Folha20 - 1

```
Private Sub ComboBox1_Change()

End Sub
```

```
Folha21 - 1

Private Sub Image1_Click()

End Sub

Private Sub Novo_Perfil_Click()

Escolha_do_Perfil.Show

End Sub
```

```
Private Sub ComdButt1_RESET_Click()
Worksheets(2).Select
Worksheets(2).Range("L9") = "Off"
Worksheets(2).Range("L22") = "Off"
Worksheets(2).Range("L40") = "Off"
Worksheets(2).Range("L56") = "Off"
Worksheets(2).Range("L84") = "Off"
Worksheets(2).Range("L30") = "Off"
Worksheets(2).Range("E6") = ""
Worksheets(2).Range("C90") = ""
Worksheets(2).Range("M9") = ""
'Stop
Worksheets(2).ComdButt1_RESET.Height = 32
Worksheets(2).ComdButt1_RESET.Height = 31
Worksheets(2).ComdButt1_RESET.Height = 32
Worksheets(2).ComdButt1_RESET.Width = 100
Worksheets(2).ComdButt1_RESET.FontName = "Arial"
Worksheets(2).ComdButt1_RESET.FontSize = 9

Worksheets(2).ComdButt1_RESET.Placement = 3

Worksheets(2).ComdButt2_InsereSeccao.Height = 32
Worksheets(2).ComdButt2_InsereSeccao.Width = 100
Worksheets(2).ComdButt2_InsereSeccao.Placement = 3

Worksheets(2).ComdButt3_Mcritico.Height = 32
Worksheets(2).ComdButt3_Mcritico.Width = 136
Worksheets(2).ComdButt3_Mcritico.Placement = 3
Worksheets(2).CommandEsforcos.Height = 32
Worksheets(2).CommandEsforcos.Width = 136
Worksheets(2).CommandEsforcos.Placement = 3

Worksheets(2).ComdButt5_factores_Cm_Metodo2.Height = 32
Worksheets(2).ComdButt5_factores_Cm_Metodo2.Width = 138
Worksheets(2).ComdButt5_factores_Cm_Metodo2.Placement = 3

Worksheets(2).ComdButt6_VS_Metodo2.Caption = "6) Factores interação ki
j e" & vbLf & "V.Segurança  (Método 2)"
Worksheets(2).ComdButt6_VS_Metodo2.Height = 34
Worksheets(2).ComdButt6_VS_Metodo2.Width = 138
Worksheets(2).ComdButt6_VS_Metodo2.Placement = 3



Worksheets(2).ComdButt7_VS_Metodo1.Caption = "7) Factores interação ki
j e" & vbLf & "V.Segurança  (Método 1)"
Worksheets(2).ComdButt7_VS_Metodo1.Height = 34
Worksheets(2).ComdButt7_VS_Metodo1.Width = 138
Worksheets(2).ComdButt7_VS_Metodo1.Placement = 3
End Sub
Private Sub ComdButt2_InsereSeccao_Click()
Dim kkk As String
```

```
Folha22 - 2

'Stop
kkk = Gama(nGama)
'Stop

Select Case kkk

Case Is = "UAP", "UPN"    ' Foi retirado o "UC"
    MsgBox "O Perfil " & kkk & " não é aplicavel, cancele!, retome a f
olha 1", vbInformation, "Carregar a secção"

Case Is = "L", "Li", "C", "JIS", "IFB", "SFB"
    MsgBox "O Perfil " & kkk & " não é aplicavel, cancele!, retome a f
olha 1", vbInformation, "Carregar a secção"

Case Else
    MsgBox "O Perfil " & kkk & " vai ser transferido a partir da folha
 1", vbInformation, "Carregar a secção"

End Select

Worksheets(2).Range("F9") = Worksheets(1).Range("H11") / 100 'area
Worksheets(2).Range("H6") = Worksheets(1).Range("J3") / 10000 'Inercy
Worksheets(2).Range("H7") = Worksheets(1).Range("J4") / 1000 'wely
Worksheets(2).Range("H8") = Worksheets(1).Range("J5") / 1000 'wply
Worksheets(2).Range("H9") = Worksheets(1).Range("J6") / 10 'iy

Worksheets(2).Range("H10") = Worksheets(1).Range("J8") / 10000 'Inercz
Worksheets(2).Range("H11") = Worksheets(1).Range("J9") / 1000 'welz
Worksheets(2).Range("H12") = Worksheets(1).Range("J10") / 1000 'wplz
Worksheets(2).Range("H13") = Worksheets(1).Range("J11") / 10 'iz
Worksheets(2).Range("H14") = Worksheets(1).Range("J14") / 10000 'it
Worksheets(2).Range("H15") = Worksheets(1).Range("J15") / 1000000 'iw
Worksheets(2).Range("E4") = Worksheets(1).Range("G2")   'nomeperfil

Range("M9") = "Perfil Inserido"
Range("L9") = "On"
Worksheets(2).ComdButt2_InsereSeccao.Height = 32
Worksheets(2).ComdButt2_InsereSeccao.Height = 35
Worksheets(2).ComdButt2_InsereSeccao.Height = 32
Worksheets(2).ComdButt2_InsereSeccao.Width = 100
Worksheets(2).ComdButt2_InsereSeccao.FontName = "Arial"
Worksheets(2).ComdButt2_InsereSeccao.Placement = 3


End Sub

Private Sub ComdButt5_factores_Cm_Metodo2_Click()
Dim alfsstr As String, alfhstr As String, PP As String
Dim MSDLMCDL As String
Dim alfs As Single, alfh As Single, Cm As Single, Cml As Single
Dim Linha As Integer, tpcarga As String, pL As String
Dim Mesq As Single, Mdir As Single, Mvao As Single, psi As Single, Mh
As Single
Dim caso As Single
```

```
Folha22 - 3

'Stop
Worksheets(2).Select

'Stop

'Deslocamentos Laterais ----------------------------------------
MSDLMCDL = Range("D40")      ' Modo sem deslocamentos laterais =0
                            ' Modo com deslocamentos laterais = 1
If MSDLMCDL <> "MSDL" And MSDLMCDL <> "MCDL" Then Range("D40") = "ERRO
": Exit Sub

'-------------------------------------------------------------

For Linha = 1 To 3
    Mesq = Mom(Linha, 1)
    Mdir = Mom(Linha, 2)
    Mvao = Mom(Linha, 3)
'Verificação do tipo de carga de vão
    'pp = Trim(Str(9 + 2 * (Linha - 1)))
    PP = 31 + 2 * (Linha - 1)

    tpcarga = TipoCarga(Linha)
    If tpcarga = "U" Or tpcarga = "u" Then CRG(Linha) = "Uniforme": tp
carga = "U"
    If tpcarga = "P" Or tpcarga = "p" Then CRG(Linha) = "Pontual": tpc
arga = "P"
    If tpcarga <> "U" And tpcarga <> "P" Then CRG(Linha) = "Não tem":
tpcarga = "NT"
'Calculo do psi
    If Mesq = 0 And Mdir = 0 Then psi = 0: Mh = 0

    If Abs(Mesq) > 0 And Abs(Mesq) >= Abs(Mdir) Then
            psi = Mdir / Mesq
            Mh = Mesq
    End If

    If Abs(Mdir) > 0 And Abs(Mesq) < Abs(Mdir) Then
            psi = Mesq / Mdir
            Mh = Mdir
    End If

'Detecção do caso de distribuição de momentos
If tpcarga = "NT" Then
    caso = 1
    alfs = -111
    alfh = -111
End If
If tpcarga <> "NT" Then

        If Abs(Mh) > 0 And Abs(Mvao / Mh) <= 1 Then
            caso = 2
            alfs = Mvao / Mh
            alfh = -111
        Else
```

```
            caso = 3
            alfh = Mh / Mvao
            alfs = -111
        End If
End If

If (MSDLMCDL = "MCDL" And (Linha = 1 Or Linha = 2)) Then caso = 4

Select Case caso
Case 1
    Cm = 0.6 + 0.4 * psi: If Cm < 0.4 Then Cm = 0.4

Case 2
    If alfs > 0 Then
            Cm = 0.2 + 0.8 * alfs: If Cm < 0.4 Then Cm = 0.4

        Else
            If psi >= 0 Then
                If tpcarga = "U" Then
                    Cm = (0.1 - 0.8 * alfs): If Cm < 0.4 Then Cm = 0.4
                Else
                    Cm = -0.8 * alfs: If Cm < 0.4 Then Cm = 0.4
                End If
            End If
            If psi < 0 Then
                If tpcarga = "U" Then
                    Cm = 0.1 * (1 - psi) - 0.8 * alfs
                    If Cm < 0.4 Then Cm = 0.4
                Else
                    Cm = 0.2 * (-psi) - 0.8 * alfs
                    If Cm < 0.4 Then Cm = 0.4
                End If
            End If
        End If

Case 3
    If alfh > 0 Then
            If tpcarga = "U" Then
                Cm = 0.95 + 0.05 * alfh
            Else
                Cm = 0.9 + 0.1 * alfh
            End If
        Else
            If psi >= 0 Then
                If tpcarga = "U" Then
                    Cm = 0.95 + 0.05 * alfh
                Else
                    Cm = 0.9 + 0.1 * alfh
                End If
            End If
            If psi < 0 Then
                If tpcarga$ = "U" Then
                    Cm = 0.95 + 0.05 * alfh * (1 + 2 * psi)
                Else
```

