

Secondary Development of Surface Texture in AutoCAD

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Abstract

In view of the fact that AutoCAD doesn't have the automatic dimensioning function towards surface texture, this text designs an automatic dimensioning plugin towards surface texture according to the national standard. And combined with the Access database, it regards AutoCAD as a development platform, and uses the programming tool VBA provided by AutoCAD to program. This design can give automatic dimensioning of lines, arcs and circles. Based on this plugin, the efficiency of dimensioning will be improved obviously.

Keywords

AutoCAD, surface texture, dimensioning, secondary development.





1. Introduction

CAD comes from interactive graphics design which is proposed by the Massachusetts Institute of Technology in the 60's of the last century. Due to the unity of the global market in twentieth century, CAD technology has been rapidly popularized and developed. Besides, CAD was named one of the ten most influential technologies in twentieth century in 1991. However, in production, the direct use of AutoCAD for mechanical design and mechanical drawing has many inconvenient places, such as the dimensioning towards surface texture. This text designs an automatic dimensioning plugin towards surface texture, and the AutoCAD function has been improved.

2. Basic Knowledge of Surface Texture

GB/T 3505-2009 stipulates that surface texture include roughness, ripple, surface defects and surface geometry. surface texture will have an impact on the product of abrasion resistance, measurement accuracy and corrosion resistance. The dimensioning and illustration of surface texture are shown in Table 1.

Table 1 The Dimensioning and Illustration of Surface Texture

	Basic symbol. The surface can be obtained in any way.
	The surface is obtained by means of removing materials, such as milling, drilling, grinding, electric machining, etc.
	The surface is obtained by the method of non-removal material, such as casting, stamping, powder metallurgy, etc.
	Add a line to the long side of the three symbols, and annotate relevant parameters and instructions

The symbol of surface texture and the location of marking are shown in Fig.1

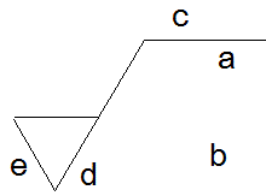


Fig.1 The symbol of surface texture

- a: The parameter code and value of sampling length or roughness;
- b: The parameter code and value of roughness;
- c: Processing requirements, surface treatment or other instructions;
- d: Processing texture direction;
- e: Machining allowance.

3. Design of the Form

The scheme of automatic dimensioning towards surface texture includes two parts. Create a form of parameter selection for users, and give dimensioning. The form includes surface texture symbol, texture direction and roughness values three aspects. In the practical and simple principle, design the form, as shown in Fig. 2.

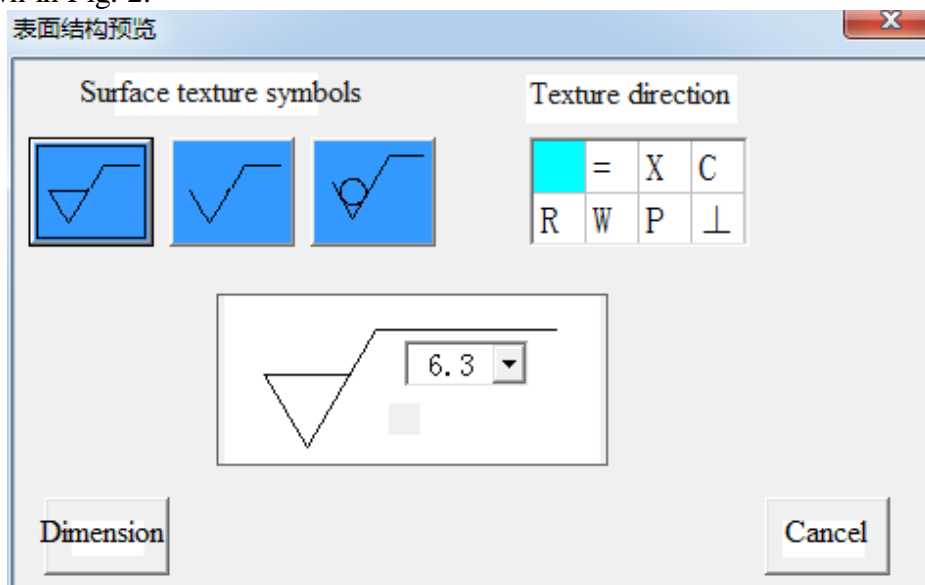


Fig.2 The form

And then, add controls and give the programming. The main controls used in the form are labels, combo boxes, images, command buttons, and vsFlexArray. Label is the control to add words and here label is used to add the heading. Besides, combo boxes is used to provide the choice of Ra's values. Images are the control to load pictures, and here they are used to load structure texture symbols. And vsFlexArray provides the table.

