文章编号: 1001－2060(2000)01－0062－03

用 VB 编制 AutoCAD 阀门绘制程序

(哈尔滨·第七　三研究所)　林向东

摘　要: 着重讨论在用 AutoCAD 进行热力系统制图设计中, 如何采用 VB 编制绘制阀门的应用程序, 以提高设计绘图的工作效率。

关　键　词: AutoCAD　VB 语言　阀门绘制

中图分类号: TP319

文献标识码: A

1　引言

在用 AutoCAD 进行热力系统制图设计的过程中, 经常要碰到绘制阀门的问题。通常预先绘制并定义一个阀门图块, 而后应用时采取块插入的方法。这样固然可以减少一些工作量, 但操作还是很麻烦, 因为还要切断通过阀门的线段。笔者用 VB 开发了 AutoCAD R14 for Windows 环境中标注绘制阀门的应用程序, 可极大地提高设计效率。

2　AutoCAD R14 的 ActiveX 服务器

AutoCAD R14 增加了 ActiveX 自动化服务能力。任何 ActiveX Automation 应用程序可以通过 AutoCAD 提供的 Automation Clients 对象来访问它。也就是说, 从其它各种应用程序(包括 Microsoft 的 VB、Excel 等)中自动操作 AutoCAD, 可以使用 AutoCAD 图形上的所有实体, 并且可以处理控制图形的视图区大小和位置等。

用 VB 编写应用程序开始部分, 先判断应用对象 AutoCAD 是否在运行。

```
Dim acadApp As Object
Set acadApp=-
  GetObject(, "AutoCAD.Application")
If Err Then
  Err.Clear
  Set acadApp=-
  CreateObject("AutoCAD.Application")
  If Err Then
    MsgBox Err.Description
    End
  End If
  End If
  acadApp.Visible=True
```

也可以判断是否已装入你想处理的图形文件。

```
Dim acadDoc As Object
Set acadDoc=acadApp.ActiveDocument
If acadDoc.FullName ◇dwgName Then
  ' dwgName 为要打开的图形文件名
  acadDoc.Save
  acadDoc.Open dwgName
End If
```

3　阀门绘制应用程序的设计

在 VB 编程环境中, 创建应用程序的方法很简单, 首先是设计用户界面, 即在空白窗体中放入所需要的控件, 如命令按钮, 文本框, 图片框等, 然后针对各控件编写事件过程。如图 1 所示。

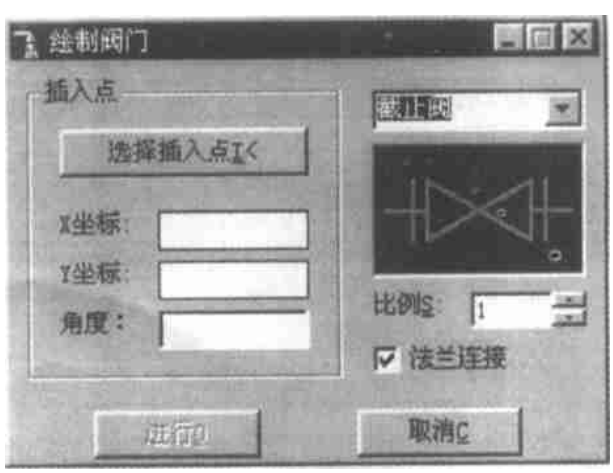

图 1　阀门绘制应用程序的用户界面

收稿日期: 1998－09－18; 修订日期: 1999－01－20

作者简介: 林向东(1964－), 男, 福州人, 工学硕士, 哈尔滨·第七　三研究所无锡分部高工. 通讯处: 214151　无锡市 117 信箱

在窗体说明中定义 Dim acadApp, acadDoc, mo-Space, acadUtil, sset As Object, IntPoint(0 To 2)As Double, Online As Boolean。阀门类型可以通过鼠标单击组合框控件来选择, 同时在图片框中显示阀门图样。在 Private Sub Form _ Load()中, 将阀门类型赋值给组合框控件 CbType, 即

```
CbType.AddItem"截止阀", 0
CbType.AddItem"闸阀", 1
CbType.AddItem"单向阀", 2 等等
```