```
                    Cm = 0.9 - 0.1 * alfh * (1 + 2 * psi)
                End If
            End If
        End If

Case 4
    Cm = 0.9
End Select

RES(Linha, 1) = Cm: RES(Linha, 2) = psi
RES(Linha, 3) = alfs
If alfs = -111 Then
    alfsstr = "---"
Else
  '  alfsstr = Trim(Str(alfs))

    alfsstr = alfs
End If
RES(Linha, 4) = alfh
If alfh = -111 Then
    alfhstr = "---"
Else
    'alfhstr = Str(alfh)
    alfhstr = alfh
End If

pL = Trim((43 + 2 * (Linha - 1)))

Range("B" & pL) = Cm
Range("C" & pL) = psi
Range("D" & pL) = alfsstr
Range("E" & pL) = alfhstr
Range("F" & pL) = CRG$(Linha)

Next Linha

Range("L40") = "On"
Worksheets(2).ComdButt5_factores_Cm_Metodo2.Height = 32
Worksheets(2).ComdButt5_factores_Cm_Metodo2.Width = 138
Worksheets(2).ComdButt5_factores_Cm_Metodo2.Width = 140
Worksheets(2).ComdButt5_factores_Cm_Metodo2.Width = 138
Worksheets(2).ComdButt5_factores_Cm_Metodo2.FontName = "Arial"
Worksheets(2).ComdButt5_factores_Cm_Metodo2.FontSize = 9
Worksheets(2).ComdButt5_factores_Cm_Metodo2.Placement = 3
End Sub
Private Sub ComdButt6_VS_Metodo2_Click()
Dim Mom(3, 3) As Single
Dim epsilon As Single, lambda1 As Single
Dim Ncry As Single, Ncrz As Single
Dim LbdBy As Double, LbdBz As Double, quiy As Single, quiz As Single
Dim nedy As Single, nedz As Single, LbdBLT As Double, quiLT As Single,
 ff As Single
Dim sy1 As Single, sz1 As Single, szy As Single, Kyy1 As Single, Kzz1
As Single, Kyz1 As Single, Kzy1 As Single
```

```
Dim Kyy2 As Single, Kzz2 As Single, Kyz2 As Single, Kzy2 As Single
Dim tpcarga As String
Dim Mesq As Single, Mdir As Single, kc As Single, psi As Single, quiLT
inic As Single
Dim p As Single, MyEd As Single, MzEd As Single, p1 As Single, p2 As S
ingle, p3 As Single, p4 As Single

          '(os resultados deverão ter as mesmas unidades)
'Ly  Lz  LLt iy  iz  A   Seccçao
'[m] [m]     [mm]    [mm]    [mm2]   "I" ou  "RHS"
'E   fy  GamaM1 Curva y Curva z Curva LT    CLASSE
'[N/mm2] [N/mm2] [---]   [--]    [--]    [--]    (1,2,3,4)

'Os cálculos são feitos em N e mm
' Logo os dados são reduzidos se necessário
Worksheets(2).Select

Stop
Call AtribuicaoSeccao
Stop
Cmy = Worksheets(2).Range("B43")
Cmz = Worksheets(2).Range("B45")
CmLT = Worksheets(2).Range("B47")

'CALCULOS PRELIMINARES
epsilon = Sqr(235 / fy): lambda1 = 93.9 * epsilon
NRk = Ar * fy

Ncry = PI ^ 2 * Elast * Inercy / Lcry ^ 2
Ncrz = PI ^ 2 * Elast * Inercz / Lcrz ^ 2
LbdBy = Sqr(Ar * fy / Ncry): LbdBz = Sqr(Ar * fy / Ncrz)
quiy = qui(LbdBy, Curvy): quiz = qui(LbdBz, Curvz)
nedy = NEd * gama1 / (quiy * Ar * fy): nedz = NEd * gama1 / (quiz * Ar
 * fy)

Call MomentoCritico

If (Classe = 1 Or Classe = 2) Then
    LbdBLT = Sqr(Wply * fy / Mcr)
Else
    LbdBLT = Sqr(Wely * fy / Mcr)
End If
quiLT = qui(LbdBLT, CurvLT)

'Factor de Correcção kc da tabela 6.6
'só funciona para My
tpcarga = UCase(Range("H31"))
Mesq = Range("E31"): Mdir = Range("F31")
If (tpcarga <> "U" And tpcarga <> "P") Then tpcarga = "NT"
If tpcarga = "U" Or tpcarga = "P" Then
    If Mesq = 0 And Mdir = 0 Then
        If tpcarga = "U" Then kc = 0.94  'tabela 6.6
        If tpcarga = "P" Then kc = 0.86  'tabela 6.6
    End If
```

```
    If (Mesq = 0 And Mdir < 0) Or (Mesq < 0 And Mdir = 0) Then
        If tpcarga = "U" Then kc = 0.91  'tabela 6.6
        If tpcarga = "P" Then kc = 0.82  'tabela 6.6
    End If

    If (Mesq < 0 And Mdir < 0) Then
        If tpcarga = "U" Then kc = 0.9  'tabela 6.6
        If tpcarga = "P" Then kc = 0.77  'tabela 6.6
    End If

    If (Mesq > 0 Or Mdir > 0) Then kc = 1  'tabela 6.6
End If

If tpcarga = "NT" Then
    If Mesq = Mdir Then
        kc = 1  'tabela 6.6
    Else
        If Abs(Mesq) > 0 And Abs(Mesq) >= Abs(Mdir) Then
            psi = Mdir / Mesq
        End If
        If Abs(Mdir) > 0 And Abs(Mesq) < Abs(Mdir) Then
            psi = Mesq / Mdir
        End If
        kc = 1 / (1.33 - 0.33 * psi)  'tabela 6.6
    End If
End If
quiLTinic = quiLT

If Clausula63232 = "S" Then
    ff = 1 - 0.5 * (1 - kc) * (1 - 2 * (LbdBLT - 0.8) ^ 2)
    If ff > 1 Then ff = 1
    If quiLT / ff > 1 Then quiLT = 1 Else quiLT = quiLT / ff

End If

'Calculo dos corficientes sij para componentes NÂO susceptíveis à defo
rmação por torção
'sy1
    If LbdBy <= 1 Then
        If (Classe = 1 Or Classe = 2) Then sy1 = LbdBy - 0.2
        If (Classe = 3 Or Classe = 4) Then sy1 = 0.6 * LbdBy
    Else
        If (Classe = 1 Or Classe = 2) Then sy1 = 0.8
        If (Classe = 3 Or Classe = 4) Then sy1 = 0.6
    End If
'sz1
    If LbdBz <= 1 Then
        If (Classe = 1 Or Classe = 2) Then
            If TPseccao = "I" Then sz1 = 2 * LbdBz - 0.6
            If (TPseccao = "RHS" Or TPseccao = "rhs") Then sz1 = LbdBz
 - 0.2
        End If
        If (Classe = 3 Or Classe = 4) Then sz1 = 0.6 * LbdBz
```

```
    Else
        If (Classe = 1 Or Classe = 2) Then
            If TPseccao = "I" Then sz1 = 1.4
            If TPseccao = "RHS" Or TPseccao = "rhs" Then sz1 = 0.8
        End If
        If (Classe = 3 Or Classe = 4) Then sz1 = 0.6
    End If

Kyy1 = Cmy * (1 + sy1 * nedy)
Kzz1 = Cmz * (1 + sz1 * nedz)

If Classe = 1 Or Classe = 2 Then
    Kyz1 = 0.6 * Kzz1
    Kzy1 = 0.8 * Kyy1
    'Se flexão composta recta então kzy1 = 0
End If
If Classe = 3 Or Classe = 4 Then
    Kyz1 = Kzz1
    Kzy1 = 0.8 * Kyy1
    'Se flexão composta recta então kzy1 = 0
End If
'-------------------------------------------------------------

'Calculo dos corficientes sij para componentes susceptíveis à deformaç
ão por torção

Kyy2 = Kyy1
Kzz2 = Kzz1
Kyz2 = Kyz1

'kzy2
    If LbdBz >= 1 Then
        If (Classe = 1 Or Classe = 2) Then szy = -0.1 / (CmLT - 0.25)
        If (Classe = 3 Or Classe = 4) Then szy = -0.05 / (CmLT - 0.25)
        Kzy2 = (1 + szy * nedz)
    End If
    If (LbdBz >= 0.4 And LbdBz < 1) Then
        If (Classe = 1 Or Classe = 2) Then szy = -0.1 * LbdBz / (CmLT
- 0.25)
        If (Classe = 3 Or Classe = 4) Then szy = -0.05 * LbdBz / (CmLT
 - 0.25)
        Kzy2 = (1 + szy * nedz)
    End If
    If LbdBz < 0.4 Then
        If (Classe = 1 Or Classe = 2) Then
            Kzy2 = 0.6 + LbdBz
            p = 1 - LbdBz * 0.1 * nedz / (CmLT - 0.25)
            If Kzy2 > p Then Kzy2 = p
        End If
        If (Classe = 3 Or Classe = 4) Then
            szy = -0.05 * LbdBz / (CmLT - 0.25)
            Kzy2 = (1 + szy * nedz)
        End If
    End If
```

```
'OUTPUT
Range("C55") = Ncry / 1000: Range("C56") = Ncrz / 1000
Range("F55") = LbdBy: Range("F56") = LbdBz
Range("G55") = quiy: Range("G56") = quiz
Range("D61") = Kyy1: Range("E61") = Kyz1: Range("F61") = Kzy1: Range("
G61") = Kzz1
Range("D64") = Kyy2: Range("E64") = Kyz2: Range("F64") = Kzy2: Range("
G64") = Kzz2
'-----------------------------------------------------------------
-------------
'VERIFICAçÂO de SEGURANÇA:

Mom(1, 1) = Range("E31") * 10 ^ 6: Mom(1, 2) = Range("F31") * 10 ^ 6:
Mom(1, 3) = Range("G31") * 10 ^ 6
Mom(2, 1) = Range("E33") * 10 ^ 6: Mom(2, 2) = Range("F33") * 10 ^ 6:
Mom(2, 3) = Range("G33") * 10 ^ 6

If Abs(Mom(1, 1)) >= Abs(Mom(1, 2)) Then MyEd = Abs(Mom(1, 1)) Else My
Ed = Abs(Mom(1, 2))
If MyEd < Abs(Mom(1, 3)) Then MyEd = Abs(Mom(1, 3))

