LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

L.B.Reddy Nagar, Mylavaram-521230, Krishna Dt., Andhra Pradesh

Internship details of the sample students

1.3.4.1 Number of students undertaking Field projects/ Internships/ Student projects.

S.No	Programme name	Program Code	List of students undertaking field projects/internships/student projects	Certificate (Yes/No)	Report of the field visit / sample photographs of the field visit / permission letter from the competent authority.	Page No.
1	B.Tech-Mechanical Engineering	03	GANDRALA HARSHITHA	YES	Report of the field visit	2-25
2	B.Tech-Mechanical Engineering	03	GOPAE VEERANJANEYULU	YES	Report of the field visit	26-45
3	B.Tech-Mechanical Engineering	03	KETAVATU BRAHMA TEJA	YES	Report of the field visit	46-75
4	B.Tech-Mechanical Engineering	03	MADUGULA PAVAN KUMAR	YES	Report of the field visit	76-98
5	B.Tech-Mechanical Engineering	03	M.SHANMUKA KALYAN	YES	Report of the field visit	99-125
6	B.Tech-Mechanical Engineering	03	PULA SRIKANTH	YES	Report of the field visit	126-148
7	B.Tech-Mechanical Engineering	03	PULICHARLA.RAMAKRISHNA	YES	Report of the field visit	149-168
8	B.Tech-Mechanical Engineering	03	JAYA VENKATA SAI BABU	YES	Report of the field visit	169-196
9	B.Tech-Mechanical Engineering	03	VEMULA DEVARAJA	YES	Report of the field visit	197-226
10	MBA	E0	AINALA NAGARJUNA	YES	Permission letter from the competent authority	227-228
11	MBA	E0	ATLURI BHAVANI	YES	Permission letter from the competent authority	229-230
12	MBA	E0	AVULA SRIKANTH	YES	Permission letter from the competent authority	231-232
13	MBA	E0	BHADRADRI SAI MEGHANA	YES	Permission letter from the competent authority	233-234
14	MBA	E0	BOBBARAPALLI SRI VAMSI	YES	Permission letter from the competent authority	235-236
15	MBA	E0	BOLLAREDDY AJAY BABU	YES	Permission letter from the competent authority	237-238
16	MBA	E0	BOLLAREDDY JAGADEESH	YES	Permission letter from the competent authority	239-240
17	MBA	E0	CHITNENI MOUNIKA	YES	Permission letter from the competent authority	241-242
18	MBA	E0	CHITTIBOINA KOTESWARA RAO	YES	Permission letter from the competent authority	243-244
19	MBA	E0	DADI PRANEETHA	YES	Permission letter from the competent authority	245-246
20	MBA	E0	DASARI ANILKUMAR	YES	Permission letter from the competent authority	247-248
21	MBA	E0	DHARMAVARAPU KARUN KUMAR	YES	Permission letter from the competent authority	249-250

Internship Coordinator

PRINCIPAL

KaaShiv

9001 ISO CERTIFIED

MVP Microsoft Most Valuable Professional

2008 - 2018

Certificate
OF COMPLETION

Gandrala Harshitha

LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING

Is presented with this certificate on successful completion of

MATLAB Internship

Under the guidelines and norms of the program structure conducted during for

1 Month (01 September 2020 - 30 September 2020)

Attendee met all certification requirements and Successful performance on the required competence examination.

Certificate ID: **KA-hvgjd**

Grade: **A**

18765A0334

Venkatesan Prabu.J
Microsoft MVP

The Certificate ID Can be Verified at **www.kaashiv.com/verify-now**

INTERNSHIP PROGRAM ON MATLAB

An Internship report submitted to the

Jawaharlal Nehru Technological University, Kakinada in partial fulfilment

of the requirements for the award of the Degree of

BACHELOR OF TECHNOLOGY

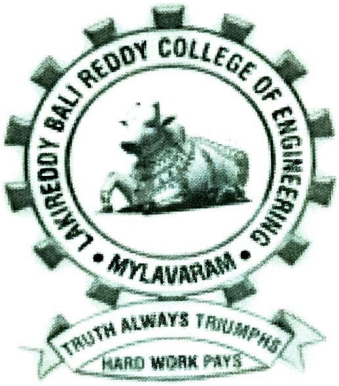
IN

MECHANICAL ENGINEERING

Submitted by

NAME: G. HARSHITHA

H.T NO: 18765A0334



DEPARTMENT OF MECHANICAL ENGINEERING

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

(Approved by AICTE, Affiliated to JNTU and ISO 9001-2015 certified)

L.B.REDDY NAGAR, MYLAVARAM, KRISHNA Dist.

2020-2021

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DEPARTMENT OF MECHANICAL ENGINEERING

CERTIFICATE

This is to certify that the internship report entitled " **MATLAB"** that is being submitted for the partial fulfilment of **BACHELOR OF TECHNOLOGY** degree in **MECHANICAL ENGINEERING** to JNTU Kakinada, is a Bonafide work done by **G. HARSHITHA (18765A0334)** during the academic year 2020-2021 and it has been found worthy of acceptance according to the requirement of the University.

Internship coordinator
Mr. K. V. Viswanadh

Dr.S.PICHI REDDY
Head of Department

ACKNOWLEDGEMENT

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G. HARSHITHA (18765A0334)

Table of Contents:

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MATLAB (matrix laboratory) is a fourth-generation high-level programming language and interactive environment for numerical computation, visualization and programming.

MATLAB is developed by MathWorks.

It allows matrix manipulations; plotting of functions and data; implementation of algorithms; creation of user interfaces; interfacing with programs written in other languages, including C, C++, Java, and FORTRAN; analyze data; develop algorithms; and create models and applications.

It has numerous built-in commands and math functions that help you in mathematical calculations, generating plots, and performing numerical methods

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i. Build a Car Parking Indicator

Parking a car can be tricky. It requires precision and a lot of practice. You can use MATLAB to make things easier for the driver, however, by building a car parking indicator. You can take inspiration from various parking indicator systems.

An automated car parking indicator would alert the driver when the car is too close to an object. This way, the driver can avoid those objects and turn the vehicle accordingly. You can build a car parking indicator for private parking spaces or open spaces. Such a system can have many benefits:

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- Parking spaces would also be used more efficiently.
- The chances of a vehicle getting damaged would decrease drastically.

Your system can guide the driver to a nearby suitable parking space. You can take it a step further and add the functionality of suggesting a parking space only if it's available. Maybe your system can determine if a car park has open slots or not, and it can indicate a parking space to the driver of the vehicle accordingly. The sensors can co-ordinate and help in guiding the driver to an open and nearby parking slot. Here's more info on this car parking indicator project.

ii. Use Artificial Neural Network for Image Encryption

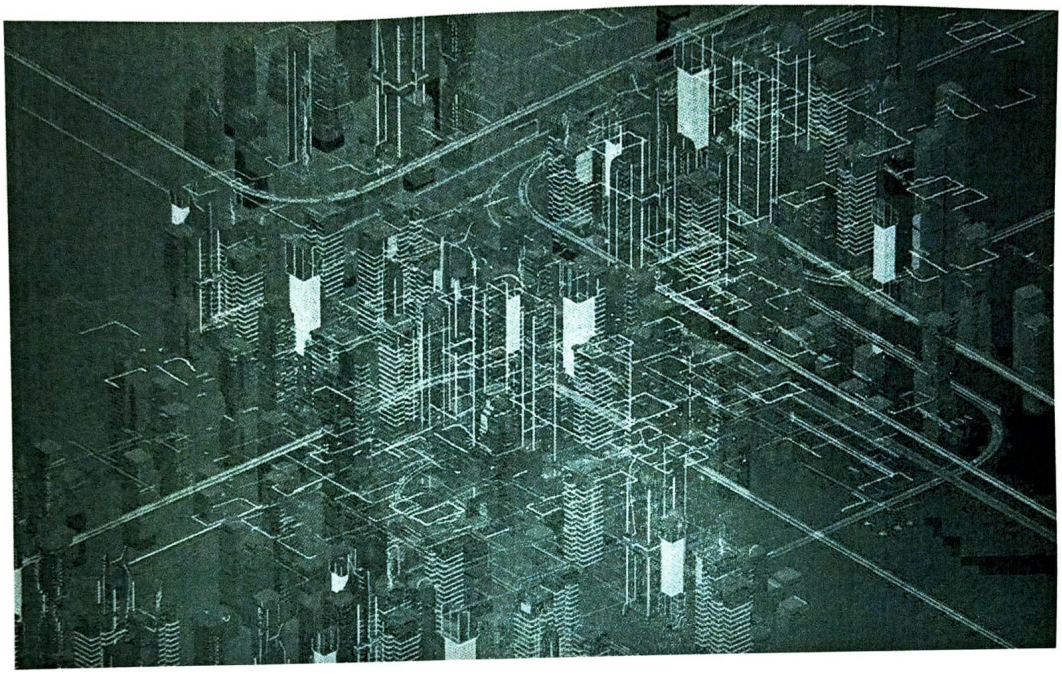
Privacy issues have become highly prevalent in recent years. This is one of the best MATLAB projects for you on this list if you take an interest in cyber security and cryptography. You can perform image encryption by taking the help of Artificial Neural Networks (ANNs in short).

Image encryption can prevent unauthorized parties from viewing and accessing images. This way, your data can remain safe. In simple terms, image encryption hides its information. In image encryption, you convert the original plaintext into ciphertext (which can seem like a bunch of nonsense). You can save and transmit this ciphertext over your network, and at the receiver's end, the ciphertext would convert into the original plaintext.

Neural Networks are machines that behave similarly to how a human brain functions. You can encrypt images on the sender's end through one ANN and use another ANN to decrypt the image on the receiver's end. You can use MATLAB to build a complete image encryption system that uses Artificial Neural Networks. After completing this project, you'd be familiar with cryptography as well.

3. Company Profile

Established in 2010 by a team of young expert software professionals, Kaashiv Infotech Solutions Limited is one of the largest IT majors today in providing educational institutions integrated modules to manage all their processes online.



Consistently delivering mission, our team has been delivering technically challenging projects under tight timelines, while also providing exceptional customer service and support to our clientele. This in turn has led to extremely positive long-term working relationships all over. Our detailed project process was created to ensure our projects are completed on-time, in-budget, and to the clients complete satisfaction.

- Kaashiv Infotech is a software services provider company.

- An ISO 9001:2000 Certified Company.
- Registered with MSME (Micro, Small & Medium Enterprises).
- Kaashiv Infotech develops IT solutions, underlined by innovation and value creation that impact and redefines the businesses processes.
- KaashivInfotechtakes pride in its philosophy of 'Customers First' which empowers our Employees to create a real value for the customers.
- Our continuous development and training programs ensure that we are always positioned to provide our valued customers a wide range of high quality services, using the latest tools and technology.
- We are focused on complete reliability models of project execution and management.

We offer turnaround guarantees for any project we undertake, backed by comprehensive management planning and supervision

- MATLAB's programming interface gives development tools for improving code quality maintainability and maximizing performance.
- It provides tools for building applications with custom graphical interfaces.
- It provides functions for integrating MATLAB based algorithms with external applications and languages such as C, Java, .NET and Microsoft Excel.

5. USES OF MATLAB

MATLAB is widely used as a computational tool in science and engineering encompassing the fields of physics, chemistry, math and all engineering streams. It is used in a range of applications including –

- ✓ Signal Processing and Communications
- ✓ Image and Video Processing
- ✓ Control Systems
- ✓ Test and Measurement
- ✓ Computational Finance
- ✓ Computational Biology

6. MATLAB - Operators

An operator is a symbol that tells the compiler to perform specific mathematical or logical manipulations. MATLAB is designed to operate primarily on whole matrices and arrays. Therefore, operators in MATLAB work both on scalar and non-scalar data. MATLAB allows the following types of elementary operations –

- Arithmetic Operators
- Relational Operators
- Logical Operators
- Bitwise Operations
- Set Operations

Operator	Meaning	Example	Algebraic
+	Addition	x + y	$x + y$
-	Subtraction	x - y	$x - y$
*	Multiplication	x * y	xy
/	Division (Left divide)	x / y	$\frac{x}{y}$
\	Right divide	x \ y	$\frac{y}{x}$
^	Exponentiation	x ^ y	x^y

Arithmetic Operators

MATLAB allows two different types of arithmetic operations –

- Matrix arithmetic operations
- Array arithmetic operations

Matrix arithmetic operations are same as defined in linear algebra. Array operations are executed element by element, both on one-dimensional and multidimensional array.

Relational Operators

Relational operators can also work on both scalar and non-scalar data. Relational operators for arrays perform element-by-element comparisons between two arrays and return a logical array of the same size, with elements set to logical 1 (true) where the relation is true and elements set to logical 0 (false) where it is not.

Logical Operators

MATLAB offers two types of logical operators and functions –

- Element-wise – These operators operate on corresponding elements of logical arrays.
- Short-circuit – These operators operate on scalar and, logical expressions.

Element-wise logical operators operate element-by-element on logical arrays. The symbols &, |, and ~ are the logical array operators AND, OR, and NOT.

Short-circuit logical operators allow short-circuiting on logical operations. The symbols && and || are the logical short-circuit operators AND and OR.

Bitwise Operations

Bitwise operators work on bits and perform bit-by-bit operation. The truth tables for &, |, and ^ are as follows –

P	q	p & q	p | q	p ^ q
0	0	0	0	0
0	1	0	1	1
1	1	1	1	0
1	0	0	1	1

Assume if A = 60; and B = 13; Now in binary format they will be as follows –

A = 0011 1100

B = 0000 1101

A&B = 0000 1100

A|B = 0011 1101

A^B = 0011 0001

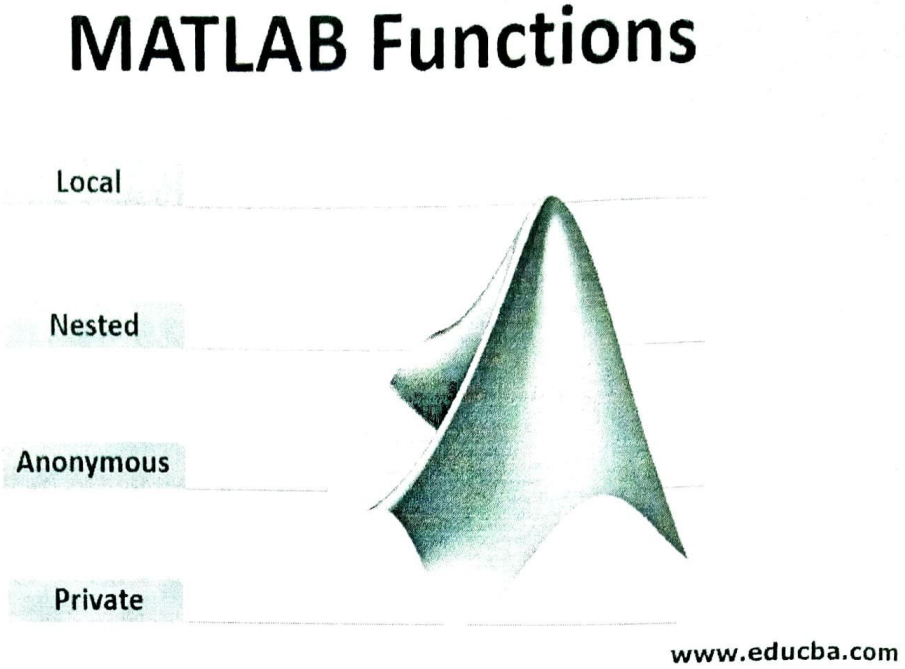
~A = 1100 0011

MATLAB provides various functions for bit-wise operations like 'bitwise and', 'bitwise or' and 'bitwise not' operations, shift operation, etc.

7. DIFFERENT TYPES OF MATLAB FUNCTIONS

There are several types of functions available with MATLAB, including local functions, nested functions, private functions, and anonymous functions.

- Anonymous Functions.
- Local Functions.
- Nested Functions.
- Private Functions



8.Image Processing using Matlab

1.How to Read and Store Image, View Pixel

2.Types of Images (Colour,Grayscale,Binary)

3.Mathematical Operations in Image

4.Channel Separation

5.Colour Space Conversion

6.Edge Detection

7.Noise and Filtering

8.Thresholding and Image Segmentation

9.Histogram Equalization and contrast Enhancement

10.Boundary labeling and Counting

Types of Images

RGB

GRAY SCALE

BINAR

How to Read and Store Image

```
a=imread('cameraman.tif');
 imshow(a);
 impixelinfo;
 imwrite(a,'test.png');
%Medical Image
info = dicominfo('CT-MONO2-16-ankle.dcm');
Y = dicomread(info);
figure, imshow(Y,[]);
```

Types of Images

```
a=imread('rose.png');
subplot(1,3,1);;imshow(a);
 %Convert Gray Scale
b=rgb2gray(a);
subplot(1,3,2);;imshow(b);
 %Convert Binary
c=im2bw(b);
subplot(1,3,3);;imshow(c);
impixelinfo;
```

Mathematical Operations in Image

1.Imadd

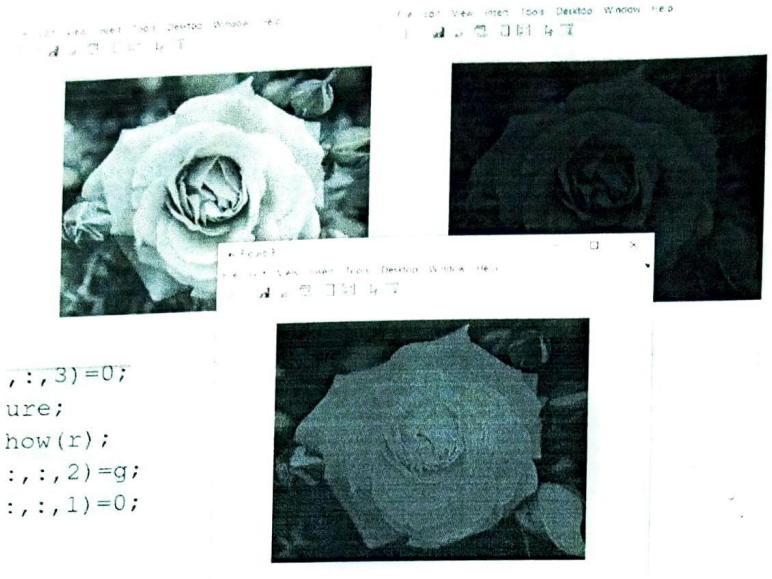
2.Imsubtract

3.Imabsdiff

4.immultiply

Color Channel Separation

```
a=imread('rose.png');
[r g b]=imsplit(a);
```



Colour Space Conversion

```
clc;

clear;

a=imread('rose.png');

b=rgb2hsv(a);

b1=hsv2rgb(b);

c=rgb2lab(a);

c1=lab2rgb(c);

d=rgb2ycbcr(a);

d1=ycbcr2rgb(d);

e=rgb2xyz(a);

e1=xyz2rgb(e);
```

figure;

subplot(2,4,1);imshow(b);

subplot(2,4,2);imshow(c);

subplot(2,4,3);imshow(d);

subplot(2,4,4);imshow(e);

subplot(2,4,5);imshow(b1);

subplot(2,4,6);imshow(c1);

subplot(2,4,7);imshow(d1);

subplot(2,4,8);imshow(e1);

impixelinfo

Edge Detection

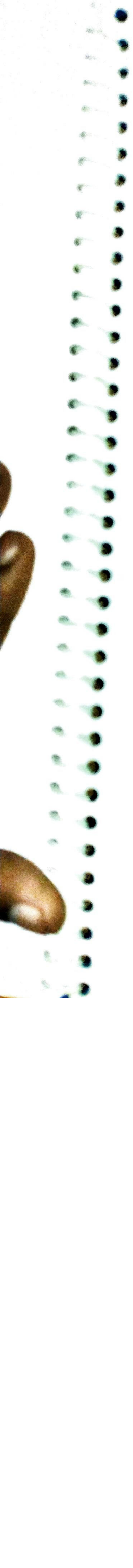
clc;

clear;close all;

```
a=imread('rose.png');
a=rgb2gray(a);
b=edge(a,'canny');
c=edge(a,'sobel');
d=edge(a,'prewitt');
figure
subplot(2,2,1);imshow(a);
subplot(2,2,2);imshow(b);title('canny');
subplot(2,2,3);imshow(b);title('sobel');
subplot(2,2,4);imshow(b);title('prewitt');
```

Noise and Filtering

```
clear;
a=imread('cameraman.tif');
```



Histogram Equalization and contrast Enhancement

Count the no of coins in a Image

```
imshow(a);
b=a>100;
figure;imshow(b);
b=medfilt2(b,[5 5]);
[L num]=bwlabel(b);
disp(num);
text=streat('No of Coins=',num2str(num));
title(text);
```

9.CONCLUSION

As a conclusion, we can say that this sofware offers strong possibilities. The utilisation is pretty easy for simple problem. For advanced problem, it is more complex. Moreover, you can access to introduction course on internet. But for advanced functions, it is more complex for find books or article. Moreover, there is some books and user manual but there are paying and expensive. There is a lot of similarities with Matlab. The graphic interface on scilab is less advanced : it is a simple interface, less developed than Matlab. For example, computation on matrix have similar syntax. Nevertheless, some functions proposed in scilab are limited or complex for a beginner. For example, the matlab to scilab translator is not very efficient and require strong skills of matlab. Some functions such as graphics or data interfacing are complex at the beginning

PANTECHSOLUTIONS

CERTIFICATE
of INTERNSHIP

This is to certify that

Mr.GOPAE VEERANJANEYULU

has Successfully Completed "30 Days Internship Program on Matlab"
at www.pantechsolutions.net in association with IETE Mumbai

Date : Sep 01-2020 to Sep 30-2020

M.Malaiyappan
Director
Pantech Solutions

Parag Walinjkar
CHAIRMAN
IETE MUMBAI

Certificate No : PS-IETE-INTERNSHIP-1687

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Submitted by

NAME: GOPAE VEERANJANEYULU

H.T NO: 18765A0335

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MATLAB

INTERNSHIP REPORT

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COMPANY PROFILE

PANTECH SOLUTIONS™
Technology Beyond the Dreams

Pantech Prolabs India Pvt Ltd is best known for manufacturing and marketing of high-quality, state-of-the-art Engineering Lab Equipments and Electronic Hobby Kits. Its products are delivered across the globe and many satisfied customers are the best guarantee of its first-rate service.Many of our products are also extensively, used by Hobbyists, Electronics, Electrical, Instrumentation, Communication and Bio Medical engineers.

Why Pantech?

With a client list spanning nearly in all industries, and colleges, Pantech Solutions' product solutions have benefited customers of many different sizes, from non-profit organizations to companies. By acquaintance with Pantech you'll have access to current technology, Development tools, Reference Schematcs, sample source code, and step-by-step action plans for completing Key projects. You'll also be provided full access to our research archives and knowledge base.

Our Vision

"To Gain Global Leadership in providing Technological Solutions through Sustained Innovation."

Core Values

You'll see that our 6 core values are derived from our stewardship quality.

