawing. It is as follows:

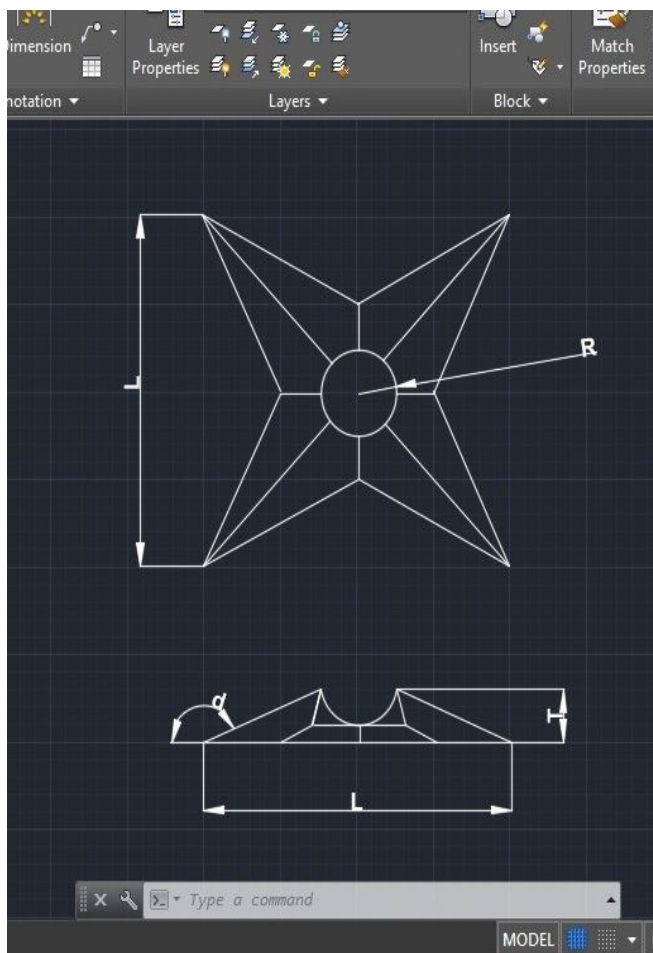


Fig 4. Carved jewelry in Auto caDD

V. CONCLUSION

Through the analysis and development of the parametric drawing design system of solid voxel, it can be noted that:

- A. The parametric drawing system based on the AutoCAD with VBA can solve the problem of repeatability and error in the mass production of industrial products. Meanwhile, it also makes up for the defects of AutoCAD single drawing function has been further promoted. On this basis, the enumeration of several functions of the expansion: custom menu bar, dimension and so on, which will also promote the future of the further development of parametric technology.
- B. At present, the parametric design with the local to the whole. First, the designer must establish the relationship between the design parameters of the basic parameters of the algorithm by the design constraints into design data. Then select the appropriate parameters of the software design products will be the initial drawing graphics, with the help of parametric technology to carry out repeated scrutiny of the prototype to explore all the possibilities of the expansion. This approach greatly simplifies the design process of the product and it shorts the entire manufacturing cycles. Meanwhile, the parametric design development is approaching an important step in the concept of intelligent.

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