UNIVERSITAT POLITÈCNICA DE VALÈNCIA

ESCOLA POLITÈCNICA SUPERIOR D'ALCOI

ANALYSIS AND EVALUATION MANUFACTING COST USING A DATABASE FOR TALLERES Y MONTAJES LUNA S.L.

Trabajo Final de Grado

Grado en Ingeniería Mecánica

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The project is based in developing a database with the excel software, using Macros and VBA, in order to achieve an interactive application for automate the management manufacturing process control (input for job, worker name, length hour, task description, platform and crane and other cost). It has been develop inside of a company, denominate Talleres y Montajes Luna S.L.

The application stores the inputs in order to have all the information in a database, so on, the completely job report can be done instantly, screening by job, operator, day, customer.

This quick information is a powerful tool for the management because they can know where has been working each worker every day and every hour; they can know all the cost invested in every customer and even better, they can know exactly how well is going each job, using the **money as a key performance indicator**.

The benefits from this application has been worthy because of implementation in Talleres y Montajes Luna S.L. For stating some benefits we can say; an indirect labour hour saved; fast and instant information; much control of the business from the beginning of the job up to the end; information in digital format (before it was in a paper format); control and follow stock and purchasing material.

Keywords: excel, macros, VBA, mechanical business, manufacturing control cost, improvement, savings, small and medium enterprise.

CONTENT LIST

1. <u>ABSTRACT</u>

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2. <u>ACKNOWLEDGEMENTS</u>

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I also place on record, my sense of gratitude to one and all, who directly or indirectly, have lent their hand in this venture.

3. <u>INTRODUCTION OR BACKGROUND</u>

This project has been developed because of the rudimentary method of controlling the business, being a low process and a waste of time. The process for register all the data (operator, hour used by operator, day, job, platform, crane, material, other cost) was done in a paper format.

Every time that the manager wanted to know the information, he asked the supervisor to come and explain the data; so the supervisor had to left what he was doing immediately , being an interruption for the supervisor and affecting manufacturing process. So on, this should be improved.

The information was communicated as an interview way, the manager ask who operators were working in each job; which and how many platforms; which crane; how many cranes works every day and how many hours works the crane; material used; personal protective equipment used (PPE). **We can see a waste of time, it is being two people working on the same task,** they both were doing the data input when nowadays it is only done by the supervisor.

The solution suggest and implement for improving the flow process is creating a digital database using an excel file.

Defining roles and responsibilities for interacting with the excel sheet application.

Nowadays, the supervisor input all the data into the excel sheet at the end of the day. He does this task as he can do it. He organized his job and there are no interruptions for the supervisor, affecting at the production as before.

The manager can have the outputs when need it, just opening an excel sheet a screening by job. He can know the money invest up to now for material, direct labor hour, platform, crane, other cost as soon as he press the bottom when before he had to look the registration paper just for the job who wanted to know and he had to look and calculate for the labor hour, material, platform, etc and make extra operation in order to know the money invested up to know.

In order to design, implement and control the new system, it has been created another role, know as a "Controller database". This person is the main responsible for the database. He has design the database solving and improving the problem and the waste. He is the responsible for implementing the database within the organization, he is the responsible for training all people who interact with the database and he is the role for updating all the data need it, like creating and closing finished jobs, maintaining operator, etc.

Another point of improving, it is to control the material and consumption good at the warehouse. Every time a material or consumption good goes in or out of the warehouse is registered at the application. So on, we can know the value of the warehouse very accurate. Since the big data to control all the information required for the warehouse, the company did not control the material and consumption goods at warehouse before the implementation.

Finally, in the future, it is plan to program another application in order to control manufacturing jobs, with a visible KPI and to control purchasing.

4. STATE OF ART

This problem can be solved using software available at the market. In this case, the company has to change and adapt the way of working to the define software (remember that the excel application has been programmed using the actual way of working in order to not change the actual way and to assure the implementation).

The excel application is programmed with the goal of several field like, cost production, control warehouse, control production, control purchasing, etc. So on, in the hypothetical case, in order to achieve all the required topics the company have to spend money buying specific software for each topic. It is also needed training for each software, with their cost.

Personally, I think, the point of using a several programs available at the market or just to program an excel sheet application depends on the business size; if it is a small company or if it is multinational company.

In the case of a big company, I will use a common program, available at the market. In the other hand, when we are in a small company, I will use an excel sheet application.

5. LIST OF PROGRAMME

In order to give you a better understanding of the project, we show you some programme application use it on the excel sheet application.

5.1 **REGISTER MATERIALS** (Programme used in 6.1.6 point. "Inputs for defining materials and consumer goods")

```
Sub ALTA_ARTICULOS()
' ALTA_ARTICULOS Macro
    Rows("112:112").Select
    Selection.Insert Shift:=xlDown, CopyOrigin:=xlFormatFromLeftOrAbove
    Range("F7:F9").Select
    Selection.Copy
    Range("B112").Select
    Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
        :=False, Transpose:=True
    Application.CutCopyMode = False
ActiveWorkbook.Worksheets("ARTICULOS").ListObjects("Tabla1").Sort.SortFields. _
        Clear    ActiveWorkbook.Worksheets("ARTICULOS").ListObjects("Tabla1").Sort.SortFields.
_
        Add Key:=Range("Tabla1[[#All],[CODIGO]]"), SortOn:=xlSortOnValues, Order _
        :=xlAscending, DataOption:=xlSortNormal
    With ActiveWorkbook.Worksheets("ARTICULOS").ListObjects("Tabla1").Sort
        .Header = xlYes
        .MatchCase = False
        .Orientation = xlTopToBottom
        .SortMethod = xlPinYin
        .Apply
    End With
    Range("F7:F11").Select
    Selection.ClearContents
    ActiveWindow.SmallScroll ToRight:=3
    Range("F7").Select
End Sub
```

5.2 REGISTER JOBS (Programme used in 6.1.2 point. " Inputs for creating a job")

```vba
Sub ALTA_TRABAJOS()'
' ALTA_TRABAJOS Macro'
    Range("D4:D8").Select
    ActiveWindow.SmallScroll Down:=21
    Rows("46:46").Select
    Selection.Insert Shift:=xlDown, CopyOrigin:=xlFormatFromLeftOrAbove
    ActiveWindow.SmallScroll Down:=-36
    Range("D4:D8").Select
    Selection.Copy
    ActiveWindow.SmallScroll Down:=27
    Range("C46").Select
    Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
        :=False, Transpose:=True
    ActiveWindow.SmallScroll Down:=-21
    Application.CutCopyMode = False
    ActiveWindow.SmallScroll Down:=-33
    Range("D9").Select
    Selection.Copy
    ActiveWindow.SmallScroll Down:=30
    Range("I46").Select
    Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
        :=False, Transpose:=False
    ActiveWindow.SmallScroll Down:=-39
    Application.CutCopyMode = False
    ActiveWindow.SmallScroll Down:=-39
    ActiveWindow.SmallScroll Down:=-6
    Range("D4:D9").Select
    Selection.ClearContents
    ActiveWindow.SmallScroll Down:=39
    ActiveWorkbook.Worksheets("ALTAS").AutoFilter.Sort.SortFields.Clear
    ActiveWorkbook.Worksheets("ALTAS").AutoFilter.Sort.SortFields.Add Key:=Range( _
        "C44"), SortOn:=xlSortOnValues, Order:=xlAscending, DataOption:= _
        xlSortNormal
    With ActiveWorkbook.Worksheets("ALTAS").AutoFilter.Sort
        .Header = xlYes
        .MatchCase = False
        .Orientation = xlTopToBottom
        .SortMethod = xlPinYin
        .Apply
    End With
    ActiveWindow.SmallScroll Down:=6
    Sheets("PARTE DIARIO").Select
    Range("C51").Select
    Selection.AutoFill Destination:=Range("C51:C94"), Type:=xlFillDefault
```

```
Range("C51:C94").Select
Sheets("REPORTE").Select
Range("C54").Select
Selection.AutoFill Destination:=Range("C54:C97"), Type:=xlFillDefault
Range("C54:C97").Select
Sheets("ALTAS").Select
Range("C45").Select
 Sheets("ALTAS").Select
Rows("89:89").Select
Selection.Delete Shift:=xlUp
Sheets("PARTE DIARIO").Select
ActiveWindow.SmallScroll Down:=-24
Range("C51:C94").Select
Selection.Copy
Sheets("COMPRAS").Select
ActiveWindow.SmallScroll Down:=12
Range("D52").Select
Range("D52").Select
Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
   :=False, Transpose:=False
ActiveWindow.SmallScroll Down:=9
Sheets("SALIDAS").Select
Range("D51").Select
Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
   :=False, Transpose:=False
ActiveWindow.SmallScroll Down:=24
Sheets("ALTAS").Select
ActiveWindow.SmallScroll Down:=-48
Range("C41").Select
ActiveWindow.SmallScroll Down:=12
Range("C45").Select

Sheets("PARTE DIARIO").Select
ActiveWindow.SmallScroll Down:=-27
Range("C51:C94").Select
Selection.Copy
Sheets("COMPROBAR STOCK").Select
Range("D49").Select
Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
   :=False, Transpose:=False
ActiveWindow.SmallScroll Down:=-39
Range("D8").Select
Sheets("SALIDAS").Select
ActiveWindow.SmallScroll Down:=-72
```

```
        Range("D6").Select
        Sheets("COMPRAS").Select
        ActiveWindow.SmallScroll Down:=-93
        Range("D6").Select
        Sheets("REPORTE").Select
        ActiveWindow.SmallScroll Down:=-72
        Range("D7").Select
        Sheets("PARTE DIARIO").Select
        ActiveWindow.SmallScroll Down:=-57
        Range("D3").Select
        Sheets("ALTAS").Select
        Range("C45").Select
End Sub
```