If Abs(Mom(2, 1)) >= Abs(Mom(2, 2)) Then MzEd = Abs(Mom(2, 1)) Else Mz
Ed = Abs(Mom(2, 2))
If MzEd < Abs(Mom(2, 3)) Then MzEd = Abs(Mom(2, 3))

    p1 = NEd / quiy / NRk
    p2 = Kyy1 * MyEd / quiLT / MyRk
    p3 = Kyz1 * MzEd / MzRk
    p4 = p1 + p2 + p3
Range("C69") = p1: Range("D69") = p2: Range("E69") = p3: Range("F69")
= p4: Range("H69") = 1 / gama1

    p1 = NEd / quiz / NRk
    p2 = Kzy1 * MyEd / quiLT / MyRk
    p3 = Kzz1 * MzEd / MzRk
    p4 = p1 + p2 + p3
Range("C70") = p1: Range("D70") = p2: Range("E70") = p3: Range("F70")
= p4: Range("H70") = 1 / gama1

    p1 = NEd / quiy / NRk
    p2 = Kyy2 * MyEd / quiLT / MyRk
    p3 = Kyz2 * MzEd / MzRk
    p4 = p1 + p2 + p3
Range("C74") = p1: Range("D74") = p2: Range("E74") = p3: Range("F74")
= p4: Range("H74") = 1 / gama1

    p1 = NEd / quiz / NRk
    p2 = Kzy2 * MyEd / quiLT / MyRk
    p3 = Kzz2 * MzEd / MzRk
    p4 = p1 + p2 + p3
Range("C75") = p1: Range("D75") = p2: Range("E75") = p3: Range("F75")
= p4: Range("H75") = 1 / gama1
```

```
Folha22 - 10

Range("L84") = "On"
Worksheets(2).ComdButt6_VS_Metodo2.Height = 34
Worksheets(2).ComdButt6_VS_Metodo2.Width = 136
Worksheets(2).ComdButt6_VS_Metodo2.Width = 140
Worksheets(2).ComdButt6_VS_Metodo2.Width = 136
Worksheets(2).ComdButt6_VS_Metodo2.Caption = "6)Factores interação kij
 e" & vbLf & "V.Segurança  (Método 2)"
Worksheets(2).ComdButt6_VS_Metodo2.FontName = "Arial"
Worksheets(2).ComdButt6_VS_Metodo2.FontSize = 9
Worksheets(2).ComdButt6_VS_Metodo2.Placement = 3
End Sub

Sub AtribuicaoSeccao()
Lcry = Worksheets(2).Range("K8") * 1000: Lcrz = Worksheets(2).Range("K
9") * 1000
LcrLT = Worksheets(2).Range("K10") * 1000
Lvao = Worksheets(2).Range("K7") * 1000: LcrT = Worksheets(2).Range("K
11") * 1000

TPseccao = Worksheets(2).Range("F7"): Classe = Worksheets(2).Range("F8
")
iy = Worksheets(2).Range("H9") * 10: iz = Worksheets(2).Range("H13") *
 10
Ar = Worksheets(2).Range("F9") * 100
Curvy = Worksheets(2).Range("F12"): Curvz = Worksheets(2).Range("F13")
: CurvLT = Worksheets(2).Range("F14")
Elast = Worksheets(2).Range("C7"): fy = Worksheets(2).Range("C8"): gam
a0 = Worksheets(2).Range("C10")
gama1 = Worksheets(2).Range("C11")
Gdist = Elast / 2 / (1 + 0.3)
Inercy = Worksheets(2).Range("H6") * 10000: Inercz = Worksheets(2).Ran
ge("H10") * 10000
InercT = Worksheets(2).Range("H14") * 10000: InercW = Worksheets(2).Ra
nge("H15") * 1000000
yc = Worksheets(2).Range("F10"): zc = Worksheets(2).Range("F11") 'corr
denadas centro de corte
Wely = Worksheets(2).Range("H7") * 1000: Wply = Worksheets(2).Range("H
8") * 1000
Welz = Worksheets(2).Range("H11") * 1000: Wplz = Worksheets(2).Range("
H12") * 1000
PI = 4 * Atn(1)
Clausula63232 = Worksheets(2).Range("F48")
NRk = Ar * fy
If Classe = 1 Or Classe = 2 Then
    MyRk = Wply * fy: MzRk = Wplz * fy
End If
If Classe = 3 Then
    MyRk = Wely * fy: MzRk = Welz * fy
End If

If UCase(Clausula63232) = "SIM" Or UCase(Clausula63232) = "S" Then Cla
usula63232 = "S"

End Sub
```

```
Private Sub ComdButt3_Mcritico_Click()
Dim a1 As Double, a2 As Double, a3 As Double, a4 As Double
Dim IndMcr As Integer
' Factores de Interacção Método 1 - Anexo A - ec3
'INPUT  - Unidades dos parametros de entrada
           '(os resultados deverão ter as mesmas unidades)
'Ly  Lz  LLt iy  iz  A   Seccçao
'[m] [m]     [mm]    [mm]    [mm2]   "I" ou  "RHS"
'E   fy  GamaM1 Curva y Curva z Curva LT    CLASSE
'[N/mm2] [N/mm2] [---]   [--]    [--]    [--]    (1,2,3,4)

'Os cálculos são feitos em N e mm
' Logo os dados são reduzidos se necessário
kw = 1: kz = 1: C1 = 1 'dados iniciais para evitar zeroing
'Stop
Call AtribuicaoSeccao
'Stop
' LEITURA de DADOS
C1 = Range("E19"): C2 = Range("E20"): C3 = Range("E21")
kz = Range("G19"): If kz = 0 Then kz = 1
kw = Range("G20"): If kw = 0 Then kw = 1
zg = Range("E22"): zj = Range("E23")

a1 = (kz / kw) ^ 2 * InercW / Inercz
a2 = (kz * LcrLT) ^ 2 * Gdist * InercT / PI ^ 2 / Elast / Inercz
a3 = C2 * zg - C3 * zj
a4 = Sqr(a1 + a2 + a3 * a3): a4 = a4 - a3
Mcr0 = PI * PI * Elast * Inercz * a4 / (kz * LcrLT) ^ 2
Mcr = C1 * Mcr0
Range("C19") = Mcr0 / 10 ^ 6
Range("C20") = Mcr / 10 ^ 6
IndMcr = 1
Range("L22") = "On"
Worksheets(2).ComdButt3_Mcritico.Height = 32
Worksheets(2).ComdButt3_Mcritico.Width = 136
Worksheets(2).ComdButt3_Mcritico.Width = 138
Worksheets(2).ComdButt3_Mcritico.Width = 136
Worksheets(2).ComdButt3_Mcritico.FontName = "Arial"
Worksheets(2).ComdButt3_Mcritico.FontSize = 9
Worksheets(2).ComdButt3_Mcritico.Placement = 3

End Sub
Private Sub ComdButt7_VS_Metodo1_Click()
Dim i As Long, Mcr As Double, Mom(3, 3) As Single, CRG(3) As String
Dim Suscept$
Dim p1 As Single, p2 As Single, p3 As Single, p4 As Single
Dim NcrTF As Single, CC1 As Single, lambda1 As Single
Dim epsilon As Single, LbdBLimite As Single
Dim IndMcr As Integer, Linha As Integer, caso As Integer, Nlinhas As I
nteger
Dim Mesq As Single, Mdir As Single, Mvao As Single, Ncritico As Single
, Inercia As Single
Dim Delta  As Single, psi As Single, Mh As Single, Mmax As Single, Cmy
```

```
0 As Single, Cmz0 As Single, Cmi0 As Single, kc As Single
Dim tpcarga As String
Dim psiy As Single, psiz As Single, MyEd As Single, MzEd As Single, Lb
dBMax As Single, aLT As Single, p As Single
Dim epsilony As Single, ff As Single, miuy As Single, miuz As Single
Dim LbdBy As Double, LbdBz As Double, LbdBLT As Double, LbdBLT0 As Dou
ble
Dim quiy As Single, quiz As Single, quiLT As Single, quiLTinic  As Sin
gle
Dim Kyy As Single, Kyz As Single, Kzy As Single, Kzz As Single, wy As
Single, wz As Single, npl As Single
Dim MplyRd  As Single, MplzRd  As Single, bLT As Single, cLT As Single
, dLT As Single, eLT As Single
Dim Cyy As Single, Cyz As Single, Czy As Single, Czz As Single
Dim f$(45), a1$, a2$, a3$, a4$, a5$, a6$, a7$, a8$, a9$, a10$, a11$, a
12$, a13$, a14$, a15$, a16$, a17$, a18$
' Factores de Interacção Método 1 - Anexo A - ec3
'INPUT  - Unidades dos parametros de entrada
           '(os resultados deverão ter as mesmas unidades)
'Ly  Lz  LLt iy  iz  A   Seccçao
'[m] [m]     [mm]    [mm]    [mm2]   "I" ou  "RHS"
'E   fy  GamaM1 Curva y Curva z Curva LT    CLASSE
'[N/mm2] [N/mm2] [---]   [--]    [--]    [--]    (1,2,3,4)

'Os cálculos são feitos em N e mm
' Logo os dados são reduzidos se necessário
kw = 1: kz = 1: C1 = 1 'dados iniciais para evitar zeroing
'Stop
' LEITURA de DADOS
Call AtribuicaoSeccao

Mom(1, 1) = Range("E31") * 10 ^ 6: Mom(1, 2) = Range("F31") * 10 ^ 6:
Mom(1, 3) = Range("G31") * 10 ^ 6
Mom(2, 1) = Range("E33") * 10 ^ 6: Mom(2, 2) = Range("F33") * 10 ^ 6:
Mom(2, 3) = Range("G33") * 10 ^ 6
Mom(3, 1) = Range("E35") * 10 ^ 6: Mom(3, 2) = Range("F35") * 10 ^ 6:
Mom(3, 3) = Range("G35") * 10 ^ 6
Mcr0 = Range("C19") * 10 ^ 6: Mcr = Range("C20") * 10 ^ 6
NcrTF = Range("C25") * 10 ^ 3
CC1 = Range("C22")

'CALCULOS PRELIMINARES

epsilon = Sqr(235 / fy): lambda1 = 93.9 * epsilon
Ncry = PI ^ 2 * Elast * Inercy / Lcry ^ 2
Ncrz = PI ^ 2 * Elast * Inercz / Lcrz ^ 2
If iy = 0 Then iy = Sqr(Inercy / Ar)
If iz = 0 Then iz = Sqr(Inercz / Ar)
i02 = iy ^ 2 + iz ^ 2 + yc ^ 2 + zc ^ 2
Gdist = Elast / 2 / (1 + 0.3)