4. The Scheme of Dimensioning

4.1 The general scheme

Dimension includes two aspects. Choose the entity and insert the block. The detail of scheme of dimension is shown in Fig.3. Lines and circles are the basic elements in the drawing and here we introduce the dimensioning of lines and circles towards structure texture.

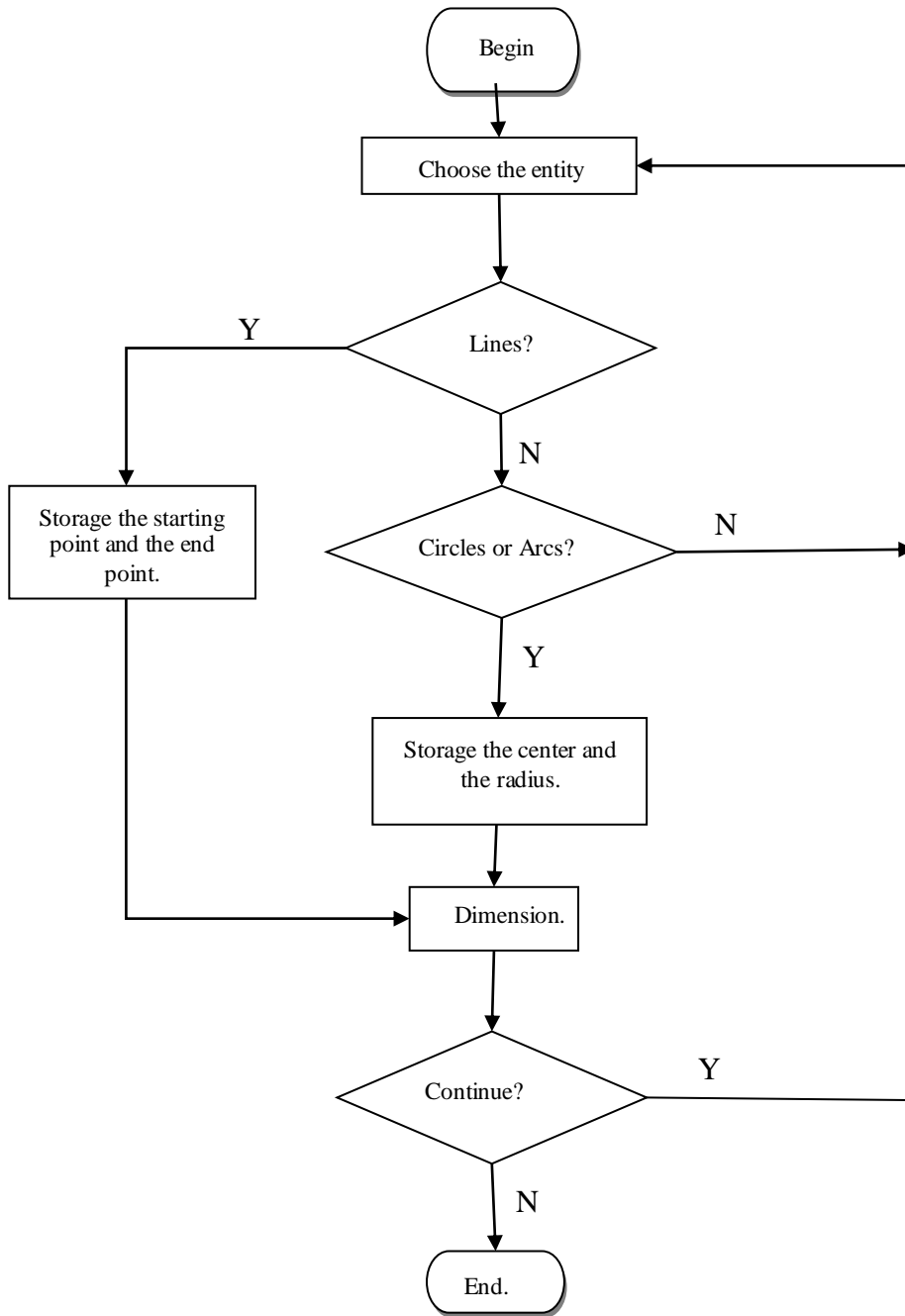


Fig.3 Demisioning of structure texture

4.2 Demisioning of lines’ structure texture

The dimensioning of lines has three situations. The linear slope does not exist, the insertion point is located above the line, and the insertion point is below the line. The flow chart of the dimensioning towards straight lines is shown in Fig.4. Besides, use The following statement to get the starting point and the end point of the line:

$$sPnt = returnObj.StartPoint \tag{1}$$

$$ePnt = returnObj.endPoint \tag{2}$$

Among them, sPnt and ePnt are array, and returnObj is a graphic element name.

