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DESIGN AND DRAWING AUTOMATION USING CAD MODEL APPLICATION PROGRAMMING INTERFACE AND KBE SYSTEM: A REVIEW PAPER

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ABSTRACT

Time consideration is very important in product design and development in industries. While designing a new product lot of efforts can be required for computations and design procedure. Also the repetitive task is the major time consuming task. That's why the automation needs in the time consuming system.

***Purpose**- Using knowledge Base Engineering (KBE) system getting better quality design at lower cost and reduce the efforts.*

***Design Methodology/Approach**- The review of KBE based on 30 papers published from 1989 to till date in academic database namely ELESVIER, SCIENCEDIRECT etc.*

***Findings**- Through the literature review this paper contains KBE system, KBE systems benefits, applications and for that which methodology has been selected or applied.*

Keywords: Knowledge based engineering (KBE), Methodology.

***Paper type -** Literature Review*

I. INTRODUCTION

In industries so much time and efforts are consumed for doing repetitive work work/ tasks. So we have to requirements of automation in our manual operation process and systems for speed up tasks and saving time and efforts. So this problem is solved by using Knowledge Base Engineering (KBE). Knowledge Base Engineering provides automation is manual process or system. KBE used knowledge such as a procedure, experience standard table, graphs and some other data for preliminary data input. KBE analysis the product on the basis of design parameter and check whether the product output is violated or not. If it is violated so it will find some another solution and KBE system is always select optimal solution for the problems. In industries the interactive collaboration with software for the less time consumption is achieved with the help of the KBE system. Another application is material selection there are lots of material in catalogue with various properties. It will not update so there is KBE system is useful for it which can reduced efforts of material selection. KBE system is used for injection molding machine. There are three steps of doing automation injection molding machine are as follows-

1) Solid-Works model.

2) Parasolid as 3D kernel.

3) Application programing interface (API).

Languages used for programing are VB.net, C++ or Solid-Works macros, when we have to require actual and realistic results in simulations. It has to tremendous harassment work (when parameters are as follows material behavior, deflection, and contact simulation). So we can integrate real geometry data on body which is simulate. Subject expert matter always may not be able to provide the knowledge in right manner. So solution for that is to Inductive Logic Programming. It is the logic build for learning any concept.

II.LITERATURE REVIEW

1. Knowledge based systems in construction and civil engineering, in this paper it gives following information Diagnosis - BRE and laugh through university both are work on finding causes of dampness in building stone and Webster analyses the welding defects in various fields.
   a. BERT - They provide a bricks design.
   b. BSRIA - They developed KBS for ventilation for building. BSRIA is developing KBS for smoke protection areas in buildings.
   c. KBS used in energy management – On the basis of KBE the saving energy and also for necessary area they provide security sensors and fire detecting devices also find the performance of building service plant.
   d. Construction management - Create a system whose help to manage complicated project also manage knowledge from different sources for analysis purpose they make a prototype by using some idea they work by digital for civil.[1]
2. The engineering design process starts with product specification and goes through an iterative process of requirements analysis, conceptual design, detailed design, design analysis, and manufacturing.

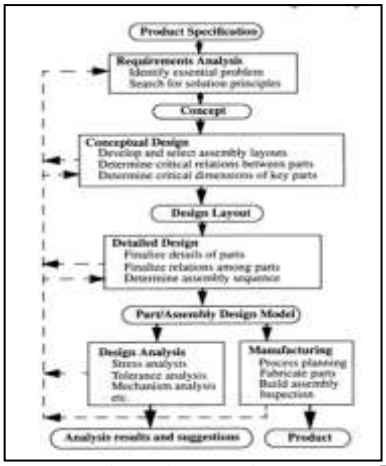

Fig.No.1 Engineering Design Process[2]

It ends with a functional product that fulfills the product specification. Within this process we have achieved islands of automation. The current MDA systems are able to model parts and assemblies very well but not to design them. These systems only play a role in the detailed design stage, a very late phase of the

complete design process. Before design engineers can use their MDA systems, they have already turned design specifications into a definitive design layout; resolved the essential problems; evaluated the solution principles; optimized the design layout and determined the size and shape of parts. The design engineers must then enter parts and assemblies into the MDA systems to create an electronic version of the designed product.[2]

3. A knowledge based system for materials selection in mechanical engineering design paper gives material selection procedure: - At the time of manufacturing of component material selection is most important thing.

For selecting material kindly this factors must be considered are as follows-

a. Market investigation - Market investigation is the one of the industrial research. In that finding business strategies find competitors all this techniques have to consider. Market research findings the conceptual design and design detail.

b. Product design specification - Find the better design for product also used the best concept to select the design. Do the comparison on that design and give the positive score for the better design. If we are finding most difference between positive and negative score on the side of positive they considered as best design.

c. Manufacturing - At the time of modeling we integrate that total concept i.e. method of designing also used the KBS material selection system. In this paper they are using matrix evaluation method.

