Development of a simple decision support system for material selection in an Electrical component manufacturing firm – A case study

[1]Karthik A R[2], K Niranjan Rao [3], Dr. Sahadeva G N
Department of Mechanical Engg. EPCET, Bangalore

Abstract – Computer Aided Design primarily is the process of using Computer in the process of Design. This is accomplished through an iterative, knowledge-based, decision-making process. This paper discusses the processes of developing of add-in that stores modifies and interpret the drawing data along with various parameters. The material properties and key values obtained automatically from the drawing are used in order to calculate the various parameters that would help in manufacturing and large scale production. Visual Basic Based application was developed to store the data and generate useful reports that would aid the management in making key decisions. The add in developed further aided in reducing considerable manpower and also reduced the errors made due to the manual intervention in the process.

I. INTRODUCTION

Automation may be defined as the process that makes use of various control systems to perform certain tasks without the interference of human. Industrial automation is the utilization of different control gadgets as plc PC's/DCS, used to have control on different activities of an industry without huge intercession from people and to give programmed control execution. In businesses, control procedures utilize a lot of advances which are executed to get the ideal execution or yield, making the mechanization framework most basic for enterprises. Automation includes use of cutting edge control procedures like course controls, current control equipment gadgets as PLC's, sensors and different instruments for detecting the control factors, flag molding supplies to associate the signs to the control gadgets, drives and other critical last control gadgets, independent processing frameworks, correspondence frameworks, disturbing and HMI (Human Machine Interface) frameworks.

Automation covers applications running from a family unit indoor regulator controlling an evaporator, to an expansive modern control framework with a huge number of information estimations and fetch control signals. In control multifaceted nature it can run from on-off control to multi-variable complicated calculations.

In the most direct sort of a programmed control circle, a controller is used to analyze a deliberate estimation of a procedure with an ideal set of needs, and procedures the subsequent blunder flag to change some contribution to the procedure, so that the procedure remains at its set point notwithstanding unsettling influences. This shut circle control is utilization of negative input to a framework. Automation has been achieved by different methods including water powered, mechanical, electrical, pneumatic, electronic gadgets and PCs, for the most parts. Confounded frameworks, present day plants, ships and planes utilize all these joined systems. The advantage of automation is to incorporate in-corporate work reserve funds, investment funds in power costs, material expenses and enhancements to quality, accuracy and exactness.

This paper tries to demonstrate the development of a simple decision support system developed by integrated a leading 2 Dimensional draughting tool with a simple application developed using Visual Basic. The resulting system not only aided in improved decision making but also in reduced time and effort of human intervention. The application also resulted in increased accuracy and timely service.

II. LITERATURE REVIEW

1. Jack C. H. Chung et al., illustrates that Engineering process design starts with the specification of the product initially and then the functional requirements analysis, conceptual design, detailed design, analysis of design followed by prototyping and manufacturing. Finally, it ends with the realistic functional product that meets the requirement. During this course of time different levels of automation is achieved. The current MDA systems are capable to model the parts well enough and not

design them. Here the systems play role once after the detailed design is ready, which means the design specifications and design layout will be ready before the use of MDA systems, hence solving the problem , evaluate the solution by optimizing the design layout and determine the size and shape of parts.

2. Jozef Vasky et al., aims towards the transformation of engineering drawings from the paper form into a 2D/3D computer representation. A 2D/3D computer model can be further processed in CAD/CAM system for various purposes. Further it can be modified according to requirement and a technical drawing can be then generated from it as well. He concluded that solving was complex even after the significant limitation of engineering drawing that enter the processing which were taken into account. About the class of rotational parts, which the paper is aimed at, involves a number of shape elements that should be taken away from the basic solid. At the same time, each additional design element bringing about the rise in asymmetries increases the difficulty of 3D reconstruction of the object.

3. L. Kong et al., studied with CAD operated 3D plastic injection mold design. The convertion of traditional injection mold design process to new CAD operated 3D injection mold system its purpose. As we all know that convectional mold process is an art and precised process. Such precision can be achieved by years of experience. Because of this time consuming process of learning and expertising people available are very less. This current situation can be changed by making use of computer-aided design (CAD) system. This makes use Solid-Works 99 as a platform of this system. It has very good assembling capabilities, ease to use, rapid learning curve. Also the software is cost effective. It is one of the best 3D product design software for windows, which provide best mechanical design solution . Applications for users can be created and can run as a standalone exe file or as a User DLL or Extension DLL in Solid-Works.

4. .B. Naylor et al., narrated that the designing process is a time-consuming process and requires experienced people. Computer aided design is a boon for todays generation which can be used for various application in mechanical engineering which leads for higher productivity and less time consumption. There are many CAD packages are available in market but demands modelling skills. The paper deals with the software application for product design and CAD model by automating tasks that are repeated in Solid works application programming interface which also helps in building the BOM (Bill of materials). Winding machine case study was taken for which a program was developed by VB.Net. Finally, it was concluded that by making use of advanced application CAD 80% of the time was reduced and hence significant amount of cost has been saved conventional drawing took 5-6 days where automated design method took 2hrs. With the help of this application the design calculation the time was drastically reduced along with cost reduction of 20-25%.

