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ICRC

Industrial Control
Research Center

Gadook Final Report (Page 1)

REPORT

CONVERSION OF

GADOOK Co.

HOT CHAMBER

FINAL REPORT

Contract No. 98/052P

UNIDO's PROJECT No. MP/IRA/96/041

1999

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SYNOPSIS

Under supreme supervision of **UNIDO** the **CFC** phase project has been implemented in Iran to phase out 100 % ODS in some Iranian White Industries

The project No. **MP/IRA/96/041** has been nominated to Islamic Republic of Iran for the Multilateral Fund for the implementation of The Montreal Protocol Financing.

The project was approved by Montreal Protocol Multilateral Fund executive committee. The project was actually started in November 1994, but the implementation of the project has been already started from January 1994, by recommendation of Montreal Protocol and request of Government of Islamic Republic of Iran, the refrigerant R134a was finally approved and selected by **UNIDO** as an alternative for refrigerant R12.

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INTRODUCTION

According to **UNIDO** contract No. **98/052P** with Industrial Control Research Center Co. (**ICRC**) the existing **Gadook Co.** hot chambers facilities shall be converted and modified to phase out CFC-12 and suitable for **R134a** refrigerant to perform functionality and performance test of converted refrigerators and complying with ISO standards 7173, 8187, and 5155.

- 1 This project has been prepared based on the requirements of Islamic Republic of Iran indicated in the country program no *UNEP/OZL.PRO/EX COM/10/24* dated 27 May 1993 prepared by **UNDP**.
- 2 The **CFC** phase out project in **Gadook Co.** will enable **Gadook Co.** to convert the existing production line facilities and existing hot chambers into Non CFC production line, using **R134a** refrigerant.
- 3 The converted Hot Chamber Installations will provide more than 20 data points in the refrigeration circuit this means more information and the ability of analyzing refrigeration system and new refrigerant effect.
- 6 The reconstructed Hot Chamber will be able to check and test three refrigerator and/or ref.-freezers units at the same time. The same equipment and data processing system, as will be used at Tehran plant test room will be installed in this chamber.
- 7 The immediate effect of this project at **Gadook Co.** is to perform all required check and tests, suitable for Refrigerator & Freezers using Ozone Friendly Gases. The existing test facilities in **Gadook Co.** are not adequate for check and testing, converted ref. and freezer units, in addition to that the hot rooms are not able to perform Energy Consumption and Optimization Program.

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ICRC Hot Chamber Characteristics

In order to convert *Gadook Co.* hot rooms facilities , ICRC shall provide following services:

- Supply of new equipment.
- Redesign of old equipment
- Delivery of technical drawings and software.
- Installation and commissioning.
- Start-up of the equipment and the technology.
- On-the-job training of the plant personnel.

With respect to **ISO** standards test requirements, and for the purpose of functionality and performance tests of the new redesigned Refrigerator and Ref.-Freezers using R134a refrigerants. The existing hot room in *Gadook Co.* is being converted and equipped in such a way to enable *Gadook Co.* to check and test at least one different models of refrigerators and freezers at ambient temperature 32 to 43 degree centigrade at one hot room chambers . In addition to these services is providing. But the hot room is capable to test eight refrigerators and freezers in case of adding more transducers and sensors in the main panel in the hot room:

- a) Procurement of new test measurement and data processing equipment.
- b) Redesign and rebuilding of presently used equipment and installation.
- c) Installation, commissioning, trial operation, start-up and on-the-job training

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GADOOK HOT CHAMBER TECHNICAL SPECIFICATION

As previously mentioned , *Gadook Co.*'s plant is producing 100 refrigerator daily . And subsequently the hot chamber should have been able to cover plant daily test requirement as well as other activities. Therefore, the converted hot chamber should respond to all test requirement and be able to meet ISO standards numbers 7371, 5155, 8187 as set forth in the contract and IJISI, Iranian standards numbers 254, 2482, 2818. The plant hot chamber technical specification are as follows:

- Hot Chamber Dimension about 3.5 mt. by 4 mt.
- Refrigerator test ability simultaneously, 2 units
- Ability to perform following operational tests and report:
 - 1 - Pull down test.
 - 2 - Continuous run test.
 - 3 - Cyclic run test.
 - 4 - Ice Freeze test.
 - 5 - Energy consumption test

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- 20 Measuring points, including. (for one applia.)