KBS Material selection has two types of situations

i Cognitive situation - Concurrent team findings the outcomes a pattern, or a hypothesis from a finite set of possible outcomes that any team-member has experienced, which is close to the functions of the products.

ii Progressive situation - Information about the product and its behavior is unknown. By combining progressive as well as cognitive aspects of product life cycle functions, the new concept called ‘smart regenerative system’ emerged. KBS also classified the material on the basis of different composite like polymeric based composite also selecting plastic material considering their properties.[3]

4. In this paper following method is used

a. Modeling the part.

b. Making an assembly with these parts.

c. List up all critical dimensions for the parametric modeling and naming the dimensions

d. Making the design knowledge based which contains the parametric relations of each dimension and formulae.

e. Making GUI program and API program for connecting the cad system and the inference engine and the knowledge.[4]

5. The application of a knowledge based engineering approach to the rapid design and analysis of an automotive structure

a) Concurrent engineering - Facilitate the acceptance of vary input parameters knowledge and technology for development of rapid product CE developed that exchange information from past and current

information in CE more research concentrate on conceptual design by considerate all factor durability, stiffness ,vibrational study, analysis of forces also alternative design they avoid traditional method for implementation this all thing they study man computer interaction and try to produce better design by importing no an idea in computer and this all information stored in KBE

b) KBE (Knowledge Based Engineering) - KBE representing an artificial technique and CAD software knowledge by using programming they help to customer for new design automated solution from business point of view it is feasible to companies KBE stored all information like product design procedure to create part technique implementation KBE capture only best information about design and also experienced person knowledge. Boeing publishing 20,000 parts for aircraft by using KBE design this is best example for them also is airbus they create software for producing 1 man design and also analyst done it in feet once. In this paper they producing design of a wing by using KBE also analysis can be done like a ASTROS FE analysis, also for optimum solution they done formation of optimization tool by using KBE

c) Implementation - In this dynamic design of model they worked on MOKA this software tool which is KBE oriented. KBE worked on implementation for this development them using RAD (Rapid Application Development). The select material for making body structure by using KBE system in that material library on the basis of properties. They developed tools by using KBE for structural analysis. In structure analysis they selecting floor pan, bonnet, doors this all thing selection they from a library in software for this KBE make a blocks for selection of packaging, structural members, joints and panels.

d) Rapid Application Development - RAD is a program leads to evolution in any cycle. In that they developed prototype and all analysis done on that prototype and checked the strength and weaknesses due to this testing time get reduced due to RAD they developed a prototype of each part separate and so working process also get parallel.

e) Hardware and software - For easily formation of GUI the used KBE system also considering cost so KBE allows capture the knowledge and to create free parametric model contain all knowledge for analysis purpose it is used.[5]

6. In this paper it research on CAD operated 3D plastic injection mold design. Its main purpose is to convert traditional injection mold design process to new CAD operated 3D injection mold system. We know convectional mold process is very precision art and this precision is achieved by years of experience. Due to this difficulty of learning or experienced in this art less people are away from this knowledge. To change this current situation, the best way is to use a computer-aided design (CAD) system. It uses Solid-Works 99 as a platform of this system. Because it has powerful assembly capabilities, ease of use, rapid learning curve and cost of this software is affordable. It is one of the best 3D product design software for windows, which provide best mechanical design solution in its segment. Users' applications can be created and run as a standalone exe file or as a User DLL or Extension DLL in Solid-Works. The Solid-Works Add-In Manager 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

it create prototype plastic injection mold object. This methodology is mainly used for plastics injection mold design process, but it could be applied to die design.[6]

7. Knowledge based requirements engineering for one of kind complex system.

a) Requirement Elicitation - In this process they find the requirement through consultation, document and stored knowledge elicitation and analysis process are connected during investigation analysis is also done

b) Requirement analysis -During analysis they decide which type of requirement system accepted RE produce a sequence KE module supporting this stages.

c) Requirement Negotiation - During investigation customer requirement and they upgrade on our elicitation process this requirement support to request engine. KARE always support to RE system for analysis. Swearing support also they giving to customer knowledge elicitation is the process in which collecting and implementation of knowledge[7]

8. Computer Aided Parametric Design for 3D Tire Mold Production

a) Tire Design Importer- To import the tire design data manually it is very tedious thing for human. The system is introduced for this which gives 2D design information with the assistance of intelligent software program and this is known as tire design importer. It includes tire profile, guide curves for the groove pattern, and cross-section profiles of each groove.

b) Road/Bottom Surface Constructor- Tire mold having one road surface and other several bottom surfaces. The road surface profile is very complex having many line and curve geometric constraints. It's very important to maintain profile completely constraints and this work is done by road /bottom surface constructer.

c) Groove Design Enabler - Groove design can be obtain by number of cross section profiles and guide curves. Guide curves determine the location and orientation of groove. Groove Design Enabler imports the profile information and provides a table for the user to select at each position. It is integral part of parameterize groove model.

d) Groove Modeling Knowledge Base- We are stored the required knowledge in computer in the form of tables. Totally Thirty types of groove are stored in the current knowledgebase. In addition, it compiles the shrinkage factors in casting, engineering change records, important inspection dimensions, and special treatments for each groove type.

