SREE CHAITANYA COLLEGE OF ENGINEERING, KARIMNAGAR
DEPARTMENT OF MECHANICAL ENGINEERING

Report: **GUEST LECTURE ON ADVANCED FINITE ELEMENT ANALYSIS (FEA)**

Even Objective: The Finite Element Analysis (FEA) is the simulation of any given physical phenomenon using the numerical technique called Finite Element Method (FEM). Engineers use it to reduce the number of physical prototypes and experiments and optimize components in their design phase to develop better products, faster.

Date of Event: 22.08.2019

Officials Attended for the Event: Dr.Ch.Shashikanth (HOD-Mech) .

Resource Persons: GM RAJAMAHENDRA (SIMULATION ENGINEER)
YUCAN TECH ,BANGALORE

Event Report: On 22.08.2019, A Guest lecture was organized by Department Of Mechanical Engineering on ADVANCED FEA

The event commenced by the arrival of GM RAJAMAHENDRA and Dr.Ch.Shashikanth(Hod- Mech).HOD introduced the Chief Guest and informed to the students and faculty, It is necessary to use mathematics to comprehensively understand and quantify any physical phenomena such as structural or fluid behavior, thermal transport, wave propagation, the growth of biological cells.
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Resource Person GM RAJAMAHENDRA explained that The Finite Element Method (FEM) is an analysis technique that is applicable to a broad range of problems. With this technique systems are described by mathematical equations. While these equations can be derived for simple objects, finding a solution that describes a complete complex structure is generally not practical. FEM addresses this difficulty by dividing a complex system into smaller objects so that the solution for each object can be represented by an equation much simpler than that required by the entire system.

The smaller elements that make up the larger object are connected at discrete joints called nodes. For each element, approximate stiffness equations are derived relating the displacements of the nodes to the node forces between elements and a computer is used to solve the simultaneous

equations that relate these node forces and displacements. Since the basic principle of subdivision of the structure into simple elements can be applied to structures of all forms and complexity, there is no logical limit to the type of structure that can be analyzed if the program is written in the appropriate form.

1. **Modeling.** FEM allows for easier modeling of complex geometrical and irregular shapes. Because the designer is able to model both the interior and exterior, he or she can determine how critical factors might affect the entire structure and why failures might occur.
2. **Adaptability.** FEM can be adapted to meet certain specifications for accuracy in order to decrease the need for physical prototypes in the design process. Creating multiple iterations of initial prototypes is usually a costly and timely process. Instead of spending weeks on hard prototyping, the designer can model different designs and materials in hours via software.
3. **Accuracy.** While modeling a complex physical deformity by hand can be impractical, a computer using FEM can solve the problem with a high degree of accuracy.
4. **Time-dependent simulation.** FEM is highly useful for certain time-dependent simulations, such as crash simulations, in which deformations in one area depend on deformation in another area.
5. **Boundaries.** With FEM, designers can use boundary conditions to define to which conditions the model needs to respond. Boundary conditions can include point forces, distributed forces, thermal effects (such as temperature changes or applied heat energy), and positional constraints.
6. **Visualization.** Engineers can easily spot any vulnerability in design with the detailed visualizations FEM produces, then use the new data to make a new design


SREE CHAITANYA COLLEGE OF ENGINEERING
A Guest Lecture on
ADVANCED FEA


DEPARTMENT OF
ADVANCED FEA

SREE CHAITANYA COLLEGE OF ENGINEERING, KARIMNAGAR
DEPARTMENT OF MECHANICAL ENGINEERING

Report: **GUEST LECTURE ON HEAT VENTILATION AND AIR CONDITIONING(HVAC,REVIT)&CAREER OPPORTUNITIES FOR MECHANICAL ENGINEERS**

Event Objective: HEAT VENTILATION AND AIR CONDITIONING (HVAC) is the simulation of any given physical phenomenon using the numerical technique Heat Techniques used it to reduce the number of physical prototypes and experiments and optimize components in their design phase to develop better products, faster in Heat Ventilation and air conditioning.

Date of Event: 26-09-2019

Officials Attended for the Event: Dr.Ch.Shashikanth(HOD-Mech) .

Resource Persons: MD.Zaheeruddin(FUTURE GEN TECHNOLOGIES).

Event Report: On 26-09-2019, A Guest lecture was organized by Department Of Mechanical Engineering on **(HVAC,REVIT).**

The event commenced by the arrival of MD.Zaheerudin & Dr.Ch.Shashikanth(Hod- Mech).HOD introduced the Chief Guest and informed to the students and faculty, It is necessary to use mathematics to comprehensively understand and quantify any physical phenomena such as Heating,Ventilation &Air Conditioning.

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Resource Person MD.Zaheeruddin explained that **HVAC,REVIT.** This is an analysis technique that is applicable to a broad range of problems. With this technique systems are described by mathematical equations. While these equations can be derived for simple objects, finding a solution that describes a complete complex structure is generally not practical. HVAC addresses this difficulty by dividing a complex system into smaller so that the solution for each object can be represented by an equation much simpler than that required by the entire system.

