# THE ROLE OF USING CAD SYSTEM IN FURNITURE DESIGN [+]

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**Abstract:**

**The basic items of this research include presentation of the contents of the (Auto-cad) system the design, with the help of CAD computer". The research has tacked the concept of cad-system, its advantages applications, typical use requirements of design using computer Advantages are: in furniture industry, savings made as a result of computer use, on theoretical level practically the project has dealt with the process of fitting the pieces of furniture together. After several attempts, a new way of fitting parts together has been concluded which has achieved planty of savings in the shown tables within the research.**

**المستخلص:**

**اشتملت الفقرات الخاصة بهذا البحث عرضاً لمضامين التصميم بمساعدة الحاسوب (CAD) حيث تناول مفهوم نظام (CAD) ومزاياه واستخداماته ومتطلبات الاستخدام ألأمثل للتصميم بمساعدة الحاسوب ومزايا استخدام الحاسوب في صناعة الأثاث المنزلي ثم الوفورات التي تتحقق من جراء استخدام الحاسوب في صناعة الأثاث ، هذا فيما يخص الجانب النظري، اما الجانب التطبيقي فقد تناول عملية ترتيب قطع الموديل على قطع الخشب الخام وبعد عدة محاولات تم التوصل إلى ترتيب جديد للقطع حققت وفورات كبيرة مثبتة في الجداول المعروضة في متن البحث علماً بأن عملية الترتيب تمت بالاستعانة ببرنامج الاوتوكاد .**

**وختاماً تم التوصل إلى مجموعة من النتائج التي توصي بضرورة استخدام الاوتوكاد في عمل قسم التصميم وذلك للوفورات الكبيرة التي يحققها.**

## Introduction:

The world today encounters a rapid movement of permanent change in the industrial institutions machinery in by means of using modern methods of production. Computer is one of these methods in all stages of production processes such as design, manufacturing, marketing and so on as requirements in productions process. In the industrial activity, there are many examples, there is no room in our project to mention all of them. We therefore deal with design using computer since it occupies a vast area of importance in our time. All studies and researches have concluded that modern production systems, CAD in particular brought or reached many intentions and targets, not able improvement in kind cost and time reduction etc.

## Research Focus:

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As a result of frequent visits to the Mosul Furniture Company, it is obvious that there is misuse of the raw material the design process which resulted from employing classical method followed in this company.

**Objectives:**

It is intended to improve design process to a better one after using computer in the process.

**Supposition of research:**

Under problem and aim of research, which is indicated above, the following supposition can be made: Using of computer in design process can get better conclusions than the design in a traditional manner.

**Manner of research:**

Reaching the research to its aims and testing from research's supposition the research considered the following concept:

Theoretical concept, it includes one chapter which takes' five gates the first one takes the concept and how of the design by using computer. The second one is benefits of CAD system , the third one included the uses of computer aided design. The application concept of research is covered in chapter two which shows identification of the company. And work of productivity process, then conclusions of using "CAD" system in designing the furniture in company undertaker the research then showing the conclusions are reached, by research and suggestion, which the researcher saw that it is necessary to give them to the responsible for deciders in furniture company.

**Theoretical concept:**

**(1-1) The concept and how of Computer Aided Design**

Specialists have a great number of concepts concerning design by computer aid. These concepts differ in details but are similar in their general frame work, where as some have remoted themselves from their real scientific conception which are confused with other concepts which have nothing to do with it.

As a mutual effect done by a designer and computer, which was called as design by a computer aid ( CAD ) where as R'anky present it as a system personating the required depending on electroning computer. It is done through a process of translation and transmission of ideas and information to mathematical model or functional Forms displayed by the projector in a very qualified and efficient way by means of using digital data, it is considered by Ranky as a branch C1M system (Computer Integrated Manufacturing) [1].

CAD is electronic in designing product as a whole or in detail or additional details or re-forming or changing cite of traditional manual. drawings [2].