e) Groove Shape Generator- Generator defines the actual mold of tire the defines top point, wall angle, radius etc. that all this operation constructed only one command so that reduces complication.

f) Design Table Constructor- Design table constructer doing the all parametric information convert into table form like text file or PDMC product data management system so they groove automatically generated with the help of that information.

g) Invalid Groove Corrector- During design process grooves pitches are varying at point to point so if user required other pitched with the help of user selected parameters that purpose they inserted correlating mechanism.

h) Parametric Design Coordinator - All above steps followed the software and after that coordinate given to the system also necessary due to that also error generated during selection of new parameters.[8]

9. A knowledge-based engineering design tool for metal forging: -

A. KBE hot forging software - By using KBE they are developed a software name as a GDL (general purpose declaration language).GDL software is object oriented language model. The main working of this software is provide database on the basis if KBE also provide design parameters also provide automatic material selection for forging and provide knowledge library. They are also generating a GUI of GDL with NERBS software .combination of GDL and Slab provide 3D surface to our system. For KBE software all related data like standards, production unit, properties all this things interface in KBE software.

Forging software includes-

a. This provides to software design parameters and manufacturing rate also requirement in market and also find workers requirement.
b. Store knowledge provide material properties and they divide material into customer requirement
c. It select type of machine for forging process they provide list of machine by our component shape requirement like hydraulic mechanical.
d. This point contains to small points related to shape generator fillet bosses angles cubes

B. Hardware and software-

For easy formation of GUI used KBE system also considered cost So KBE allows capture the knowledge and crate free parametric model contain all knowledge for analysis purpose.[9]

10. Methodology comes in three steps are as follows-

a. Die design information - In die design contents Blanking lines, die face, Press data. Blanking lines means what type of shape we have to require. Die face defined the face parameters like addendum; face form etc. press data only contains the machine information. In that all machine individual components information e.g. Bolster position of pin hole.
b. Skeleton structure design - It defines the thickness of dies rib structure of die, face, size etc.
c. Feature structure design - All supporting members define the structure design like V-groove, stages, pins etc. After receiving put this data they form interface of CAD software and used all this data and knowledge based data. After forming this GUI uses all numerical values and that software gives to user all selected information to user automatically like type of machine press, which mechanism to use, stopping seals also graphical information. In this paper for generating purpose they use inference engine and whose parameters required to solid model they are automatically calculated by software KBE helps to guideline purpose. Guideline are used for determined the quantity position and size of any component of machine also for understanding the relation between all component and their work, KBE use in this paper like a reference. They are used CATIA software for modeling because it is effective and flexible. Programming is done for the purpose of all the data implementation. In this paper programming is done in VBA software also finding position program needed.

Conclusion-This paper design the automated drawing dies with help of cad software(CAD) and KBE system.[10]

11. The Parametric Design and Intelligent Assembly System based on the Secondary Development of Solid-Works

a) Parametric Design Process Flow - User can select file .exe type and then enter the main parameters. When the parameters are validated then the model generate in solid works due to interface. Their parameters and model save in the database.

b) Program interface and database design - Interfacing is the medium of interaction between human and computer. Parametric design interface has been used Tab Control, Image Control, and Button controls. In this paper, Access database was selected as data processing**. The parts parameters used in the program were stored in the database in security, for the program has provided a guarantee to read and maintain.**

c) Instances of the program flow - Set up the human-computer interface and databases of parts parametric design, users can turn to add parts of product in the software components.

a) Insert part to be assembled in solid works
b) Choose surface and edge of part
c) Choose assembly type
d) Assembly
e) Check collation and interference
f) If satisfy then end of process[11]

12. This is the paper of Knowledge – Based Engineering to identify the research challenges. KBE means it is a field to study and research on methods and techniques of various parts and process to reuse them and develop optimum solution. In this it identifies theoretical foundations of KBE and research issues within KBE. There are many methods to support development of KBE system and applications. But in this paper it focused on Methodology and software tools oriented Knowledge Based application or MOKA methodology. It explains eight KBE life cycle. It gives projects to move towards industries and in actual use. It focus on various research challenges in KBE like improve methodological support foe KBE, transparency of KBE applications, effectively sourcing of reuse knowledge etc.[12]

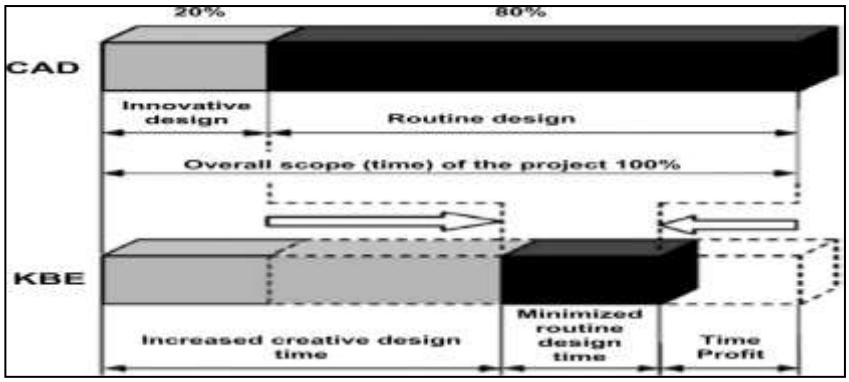

Fig. 2.Comparision of KBE and CAD[12]