5.3 CANCEL JOBS (Programme used in 6.1.3 point. " Inputs for closing finished jobs")

```
Sub BAJA_TRABAJOS()
'
' BAJA_TRABAJOS Macro
Dim I As String
 I = Range("Q13").Value
Range("C45").Select
Do While Not IsEmpty(ActiveCell)
If ActiveCell = I Then
Selection.EntireRow.Delete
Else
ActiveCell.Offset(1, 0).Select
End If
Loop

Range("Q13").Select
    Selection.ClearContents
     Sheets("PARTE DIARIO").Select

    Range("C51").Select
    Selection.AutoFill Destination:=Range("C51:C94"), Type:=xlFillDefault
    Range("C51:C94").Select
    Sheets("REPORTE").Select
    Range("C54").Select
    Selection.AutoFill Destination:=Range("C54:C97"), Type:=xlFillDefault
    Range("C54:C97").Select
    Sheets("ALTAS").Select
    Range("C45").Select
```

```
Sheets("PARTE DIARIO").Select
ActiveWindow.SmallScroll Down:=-24
Range("C51:C94").Select
Selection.Copy
Sheets("COMPRAS").Select
ActiveWindow.SmallScroll Down:=12
Range("D52").Select
Range("D52").Select
Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
    :=False, Transpose:=False
ActiveWindow.SmallScroll Down:=9
Sheets("SALIDAS").Select
Range("D51").Select
Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
    :=False, Transpose:=False
ActiveWindow.SmallScroll Down:=24
Sheets("ALTAS").Select
ActiveWindow.SmallScroll Down:=-48
Range("C41").Select
ActiveWindow.SmallScroll Down:=12
Range("C45").Select

Sheets("PARTE DIARIO").Select
ActiveWindow.SmallScroll Down:=-27
Range("C51:C94").Select
Selection.Copy
Sheets("COMPROBAR STOCK").Select
Range("D49").Select
Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
    :=False, Transpose:=False
ActiveWindow.SmallScroll Down:=-39
Range("D8").Select
Sheets("SALIDAS").Select
ActiveWindow.SmallScroll Down:=-72
Range("D6").Select
Sheets("COMPRAS").Select
ActiveWindow.SmallScroll Down:=-93
Range("D6").Select
Sheets("REPORTE").Select
ActiveWindow.SmallScroll Down:=-72
Range("D7").Select
Sheets("PARTE DIARIO").Select
ActiveWindow.SmallScroll Down:=-57
Range("D3").Select
```

```
        Sheets("ALTAS").Select
        Range("C45").Select


End Sub
```