NcrT = Gdist * InercT + PI * PI * Elast * InercW / LcrT / LcrT: NcrT =
 NcrT / i02

If TPseccao = "I" Then NcrTF = NcrT
```

```
If NcrT < NcrTF Then NcrTF = NcrT

'Controle do nível de esforço axial
Range("C82") = Ncry / 1000
Range("C83") = Ncrz / 1000
Range("C84") = NcrT / 1000
If NEd > NcrT Then MsgBox ("Erro de dados: NEd superior à carga crític
a NcrT !"): Exit Sub
If NEd > Ncry Then MsgBox ("Erro de dados: NEd superior à carga crític
a Ncry !"): Exit Sub
If NEd > Ncrz Then MsgBox ("Erro de dados: NEd superior à carga crític
a Ncrz !"): Exit Sub


LbdBLimite = (1 - NEd / Ncrz) * (1 - NEd / NcrTF)
LbdBLimite = Sqr(LbdBLimite)
LbdBLimite = Sqr(LbdBLimite)
LbdBLimite = LbdBLimite * 0.2 * Sqr(CC1)

LbdBy = Sqr(Ar * fy / Ncry): LbdBz = Sqr(Ar * fy / Ncrz)

If IndMcr = 1 Then
    Range("F23") = "Mcr,0  e Mcr resultam de cálculo"
Else
    Range("F23") = "Mcr,0 e Mcr fornecidos pelo utilizador"
End If

If Mcr0 = 0 Then Call MomentoCritico

If (Classe = 1 Or Classe = 2) Then
    LbdBLT = Sqr(Wply * fy / Mcr)
    LbdBLT0 = Sqr(Wply * fy / Mcr0)
Else
    LbdBLT = Sqr(Wely * fy / Mcr)
    LbdBLT0 = Sqr(Wely * fy / Mcr0)
End If

For Linha = 1 To 2

    Mesq = Mom(Linha, 1)
    Mdir = Mom(Linha, 2)
    Mvao = Mom(Linha, 3)
    If Linha = 1 Then
        Ncritico = Ncry: Inercia = Inercy: Delta = Deltaz
    Else
        Ncritico = Ncrz: Inercia = Inercz: Delta = Deltay
    End If

'Verificação do tipo de carga de vão
    tpcarga = Range("H" & Trim(Str(31 + 2 * (Linha - 1))))
    If tpcarga = "U" Or tpcarga = "u" Then CRG(Linha) = "Uniforme": tp
carga = "U"
    If tpcarga = "P" Or tpcarga = "p" Then CRG(Linha) = "Pontual": tpc
```

```
arga = "P"
    If tpcarga <> "U" And tpcarga <> "P" Then CRG(Linha) = "Não tem":
tpcarga = "NT"

'Detecção do caso de distribuição de momentos
If tpcarga = "NT" Then            'Não tem cargas de vão
    caso = 1
End If

If Abs(Mesq) = 0 And Abs(Mdir) = 0 Then
    If tpcarga = "P" Then caso = 3   'Sem Mom hipertstaticos Com carga
 pontual
    If tpcarga = "U" Then caso = 4   'Sem Mom hipertstaticos Com carga
 uniforme
    If tpcarga = "NT" Then caso = 5  'Sem Mom hipertstaticos sem carga
 de vão
End If

If tpcarga <> "NT" Then
    If Abs(Mesq) <> 0 Or Abs(Mdir) <> 0 Then caso = 2 'Com pelo menos
um Mh e Sem carga de vão
End If


'Factores de equivalência a momento uniforme
Select Case caso
Case 1    'não tem carga de vão
    'Calculo do psi
        If Mesq = 0 And Mdir = 0 Then psi = 0: Mmax = 0
        If Abs(Mesq) > 0 And Abs(Mesq) >= Abs(Mdir) Then
            psi = Mdir / Mesq
            Mh = Mesq
            Mmax = Abs(Mesq)
        End If
            If Abs(Mdir) > 0 And Abs(Mesq) < Abs(Mdir) Then
            psi = Mesq / Mdir
            Mh = Mdir
            Mmax = Abs(Mdir)

        End If

        Cmi0 = 0.79 + 0.21 * psi + 0.36 * (psi - 0.33) * NEd / Ncritic
o

Case 2
        If Abs(Mdir) > Abs(Mesq) Then Mmax = Mdir Else Mmax = Mesq
        If Abs(Mvao) > Abs(Mmax) Then Mmax = Mvao

        Cmi0 = PI * PI * Elast * Inercia / Lvao ^ 2 * Abs(Delta) / Abs
(Mmax)
        Cmi0 = 1 + (Cmi0 - 1) * NEd / Ncritico
        kc = 1 / (1.33 - 0.33 * psi)  'tabela 6.6

Case 3
```

```
        Cmi0 = 1 - 0.18 * NEd / Ncritico: Mmax = Mvao
Case 4
        Cmi0 = 1 - 0.03 * NEd / Ncritico: Mmax = Mvao
Case 5
        Cmi0 = 0: psi = 0: Mmax = 0
End Select

If Linha = 1 Then
        Cmy0 = Cmi0: psiy = psi: MyEd = Abs(Mmax)
Else
        Cmz0 = Cmi0: psiz = psi: MzEd = Abs(Mmax)
End If


'Factor de Correcção kc da tabela 6.6
If Linha = 1 Then 'só funciona para My

If tpcarga = "U" Or tpcarga = "P" Then
    If Mesq = 0 And Mdir = 0 Then
        If tpcarga = "U" Then kc = 0.94  'tabela 6.6
        If tpcarga = "P" Then kc = 0.86  'tabela 6.6
    End If

    If (Mesq = 0 And Mdir < 0) Or (Mesq < 0 And Mdir = 0) Then
        If tpcarga = "U" Then kc = 0.91  'tabela 6.6
        If tpcarga = "P" Then kc = 0.82  'tabela 6.6
    End If

    If (Mesq < 0 And Mdir < 0) Then
        If tpcarga = "U" Then kc = 0.9  'tabela 6.6
        If tpcarga = "P" Then kc = 0.77  'tabela 6.6
    End If

    If (Mesq > 0 Or Mdir > 0) Then kc = 1  'tabela 6.6
End If

If tpcarga = "NT" Then

    If Mesq = Mdir Then
        kc = 1  'tabela 6.6
    Else
        If Abs(Mesq) > 0 And Abs(Mesq) >= Abs(Mdir) Then
            psi = Mdir / Mesq
        End If
        If Abs(Mdir) > 0 And Abs(Mesq) < Abs(Mdir) Then
            psi = Mesq / Mdir
        End If
        kc = 1 / (1.33 - 0.33 * psi)  'tabela 6.6
    End If
End If

End If
Next Linha
```

```
'Cálculo
If LbdBy > LbdBz Then LbdBMax = LbdBy Else LbdBMax = LbdBz
If LbdBLT0 <= LbdBLimite Then
    Cmy = Cmy0
    Cmz = Cmz0
    CmLT = 1#
    Suscept$ = "A secção não é susceptível à encurvadura lateral"

Else
    aLT = 1 - InercT / Inercy: If aLT <= 0 Then aLT = 0
    If NEd > 0 Then epsilony = MyEd * Ar / NEd / Wely Else epsilony =
0
    p = aLT * Sqr(epsilony) / (1 + aLT * Sqr(epsilony))
    Cmy = Cmy0 + (1 - Cmy0) * p
    Cmz = Cmz0
    p = Sqr((1 - NEd / Ncrz) * (1 - NEd / NcrT))
    CmLT = Cmy * Cmy * aLT / p
    If CmLT < 1 Then CmLT = 1
    Suscept$ = "A secção é susceptível à encurvadura lateral"
End If

' Termos auxiliares
quiy = qui(LbdBy, Curvy)
quiz = qui(LbdBz, Curvz)
quiLT = qui(LbdBLT, CurvLT)
quiLTinic = quiLT

If Clausula63232 = "S" Then
    ff = 1 - 0.5 * (1 - kc) * (1 - 2 * (LbdBLT - 0.8) ^ 2)
    If ff > 1 Then ff = 1
    If quiLT / ff > 1 Then quiLT = 1 Else quiLT = quiLT / ff

End If

miuy = (1 - NEd / Ncry) / (1 - quiy * NEd / Ncry)
miuz = (1 - NEd / Ncrz) / (1 - quiz * NEd / Ncrz)

If Classe = 3 Or Classe = 4 Then

Kyy = Cmy * CmLT * miuy / (1 - NEd / Ncry)

Kyz = Cmz * miuy / (1 - NEd / Ncrz)

Kzy = Cmy * CmLT * miuz / (1 - NEd / Ncry)

Kzz = Cmz * miuz / (1 - NEd / Ncrz)

MyRk = Wely * fy: MzRk = Welz * fy

End If


If Classe = 1 Or Classe = 2 Then
```

```
wy = Wply / Wely: If wy > 1.5 Then wy = 1.5
wz = Wplz / Welz: If wz > 1.5 Then wz = 1.5
NRk = Ar * fy
npl = NEd / NRk * gama1
MyRk = Wply * fy: MzRk = Wplz * fy

MplyRd = Wply * fy / gama0: MplzRd = Wplz * fy / gama0


'Parametros LT
aLT = 1 - InercT / Inercy: If aLT <= 0 Then aLT = 0

bLT = 0.5 * aLT * LbdBLT0 ^ 2 * MyEd * MzEd / (quiLT * MplyRd * MplzRd
)

If Cmy = 0 Then
    cLT = 0
Else
    cLT = 10 * aLT * LbdBLT0 ^ 2 * MyEd / (Cmy * quiLT * MplyRd) / (5
+ LbdBz ^ 4)
End If

If Cmy = 0 Or Cmz = 0 Then
    dLT = 0
Else
    dLT = 2 * aLT * LbdBLT0 * MyEd * MzEd / (Cmy * quiLT * MplyRd * Cm
z * MplzRd) / (0.1 + LbdBz ^ 4)
End If

If Cmy = 0 Then
    eLT = 0
Else
    eLT = 1.7 * aLT * LbdBLT0 * MyEd / (Cmy * quiLT * MplyRd) / (0.1 +
 LbdBz ^ 4)
End If

'Parametros CC

Cyy = (2 - 1.6 * Cmy ^ 2 * LbdBMax / wy - 1.6 * Cmy ^ 2 * LbdBMax ^ 2
/ wy) * npl - bLT
Cyy = 1 + (wy - 1) * Cyy
If Cyy < Wely / Wply Then Cyy = Wely / Wply

Cyz = (2 - 14 * Cmz ^ 2 * LbdBMax ^ 2 / wz ^ 5) * npl - cLT
Cyz = 1 + (wz - 1) * Cyz
If Cyz < 0.6 * Welz / Wplz * Sqr(wz / wy) Then Cyz = 0.6 * Welz / Wplz
 * Sqr(wz / wy)

Czy = (2 - 14 * Cmy ^ 2 * LbdBMax ^ 2 / wy ^ 5) * npl - dLT
Czy = 1 + (wy - 1) * Czy
If Czy < 0.6 * Wely / Wply * Sqr(wy / wz) Then Czy = 0.6 * Wely / Wply