- 1 - Humidity, one point for one hot room.
- 2 - Compressor Power, one point
- 3 - Motor current, one point.
- 4 - Supply Voltage, one point.
- 5 - Hot chamber air temperature reading, one point.

160 points for eight models in case of improving the system by spending very low costs.

- Computerized graphical diagram of the refrigerator performance data sheet.
- Test measurement tolerance for temperature reading 0.3 degree centigrade.
- Computerized data processing system.
- Full color test sheet system reporting.

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- On screen and data reporting system ability with following characteristics;

- 1 - Test number.
- 2 - Product name.
- 3 - Product model
- 4 - Product internal volume
- 5 - Compressor name
- 6 - Compressor model
- 7 - Compressor cooling capacity
- 8 - Compressor current
- 9 - Thermostat setting
- 10 - Thermostat type.
- 11 - Total test running time.
- 12 - Ambient temperature.
- 13 - Voltage rating
- 14 - Working percentage
- 15 - Evaporator mean air temperature
- 16 - Cabin mean temperature
- 17 - Evaporator bulb temperature
- 18 - Crisper temperature.
- 19 - Actual compressor running time
- 20 - Energy consumption
- 21 - Compressor motor winding temperature
- 22 - Compressor shell temperature.
- 23 - Compressor discharge temperature.
- 24 - Condenser inlet temperature.
- 25 - Condenser out let temperature.
- 26 - Condenser mid temperature
- 27 - Evaporator inlet temperature
- 28 - Evaporator outlet temperature.
- 29 - Freezing temperature.
- 30 - Refrigeration system condition display.

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ACTIVITIES

The following activities were accomplished so far toward the first interim report

1 - Planning for

- a) Hot chambers system management.
- b) Hot chambers graphic display management.
- c) Hot chambers calibration setting parameters.
- d) Hot chambers test standards management

2 - Preparing all material .

3 - Installing Component and material and Data Logger Panel .

4 - Technical data collecting.

5 - Engineering testing of electronic and electrical system

6 - Hot chamber design review.

7 - Data processing software installing.

8 - Data processing hardware installing.

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- 9 - Thermal amplification electronic cart installing
- 10 - installing of timer 1 flow chart..
- 11 - Last test of data loggers electronic cart.
- 12 - Last connection of data loggers to the computers.
- 13 - Interface electronic cart design for PC and operating system.
- 14 - RTX3 electronic diagram design.
- 15 - RTX electronic diagram design.
- 16 - UNIDO, CRC - 386 design.
- 17 - UNIDO, TC- 100 design.
- 18 - UNIDO, in-out CRC design.
- 19 - Preparation of operating system display flow chart.
- 20 - Visits and coordination;
 - Visiting plant four days, two engineers, one time.
 - Visiting and coordinating with UNDP office .
 - Technical negotiation with *Gadook Co.* engineers in order to coordinate activities.
 - Visiting hot chamber several times in order to coordinate activities.



21 - Activities On Hot Chamber

- a) Hot Chamber Heat Control Design
- b) Hot Chamber Heat Capacity
- c) Hot Chamber Heat Leak
- d) System Control Planning
- e) Cooling System Ordering

22 - Following steps were taken to manufacture hot chamber hoods

- a) Designing
- b) Fabricating
- c) Preparing
- d) Hood Installing
- e) Sensors preparation
- f) Sensor check and test
- g) Sensor installing
- h) Wiring
- i) Wiring Control
- j) Selecting Blower and Fan
- k) Blower check and test
- l) Blower installation

23- Following Component and Parts were Designed and manufactured

- a) Complete Data Logger System
- b) Thermal Amplifier
- c) Electrical Control Panel
- d) Electronic Control Panel
- e) Complete Heat control system
- f) Hot Air Circulation System

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SUPPLY PARTS AND MATERIALS

In order to fabricate components and electronic kits following material and parts have been purchased so far and fabricated .