Integrity - Honesty in how we deal with our clients, each other and with the world.
Candor - Be open and upfront in all our conversations. Keep clients updated on the real situation. Deal with situations early; avoid last minute surprises.
Service - Seek to empower and enable our clients. Consider ourselves successful not when we deliver our client's final product but when the product is launched and meets success.
Kindness - Go the extra mile. Speak the truth with grace. Deliver more than is expected or promised.
Competence - Benchmark with the best in the business. Try new and better things. Never rest on laurels. Move out of comfort zones. Keep suggesting new things. Seek to know more.
Growth - Success is a journey, not a destination. Seek to multiply/increase what we have - wealth, skills, influence, and our client's business.

4. FEATURES OF MATLAB

Following are the basic features of MATLAB

- It is a high-level language for numerical computation, visualization and application development.
- It also provides an interactive environment for iterative exploration, design and problem solving.

- It provides vast library of mathematical functions for linear algebra, statistics, Fourier analysis, filtering, optimization, numerical integration and solving ordinary differential equations.
- It provides built-in graphics for visualizing data and tools for creating custom plots.
- MATLAB's programming interface gives development tools for improving code quality maintainability and maximizing performance.
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- It provides functions for integrating MATLAB based algorithms with external applications and languages such as C, Java, .NET and Microsoft Excel.

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Logical Operators

MATLAB offers two types of logical operators and functions

- Element-wise – These operators operate on corresponding elements of logical arrays.
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Bitwise Operations

are as follows

P	q	p & q	p | q	p ^ q
0	0	0	0	0
0	1	0	1	1
1	1	1	1	0
1	0	0	1	1

Assume if A = 60; and B = 13; Now in binary format they will be as follows −

A = 0011 1100

B = 0000 1101

A&B = 0000 1100

A|B = 0011 1101

A^B = 0011 0001

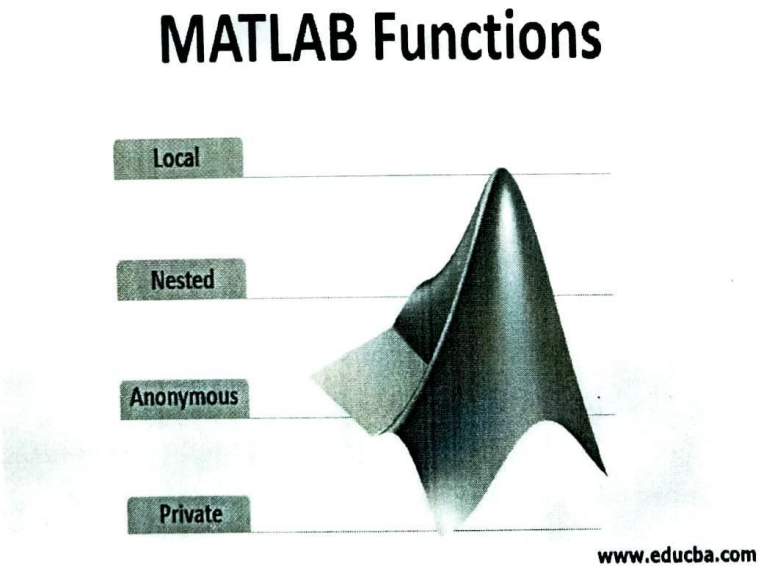
~A = 1100 0011

MATLAB provides various functions for bit-wise operations like 'bitwise and', 'bitwise or' and 'bitwise not' operations, shift operation, etc.

7. DIFFERENT TYPES OF MATLAB FUNCTIONS

There are several types of functions available with MATLAB, including local functions, nested functions, private functions, and anonymous functions.

- Anonymous Functions.
- Local Functions.
- Nested Functions.
- Private Functions



8. Image Processing using Matlab

1. How to Read and Store Image, View Pixel2. Types of Images (Colour,Grayscale,Binary)3. Mathematical Operations in Image4. Channel Separation5. Colour Space Conversion6. Edge Detection7. Noise and Filtering8. Thresholding and Image Segmentation9. Histogram Equalization and contrast Enhancement10. Boundary labeling and Counting

Types of Images

RGBGRAY SCALEBINAR

How to Read and Store Image

a=imread('cameraman.tif'); imshow(a); impixelinfo; imwrite(a,'test.png');%Medical Imageinfo = dicominfo('CT-MONO2-16-ankle.dcm');Y = dicomread(info);figure, imshow(Y,[]);

Types of Images

a=imread('rose.png');subplot(1,3,1);;imshow(a); %Convert Gray Scale

b=rgb2gray(a);subplot(1,3,2);;imshow(b); %Convert Binary

c=im2bw(b);subplot(1,3,3);;imshow(c);

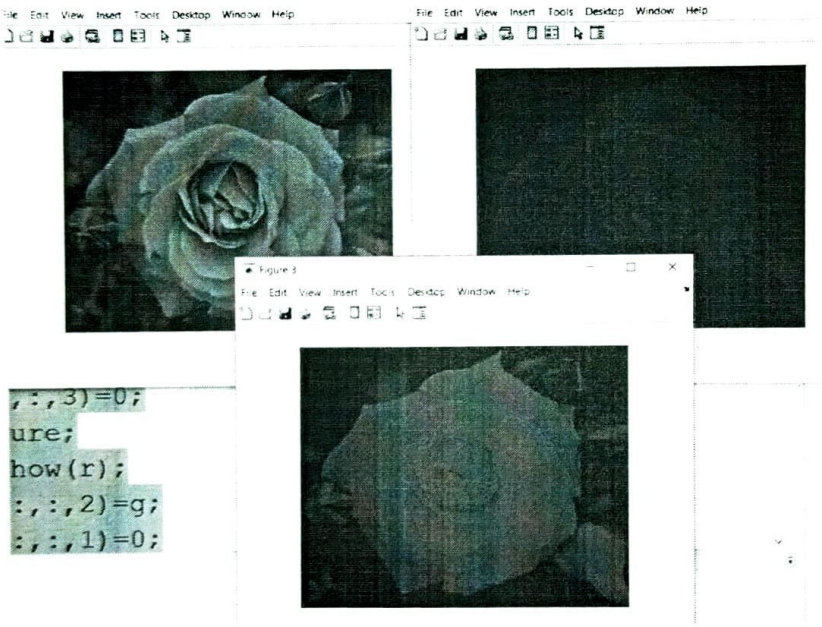
impixelinfo;

Mathematical Operations in Image

1. Imadd

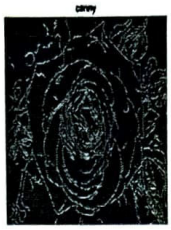
2 .Imsubtract3. Imabsdiff4. immultiply

Color Channel Separationa=imread('rose.png');[r g b]=imsplit(a);figure;imshow(r);r(:,:,1)=r;r(:,:,2)=0;r(:,:,3)=0;figure;imshow(r);gr(:,:,2)=g;gr(:,:,1)=0;gr(:,:,3)=0;figure;imshow(gr);bl(:,:,3)=b;bl(:,:,2)=0;bl(:,:,1)=0;figure;imshow(bl);



Colour Space Conversion

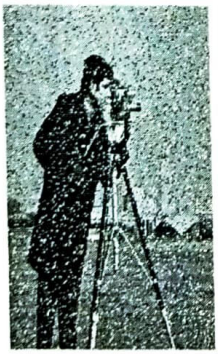
clc;clear;a=imread('rose.png');b=rgb2hsv(a);b1=hsv2rgb(b);c=rgb2lab(a);c1=lab2rgb(c);d=rgb2ycbcr(a);d1=ycbcr2rgb(d);e=rgb2xyz(a);e1=xyz2rgb(e);figure;subplot(2,4,1);imshow(b);subplot(2,4,2);imshow(c);subplot(2,4,3);imshow(d);subplot(2,4,4);imshow(e);subplot(2,4,5);imshow(b1);subplot(2,4,6);imshow(c1);subplot(2,4,7);imshow(d1);subplot(2,4,8);imshow(e1);impixelinfo**Ed**



ge Detection

```
clc;clear;close
all;a=imread('rose.png');a=rgb2gray(a);b=edge(a,'canny');c=edge(a,'sobel');d=edge(a,'prewitt');fi
guresubplot(2,2,1);imshow(a);subplot(2,2,2);imshow(b);title('canny');subplot(2,2,3);imshow(b);t
itle('sobel');subplot(2,2,4);imshow(b);title('prewitt');
```

Noise and Filtering



```
clear;a=imread('cameraman.tif');J = imnoise(a,'salt & pepper', 0.12);C=medfilt2(J,[5
5]);subplot(1,3,1);imshow(a);subplot(1,3,2);imshow(J);subplot(1,3,3);imshow(C);
```

Histogram Equalization and contrast Enhancement

```
a = imread('pout.tif');b = imadjust(a);c = histeq(a);d = adapthisteq(a); I=[a b c
d];imshow(I);title("Original Image and Enhanced Images using imadjust, histeq, and
adapthisteq")
```

Count the no of coins in a Image

```
a=imread('coins.png');imhist(a);figure;imshow(a);b=a>100;figure;imshow(b);b=medfilt2(b,[5
5]);[L num]=bwlabel(b);disp(num);text=strcat('No of Coins=',num2str(num));title(text);
```

9.CONCLUSION

As a conclusion, we can say that this sofware offers strong possibilities. The utilisation is pretty easy for simple problem. For advanced problem, it is more complex. Moreover, you can access to introduction course on internet. But for advanced functions, it is more complex for find books or article. Moreover, there is some books and user manual but there are paying and expensive. There is a lot of similarities with Matlab. The graphic interface on scilab is less advanced : it is a simple interface, less developed than Matlab. For example, computation on matrix have similar syntax. Nevertheless, some functions proposed in scilab are limited or complex for a beginner. For example, the matlab to scilab translator is not very efficient and require strong skills of matlab. Some functions such as graphics or data interfacing are complex at the beginning.

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OF COMPLETION

KETAVATU BRAHMA TEJA

LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING

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3D Modelling Internship

Under the guidelines and norms of the program structure conducted during for

1 Month (01 September 2020 - 30 September 2020)

Attendee met all certification requirements and Successful performance on the required competence examination.

Certificate ID: **KA-aijdp** Grade: **A**

Venkatesan Prabu.J
Microsoft MVP

187651A0337

The Certificate ID Can be Verified at **www.kaashiv.com/verify-now**

3D MODELLING

An Internship report submitted to the

Jawaharlal Nehru Technological University, Kakinada in partial ful filment

Of the requirements for the award of the Degree of

BACHELOR OF TECHNOLOGY

IN

MECHANICAL ENGINEERING

Submitted by

NAME: KETAVATU BRAHMA TEJA

H.T NO: 18765A0337

DEPARTMENT OF MECHANICAL ENGINEERING

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

(Approved by AICTE, Affiliated to JNTU and ISO 9001-2015 certified)

L.B.REDDY NAGAR, MYLAVARAM, KRISHNA Dist.

2020-2021

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L.B.REDDY NAGAR, MYLAVARAM, KRISHNA Dist.

DEPARTMENT OF MECHANICAL ENGINEERING

CERTIFICATE

This is to certify that the internship report entitled **"3D MODELLING"** that is being submitted for the partial fulfilment of **BACHELOR OF TECHNOLOGY** degree in **MECHANICAL ENGINEERING** to JNTU Kakinada, is a bonafide work done by **KETAVATU BRAHMA TEJA** bearing **18765A0337** during the academic year 2020-2021 and ithas been found worthy of acceptance according to the requirement of the University.

Internship coordinator
Mr. K. V. Viswanadh

Head of the Department
Dr. S. Pichi Reddy

ACKNOWLEDGEMENT

The satisfaction that accompanies that the successful completion of any task would be incomplete without the mention of the people whose care cease less cooperation made it possible, whose constant guidance and encouragement crown all efforts with success.

I humbly express my thanks to our management and Principal Dr. K. Appa Rao for extending his support for providing us with an environment to complete our internship successfully.

I indebted to our Head of the Department Dr. S. Pichi Reddy who modeled us both technically and morally for achieving greater success in life.

I humbly my thanks to my guide Mr. K. V. Viswanadh for giving timely valuable suggestions and encouragements the make the completion of the internship successfully.

I would like to thank all the teaching and non-teaching staff members of Mechanical engineering, who have extended their cooperation during the course of this work.

I am thankful to my friends who helped me sharing knowledge and by providing material to complete the internship in time.

KETAVATU BRAHMA TEJA
18765A0337

INDEX

INTERNSHIP REPORT ON3D Modelling

1. Introduction on 3D Modelling

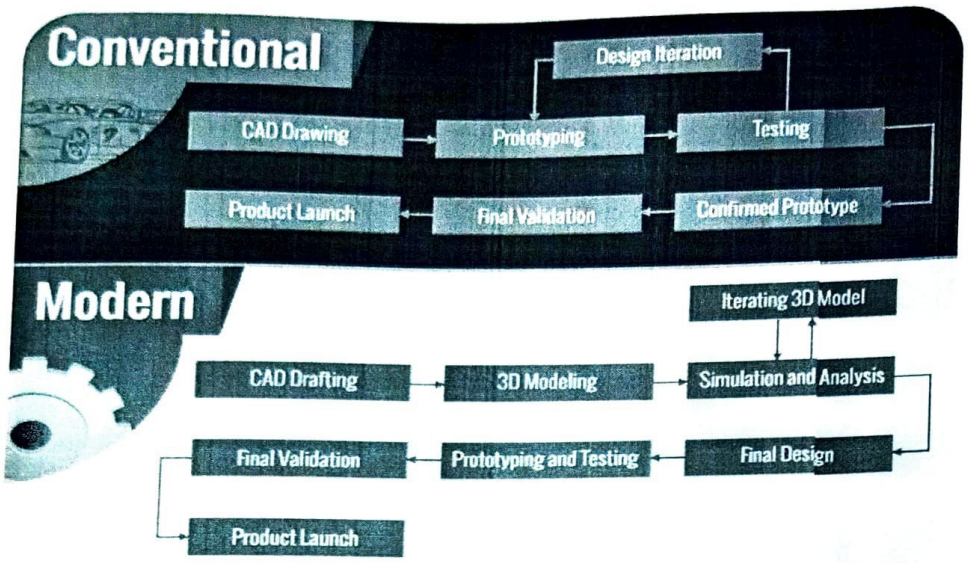
3D Modelling is defined the use of information technology (IT) in the Design process. A 3D Modelling system consists of IT hardware (H/W), specialized software (S/W) (depending on the area of application) and peripherals, which in certain applications are quite specialized. The core of a 3D MODELLING system is the S/W, which makes use of graphics for product representation; databases for storing the product model and drives the peripherals for product presentation it does not change the nature of the design process but as the name states it aids the product designer. The role of the 3D MODELLING is in aiding him/her by providing:

Accurately generated and easily modifiable graphical representation of the product. The user can nearly view the actual product on screen, make any modifications to it, and present his/her ideas on screen without any prototype, especially during the early stages of the design process.

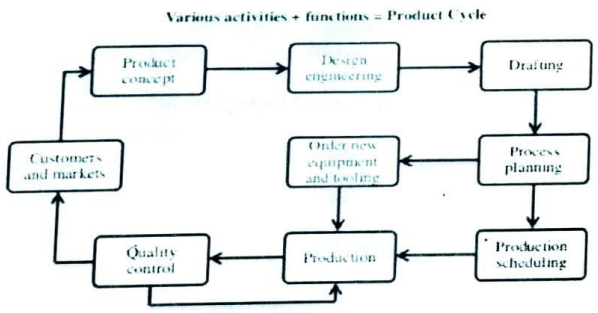
Perform complex design analysis in short time. Implementing Finite Elements Analysis methods, the user can perform: Static, Dynamic and Natural Frequency analysis, Heat transfer analysis, Plastic analysis, Fluid flow analysis, Motion analysis, Tolerance analysis, Design optimization.

Record and recall information with consistency and speed. The use of Product Data Management (PDM) systems can store the whole design and processing history of a certain product, for future reuse and upgrade.

COVENTIONAL Vs MOD] RN DESIGN PROCESS



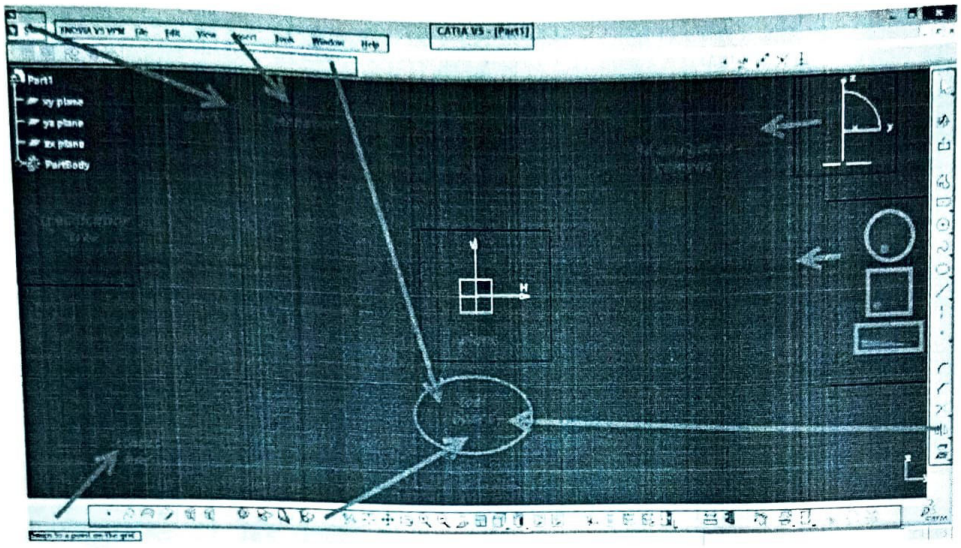
DESIGN PRODUCT CYCI E:



2. INTRODUCTION TO CATIA

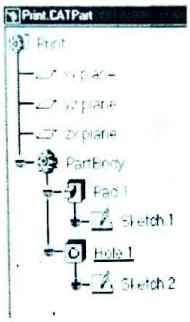
CATIA (an acronym of **computer aided three-dimensional interactive application**) developed by the French company Dassault Systems.

CATIA INTERFACE(G I)



SPECIFICATION TREE

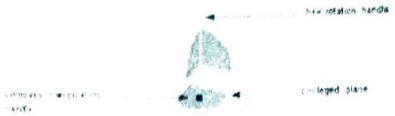
- The Specification Tree is displayed on the left side of the screen while you are working
- Provides access to the history of how a part was constructed, and shows the product structure
- Product entities can be selected from the spec. tree or in the geometry area
- Parts can be modified by selecting them from the spec. tree.
- Click on + to open a tree branch
- Solid Parts are stored in the PartBody branch of the Part tree



MOUSE CONTROLS

- Pan
  - Press and hold the middle mouse button and move the mouse to pan
- Rotate
  - Press and hold the middle mouse button then the left mouse button and move the mouse to rotate
- Zoom
  - Press and hold the middle mouse button and click the left mouse button then move the mouse to zoom in and out

- Using the compass



- Drag the axes or planes of the compass to dynamically rotate the display
- Multi-select entities by holding down the ***Shift*** key

VIEW TOOLBAR

- Display Commands
  - Fly Through
  - Fit View
  - Layer control
  - Pan
  - Rotate
  - Zoom
  - Normal View
  - Standard Views
  - View Types: Shaded/ Hidden Line/ Wireframe/ User Defined

- Hide/ Show
  - Hide
  - Swap Visible Space
- Properties
  - Display Characteristics for an object are set by selecting the entity, then pressing the right mouse button and selecting **Properties** from the menu

OTHER COMMONLY USED TOOLS:

- Copy/ Paste

- Geometry entities can be copied and pasted from one part to another.

- Paste Special allows you to:
  - Paste a complete copy with history
  - Paste a linked copy
  - Paste the result without linking

- Undo/ Redo

- Allows you to undo previous actions

- Redo repeats an action that has been undone

- Hide/ Show

- Allows you to temporarily hide entities from the display

- Hidden entities can be recovered by clicking on the "Swap visible space" icon, and then selecting the entity to make visible

- Update

- Used to update the part after modification

3. Step 2:Sketcher Module

The Sketcher workbench is a set of tools that helps you create and constrain 2D geometries. Features (pads, pockets, shafts, etc...) may then be created solids or modifications to solids using these 2D profiles. You can access the Sketcher workbench in many ways. Two simple ways are by using the top pull down menu (Start – Mechanical Design – Sketcher), or by selecting the Sketcher icon. When you enter the sketcher, CATIA requires that you choose a plane to sketch on. You can choose this plane either before or after you select the Sketcher icon. To exit the sketcher, select the Exit Workbench icon.

The Sketcher workbench contains the following standard workbench specific toolbars.

- **Profile toolbar:**The commands located in this toolbar allow you to create simple geometries (rectangle, circle, line, etc...) and more complex geometries (profile, spline, etc...).

• **Operation too bar:** Once a profile has been created, it can be modified using commands st ch as trim, mirror, chamfer, and other comn ands located in the Operation toolb: r.

• **Constraint toolbar:** Profiles may be constrained wi h dimensional (distances, angles, ctc...) or geometrical (tangent, parallel, etc...) constraints using the commands located in the Constraint toolbar.

• **Sketch tools tc olbar:** The commands in this toolbar allow you to work in different modes which make sketching easier.

- Entering the sketcher

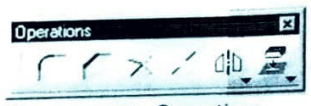
  - Click on the Sketcher icon or select Start -> Mechanical Design -> Sketcher

- Exiting from the Sketcher

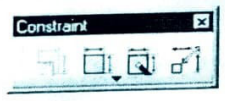
  - Click on the Exit icon to leave the sketcher and return to the 3D workspace

- Geometry Creation

- Geometry Operations



- Constraint Creation



- Tools Toolbar

  - Snap to point
  - Construction Geometry
  - Constraint

4. Step 3: Part Design Module

Part design environment is used to create 3D models from the basic 2] sketches created in sketcher environment.