The smaller elements that make up the larger object are connected at discrete joints called nodes. For each element, approximate stiffness equations are derived relating the displacements of the nodes to the node forces between elements and a computer is used to solve the simultaneous equations that relate these node forces and displacements. Since the basic principle of subdivision of the structure into simple elements can be applied to structures of all forms and complexity, there is no logical limit to the type of structure that can be analyzed if the program is written in the appropriate form.

1. **Modeling.** FEM allows for easier modeling of complex geometrical and irregular shapes. Because the designer is able to model both the interior and exterior, he or she can determine how critical factors might affect the entire structure and why failures might occur.
2. **Adaptability.** FEM can be adapted to meet certain specifications for accuracy in order to decrease the need for physical prototypes in the design process. Creating multiple iterations of initial prototypes is usually a costly and timely process. Instead of spending weeks on hard prototyping, the designer can model different designs and materials in hours via software.
3. **Accuracy.** While modeling a complex physical deformity by hand can be impractical, a computer using FEM can solve the problem with a high degree of accuracy.
4. **Time-dependent simulation.** FEM is highly useful for certain time-dependent simulations, such as crash simulations, in which deformations in one area depend on deformation in another area.
5. **Boundaries.** With FEM, designers can use boundary conditions to define to which conditions the model needs to respond. Boundary conditions can include point forces, distributed forces, thermal effects (such as temperature changes or applied heat energy), and positional constraints.
6. **Visualization.** Engineers can easily spot any vulnerability in design with the detailed visualizations FEM produces, then use the new data to make a new design

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Report Of

5 Day Workshop on CNC Programming

Organized by

Department Of Mechanical Engineering

Held at

Sree Chaitantya College of Engineering,karimnagar

Speaker

K.Vijay (Design Engineer)

Dated from 27 /01/2020 to 31 /01/2020 time 10:00am to 5:00pm

Iaugural of workshop

Objective of Workshop on CNC programming:-

Department of Mechanical Engineering arranged 5 day workshop on CNC programming for mechanical engineering final year students. Now in a day's use of CNC Machine in all industries is increase day by day so this course introduces the concepts and capabilities of computer numerical control machine tools. Topics include Introduction about CNC technologies. Part Programming, Geometric dimensioning and Tolerances, setup CNC machine for operation and basic practice on CNC machine in context with industrial applications gives real industrial knowledge to the attendees. With completion of this course students should be able to operate CNC machine as well as able to program any industrial component.

Content Delivered During CNC Programming Workshop:

Introduction about CNC Technologies:

Classification of CNC Machine

Advantage of CNC Machine tool Limitation of CNC Machine tool Application of CNC Machine tool

General Construction of CNC Machine tool

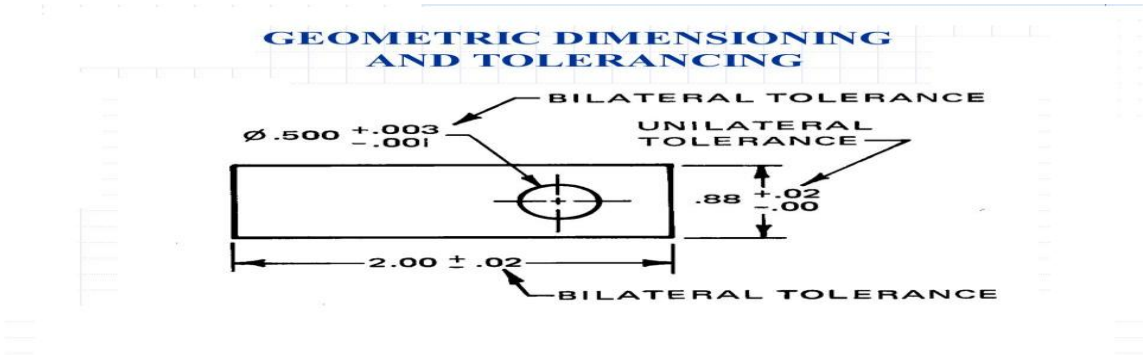
- Structure
- Spindle and Feed Drives
- Actuator Support bearings
- Feed Back Systems
- Automatic Tool Changers
- Tooling
- Material Handling System
- Pallet Changer System
- Lubrication System
- Coolant System Comparison between conventional & CNC

Introduction to Part Programming:

Steps In Part Programming

Terminology used in CNC part Programming

Introduction about geometric dimensioning and tolerances and selection of cutting parameters :



Introduction about various features of GD & T

- Flatness
- Parallelism
- Circularity
- Eccentricity with use of engineering drawing How to select cutting parameters like spindle speed, feed, axial and radial depth of cut for different machining condition.