13. Knowledge Based Engineering is a new and young technology with lots of potential to all applications in various fields like automobile, medical, industrial, etc. This is a vast technology but paper related to this is

not enough. So this paper gives broad technology review to fulfill the current information gap. KBE is a diverse fundamental discipline such as artificial intelligence (AI) and computer aided design (CAD). According to the methodology of Knowledge Based Engineering to develop new system first step is to identification of process, then acquisition and then codification of relevant knowledge that would have to embed in the KBE application. This application is integrated with other computer aided engineering tool by means of some workflow management system. From this knowledge management area the overall goal of nurturing and supporting initiatives that gives more effective use of the knowledge aspects in the organization. This KBE system is not a novel and revolutionary product from the world of computer science, but it has strong roots in the field of artificial intelligence, particularly in the knowledge based systems (KBSs) technology of the 1970s. The KBE systems already have capabilities of a CAD system or to interlink to external CAD system. When a design of any process which is highly rule based, disciplinary, repetitive tasks then KBE is a perfect tool for this. The rules of Knowledge Based Engineering are as follows:-

a) Logic Rules.
b) Math Rules - These math rules are commonly used for evaluating computed-slots and child object inputs. Mathematical rules can be used both in the antecedent and consequent part of any production rules.
c) Geometry Manipulation rules.
d) Topology rules - This paper gives detail review of KBE with the main objective of increasing understanding of its technology fundamentals. Current KBE system seems reinvent whole system is not needed but it can standardize it. KBE system is already reduce time to create application compare to plain, general purpose programming language. The existing language-based KBE systems can improve the feedback to user around geometry manipulation. For instance, they could give context-sensitive suggestions and guidance when some geometry operation fails.[13]

14. Drawing automation of nozzle is reducing the cycle time in designing. Automation has been produced by using solid edge ST-2 and it is linked with the Microsoft excel. This technique gives detail drawing of reactor nozzle. The drawing varies with input supplied. Geometric relationships control the orientation of elements with respect to another element. Sketch changes with change in relations. Excel sheet contains various parameters and their relationships. Nozzle main parts –

Nozzle ID , Hub Height, Hub OD , Neck OD, Bolt Hole Dam., Flange OD, Neck Height, Lip Height , Lip Angle, Chamfer and its angle, Lip OD , Lip OD Ref. ,Head inner/outer radius, Neck Angle.[14]

15. Design process automation support through knowledge base engineering. In this paper, it develops an application of KBE to automate the repetitive task while modifying design created in CAD model. It provides designers to devote more time and effort in creative and innovative work and makes design process simpler.

Methodology used:-

The methodology involves following steps-

A. Identify parts and products functions and behaviors.

B. Convert these functions and behaviors in terms of rules, associative expressions, design evaluation constraints (identification of knowledge).

C. Manage these constraints, expressions, and rules in the form of database or spreadsheet (knowledge management).

D. Access this knowledge, expressions and evaluation criteria through program and user interface generation (knowledge acquisition and codification).

After developing CAD model it is necessary to define a link between them. The linking is done through following steps-

a) Microsoft Access database is linked through the open database connectivity (ODBC). It provides a standard interface to connect KF applications to many data sources. KF application connects database by executing SQL statements using standard library of functions. NX connects KF program to the database through functions namely ug.odbc.database and fetches record of the database through function ug_odbc_recordset.

b) The database is linked to KF application and CAD model through following steps.

c) The code is written in notepad with .dfa extension and is linked to CAD model and GUI through DFA manager that is available in KF module of NX.

d) After linking code and database, GUI is called through the KF toolbar and the user input load constraint and other input parameters. The program calculates all the output parameters by checking against all failure criteria and generate CAD model of knuckle joint assembly in CAD environment.

The purpose of this paper is to improve design efficiency. It provides safe design and assembly of the product. In industries, it can use both parametric modelings to achieve quality, creativity, and innovation to stay in the market ahead.[15]

16. During the research they are doing study with the help of knowledge management. This case study help us to inquiry and also data collection also helps the examine problems and causes due to this they find out empirical data and describing causes mechanism. Process is given below [16]-

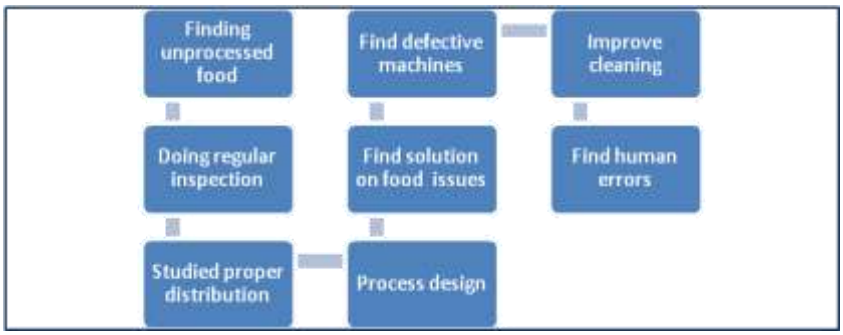

Fig.3. Problem finding process

17. Design and drawing automation using Solid-Works application programming interface

a. Modeling the part.