5.4 JOB REPORT. MAIN TOOL (Programme used in 6.2.2 point. "Outputs report")

```
Sub FINAL02()


Call primero 'llama al procedimiento de nombre primero
Call segundo 'llama al procedimiento de nombre segundo
Call tercero 'llama al procedimiento de nombre tercero
Call cuarto  'llama al procedimiento de nombre cuarto


End Sub '
' FINAL02 Macro


Sub primero()
CreateObject("wscript.shell").popup "Realizando Reporte. Espere, por Favor", 3
Application.ScreenUpdating = False



'

    Sheets("FINAL").Select
      Cells.Select
    Range("A67").Activate
    Selection.ClearContents
    Selection.ClearContents
    Selection.ClearContents
    Selection.ClearContents
    Range("D2").Select
    ActiveCell.FormulaR1C1 = ""
    Cells.Select
    Selection.Delete Shift:=xlUp
    Range("E3").Select
    ActiveCell.FormulaR1C1 = "REPORTE FINAL OBRA"
    Range("E3:G3").Select
    With Selection
        .HorizontalAlignment = xlCenter
        .VerticalAlignment = xlBottom
        .WrapText = False
        .Orientation = 0
        .AddIndent = False
        .IndentLevel = 0
```

```vba
    .ShrinkToFit = False
    .ReadingOrder = xlContext
    .MergeCells = False
End With
Selection.Merge
Selection.Borders(xlDiagonalDown).LineStyle = xlNone
Selection.Borders(xlDiagonalUp).LineStyle = xlNone
With Selection.Borders(xlEdgeLeft)
    .LineStyle = xlContinuous
    .ColorIndex = 0
    .TintAndShade = 0
    .Weight = xlMedium
End With
With Selection.Borders(xlEdgeTop)
    .LineStyle = xlContinuous
    .ColorIndex = 0
    .TintAndShade = 0
    .Weight = xlMedium
End With
With Selection.Borders(xlEdgeBottom)
    .LineStyle = xlContinuous
    .ColorIndex = 0
    .TintAndShade = 0
    .Weight = xlMedium
End With
With Selection.Borders(xlEdgeRight)
    .LineStyle = xlContinuous
    .ColorIndex = 0
    .TintAndShade = 0
    .Weight = xlMedium
End With
Selection.Borders(xlInsideVertical).LineStyle = xlNone
Selection.Borders(xlInsideHorizontal).LineStyle = xlNone
With Selection.Interior
    .Pattern = xlSolid
    .PatternColorIndex = xlAutomatic
    .ThemeColor = xlThemeColorDark1
    .TintAndShade = -0.249977111117893
    .PatternTintAndShade = 0
End With
Range("E5").Select
ActiveCell.FormulaR1C1 = "DATOS"
Range("E7").Select
ActiveCell.FormulaR1C1 = "CLIENTE"
```

```vba
Range("E8").Select
ActiveCell.FormulaR1C1 = "OBRA"
Range("E9").Select
ActiveCell.FormulaR1C1 = "NºPRESUPUESTO"
Range("E5:F5").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .AddIndent = False
    .IndentLevel = 0
    .ShrinkToFit = False
    .ReadingOrder = xlContext
    .MergeCells = False
End With
Selection.Merge
Selection.Borders(xlDiagonalDown).LineStyle = xlNone
Selection.Borders(xlDiagonalUp).LineStyle = xlNone
With Selection.Borders(xlEdgeLeft)
    .LineStyle = xlContinuous
    .ColorIndex = 0
    .TintAndShade = 0
    .Weight = xlMedium
End With
With Selection.Borders(xlEdgeTop)
    .LineStyle = xlContinuous
    .ColorIndex = 0
    .TintAndShade = 0
    .Weight = xlMedium
End With
With Selection.Borders(xlEdgeBottom)
    .LineStyle = xlContinuous
    .ColorIndex = 0
    .TintAndShade = 0
    .Weight = xlMedium
End With
With Selection.Borders(xlEdgeRight)
    .LineStyle = xlContinuous
    .ColorIndex = 0
    .TintAndShade = 0
    .Weight = xlMedium
End With
Selection.Borders(xlInsideVertical).LineStyle = xlNone
```

```
Selection.Borders(xlInsideHorizontal).LineStyle = xlNone
With Selection.Interior
    .Pattern = xlSolid
    .PatternColorIndex = xlAutomatic
    .ThemeColor = xlThemeColorDark1
    .TintAndShade = -0.149998474074526
    .PatternTintAndShade = 0
End With
Range("E7:F9").Select
Selection.Borders(xlDiagonalDown).LineStyle = xlNone
Selection.Borders(xlDiagonalUp).LineStyle = xlNone
With Selection.Borders(xlEdgeLeft)
    .LineStyle = xlContinuous
    .ColorIndex = 0
    .TintAndShade = 0
    .Weight = xlThin
End With
With Selection.Borders(xlEdgeTop)
    .LineStyle = xlContinuous
    .ColorIndex = 0
    .TintAndShade = 0
    .Weight = xlThin
End With
With Selection.Borders(xlEdgeBottom)
    .LineStyle = xlContinuous
    .ColorIndex = 0
    .TintAndShade = 0
    .Weight = xlThin
End With
With Selection.Borders(xlEdgeRight)
    .LineStyle = xlContinuous
    .ColorIndex = 0
    .TintAndShade = 0
    .Weight = xlThin
End With
With Selection.Borders(xlInsideVertical)
    .LineStyle = xlContinuous
    .ColorIndex = 0
    .TintAndShade = 0
    .Weight = xlThin
End With
With Selection.Borders(xlInsideHorizontal)
    .LineStyle = xlContinuous
    .ColorIndex = 0
```

```
      .TintAndShade = 0
      .Weight = xlThin
End With
Columns("E:E").ColumnWidth = 17.71
Columns("F:F").ColumnWidth = 27.14
Range("F8").Select
Sheets("REPORTE").Select
Selection.Copy
Sheets("FINAL").Select
Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
    :=False, Transpose:=False
Range("F7").Select
Application.CutCopyMode = False
ActiveCell.FormulaR1C1 = "=VLOOKUP(R[1]C,ALTAS!R[38]C[-3]:R[81]C[3],3,FALSE)"
Range("F9").Select
ActiveCell.FormulaR1C1 = "=VLOOKUP(R[-1]C,ALTAS!R[36]C[-3]:R[79]C[3],2,FALSE)"
Range("E12").Select
Columns("F:F").ColumnWidth = 34.14
Range("F7:F9").Select
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .AddIndent = False
    .IndentLevel = 0
    .ShrinkToFit = False
    .ReadingOrder = xlContext
    .MergeCells = False
End With
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = True
    .Orientation = 0
    .AddIndent = False
    .IndentLevel = 0
    .ShrinkToFit = False
    .ReadingOrder = xlContext
    .MergeCells = False
End With
With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
```

```vba
        .WrapText = False
        .Orientation = 0
        .AddIndent = False
        .IndentLevel = 0
        .ShrinkToFit = False
        .ReadingOrder = xlContext
        .MergeCells = False
    End With


    Range("E11").Select
    ActiveCell.FormulaR1C1 = "COSTES"
    Range("E11").Select
    ActiveCell.FormulaR1C1 = " RESUMEN COSTES"
    Range("E11:F11").Select
    With Selection
        .HorizontalAlignment = xlCenter
        .VerticalAlignment = xlBottom
        .WrapText = False
        .Orientation = 0
        .AddIndent = False
        .IndentLevel = 0
        .ShrinkToFit = False
        .ReadingOrder = xlContext
        .MergeCells = False
    End With
    Selection.Merge
    Selection.Borders(xlDiagonalDown).LineStyle = xlNone
    Selection.Borders(xlDiagonalUp).LineStyle = xlNone
    With Selection.Borders(xlEdgeLeft)
        .LineStyle = xlContinuous
        .ColorIndex = 0
        .TintAndShade = 0
        .Weight = xlMedium
    End With
    With Selection.Borders(xlEdgeTop)
        .LineStyle = xlContinuous
        .ColorIndex = 0
        .TintAndShade = 0
        .Weight = xlMedium
    End With
    With Selection.Borders(xlEdgeBottom)
        .LineStyle = xlContinuous
        .ColorIndex = 0
        .TintAndShade = 0
```

```vba
      .Weight = xlMedium
   End With
   With Selection.Borders(xlEdgeRight)
      .LineStyle = xlContinuous
      .ColorIndex = 0
      .TintAndShade = 0
      .Weight = xlMedium
   End With
   Selection.Borders(xlInsideVertical).LineStyle = xlNone
   Selection.Borders(xlInsideHorizontal).LineStyle = xlNone
   With Selection.Interior
      .Pattern = xlSolid
      .PatternColorIndex = xlAutomatic
      .ThemeColor = xlThemeColorDark1
      .TintAndShade = -0.349986266670736
      .PatternTintAndShade = 0
   End With
   With Selection.Interior
      .Pattern = xlSolid
      .PatternColorIndex = xlAutomatic
      .ThemeColor = xlThemeColorDark1
      .TintAndShade = -0.249977111117893
      .PatternTintAndShade = 0
   End With
   Range("E13").Select
   ActiveCell.FormulaR1C1 = "MANO OBRA"
   Range("E14").Select
   ActiveCell.FormulaR1C1 = "GRÚAS"
   Range("E15").Select
   ActiveCell.FormulaR1C1 = "PLATAFORMAS"
   Range("E16").Select
   ActiveCell.FormulaR1C1 = "TRANSPORTE"
   Range("E17").Select
   ActiveCell.FormulaR1C1 = "EXTRAS"
   Range("E18").Select
   ActiveCell.FormulaR1C1 = "CONSUMIBLES"
   Range("E19").Select
   ActiveCell.FormulaR1C1 = "MATERIAL"
------------------ AS THE PROGRAMME IS VERY LONG, A PART OF IT IT IS NOT SHOWN
      .TintAndShade = 0
      .Weight = xlMedium
   End With
   With Selection.Borders(xlEdgeRight)
      .LineStyle = xlContinuous
```

```
      .ColorIndex = 0
      .TintAndShade = 0
      .Weight = xlMedium
   End With
   Selection.Borders(xlInsideVertical).LineStyle = xlNone
   Selection.Borders(xlInsideHorizontal).LineStyle = xlNone
   ActiveWindow.SmallScroll ToRight:=12
   Range("E120:AJ120").Select
   ActiveCell.FormulaR1C1 = _
      "PARTES DE TRABAJO DE PERSONAL, GRÚAS, PLATAFORMAS Y EXTRAS"
   Range("E121").Select
   Range("AP120:BB120").Select
   With Selection
      .HorizontalAlignment = xlCenter
      .VerticalAlignment = xlBottom
      .WrapText = False
      .Orientation = 0
      .AddIndent = False
      .IndentLevel = 0
      .ShrinkToFit = False
      .ReadingOrder = xlContext
      .MergeCells = False
   End With
   Selection.Merge
   With Selection.Interior
      .Pattern = xlSolid
      .PatternColorIndex = xlAutomatic
      .ThemeColor = xlThemeColorDark1
      .TintAndShade = -0.349986266670736
      .PatternTintAndShade = 0
   End With
   Selection.Borders(xlDiagonalDown).LineStyle = xlNone
   Selection.Borders(xlDiagonalUp).LineStyle = xlNone
   With Selection.Borders(xlEdgeLeft)
      .LineStyle = xlContinuous
      .ColorIndex = 0
      .TintAndShade = 0
      .Weight = xlMedium
   End With
   With Selection.Borders(xlEdgeTop)
      .LineStyle = xlContinuous
      .ColorIndex = 0
      .TintAndShade = 0
      .Weight = xlMedium
```

```
End With
With Selection.Borders(xlEdgeBottom)
    .LineStyle = xlContinuous
    .ColorIndex = 0
    .TintAndShade = 0
    .Weight = xlMedium
End With
With Selection.Borders(xlEdgeRight)
    .LineStyle = xlContinuous
    .ColorIndex = 0
    .TintAndShade = 0
    .Weight = xlMedium
End With
Selection.Borders(xlInsideVertical).LineStyle = xlNone
Selection.Borders(xlInsideHorizontal).LineStyle = xlNone
Range("AP120:BB120").Select
ActiveCell.FormulaR1C1 = _
    "PARTES DE TRABAJO DE CONSUMIBLES, EPIS Y HERRAMIENTAS"
Range("AP121").Select
Range("F7").Select
Sheets("STOCK").Select
Columns("Q:AC").Select
Range("Q4").Activate
Selection.Delete Shift:=xlToLeft
Range("A4").Select
Sheets("FINAL").Select

Range("F7").Select
 ActiveWindow.ScrollColumn = 37
ActiveWindow.ScrollColumn = 34
ActiveWindow.ScrollColumn = 1
ActiveWindow.ScrollRow = 85
ActiveWindow.ScrollRow = 78
ActiveWindow.ScrollRow = 69
ActiveWindow.ScrollRow = 66
ActiveWindow.ScrollRow = 63
ActiveWindow.ScrollRow = 54
ActiveWindow.ScrollRow = 51
ActiveWindow.ScrollRow = 35
ActiveWindow.ScrollRow = 32
ActiveWindow.ScrollRow = 26
ActiveWindow.ScrollRow = 23
ActiveWindow.ScrollRow = 20
ActiveWindow.ScrollRow = 16
```

```vba
ActiveWindow.ScrollRow = 13
ActiveWindow.ScrollRow = 10
ActiveWindow.ScrollRow = 7
ActiveWindow.ScrollRow = 4
ActiveWindow.ScrollRow = 1
ActiveWindow.SmallScroll ToRight:=3



    Application.ScreenUpdating = True
End Sub
```

5.5 OPERATOR REPORT (Programme used in 6.2.2.3 point. "Screening by operator")

```vba
Sub FILTRO()
'
' FILTRO Macro
'
CreateObject("wscript.shell").popup "Aplicando Filtro. Espere, por Favor", 3
Application.ScreenUpdating = False
'
    Range("D7").Select
    Application.CutCopyMode = False
    Selection.Copy

    Range("Z2").Select
    ActiveSheet.Paste

    Range("D7").Select
    Application.CutCopyMode = False
    Selection.Copy
    Application.CutCopyMode = False
    Selection.Copy

    Range("Z2").Select
    Selection.PasteSpecial Paste:=xPasteValues, Operation:=xlNone, SkipBlanks _
        :=False, Transpose:=False
    Application.CutCopyMode = False
    Range("D8").Select
    Selection.Copy
    ActiveWindow.ScrollColumn = 2

    Range("AX2").Select
    Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
```

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```
    :=False, Transpose:=False
Application.CutCopyMode = False
Range("D9").Select
Selection.Copy

Range("AA2").Select
Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
    :=False, Transpose:=False

Application.CutCopyMode = False

Range("D10:D11").Select
Selection.Copy

Range("AC2").Select
Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
    :=False, Transpose:=True

Application.CutCopyMode = False
Range("D7:D13").Select
Selection.ClearContents
Sheets("PARTE").Range("Tabla3[#All]").AdvancedFilter Action:=xlFilterCopy, _
    CriteriaRange:=Range("Z1:AX2"), CopyToRange:=Range("Z5:AX5"), Unique:= _
    False
Range("Z2:AX2").Select
Selection.ClearContents
Range("Z5:AX1035").Select
Selection.Borders(xlDiagonalDown).LineStyle = xlNone
Selection.Borders(xlDiagonalUp).LineStyle = xlNone
With Selection.Borders(xlEdgeLeft)
    .LineStyle = xlContinuous
    .ColorIndex = 0
    .TintAndShade = 0
    .Weight = xlThin
End With
With Selection.Borders(xlEdgeTop)
    .LineStyle = xlContinuous
    .ColorIndex = 0
    .TintAndShade = 0
    .Weight = xlThin
End With
With Selection.Borders(xlEdgeBottom)
    .LineStyle = xlContinuous
    .ColorIndex = 0
```