- Base Features

❑ Pad
❑ Pocket
❑ Shaft
❑ Slot
❑ Hole
❑ Groove

- Reference Elements

❑ Point
❑ Line
❑ Plane

- Dress-up Features

❑ Fillets
❑ Chamfers
❑ Draft Shell
❑ Thickness

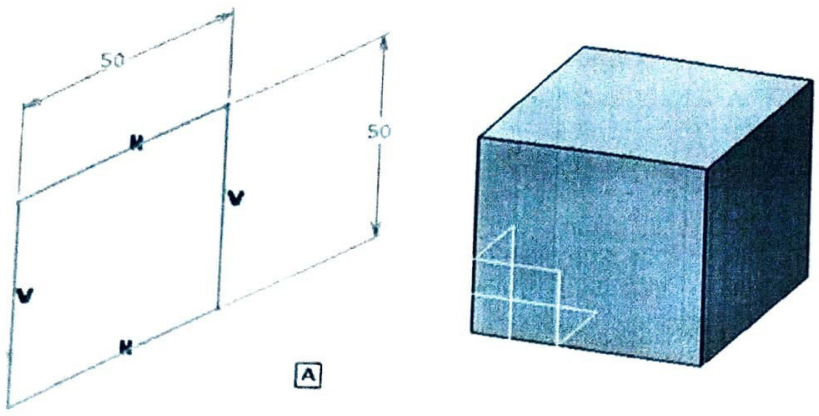
- Transformation Features

❑ Translation
❑ Rotation
❑ Mirror
❑ Pattern
❑ Scale

Some of the commands in workbench explained below

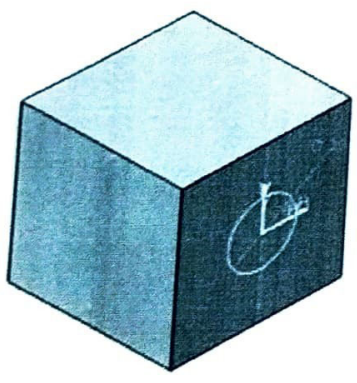
PAD command

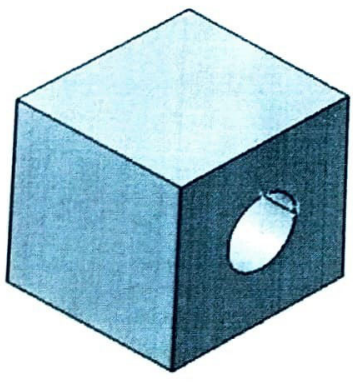
In most CAD software, the equivalent of this is called EXTRUDI , but in CATIA we call it PAD. TI is command adds material in the third direction, a direction other than the sketcl .



POCKET command

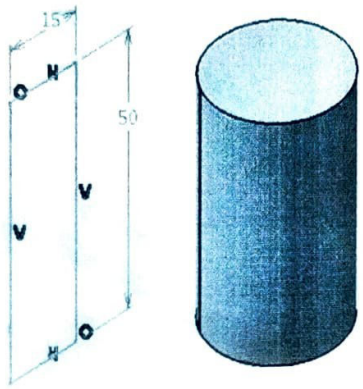
The POCKET commands somehow the opposite of PAD command. It simply helps remove geometry belonging to an already create part. On the figure below the POCKET command is helping to create the cylinder hole in the middle of the cube.





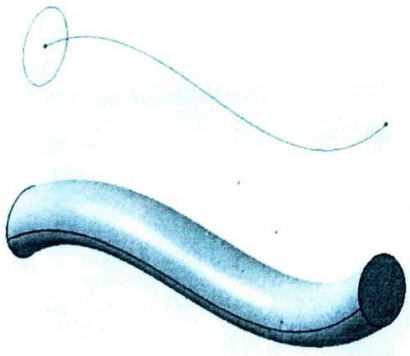
SHAFT command

It is Like revolve command in other CAD software, the SHAFT command is mostly used to make shaft like parts. It requires an axis, around which the sketch will be revolved.



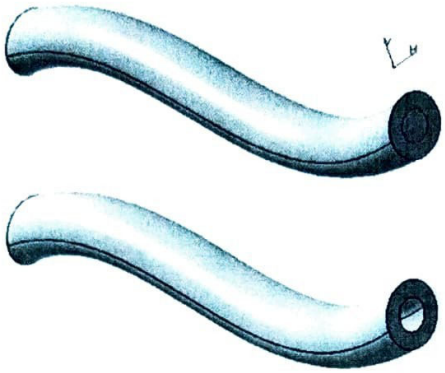
RIB command

This command which is usually known as SWEEP is called RIB IN CATIA. It adds material along a guide curve. RIB is used to make components like springs, pipes etc.



SLOT command

SLOT removes the material along a guide curve. Here is an example of slot. While using SLOT, I have used the same guide curve that was used for RIB. This ensures that the cross section will be uniform throughout.



5. Step 4: Assembly Module

Assembly environment is used to provide mating to two or more part models to from complete assembly

- Product Structure Tools

- Insert New Component
- Insert New Product
- Insert New Part
- Insert Existing Component
- Replace Component
- Reorder Tree
- Generate Numbers
- Load Components
- Unload Components
- Manage Representations
- Multi-Instantiation

- Move Toolbar

- Manipulate
- Snap
- Explode and Assembly

- Constraints Toolbar

- Coincidence
- Contact
- Offset
- Angular
- Anchor
- Fix Together

We have two approaches in assembly

- Top -down approach
- Bottom -up approach

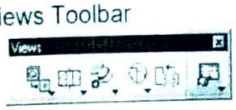
entire design structure will be created in product environment in Top - down approach whereas in bottom - up parts will be created separately and will be mated using mating or constraint tools.

6. Step 5: Drafting Module

Drafting is a process of generating 2D machine drawing for the 3D part models to send it to the manufacturers.Catia drafting is of two types

- Interactive Drafting
- Generative Drafting

- Views Toolbar

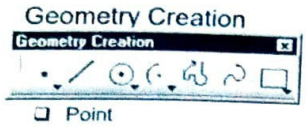


  - Create a Front View (other views available underneath icon)
  - Create a section view
  - Create a detail view
  - Create a Clipping View
  - Create Views Via Wizard

- Automatic Dimension Creation

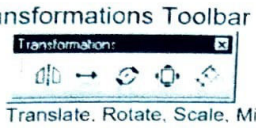
  - Auto-dimension
  - Semi-Automatic Dimensions

Geometry Creation



- Point
- Line
- Circle
- Arc
- Profile
- Curve
- Pre-Define Profiles

Transformations Toolbar

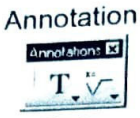


- Translate, Rotate, Scale, Mirror

- Relimitations Toolbar

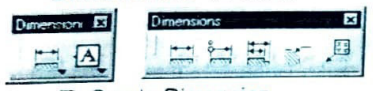
- Corner
- Chamfer
- Trim
- Break

- Annotation



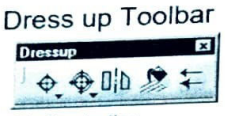
- Text
- Symbols

- Dimensions Toolbar



- Create Dimension
- Create Tolerance

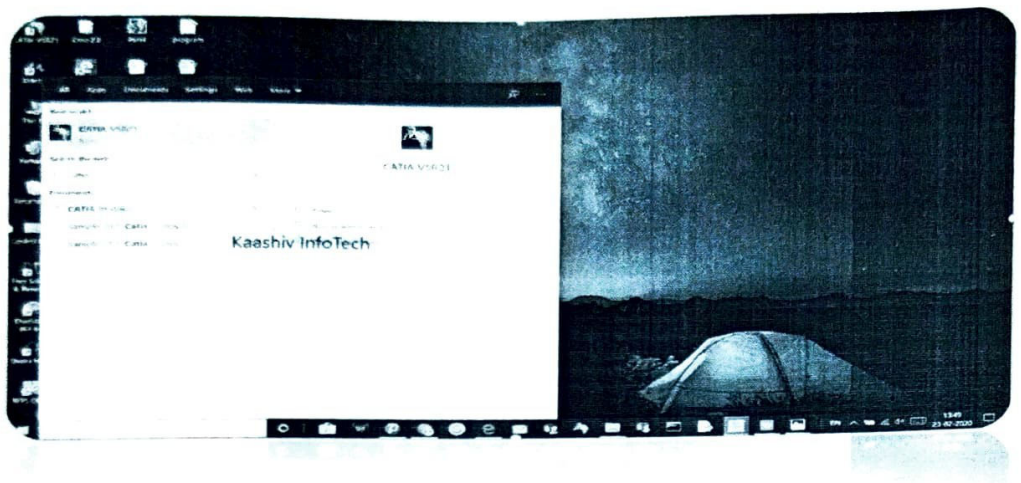
- Dress up Toolbar



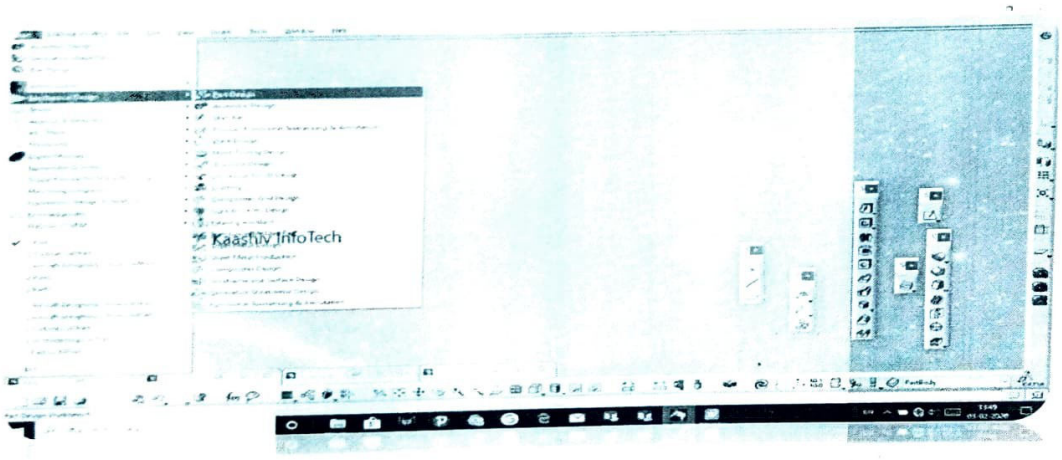
- Centreline
- Thread
- Axis
- Fill
- Arrow

7. 3D Modelling - Turbine Design in Catia

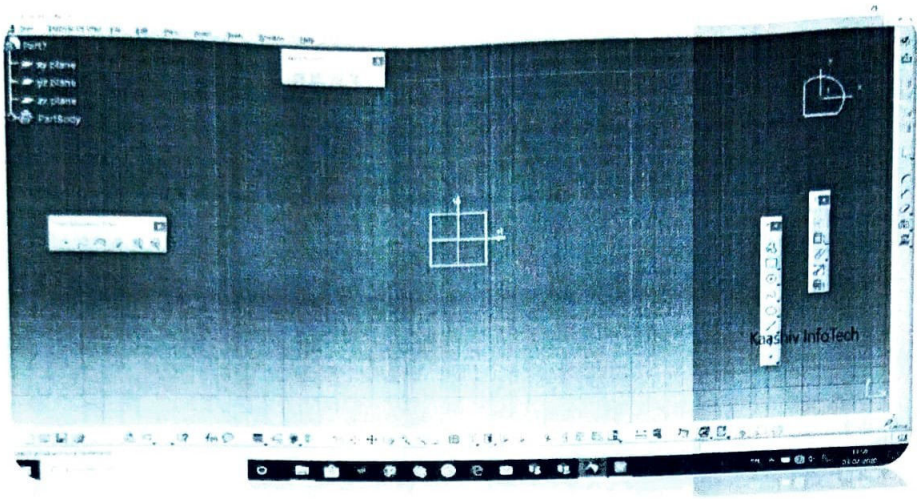
Step 1: Start -> Tyɼ e as catia -> Doubleclick



Step 2: Start -> Me hanical design -> Part design

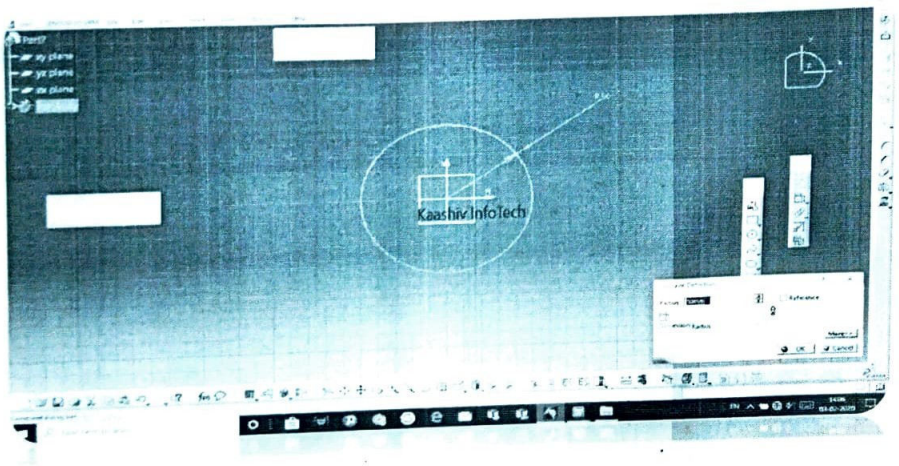


Step 3: Select XY I lane -> Click sketch

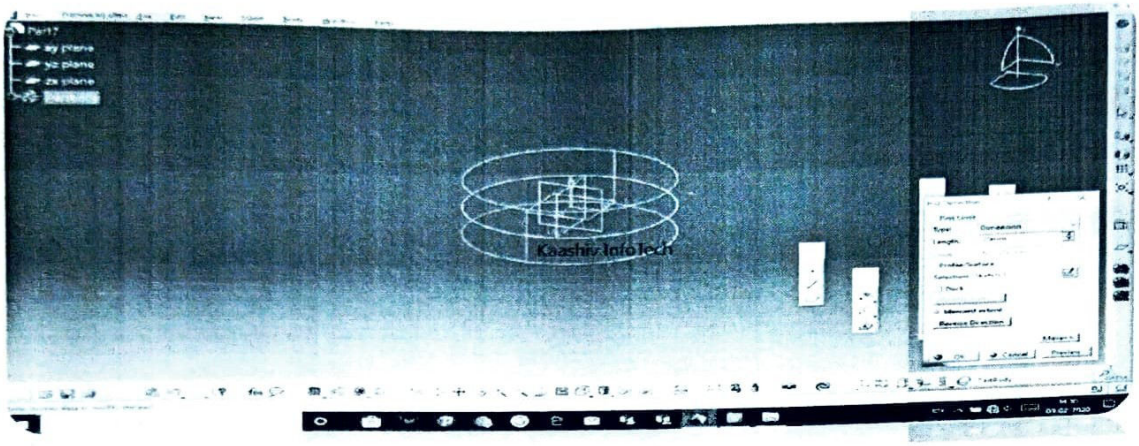


Step 4: Select circl (Draw a Circle on origin) -> Select Constrair t (Radius 50) ->

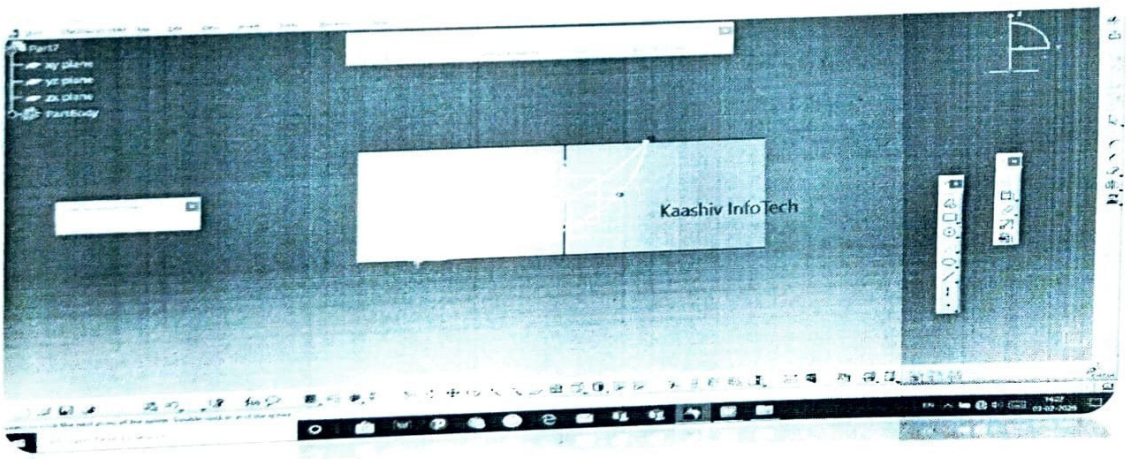
Click Ok



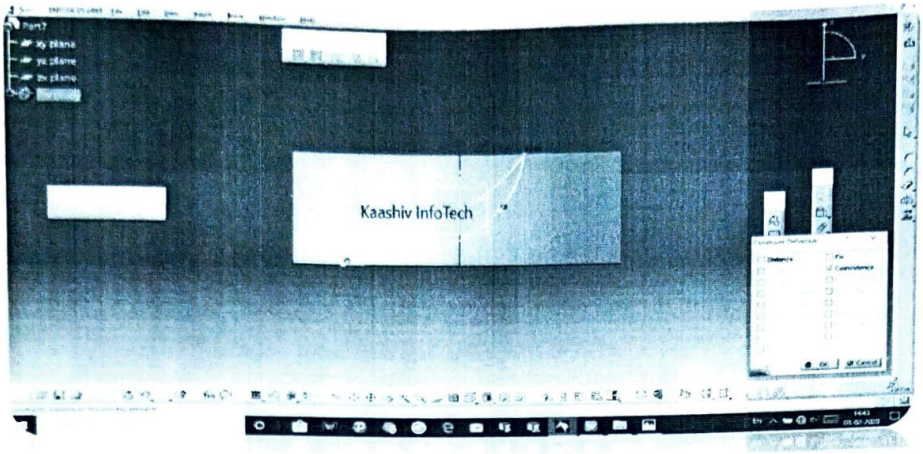
Step 5: Click Exit ' orkBench -> Select Pad Definition (Give d mention Length 20mm) -> Mirrored Extend -> Click Ok



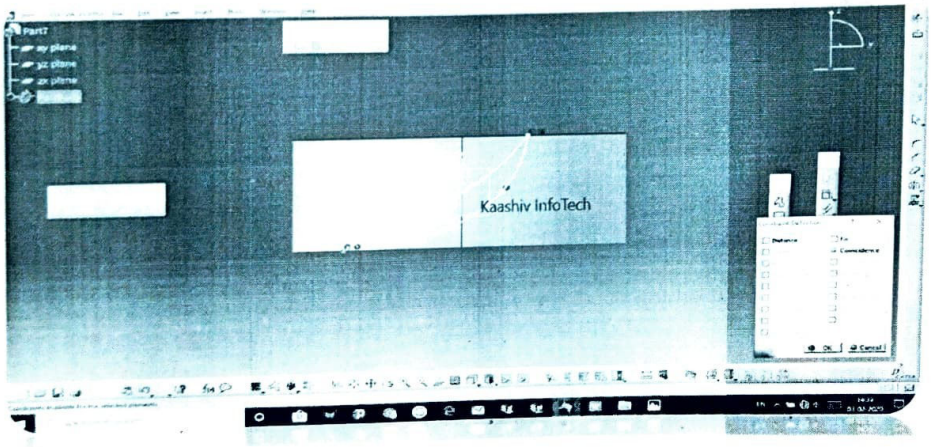
Step 6: Select YZ I lane -> Click Sketch tool -> Select Spline to· l (Draw Airfoil Shape from right sic e of top To bottom side of the left on Circle Product)



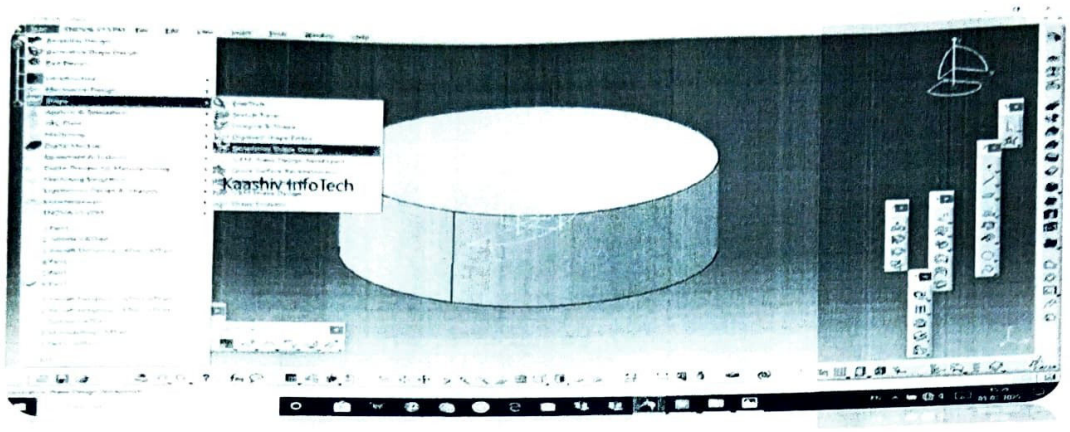
Step 7: Select Both top point of the Airfoil shape & Top line of tl e circle product By CTRL Key -> sc lect constraint definition -> Coincidence -> C ick ok



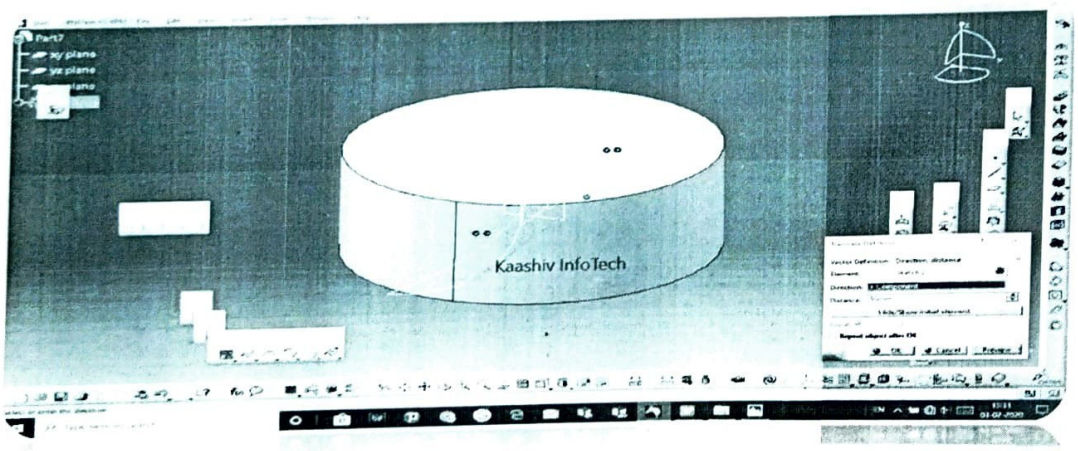
Step 8: Apply same way Select Both Bottom point of Airfoil an Circle line By CTRL key -> select Constraint Definition -> Coincidence -> Click ok



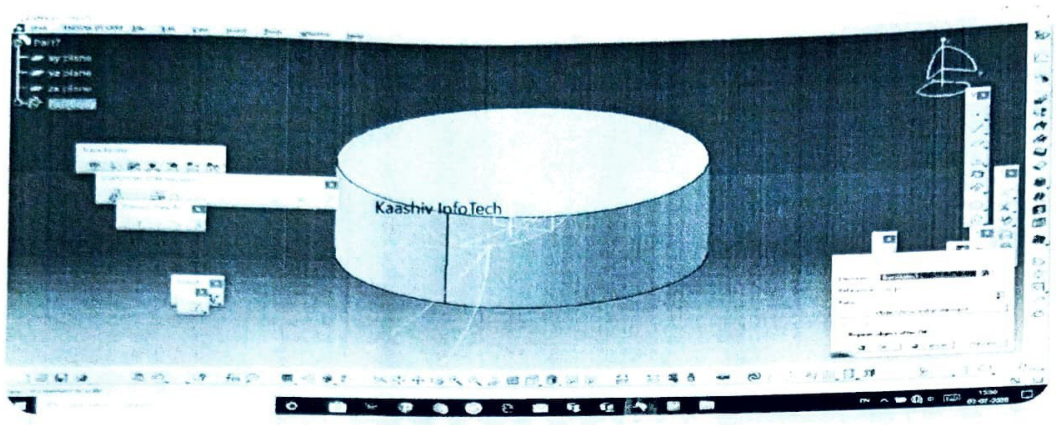
Step 9: Exit Workbench -> Start -> Shape ->Genrative Shape Design -> Click ok