b. Making an assembly with this parts.

c. List up all critical dimensions for the parametric modeling and naming the dimensions

d. Making the design knowledge based which contains the parametric relations of each dimension and formulae.

e. Making GUI program and API program for connecting the cad system and the inference engine and the knowledgebase.[17]

18. Class hierarchy shown in the product view window.

The design requirements proposed by the selected product class are automatically retrieved and chosen as the new design requirement reference, some of which can be modified, deleted, or appended.so when we required aluminum alloy die casting mold product In this case, we select a suitable material for an aluminum alloy die-casting mold product. The design requirements and manufacturing processes are retrieved from the knowledge base and listed in the user interface.

Step 2. Obtain the product's property requirements for materials

In this step, the new design requirements and manufacturing requirements can be automatically mapped to the material property requirements. The mapping procedures are as follows:

(1) Defining the mapping knowledge rules.

(2) Creating the requirement instances of the design and manufacturing processes.

(3) Creating the material property instances with mapping knowledge rules

Step3. Retrieve materials that can meet the proposed property requirements from the existing material selections.

As there are comparison operations between material property values, we first define two concepts with SWRL rules to represent retrieving of two types of comparison operation. Then, we construct two selection sets by executing two types of comparison operation. Finally, we calculate the intersection set of the two selection sets. Intersection set is the final result of retrieving the material.

Step4. Rank candidate materials.

For all candidate materials in the material selection set, it is necessary to implement a ranking operation. In general, according to the objective design requirements, a multiple attribute decision-making can be carried out. In this material selector, we employ a commonly used approach, the analytic hierarchy process (AHP) approach, to rank the candidate materials .At the same time, the material selector can provide a multiple objective design attribute data file in XML format to integrate other multiple attribute decision-making approaches.

Step5. Create a new material selection. It needs to be noted that the whole process of creating a new material selection is carried out in the material selector of this knowledge framework, and the user only needs to define the mapping knowledge rules.[18]

19. The development of global market is increases rapidly year by year. To meet this increasing rate of market we required to change or modify the convectional manufacturing system. Because the demand is increasing and to provide better quality at lowest lead time we move to Concurrent method of manufacturing is one of the best solution for this. The main objective is to reduce the process lead time and cost of the product. This method is used on two wheeler front fork. Method of this is Reversed Engineering. It uses CMM (Coordinate Measuring Machine) to find the coordinates of front fork. It can create a 3D model with the

help of CATIA modelling software by using coordinates of the front fork. The output data of the CMM are coordinate values so it can be converted into suitable format which is acceptable to CATIA software. This CAD model is stored in database. This is the dedicated database so it can be change in future as per requirement. Due to this redesign of existing part easy. Then it take machining simulation and then analysis using ANSYS software to confirm it achieve the requirement or not before going to production. So this process optimizes the production for better quality at lowest lead time. It reduces the wastage of material and cost of the product. Thus this work integrated the Redesign, Concurrent Engineering, Reverse Engineering & Group Technology, which is a new strategy.[19]

20. The objective of this paper is to optimize the resources and energy consumption of production system. We know the industries should make relevant improvements to optimize the resources and energy consumption. The main scope is not to deal with the technical issues but to discuss how such kind of integrated frameworks, which we name KB-PLM frameworks for "Knowledge Based combined to Product Lifecycle Management", can be applied to support new generation of sustainability frameworks.

To perform sustainability oriented framework the following aspects are considered-

1.) Metric is required for comparing the machine tools with each other.

2.) Machine energy consumption is to be measured before and after machining and also during standby mode.

After completing the product design, the production planning takes place which include machine capability, their availability and suitability. But it cannot focus on energetic aspects and there consumption. So the production system should considered product with its life cycle. At one hand it contains design of production equipment and process and other hand contains project cost and energy consumption of system. So due to this system energy consumption, production time is reduced.[20]

21. Knowledge Based Engineering (KBE) is a research on various processes which are complex and capture technologies which are existing and reuse them. It research on various fields like web-based, function-based, ontology technology for enhancing the capabilities of KBE but still KBE level is not achieved. The objective of this paper is to collect and review on KBE approaches, methodologies. From this evaluation of KBE, time required for designing is reduced. It is the practical method to visualize and analyses the design process. The main objective of this paper is to describe KBE by selecting, classifying and reviewing the literature which are present till date. Review procedure is explain in this paper are-

a. Selection of literature through internet.
b. It filters according to engineering background.
c. Again search on internet according to background.
d. At this step it can be filter on CAD based modelling domain.
e. Refining the work.