 * Sqr(wy / wz)
```

```
Czz = (2 - 1.6 * Cmz ^ 2 * LbdBMax / wz - 1.6 * Cmz ^ 2 * LbdBMax ^ 2
/ wz - eLT) * npl
Czz = 1 + (wz - 1) * Czz
If Czz < Welz / Wplz Then Czz = Welz / Wplz

'factores de Interacção  kij
Kyy = Cmy * CmLT * miuy / Cyy / (1 - NEd / Ncry)

Kyz = Cmz * miuy / Cyz * 0.6 * Sqr(wz / wy) / (1 - NEd / Ncrz)

Kzy = Cmy * CmLT * miuz / Czy * 0.6 * Sqr(wy / wz) / (1 - NEd / Ncry)

Kzz = Cmz * miuz / Czz / (1 - NEd / Ncrz)

End If


'OUTPUT
Range("C82") = Ncry / 1000: Range("C83") = Ncrz / 1000: Range("C84") =
 Mcr / 1000000
Range("F82") = LbdBy: Range("F83") = LbdBz: Range("F84") = LbdBLT
Range("G82") = quiy: Range("G83") = quiz: Range("G84") = quiLT
Range("D87") = Kyy: Range("E87") = Kyz: Range("F87") = Kzy: Range("G87
") = Kzz

Range("C90") = Suscept$

f$(1) = "Comprimentos de Encurvadura (dados):"
a1$ = Str(Int(Lcry) / 1000)
a2$ = Str(Int(Lcrz) / 1000)
a3$ = Str(Int(LcrT) / 1000)
a4$ = Str(Int(LcrLT) / 1000)
f$(2) = "    Lcry=" & a1$ & "     Lcrz=" & a2$ & "     LcrT=" & a3$ &
"     LcrLT=" & a4$
f$(3) = ""
f$(4) = "Cargas críticas:"
a1$ = Str(Int(Ncry / 1000))
a2$ = Str(Int(Ncrz / 1000))
a3$ = Str(Int(NcrT / 1000))
f$(5) = "    Ncry=" & a1$ & "     Ncrz=" & a2$ & "     NcrT=" & a3$
f$(6) = ""

f$(7) = "Comprimentos de encurvadura normalizados:"
a1$ = Str(Int(LbdBy * 1000) / 1000)
a2$ = Str(Int(LbdBz * 1000) / 1000)
a3$ = Str(Int(LbdBMax * 1000) / 1000)
a4$ = Str(Int(quiy * 1000) / 1000)
a5$ = Str(Int(quiz * 1000) / 1000)
f$(8) = "    Lby=" & a1$ & "     Lbz=" & a2$ & "     LbdBMax=" & a3$
f$(9) = "   quiy=" & a4$ & "    quiz=" & a5$
f$(10) = ""

f$(11) = "Momnento Crítico:"
a1$ = Str(Int(Mcr0 / 1000000))
```

```
a2$ = Str(Int(Mcr / 1000000))
f$(12) = "    Mcr0=" & a1$ & "     Mcr=" & a2$

a1$ = Str(Int(LbdBLT * 1000) / 1000)
a2$ = Str(Int(LbdBLT0 * 1000) / 1000)
a3$ = Str(Int(LbdBLimite * 1000) / 1000)
a4$ = Str(Int(quiLTinic * 1000) / 1000)
a5$ = Str(Int(quiLT * 1000) / 1000)

f$(13) = "    LbBLT=" & a1$ & "   quiLT=" & a4$ & "    quiLTmod=" & a5
$
f$(14) = "    LbBLT0=" & a2$ & "     LbBLT0Limite=" & a3$
f$(15) = Suscept$
f$(16) = ""

f$(17) = "Factores de equivalencia a momento uniforme iniciais:"
a1$ = Str(Int(Cmy0 * 1000) / 1000)
a2$ = Str(Int(Cmz0 * 1000) / 1000)
f$(18) = "    Cmy,0=" & a1$ & "     Cmz,0=" & a2$
f$(19) = ""

f$(20) = "Factores de equivalencia a momento uniforme finais:"
a1$ = Str(Int(Cmy * 1000) / 1000)
a2$ = Str(Int(Cmz * 1000) / 1000)
a3$ = Str(Int(CmLT * 1000) / 1000)
f$(21) = "    Cmy=" & a1$ & "     Cmz=" & a2$ & "     CmLT=" & a3$

f$(22) = ""
f$(23) = ""
f$(24) = "epsilon:"
a1$ = Str(Int(epsilony * 1000) / 1000)
f$(25) = "     epsilony=" & a1$
f$(26) = ""

f$(27) = "Termos auxiliares:"
a1$ = Str(Int(miuy * 1000) / 1000)
a2$ = Str(Int(miuz * 1000) / 1000)
f$(28) = "    miuy=" & a1$ & "     miuz=" & a2$
f$(29) = ""

f$(30) = "Classe de Resistência do perfil : Classe " & Str(Classe)
f$(31) = ""

If Classe = 3 Or Classe = 4 Then
    Nlinhas = 35
    f$(32) = "Factores de Interacção:"
    a1$ = Str(Int(Kyy * 1000) / 1000)
    a2$ = Str(Int(Kyz * 1000) / 1000)
    a3$ = Str(Int(Kzy * 1000) / 1000)
    a4$ = Str(Int(Kzz * 1000) / 1000)
    f$(33) = "    Kyy=" & a1$ & "     Kyz=" & a2$ & "     Kzy=" & a3$
& "     Kzz=" & a4$
    f$(34) = Suscept$
    f$(35) = "Fim."
```

```
End If

If Classe = 1 Or Classe = 2 Then
    Nlinhas = 41
    f$(32) = "Outros termos auxiliares:"
    a3$ = Str(Int(npl * 1000) / 1000)
    a4$ = Str(Int(wy * 1000) / 1000)
    a5$ = Str(Int(wz * 1000) / 1000)
    f$(33) = "    npl=" & a3$ & "    wy=" & a4$ & "     wz=" & a5$
    f$(34) = ""

    a1$ = Str(Int(aLT * 1000) / 1000)
    a2$ = Str(Int(bLT * 1000) / 1000)
    a3$ = Str(Int(cLT * 1000) / 1000)
    a4$ = Str(Int(dLT * 1000) / 1000)
    a5$ = Str(Int(eLT * 1000) / 1000)
    f$(35) = "    aLT=" & a1$ & "     bLT=" & a2$ & "    cLT=" & a3$ &
 "     dLT=" & a4$ & "     eLT=" & a5$
    f$(36) = ""

    a1$ = Str(Int(Cyy * 1000) / 1000)
    a2$ = Str(Int(Cyz * 1000) / 1000)
    a3$ = Str(Int(Czy * 1000) / 1000)
    a4$ = Str(Int(Czz * 1000) / 1000)
    a5$ = Str(Int(CmLT * 1000) / 1000)
    f$(37) = "    Cyy=" & a1$ & "     Cyz=" & a2$ & "     Czy=" & a3$
& "     Czz=" & a4$ & "     CmLT=" & a5$
    f$(38) = ""
    f$(39) = "Factores de Interacção:"
    a1$ = Str(Int(Kyy * 1000) / 1000)
    a2$ = Str(Int(Kyz * 1000) / 1000)
    a3$ = Str(Int(Kzy * 1000) / 1000)
    a4$ = Str(Int(Kzz * 1000) / 1000)
    f$(40) = "    Kyy=" & a1$ & "     Kyz=" & a2$ & "     Kzy=" & a3$
& "     Kzz=" & a4$
    f$(41) = Suscept$
    End If

'-----------------------------------------------------------------------
---------------
For i = 1 To Nlinhas
    Range("A" & Trim(Str(i + 94))) = f$(i)
Next i
'-----------------------------------------------------------------------
---------------
    a1$ = Format((NEd / 1000), "####0.00")
    a2$ = Format((MyEd / 1000000), "#####0.00")
    a3$ = Format((MzEd / 1000000), "#####0.00")

    a5$ = Format(Kyy, "#.###")
    a6$ = Str(Format(Kyz, "#.###"))
    a7$ = Str(Format(Kzy, "#.###"))
    a8$ = Str(Format(Kzz, "#.###"))
```

```
    a9$ = Str(Format(quiy, "#.###"))
    a10$ = Str(Format(quiz, "#.###"))
    a11$ = Str(Format(quiLT, "#.###"))

    a12$ = Format((NRk / 1000), "####0.00")
    a13$ = Format((MyRk / 1000000), "#####0.00")
    a14$ = Format((MzRk / 1000000), "#####0.00")
    p1 = NEd / quiy / NRk
    p2 = Kyy * MyEd / quiLT / MyRk
    p3 = Kyz * MzEd / MzRk
    p4 = p1 + p2 + p3

    a15$ = Format(p1, "#.###")
    a16$ = Format(p2, "#.###")
    a17$ = Format(p3, "#.###")
    a18$ = Format(p4, "#.###")


    f$(1) = ""
    f$(2) = "Verificação de segurança - 1 "
    f$(3) = "    NEd           kyy  * MyEd        kyz   * MzEd "
    f$(4) = " -----------  +  --------------- +  ---------------  <= g
ama1"
    f$(5) = " quiy * NRk       kLT  *  MyRk       MzRk  * MzEd "

    f$(6) = ""
    f$(7) = "  " & a1$ & "         " & a5$ & "*" & a2$ & "      " & a6
$ & "*" & a3$

    f$(8) = " ---------  + ------------------ + ------------------  <
= " & Str(gama1)
    f$(9) = "" & a9$ & "*" & a12$ & "     " & a11$ & "*" & a13$ & "
    " & a14$
    f$(10) = " " & a15$ & "  +  " & a16$ & "  +  " & a17$ & "  =  " &
a18$ & " <=" & Str(gama1)


    p1 = NEd / quiz / NRk
    p2 = Kzy * MyEd / quiLT / MyRk
    p3 = Kzz * MzEd / MzRk
    p4 = p1 + p2 + p3

    a15$ = Format(p1, "#.###")
    a16$ = Format(p2, "#.###")
    a17$ = Format(p3, "#.###")
    a18$ = Format(p4, "#.###")


    f$(11) = ""
    f$(12) = "Verificação de segurança - 2 "
    f$(13) = "    NEd           kzy  * MyEd        kzz   * MzEd "
    f$(14) = "-----------  +  --------------- +  ---------------  <= g
ama1"
    f$(15) = "quiz * NRk       kLT  *  MyRk       MzRk  * MzEd "
```

```
    f$(16) = ""
    f$(17) = " " & a1$ & "    " & a7$ & "*" & a2$ & "  " & a8$ & "*" &
 a3$
    f$(18) = "----------  +  -------------- +  --------------  <= "
 & Str(gama1)
    f$(19) = " " & a10$ & "*" & a12$ & "   " & a11$ & "*" & a13$ & "
 " & a14$

    f$(20) = " " & a15$ & "  +  " & a16$ & "  +  " & a17$ & "  =  " &
a18$ & " <=" & Str(gama1)
    f$(21) = "Fim."