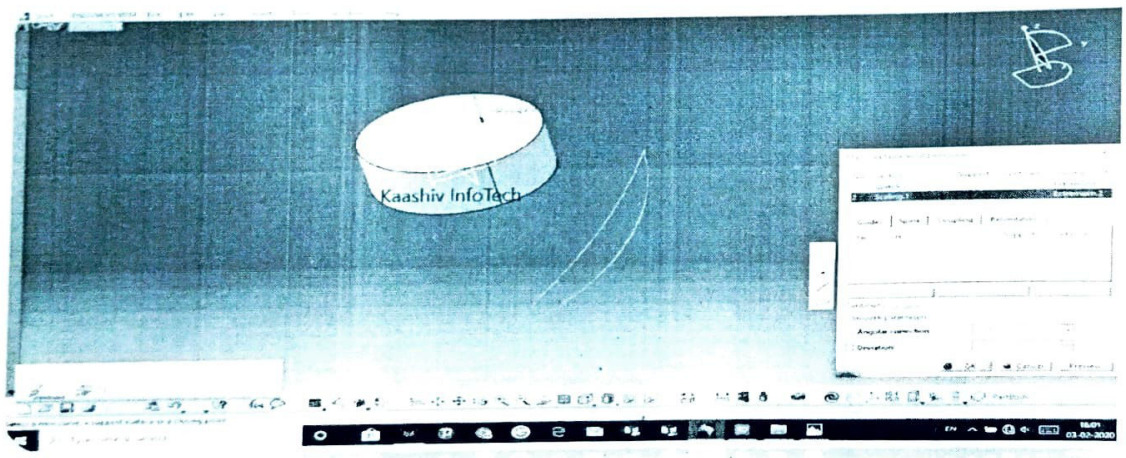
Step 10: Select Tr nslate Definition (Element = sketch.2 , Direction = x-component , Distan e = 50mm) -> Click ok



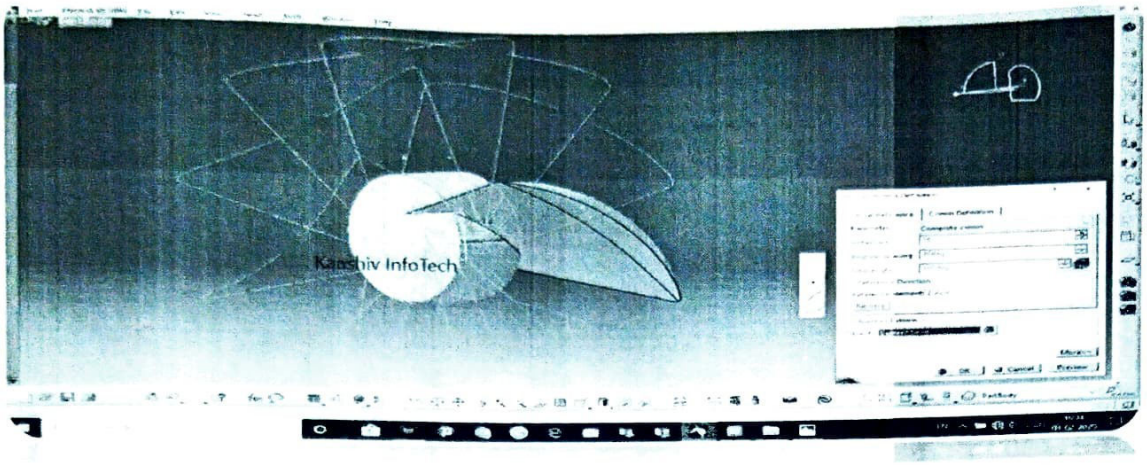
Step 11: Select Sca ing definition (Element = Translate.1 , Reference = origin , Ratio = 3) -> click ide / show Initial Element -> Click ok

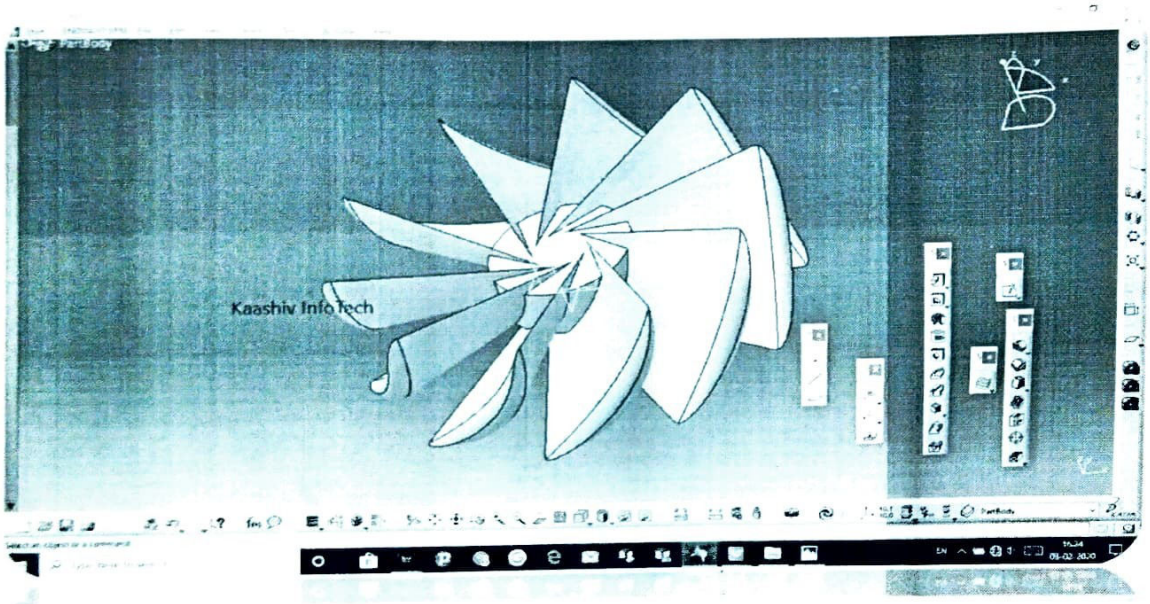


Step 12: Click Start -> Mechanical design -> Part Design -> Sel ct multi section solid definition tool (select sketch.2 and Scaling.1) -> Click ok

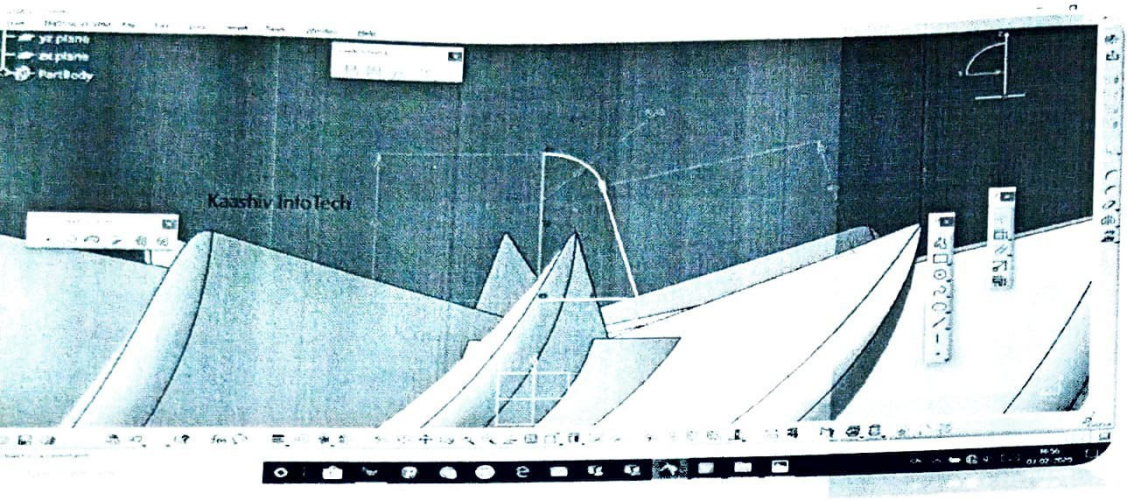


Step 13: Select Circular Pattern Definition (Parameter= Co1 plete crown , Instance= 10 , Refei ence= x- axis) -> Click ok

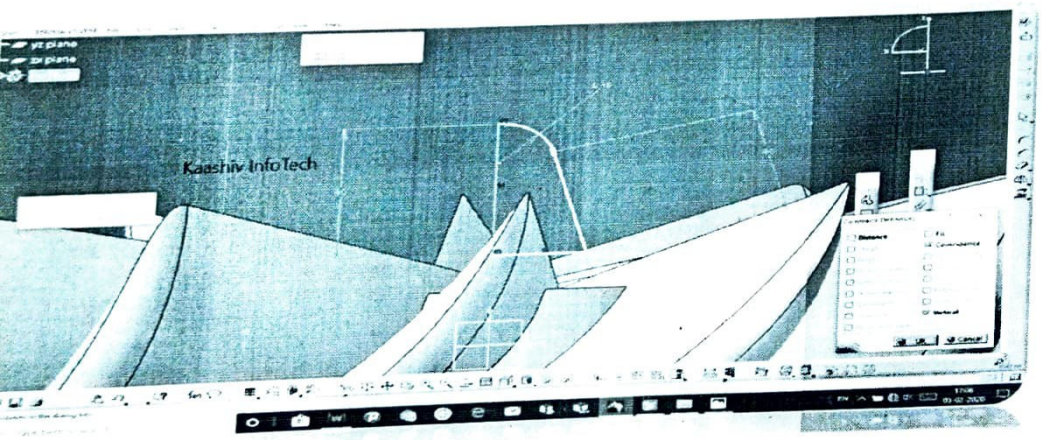




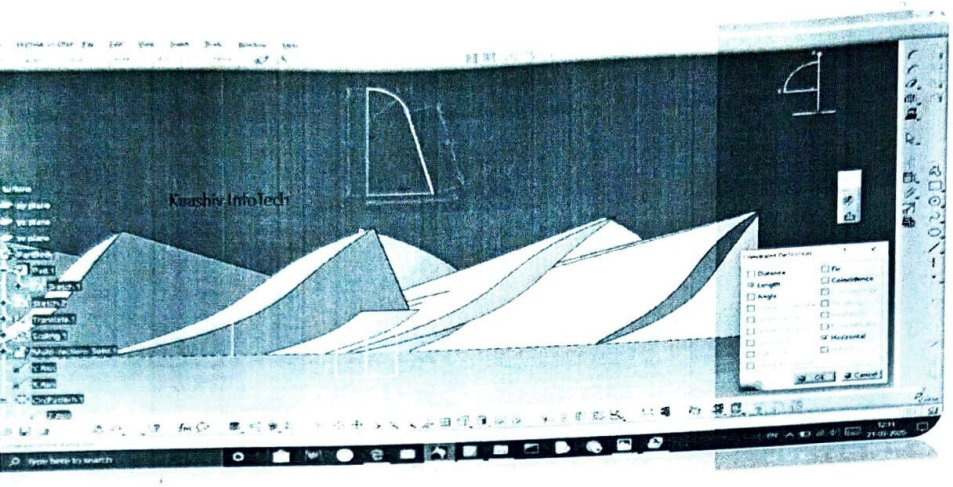
Step 14: Select zx plane -> Click sketch -> Select profile (Draw with help of figure given below)



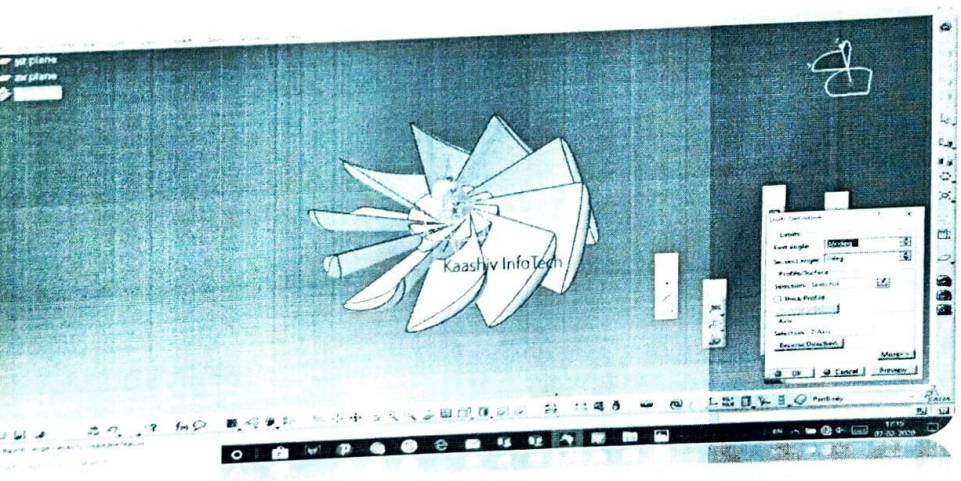
Step 15: Select top point of verticaly line & Z- axis with the help of CTRL key -> Constraint definitio -> Coincidence -> Click ok



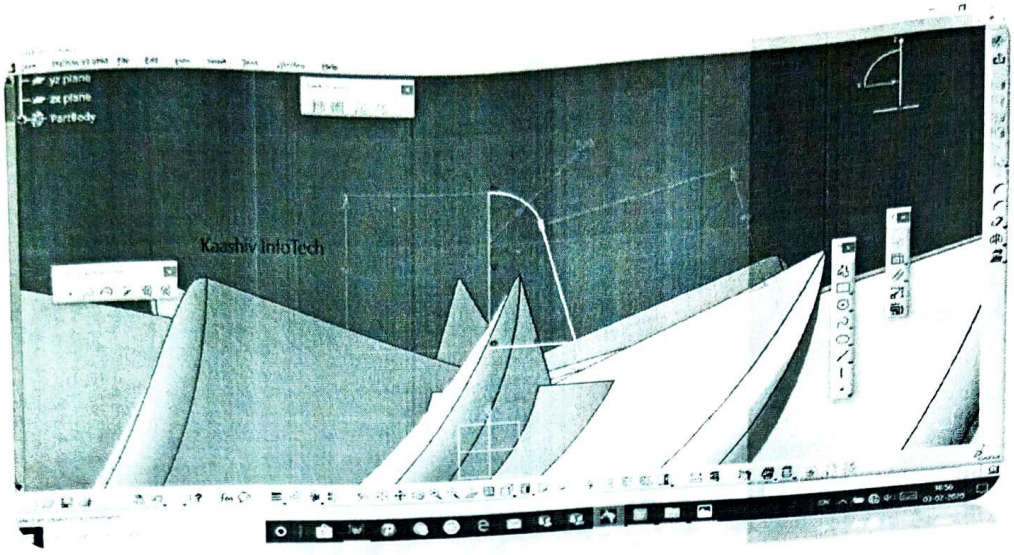
Step 16: Select bottom line of sketch with help of ctrl key select x-axis Too -> Make it Coincident



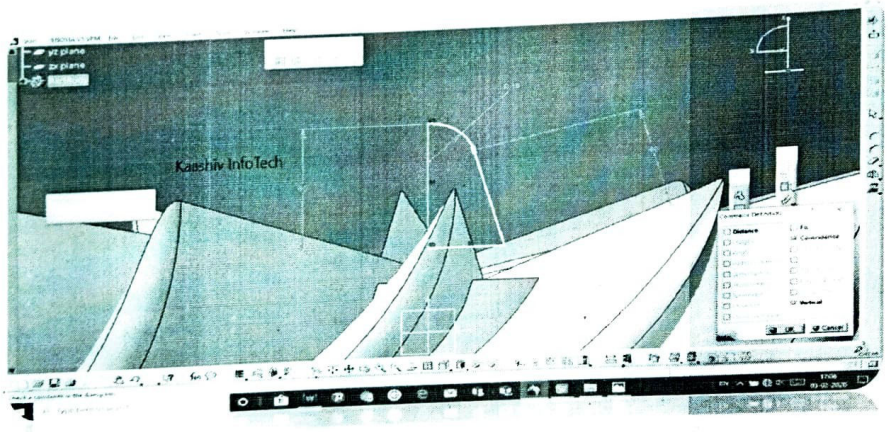
Step 17:Exit Workl ench -> Select Shaft definition (First angle = 360 degree , Axis selection = Z- axis) -> Click ok



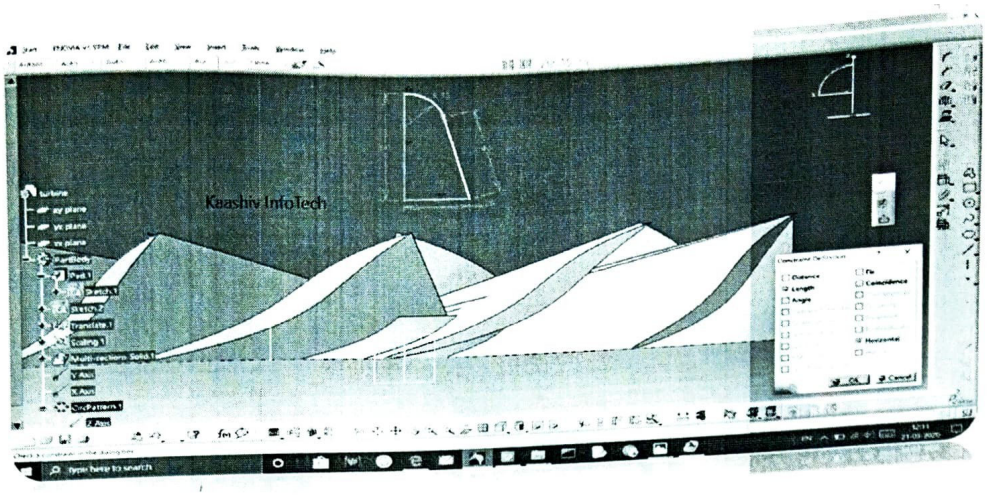
Step 14: Select zx plane -> Click sketch -> Select profile (Draw with help of figure given below)



Step 15: Select top point of verticaly line & Z- axis with the help of CTRL key -> Constraint definition -> Coincidence -> Click ok



Step 16: Select bottom line of sketch with help of ctrl key select x-axis Too -> Make it Coincident



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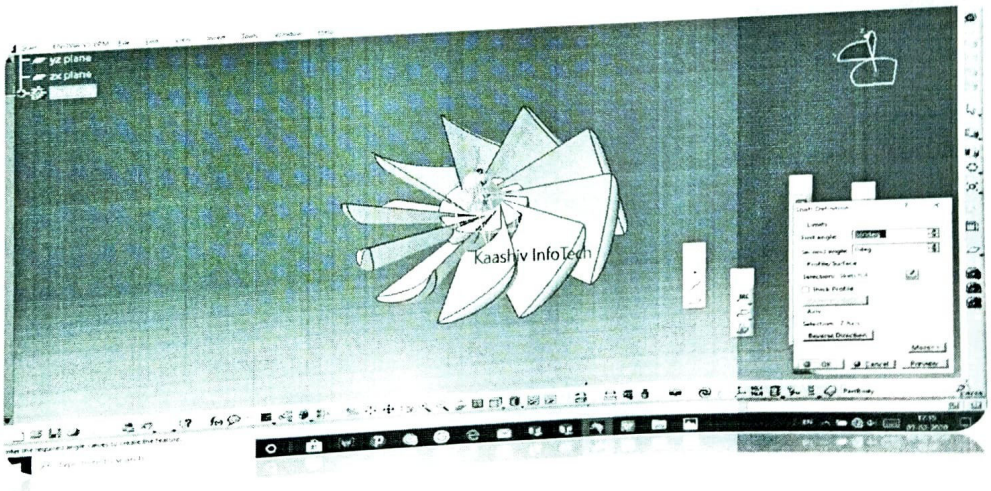
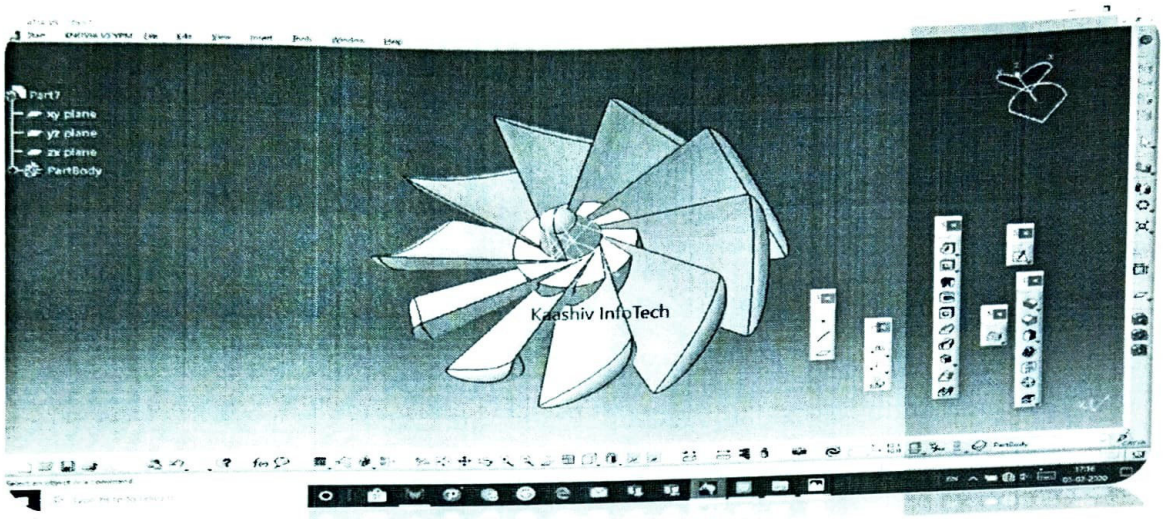
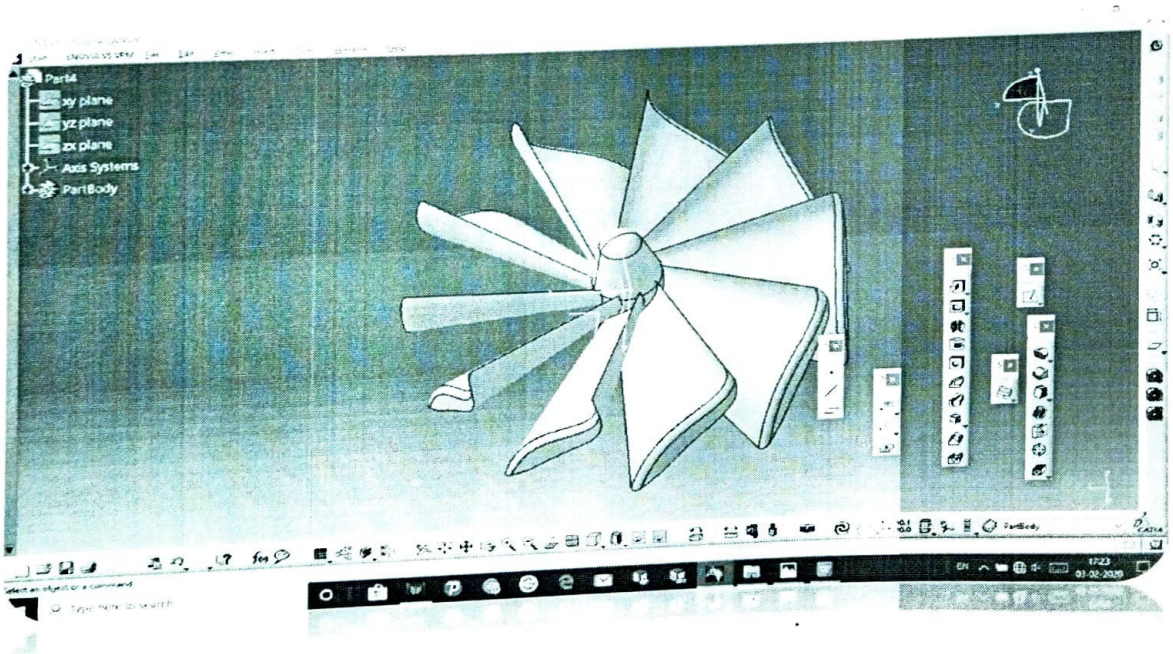


Step 18:Final outpu of Turbine Design in Catia look like this:





8. About the Company

Established in 2010 by a team of young expert software professionals, Kaashiv Infotech Solutions Limited is one of the largest IT majors today in providing educational institutions integrated modules to manage all their processes online.