In this paper it shows how KBE is important because of volatile, insecure, user unfriendly, disorganized present day market. Apart from this it is speedy, innovative, skilled and less error proof.

Benefits of KBE:-

A. Reduced time:

a) It reduces Analysis and simulation time.

b) It is not required to redesign the existing part so due to this time required for redesign existing part is avoided.

c) Code generated in CATIA during machining which is directly used in CNC machine programing.

B. Product Optimization:

a) It gives knowledge about components, its functions, and the way it fulfills each function.

b) Due to this system energy consumption, production time is reduced and optimize the production.

c) Cost of the product is reduced because of product optimization using KBE system.

C. Extra time is given for innovation.

Resent Development of KBE Methodologies.

a) MOKA (Methodology and tools Oriented to Knowledge-based Applications) is one of the best methods for KBE which focuses on capturing, structuring, formalization and implementation. It consists of six main steps- identify the process, justify process, capture, formalize it, package and activate.

b) The second method is KOMPRESSA (Knowledge Oriented Methodology for the Planning and Rapid Engineering of Small-Scale Applications). It can use in small to medium enterprises. It covers the whole life cycle development of KBE by maximizing the client involvement based on the experience of the client, and it is good known for its flexibility in application. It provides a guideline, instructions, and a technique to manipulate and manage the complex knowledge.

c) DEKLARE (Design Knowledge Acquisition and Redesign Environment) which is similar to MOKA.

d) KNOMAD (Knowledge Nurture for Optimal Multidisciplinary Analysis and Design). And much more like this.[21]

22. In this paper survey following is the points-

a) **Industrial motivation and research problem statement -** First of all study the system which we have to innovate and then find out some negative things in that system .so that we are using this negative point's find out problem statement.

b) **Development of the survey criteria -** Recent research find out related to KBE technology challenges to achieve scope of the literature survey from that we have to get 4 functionalities of KBE. They are helpful for research.

c) **Literature analysis and classification -** Scope of review are toe types, first is KBE applications and another one is to automation in design repetitive work. Then relevant papers to scope of our paper are make its different groups. To reach this subset of relevant articles, extensive filtering and searching was required. The keywords used to identify the relevant literature included "knowledge-based engineering & engineering design" and "artificial intelligence & knowledge-based engineering" These papers are found from using Scopus, Science Direct and Springer Link.

d) **Expert assessment of the insights gained through the literature -** A final validation of the survey outcomes has been made through expert assessment. A panel of 6 experts from various domains

working in different organizations were selected to assess the importance of the functional roles identified in this study. The objective of the assessment activity performed by experts is to support the research opportunities obtained through the analysis of the literature.

e) **Discussion and conclusions -** The survey design finished with a discussion on the insights gained and a summary of the achievements and limitations of the research.[22]

23. Using Rule Based Design in Engineer to Order Industry: An SME Case Study

a) Customer specification – After customers signoff we are finding out the requirements of the customer. **Solid-Works Models are built compatible to the design output produced by Drive Works. Design output form in solidworks-2007automatically by connecting solid works sessions to store the design parameters by the using interface.**

b) Drive works- In drive works there are many steps first of all apply rule for the drive works then make a decision after the application of rule and giving the output of drive works. After that generate solid works model with the help of solid work interfaced.

c) 3) Solid-Works- Seed model generate in slopworks and doing the assembly and component drawings and model forwarded to manufacturing.[23]

24. There are two process did side by side they are as follows:

A. Product simulation

B. Manufacturing

C. Usually, nowadays so many efforts taking for precise and accurate results. And for that ideal cad model is used for simulation .but this simulation is based on ideal cad model which is not actual product and this geometry does not exist in nature.

D. Manufacturing -For improve the result of simulation we are adding the material, manufacturing process creates deviation and real based knowledge on cad model and then we are doing simulation on that cad model so that the improve the precision and accuracy of the simulation .[24]

Fig.4 Select a product class or an instance from the product[24]

25. The repetition in the single part production process in metal industries which causes limitation in exact determination of the necessary process parameters it means welding time. So this paper discusses the methodology to improve prediction accuracy in welding time in single part production system. To achieve this requirements configuration and integration of Product Data Management (PDM) and Business

Intelligence System is necessary. But this method is only for simple welding process. It cannot use in complex welding process. So to overcome another prediction model is developed on the basis of analytics methodology. It work automatically within a knowledge-based circuit.

Requirements of this method are as follows:-

A. The process, work tools, workers, welding technology, logistic flow in the same work station must have equal and consistence and should have the same quality and quantity.

