

## **Automation of Design by Integrating Pro/Engineer with Ms-Excel**

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**ABSTRACT:** *In this paper, describes how the customization (automation) of design task, in solid modelling with Pro/Engineer can be approached, by means of Ms-Excel macros (piece of code), working under the windows operating system and with the visual basic as event driven programming. The Parametric Nature of any component design makes the effective implementation of the design concept with ease and simplicity using Pro/Engineer. Using parameters and its relationship, the parametric concept is implemented for designing different modelling using Pro/Engineer software through different interface for automation of them. Data from Excel is transferred to Pro/ENGINEER via Excel Visual basic, Component trial file, and Pro/Program to update the solid geometry, which improves the Automation of Product design. In order to develop a macro in Ms-Excel sheet all we need is the inputs, outputs and necessary supporting data from the user.*

**Keywords:** *Automation, Customization of Pro/E trial file, Interface with Ms-Excel, Visual Basic*

### **I. INTRODUCTION**

The Parametric Nature of any component design makes the effective implementation of the design concept with ease and simplicity using Pro/Engineer. The work describes the customization of design task, in solid modelling with Pro/Engineer have to be approached, by means of excel visual basic macros, trial file, pro/program. The users have to follow the procedures as mentioned in below discussions for attaining the design automation based on standards [1]. Iterative process, through iteration in parametric design parameter, is required to obtain and the value of parameter is required from excel and this value of parameter based on standards will be updated automatically in Pro\E.

### **II METHODS FOR INTEGRATING PRO/ENGINEER WITH MS-EXCEL**

#### **1. Introduction**

Pro\Engineer is one of the most widely used 3D CAD package, and industry's first successful parametric 3D CAD modelling system. The parametric modelling approach uses parameters, dimensions, features and relationships for understanding the Product design characteristics and behaviour. Pro\Engineer provides a complete set of design and manufacturing utilities in single platform. Pro/Engineer used to creating complex 3D modelling for analysis purposes and attaining the optimization of the Product for introduction.

A Parametric model is defined by its attributes based on input parameters. An input parameter is a variable or relationship that can be used as a dimension for the reusable model. A parametric model is re-usable, because modification can be easily implemented on the model. Mostly two approaches can be used for parameterization automation- Interfacing and Programming.

An interactive approach involves parametric capabilities within system to create flexible re-usable models. Once the Pro\Model has been defined parametrically, the user allows the system to regenerate model with new Parameters based on Ms-excel sheet, Visual Basic and Pro/Program. The interfacing of Pro\ model parameter automation is made here with Ms-Excel sheet using Visual basic macros. This will reduce the time of complex design and increase the Product design capability for Automation.

#### **2. Integrating Pro/E with excel**

The detailed methodology of integrating Pro/Engineer with Ms-Excel is described herewith. Flange Coupling is taken as consideration because design of model is depends on some of basic parameters and relationships. To attaining the Pro/Engineer design parameter updation interface with Ms-Excel sheet, the following procedure should be taken:

##### **2.1 Create model using Pro/e**

Create a Model in Pro/Engineer with geometric and parametric constraints .The following Fig1 shows the parameterised Flange coupling.

##### **2.2 Configuring the Pro/E Flange coupling**

In Pro/E design of Flange coupling, drive the dimensions as per parameters from standards for obtaining automation values from the Excel workbook. For that rename the dimensions to appropriate variable names

from standards. Use main menu Info\ Switch Dimensions to display the dimensions names based on variable provided as shown in Fig2.

**2.3 Create an excel sheet to integrate with Pro/Engineer**

The Flange coupling design parameters can be automated based on input values provided on the Ms-Excel sheet. Make a new Excel sheet and provide a standard input values from the PSG data book [2], for the flange coupling design parameters automation. The values in the Excel have to be represented based on the standards such as d,d1,b,D3,b1,D2,d,n,dt,nt. Also add Update button in the Excel workbook for attaining the automation. The cells in the Excel sheet are constrained using data\validation to avoid the non standard values from the users as shown in Fig3.