- 1 - Semiconductor sensors for measuring temperature from - 30 to + 110 degree centigrade. 16 each
- 2 - Electronic humidity measurement sensor 1 each
- 3 - Electronic data logger cart for temperature measurement 2 each
- 4 - Electronic data logger cart for humidity Calibration 1 each
- 5 - ADC912 Converter IC for system conversion management.
- 6 - Electronic parts consist of resistor. IC, capacitor, and diode.
- 7 - Data Logger Panel

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```
ElseIf n > 0 Then
    If Seg(ActivePage).Left + ww + n >= Seg(ActivePage + 1).Left Then
        n1 = Seg(ActivePage + 1).Left
        n2 = (Seg(ActivePage).Left + ww)
        n = n1 - n2 - 3
    End If
ElseIf n < 0 Then
    If Seg(ActivePage - 1).Left + ww > Seg(ActivePage).Left + n Then
        n = Seg(ActivePage - 1).Left + ww - Seg(ActivePage).Left + 1
    End If
End If
'DoEvents
Seg(ActivePage).Left = Seg(ActivePage).Left + n
zoom(ActivePage).X1 = zoom(ActivePage).X1 + n
zoom(ActivePage).X2 = zoom(ActivePage).X2 + n
'DoEvents
RecLb(ActivePage).Left = RecLb(ActivePage).Left + n
RecLb(ActivePage).Caption = Val(RecLb(ActivePage).Caption) + n
Call CrvZoom

DoEvents
End Sub
```

```
'-----  
'  
Sub Form_QueryUnload (Cancel As Integer, UnloadMode As Integer)
```

```
    hr.Visible = True
```

```
End Sub
```

```
'-----  
'  
Sub Grafall_KeyDown (keycode As Integer, Shift As Integer)
```

```
    X = Int(X)
```

```
    ShiftDown = (Shift And 1) <> 0
```

```
    ww = PageWidth * 60
```

```
    Select Case keycode
```

```
        Case 49, 50, 51, 52, 53, 54
```

```
            Page = keycode - 48
```

```
            If Page > PrnPageNo Then Exit Sub
```

```
            ActivePage = Page
```

```
            Call PrnPageGrf_click
```

```
            DoEvents
```

```
            Exit Sub
```

```
        Case Key_Up
```

```
            Call PrnPageSpin_SpinUp
```

```
            Exit Sub
```

```
        Case Key_Down
```

```
            Call PrnPageSpin_SpinDown
```

```
            Exit Sub
```

```
        Case KEY_LEFT
```

```
            n = -5
```

```
        Case KEY_RIGHT
```

```
            n = 5
```

```
        Case KEY_NUMPAD4
```

```
            n = -30
```

```
        Case KEY_NUMPAD6
```

```
            n = 30
```

```
    End Select
```

```
    If ActivePage = 1 And n < 0 Then
```

```
        If Seg(1).Left + n < 0 Then n = -Seg(1).Left
```

```
    ElseIf ActivePage = PrnPageNo And n > 0 Then
```

```
        X1 = Seg(ActivePage).Left + Seg(ActivePage).Width + n
```

```
        If X1 > RecEnd0 Then
```

```
            n = RecEnd0 - (Seg(ActivePage).Left + Seg(ActivePage).Width)
```

```
        End If
```

```
For Rec = x0 To Recl
  If grf(26, Rec) = 789 Then
    If grf(18, Rec) < 30 Then
      rr(main, workoff) = rr(main, workoff) + 1
    Else
      rr(main, workon) = rr(main, workon) + 1
    End If
    rr(main, Jule) = rr(main, Jule) + grf(20, Rec)
    rr(main, CMT) = rr(main, CMT) + grf(4, Rec) + grf(5, Rec) + gr
    n_cmt_main = n_cmt_main + 3
  End If
Next Rec
rr(main, TTT) = RecEnd0
rr(main, CMT) = Int(rr(main, CMT) / n_cmt_main + .5)
```

End Sub

```
Sub Form_Activate ()
'Call PrnLb_Mousedown(0, 0, 0, 0, 0)
End Sub
```

'-----
,

```
Sub Form_Load ()

If Dir("c:\hrl.exe") <> "" Then Exit Sub
nn = Variable("Prnt", "Read")
'PrnLb(2).Caption = Operator0
'PrnLb(3).Caption = Chief0

PrnPageNo = 0
Cmd(0).Enabled = True
Cmd(1).Enabled = True
Call Color_chk_Click(True)
'Set Lb_Tmp = TestName0

grafzoom.ScaleHeight = -1450
grafzoom.ScaleTop = 1100
grafall.ScaleHeight = -1450
grafall.ScaleTop = 1100