```vba
      .TintAndShade = 0
      .Weight = xlThin
   End With
   With Selection.Borders(xlEdgeRight)
      .LineStyle = xlContinuous
      .ColorIndex = 0
      .TintAndShade = 0
      .Weight = xlThin
   End With
   With Selection.Borders(xlInsideVertical)
      .LineStyle = xlContinuous
      .ColorIndex = 0
      .TintAndShade = 0
      .Weight = xlThin
   End With
   With Selection.Borders(xlInsideHorizontal)
      .LineStyle = xlContinuous
      .ColorIndex = 0
      .TintAndShade = 0
      .Weight = xlThin
   End With
   Range("Z5:AX5").Select
   With Selection.Interior
      .Pattern = xlSolid
      .PatternColorIndex = xlAutomatic
      .ThemeColor = xlThemeColorDark1
      .TintAndShade = -0.349986266670736
      .PatternTintAndShade = 0
   End With
   Application.ScreenUpdating = True

   ActiveWindow.ScrollColumn = 26
End Sub
```

5.6 REGISTER TASK (Programme used in 6.1.1 point. " Inputs for the task")

```vba
Sub INTRODUCIR_TRABAJO()
'
' INTRODUCIR_TRABAJO Macro'
   CreateObject("wscript.shell").popup "Introduciendo datos. Espere, por Favor", 3
Application.ScreenUpdating = False
'
   Range("D3:D7").Select
   Selection.Copy
```

```vba
Sheets("PARTE").Select
Rows("3:3").Select
Application.CutCopyMode = False
Selection.Insert Shift:=xlDown, CopyOrigin:=xlFormatFromLeftOrAbove
Sheets("PARTE DIARIO").Select
Selection.Copy
Sheets("PARTE").Select
Range("A3").Select
Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
    :=False, Transpose:=True
Sheets("PARTE DIARIO").Select
Application.CutCopyMode = False
Range("D9:D19").Select
Selection.Copy
Sheets("PARTE").Select
ActiveWindow.SmallScroll ToRight:=8
Range("N3").Select
Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
    :=False, Transpose:=True


Range("A2").Select
Sheets("PARTE DIARIO").Select
Application.CutCopyMode = False
Selection.ClearContents
Range("D3:D4").Select
Selection.ClearContents
Range("D6:D7").Select
Selection.ClearContents
Range("D3").Select
Sheets("PARTE").Select
ActiveWindow.ScrollColumn = 8
ActiveWindow.ScrollColumn = 7
ActiveWindow.ScrollColumn = 6
ActiveWindow.ScrollColumn = 5
ActiveWindow.ScrollColumn = 4
ActiveWindow.ScrollColumn = 3
ActiveWindow.ScrollColumn = 2
ActiveWindow.ScrollColumn = 1
Range("A3").Select
Sheets("PARTE DIARIO").Select
Range("D3").Select


 Application.ScreenUpdating = True
```

End Sub

5.7 REGISTER SUPPLIERS (Programme used in 6.1.9 point. "Inputs for defining suppliers")

```vba
Sub IR_ALTA_PROVEEDORES()
'
' IR_ALTA_PROVEEDORES Macro
'
    ActiveWindow.ScrollWorkbookTabs Sheets:=1
    ActiveWindow.ScrollWorkbookTabs Sheets:=1
    ActiveWindow.ScrollWorkbookTabs Sheets:=1
    ActiveWindow.ScrollWorkbookTabs Sheets:=1
    Sheets("COMPRAS").Select
    ActiveWindow.SmallScroll Down:=-111
    ActiveWindow.SmallScroll ToRight:=3
    Range("F52").Select
End Sub
```

5.8 GO TO REGISTER OPERATORS (Programme used in order to go directly to the information)

```vba
Sub IR_ALTA_TRABAJOS()'
' IR_ALTA_TRABAJOS Macro'
    Sheets("ALTAS").Select
    Range("D4").Select
End Sub
```

5.9 GO TO MENU (Programme used in order to go directly to the information)

```vba
Sub IR_MENU()'
' IR_MENU Macro'
    Sheets("MENU").Select
    Range("B3").Select
End Sub
```

5.10 GO TO ACTIVE OPERATORS (Programme used in order to go directly to the information)

```vba
Sub IR_TRABAJADORES()'
' IR_TRABAJADORES Macro'
    Sheets("PARTE DIARIO").Select
    ActiveWindow.SmallScroll Down:=-6
    ActiveWindow.SmallScroll ToRight:=1
    Range("C174").Select
```

End Sub

5.11 SAVE AS (Programme used in 6.1.3 point. "Inputs for closing finished jobs")

```
Sub GUARDAR_COMO()'
' GUARDAR_COMO Macro
Sheets("FINAL").Select
    Workbooks.Add
    Windows("BASE DE DATOS.xlsm").Activate
    Cells.Select
    Selection.Copy
    Windows("Libro1").Activate
    Cells.Select
    Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
        :=False, Transpose:=False
    Cells.Select
    Selection.PasteSpecial Paste:=xlPasteFormats, Operation:=xlNone, _
        SkipBlanks:=False, Transpose:=False
    Range("F13").Select
    ActiveWindow.SmallScroll Down:=-51
    Range("B3").Select
    Windows("BASE DE DATOS.xlsm").Activate
    Range("A1").Select
    Application.CutCopyMode = False
    ActiveCell.FormulaR1C1 = ""
    Range("A2").Select
    Windows("Libro1").Activate
    Range("A2").Select

    Application.Dialogs(xlDialogSaveAs).Show
    ActiveWorkbook.Close
    Sheets("ALTAS").Select
    Range("Q13").Select'

End Sub
```

5.12 REGISTER PURCHASING MATERIAL (Programme used in 6.1.7 point. "Inputs for purchasing materials and consumer goods")

```
Sub INTRODUCIR_ENTRADA_MATERIAL()
'
' INTRODUCIR_ENTRADA_MATERIAL Macro'
    Range("D16").Select
```