- Kaashiv Infotech is a services provider company.
- An ISO 9001:2000 Certified Company.
- Registered with MSME (Micro, Small & Medium Enterprises).
- Kaashiv Infotech develops IT solutions, underlined by innovation and value creation that impact and redefines the businesses processes.
- Kaashiv Infotechtakes pride in its philosophy of 'Customers First' which empowers our Employees to create a real value for the customers.
- Our continuous development and training programs ensure that we are always positioned to provide our valued customers a wide range of high quality services, using the latest tools and technology.
- We are focused on complete reliability models of project execution and management.

We offer turnaround guarantees for any project we undertake, backed by comprehensive management planning and supervision.

KaaShiv

9001 ISO CERTIFIED

MVP Microsoft Most Valuable Professional

2008 - 2018

Certificate

OF COMPLETION

Madugula Pavan Kumar

LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING

Is presented with this certificate on successful completion of

MATLAB Internship

Under the guidelines and norms of the program structure conducted during for

1 Month (01 September 2020 - 30 September 2020)

Attendee met all certification requirements and Successful performance on the required competence examination.

Certificate ID: **KA-fgvju** Grade: **A**

Venkatesan Prabu.J
Microsoft MVP

18765A0338
mpavankomal7@gmail.com

The Certificate ID Can be Verified at **www.kaashiv.com/verify-now**

INTERNSHIP PROGRAM ON MATLAB

An Internship report submitted to the

Jawaharlal Nehru Technological University, Kakinada in partial fulfilment of the requirements for the award of the Degree of

BACHELOR OF TECHNOLOGY

IN

MECHANICAL ENGINEERING

Submitted by

NAME: MADUGULA PAVAN KUMAR

H.T NO: 18765A0338

DEPARTMENT OF MECHANICAL ENGINEERING

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

(Approved by AICTE, Affiliated to JNTU and ISO 9001-2015 certified)

L.B.REDDY NAGAR, MYLAVARAM, KRISHNA Dist.

2020-2021

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

(Approved by AICTE, Affiliated to JNTU and ISO 9001-2015 certified)

L.B.REDDY NAGAR, MYLAVARAM, KRISHNA Dist.

DEPARTMENT OF MECHANICAL ENGINEERING

CERTIFICATE

This is to certify that the internship report entitled " **MATLAB"** that is being submitted for the partial fulfilment of **BACHELOR OF TECHNOLOGY** degree in **MECHANICAL ENGINEERING** to JNTU Kakinada, is a bonafide work done by **MADUGULA PAVAN KUMAR (18765A0338)** during the academic year 2020-2021 and it has been found worthy of acceptance according to the requirement of the University.

Internship coordinator
Mr. K. V. Viswanadh

Dr.S.PICHI REDDY
Head of Department

ACKNOWLEDGEMENT

The satisfaction that accompanies that the successful completion of any task would be incomplete without the mention of the people whose care cease less cooperation made it possible, whose constant guidance and encouragement crown all efforts with success.

I humbly express my thanks to our management and Principal **Dr.K. APPA RAO** for extending his support for providing us with an environment to complete our internship successfully.

I indebted to our Head of the Department **Dr. S. PICHI REDDY** who modelled us both technically and morally for achieving greater success in life.

I humbly my thanks to my guide **Mr. K. V. VISWANADH** for giving timely valuable suggestions and encouragements the make the completion of the internship successfully.

I would like to thank all the teaching and non-teaching staff members of Mechanical engineering, who have extended their cooperation during the course of this work.

I am thank full to my friends who helped me sharing knowledge and by providing material to complete the internship in time.

18765A0338 **MADUGULA PAVAN KUMAR**

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18765A0338 **MADUGULA PAVAN KUMAR**

Table of Contents:

INTERNSHIP REPORT ON MODELLING IN MATLAB

1. INTRODUCTION OF MATLAB:

MATLAB (matrix laboratory) is a fourth-generation high-level programming language and interactive environment for numerical computation, visualization and programming.

MATLAB is developed by MathWorks.

It allows matrix manipulations; plotting of functions and data; implementation of algorithms; creation of user interfaces; interfacing with programs written in other languages, including C, C++, Java, and FORTRAN; analyze data; develop algorithms; and create models and applications.

It has numerous built-in commands and math functions that help you in mathematical calculations, generating plots, and performing numerical methods

2. REAL TIME PROJECT USING MATLAB:

i. Build a Car Parking Indicator

Parking a car can be tricky. It requires precision and a lot of practice. You can use MATLAB to make things easier for the driver, however, by building a car parking indicator. You can take inspiration from various parking indicator systems.

An automated car parking indicator would alert the driver when the car is too close to an object. This way, the driver can avoid those objects and turn the vehicle accordingly. You can build a car parking indicator for private parking spaces or open spaces. Such a system can have many benefits:

- The driver would save time and park his/her car more efficiently.
- Parking spaces would also be used more efficiently.
- The chances of a vehicle getting damaged would decrease drastically.

Your system can guide the driver to a nearby suitable parking space. You can take it a step further and add the functionality of suggesting a parking space only if it's available. Maybe your system can determine if a car park has open slots or not, and it can indicate a parking space to the driver of the vehicle accordingly. The sensors

can co-ordinate and help in guiding the driver to an open and nearby parking slot. Here's more info on this car parking indicator project.

ii. Use Artificial Neural Network for Image Encryption

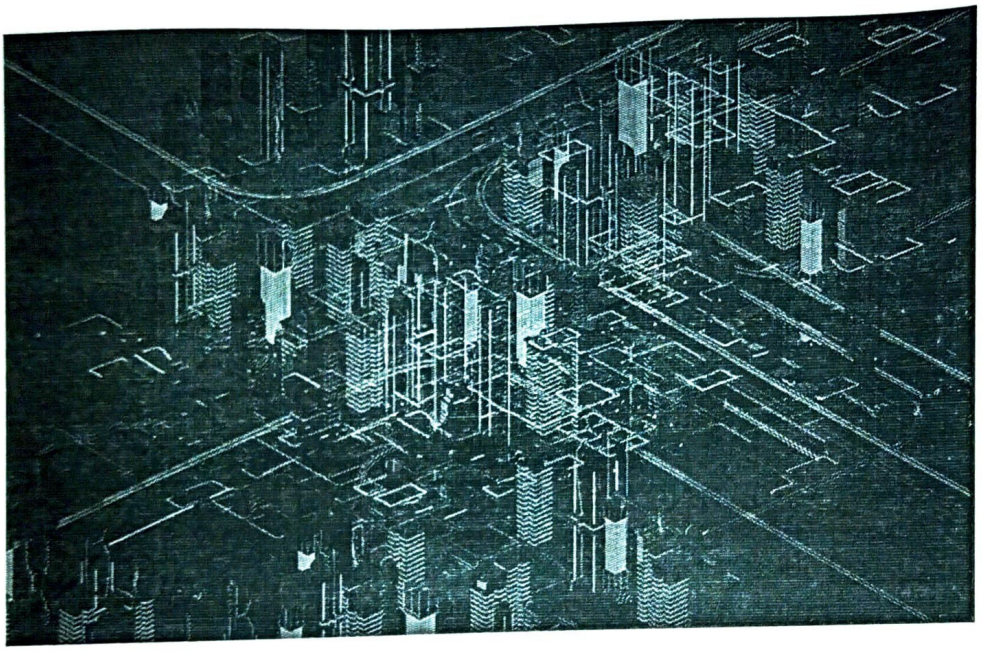
Privacy issues have become highly prevalent in recent years. This is one of the best MATLAB projects for you on this list if you take an interest in cyber security and cryptography. You can perform image encryption by taking the help of Artificial Neural Networks (ANNs in short).

Image encryption can prevent unauthorized parties from viewing and accessing images. This way, your data can remain safe. In simple terms, image encryption hides its information. In image encryption, you convert the original plaintext into ciphertext (which can seem like a bunch of nonsense). You can save and transmit this ciphertext over your network, and at the receiver's end, the ciphertext would convert into the original plaintext.

Neural Networks are machines that behave similarly to how a human brain functions. You can encrypt images on the sender's end through one ANN and use another ANN to decrypt the image on the receiver's end. You can use MATLAB to build a complete image encryption system that uses Artificial Neural Networks. After completing this project, you'd be familiar with cryptography as well.

3. Company Profile

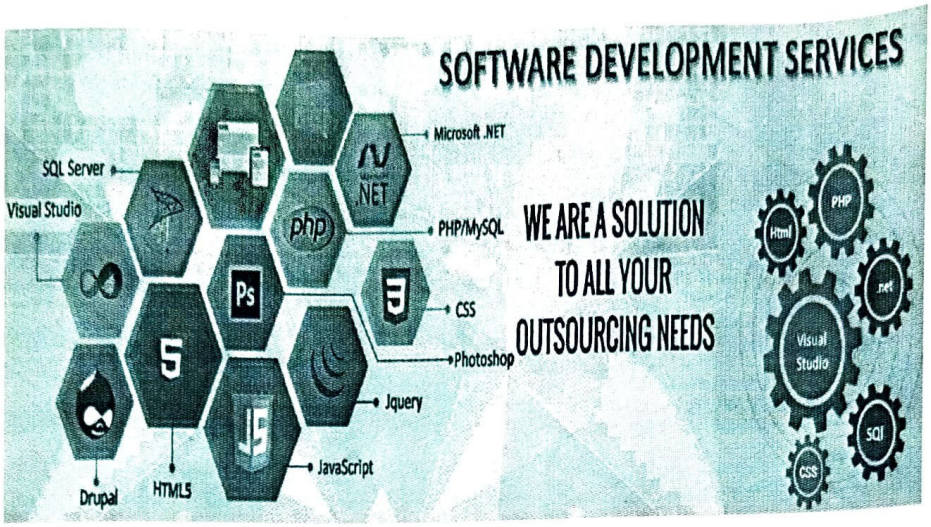
Established in 2010 by a team of young expert software professionals, Kaashiv Infotech Solutions Limited is one of the largest IT majors today in providing educational institutions integrated modules to manage all their processes online.



Consistently delivering mission, our team has been delivering technically challenging projects under tight timelines, while also providing exceptional customer service and support to our clientele. This in turn has led to extremely positive long-term working relationships all over. Our detailed project process was created to ensure our projects are completed on-time, in-budget, and to the clients complete satisfaction.

- Kaashiv Infotech is a software services provider company.
- An ISO 9001:2000 Certified Company.
- Registered with MSME (Micro, Small & Medium Enterprises).
- Kaashiv Infotech develops IT solutions, underlined by innovation and value creation that impact and redefines the businesses processes.
- Kaashiv Infotechtakes pride in its philosophy of 'Customers First' which empowers our Employees to create a real value for the customers.
- Our continuous development and training programs ensure that we are always positioned to provide our valued customers a wide range of high quality services, using the latest tools and technology.
- We are focused on complete reliability models of project execution and management.

We offer turnaround guarantees for any project we undertake, backed by comprehensive management planning and supervision

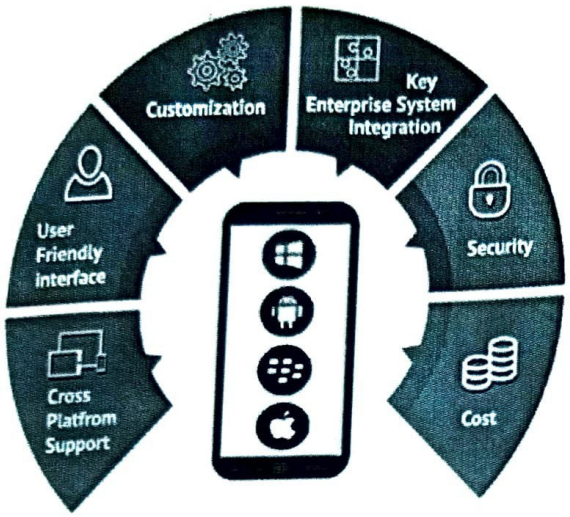


3.1 Mission

Provide cost effect high quality innovative solution & services, powered by state-of-the-art technologies, anchored on our basic principles of:

- Explore
- Innovate
- Improve

The strong R&D team of Kaashiv Infotech is constantly working to upgrade existing solutions and develop new products. Kaashiv Infotech is transparent and accountable to customers, shareholders, partners, and employees and strives to deliver on commitments and results.



3.2 Company Values

Kaashiv Infotech respects and seeks to maintain the highest standards of fairness, equality, integrity, and honesty. Our corporate philosophy is:

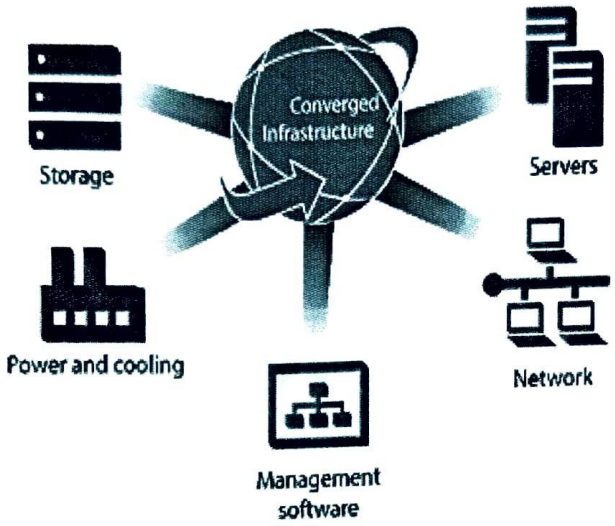
- Total customer satisfaction, continuous improvement and total involvement.
- Constantly and consistently deliver products and services of highest quality.

Keep pace with change and continuously strive for innovation while keeping in step with modern technology and methodology. Our core value centers on total customer satisfaction and quest towards ensuring good corporate citizenship

3.3 Company Infrastructure

We have Pofessionally managed Software Development Company servicing clients all over the India &abroad .Kaashiv Infotech was formed with a clear goal

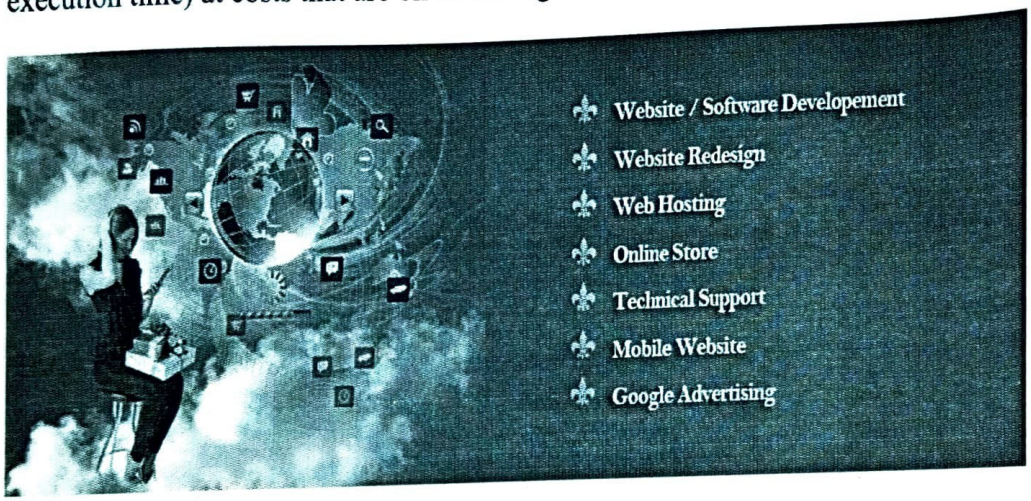
to provide quality software development services. We are equipped with state of the art infrastructure to cater to nearly every software development requirement:



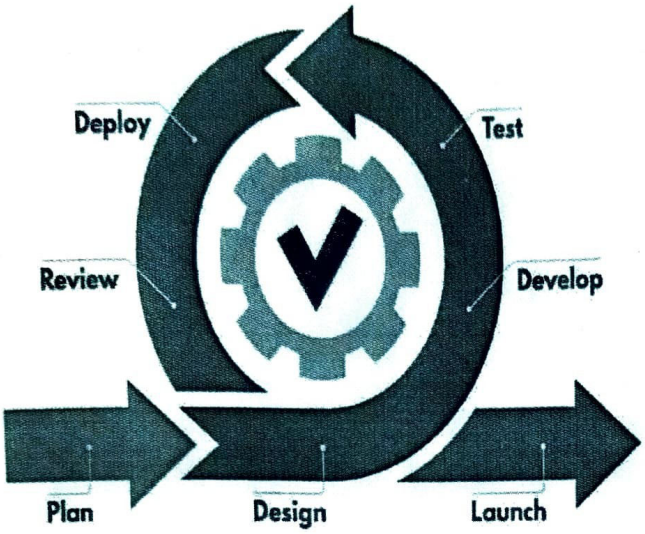
- Modern office set-up with state of the art development center
- High speed connectivity to internet gateway
- Latest hardware and licensed software
- Custom built testing software applications
- Adequate communications infrastructure
- Reserve employee resource pool
- Data backup systems and redundant backup servers
- Redundant Power backups through Generators and Inverters
- Secure access for all employees.

3.4 Company Services

Kaashiv Infotech delivers quality and timely solutions and services at a price that make our clients smile. Kaashiv Infotech Solutions Limited focuses on offshore development at our excellence center in Noida, India. This allows us to scale up rapidly (leveraging on the plentiful supply of talent and thus cutting down on execution time) at costs that are on an average 70% cheaper.



An in-depth knowledge of various technology areas enables us to provide end-to-end solutions and services. With our 'Web of Participation', we maximize the benefits of our depth, diversity and delivery capability, ensuring adaptability to client needs, and thus bringing out the most innovative solutions in every business and technology domain.



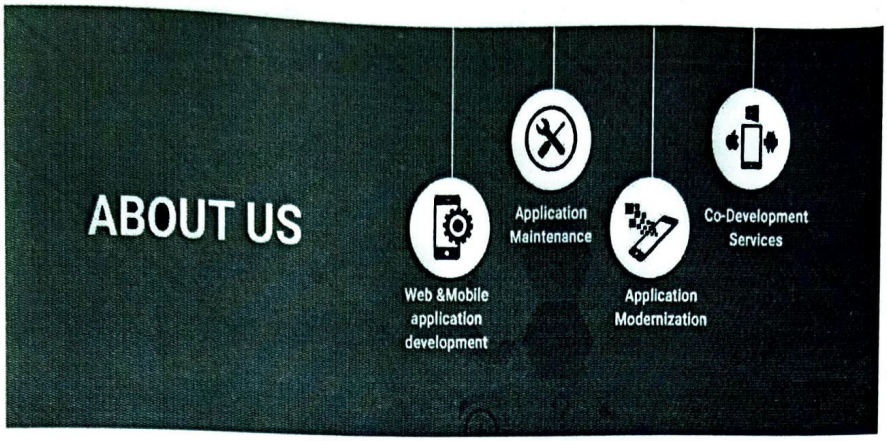
Kaashiv Infotech is your one stop partner where you can outsource all your support services with complete peace of mind about quality and reliability. Kaashiv Infotech Solutions Limited strength lies in understanding the client's business processes, culture, vision and goals across the industry segments and offering client-oriented solutions which are highly reliable, creating customer comfort.Our team is committed to provide IT Services with:

Quality | Technology | Innovation

Our Services Include:

- IT Services
- Project Management
- Consultancy
- Outsourcing

- Education / Training



4. FEATURES OF MATLAB

Following are the basic features of MATLAB –

- It is a high-level language for numerical computation, visualization and application development.
- It also provides an interactive environment for iterative exploration, design and problem solving.
- It provides vast library of mathematical functions for linear algebra, statistics, Fourier analysis, filtering, optimization, numerical integration and solving ordinary differential equations.
- It provides built-in graphics for visualizing data and tools for creating custom plots.

- MATLAB's programming interface gives development tools for improving code quality maintainability and maximizing performance.
- It provides tools for building applications with custom graphical interfaces.
- It provides functions for integrating MATLAB based algorithms with external applications and languages such as C, Java, .NET and Microsoft Excel.

5. USES OF MATLAB

MATLAB is widely used as a computational tool in science and engineering encompassing the fields of physics, chemistry, math and all engineering streams. It is used in a range of applications including –

- ✓ Signal Processing and Communications
- ✓ Image and Video Processing
- ✓ Control Systems
- ✓ Test and Measurement
- ✓ Computational Finance
- ✓ Computational Biology

6. MATLAB - Operators

An operator is a symbol that tells the compiler to perform specific mathematical or logical manipulations. MATLAB is designed to operate primarily on whole matrices and arrays. Therefore, operators in MATLAB work both on scalar and non-scalar data. MATLAB allows the following types of elementary operations –

- Arithmetic Operators
- Relational Operators
- Logical Operators
- Bitwise Operations
- Set Operations

Operator	Meaning	Example	Algebraic
+	Addition	x + y	$x+y$
-	Subtraction	x - y	$x-y$
*	Multiplication	x * y	xy
/	Division (Left divide)	x / y	$\frac{x}{y}$
\	Right divide	x \ y	$\frac{y}{x}$
^	Exponentiation	x ^ y	x^y

Arithmetic Operators

MATLAB allows two different types of arithmetic operations –

- Matrix arithmetic operations
- Array arithmetic operations

Matrix arithmetic operations are same as defined in linear algebra. Array operations are executed element by element, both on one-dimensional and multidimensional array.

Relational Operators

Relational operators can also work on both scalar and non-scalar data. Relational operators for arrays perform element-by-element comparisons between two arrays and return a logical array of the same size, with elements set to logical 1 (true) where the relation is true and elements set to logical 0 (false) where it is not.

Logical Operators

MATLAB offers two types of logical operators and functions –

- Element-wise – These operators operate on corresponding elements of logical arrays.
- Short-circuit – These operators operate on scalar and, logical expressions.