Call crv("grfall", 0, 0)
ActivePage = 1
SegEn = -1
```

End Sub


```
Const main = 0, TTT = 0 'TTT=Total Test Time
Const workon = 1, workoff = 2, Jule = 3
Const CMT = 4 'CMT=Cabin Mid. Temperature
x0 = 1
n_cmt_main = 0
For Page = 1 To PrnPageNo
  n_cmt_Seg = 0
  Recl = Int(Seg(Page).Left + .5)
  Rec2 = Recl + Int(Seg(Page).Width + .5)
  For Rec = x0 To Recl
    If grf(26, Rec) = 789 Then
      If grf(18, Rec) < 30 Then
        rr(main, workoff) = rr(main, workoff) + 1
      Else
        rr(main, workon) = rr(main, workon) + 1
      End If
      rr(main, Jule) = rr(main, Jule) + grf(20, Rec)
      rr(main, CMT) = rr(main, CMT) + grf(4, Rec) + grf(5, Rec)
      n_cmt_main = n_cmt_main + 3'4
    End If
  Next Rec
  x0 = Recl + 1
  For Rec = Recl + 1 To Rec2
    If grf(26, Rec) = 789 Then
      If grf(18, Rec) < 30 Then
        rr(i, workoff) = rr(i, workoff) + 1
        rr(main, workoff) = rr(main, workoff) + 1
      Else
        rr(i, workon) = rr(i, workon) + 1
        rr(main, workon) = rr(main, workon) + 1
      End If
      rr(i, Jule) = rr(i, Jule) + grf(20, Rec)
      rr(main, Jule) = rr(main, Jule) + grf(20, Rec)

      rr(i, CMT) = rr(i, CMT) + grf(4, Rec) + grf(5, Rec) + grf(
      n_cmt_Seg = n_cmt_Seg + 3
      rr(main, CMT) = rr(main, CMT) + grf(4, Rec) + grf(5, Rec)
      n_cmt_main = n_cmt_main + 3

    End If
  Next Rec
  rr(i, TTT) = Rec2 - Recl
  rr(i, CMT) = Int(rr(i, CMT) / n_cmt_Seg + .5)
  x0 = Rec2 + 1
Next Page
Recl = RecEnd0
```

```
Rec_end = Rec_Start + grafzoom.ScaleWidth - 1
If Rec_end > UBound(grf, 2) Then Rec_end = UBound(grf, 2)
grafzoom.Cls
grafzoom.DrawMode = 7 ' (7=xor 13=copy)
grafzoom.Line (Rec_Start, 0)-(Rec_end, 0), QBColor(3)
For n = 0 To 1
  For d = 1 To 6
    If curve_Item(n, d) < 50 Then
      z = curve_Item(n, d)
      If hr.lbt(z).Visible = True Then
        grafzoom.ForeColor = QBColor(curve_color(n, d))
        If Rec_Start < 1 Then Rec_Start = 1
        For Rec = Rec_Start To Rec_end - 1
          bol1 = (grf(26, Rec) = 789)
          bol2 = (grf(26, Rec + 1) = 789)
          If bol1 And bol2 Then
            Y2 = grf(z, Rec + 1)
            Y1 = grf(z, Rec)
            grafzoom.Line (Rec, Y1)-(Rec + 1, Y2)
          End If
        Next Rec
      Else
        'curve_Item(n, d) = 50
        'hr.lbt(z).ForeColor = QBColor(0)
        'hr.lbt(z).BackColor = &H202020
      End If
    End If
  Next d
Next n
z = Int(zoom(ActivePage).X1)
zoomzoom.X1 = z
zoomzoom.X2 = z
zoomzoom.BorderColor = zoom(ActivePage).BorderColor
Grfzoom_pnl.BackColor = zoomzoom.BorderColor
a$ = Right$("0" & z \ 60, 2) & ":" & Right$("0" & z Mod 60, 2)
RecLb(ActivePage).Caption = a$
Call ResultsGrf_click
```

End Sub

,

Sub Extract_Results ()

```
ReDim rr(0 To 4, 0 To 4)
```

```
'rr(main,p1,p2,p3,p4;;TTT,work_on,work_off,July)
```

```
'Rec_End = Rec_Start + Seg(ActiveSeg).Width  
'grafzoom.ScaleWidth = Seg(ActiveSeg).Width  
'grafzoom.ScaleLeft = Rec_Start
```

```
grafzoom.Cls  
grafzoom.DrawMode = 7 ' (7=xor 13=copy)  
grafzoom.Line (Rec_Start, 0)-(Rec_end, 0), QBColor(3)  
For n = 0 To 1  
For d = 1 To 6  
If curve_Item(n, d) < 50 Then
```