For i = 1 To 21
    Range("A" & Trim(Str(Nlinhas + i + 94))) = f$(i)
Next i

Range("L84") = "On"

Worksheets(2).ComdButt7_VS_Metodo1.Height = 34
Worksheets(2).ComdButt7_VS_Metodo1.Width = 136
Worksheets(2).ComdButt7_VS_Metodo1.Width = 138
Worksheets(2).ComdButt7_VS_Metodo1.Width = 136

Worksheets(2).ComdButt7_VS_Metodo1.Caption = "7) Factores interação ki
j e" & vbLf & "V.Segurança  (Método 1)"
Worksheets(2).ComdButt7_VS_Metodo1.FontName = "Arial"
Worksheets(2).ComdButt7_VS_Metodo1.FontSize = 9
Worksheets(2).ComdButt7_VS_Metodo1.Placement = 3
End Sub

Private Sub CommandEsforcos_Click()
'Stop
Worksheets(2).Select
NEd = Worksheets(2).Range("C30") * 1000
Deltaz = Worksheets(2).Range("J20")
Deltay = Worksheets(2).Range("CJ21") ' máximas flechas

'Stop
Mom(1, 1) = Range("E31"): Mom(1, 2) = Range("F31"): Mom(1, 3) = Range(
"G31")
Mom(2, 1) = Range("E33"): Mom(2, 2) = Range("F33"): Mom(2, 3) = Range(
"G33")
Mom(3, 1) = Range("E35"): Mom(3, 2) = Range("F35"): Mom(3, 3) = Range(
"G35")

TipoCarga(1) = UCase(Worksheets(2).Range("H31")): Range("H31") = TipoC
arga(1)
TipoCarga(2) = UCase(Worksheets(2).Range("H32")): Range("H32") = TipoC
arga(2)
TipoCarga(3) = UCase(Worksheets(2).Range("H33")): Range("H33") = TipoC
arga(3)
For i = 1 To 3
    If TipoCarga(i) = "0" Then
```

```
        TipoCarga(i) = "O": Range("H3" & Trim(Str(i))) = TipoCarga(i)

    End If
Next i


Worksheets(2).Range("L30") = "On"
Worksheets(2).CommandEsforcos.Height = 32
Worksheets(2).CommandEsforcos.Height = 31
Worksheets(2).CommandEsforcos.Height = 32
Worksheets(2).CommandEsforcos.Width = 136
Worksheets(2).CommandEsforcos.FontName = "Arial"
Worksheets(2).CommandEsforcos.FontSize = 9
Worksheets(2).CommandEsforcos.Placement = 3


End Sub

Private Sub Worksheet_SelectionChange(ByVal Target As Range)

End Sub
```

```
Escolha_do_Perfil - 1


Private Sub UserForm_Initialize()
 'Stop
Escolha_do_Perfil.Left = 35
Escolha_do_Perfil.Top = 280

ind2 = 1
ComboBox1_Gama.RowSource = "Seccao!K18:K35"
ComboBox1_Gama.Text = Range("K18")

'Stop
ComboBox2_Perfil.RowSource = "Seccao!M3:M52"
ComboBox2_Perfil.Text = Range("M3")

Escolha_do_Perfil.Width = 250
Escolha_do_Perfil.Height = 150

'Stop

End Sub
Private Sub ComboBox1_Gama_Change()
Dim ast As Integer, bst As Integer, nTopGama As Long

ComboBox1_Gama.Height = 25
ComboBox1_Gama.Width = 140
'Stop

nGama = ComboBox1_Gama.ListIndex + 1 'numero de ordem na lista das gam
as de perfil
Range("B5") = nGama

Range("B4") = ComboBox1_Gama.Value
kkk = ComboBox1_Gama.Value    'nome da gama de perfis
kkk = Trim(kkk)

Select Case kkk
Case "IPE"
    Gama(1) = "IPE": nespecimens(1) = 50
    ComboBox2_Perfil.RowSource = "Seccao!M3:M52"
    ComboBox2_Perfil.Text = Range("M3")


Case "HE"
    Gama(2) = "HE": nespecimens(2) = 136
    ComboBox2_Perfil.RowSource = "Seccao!N3:N138"
    ComboBox2_Perfil.Text = Range("N3")

Case "HD"
    Gama(3) = "HD": nespecimens(3) = 38
    ComboBox2_Perfil.RowSource = "Seccao!O3:O40"
    ComboBox2_Perfil.Text = Range("O3")

Case "HP"
    Gama(4) = "HP": nespecimens(4) = 31
```

```
Escolha_do_Perfil - 2

    ComboBox2_Perfil.RowSource = "Seccao!P3:P33"
    ComboBox2_Perfil.Text = Range("P3")
Case "IPN"
    Gama(5) = "IPN": nespecimens(5) = 19
    ComboBox2_Perfil.RowSource = "Seccao!Q3:Q21"
    ComboBox2_Perfil.Text = Range("Q3")

Case "W"
    Gama(6) = "W": nespecimens(6) = 190
    ComboBox2_Perfil.RowSource = "Seccao!R3:R192"
    ComboBox2_Perfil.Text = Range("R3")

Case "HP(US)"
    Gama(7) = "HP(US)": nespecimens(7) = 13
    ComboBox2_Perfil.RowSource = "Seccao!S3:S15"
    ComboBox2_Perfil.Text = Range("S3")

Case "UB"
    Gama(8) = "UB": nespecimens(8) = 67
    ComboBox2_Perfil.RowSource = "Seccao!T3:T69"
    ComboBox2_Perfil.Text = Range("T3")

Case "UBP(=HP UK)"
    Gama(9) = "UBP(=HP UK)": nespecimens(9) = 17
    ComboBox2_Perfil.RowSource = "Seccao!U3:U19"

    ComboBox2_Perfil.Text = Range("U3")
Case "UC"
    Gama(10) = "UC": nespecimens(10) = 31
    ComboBox2_Perfil.RowSource = "Seccao!V3:V33"
    ComboBox2_Perfil.Text = Range("V3")
Case "UAP"
    Gama(11) = "UAP":: nespecimens(11) = 9
    ComboBox2_Perfil.RowSource = "Seccao!W3:W11"
    ComboBox2_Perfil.Text = Range("W3")
Case "UPN"
    Gama(12) = "UPN": nespecimens(12) = 15
    ComboBox2_Perfil.RowSource = "Seccao!X3:X17"
    ComboBox2_Perfil.Text = Range("X3")
Case "L"
    Gama(13) = "L": nespecimens(13) = 55
    ComboBox2_Perfil.RowSource = "Seccao!Y3:Y57"
    ComboBox2_Perfil.Text = Range("Y3")
Case "Li"
    Gama(14) = "Li": nespecimens(14) = 15
    ComboBox2_Perfil.RowSource = "Seccao!Z3:Z17"
    ComboBox2_Perfil.Text = Range("Z3")

Case "C"
    Gama(15) = "C": nespecimens(15) = 13
    ComboBox2_Perfil.RowSource = "Seccao!AA3:AA15"
    ComboBox2_Perfil.Text = Range("AA3")
Case "JIS"
    Gama(16) = "JIS": nespecimens(16) = 50
```

```
Escolha_do_Perfil - 3

    ComboBox2_Perfil.RowSource = "Seccao!AB3:AB52"
    ComboBox2_Perfil.Text = Range("AB3")
Case "IFB"
      Gama(17) = "IFB": nespecimens(17) = 72
      ComboBox2_Perfil.RowSource = "Seccao!AC3:AC74"
      ComboBox2_Perfil.Text = Range("AC3")

Case "SFB"
     Gama(18) = "SFB": nespecimens(18) = 75
     ComboBox2_Perfil.RowSource = "Seccao!AD3:AD77"
    ComboBox2_Perfil.Text = Range("AD3")
End Select



'Stop
End Sub
Private Sub ComboBox2_Perfil_Change()

ComboBox2_Perfil.Height = 25
ComboBox2_Perfil.Width = 140

If ind2 = 1 Then
    ind2 = 0
    ComboBox2_Perfil.ListIndex = 0
End If

nPerfil = ComboBox2_Perfil.ListIndex + 1  'nº ordem do perfil
Range("C5") = nPerfil

Range("C4") = ComboBox2_Perfil.Value 'nome do perfil
nGama = ComboBox1_Gama.ListIndex + 1


Call Principal

End Sub
Private Sub Principal()
'Stop

' Principal dentro do FORM
 Dim linhaprf As Integer
 If ind1 = 0 Then
    Gama(1) = "IPE": Gama(2) = "HE": Gama(3) = "HD": Gama(4) = "HP": G
ama(5) = "IPN"
    Gama(6) = "W": Gama(7) = "HP(US)": Gama(8) = "UB": Gama(9) = "UBP(
=HP UK)"
    Gama(10) = "UC": Gama(11) = "UAP": Gama(12) = "UPN": Gama(13) = "L
"
    Gama(14) = "LI": Gama(15) = "C": Gama(16) = "JIS": Gama(17) = "IFB
": Gama(18) = "SFB"

    nespecimens(1) = 50: nespecimens(2) = 132: nespecimens(3) = 36
    nespecimens(4) = 30: nespecimens(5) = 18: nespecimens(6) = 187
```

```
    nespecimens(7) = 11: nespecimens(8) = 67: nespecimens(9) = 17