```vba
    Sheets("STOCK").Select
    Rows("4:4").Select
    Selection.Insert Shift:=xlDown, CopyOrigin:=xlFormatFromLeftOrAbove
    Sheets("COMPRAS").Select
    Range("D6:D15").Select
    Selection.Copy
    Sheets("STOCK").Select
    Range("B4").Select
    Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
        :=False, Transpose:=True
    Range("C5").Select
    Sheets("COMPRAS").Select
    Range("D6").Select
    Application.CutCopyMode = False
    Range("D6:D8").Select
    Selection.ClearContents
    Range("D10:D15").Select
    Selection.ClearContents
    Range("C3:D4").Select
    ActiveCell.FormulaR1C1 = "COMPRAS DE MATERIAL"
    Sheets("STOCK").Select
    Range("A4").Select
    ActiveCell.FormulaR1C1 = "ENTRADAS"
    Range("C6").Select
    Sheets("COMPRAS").Select
    Range("D6").Select
    Range("D6").Select
End Sub
```

6. <u>METHODOLOGY</u>

The way of developing the database was done for the first time, having a meeting with the involve people. The person and roles who were at the meeting was the manager, the supervisor and the controller database; the manager define what he need using his actual way of registration the inputs, so on the controller said how could be done and program.

In order to not modify the actual way of registration very much and to do not get people confused and to guarantee the implementation the designer tried to adapt the actual system into the digital way for being the flow process very similar.

Once the needs were defined, the designer started to program the inputs and the outputs.

Most of the tools used have been learn by Self-taught way. What the designer has done is Watching videos in youtube, reading on internet, reading examples.

6.1   <u>INPUTS</u>
6.1.1 Inputs for the task.

Those inputs are done **by the supervisor and it is his responsibility** to keep updates it. This is related for the

task what the operators has been doing during their job shift.
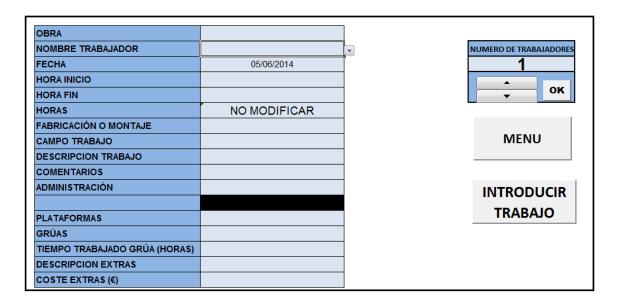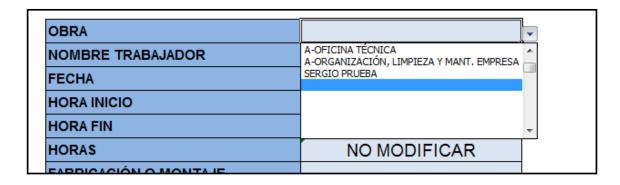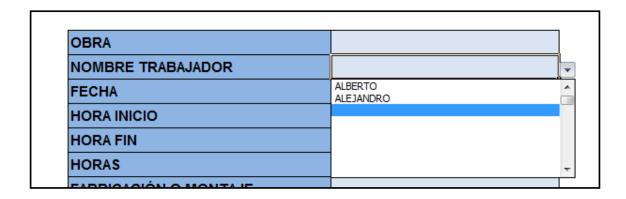
The inputs are the fields shown in chart 1.

Field job: there is a list where it can be selected the job.

Field Operator name: there is a list where it can be select the operator name.

Field Data: It has to be registered the date where the operator has worked.

Field Start hour: It is the time when the operator starts working.

Field Finish hour: It is the time when the operator end working at this job.

Field Hour: This is a field which is calculating automatically. It is the hour worked between the end working operator and the starts.

Field manufacturing or assembly: This field is a list for selecting which task is done by the operator and it is related to the manufacturing or assembly process.

Field type job: This field is a list for what type of the job the operator is working, choosing from pipe, boiler works, fences, engineering, etc.

CAMPO TRABAJO	
DESCRIPCION TRABAJO	TUBERÍAS
	CALDERERÍA
COMENTARIOS	CERRAMIENTOS
	BARANDILLAS
ADMINISTRACIÓN	ESCALERA DE GATO
	ESCALERA DE ZANCAS
	FABRICACIÓN MAQUINARIA
	OFICINA TÉCNICA
PLATAFORMAS	
GRÚAS	

Field job description: This is an open field where the supervisor can write down what the operator has done.

Field comments: This is an open field where the supervisor can write down any comments which he thinks are relevant, important or just to mention whatever.

Field Administration: This is a list field where it can be selected from 2 choice, Administration or budget. Budget is for something which has been valued at the budget process and administration is for when the job is ongoing and the customer asks for anything extra what has been not defined at the budget process. This field is very important because calculate extra cost for the customer and for the business is a very powerful tool that give at the report a quick data cost in order to invoice.

Field platform: It is list field where it can be selected what kind of platform has been used for the task. All the platform cost has been defined previously.

PLATAFORMAS					
ENERO - JUNIO 2013		1-2 DÍAS		3 o mas días	
TIPO	MODELO	DIA LABORAL	SEGURO DIA	DIA LABORAL	SEGURO DIA
ARTICULADA PAD12	PAD12	88,00 €	5,80 €	88,00 €	5,80 €
ARTICULADA PAD16	PAD16	93,00 €	6,30 €	93,00 €	6,30 €
ARTICULADA PAD18	PAD18	95,00 €	6,90 €	95,00 €	6,90 €
ARTICULADA PAD20	PAD20	124,00 €	10,40 €	124,00 €	10,40 €
ARTICULADA PAD26	PAD26	185,00 €	16,50 €	175,00 €	14,50 €
TELESCOPICA PBT22	PBT22	140,00 €	11,00 €	135,00 €	11,00 €
TELESCOPICA PBT28	PBT28	210,00 €	17,00 €	190,00 €	15,30 €
TELESCOPICA PBT38	PBT38	310,00 €	26,50 €	280,00 €	21,00 €
TIJERA PTD10	PTD10	81,00 €	5,10 €	71,00 €	4,00 €
TIJERA PTD12	PTD12	91,00 €	6,10 €	82,00 €	5,20 €
TIJERA PTD15	PTD15	101,00 €	6,90 €	90,00 €	6,30 €
TIJERA PTD18	PTD18	109,00 €	7,40 €	100,00 €	6,90 €

Field crane: It is a list field where it can be selected what type of crane has been working on the task. All the crane cost has been defined previously.

Field hour crane: It is how many hours the crane has worked.

Field Extra description: This is an open field to describe any extra cost.

Field extra cost (€): This field is to indicate the extra cost describe in the before field.

6.1.2 Inputs for creating a job.

Once the budget job has been accepted by the customer for being done, it is needed to create the job in the system and define several items like, number budget, customer, contact, accepted budget date, globally description job.

After defining all points, it has to be pressed "Alta button" in order to register the data automatically in the system.
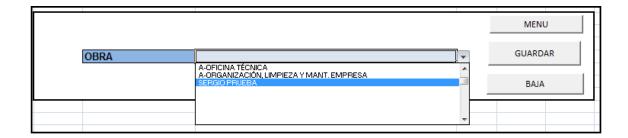
OBRA	
Nº PRESUPUESTO	
CLIENTE	
CONTACTO	
FECHA ALTA	
DESCRIPCIÓN TRABAJO	

MENU

ALTA

6.1.3 Inputs for closing finished job.

When the job is completely finished, the job report has to be saved in the selected folder for having the information available in order to check the data as needed (for future similar projects or to review the project done).

The way of saving the data is after creating the final job report pressing "GUARDAR" button. Just pressing the button is open an interaction window in order to saved the data in the wanted file.

Once the data is properly saved the following step is closing the job in the system. So on, it is selecting the job

wanted to be closed from the list and pressing the "BAJA" button.

6.1.4 Inputs for creating new operators and updating within the actual organization.

The system needs to be updated with the actual people within the organization. So on, this tools is used for defining the category, the status on the company, the price every hour for each type (normal hour cost, extra hour cost, night hour cost, holiday hour cost).

TRABAJADORES	CATEGORIA	ESTADO	COSTE TRABAJADOR HORA NORMAL(€)	COSTE TRABAJADOR HORA EXTRA(€)	COSTE TRABAJADOR HORA FESTIVA(€)	COSTE TRABAJADOR HORA NOCTURNA (€)	COSTE TRABAJADOR HORA EXTRA NOCTURNA (€)
ALBERTO	JEFE TALLER	ALTA	30	40	40	40	50
ALEJANDRO	ENCARGADO	ALTA	20	30	30	30	30
			#N/A	#N/A	#N/A	#N/A	#N/A
			#N/A	#N/A	#N/A	#N/A	#N/A
			#N/A	#N/A	#N/A	#N/A	#N/A
			#N/A	#N/A	#N/A	#N/A	#N/A
			#N/A	#N/A	#N/A	#N/A	#N/A
			#N/A	#N/A	#N/A	#N/A	#N/A
			#N/A	#N/A	#N/A	#N/A	#N/A

6.1.5 Inputs for platforms and crane.

In order to calculate automatically the cost for the platform and cranes needs to be defined all the data required. At this point can be defined the entire platform types with their cost in function of the days used.

PLATAFORMAS							
ENERO - JUNIO 2013		1-2 DÍAS		3 o mas días			
TIPO	MODELO	DIA LABORAL	SEGURO DIA	DIA LABORAL	SEGURO DIA	PORTES ALICANTE	LIMPIEZA
ARTICULADA PAD12	PAD12	88,00 €	5,80 €	88,00 €	5,80 €	300,00 €	30,00 €
ARTICULADA PAD16	PAD16	93,00 €	6,30 €	93,00 €	6,30 €	300,00 €	30,00 €
ARTICULADA PAD18	PAD18	95,00 €	6,90 €	95,00 €	6,90 €	300,00 €	30,00 €
ARTICULADA PAD20	PAD20	124,00 €	10,40 €	124,00 €	10,40 €	300,00 €	30,00 €