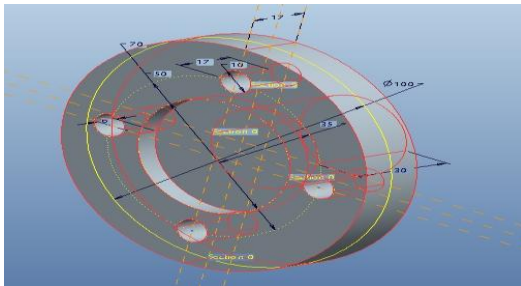


Figure 1 parameterised pro/e flange coupling

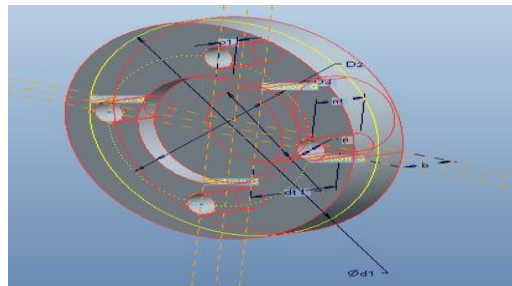


Figure 2 configured pro/e design dimension variables

PROPORTIONS OF FORGED END. RIGID COUPLING IS:365-1966								
d	D1	b	D3	b1	D2	n	dt	nt
45	120	22	60	6	85	12	40	22

Figure 3 Excel sheet with Update dimensions

**2.4 Update the variables using Visual program**

The variables provided in the Excel sheet have to update the Pro/E design based on text file. The Excel sheet data has to convert to text file based on macros created. Using File\Save as and select the text (tab delimited) file type the macros to be automated. The converting process is obtained based on Macro, it checks for and removes any existing data text file exports the active sheet to text files (F:\flange.txt), and checks for and removes the spreadsheet file before saving it again. The created macros has to be assigned for certain form control button for automating the excel sheet data to text file by clicking the Update button, the data will be exported to "F:\flange\flange.txt".

**2.5 Updating the data using Pro/Program**

The data from excel sheet to Pro/E model have to be updated based on Pro/Program. The Pro/Program can be used by Tools\Program\Edit design\From file. The Pro/program editor will be displaying. Then add the lines of variables based on standards, the name to be stated as:

```
INPUT
d
D1
b
D3
b1
D2
n
dt
nt
END OUTPUT
```

This allows Pro/E model to accept the inputs to drive geometry. After adding variables File\Save, then yes to incorporate changes to the model. Now menu manager deflects the changes in the program with the program as shown in Fig 4. Select read file and enter the file name "F:\flange\flange.txt"; the geometry will be generated as per data in the text file.

### 2.6 Linking Trial file with excel sheet

The data from the excel sheet have to regenerate the Pro/E model based on Update button provided in the excel sheet. The dimensions of the Pro/E model have to generate automatically before opening the model manually. The created flange coupling have trial file in the temp folder created by users. Now the trial file has to be saving as text file "F:\flange\regen.txt". Record one more macro for reading the flange coupling model trial file as text file ("F:\flange\regen.txt"), and assign that macro file to update button. Click the update button in excel sheet, the workbook data is converted to text file and that text file linking with flange coupling model via trial text file. This macro to be used for generating more design based on standard dimensions of flange coupling [3].

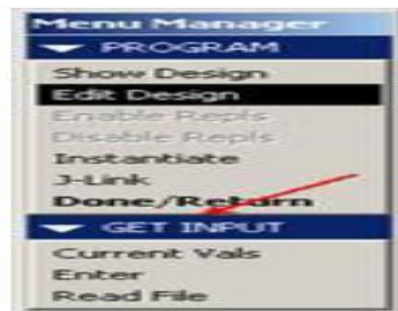


Figure 4 menu manager

### 2.7 Regenerated Model

The flange coupling regenerated dimensions of proe model as per promoted input by user. Updated model is shown below after executing new inputs. The time study of the model making of single flange coupling is carried out to understand the use & importance of this interface for industrial applications. The results are displayed as shown in Fig 5.