```
z = curve_Item(n, d)  
If hr.lbt(z).Visible = True Then  
grafzoom.ForeColor = QBColor(curve_color(n, d))  
For Rec = Rec_Start To Rec_end - 1  
If grf(26, Rec) = 789 And grf(26, Rec + 1) = 789 Then  
grafzoom.Line (Rec, grf(z, Rec))-(Rec + 1, grf(z, Rec + 1))  
End If  
Next Rec  
Else  
curve_Item(n, d) = 50  
hr.lbt(z).ForeColor = QBColor(0)  
hr.lbt(z).BackColor = &H202020  
End If  
  
End If  
Next d  
Next n  
screen.MousePointer = 0  
Call ResultsGrf_click  
End Select
```

End Sub

,
,

Sub CrvZoom ()

```
On Error Resume Next  
obj = activeobj  
zoomarea = 30  
zoomarea2 = zoomarea \ 2  
grafzoom.ScaleWidth = Val(PrnLb(27)) * 60  
grafzoom.ScaleLeft = Seg(ActivePage).Left  
Rec_Start = grafzoom.ScaleLeft + 1
```

```
End If
Rec_Max = RecAll_End
screen.MousePointer = 11
sw = IIf(RecAll_End < 100, 100, RecAll_End)
grafall.ScaleWidth = sw'+ recall_end \ 10
grafall.ScaleLeft = 0
recall_start = 1
grafall.Line (recall_start, 0)-(RecAll_End, 0), QBColor(3)

For n = 0 To 1
For d = 1 To 6
If curve_Item(n, d) < 50 Then
z = curve_Item(n, d)
If hr.lbt(z).Visible = True Then
grafall.ForeColor = QBColor(curve_color(n, d))
For Rec = recall_start To RecAll_End - 1
If grf(26, Rec) = 789 And grf(26, Rec + 1) = 789 Then
grafall.Line (Rec, grf(z, Rec))-(Rec + 1, grf(z, Rec + 1)
End If
Next Rec
Else
curve_Item(n, d) = 50
hr.lbt(z).ForeColor = QBColor(0)
hr.lbt(z).BackColor = &H202020
End If

End If
Next d
Next n
screen.MousePointer = 0
Case "grfzoom"
On Error Resume Next
obj = activeobj

zoomarea = 30
zoomarea2 = zoomarea \ 2
grafzoom.ScaleWidth = zoomarea
'X = Int(zoom.X1 + .5)
'If X > Rec_Max Then Stop
grafzoom.ScaleLeft = X - zoomarea2

Rec_Start = IIf(X - zoomarea2 > 0, X - zoomarea2, 0)
Rec_end = IIf(X + zoomarea2 < Rec_Max, X + zoomarea2, Rec_Max)

'Rec_Start = Seg(ActiveSeg).Left
```

```
R1 = (Rec1 \ 10 + 1) * 10
R2 = (Rec2 \ 10) * 10
```

```
printer.FontSize = 5
printer.ForeColor = Black
For Rec = R1 To R2 Step 10
```

```
printer.Line (Rec, 10)-(Rec, -10), Black
  n = n + 1
  If n Mod 3 = 0 Then
    B$ = Right$("0" & Rec \ 60, 2) & ":" & Right$("0" & Rec Mo
    printer.CurrentX = Rec - 2'offset / 13
    printer.CurrentY = -12
    printer.Print B$
  End If
Next Rec
```

```
'graph
For n = 0 To 1
  For d = 1 To 6
    If curve_Item(n, d) < 50 Then
      z = curve_Item(n, d)
      If curve_color(n, d) = 15 Then col = 0 Else col = curv
      printer.ForeColor = IIf(prn_color = False, Black, QBCo
      For Rec = Rec1 To Rec2 - 1
        bool1 = grf(26, Rec) = 789
        bool2 = grf(26, Rec + 1) = 789
        If bool1 And bool2 Then
          Y1 = grf(z, Rec)
          Y2 = grf(z, Rec + 1)
          printer.Line (Rec, Y1)-(Rec + 1, Y2)
        End If
      Next Rec
    End If
  Next d
Next n
```

```
Case "grfall"
```

```
On Error Resume Next 'Note:Karim
```

```
obj = activeobj
```

```
grafall.Cls
```

```
grafall.DrawMode = 7
```

```
' (7=xor 13=copy)
```

```
RecAll_End = UBound(grf, 2) - 1
```

```
If Err = 9 Then
```

```
  Rec_Max = 0
```

```
  Exit Sub
```

```
Magenta = QBColor(5)
YELLOW = QBColor(6)
gray = QBColor(8)
L_Blue = QBColor(9)
```