Element-wise logical operators operate element-by-element on logical arrays. The symbols &, |, and ~ are the logical array operators AND, OR, and NOT.

Short-circuit logical operators allow short-circuiting on logical operations. The symbols && and || are the logical short-circuit operators AND and OR.

Bitwise Operations

Bitwise operators work on bits and perform bit-by-bit operation. The truth tables for &, |, and ^ are as follows –

Pqp & q	p | q	p ^ q
0 0 0	0	0
0 1 0	1	1
1 1 1	1	0
1 0 0	1	1

Assume if A = 60; and B = 13; Now in binary format they will be as follows –

A = 0011 1100

B = 0000 1101

A&B = 0000 1100

A|B = 0011 1101

A^B = 0011 0001

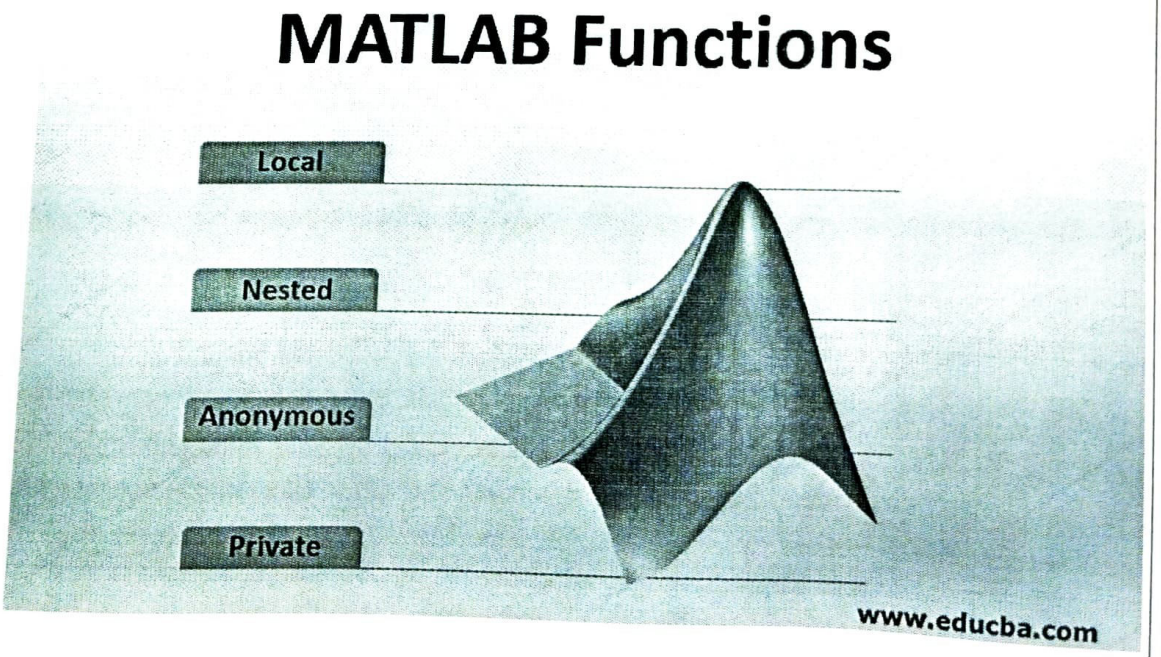
~A = 1100 0011

MATLAB provides various functions for bit-wise operations like 'bitwise and', 'bitwise or' and 'bitwise not' operations, shift operation, etc.

7. DIFFERENT TYPES OF MATLAB FUNCTIONS

There are several types of functions available with MATLAB, including local functions, nested functions, private functions, and anonymous functions.

- Anonymous Functions.
- Local Functions.
- Nested Functions.
- Private Functions



8. CONCLUSION

As a conclusion, we can say that this sofware offers strong possibilities. The utilisation is pretty easy for simple problem. For advanced problem, it is more complex. Moreover, you can access to introduction course on internet. But for advanced functions, it is more complex for find books or article. Moreover, there is some books and user manual but there are paying and expensive. There is a lot of similarities with Matlab. The graphic interface on scilab is less advanced : it is a simple interface, less developed than Matlab. For example, computation on matrix have similar syntax. Nevertheless, some functions proposed in scilab are limited or complex for a beginner. For example, the matlab to scilab translator is not very efficient and require strong skills of matlab. Some functions such as graphics or data interfacing are complex at the beginning.

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18765A0340

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INTERNSHIP ON 3D MODELLING

An Internship report submitted to the

Jawaharlal Nehru Technological University, Kakinada in partial fulfilment of the requirements for the award of the Degree of

BACHELOR OF TECHNOLOGY

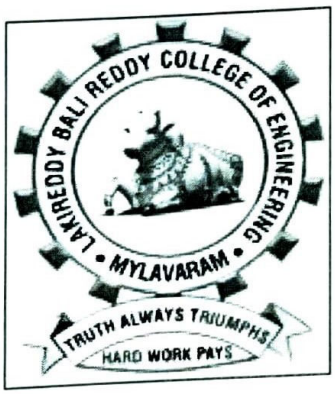
IN

MECHANICAL ENGINEERING

Submitted by

NAME: M. SHANMUKKA KALYAN

H.T NO: 18765A0340



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LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

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2020-2021

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DEPARTMENT OF MECHANICAL ENGINEERING

CERTIFICATE

This is to certify that the internship report entitled " **3D MODELING** " that is being submitted for the partial fulfilment of **BACHELOR OF TECHNOLOGY** degree in **MECHANICAL ENGINEERING** to JNTU Kakinada, is a bonafide work done by **M SHANMUKA KALYAN (18765A0340)** during the academic year 2020-2021 and it has been found worthy of acceptance according to the requirement of the University.

Internshipcoordinator

Dr.S.PICHI REDDY
Head of Department

ACKNOWLEDGEMENT

The satisfaction that accompanies that the successful completion of any task would be incomplete without the mention of the people whose care cease less cooperation made it possible, whose constant guidance and encouragement crown all efforts with success.

I humbly express my thanks to our management and Principal **Dr.K. APPA RAO** for extending his support for providing us with an environment to complete our internship successfully.

I indebted to our Head of the Department **Dr. S. PICHI REDDY** who modelled us both technically and morally for achieving greater success in life.

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I would like to thank all the teaching and non-teaching staff members of Mechanical engineering, who have extended their cooperation during the course of this work.

I am thank full to my friends who helped me sharing knowledge and by providing material to complete the internship in time.

M.SHANMUKA KALYAN

18765A0340

ABSTRACT

Computers have been used for 3D modeling and simulation for many decades, and computational resources have also in general become available for large industrial models. The emergence of powerful workstations and supercomputers in the 1980s, 3D modeling engines to represent and manipulate geometrical models, and efficient numerical solvers and algorithms. The combination of these technologies was focused on several areas, specifically aerospace design for a hypothetical maritime patrol aircraft, as a candidate.

CONTENTS

FIGURES

ACRONYMS

API	Application programming interface
FLIP	Fluid-Implicit-Particle
FPS	Frames per second
GB	Gigabyte
GHz	Gigahertz
GPU	Graphics Processing Unit
HPC	High Performance Computing
INL	Idaho National Laboratory
INI	Initialization
PIC	Particle-In-Cell
SPH	Smoothed Particle Hydrodynamics

3D Modeling Engine Representation Summary Report

1. BACKGROUND

Through physics and complex mathematical models, we have a good understanding how our world around us behaves. However for anything other than small problems, these models become complicated when attempting to represent reality. The field of computational physics applies numerical approximations and decomposes a problem into a large number of simple mathematical operations that can be solved using a computer. [http://en.wikipedia.org/wiki/Computational_physics]

Many fields of study use computational physics to do calculations from protein folding for medicine to realistic effects in visualization. With the expansion of computation power and distributed computing, larger and more complex problems are able to be solved. We have targeted some of these standard methods and tools used in other fields to analyze flooding events for risk analysis of nuclear facilities such as small modular reactors.

The software prototype development for this activity used a generic light water reactor (LWR) model to represent hypothetical facility building locations (including relative locations of buildings on-site), elevations (including facility topology information), and hazard representation (including potential tsunami flooding frequency and magnitudes). The main focus of this 3D modeling engine work was to demonstrate feasibility with a model that is not overly simplified. At the start of the activity in FY14, the project team recognized that a detailed Small Modular Reactor (SMR) or Advanced SMR model (where here, "model" implies the site characteristic, 3D building details, locations of key components) was not available – consequently the suggestions from the team was to demonstrate the process using an available model (based upon a LWR). It was felt that this approach would be effective for three primary reasons:

1. Starting with an existing model will facilitate quick development on the project
2. Simulating actual events allows for some validation of the mechanistic flooding model approach
3. Flooding events affect nuclear power plants in (mostly) the same way regardless of the type of reactor technology (they impact site infrastructure, where the details will depend on the specific site and plant type)

As additional detailed models become available to the research team specific to aSMRs, we plan on incorporating them into our analysis platform.

This work on the 3D modeling engine supports the overall advanced PRA Framework that has been proposed as illustrated in Figure 1.

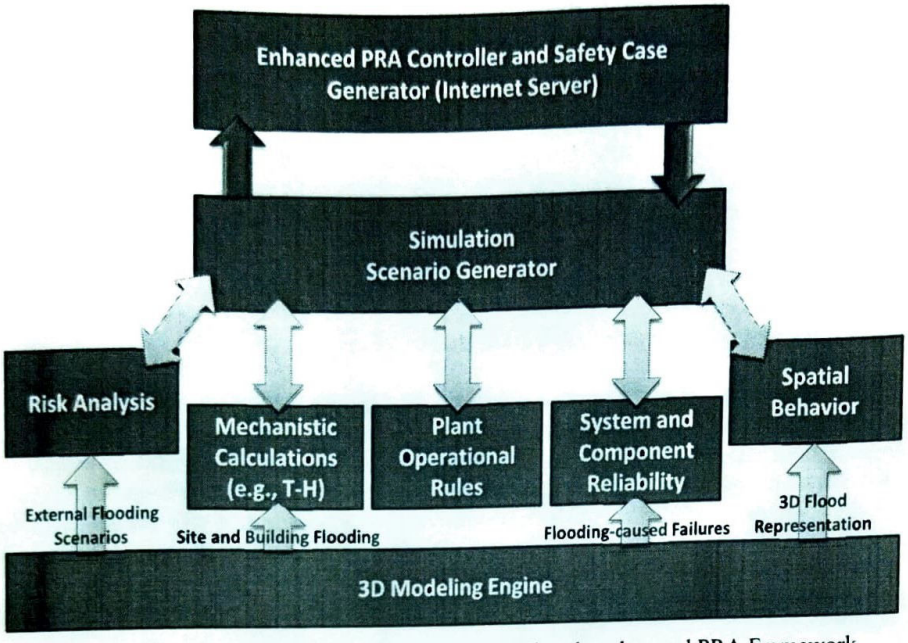

Figure 1: 3D modeling engine development supporting the advanced PRA Framework.

2. SIMULATION ENGINES

With our focus on flooding, a fluid simulation engine was needed. There are different 3D physics simulation engines using a variety of methods. Each has its advantages or disadvantages depending on the intended use. In this report, we describe a couple of approaches, and provide demonstration cases where these may be applicable for risk analysis.

2.1 Houdini FX

For this research, we initially started with a software package called Houdini FX. This application is a dynamic and widely used 3D simulation environment for visual effects. It also has an API for custom modifications which allowed us to communicate with it through other applications during each frame of the simulation. (See Figure 2) This feature makes it useful for incorporation into risk analysis modeling since the scenario evolution can be controlled (e.g., a failure can be triggered) during the calculations being performed.

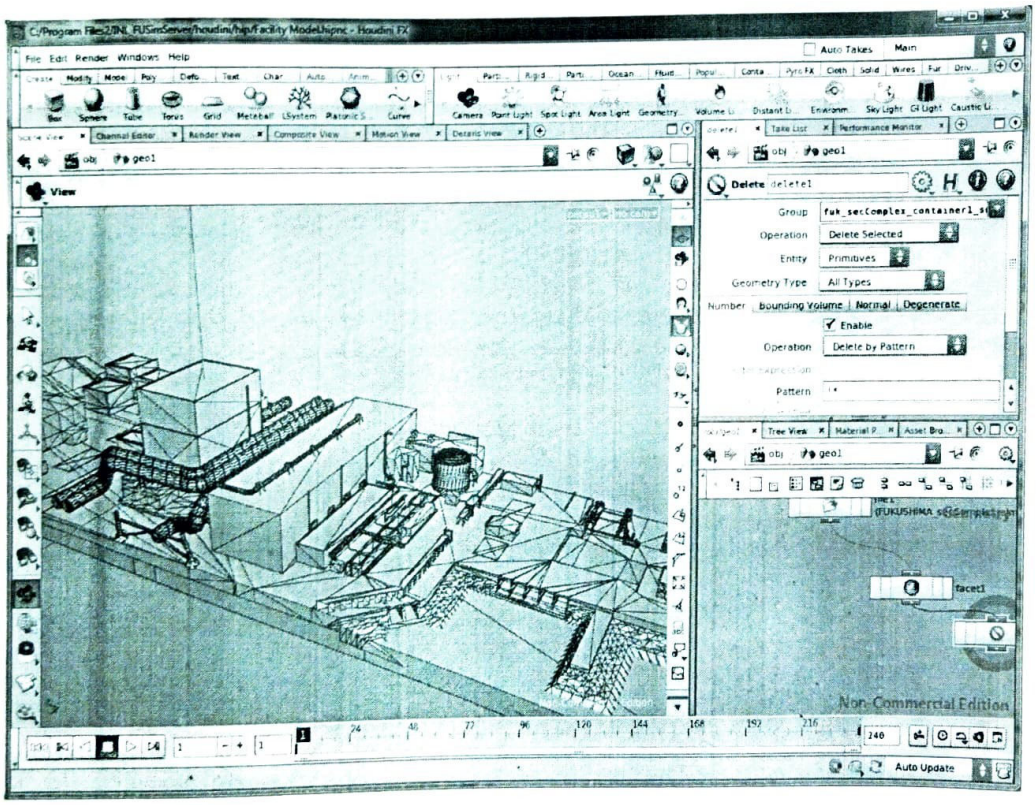

Figure 2: Houdini FX user interface

The Houdini package worked well for smaller simulation such as water flow inside of a room. However, it had two issues with larger simulations. First, the solver that is used in Houdini was grid based Fluid In Particle (FLIP) method. PIC/FLIP based solvers are extensively used in visual effects and produces visually interesting dynamic motion because it uses custom particle advection methods to combat numerical diffusion problems resulting in diffuse fluids. However, using a Smoothed Particle Hydrodynamics (SPH) solver with physics based modifications to handle boundaries guarantees conservation of mass with computation of pressure from weighted contribution of neighboring particles [1]. Although this option was present in Houdini to use its SPH solver, it was not suited for our needs. When Houdini's FLIP solver was used to generate a solution wave like a tsunami wave, the wave would quickly lost momentum and diffuse out. We tried to overcome this numerical diffusion by using higher resolution grids. But, in using higher resolution grids, we ran into the second problem. The Houdini engine was not able to support the memory requirement needed to run the larger simulations. Moreover even running higher resolutions to a maximum of what could be handled, this work around still did not produce a wave which preserved energy and it had excessive numerical diffusion

2.2 Neutrino

To compare the results from Houdini as well as to combat the problems we encountered with Houdini's FLIP fluid solver, we decided to try "Neutrino." The Neutrino fluid solver developed by Neutrino Industries is based on Smooth Particle Hydrodynamics with a pressure solve to handle incompressible fluids. The Neutrino fluid solver also factors in accurate boundary handling, and adaptive time stepping to help to increase accuracy and calculation speed [2].

For this purpose, Neutrino Industries collaborated with the Idaho National Laboratory (INL) by providing the use of their solve engine and making custom modifications to the code base to help with analysis. Neutrino was able to handle not only the memory requirements needed for large simulations, but provided more accurate fluid movement with less numerical diffusion which preserved the solitary tsunami wave momentum required for our simulation. Neutrino's simulation framework was very flexible and provides a python based expression system (see Figure 2) to accurately model the movement of the wave machine based on Goring's 1978 numerical wave model (see Appendix A). Neutrino also provided a variety of tools to measure parameters in a section of the fluid simulated. This includes the wave height at a specific point, the average pressure and average velocity in a certain area/volume, as well as the flow rate across a certain area/volume.

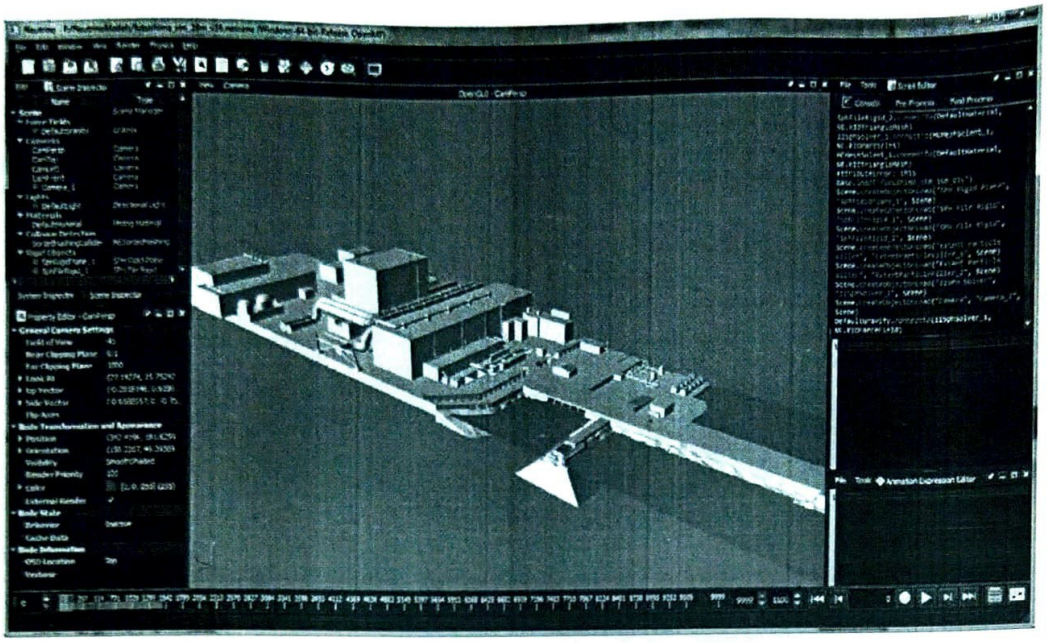

Figure 3: Example of the Neutrino modeling framework.

3. 3D MODELING DEVELOPMENT

Before simulations can be performed, a model of the desired facility must be made. Many tools exist for 3D modeling and, in general, it does not matter which tool is used as long as it can export the model to a format used by the simulation engine. Many model used for simulation consists of two parts, the visual model, and the collision model. The visual model consists of an accurate representation of the physical appearance of the facility and usually has image maps applied to the 3D structures to make them appear realistic. For our purposes, little emphasis is placed on the visual appearances, as long as an analyst can easily understand where and what items are such as buildings and components. More important is the collision model and in our case it is almost identical to the visual model except with additional invisible boundary items to bound calculations within the desired risk analysis scope.

3.1 Facility Model

For this advanced analysis, a detailed 3D model of a nuclear facility was obtained through a 3D modeling clearing house for a nominal cost. We started with this visual model and, while it provided a good starting point, some additional work was required since it was designed with only visual uses in mind, not as a collision model.

Our initial facility modeling consisted of a ¼ slice of the facility which included one reactor, one turbine building and other various structures. (See Figure 4) The second stage modeling consisted of the south half of the facility including support building. (See Figure 5) A larger model can show secondary effects such as water flowing around other buildings and terrain features forcing water in from other directions.

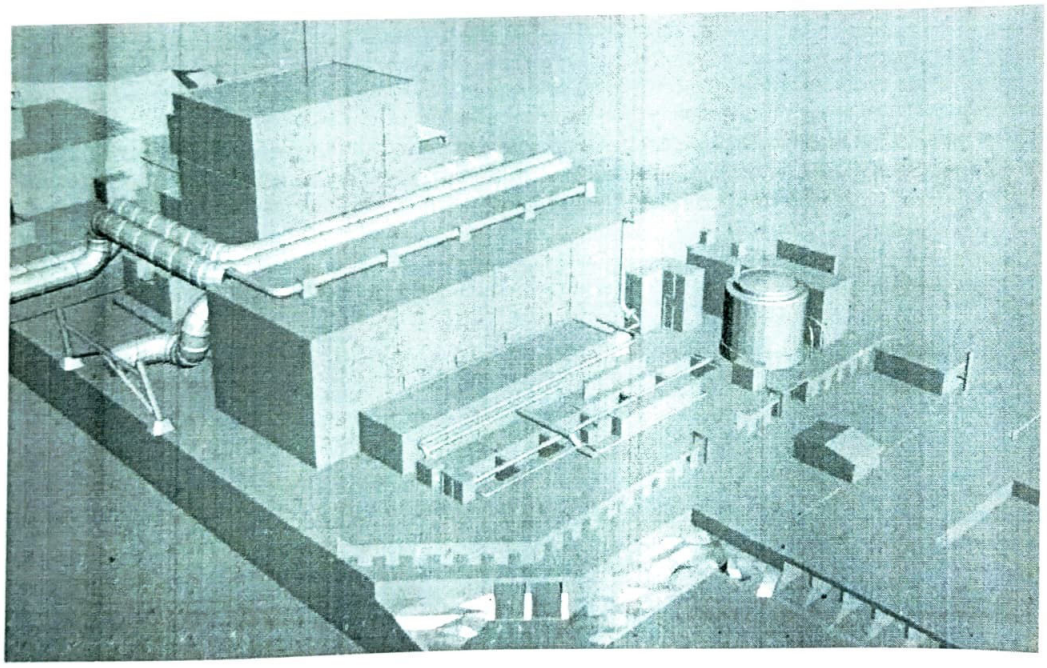

Figure 4: Quarter section for the 3D model of a nuclear reactor facility to be used for simulation testing.