ARTICULADA PAD26	PAD26	185,00 €	16,50 €	175,00 €	14,50 €	300,00 €	30,00 €
TELESCOPICA PBT22	PBT22	140,00 €	11,00 €	135,00 €	11,00 €	300,00 €	30,00 €
TELESCOPICA PBT28	PBT28	210,00 €	17,00 €	190,00 €	15,30 €	300,00 €	30,00 €
TELESCOPICA PBT38	PBT38	310,00 €	26,50 €	280,00 €	21,00 €	300,00 €	30,00 €
TIJERA PTD10	PTD10	81,00 €	5,10 €	71,00 €	4,00 €	300,00 €	30,00 €
TIJERA PTD12	PTD12	91,00 €	6,10 €	82,00 €	5,20 €	300,00 €	30,00 €
TIJERA PTD15	PTD15	101,00 €	6,90 €	90,00 €	6,30 €	300,00 €	30,00 €
TIJERA PTD18	PTD18	109,00 €	7,40 €	100,00 €	6,90 €	300,00 €	30,00 €

GRÚAS						
TIPO VEHICULO	PRECIO HORA	SERVICIO MÍNIMO	DESPLAZAMIENTO		COSTE MINIMO (€)	COSTE (€)
AUTOCARGANTE HASTA 28 TNM	83,00 €	4 Horas	SIN CARGO		332,00 €	
AUTOCARGANTE HASTA 44 TNM	86,00 €	4 Horas	SIN CARGO		344,00 €	
AUTOCARGANTE HASTA 66 TNM	95,00 €	4 Horas	SIN CARGO		380,00 €	
AUTOCARGANTE HASTA 100 TNM	120,00 €	4 Horas	SIN CARGO		480,00 €	
TRAYLER	80,00 €	5 Horas	SEGÚN OBRA		400,00 €	
TRAYLER AUTOCARGANTE	100,00 €	5 Horas	SEGÚN OBRA		500,00 €	
GONDOLA	80,00 €	5 Horas	SEGÚN OBRA		400,00 €	
GRUA 30 TM	60,00 €	4 Horas	SIN CARGO		240,00 €	
GRUA 40 TM	80,00 €	4 Horas	SIN CARGO		320,00 €	
GRUA 50 TM	110,00 €	4 Horas			440,00 €	
GRUA 60 TM	110,00 €	5 Horas			550,00 €	
GRUA 70 TM	150,00 €	6 Horas	sin cargo		900,00 €	
GRUA 75 TM	150,00 €	6 Horas			900,00 €	
GRUA 80 TM	150,00 €	8 Horas	SIN CARGO		1.200,00 €	
GRUA 90	180,00 €	8 Horas			1.440,00 €	
GRUA 100 TM	180,00 €	8 Horas	SIN CARGO		1.440,00 €	
GRUA 120 TM	240,00 €	10 Horas	SIN CARGO		2.400,00 €	
GRUA 160 TM	360,00 €	10 Horas	SIN CARGO		3.600,00 €	
GRUA 250 TM	500,00 €	SOLICITAR PRESUPUESTO	SOLICITAR PRESUPUESTO		#¡VALOR!	

6.1.6 Inputs for defining materials and consumer goods.

All materials and consumer goods which are at the warehouse should be introduced at the application.
They are defined by file, code and description.

6.1.7 Inputs for purchasing materials and consumer goods.

Every time is done a purchasing should be registered indicating the following items:

Purchasing date: Data when the material has being bought.

Code: The identification material.

Quantity bought: Number of item bought.

Cost: To indicate how much has the item cost.

Comments: This field is for writing any comments.

Supplier: To indicate which one is the supplier.

6.1.8 Inputs for used materials and consumer goods.

In order to register when a material or consumption goods are used, it is programmed the following fields:

Job: To select from the list the job where the material is used.

Administration: To indicate if the material is for administration o from budget.

Date: To indicate the data.

Code: to write the code.

Description: field to not modify. Once the code has been introduced, this file is shown automatically.

Quantity: To indicate how many items has been used.

Cost: This field is automatically. Once introduced the code and the quantity, it is shown the total cost.

Name: to indicate what operator is using the material or consumption good.

Comments: to write down any comment wanted.

OBRA	
ADMINISTRACIÓN	
FECHA	05/06/2014
CODIGO	
DESCRIPCIÓN	NO MODIFICAR
CANTIDAD	
COSTE (€)	NO MODIFICAR
NOMBRE	
COMENTARIOS	

6.1.9 Inputs for defining suppliers.

All suppliers should be introduced at the application.

The way is just writing down the supplier name on the list.

PROVEEDORES
BRU Y RUBIO

After program all this topics comments before, it was programmed a menu in order to go directly and fast to the required inputs. In the chart below is shown the menu as it is.

6.2 OUTPUTS

6.2.1 Output active jobs

The excel sheet shows the active jobs which are running, defined by quotation number, customer, contact, start date, end date, job description.

There is available a tool if the user needs to screen by customer in order to know the jobs running for each client.

ALTA Y BAJA DE OBRAS EN PROCESO						
NOMBRE	Nº PRESUPUESTO	CLIENTE	CONTACT	FECHA ALT	FECHA BA	DESCRIPCIÓN TRABAJO
A-AUSENCIA LABORAL	INTERNO	INTERNO	SERGIO	XXX	XXX	Permiso medico, etc
A-GESTION INTERNA	INTERNO	INTERNO	SERGIO	XXX	XXX	Nominas, banco, etc
A-GESTIÓN SEGURIDAD Y FORM	INTERNO	INTERNO	SERGIO	XXX	XXX	e-coordina, reco, etc
A-OFICINA TÉCNICA	INTERNO	INTERNO	SERGIO	XXX	XXX	Diseño hojas excel, calculo estructural, optimización, etc
A-ORGANIZACIÓN, LIMPIEZA Y	INTERNO	INTERNO	PEPINO	XXX	XXX	Ordenar herramienta, limpiar taller, etc
SERGIO PRUEBA						

6.2.2 Output Report

This is the most important tool of the project. Below is shown, the menu for creating the job report, to know where has been working each operator and what the operator has done, the crane and platforms used, the material and consumption good used, the

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extras used. We can know very accurate the money invested up to know.

Mention that in the future it can be programmed other fields in order to screen by other topics like data, hour time started, hour time ended and so on.

6.2.2.1 Screening by job

Pressing the job field is shown all the active jobs. Underneath you can see a view of how it can be selected the job in order to create the final report.

Once selected the job wanted and pressing "Generar reporte final de obra" button, it is created the final job report automatically.

As it is shown, at the final report can be found:

General data: Customer, name of the job, number of budget, description job.

Outcomes cost (budget and administration): It is shown how much money it is invested in labour hour, crane, platforms, extras, consumption goods and at the end, it is shown all the cost together.

Note that there are some field to indicate the value of the quotation, the way of paying and the interest bank. <u>Once introduced the profitability and the money earn is shown automatically.</u>

Extras: It is shown all the extras introduced at inputs.

Comments: It is shown all the comments introduced at inputs.

Platforms: It is shown all the platforms introduced at inputs.

Cranes: It is shown the entire crane introduced at inputs.

Chart: This is the main information, where the entire data job is registered. If required can be sorting by field.

REPORTE FINAL OBRA

DATOS

CLIENTE	0	NOTA: INTRODUCIR COSTE DESPLAZAMIENTO GRÚA EN COLUMNA O71 Y V71 SI PROCEDE
OBRA	SERGIO PRUEBA	¿COMPROBAR CANTIDAD DE PLATAFORMAS EN COLUMNA O SI
NºPRESUPUESTO	0	

RESUMEN COSTES TRABAJOS POR PRESUPUESTO		RESUMEN COSTES TRABAJOS POR ADMINISTRACIÓN	
MANO OBRA	160,00 €		0,00 €
GRÚAS	0,00 €		0,00 €
PLATAFORMAS	0,00 €		0,00 €
TRANSPORTE			
EXTRAS	0,00 €		0,00 €
CONSUMIBLES	0,00 €		0,00 €
MATERIAL			

TOTAL COSTES (€)	160,00 €		0,00 €	COMENTARIOS GENERALES
				INTRODUCIR COMENTARIOS GENERALES SI PROCEDE
TOTAL FACT. O PRESU. (€)	INTRODUCIR IMPORTE		INTRODUCIR IMPORTE	
FORMA DE PAGO	SELECCIONAR FORMA DE PAGO		SELECCIONAR FORMA DE PAGO	
COMISIÓN BANCO	INTRODUCIR COMISIÓN BANCO		INTRODUCIR COMISIÓN BANCO	
BENEFICIO OBRA (€)				
RENTABILIDAD (%)				

EXTRAS

DESCRIPCIÓN	COSTE (€)	DESCRIPCIÓN	COSTE (€)

COMENTARIOS

DESCRIPCIÓN TRABAJO	COMENTARIO	DESCRIPCIÓN TRABAJO	COMENTARIO
realización de practicas para estudio			

GRÚAS COSTE TRABAJOS POR PRESUPUESTO

TIPO VEHICULO	PRECIO HORA (€)	SERVICIO MÍNIMO (Horas)	DESPLAZAMIENTO	HORAS TRAB. (Horas)	COSTE HOR. TRAB (€)	COSTE MINIMO (€)	COSTE REAL (€)	COSTE DESPLAM. (€)
AUTOCARGANTE HASTA 28	83,00	4	SIN CARGO	0-1-00 0:00	0,00	332,00		
AUTOCARGANTE HASTA 44	86,00	4	SIN CARGO	0-1-00 0:00	0,00	344,00		
AUTOCARGANTE HASTA 66	95,00	4	SIN CARGO	0-1-00 0:00	0,00	380,00		
AUTOCARGANTE HASTA 10	120,00	4	SIN CARGO	0-1-00 0:00	0,00	480,00		
TRAYLER	80,00	5	SEGÚN OBRA	0-1-00 0:00	0,00	400,00		
TRAYLER AUTOCARGANTE	100,00	5	SEGÚN OBRA	0-1-00 0:00	0,00	500,00		
GONDOLA	80,00	5	SEGÚN OBRA	0-1-00 0:00	0,00	400,00		
GRUA 30 TM	60,00	4	SIN CARGO	0-1-00 0:00	0,00	240,00		
GRUA 40 TM	80,00	4	SIN CARGO	0-1-00 0:00	0,00	320,00		