```
L_Green = QBColor(10)
L_cyan = QBColor(11)
L_red = QBColor(12)
L_Magenta = QBColor(13)
L_yellow = QBColor(14)
End If
```

```
End Sub
```

```
'-----
```

```
Sub crv (mode$, Rec1, Rec2)
```

```
  Select Case mode$
```

```
    Case "prn"
```

```
      printer.ForeColor = Black
      printer.FontName = "Arial"
      printer.FontSize = 10
      obj = activeobj
```

```
      'print x_axis
      printer.DrawWidth = 3 * printerdrawwidth
      printer.Line (Rec1, 0)-(Rec2, 0)'axis
      printer.DrawWidth = 1
      printer.DrawStyle = 2'=Dot 3=Dash-Dot 4=Dash_Dot_Dot
      For i = -300 To 1000 Step 100
        printer.Line (Rec1, i)-(Rec2, i)
```

```
      Next i
```

```
      Rec = zoom(Seg_n).X1
      printer.DrawWidth = 3 * printerdrawwidth
      printer.ForeColor = IIf(prn_color = False, Black, zoom(Seg_n).Bord
      printer.Line (Rec, -300)-(Rec, 1000)
      printer.DrawStyle = 0 'Solid
      printer.DrawWidth = 1 * printerdrawwidth
```

```
      printer.CurrentX = Rec - RecLb(Seg_n).Width / 2
      printer.CurrentY = 1030
      printer.Print RecLb(Seg_n).Caption
```

```
      n = -1
```

```
Cmd(1).Enabled = True
'Unload Me
```

```
Case 1                                'Save
    nn = Variable("Prnt", "Write")
    nn = Variable("Prnt", "Read")
Case 2                                'cancel
    Unload Me
Case 3
    Me.Hide
    Paper.Show
End Select
Exit Sub
End Sub
```

'-----
'

```
Sub Color_chk_Click (Value As Integer)
```

```
    If color_chk.Value = False Then
```

```
        prn_color = False
        color = 0
        Black = color
        Blue = color
        Green = color
        Cyan = color
        red = color
        Magenta = color
        YELLOW = color
        gray = color
        L_Blue = color
        L_Green = color
        L_cyan = color
        L_red = color
        L_Magenta = color
        L_yellow = color
```

```
    Else
```

```
        prn_color = True
        Black = QBColor(0)
        Blue = QBColor(1)
        Green = QBColor(2)
        Cyan = QBColor(3)
        red = QBColor(4)
```

```
Dim Black, Blue, Green
Dim Cyan, red, Magenta, YELLOW
Dim gray, L_Blue, L_Green
Dim L_cyan, L_red, L_Magenta, L_yellow
```

```
Dim prn_color As Integer 'False=Black & White ; True=Color
```

```
Dim printcolor As Integer
Dim Y, Repstr$, Rot_Txt_no%
Dim printerdrawwidth As Integer
Dim offset, PageNo
Dim Lb_Tmp As Label
Dim FirstKey
```

```
Dim Rec_Max%
    Dim SegEn
    Dim ActiveFrame      As Integer
    Dim ActiveLabel     As Integer
    Dim Seg_n           As Integer