如果要按法兰连接方式绘制, 只要点选窗体上的复选框即可。法门大小由文本框中的数值而定, 缺省值为 5 mm 长。用鼠标单击命令按钮选择阀门在直线或图面上的插入点, 其坐标显示在两个文本框中。选取插入点的事件代码为

```
Private Sub cmdIntPoint _Click()
Dim prompt As String
Dim Pt As Variant
On Error Resume Next
AppActivate acadApp.Caption
prompt=vbCrLf &"Insert point:"
Pt=acadUtil.GetPoint(, prompt)
cmdOk.Enabled=True
tX.Text=Format(Str $(Pt(0)),". # # # #")
tY.Text=Format(Str $(Pt(1)),". # # # #")
Call Convert(IntPoint, Pt, 0)
Set sset=acadDoc.SelectionSets.Add("ss1")
Dim gpCode(0)As Integer
Dim dataValue(0)As Variant
gpCode(0)=0
dataValue(0)="Line"
Dim groupCode As Variant, dataCode As Variant
groupCode=gpCode
dataCode= dataValue
Call sset.SelectAtPoint(IntPoint, -
  groupCode, dataCode)
If sset.Count>0 Then
  LbLine.Visible=True
  LbAngle.Visible=False
  TAngle.Visible=False
  Online=True
Else
  LbLine.Visible=False
  LbAngle.Visible=True
  TAngle.Visible=True
  TAngle.Text=0
  Online=False
End If
AppActivate frm Valve.Caption
End Sub
```

如果选取的插入点不在一直线上, 则要求输入一个角度值, 相应标签和文本框 Visible 属性设置为 True。

假定已在 AutoCAD 图形一条直线上选取一插入点, 绘制截止阀的过程代码为

```
On Error Resume Next
Dim lineObj As Object, ent As Object
Dim VLength As Double, VScale As Single, -
  retLayer As String, retColor As Long
Dim stpt(0 To 2)As Double, -
  endpt(0 To 2)As Double, retAngle As Double
Dim pt1(0 To 2)As Double, -
  pt2(0 To 2)As Double
Dim pt3(0 To 2)As Double, -
  pt4(0 To 2)As Double
Dim pl1(0 To 2)As Double, -
  pl2(0 To 2)As Double
Dim ptv As Variant, -
  intPt1 As Variant, intPt2 As Variant
Const VL=5
Const PI=3.14159265359

If Online Then
  sset.Highlight(False)
  Set ent=sset.Item(0)
  retLayer=ent.Layer: retColor=ent.Color
  Call Convert(stpt, ent.startPoint, 0)
    '将直线起始点坐标赋予 stpt
  Call Convert(endpt, ent.endPoint, 0)
    '将直线终点坐标赋予 endpt
  retAngle=-
    acadUtil.AngleFromXAxis(stpt, endpt)+PI/2
    '计算直线倾斜角
Else
  retAngle=TAngle.Text*PI/180+PI/2
    '当插入点不在直线时取倾斜角
```

```
End If
If TScale.Text 〈 〉 “”Then ‘设置阀门绘制比例
  VScale=TScale.Text
Else
  VScale=1
End If
VLength=VL*VScale/1.732 ‘计算阀门长度
AppActivate acadApp.Caption
Select Case CbValveType.ListIndex
Case 0
  If Check1.Value Then ‘绘制法兰线
    ptv=acadUtil.PolarPoint(IntPoint,-
      retAngle-PI/2,3/VScale)
    Call Convert(pl1,ptv,0)
    ptv=acadUtil.PolarPoint(IntPoint,-
      retAngle+PI/2,3/VScale)
    Call Convert(pl2,ptv,0)
    ptv=acadUtil.PolarPoint(pl1,retAngle,-
      0.5*VLength)
    Call Convert(pt1,ptv,0)
    ptv=acadUtil.PolarPoint(pl1,-
      retAngle+PI,0.5*VLength)
    Call Convert(pt2,ptv,0)
    ptv=acadUtil.PolarPoint(pl2,-
      retAngle+PI,0.5*VLength)
    Call Convert(pt3,ptv,0)
    ptv=acadUtil.PolarPoint(pl2,-
      retAngle,0.5*VLength)
    Call Convert(pt4,ptv,0)
    Set lineObj=moSpace.AddLine(pt1,pt2)
    Set LineObj=moSpace.AddLine(pt3,pt4)
End If
ptv=acadUtil.PolarPoint(IntPoint,-
  retAngle+2*PI/3,VLength)
Call Convert(pt1,ptv,0)
ptv=acadUtil.PolarPoint(IntPoint,-
  retAngle+PI/3,VLength)
Call Convert(pt2,ptv,0)
ptv=acadUtil.PolarPoint(IntPoint,-
  retAngle+4*PI/3,VLength)
Call Convert(pt3,ptv,0)
ptv=acadUtil.PolarPoint(IntPoint,-
  retAngle+5*PI/3,VLength)
Call Convert(pt4,ptv,0)
Set lineObj=moSpace.AddLine(pt1,pt2)
If Online Then intPt1=-
  ent.IntersectWith(lineObj,0)
Set lineObj=moSpace.AddLine(pt2,pt3)
Set lineObj=moSpace.AddLine(pt3,pt4)
If Online Then intPt2=-
  ent.IntersectWith(lineObj,0)
Set lineObj=moSpace.AddLine(pt4,pt1)
If Online Then
  ent.Erase
  Call Convert(pl1,intPt1,0)
  Call Convert(pl2,intPt2,0)
  Set lineObj=moSpace.AddLine(stpt,pl1)
  lineObj.Layer=retLayer:lineObj.Color=retColor
  Set lineObj=moSpace.AddLine(pl2,endpt)
  lineObj.Layer=retLayer:lineObj.Color=retColor
  End If
  lineObj.Update
Case 1

End Select
AppActivate frm Valve.Caption
```