Input Data in Manual Part Programming:

Sequence Number (N code) Preparatory Function (G Codes) Coordinate Function (X,Y,Z,U,V,W and I,J,K) Feed Function (F) Spindle Speed Function (S) Tool Function (T) Miscellaneous Function (M codes).

Manual Part Programming for Turning application:

Axes Designation convention Types of CNC Lathes(CNC turning Centre)

Zero point and Reference Point

Programming Types

General Structure of Turning part program

Practice of CNC turning Part Programming On CNC Machine

Highlights of 28th and 29th January 2020

Workshop of CNC programming is divided in two sessions. In first session all students got knowledge about basics of CNC machine and its application. There are many difference of NC and CNC machine and it's more beneficial to work with CNC machine compare to NC machine. In this session giving demonstration of CNC machine as well as CNC classification, advantages, disadvantages and other factors which are related to CNC machine is explained in this session.

After Completion of this introductory session start with all terminology related CNC machine is explained to students so they will understand all the parameters of CNC part programming easily. The CNC part programming is based on coding so all coding system explain by the respective faculty to student and so that they can understand brief of programming. After this session conduct another session for cutting parameter, tool selection and insert selection. There are many parameters for cutting which is feed, speed and depth of cut. All parameters consider for CNC machine which is used in manufacturing process. There are different cutting tool which is use differently for straight turning, taper turning, thread cutting etc. processes. Inserts are used for cutting which is fitted on tool. If any process or at cutting time suddenly change is there so tool will safe if insert is added on the top of tool so inserts are widely used for CNC machine. Inserts are made from different material as per process required.

After completion of all theoretical knowledge about CNC machine start with actual part programming which is used for manufacturing in CNC machine. There are many codes used for CNC machine in which G code, M code, N Code, X,Y,Z code, S code etc. which is used for part programming.

- N - Block number - specifies the start of the block
- G - Preparatory functions
- M - Miscellaneous functions
- X - X-axis coordinate

 Z - Z-axis coordinate

 I - X-axis location of arc center

 K - Z-axis location of arc center

 R - Radius of arc

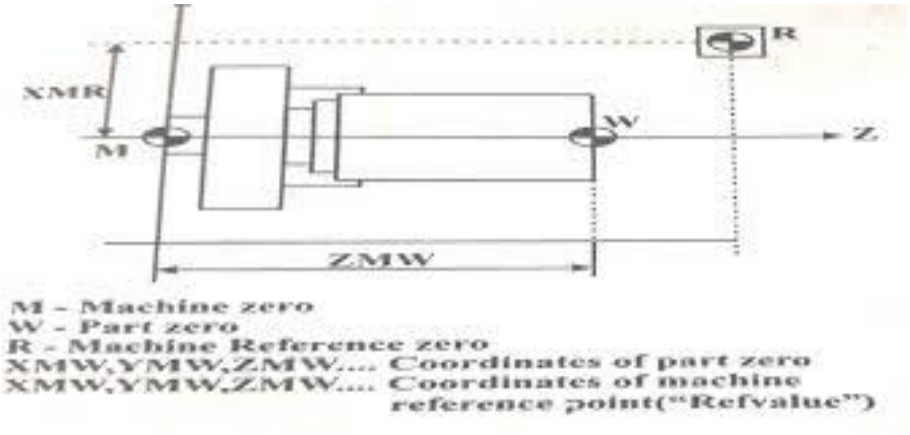
 S - Spindle speed or Cutting speed

 F - Feed rate

 T - Tool number.

CNC machine basically work on thumb rule and for axis designation it is given on that given sign as sown in Image.

Zero Points and Reference Points



There are different G codes and M codes which is generally used for part programming in which following codes are most important for CNC machines like linear interpolation, rapid traverse, spindle rotation etc. codes are used for programming and in M code spindle start, stop coolant on off etc will be done from the M code.

Highlights of 30th and31st January 2017

On this date practical work of CNC machine is done by the students and which program is done by student they load on the machine by them self and they see simulation of the part program. Simulation is need for safety purpose as well as tool life of machine. If simulation is not seen and direct execution of program is done than more chance of accident will occurs on machine so simulation is needed for CNC machine.

After see the simulation of part programming actual machining process is teach to students and they are perform practically as per instruction given by faculty. Moreover they perform practically they seen that this is actual manufacturing on CNC machine and they are quite confident about their learning of part programming. They make 4-5 practical of CNC part programming and manufacturing and program loading on CNC machine.

Conclusion Of this Workshop:-

After completion of this workshop 45 studetns of final year mechanical students got training about CNC machine and Manufacturing with CNC machine. All parameters which is related to CNC machine is known by the students and they are happy after attending this fabulous program which is conducted by Mechanical Department. The basic feed back of student is that they want extend this workshop and learn more of CNC and in future if it is possible than they want to learn of VMC machine also. So it is great success of this workshop that studets are happy to attending this 5 Day workshop On CNC programming.