    Dim PrnPageNo       As Integer
    Dim ActivePage      As Integer
```

```
Dim sl%, st%, sw%, sh%, dw%
Dim a30 As String * 30
```

```
Dim rr() 'Extracted Results
```

```
Sub cmd_click (Index As Integer)
```

```
    Select Case Index
```

```
        Case 0
```

```
            'print
```

```
                screen.MousePointer = 11
                Cmd(0).Enabled = False
                Cmd(1).Enabled = False
                DoEvents
                Call Print_All
                Call Save_Spec
                screen.MousePointer = 0
                Cmd(0).Enabled = True
```




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- ماشین را روشن میکنیم

بررسی آزمایش های قبلی

- برای بررسی آزمایش های قبلی آیکون گراف را تیک میکنیم
- از روی لیست نام آزمایش مورد نظر خود را انتخاب میکنیم
- با تیک کردن روی نقاط مورد نظر برای مشاهده منحنی منحنی های مربوطه را فعال میکنیم
- هر منحنی یک رنگ خاص برای خود در نظر میگیرد
- در کل ۵ نقطه در داخل یخچال و ۵ نقطه در بیرون یخچال میتوانیم انتخاب همزمان داشته باشیم
- با اسکرول افقی میتوانیم به زمان های مختلف از آزمایش دسترسی داشته باشیم
- با تیک کردن مجدد بر روی نقاط تعیین شده میتوان آنها را فعال و یا غیر فعال نمود
- با استفاده از خط زوم که توسط ماوس بر روی صفحه گرافیک ظاهر میشود میتوان جزئیات را خواند
- با تیک کردن بر روی صفحه گرافیک میتوان محل خط زوم را تعیین کرد
- اطلاعات محل زوم بر روی میمیک یخچال نوشته میشود
- برای مقایسه نتایج آزمایش یخچال های مختلف میتوان بلافاصله با تیک کردن روی آیکون فایل اقدام به انتخاب فایل آزمایش دیگری نمود



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چاپ نتایج آزمایش

- برای چاپ نتایج آزمایش های قبلی آیکون گراف را تیک میکنیم
- از روی لیست نام آزمایش مورد نظر خود را انتخاب میکنیم
- با تیک کردن روی نقاط مورد نظر برای مشاهده منحنی منحنی های مربوطه را فعال میکنیم
- هر منحنی یک رنگ خاص برای خود در نظر میگیرد
- در کل ۵ نقطه در داخل یخچال و ۵ نقطه در بیرون یخچال میتوانیم انتخاب همزمان داشته باشیم
- با اسکرول افقی میتوانیم به زمان های مختلف از آزمایش دسترسی داشته باشیم
- با تیک کردن مجدد بر روی نقاط تعیین شده میتوان آنها را فعال و یا غیر فعال نمود
- با استفاده از خط زوم که توسط ماوس بر روی صفحه گرافیک ظاهر میشود میتوان جزئیات را خواند
- با تیک کردن بر روی صفحه گرافیک میتوان محل خط زوم را تعیین کرد
- اطلاعات محل زوم بر روی میمیک یخچال نوشته میشود
- آیکون چاپ را تیک میکنیم
- درخواست یک سگمنت برای چاپ میکنیم
- با کشیدن دو طرف سگمنت محل آنرا در محدوده زمانی مورد نظر قرار میدهیم
- در صورت لزوم سگمنت دیگری درخواست میکنیم
- محل ابتدا و انتهای سگمنت را تعیین میکنیم
- با تیک نمودن آیکون چاپ صفحه تنظیمات چاپ ظاهر میگردد
- تنظیمات عبارتند از تعداد ساعت بر صفحه و مشخصات تفصیلی نمونه و مشخصات زمانی و اپراتوری
- با تیک نمودن مجدد بر روی آیکون پرینتر عملیات پرینت آغاز میگردد



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آغاز یک آزمایش جدید

- نمونه هارا در محل مخصوص قرار داده و سنسورها را به مکان های خاص خود نصب میکنیم
- با تیک نمودن آیکون قلم مشخصات نمونه را به کامپیوتر وارد میکنیم
- نقاط تست غیر لازم را از روی میمیک حذف میکنیم
- شرایط حرارتی و رطوبتی را مشخص میکنیم
- با تیک نمودن آیکون استارت عملیات آزمایش را شروع میکنیم
- از این لحظه دیگر نمیتوان مشخصات نمونه را تغییر داد
- میتوان برای جلوگیری از فرسودگی اقدام به خاموش نمودن مونیتر نمود
- گراف های آزمایش جاری همیشه روی صفحه در اختیار اپراتور میباشد



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پایان یک آزمایش جاری

- ابتدا اقدام به مشاهده گراف آزمایش جاری مینماییم
- در صورت لزوم با تیک کردن بر روی آیکن Stop دیالوگ تایید مجدد ظاهر میشود
- در صورت لزوم با تایید مجدد Stop فایل جاری بسته شده و دیگر نمیتوان هیچگونه تغییری در آن داد



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کالیبراسیون

- ضرایب کالیبراسیون سیستم در درون حافظه کامپیوتر قرار دارد
- کلیه عملیات کالیبراسیون توسط متخصص ماشین انجام میگردد
- عملیات کالیبره نمودن باید هر دو ماه یک بار انجام گردد
- تست کالیبره بودن توسط اپراتور ماشین در هر هفته یک بار باید انجام گیرد