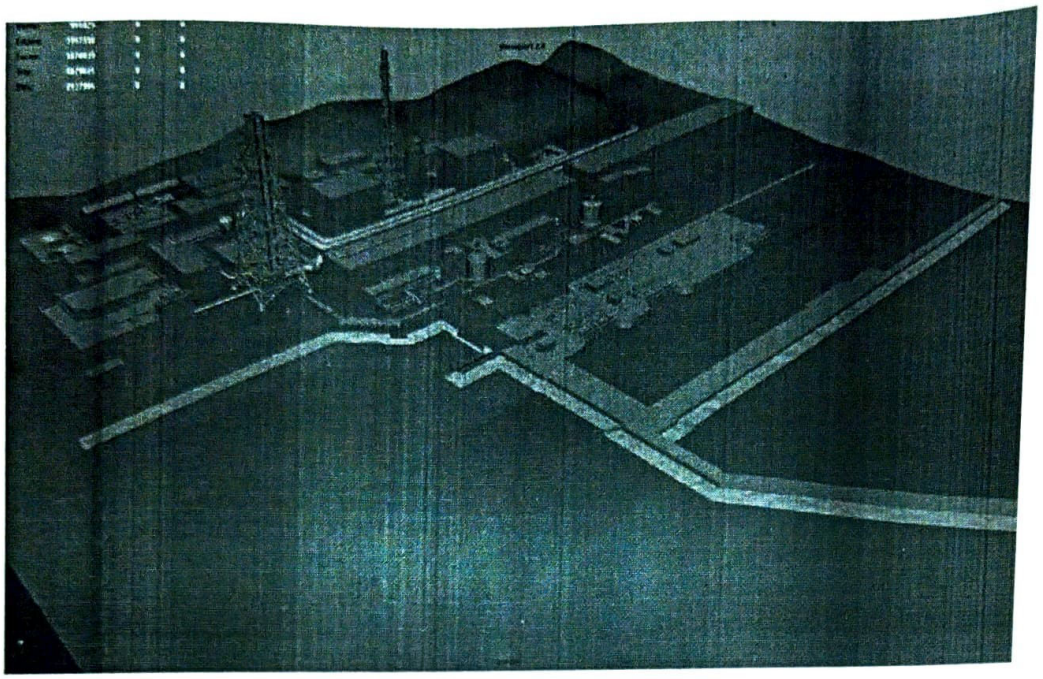

Figure 5: Half facility model of a nuclear reactor facility to be used for simulation testing.

3.2 Terrain mapping

Initial testing was done with a flat gradient on the facility and simple gradual slope for the ocean floor. However, to produce better results, an accurate terrain map showing the topography of the area is needed. To easily obtain this information, a standalone applet was created using Google's Elevation API. (See Figure 6) The Elevation API allowed for us to retrieve elevation levels from a set of points in a rectangular area anywhere on the surface of the earth. The user inputs latitude, longitude, distance and resolution data for the desired location. Using this information, the application gives a visual representation of the defined area on a Google map (and which can also be saved as a 3D model for incorporation into the facility 3D model). For our testing we used a location with a scale of five meters between grid points.

Figure 6: Terrain mapping application used to generate a 3D map of a specified area.

Using the data from the inputs, the terrain map application then calculates all the points within the rectangular area using the Haversine formula (See Appendix A) and proceeds to query the Google terrain database for elevation data for each point that was calculated. After the all the queries are complete, the application is able to export all the elevation data gathered and convert it into a set of representative points. The exported file is saved as Wavefront Technologies' most common geometry interchange file format: the OBJ file format.

The OBJ file created from the facility area was imported to our facility model and used in the simulations of the facility. (See Figure 7)

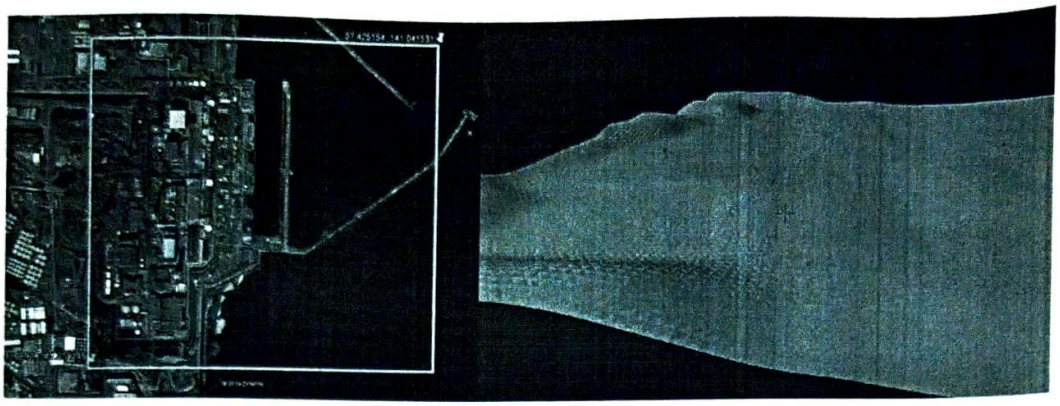

Figure 7: The 3D map generated from the Fukushima site.

3.3 Detailed Modeling

A large facility model gives a generalization of an event at the facility-level, but in order to have a complete scenario, we need to know what effects the event has inside critical facility buildings. To demonstrate this, a mockup of the inside of a hypothetical reactor building was modeled. It included the general structure, reactor core, a few components, and access points/stairways between levels. (See Figure 8)

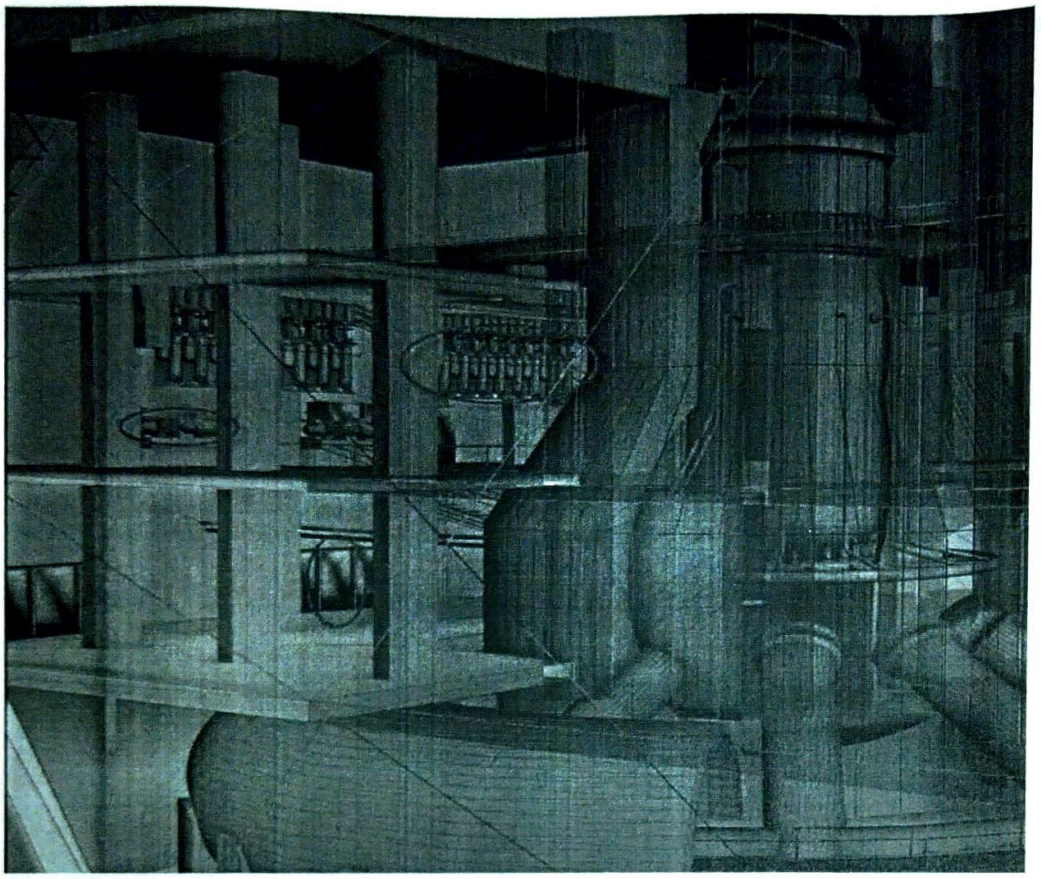

Figure 8: Detailed model of reactor building.

4. SIMULATION DEVELOPMENT

Simulations were performed for both tsunamis of various heights and flooding into the reactor building.

4.1 Tsunami Simulation Setup

Initial simulations to show proof of concept were performed using the ¼ facility slice. Initially, this model lacked accuracies such as actual terrain and wave formula representations. For the ½ slice of the facility, the ground terrain and ocean depth were obtained by using our custom mapping application as explained in section 3.2. Then, a boundary container was added to the model outside of the facility to represent the deeper part of the ocean. A bounding container was also modeled around the area of simulation with the measured ocean depth as its floor. The container was filled with water particles using volumetric operations and Boolean operations to remove any particles inside solid geometry. This served as a start point of the simulation (i.e., still water). A wave piston machine which acted as a collision object was setup to follow Goring's 1978 model (see Appendix A) for generating waves. This wave piston (Figure 9) was placed at the far end in the "deep ocean." An additional rotational component of the wave piston was also generated using a sinusoidal equation to represent the wave part of the water.

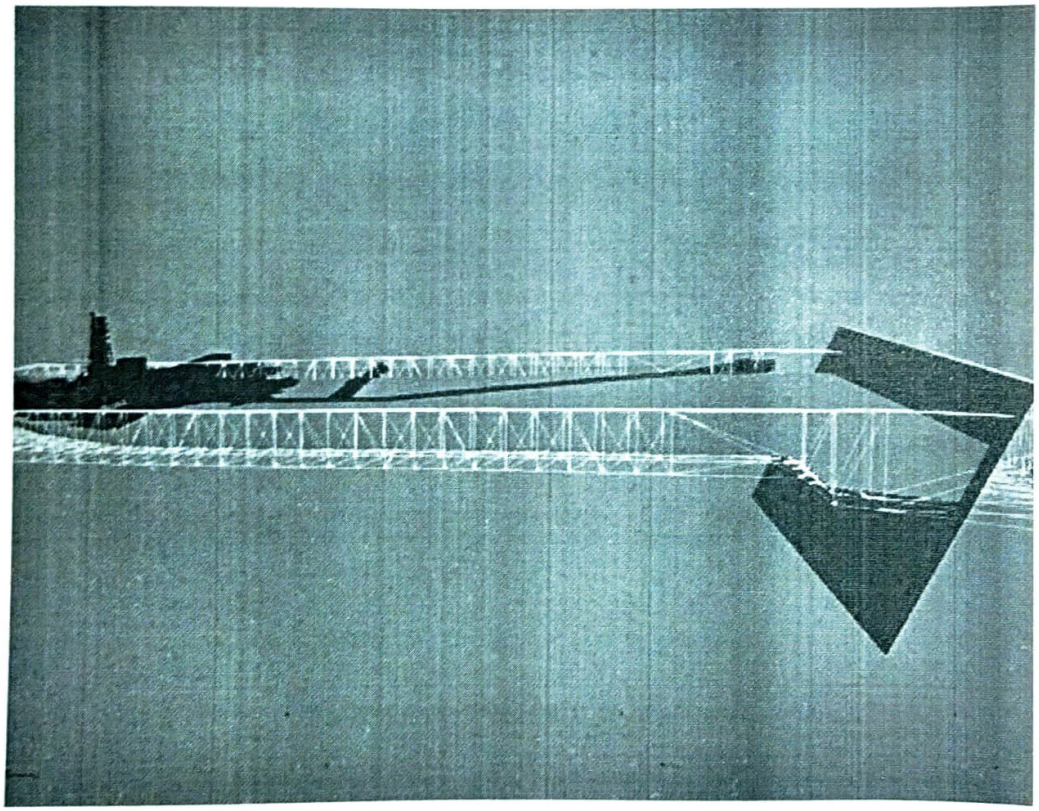

Figure 9: Neutrino Wave Piston Setup with Initial Conditions.

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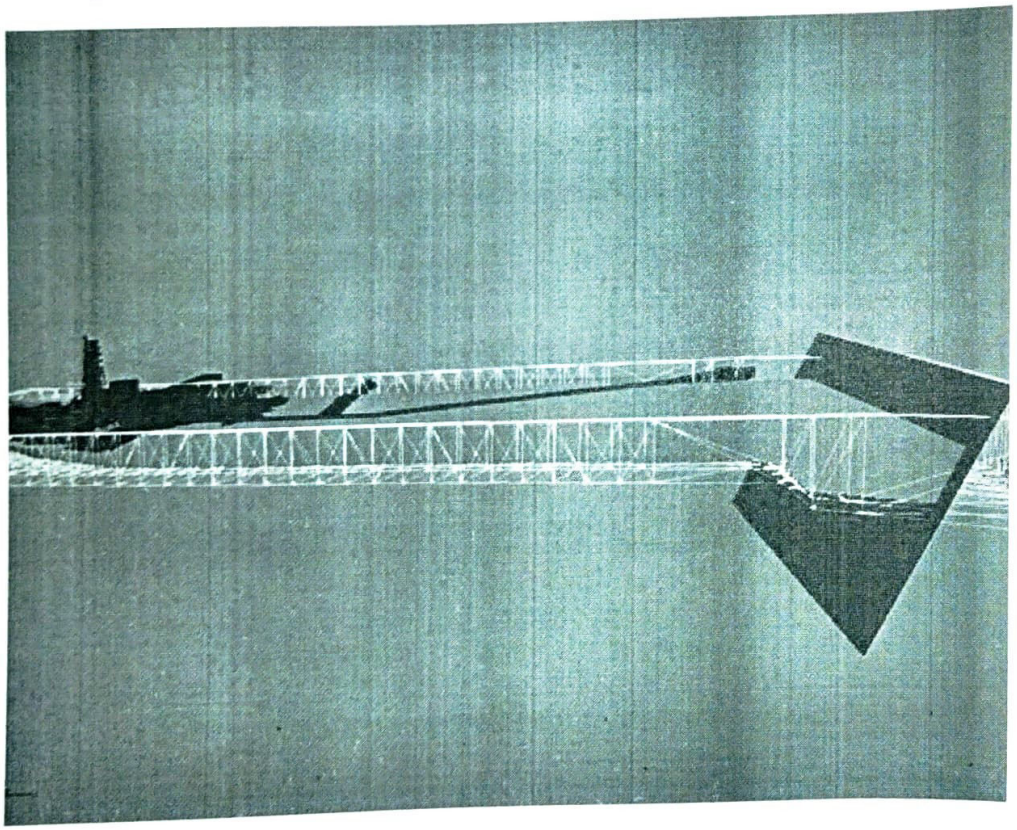


Figure 9: Neutrino Wave Piston Setup with Initial Conditions.

4.2 Tsunami Simulations

Initial testing was done using the ¼ slice of the facility. Wave heights (in the ocean) from 14 to 38 meters were generated to determine impact data on the facility. These different waves were generated by varying the parameters to the wave piston. Twelve million particles at ½ meter resolution were used for the ocean water and tsunami wave, requiring approximately 16 GB of ram for simulation. Each frame simulated at 24fps required about 2-3 minutes on a 24 thread 12 core dual processor Xeon 2.8 GHz machine. (See Figure 10)

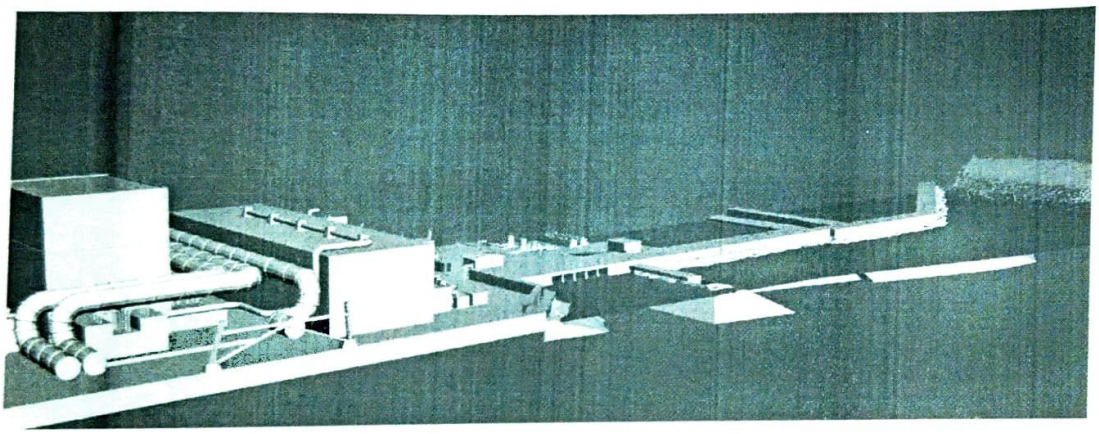


Figure 10 : Simulation of 16 meter tsunami on the ¼ facility model

The second stage of simulations used the ½ the facility model. Currently it has been running at a lower resolution of 1 meter but on a much faster 40 thread, 20 core machine, requiring approximately12 GB of memory and simulated at about 20 seconds a frame at 24fps. Two wave heights, 19 and 34 meters were generated to determine water movement into a much larger section of the facility. For each simulation, an initial run-up of about 100 frames is used to settle the particles into the initial configuration. The total simulation for about 2,000 frames took about 3 days for ¼ slice facility at 0.5 meter resolution on the 24 thread/12 core, dual processor Xeon 2.8 Ghz machine while the simulation took about 24 hours for 2,000 frames for the ½ slice facility at 0.5 meter resolution on the 40 thread/20 core dual processor Xeon 2.6 GHz machine.

4.3 Interior Flooding Simulation

Two interior flooding scenarios of the reactor building were performed. The first consisted of flooding through the bay door into the interior of the reactor building. (See Figure 11) The second was to demonstrate water flow through the facility from a tank rupture. (See Figure 12) The first simulation was also set up to allow the flow-rate of inflow of fluid to be determined by the external facility-level flooding simulation. This coupling allowed for dynamic simulation of reactor flooding at any flow rate. Because

of the comparatively low number of particles, these internal flooding simulations took only a couple seconds per frame.

In the Houdini FX module to simulate both scenarios, two custom plugins, along with a server program, was written to test the scenarios. The server program first runs acting as the simulation command center. This is a Houdini python script which gets automatically executed during Houdini start up and keeps running in the background waiting for commands which are sent from the risk analysis simulation. Upon an initiating event simulation, the server activates the plugin which read a file describing the interested components and the actions to be taken upon the initiator. On receiving a simulation event, the server activates the simulation and sends events of interest back to the remote risk analysis program and waits for subsequent commands.

When coupling two varying time dependent messaging simulations, there were several race conditions which had to be handled. In our testing, we had to handle these in order not to miss any commands or events.

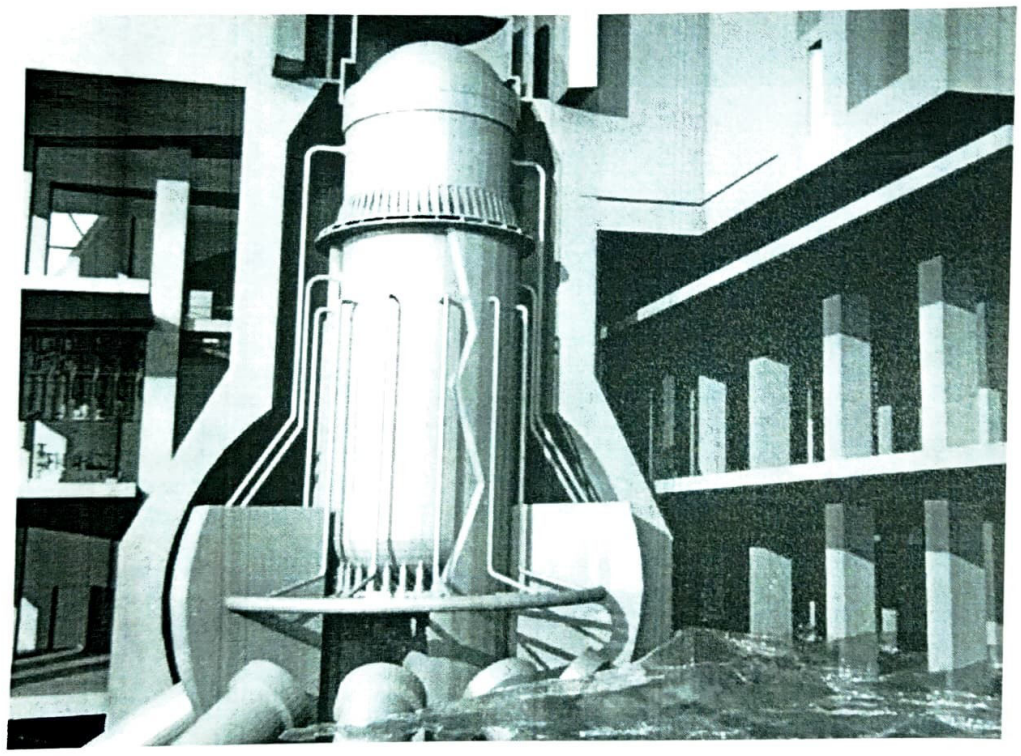


Figure 11: Reactor building flooding from the bay door (cutaway view).

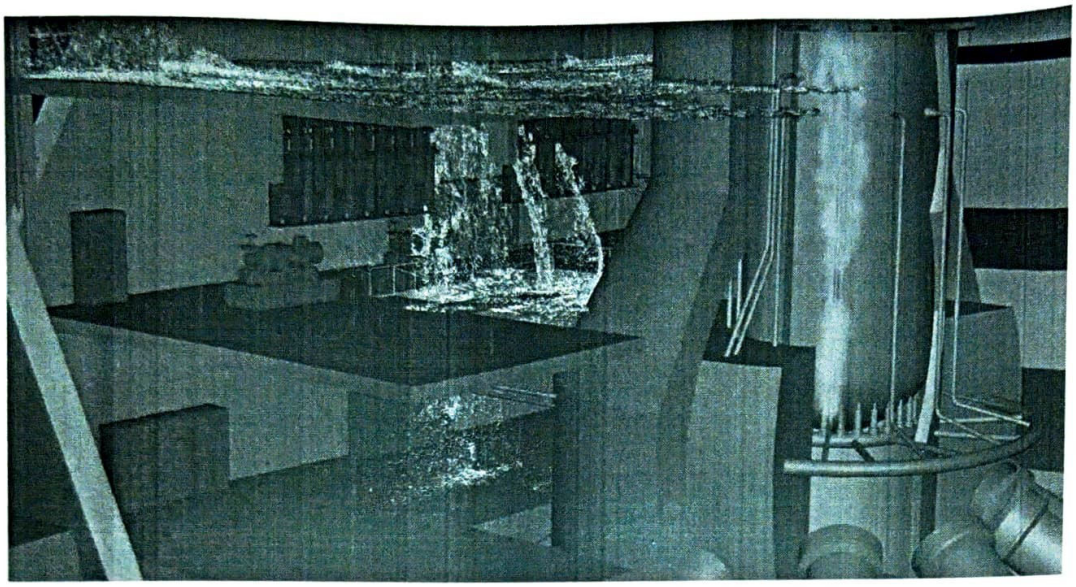


Figure 12: Water flow flooding example in a reactor building.

4.4 Proposed Development Improvements

Because of shared memory requirements, these simulations were done on individual multi-core computers. Future work will investigate how to distribute the calculations in order to speed simulation results. For smaller simulations, such as inside the reactor building, a GPU processor could be used to possibly give real-time results. This option is machine dependent and limited to small simulations depending on the memory capacity of the GPU. The second option is a dedicated co-processor which can add hundreds of additional cores to an existing machine. The principle is similar to the GPU but makes memory management much simpler because of the similar architecture to the main core and the code remains the same even if there is no co-processor on the machine. Lastly, distributed computing could be implemented to take advantage of clusters of networked computers. These High Performance Computing (HPC) systems could possibly run large simulations in close to real time (depending on the size of the system). However, this requires modifications to 3D engine we are using in order to insure they work in unison with an effective memory management system.