4 结束语

在完成编写应用程序之后,经过运行调试,生成可执行文件,即可在 AutoCAD R14 for Windows 中应用。如果必要,可以将它装入菜单文件中。笔者在设计工作中深感到,充分利用 AutoCAD 的丰富资源作二次开发,可很大程度地提高设计绘图的效率。

参考文献

〔1〕〔美〕George Omura. AutoCAD 14 从入门到精通. 电子工业出版社, 1998.3.

〔2〕 刘炳文. Visual Basic 4.0 for windows 95 高级程序设计. 人民邮电出版社, 1998.4.

(复 编辑)

mance variation relationship and the specific features of the air-cooling tower inner and outer flow fields under cross-wind operating conditions. By revealing the major cause of the drop in heat dissipation the above work is helpful in providing some new ideas for further improving the cooling-air tower performance. **Key words**: air-cooling tower, Heller type indirect air-cooling system, k -ε dual equation model, numerical simulation, turbulent flow field

燃机 Mark V 遥控监控系统=**Mark V Remote-controlled Monitoring System for Gas Turbines**〔刊, 中〕/Wang Jingyi, Shen Qingwen, Yun Ruitian (Harbin No. 703 Research Institute), et al //Journal of Engineering for Thermal Energy &Power, 2000, 15(1). —55 ~ 58

The application of an industrial control PC is described. Through the preparation of a pertinent software the use of GE Co. Mark V gas turbine control system as a remote-controlled monitoring system was successfully realized. Furthermore, a detailed account of the software design process is also given. **Key words**: gas turbine control system, remote-controlled monitoring, software design

工业锅炉热力计算软件编制=**Preparation of a Thermodynamic Calculation Software for Industrial Boilers**〔刊, 中〕/Han Muxin, Fan Wei (Harbin No. 703 Research Institute), Lu Hengyu (Harbin Boiler Works), et al //Journal of Engineering for Thermal Energy &Power, 2000, 15(1). —59 ~ 61

By the use of a target-oriented programming language the authors have developed a Windows 95-based industrial boiler thermodynamic calculation software. Described in this paper are the specific features of the above development process. A proper approach for solving some key technical issues has also been expounded. **Key words**: industrial boiler, thermodynamic calculation, OOP

用 VB 编制 AutoCAD 阀门绘制程序=**Application Program of AutoCAD Plotting of Valves with the Help of a Visual Basic Language**〔刊, 中〕/Lin Xiangdong (Harbin No. 703 Research Institute) //Journal of Engineering for Thermal Energy &Power, 2000, 15(1). —62 ~ 64

The preparation of an application program for AutoCAD plotting of valves with the aid of a visual basic language is briefly described in this paper for use in a thermodynamic system. This results in a significant enhancement of the AutoCad plotting efficiency. **Key words**: AutoCAD, VB language, plotting of valves

利用冷却塔排放湿法脱硫锅炉净烟气的技术=**New Technology Featuring the Discharge of Desulfurized Gas via a Cooling Tower for Boilers with a Flue Gas Wet Desulfurization System**〔刊, 中〕/Luo Chuankui Nong Youxing, Ying Chunhua (Zhejiang Provincial Electric Power Design Institute) //Journal of Engineering for Thermal Energy & Power, 2000, 15(1). —65 ~ 66

With the development and gradual sophistication of flue gas desulphurization technology, especially flue gas wet desulphurization, there emerged in succession various versions of this new technology. The discharge via a cooling tower of desulphurized flue gas represents one of the typical methods currently widely employed in some developed countries with high effectiveness. By contrast, the use of such technology in China is still in its infancy. Nevertheless, its rapid popularization can be readily expected in view of its varied technical merits. After a brief description and economic evaluation of the above technology the present paper proposes some original approaches for stepping up its engineering applications in China. **Key words**: cooling tower, discharge of flue gas, desulphrization

锅炉制造业几种简易设备的研制=**Development and Fabrication of Some Simple Machines Used in Boiler Manufacturing Industry**〔刊, 中〕/Zhao Yan (Heilongjiang Provincial Machine Manufacturing Technicum), Dong Dachang (Harbin Boiler Inspection Research Institute), Song Wei (Hegang Municipal Water, Electricity and Thermal Power Co.) //Journal of Engineering for Thermal Energy &Power, 2000, 15(1). —67 ~ 68, 74