CAD is one of the new programs and more comprehensive and more complex by which it is intended planning and production [3].Computer is employed for displaying variety of forms whether these forms are product design or parts of this product CAD system was used for architectural purposes such as calculating area gaps among them. Yet the computer was limited because of low computers, capabilities, with the development of factories and employment of computer for controlling industrial processes, their appeared a need for complementation of engineering design processes and industrial processes for variety of goods. This had made a leap in the application of CAD system. AutoCAD program with all it is various technical method

needed rapidly for developing. This program in all its stages is proper to meet the increasing demand for design of various qualities and applications. With a development of digital control computer NC / CNC which are used in designed system it has become possible to design drawings on monitor then sending them directly for production by means of digital controlled machines . This has less to speed up production process cost reduction and the total cost of the goods [4]. or CAD involves the use of computer hardware and software to assist the designer in the storage manipulation, analysis and reproduction of his/her, or CAD systems allow designers to produce 3D (three dimensional) geometric models. These geometric models may be constructed using wire frame models, surface models or solid [5].

**(1-2) Benefits of CAD System** [6].

CAD radically reduces the lead time for new product introduction CAD's time advantage is not being able to draw lines faster, but being able to find them faster. The drafting of an original design by computer is not significantly faster than drafting by hand, but revising and adapting existing designs is almost twelve times faster. The ability to sort, classify, and relative similar designs facilities standardization of parts prompts ideas, and eliminates building a design from scratch.

- CAD generated products can be introduced faster to the market because they can be tested quicker.
- CAD improves every stage of products design and is especially useful as a means of integrating design and manufacture.

And other benefits are: [7].

1. Product quality: CAD allows designers to develop alternatives and to be aware of possible problems at early stages of design.
2. Shorter design time: This clearly influences both cost and actual development times to market.
3. Manufacturing cost reductions.
4. Data base management.
5. Enhanced capabilities.

**(1-3) Uses of Computer Aided Design**

1. It is possible for designer working with a light pen to sketch ideas on a cathode ray tube and receive a response from the computer after the design has been evaluated [8].
2. The CAD data base enables other functions to access the same data and with much less paper work. Functions like tooling design quality and purchasing can access the same data base to ensure coordinated use of the latest product definition [9].
3. A designer working at a workstation with a high - resolution graphics screen, can generate various views of an assembly or components [8].
4. The designer can zoom in on portions of an assembly, rotate it or enlarge it to check for interference and to examine other geometric features.
5. CAD graphical models provide opportunities for manufacturing engineers marketing specialists, and even customers to view the item and offer suggestions before further work is done [1].
6. The CAD element not only speed up slow and tedious drafting but also aids in analyzing various configurations of a product by rotating them on a computer screen.

7. Using CAD, the designer can look at cross ~ sections and can request product drawings to different scales [10].
8. CAD tools are used to create, store and modify the designs of products, production processes, facility layouts, and equipment tooling [11].
9. CAD is used to design everything from pencils to submarines. Some of our every day products are more difficult to design than you may think. Potato chips with ridges, the top of a soda can a two liter bottle of soft drink, a car door, and golf balls are examples of simple products that require the sophistication of CAD for effective design and testing [6].
10. CAD is used a design engineer starts by developing a rough sketch or conceivably. Just an idea. The designer then utilizes a graphic display as a drafting board to construct the geometry of a design [12].

**Application concept:**

**(2-1) A Brief Historical Survey:**

Cornerstone was laid to established the state company for furniture industry in Mosul, issued by Minatory of industry and mineral. The company was inaugurated in1985, and experimental production started in 1990, and it has lasted for three months. As for the commercial production, it began at the beginning of 1991. The project cost a bout 10 million ID. The total area of the company is about 168 cubic meters, 14400 cubic metres are specified for the productive department and engineering services, and 4800 for the store of initial materials, ready made goods, and spare parts . The designed capacity of the company had been determined to produce 6000 bed room furniture (within a year ) , 6000 reception room furniture , and 6000 kitchens furniture ( within a year ). All these are ready piece furniture made by 100 working hands which are distributed on all working activities.

**(2-2) The manufacturing Process**

**First step:**

It involves designing stage. It is the point of departure in the productive activity at the factory. The selection of samples is determined by two styles. The first style: it depends upon the self-experience of the experts by means of following the results of the market studies.

The second style: It depends, upon extracting from special magazines. The procedure of working in the design department is as follows:

1.Preparing the initial design according to charts and a sample and exposing it to the managerial office so as to he certified.
2.Preparing a file including the engineering details for the whole parts of the product and its components, and sending it to the production department accompanied by the wages.