B. According to different types of welding technologies, welding process method must be classified.

C. The new component and assemblies are in same family, if it is not then it is required to classify based on their categories.

a) Data is to be collected in right manner as per requirements.

b) The second step is data classification. This classification is based on material or welding technology, etc.

c) The data sets can be imported in two separate models to estimate the process time. The first one is direct prediction. In this case the process time as output parameter is predicted in a predictive model directly. The other is prediction through indicator, which predicts the process time indirect through specific and characteristic indicator like welding speed.

d) There is various analytics software for analysing and predictive modelling. These techniques depend on situation and operation conditions. This process gives flexibility in welding process and improvement in quality as well as quantity.[25]

26. By using knowledge engineering they give

a. Obtaining knowledge

b. Presenting knowledge

c. Analysis done on that knowledge

d. Again searching and sharing knowledge with others

Proper used of knowledge based engineering is the data acquisition and proper used of that knowledge. It reduces risk time and cost. MOKA divide KBE system into following stages-

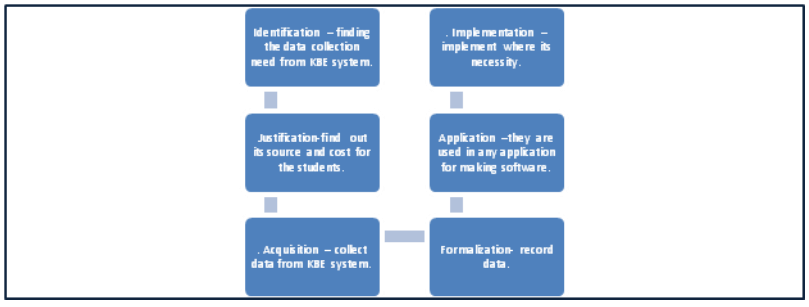

Fig.4. All this six stages done by MOKA.[26]

How to reduce the negative impact of knowledge heterogeneity in engineering design team: exploring the role of knowledge reuse-

a) Survey instruments and process - Make a team having its size upto10 peoples. Then take pilot study by involving 12 engineering design team by using this study did the expletory factor analysis, from this

determined no of questionaries' .then adding 13 sample team and did a formal survey –which contains 25 engineering design teams of 469 individuals.

b) Sample and data collection - In pilot study first conduct pre-test and we also find research objectives before survey .determined questionaries' by taking interviewed .third questionaries' are divided into online and printed questionnaires .from that find out 262 usable questionnaires from this pilot study .

e) Measure - Constructs. A 5-point Liker scale (ranging from 1 = none to 5 = a great deal) was used to measure survey constructs, which were engineering design team performance, knowledge heterogeneity, knowledge reuse, and employee relationships. These scales were adapted from existing literature. Various factor measures as follows-

a) Engineering design team performance
b) Knowledge hetroginitry
c) Knowledge reused
d) Employee relationships

f) Results and analysis - The convergent validity of the scales was verified by this criteria: all indicator loadings should be significant and exceed 0.7, the composite reliability (CR) should exceed 0.7, the average variance extracted (AVE) by each factor should exceed 0.50 (Fornell and Larcker, 1981; Pavlou and Fygenson, 2006). Thus, it can be concluded that the discriminant validity of the constructs was acceptable. The structural model shows potential causal dependencies between the four construct researches; we conducted an exploratory factor analysis of all reflective measures (engineering design team performance, knowledge heterogeneity, knowledge reuse, and employee relationships). Goodness-of-fit statistics (GOF) was calculated to determine whether the model is appropriate or needs further revision.[27]

27. For improvement in the efficiency of engineering change (EC) process, the mechanism of knowledge flow is described through analyzing knowledge transformation and transmission between knowledge carriers. EC is a complex process which reflected in the complicity on discipline and functional organization. Knowledge flow involves knowledge carrier, intellectual content and direction. In order to analyses the knowledge flow in EC process a modelling method using Petri net is proposed in this section based on knowledge flow. The four kinds of Knowledge Activity Unit (KAU) are-

a) Socialization Activity Unit (SAU).
b) Externalization Activity Unit (EAU).
c) Combination Activity Unit (CAU).
d) Internalization Activity Unit (IAU).[28]

28. In last few years the supervision is based on rule base oriented. But due to this the supervision is not getting sufficient to industry. It required knowledge base oriented approach to resolve this problem. So for this create new generation supervision application and control system, which would provide added value to the operation of plant areas and like this. It improves man machine interface by crating this new generation application.

Daniela Automation meets these needs by creating new applications "operator independent", not only with transfer of know-how from the man to the machine, but also through the optimization of human-machine interfaces in order to improve the quality of operator's work. A key factor of this is to understand the operator's tasks effectively and design the work environment. It improves quality of the product. This technique reduces number of commands and unwanted signals sent to operator. It uses 3Q concept. It means Quality, Quantity, and Quickness. It manage all the process which is technological related and its work in parallel way with the application designed for the supervision. The difference between old system and new application is innovative man-machine interface called 'Operator Assistant' (OA). This system covers all the steel making process, from raw material to final product shipping. This all process is merged in three 3Q application- Ergonomic, Knowledge, Advanced Architecture which is shown in fig. Furthermore this new technology allows a perfect coordination with automation system and controls. To give operators to concentrate on optimization of process.[29]