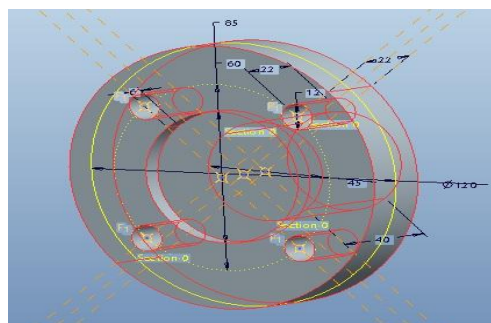
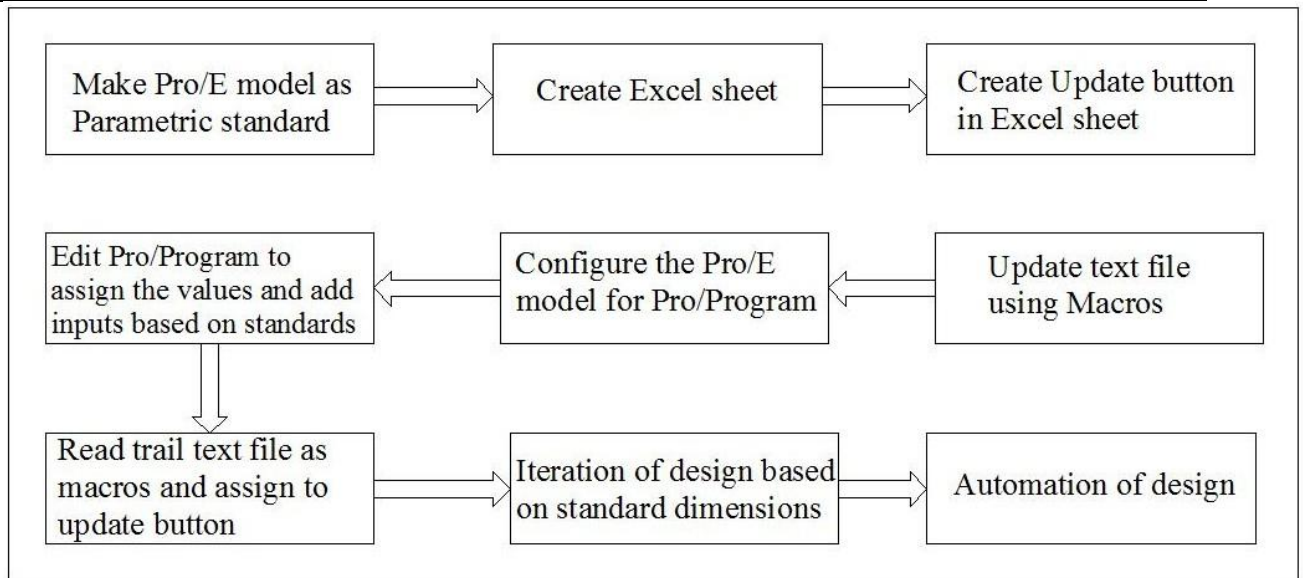


Figure 5 regenerated parametric pro/e model

## III DEVELOPED APPROACH FOR INTEGRATING PRO/E WITH EXCEL

The steps for integrating Pro/E with Excel have to follow by the users as shown below, based on this approach optimising the design time for making the new model as compared with traditional approach.



#### IV ADVANTAGES OF INTEGRATING PRO/E WITH EXCEL

Reducing the designing time ,designing cost as compared with traditional approach of design Iteration process, the values in an excel is easy to readable and it displays the inputs clearly based on the standards.

Automation of design is possible

Provide message feedback alerts on the excel if user enter invalid or incompatible values apart from standards.

#### V. CONCLUSION

The parameterisation and relationship of model, the modular approach of the designing time to be reduced. This reduced time required to perform the desired operation to a great extent and subsequently, the lead time of design and designing cost is reduced. These applications for automation of design based on excel visual basic macro is simple to understand and implement.

#### REFERENCES

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