GRUA 50 TM	110,00	4	SIN CARGO	0-1-00 0:00	0,00	440,00		
GRUA 60 TM	110,00	5	SIN CARGO	0-1-00 0:00	0,00	550,00		
GRUA 70 TM	150,00	6	SIN CARGO	0-1-00 0:00	0,00	900,00		
GRUA 75 TM	150,00	6	SIN CARGO	0-1-00 0:00	0,00	900,00		
GRUA 80 TM	150,00	8	SIN CARGO	0-1-00 0:00	0,00	1.200,00		
GRUA 90	180,00	8	SIN CARGO	0-1-00 0:00	0,00	1.440,00		
GRUA 100 TM	180,00	8	SIN CARGO	0-1-00 0:00	0,00	1.440,00		
GRUA 120 TM	240,00	10	SIN CARGO	0-1-00 0:00	0,00	2.400,00		
GRUA 160 TM	360,00	10	SIN CARGO	0-1-00 0:00	0,00	3.600,00		
GRUA 250 TM	500,00	SOLICITAR PRESUPUESTO	SOLICITAR PRESUPUESTO	0-1-00 0:00	0,00	#¡VALOR!		

		SUMA	0,00 €		0,00 €
		COSTE TOTAL	0,00 €		

GRÚAS TRABAJOS POR ADMINISTRACIÓN				
HORAS TRAB. (HC	COSTE HOR. TRAB (€	COSTE MINIMO (€)	COSTE REAL (€)	COSTE DESPLAM. (€)
0-1-00 0:00	0,00	332,00		
0-1-00 0:00	0,00	344,00		
0-1-00 0:00	0,00	380,00		
0-1-00 0:00	0,00	480,00		
0-1-00 0:00	0,00	400,00		
0-1-00 0:00	0,00	500,00		
0-1-00 0:00	0,00	400,00		
0-1-00 0:00	0,00	240,00		
0-1-00 0:00	0,00	320,00		
0-1-00 0:00	0,00	440,00		
0-1-00 0:00	0,00	550,00		
0-1-00 0:00	0,00	900,00		
0-1-00 0:00	0,00	900,00		
0-1-00 0:00	0,00	1.200,00		
0-1-00 0:00	0,00	1.440,00		
0-1-00 0:00	0,00	1.440,00		
0-1-00 0:00	0,00	2.400,00		
0-1-00 0:00	0,00	3.600,00		
0-1-00 0:00	0,00	#¡VALOR!		
	SUMA		0,00 €	0,00 €
		COSTE TOTAL		0,00 €

GRÚAS TRABAJOS POR ADMINISTRACIÓN				
HORAS TRAB. (HC	COSTE HOR. TRAB (€	COSTE MINIMO (€)	COSTE REAL (€)	COSTE DESPLAM. (€)
0-1-00 0:00	0,00	332,00		
0-1-00 0:00	0,00	344,00		
0-1-00 0:00	0,00	380,00		
0-1-00 0:00	0,00	480,00		
0-1-00 0:00	0,00	400,00		
0-1-00 0:00	0,00	500,00		
0-1-00 0:00	0,00	400,00		
0-1-00 0:00	0,00	240,00		
0-1-00 0:00	0,00	320,00		
0-1-00 0:00	0,00	440,00		
0-1-00 0:00	0,00	550,00		
0-1-00 0:00	0,00	900,00		
0-1-00 0:00	0,00	900,00		
0-1-00 0:00	0,00	1.200,00		
0-1-00 0:00	0,00	1.440,00		
0-1-00 0:00	0,00	1.440,00		
0-1-00 0:00	0,00	2.400,00		
0-1-00 0:00	0,00	3.600,00		
0-1-00 0:00	0,00	#¡VALOR!		
	SUMA		0,00 €	0,00 €
		COSTE TOTAL		0,00 €

OBRA	NOMBRE TRABAJADOR	FECHA	HORA INICIO
SERGIO PRUEBA	ALEJANDRO	6/5/2014	6:00

6.2.2.2 Screening by customer

This tool has been programmed in order to know what jobs and task has been done for each customer.

Note: This tool is ongoing. At the moment is not available.

6.2.2.3 Screening by Operator

This tool can be used to know the information where, when and what the operator selected have been doing.

OBRA	BRE TRABAJA	FECHA	HORA INICIO	HORA FIN	HORAS	NORMAL	O NORM. O	EXTRA	NOCTURNA	OCTURNIDA	EXTRAS NOCT	FESTIVA	ABRI. O MON	AMPO TRABA	RIPCION TRA	OMENTARIO
ERGIO PRUEB	ALEJANDRO	08/06/2014	6:00	14:30	8:00	0:00	0:00	0:00		FALSO	0:00	8:00	MONTAJE	CALERA DE GA	era de gato para obra de J
ERGIO PRUEB	ALEJANDRO	06/06/2014	6:00	14:30	8:00	8:00	0:00	0:00		FALSO	0:00	0:00	FABRICACIÓN	TUBERÍAS	el material a fabrica
ERGIO PRUEB	ALEJANDRO	6/5/2014	6:00	14:30	8:00	8:00	0:00	0:00		FALSO	0:00:00	0:00:00	MONTAJE	ESTRUCTURAS	de practicas para estudio

6.2.3 Output Check materials and consumption good stock

Sometimes it is needed to know how many items there are at the warehouse.

The way of doing this it is just writing down the code and the quantities available is shown.

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7. <u>CONCLUSION</u>

As I am working in a Talleres y Montajes Luna S.L. and we have seen a big opportunity of improvement, we decided to design and implement this application in order to control the manufacturing cost. Talleres y Montajes Luna S.L. is an SME company (small and medium enterprise) based in Alicante, Osa Mayor Street and number 4.

Below it is shown a photo where the factory is located.

The normal size of this business is around 25 workers all the year and reaching the double size when the load job increase to the maximum.

Nowadays, the final invoice at the end of the year is about 1.5 million of Euros. Considering that the economy in Spain the last few years is quite bad, we can say we are working and offering the service. However, before this difficult time, the business invoice around 5-6 million of €.

Below, it is shown two pictures from the street.

At the following picture you can see a photo and make a general idea of this business.

Talleres y Montajes Luna S.L. is a business working for the mechanical sector. The kinds of jobs what the Talleres y Montajes Luna can do are different; working in mechanical structural, mechanical pipes, boiler jobs and industrial maintenance.

Following, you can see photos from jobs which Talleres and Montajes Luna has done.

MECHANICAL STRUCTURAL JOBS

Horno Johson

Parking

Service stairs for a silo

MECHANICAL PIPES

BOILER JOB

Metal tankard

Cyclone blending tank

Hopper and bidirectional hopper

Sliding floodgate with pneumatic command

INDUSTRIAL MAINTENANCE

Change hummer grinding

Fix mechanical conveyor for a oven

Talleres y Montajes Luna S.L. has an industrial unit with 500 m2, being the place for manufacturing, using the following machines:

Hydraulic sheet shear

Bending machine

Folder machine

Milling machine

Lathe machine

Driller machine

Saw machine

Stamp

Welding machines (MAG, TIG, Arc welding process)

Oxygen Flame cutting machine(oxicorte)

Plasma cutting machine

Platform

Forklift

Crane-truck

Overhead travelling crane

7.1 EXAMPLE OF A REAL CASE

A customer ask for 100 steel container in 3 different types. In order to control the manufacturing cost; people, materials, good consumer goods is include all the information on the excel sheet application.

The manufacturing organization is done as follow:

Day 1. 3 people. All shift

Day 2. 4 people. All shift

Day 3. 1 person. All shift

Day 4. 3 people. 1 person half shift, other people all shift

Day 5. 4 people. 2 people 6 hours, other people all shift

Day 6. 1 person. All shift

Day 7. 5 person. All shift

The material and consumer goods are 3 steel sheet, size 6000 x 2000 x 4 mm and 1 box of electrode.

Step 1. We open the application.

Step 2. Go to alta obras. This task is only done the first day.

OBRA	100 steal container
Nº PRESUPUESTO	100215
CLIENTE	Ayuntamiento de Alicante
CONTACTO	Arquitecto Tecnico
FECHA ALTA	13/07/2015
DESCRIPCIÓN TRABAJO	Manufacturing of a 100 steal container

MENU

ALTA

Step 3. Go to Parte Diario. Everday, at the end of the shift, the data is registered at the excel application.

Day 1

OBRA	100 steal container		
NOMBRE TRABAJADOR	ALEJANDRO RAMOS	JUAN VALDES	ALBERTO MARTINEZ
FECHA	10/06/2015		
HORA INICIO	6:00	6:00	6:00
HORA FIN	14:30	14:30	14:30
HORAS	8:00	8:00	8:00
FABRICACIÓN O MONTAJE	FABRICACIÓN	FABRICACIÓN	FABRICACIÓN
CAMPO TRABAJO	CALDERERÍA	CALDERERÍA	CALDERERÍA
DESCRIPCION TRABAJO	Cutting sheet type 1 at hidraulic	Cutting sheet type 1 at hidraulic	Bend sheet type 1 at sheet
COMENTARIOS			
ADMINISTRACIÓN			
PLATAFORMAS			
GRÚAS			
TIEMPO TRABAJADO GRÚA (HORAS)			
DESCRIPCION EXTRAS			
COSTE EXTRAS (€)			

MENU

INTRODUCIR TRABAJO

Day 2

OBRA	100 steal container			
NOMBRE TRABAJADOR	ALBERTO MARTINEZ	ALEJANDRO RAMOS	RAMON PASTOR	RAMON SANCHEZ
FECHA	11/06/2015			
HORA INICIO	6:00	6:00	6:00	6:00
HORA FIN	14:30	14:30	14:30	14:30
HORAS	8:00	8:00	8:00	8:00
FABRICACIÓN O MONTAJE	FABRICACIÓN	FABRICACIÓN	FABRICACIÓN	FABRICACIÓN
CAMPO TRABAJO	CALDERERÍA	CALDERERÍA	CALDERERÍA	CALDERERÍA
DESCRIPCION TRABAJO	Cutting sheet type 1 using the	Cutting sheet type 1 using the	Bendig sheet type 1	weling type 1.
COMENTARIOS				
ADMINISTRACIÓN				
PLATAFORMAS				
GRÚAS				
TIEMPO TRABAJADO GRÚA (HORAS)				
DESCRIPCION EXTRAS				1 box of electrode
COSTE EXTRAS (€)				65,44

Day 3

OBRA	100 steal container
NOMBRE TRABAJADOR	RAMON PASTOR
FECHA	12/06/2014
HORA INICIO	6:00
HORA FIN	14:30
HORAS	8:00
FABRICACIÓN O MONTAJE	FABRICACIÓN
CAMPO TRABAJO	CALDERERÍA
DESCRIPCION TRABAJO	Welding type 1
COMENTARIOS	
ADMINISTRACIÓN	
PLATAFORMAS	
GRÚAS	
TIEMPO TRABAJADO GRÚA (HORAS)	
DESCRIPCION EXTRAS	
COSTE EXTRAS (€)	

NUMERO DE TRABAJADORES