**Second Step:**

It includes starting of preparing designs as a productive plan and according to the details below:

**1. The process of selecting the initial materials:**

Some initial materials are available in the stores with different symmetrical dimensions. Thus the choice of units that achieves the least percentage of waste things according to their dimensions (their measurements).

**2. Cutting: it includes the following steps:**

A. The initial materials that are proposed to use as levels and determined by number, quality and thickness are arranged.

B. Then comes the process of cleaning the initial materials by cutting them in their four dimensions with a two-centimetre- length and vertical mechanical divisions.

C. The pieces of material are numbered mechanically or by hand after cutting them to sequentially determined measurements.

D. Preparing the pieces for manufacturing. This can be achieved through certain processes including casting models.

**Third step:**

The process of assembling the pieces made in the second step.

**Fourth step:**

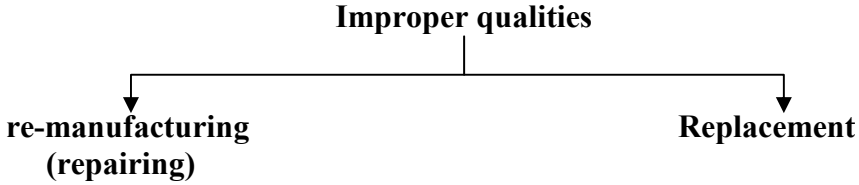
Finishing, Final preparations:

A- polishing, B- initial constructing, C- painting the constructed furniture:

**Fifth step:**

Quality control: Final testing which includes all stages of manufacturing. The company takes into consideration all practical qualities.

Department of quality control may have two possibilities:




**Final step:**

It is the storage of finished goods which are ready for marketing.

**(2-3) The conclusion of using CAD system in furniture design**

**Preamble:** In this time, the necessarily of using computer is appeared in the design process which considered.

The first of product processes, where as the studies and researches which achieved in this area have improved that the auto designation by (using) of computer has many a characteristics, first one is reduction of waste into minimum and which reduces a great characteristics. So the applicational side have been put for this chapter by frame which surve this purposes. The auto designation by using computer is considered one of the techniques which is depended on now, for purpose of facilitate product designation process and assisting the designer and his conclusion to the thought, the suitable means and representing in a mathematics sample or painting by computer. Through investigation which is made by researcher in this area, (Auto cad), can be used in many copies, first one is (releas 10) which is considered a typical for beginners , and there are copies 12, 13, 14, 2000.

The program is carried out by this way: In the applicational side, the releas 14 is depended on in entrance pieces of furniture in computer with arranging of pieces the painting in the three dimension and printing.

The arranging of small pieces related to the bed room have included raw piece used in producing, after frequent attempts with continuous effort and finally is concluded to most suitable choice economically, where the maximum of reduction is achieved in the raw piece used. The Fig. l (a, b, c, d, e, f) form show the process in a list forms . The entering of small pieces has made then show on computer by assisting of AutoCAD 14 which contains of (113) parts, to be known that there are repeated parts in two copies or three or four till twelve, the unreported part is (24).

It is worth mentioning that there are countless number of choices which can be taken into consideration upon make a model before cutting process [1]. By the use of CAD system raw piece parts can be well arranged which can offer saving in the use of pieces of different sizes which can also be used again in increasing production particularly organized pieces by means of certain restriction we can draw accurate pieces of \furniture as follows.

Twenty four pieces of furniture have been drawn and copied more than once according to the required number repealed in the bed room furniture. These drawn parts which ( 113 ) are stored in order to arrange them properly Through the use of AutoCAD system using special computers drawings for bed room furniture were made, followed this process, the process of the draw of raw part which was at the following measured:
width: 155cm, length: 355

These measures are depended in the company and it imported as standard. After ended the process of the raw part drawing. The arranging of small parts begun on which the standard parts. After operating computer, it showed that the arranging of small parts, on a choice existing list of forms, had saved some parts which have different dimension but ordered areas. After subtracting total pattern area which is (240572,8)from area of total raw parts which is (330150),we reached to the actual waste in the used wood which results from arranging the raw parts under the contexts of work in the company, which is equal to (26%).