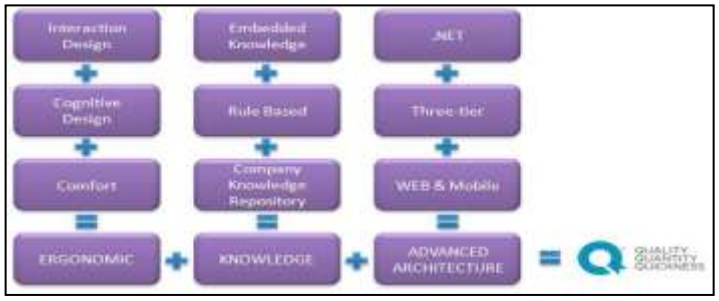

Fig.5 3Q Concept Chart[29]

29. The various task are divided into small working groups. They are face designing aircraft need to comply consideration to request for the proposal. They are regularly monitoring by teachers. Teachers divided by 3 groups for monitoring .The 3 teaching structural blocks as follows:

a) Theoretical session
b) Control session
c) Tutoring session

Then evaluate the group by checking three reports of each group and final report during final evaluation and presentation.[30]

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sr.no	Title	Publishing year	Design	Production	Airospace	Management	Medical	Civil	Automotive
1	An approach of a knowledge-based process to integrate real geometry models in product simulations	2016							
2	An ontology-based knowledge framework for engineering material selection. 1 class hierarchy shown in the product view window.	2015							
3	Using Rule Based Design in Engineer to Order Industry: An SME Case Study	2015							
4	Transforming expertise into Knowledge-Based Engineering tools: A survey, knowledge sourcing in the context c	2015							
5	Project Based Learning Methodologies Applied to Large Groups of Students: Airplane Design in a Concurrent Er	2015							
6	Framework for integrated mechanical design automation	2000							
7	The Parametric Design and Intelligent Assembly System based on the Secondary Development of SolidWorks	2010							
8	Drawing automation of raecter nozzle								
9	How to reduce the negative impact of knowledge heterogeneity in engineering design team: exploring the role	2016							
10	Design and drawing automation using solidworks application programming interface	2014							
11	Automated Design System for drawing Dies	2008							
12	Computer Aided Parametric Design for 3D Tire Mold Production	2005							
13	A knowledge based reliability engineering approach to manage product safety and recalls	2014							
14	Effective Design of Educational Virtual Reality Applications for Medicine using Knowledge-Engineering Techniqu	2016							
15	A knowledge-based system for materials selection in mechanical engineering design	2001							
16	Knowledge-based systems in construction and civil engineering	1989							
17	A knowledge-based engineering design tool for metal forging	2006							
18	The application of a knowledge based engineering approach to the rapid design and analysis of an automotive	2001							
19	Knowledge based requiredment engineering for one of kind complex system	2003							
20	Knowledge based parametric design of mechanical product based on configuration design method	2001							
21	A critical review of Knowledge-Based Engineering: An identification of research challenges	2012							
22	Windows native 3D plastic injection mold design	2003							
23	The knowledge based tool for steel industry	2016							
24	Implementation of concurrent redesign and manufacturing for an automotive component.	2015							
25	Knowledge based and PLM facilities for sustainability perspective in manufacturing.	2015							
26	Knowledge based engineering: Between AL and CAD. Review of a language based technology to support engine	2012							
27	Knowledge Based Engineering: Notion, approaches and future trends.	2015							
28	Design process automation support through knowledge base engineering.	2014							
29	Development of a knowledge based predictive model to estimate the welding process time in single part produ	2016							
30	Process optimization based on knowledge flow in engineering change	2016							

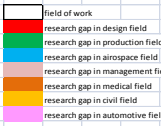

Table 1. List Of literatures and there Scope

III. FUTURE SCOPE

KBE (Knowledge Based Engineering) system used in many application such as proper material selection from library. Tool design for winding machine design automation, for identification of research challenges to integrate real geometry models in product simulations etc. But when we are doing survey on design industry. The problem comes front of us is that Gearbox. It is design for large applications. Its procedure always change with respect to application and this repetitive work/tasks very time consuming. So we are design a tool for gearbox which will give us a direct design sheet of gearbox and assembly by changing is only input parameters and other required things. This will reduce gearbox design time from8 to 10 days to only maximum 20 to 30 minute.

IV.BENIFITS

A. Reduced time:

a) It reduces Analysis and simulation time.

b) It is not required to redesign the existing part so due to this time required for redesign existing part is avoided.

c) Code generated in CATIA during machining which is directly used in CNC machine programing[21]

B. Product Optimization:

a) It gives knowledge about components, its functions, and the way it fulfills each function.

b) Due to this system energy consumption, production time is reduced and optimize the production.

c) Cost of the product is reduced because of product optimization using KBE system.

VI. CONCLUSION

The main purpose of KBE is to automate the system or to connect the Man-Machine through API (Application Programming Interface) system. This system improves application with more user-friendly, flexible and adoptable knowledge bases. By using this we can definitely improve quality. It reduces number of commands

and useless signal send to operator. Furthermore this new technology allows operator to concentrate on the optimization of the process because of perfect co-ordination of automation system. KBE system gives us good interlinking between human operator and software. This makes system comfortable towards operator. Reduce repetitive work time, reduce cost of product this technique used for further more application.

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