5. K. S. Lee et al., studied on Solid-Works Add-In Manager that allows users to control which third party software is loaded at any time during their Solid-Works session. More than one package can be loaded at once, and the settings will be maintained across Solid-Works sessions. By using the object-oriented programming language like Visual Basic or C++ and Solid-Works99.

6. Abhishek C. Lad et al., in this paper discussed on Design and drawing automation by making use of Solid-Works software programming interface. The process consisted of firstly Model the part later assembling the modeled parts. Once assembly is done then lists all critical dimensions for the parametric modeling and naming of the dimensions. Find out the design based parametric relations for each dimension and finally making GUI program and API program for connecting the CAD system and the inference engine and the knowledgebase.

III. METHODOLOGY

The detail process of computing is explained in the below flow chart

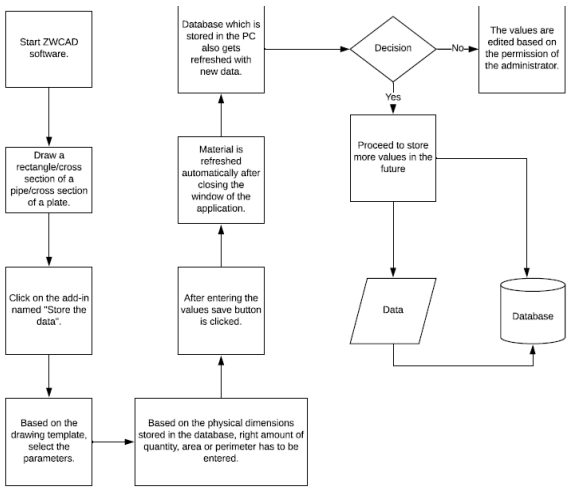

Fig 1: Flow chart of detailed process of computing

The procedure followed is explained in the below steps

Step 1: Launch ZWCAD from the file explorer

Step 2: Draw a standard shape like rectangle/square/triangle etc., or draw any geometrical shape

Step 3: Click on the add-in button "Store the data"

Step 4: Based on the geometry (Plate/rod and pipes or Angles/channels/hollow sections) select or enter the parameters manually.

Step 5: Once the parameters are set, the area /perimeter will be calculated automatically via programmed formulae.

Step 6: These calculated data can be saved in database for future use as standard set of values or can be recalculated whenever necessary

A sample reference images are shown below

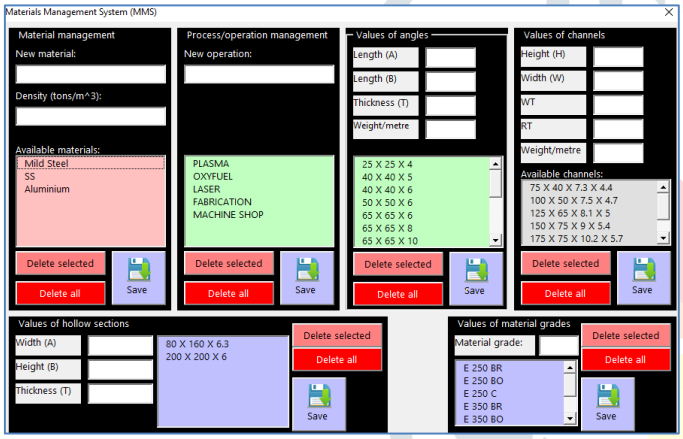

Fig 2: Materials Management

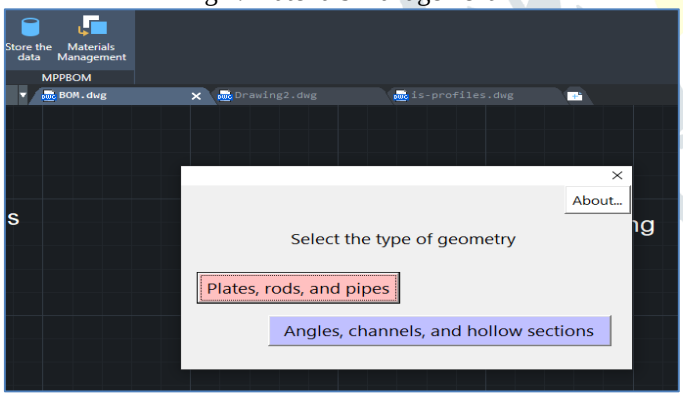

Fig 3: Selection of drawing

IV. CONCLUSION

The decision support system developed by integrating a 2D CAD tool clearly demonstrates the potential of integrating softwares from various domains. The resulting system not only reduced the manual intervention but also reduced errors and the time spent in such processes. It was realized that the total cost involved in the selection of the appropriate materials based on the drawing was reduced considerably . The material wastage resulting in the manufacturing operation were also reduced as informed decision making was done with key inputs from the system.

V. REFERENCES

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