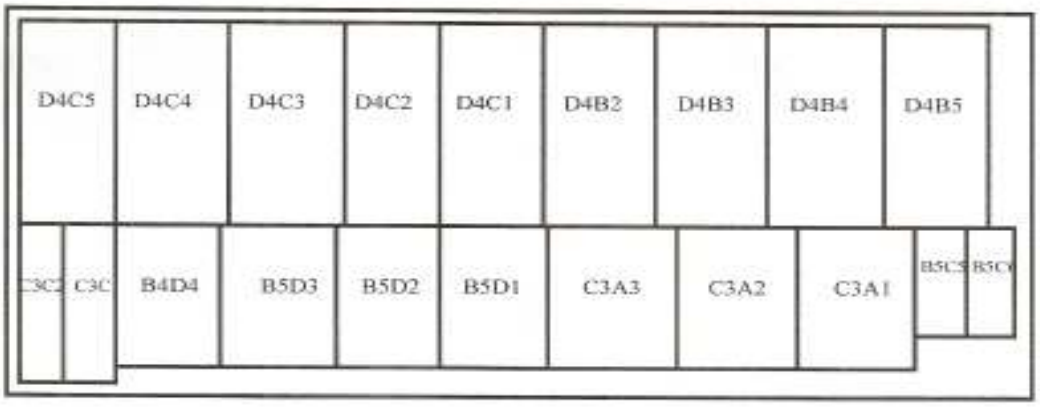



Fig. 1-a

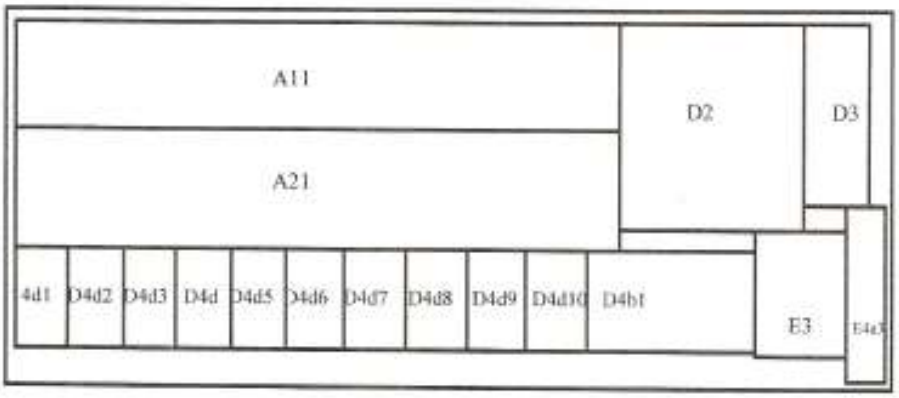



Fig. 1-b

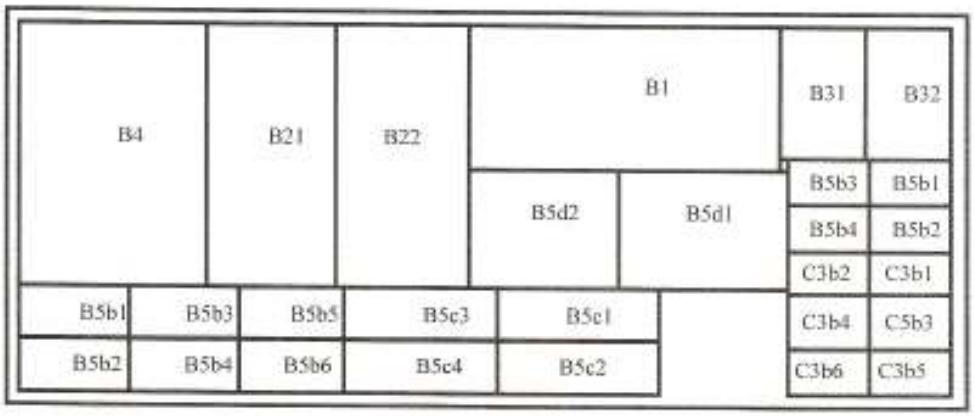



Fig. 1-c

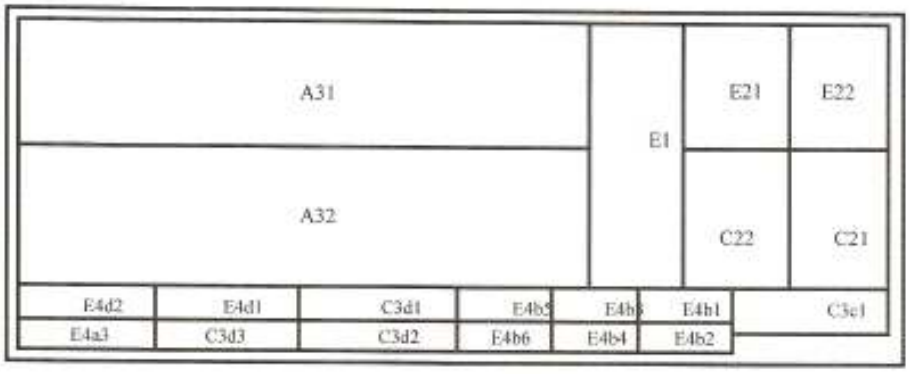



Fig. 1-d

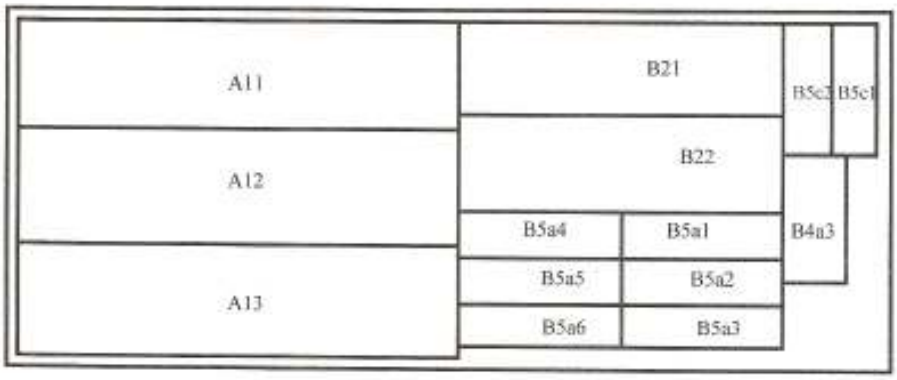



Fig. 1-e

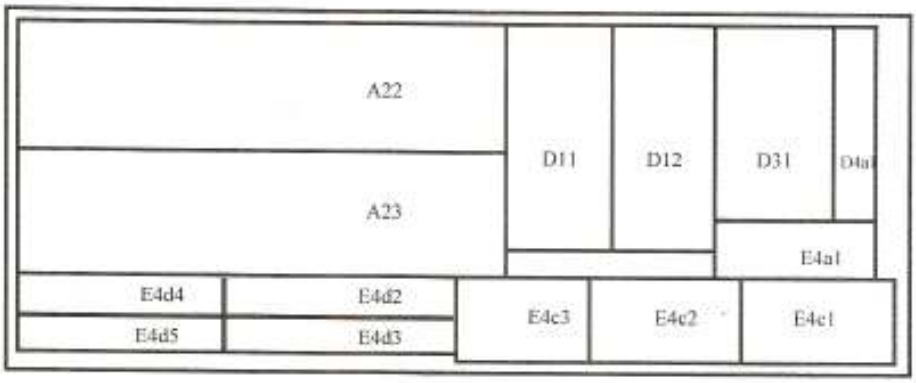



Fig. 1-f

**Results:**

As a result of using CAD system, taking into account all production processes in this company and accommodating with stages of works the following points:

1. Auto-cad has effectively participated in reducing damages in design implementation the production processes.
2. This program saves plenty of time in the designation, i.e arrangement of small pieces last for a long period of time a day, or two in the traditional (manual) method. Using the auto-cad program does not lost more than few hours.
3. This system (auto-cad) might be costly but it also saves much when it provides company with a lot of benefits. Besides, one of the important savings is effort and reducing the number of hands working in it, it is also economic in saving papers and wages paid to workers.

**Suggestion:**

In the light of previous efforts, the following suggestions can be offered:

1. It is necessary to use auto-cad program which can save time, efforts working hands, money raw material and even costs in all production stages
2. In order to reduce damages in the design department, the company has to increase the staff awareness and skill in arranging pieces of furniture and make use of experience in this field. The company holds training course in the design department and use of computer in the process of arrangement of pieces. In such a way that make typical use of raw material in the lowest cost This program in defining the standard time necessary to the implementation of models.
3. Application f programmed maintenance particularly of machines in the department of cutting and repairing shelling set. This is to achieve cutting automatically.
4. It is necessary to make practical survey of marketing, which can be done, through reviewing consumers views on kind, colours, design and their suggestion to improve the national manufacturing.

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