    nespecimens(10) = 31: nespecimens(11) = 9: nespecimens(12) = 20
    nespecimens(13) = 55: nespecimens(14) = 15: nespecimens(15) = 13
    nespecimens(16) = 50: nespecimens(17) = 72: nespecimens(18) = 75
End If
'Stop
kkk = ComboBox1_Gama.Value    'nome da gama de perfis
kkk = Trim(kkk)

Select Case kkk
Case "IPE", "HE", "HD", "HP", "IPN", "W", "HP(US)", "UB", "UBP(=HP UK)
", "UC", "UAP", "UPN", "JIS"
    'Escrita da designação das variáveis- cabeçalho (em colunas)
    Worksheets(1).Range("G3") = "pf.G": Worksheets(1).Range("G4") = "p
f.h":
    Worksheets(1).Range("G5") = "pf.b":    Worksheets(1).Range("G6") =
 "pf.tw"
    Worksheets(1).Range("G7") = "pf.tf": Worksheets(1).Range("G8") = "
pf.r"
    Worksheets(1).Range("G9") = "pf.d": Worksheets(1).Range("G11") = "
pf.Area"
    Worksheets(1).Range("G12") = "pf.Avz": Worksheets(1).Range("I3") =
 "pf.Inercy"
    Worksheets(1).Range("I4") = "pf.Wely": Worksheets(1).Range("I5") =
 "pf.Wply"
    Worksheets(1).Range("I6") = "pf.iy": Worksheets(1).Range("I8") = "
pf.Inercz"
    Worksheets(1).Range("I9") = "pf.Welz": Worksheets(1).Range("I10")
= "pf.Wplz"
    Worksheets(1).Range("I11") = "pf.iz": Worksheets(1).Range("I13") =
 "pf.ss"
    Worksheets(1).Range("I14") = "pf.It": Worksheets(1).Range("I15") =
 "pf.Iw"
    'Leitura das variáveis da folha Excel respectiva

    p$ = Trim(Str(nPerfil + 19))
    pf.Nome = Worksheets(nGama + 2).Range("A" & p$)
    pf.G = Worksheets(nGama + 2).Range("B" & p$)
    pf.h = Worksheets(nGama + 2).Range("C" & p$)
    pf.b = Worksheets(nGama + 2).Range("D" & p$)
    pf.tw = Worksheets(nGama + 2).Range("E" & p$)
    pf.tf = Worksheets(nGama + 2).Range("F" & p$)
    pf.r = Worksheets(nGama + 2).Range("G" & p$)
    pf.Area = Worksheets(nGama + 2).Range(("H" & p$)) * 100
    pf.d = Worksheets(nGama + 2).Range("J" & p$)
    pf.Inercy = Worksheets(nGama + 2).Range("R" & p$) * 10000
    pf.Wely = Worksheets(nGama + 2).Range("S" & p$) * 1000
    pf.Wply = Worksheets(nGama + 2).Range("T" & p$) * 1000
    pf.iy = Worksheets(nGama + 2).Range("U" & p$) * 10
    pf.Avz = Worksheets(nGama + 2).Range("V" & p$) * 100
    pf.Inercz = Worksheets(nGama + 2).Range("W" & p$) * 10000
    pf.Welz = Worksheets(nGama + 2).Range("X" & p$) * 1000
    pf.Wplz = Worksheets(nGama + 2).Range("Y" & p$) * 1000
    pf.iz = Worksheets(nGama + 2).Range("Z" & p$) * 10
```

```
    pf.ss = Worksheets(nGama + 2).Range("AA" & p$) * 10
    pf.It = Worksheets(nGama + 2).Range("AB" & p$) * 10000
    pf.Iw = Worksheets(nGama + 2).Range("AC" & p$) * 1000000000

    'Escrita dos valores obtidos frente a cada designação

    Worksheets(1).Range("G2") = pf.Nome
    Worksheets(1).Range("H3") = pf.G: Worksheets(1).Range("H4") = pf.h
:
    Worksheets(1).Range("H5") = pf.b:    Worksheets(1).Range("H6") = p
f.tw
    Worksheets(1).Range("H7") = pf.tf: Worksheets(1).Range("H8") = pf.
r
    Worksheets(1).Range("H9") = pf.d: Worksheets(1).Range("H11") = pf.
Area
    Worksheets(1).Range("H12") = pf.Avz: Worksheets(1).Range("J3") = p
f.Inercy
    Worksheets(1).Range("J4") = pf.Wely: Worksheets(1).Range("J5") = p
f.Wply
    Worksheets(1).Range("J6") = pf.iy: Worksheets(1).Range("J8") = pf.
Inercz
    Worksheets(1).Range("J9") = pf.Welz: Worksheets(1).Range("J10") =
pf.Wplz
    Worksheets(1).Range("J11") = pf.iz: Worksheets(1).Range("J13") = p
f.ss
    Worksheets(1).Range("J14") = pf.It: Worksheets(1).Range("J15") = p
f.Iw
    Worksheets(1).Range("G13") = "": Worksheets(1).Range("G14") = ""
    Worksheets(1).Range("H13") = "": Worksheets(1).Range("H14") = ""

    If (kkk = "UAP") Or (kkk = "UPN") Then
        Worksheets(1).Range("G13") = "ys=": Worksheets(1).Range("G14")
 = "ym"

        pf.ys = Worksheets(nGama + 2).Range("AD" & p$) * 10
        pf.ym = Worksheets(nGama + 2).Range("AE" & p$) * 10
        Worksheets(1).Range("H13") = pf.ys: Worksheets(1).Range("H14")
 = pf.ym
    End If


Case "L", "Li", "C"
    'Escrita da designação das variáveis- cabeçalho (em colunas)

    Worksheets(1).Range("G3") = "pf.G": Worksheets(1).Range("G4") = "p
f.h":
    Worksheets(1).Range("G5") = "pf.b":    Worksheets(1).Range("G6") =
 "pf.t"
    Worksheets(1).Range("G7") = "pf.zs": Worksheets(1).Range("G8") = "
pf.ys"

    Worksheets(1).Range("G9") = "---": Worksheets(1).Range("G11") = "p
f.Area"
    Worksheets(1).Range("G12") = "pf.It  ": Worksheets(1).Range("I3")
```

```
Escolha_do_Perfil - 6

= "pf.Inercy"
    Worksheets(1).Range("I4") = "pf.Wely": Worksheets(1).Range("I5") =
 "pf.iy"
    Worksheets(1).Range("I6") = "pf.Inercz": Worksheets(1).Range("I8")
 = "pf.Welz"
    Worksheets(1).Range("I9") = "pf.iz"

    Worksheets(1).Range("I10") = "pf.iu"
    Worksheets(1).Range("I11") = "pf.iv"

    Worksheets(1).Range("I13") = "pf.Iyz  "
    Worksheets(1).Range("I14") = "pf.alfa": Worksheets(1).Range("I15")
 = "pf.Iw=???"

    'Leitura das variáveis da folha Excel respectiva
    p$ = Trim(Str(nPerfil + 19))
    pf.Nome = Worksheets(nGama + 2).Range("A" & p$)
    pf.G = Worksheets(nGama + 2).Range("B" & p$)
    pf.h = Worksheets(nGama + 2).Range("C" & p$)
    pf.b = Worksheets(nGama + 2).Range("D" & p$)
    pf.t = Worksheets(nGama + 2).Range("I" & p$)
    pf.zs = Worksheets(nGama + 2).Range("J" & p$)
    pf.ys = Worksheets(nGama + 2).Range("G" & p$)
    pf.Area = Worksheets(nGama + 2).Range(("H" & p$)) * 100
    pf.It = 2 / 3 * 1.1 * (pf.h - pf.t / 2) * (pf.t) ^ 3
    pf.Inercy = Worksheets(nGama + 2).Range("R" & p$) * 10000
    pf.Wely = Worksheets(nGama + 2).Range("S" & p$) * 1000
    pf.iy = Worksheets(nGama + 2).Range("T" & p$) * 10

    pf.Inercz = Worksheets(nGama + 2).Range("U" & p$) * 10000
    pf.Welz = Worksheets(nGama + 2).Range("V" & p$) * 1000
    pf.Wplz = Worksheets(nGama + 2).Range("W" & p$) * 1000
    pf.iz = Worksheets(nGama + 2).Range("Z" & p$) * 10
    pf.iu = Worksheets(nGama + 2).Range("Y" & p$) * 10
    pf.iv = Worksheets(nGama + 2).Range("AA" & p$) * 10
    pf.Iw = 0
    'Escrita dos valores obtidos frente a cada designação

    Worksheets(1).Range("G2") = pf.Nome
    Worksheets(1).Range("H4") = pf.G: Worksheets(1).Range("H4") = pf.h
:
    Worksheets(1).Range("H5") = pf.b:    Worksheets(1).Range("H6") = p
f.t
    Worksheets(1).Range("H7") = pf.zs: Worksheets(1).Range("H8") = pf.