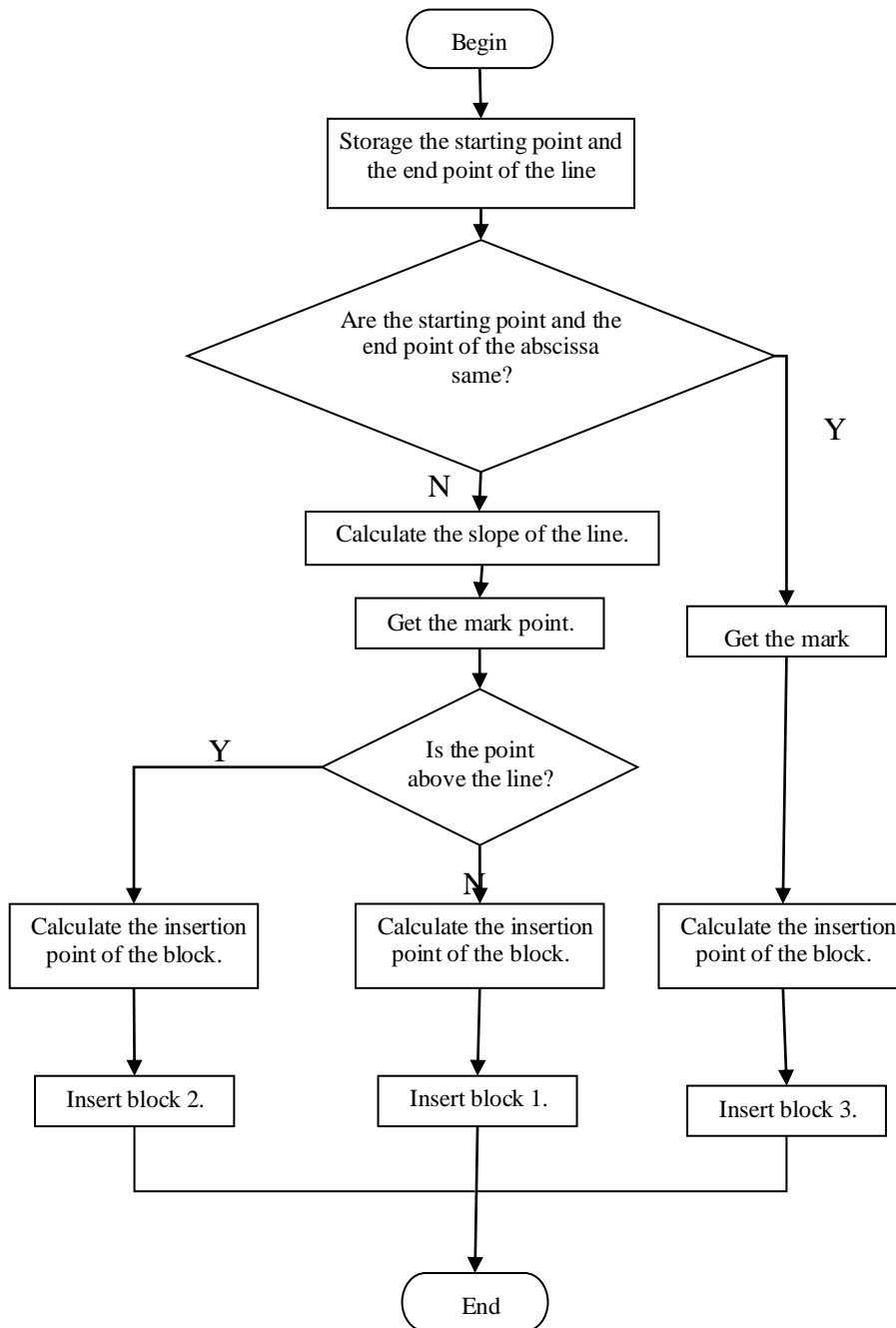


Fig. 4 Demisioning of lines' structure texture

4.3 Demisioning of circles' structure texture

The dimensioning of circle is complicated, and we should consider the dimensioning point's location. Fig.5 is the chart of the dimensioning towards circles. Besides, use The following statement to get the center and radius of the circle:

$$\text{circleRadius} = \text{returnObj.radius} \tag{3}$$

$$\text{CircleCenter} = \text{returnObj.center} \tag{4}$$

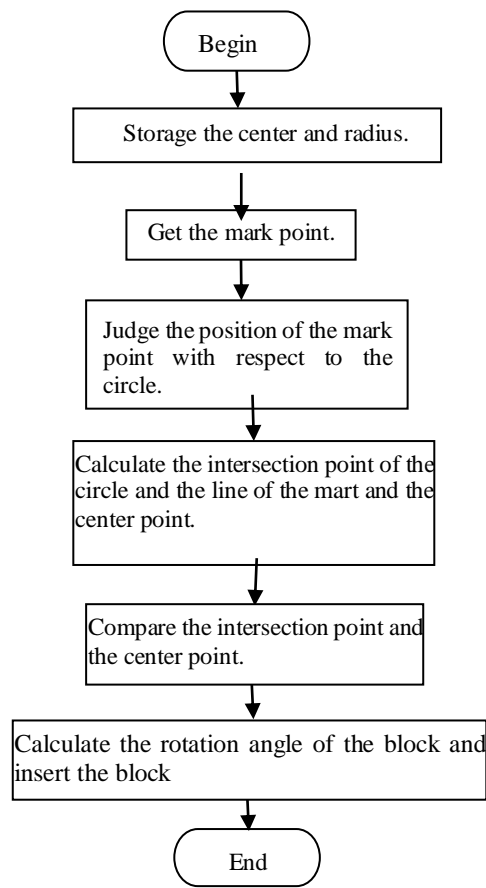


Fig. 5 Demising of circles' structure texture

4.4 Demonstrate of dimensioning

Dimensioning separates into three steps: choose the symbol of structure texture and the value, preview and dimension. Demonstrate of dimensioning is shown in Fig.6. From the picture ,we can find it's accurate.

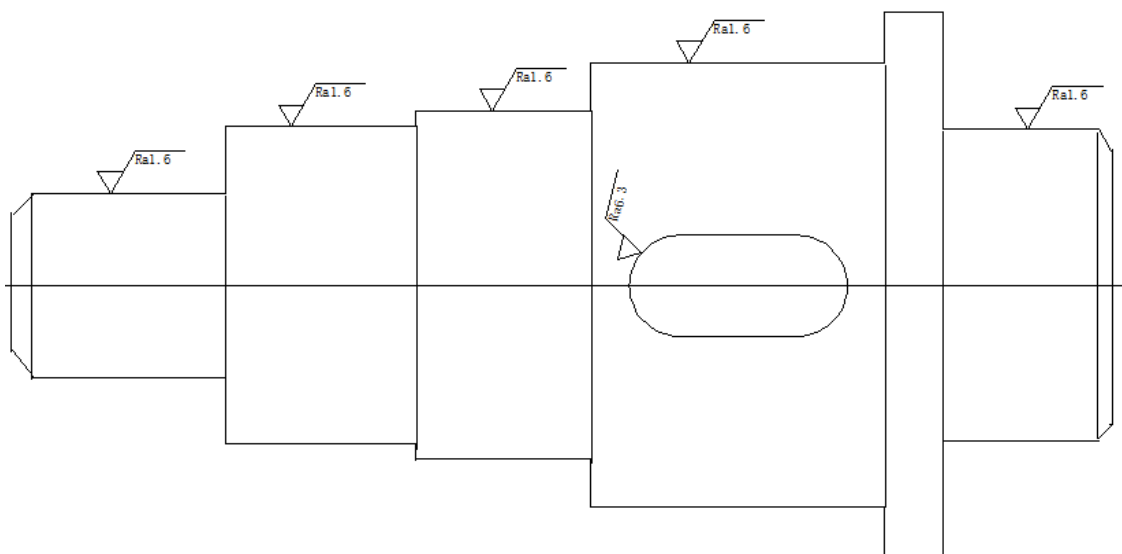


Fig. 6 Demonstrate of dimensioning

5. Conclusion

This text designs an automatic dimensioning plugin towards surface texture based on AutoCAD. The design scheme and the realization process of the automatic marking towards the surface structure are described. This text provides a scheme for AutoCAD's development and the efficiency of dimensioning will be improved obviously through this plugin.

References

- [1] Liu Zhihong, Xie Ping, the method of surface roughness annotation in Auto CAD [J]. Journal of East China Jiaotong University, 2005 (8): 121
- [2] Research on the automatic programming system of in Auto CAD. Master thesis, Shandong: Shandong University of Science and Technology, 2006
- [3] Zhang Guangbin. Best LISP Visual and for AutoCAD VBA program [M]. Beijing; Beihang University press, 199.