1

OK

MENU

INTRODUCIR TRABAJO

Day 4

OBRA	100 steal container			
NOMBRE TRABAJADOR	ANTONIO VARGAS	ALBERTO MARTINEZ	RAMON PASTOR	
FECHA	15/06/2015			
HORA INICIO	6:00	6:00	6:00	
HORA FIN	10:00	14:30	14:30	
HORAS	4:00	8:00	8:00	
FABRICACIÓN O MONTAJE	FABRICACIÓN	FABRICACIÓN	FABRICACIÓN	
CAMPO TRABAJO	CALDERERÍA	CALDERERÍA	CALDERERÍA	
DESCRIPCION TRABAJO	Welding type 1,	cutting type 2 suing hidraulic	cutting type 2 suing	
COMENTARIOS				
ADMINISTRACIÓN				
PLATAFORMAS				
GRÚAS				
TIEMPO TRABAJADO GRÚA (HORAS)				
DESCRIPCION EXTRAS				
COSTE EXTRAS (€)				

Day 5

OBRA	100 steal container			
NOMBRE TRABAJADOR	ALBERTO MARTINEZ	ALEJANDRO RAMOS	RAMON PASTOR	SERGIO RAMIREZ
FECHA	16/06/2015			
HORA INICIO	6:00	6:00	6:00	6:00
HORA FIN	12:30	12:30	14:30	14:30
HORAS	6:00	6:00	8:00	8:00
FABRICACIÓN O MONTAJE	FABRICACIÓN	FABRICACIÓN	FABRICACIÓN	FABRICACIÓN
CAMPO TRABAJO	CALDERERÍA	CALDERERÍA	CALDERERÍA	CALDERERÍA
DESCRIPCION TRABAJO	Cutting type 2	Bending type 2	Welding type 2	Welding type 2
COMENTARIOS				
ADMINISTRACIÓN				
PLATAFORMAS				
GRÚAS				
TIEMPO TRABAJADO GRÚA (HORAS)				
DESCRIPCION EXTRAS				
COSTE EXTRAS (€)				

Day 6

OBRA	100 steal container
NOMBRE TRABAJADOR	RAMON PASTOR
FECHA	17/06/2014
HORA INICIO	6:00
HORA FIN	14:30
HORAS	8:00
FABRICACIÓN O MONTAJE	FABRICACIÓN
CAMPO TRABAJO	CALDERERÍA
DESCRIPCION TRABAJO	Welding type 2
COMENTARIOS	
ADMINISTRACIÓN	
PLATAFORMAS	
GRÚAS	
TIEMPO TRABAJADO GRÚA (HORAS)	
DESCRIPCION EXTRAS	
COSTE EXTRAS (€)	

NUMERO DE TRABAJADORES

1

OK

MENU

INTRODUCIR TRABAJO

Day 7

OBRA	100 steal container				
NOMBRE TRABAJADOR	ALBERTO MARTINEZ	RAMON PASTOR	ANTONIO VARGAS	JUAN VALDES	SERGIO RAMIREZ
FECHA	18/06/2015				
HORA INICIO	6:00	6:00	6:00	6:00	6:00
HORA FIN	14:30	14:30	14:30	14:30	14:30
HORAS	8:00	8:00	8:00	8:00	8:00
FABRICACIÓN O MONTAJE	FABRICACIÓN	FABRICACIÓN	FABRICACIÓN	FABRICACIÓN	FABRICACIÓN
CAMPO TRABAJO	CALDERERÍA	CALDERERÌA	CALDERERÌA	CALDERERÌA	CALDERERÌA
DESCRIPCION TRABAJO	Cutting type 3 and welding type 3	bending type 3 and weling	welgind type 2	welding type 3	welding type 3
COMENTARIOS					
ADMINISTRACIÓN					
PLATAFORMAS					
GRÚAS					
TIEMPO TRABAJADO GRÚA (HORAS)					
DESCRIPCION EXTRAS	3 steel sheet 6000 *2000 * 4 size				
COSTE EXTRAS (€)	806,40				

Step 4. Go to reporte

Selecting the job wanted and pressing "Generar reporte final de obra" the main report is automatically create, **being the most value of the excel application.**

EXTRAS			
DESCRIPCIÓN	**COSTE (€)**	**DESCRIPCIÓN**	**COSTE (€)**
1 box of electrode	65,44		
3 steel sheet 6000 *2000 * 4 si	806,4		

COMENTARIOS			
DESCRIPCIÓN TRABAJO	**COMENTARIO**	**DESCRIPCIÓN TRABAJO**	**COMENTARIO**
Cutting type 3 and welding type 3		Bendig sheet type 1 using the bend sheet machine	
bending type 3 and weling type 2		Cutting sheet type 1 at hidraulic sheet shear machine	
welgind type 2		Cutting sheet type 1 at hidraulic sheet shear machine	
welding type 3		Bend sheet type 1 at sheet bender	
welding type 3		Welding type 2	
Cutting type 2		Welding type 1	
Bending type 2			
Welding type 2			
Welding type 2			
Welding type 1,			
cutting type 2 suing hidraulic sheet shear			
cutting type 2 suing hidraulic sheet shear			
weling type 1.			
Cutting sheet type 1 using the hidraulic sheet shear.			
Cutting sheet type 1 using the hidraulic sheet shear.			

OBRA	NOMBRE TRABAJADOR	FECHA	HORA INICIO	HORA FIN	HORAS	DESCRIPCION TRABAJOS
100 steel container	ALBERTO MARTINEZ	18/06/2015	6:00	14:30	8:00	Cutting type 3 and welding type 3
100 steel container	RAMON PASTOR	18/06/2015	6:00	14:30	8:00	bending type 3 and weling type 2
100 steel container	ANTONIO VARGAS	18/06/2015	6:00	14:30	8:00	welgind type 2
100 steel container	JUAN VALDES	18/06/2015	6:00	14:30	8:00	welding type 3
100 steel container	SERGIO RAMIREZ	18/06/2015	6:00	14:30	8:00	welding type 3
100 steel container	ALBERTO MARTINEZ	16/06/2015	6:00	12:30	6:00	Cutting type 2
100 steel container	ALEJANDRO RAMOS	16/06/2015	6:00	12:30	6:00	Bending type 2
100 steel container	RAMON PASTOR	16/06/2015	6:00	14:30	8:00	Welding type 2
100 steel container	SERGIO RAMIREZ	16/06/2015	6:00	14:30	8:00	Welding type 2
100 steel container	ANTONIO VARGAS	15/06/2015	6:00	10:00	4:00	Welding type 1,
100 steel container	ALBERTO MARTINEZ	15/06/2015	6:00	14:30	8:00	tting type 2 suing hidraulic sheet she
100 steel container	RAMON PASTOR	15/06/2015	6:00	14:30	8:00	tting type 2 suing hidraulic sheet she
100 steel container	RAMON SANCHEZ	11/06/2015	6:00	14:30	8:00	weling type 1.
100 steel container	ALBERTO MARTINEZ	11/06/2015	6:00	14:30	8:00	sheet type 1 using the hidraulic shee
100 steel container	ALEJANDRO RAMOS	11/06/2015	6:00	14:30	8:00	sheet type 1 using the hidraulic shee
100 steel container	RAMON PASTOR	11/06/2015	6:00	14:30	8:00	sheet type 1 using the bend sheet m
100 steel container	ALEJANDRO RAMOS	10/06/2015	6:00	14:30	8:00	:heet type 1 at hidraulic sheet shear
100 steel container	JUAN VALDES	10/06/2015	6:00	14:30	8:00	:heet type 1 at hidraulic sheet shear
100 steel container	ALBERTO MARTINEZ	10/06/2015	6:00	14:30	8:00	Bend sheet type 1 at sheet bender
100 steel container	RAMON PASTOR	17/06/2014	6:00	14:30	8:00	Welding type 2
100 steel container	RAMON PASTOR	12/06/2014	6:00	14:30	8:00	Welding type 1

7.2 SAVINGS

The implementation in Talleres y Montajes Luna S.L. has been successfully done. All roles are doing their task and the system is working.

The benefits accomplish are many and some of those can be valued and another cannot be valued. For stating some benefits we can say:

- **An indirect labour hour saved:** Every day, 2 people were doing the same task, the Manager ask the information to the supervisor.

  30 minutes/day x 5 days/week x 52 weeks/year = 7.800 minutes = 130 hours

  130 hours x 25 €/hour = 3.250€

- **Manufacturing process flow improved:** Nowadays, the supervisor does the inputs as he can. There are no interruptions, affecting manufacturing.

  30 minutes/day x 5 days/week x 52 weeks/year = 7.800 minutes = 130 hours

  130 hours x 16 €/hour = 2.080€

- **Fast and instant information:** just pressing a button you can know all the money invested in every job running. It is a big improvement for the manager, to have all this data every time needed. Before implementing this excel application sheet, he had to calculate manually.

60 minutes/job closed   x   2 jobs closed/week   x   52 weeks/year = 6.240 minutes = 104 hours

104 hours x 25 €/hour = <u>2.600€</u>

* **Much control of the business from the beginning of the job up to the end:** as we can know the money invested up to know very easy we can follow all the jobs running and make some actions as needed.

30 minutes/job check   x   5 jobs check/week   x   52 weeks/year = 7.800 minutes = 130 hours

130 hours x 25 €/hour = <u>3.250€</u>

* **Information in digital format** (before it was in a paper format): all the data it is on the same file. Before the implementation, it takes long time to look for the papers wanted.

 10 minutes/job check x 3 jobs check/week x 52 weeks/year = 1.560 minutes = 26 hours

26 hours x 25 €/hour = <u>650€</u>

- **Control and follow stock and purchasing material for consumption goods at warehouse:** it was not control before.

Total saving cost: 11.830€/year

It is expected to go further with the excel sheet application. We would like to control manufacturing process in live with a KPI and to control purchasing flow process, we would like to control all raw material (beams, steel sheets, etc) and we would like to have a Personal protective equipment (PPE) used report by operator.

7.3 AMORTIZATION

Total Savings: 11.830€/year

Cost implementation: 8 hours/day x 20 days = 160 hours
160hours x 20 €/hour = 3.200€

3.200 € / 11.830 € = 0.27
Amortization → 0.27 X 52 Weeks = 14.56 weeks x 1 month / 4 week = **3.6 month**

8. REFERENCES AND BIBLIOGRAFHY

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