ys
    Worksheets(1).Range("H9") = 0: Worksheets(1).Range("H11") = pf.Are
a
    Worksheets(1).Range("H12") = pf.It: Worksheets(1).Range("J3") = pf
.Inercy
    Worksheets(1).Range("J4") = pf.Wely: Worksheets(1).Range("J5") = p
f.iy
    Worksheets(1).Range("J6") = pf.Inercz: Worksheets(1).Range("J8") =
 pf.Welz
    Worksheets(1).Range("J9") = pf.iz: Worksheets(1).Range("J10") = pf
```

```
.iu
    Worksheets(1).Range("J11") = pf.iv: Worksheets(1).Range("J13") = p
f.Iyz
    Worksheets(1).Range("J14") = pf.alfa: Worksheets(1).Range("J15") =
 0
    Worksheets(1).Range("G13") = "": Worksheets(1).Range("G14") = ""
    Worksheets(1).Range("H14") = ""



Case "IFB", "SFB"
 'Escrita da designação das variáveis- cabeçalho (em colunas)
    Worksheets(1).Range("G3") = "pf.bp=": Worksheets(1).Range("G4") =
"pf.tp=":
    Worksheets(1).Range("G5") = "pf.heff=":    Worksheets(1).Range("G6
") = "pf.b="
    Worksheets(1).Range("G7") = "pf.tw=": Worksheets(1).Range("G8") =
"pf.tf="
    Worksheets(1).Range("G9") = "pf.r=":
    pf.Dim = "Dim:" & Str(pf.bp) & "x" & Str(pf.tp)
    Worksheets(1).Range("G11") = "pf.G="
    Worksheets(1).Range("G12") = "p.Area=":
    Worksheets(1).Range("G13") = pf.Dim
    Worksheets(1).Range("G14") = "Tipo="
    Worksheets(1).Range("I3") = "pf.Inercy="
    Worksheets(1).Range("I4") = "pf.Wely="
    Worksheets(1).Range("I5") = "pf.z1="
    Worksheets(1).Range("I6") = "pf.z2="
    Worksheets(1).Range("I8") = ""
    Worksheets(1).Range("I9") = ""
    Worksheets(1).Range("I10") = ""
    Worksheets(1).Range("I11") = ""
    Worksheets(1).Range("I13") = ""
    Worksheets(1).Range("I14") = ""
    Worksheets(1).Range("I15") = ""

'Leitura das variáveis da folha Excel respectiva
    p$ = Trim(Str(nPerfil + 19))
    pf.Nome = Worksheets(nGama + 2).Range("A" & p$)
        If kkk = "IFB" Then pf.Nome = pf.Nome & " - IFB"
        If kkk = "SFB" Then pf.Nome = pf.Nome & " - SFB"

    pf.G = Worksheets(nGama + 2).Range("F" & p$)
    pf.bp = Worksheets(nGama + 2).Range("B" & p$)
    pf.tp = Worksheets(nGama + 2).Range("D" & p$)
    pf.Tipo = Worksheets(nGama + 2).Range("E" & p$)
    pf.heff = Worksheets(nGama + 2).Range("G" & p$)
    pf.b = Worksheets(nGama + 2).Range("H" & p$)
    pf.tw = Worksheets(nGama + 2).Range("I" & p$)
    pf.tf = Worksheets(nGama + 2).Range("J" & p$)
    pf.r = Worksheets(nGama + 2).Range("K" & p$)
    pf.Area = Worksheets(nGama + 2).Range("L" & p$) * 100
    pf.Inercy = Worksheets(nGama + 2).Range("M" & p$) * 10000
    pf.Wely = Worksheets(nGama + 2).Range("N" & p$) * 1000
```

```
Escolha_do_Perfil - 8

    pf.z1 = Worksheets(nGama + 2).Range("O" & p$) * 10
    pf.z2 = Worksheets(nGama + 2).Range("P" & p$) * 10
    pf.Welz = 0: pf.Wplz = 0: pf.iz = 0: pf.iu = 0: pf.iv = 0: pf.Iw =
 0

    'Escrita dos valores obtidos frente a cada designação
    Worksheets(1).Range("G2") = pf.Nome
    Worksheets(1).Range("H3") = pf.bp: Worksheets(1).Range("H4") = pf.
tp:
    Worksheets(1).Range("H5") = pf.heff:    Worksheets(1).Range("H6")
= pf.b
    Worksheets(1).Range("H7") = pf.tw: Worksheets(1).Range("H8") = pf.
tf
    Worksheets(1).Range("H9") = pf.r
    Worksheets(1).Range("H11") = pf.G
    Worksheets(1).Range("H12") = pf.Area

    Worksheets(1).Range("H14") = pf.Tipo
    Worksheets(1).Range("J3") = pf.Inercy
    Worksheets(1).Range("J4") = pf.Wely: Worksheets(1).Range("J5") = p
f.z1
    Worksheets(1).Range("J6") = pf.z2: Worksheets(1).Range("J8") = 0
    Worksheets(1).Range("J9") = 0: Worksheets(1).Range("J10") = 0
    Worksheets(1).Range("J11") = 0: Worksheets(1).Range("J13") = 0
    Worksheets(1).Range("J14") = 0: Worksheets(1).Range("J15") = 0

End Select

'Stop
Call Carrega_Foto(kkk)




'Stop
End Sub
Sub Carrega_Foto(kkk)

' Var. Publicas: MinhaPath As Variant, Endereco As Variant, Ficheiro A
s Variant
Dim Compr As Long

'Stop
'Image1.Picture = ""
'NomedaImagem = Image1.Value

Ficheiro = "\Des" & kkk & ".gif": Ficheiro = Trim(Ficheiro)
MinhaPath = Application.ThisWorkbook.Path
Endereco = MinhaPath & Ficheiro
Compr = Len(MeuFicheiro)

On Error GoTo Linha1220:

ActiveSheet.Shapes("FotoPerfil").Fill.UserPicture Endereco
```

```
Escolha_do_Perfil - 9


GoTo Linha1230
'--------------------------------------------------
Linha1220:
'Stop
Endereco = MinhaPath & "\DesX.gif"
ActiveSheet.Shapes("FotoPerfil").Fill.UserPicture Endereco

Linha1230:
End Sub
```

Gama/Série:

Perfil:

Module1 - 1

```
Option Explicit
Public Cmy As Single, Cmz As Single, CmLT As Single
Public Lcry As Single, Lcrz As Single, LcrLT As Single, Lvao As Single
, LcrT As Single
Public NEd As Single, TPseccao As String, Classe As Integer, iy As Sin
gle, iz As Single
Public Ar As Single, Curvy As String, Curvz As String, CurvLT As Strin
g
Public Elast As Single, fy As Single, gama0 As Single, gama1 As Single
, Gdist As Single
Public Inercy As Single, Inercz As Single, InercT As Single, InercW As
 Single
Public Deltaz As Single, Deltay As Single, yc As Single, zc As Single,
 Wely As Single, Wply As Single
Public Welz As Single, Wplz As Single, PI As Double, Clausula63232 As
String
Public NRk As Single, MyRk As Single, MzRk   As Single
Public C1 As Single, C2 As Single, C3 As Single, kz As Single, kw As S
ingle, zg As Single, zj As Single
Public Mcr As Single, Mcr0 As Single
Public Ncry As Single, Ncrz As Single
Public i02 As Single
Public NcrT As Single, NcrTF As Single
Public MinhaPath As Variant, Endereco As Variant, Ficheiro As Variant,
 Image1 As Variant
Public Images() As Variant, Mom(3, 3) As Single, CRG(3) As String, Tip
oCarga(3) As String
Public RES(3, 4) As Single


Function qui(lbd As Double, crv As String)
Dim alf As Single, fi As Single
If (crv = "a0" Or crv = "A0" Or crv = "ao" Or crv = "Ao" Or crv = "aO"
 Or crv = "AO") Then alf = 0.13
If (crv = "a" Or crv = "A") Then alf = 0.21
If (crv = "b" Or crv = "B") Then alf = 0.34
If (crv = "c" Or crv = "C") Then alf = 0.49
If (crv = "d" Or crv = "D") Then alf = 0.76
fi = 0.5 * (1 + alf * (lbd - 0.2) + lbd * lbd)
qui = fi + Sqr(fi * fi - lbd * lbd): qui = 1 / qui
If qui > 1 Then qui = 1
End Function
Function MomentoCritico()
    MomentoCritico = C1 * MomentoCriticoZero
End Function
Function MomentoCriticoZero()
Dim a As Double
    a = InercW / Inercz * (kz / kw) ^ 2
    a = a + (kz * LcrLT) ^ 2 * Gdist * InercT / PI ^ 2 / Elast / Inerc
z
    a = a + (C2 * zg - C3 * zj) ^ 2
    a = Sqr(a)
    a = a - (C2 * zg - C3 * zj) ^ 2
    MomentoCriticoZero = a * PI ^ 2 * Elast * Inercz / (kz * LcrLT) ^
```

```
Module1 - 2

2
End Function
```

Module2 - 1

```
'Declarações no FORM
Public Gama(18) As String, ind1 As Integer, ind2 As Integer
Public nPerfil As Integer, ValorMinimo As Integer, ValorMaximo As Inte
ger
Public InicioFimFolha(16, 2) As Integer
Public nespecimens(18) As Integer, nGama As Long
Public Folha As String, prf As Long
Public kkk As String
Public Type perfilmetalico
   Nome As String
    G As Single
    h As Single
    b As Single
    tw As Single
    tf As Single
    r As Single
    Area As Single
    d As Single
    Inercy As Single
    Wely As Single
    Wply As Single
    iy As Single
    Avz As Single
    Inercz As Single
    Welz As Single
    Wplz As Single
    iz As Single
    ss As Single
    It As Single
    Iw As Single
    t As Single
    zs As Single
    ys As Single
    ym As Single
    iu As Single
    iv As Single
    Iyz As Single
    alfa As Single
    bp As Single
    tp As Single
    heff As Single
    Tipo As String
    z1 As Single
    z2 As Single
    Dim As String
End Type
Public pf As perfilmetalico
```