5. CONCLUSIONS

Computers have been used for 3D modeling and simulation, but only recently have computational resources been able to give realistic results in a reasonable time frame for large complex models. In this report, we described the methods, techniques, and resources which are being developed at the INL to support a 3D modeling engine used to represent risk analysis simulation for advanced small modular reactor structures and components. This capability is important since explicit, scenario-based analysis of plant safety will play a key role in licensing of small modular reactors, and significant emphasis will be placed on selection of events to be analyzed. Consequently, the need for extensive analysis, and representative models, supporting the safety case will be paramount.

During FY14, the 3D modeling engine development focused on four aspects:

1. Providing the creation of external flooding scenarios by representing an initiating event (potential flooding event entering a coastal plant site) through an entire risk analysis scenario.
2. Providing mechanistic calculations specific for flood representation where we "generate" the simulated flood occurring in the ocean, entering the coastal site boundary, and tracing the water as it enters and moves through the site buildings.
3. Providing flooding-caused failures for components that are inside buildings that may be impacted as seawater enters building through doors or other penetrations.
4. Providing an overall spatial representation of a flooding hazard by depicting how a tsunami might impact various buildings and components that are distributed at different locations at a hypothetical plant site.

The ability to represent hazards such as floods is integral to having a robust PRA approach for aSMRs for a variety of different siting conditions.

6. REFERENCES

[1] [illegible]

[2] [illegible]

APPENDIX A

A.1 Google Elevation API

Google's Elevation API places a limit on the number of possible query requests. Normally, a free user has up to request up to 2500 points per day. The API also tries to limit automated requests, so in order for the terrain map generator not to be blocked, time pauses were also added between requests. Optionally, Google provides an advanced subscription that can be to purchase which enables more requests. A terrain portion is determined by:

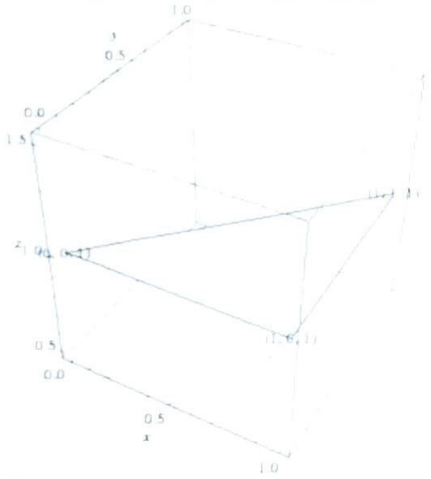
Haversine formula:
$a = \sin^2(\Delta\varphi/2) + \cos\varphi 1 \cdot \cos\phi 2 \cdot \sin^2(\Delta\lambda/2)$
$c = 2 \cdot \text{atan2}(\sqrt{a}, \sqrt{(1-a)})$
$d = R \cdot c$
Where φ is latitude, λ is longitude, R is earth's radius (mean radius = 6,371km).
Note that angles need to be in radians.
[http://www.movable-type.co.uk/scripts/latlong.html]

The OBJ file format is generated first by defining points in a parameter space of curve or surface. As an example, if "v 5 15 34.483" were to be generated, it would mean that a vertex (v for vertex) at rectangular point coordinate (5, 15) with z-axis (elevation) 34.483.

Secondly, the faces are generated to produce the texture from the vertices. Suppose the following were to be generated in the OBJ file:

```
v 0 0 1
v 1 0 1
v 1 1 1
v 0 1 1
f 1 2 3
```

This would generate a triangle connecting the three vertices numbered 1, 2, and 3. The number of the vertices is determined by their order from the top of the list going down.



(Visual Representation generated by WolframAlpha)

However the faces generated from the applet is generated as a rectangle and that only requires that the face generated have one additional vector number at the end.

A.2 Goring Solitary Wave Generation – Numerical Model

Goring (1978) proposed a model for the purpose of laboratory solitary wave generation. The surface profile (x,t) of a solitary wave can be described using the following equation:

$$\eta(x,t) = Hsech^2[\kappa(Ct - X_0)] \qquad \text{(A-1)}$$

$$C = \sqrt{g(H+h)} \qquad \text{(A-2)}$$

$$K = \sqrt{\frac{3H}{4h^3}} \qquad \text{(A-3)}$$

Where C is the wave celerity or phase velocity, X_0 is the wave displacement, H is the wave height and h is the depth of the ocean. Applying equation A-1 to the wave maker piston results in

$$X_0(t) = \frac{H}{\kappa h}(tanh(\kappa(Ct - X_0)) \qquad \text{(A-4)}$$

Using this equation one can solve for the wave piston displacement and wave piston duration using newton iterations resulting in

$$S = \sqrt{\frac{16Hh}{3}} \quad \text{and} \quad t_f = \frac{2\left(3.80+\frac{H}{h}\right)}{\kappa C}$$

Where S is the displacement and t_f is the time taken for the displacement.

Goring, D. G. (1978). Tsunamis – The Propagation of Long Waves Onto a Shelf. Doctoral Dissertation, Report No. KH-R-38, Keck Laboratory of Hydraulics and Water Resources, California Institute of Technology, Pasadena, California.

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Mr.SRIKANTH PULA

has Successfully Completed "30 Days Internship Program on Matlab"
at www.pantechsolutions.net in association with IETE Mumbai

Date : Sep 01-2020 to Sep 30-2020

M.Malaiyappan
Director
Pantech Solutions

Parag Walinjkar
CHAIRMAN
IETE MUMBAI

Certificate No: PS-IETE-INTERNSHIP-0390

P. Srikanth 18765A0341 pulas srikanth 1000@gmail.com

INTERNSHIP PROGRAM ON MATLAB

An Internship report submitted to the

Jawaharlal Nehru Technological University, Kakinada in partial fulfilment

of the requirements for the award of the Degree of

BACHELOR OF TECHNOLOGY

IN

MECHANICAL ENGINEERING

Submitted by

NAME: P.SRIKANTH

H.T NO: 18765A0341

DEPARTMENT OF MECHANICAL ENGINEERING

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

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L.B.REDDY NAGAR, MYLAVARAM, KRISHNA Dist.

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Internship coordinator
Mr. K. V. Viswanadh

Dr.S.PICHI REDDY
Head of Department

ACKNOWLEDGEMENT

The satisfaction that accompanies that the successful completion of any task would be incomplete without the mention of the people whose care cease less cooperation made it possible, whose constant guidance and encouragement crown all efforts with success.

I humbly express my thanks to our management and Principal **Dr.K. APPA RAO** for extending his support for providing us with an environment to complete our internship successfully.

I indebted to our Head of the Department **Dr. S. PICHI REDDY** who modelled us both technically and morally for achieving greater success in life.

I humbly my thanks to my guide **Mr. K. V. VISWANADH** for giving timely valuable suggestions and encouragements the make the completion of the internship successfully.

I would like to thank all the teaching and non-teaching staff members of Mechanical engineering, who have extended their cooperation during the course of this work.

I am thank full to my friends who helped me sharing knowledge and by providing material to complete the internship in time.

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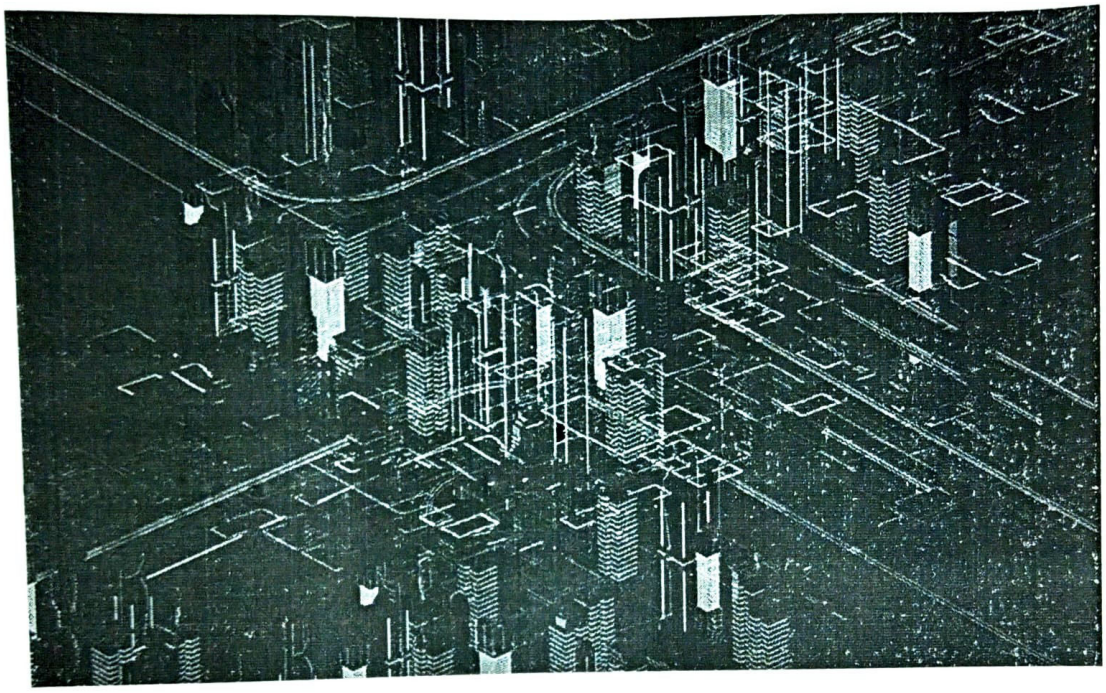

Consistently delivering mission, our team has been delivering technically challenging projects under tight timelines, while also providing exceptional customer service and support to our clientele. This in turn has led to extremely positive long-term working relationships all over. Our detailed project process was created to ensure our projects are completed on-time, in-budget, and to the clients complete satisfaction.

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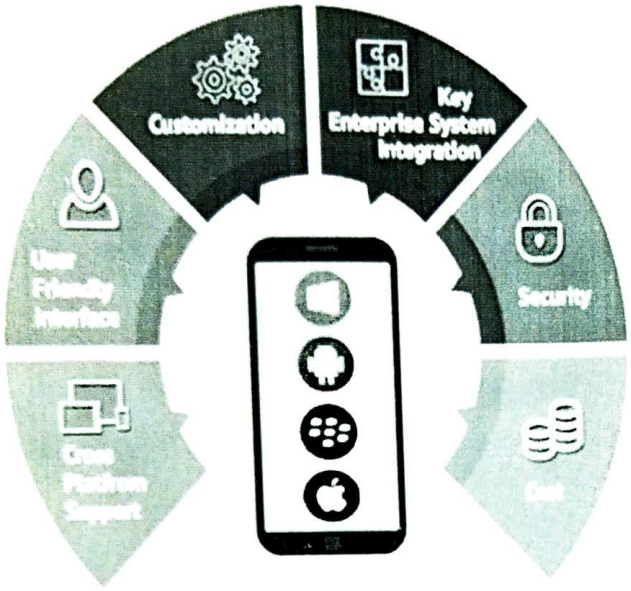

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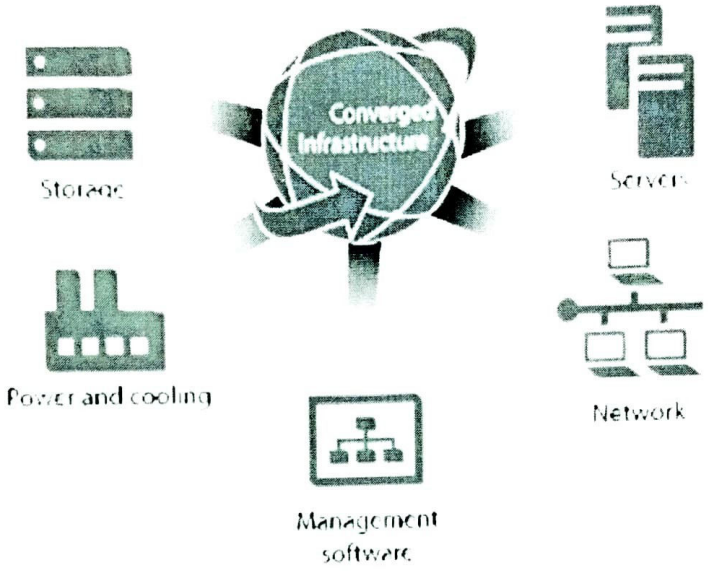

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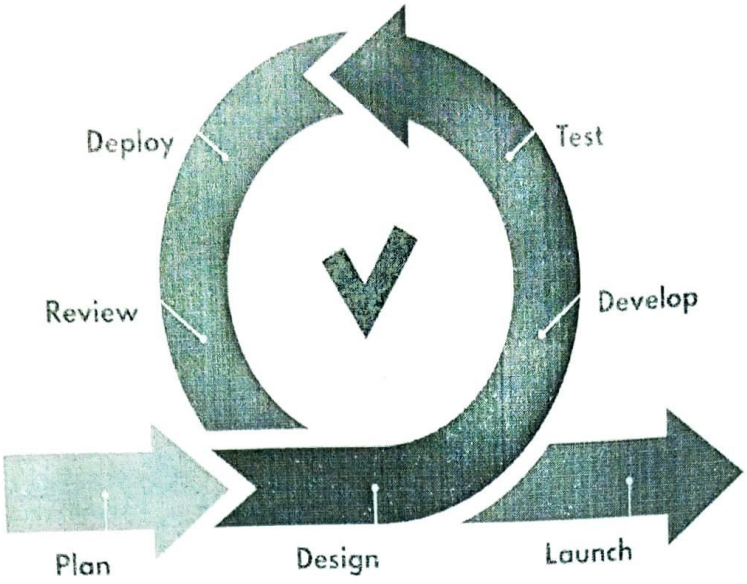

Kaashiv Infotech is your one stop partner where you can outsource all your support services with complete peace of mind about quality and reliability. Kaashiv Infotech Solutions Limited strength lies in understanding the client's business processes, culture, vision and goals across the industry segments and offering client-oriented solutions which are highly reliable, creating customer comfort.Our team is committed to provide IT Services with:

Quality | Technology | Innovation

Our Services Include:

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- Project Management
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- Outsourcing

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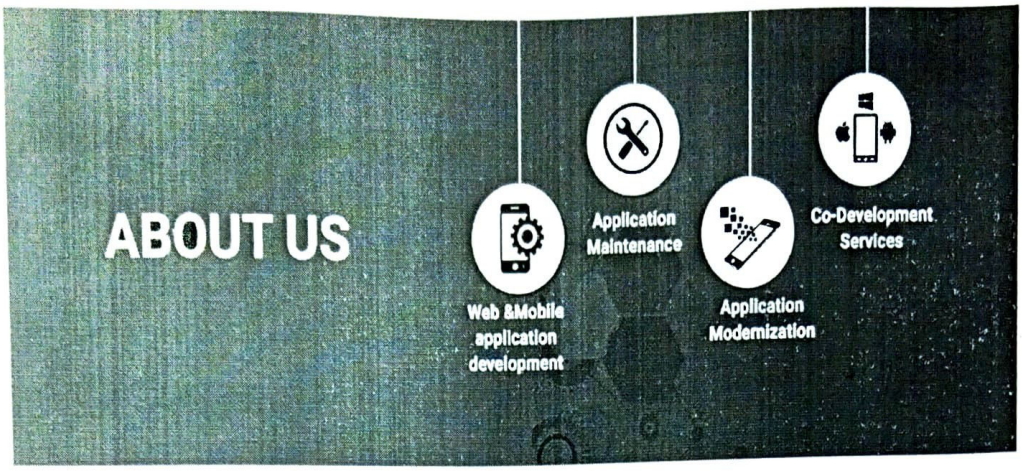

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MATLAB offers two types of logical operators and functions −

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- Short-circuit − These operators operate on scalar and, logical expressions.

Element-wise logical operators operate element-by-element on logical arrays. The symbols &, |, and ~ are the logical array operators AND, OR, and NOT.

Short-circuit logical operators allow short-circuiting on logical operations. The symbols && and || are the logical short-circuit operators AND and OR.

Bitwise Operations

Bitwise operators work on bits and perform bit-by-bit operation. The truth tables for &, |, and ^ are as follows –

P	q	p & q	p | q	p ^ q
0	0	0	0	0
0	1	0	1	1
1	1	1	1	0
1	0	0	1	1

Assume if A = 60; and B = 13; Now in binary format they will be as follows –

A = 0011 1100

B = 0000 1101

A&B = 0000 1100

A|B = 0011 1101

A^B = 0011 0001

~A = 1100 0011

MATLAB provides various functions for bit-wise operations like 'bitwise and', 'bitwise or' and 'bitwise not' operations, shift operation, etc.

7. DIFFERENT TYPES OF MATLAB FUNCTIONS

There are several types of functions available with MATLAB, including local functions, nested functions, private functions, and anonymous functions.

- Anonymous Functions.
- Local Functions.
- Nested Functions.
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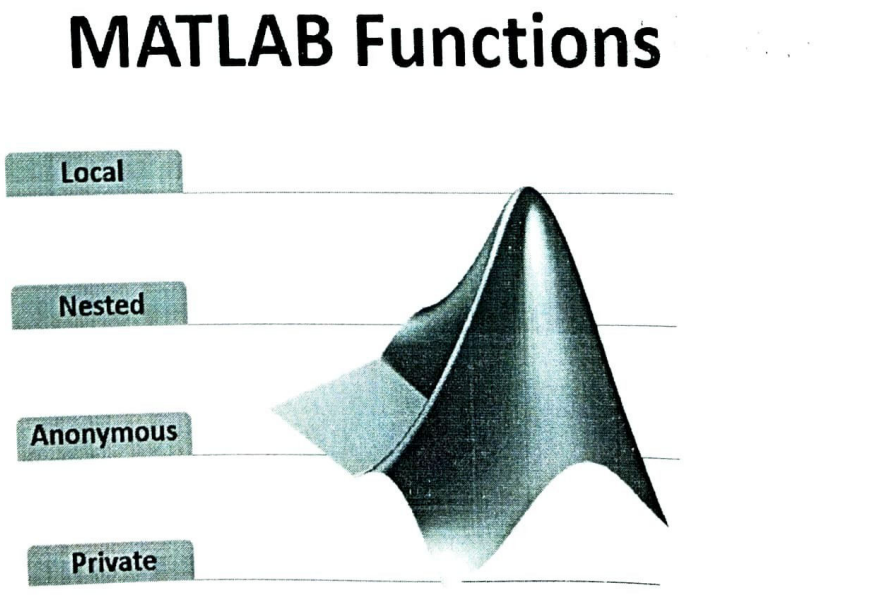

8. CONCLUSION

As a conclusion, we can say that this sofware offers strong possibilities. The utilisation is pretty easy for simple problem. For advanced problem, it is more complex. Moreover, you can access to introduction course on internet. But for advanced functions, it is more complex for find books or article. Moreover, there is some books and user manual but there are paying and expensive. There is a lot of similarities with Matlab. The graphic interface on scilab is less advanced : it is a simple interface, less developed than Matlab. For example, computation on matrix have similar syntax. Nevertheless, some functions proposed in scilab are limited or complex for a beginner. For example, the matlab to scilab translator is not very efficient and require strong skills of matlab. Some functions such as graphics or data interfacing are complex at the beginning.

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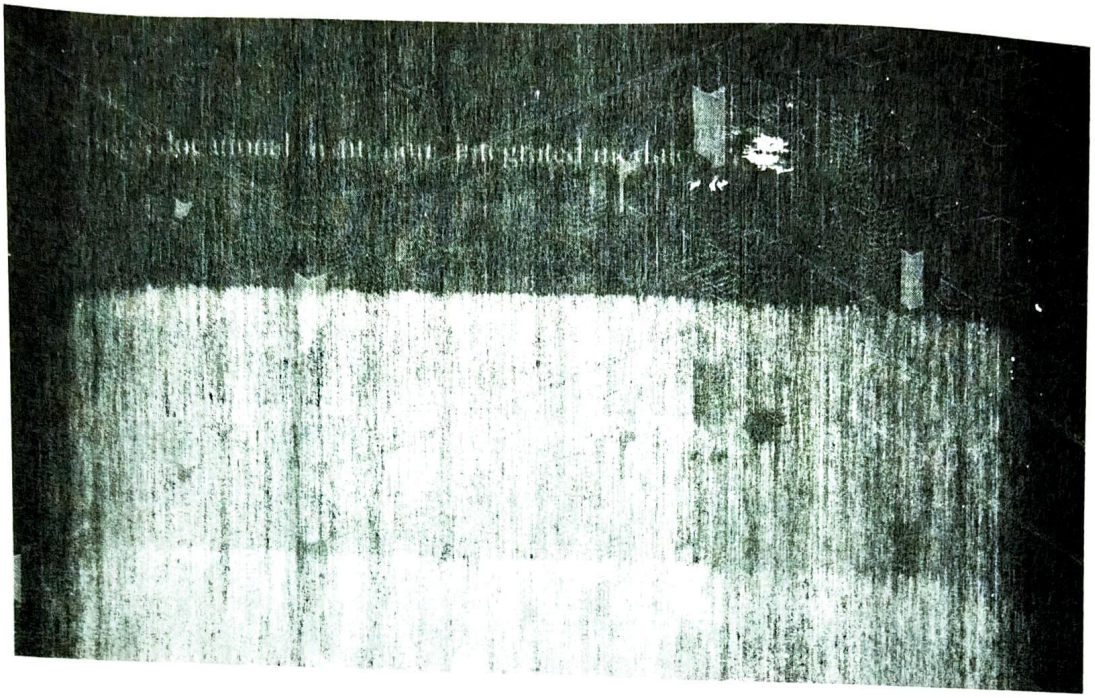

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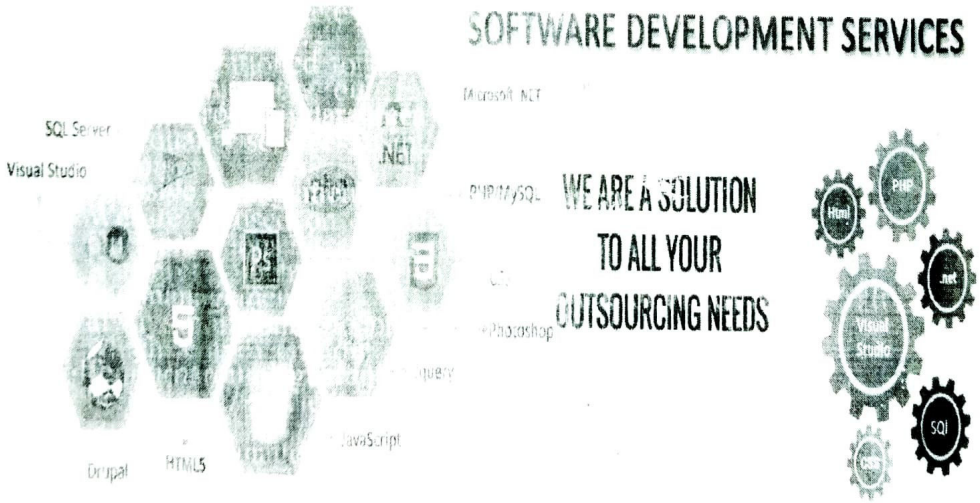

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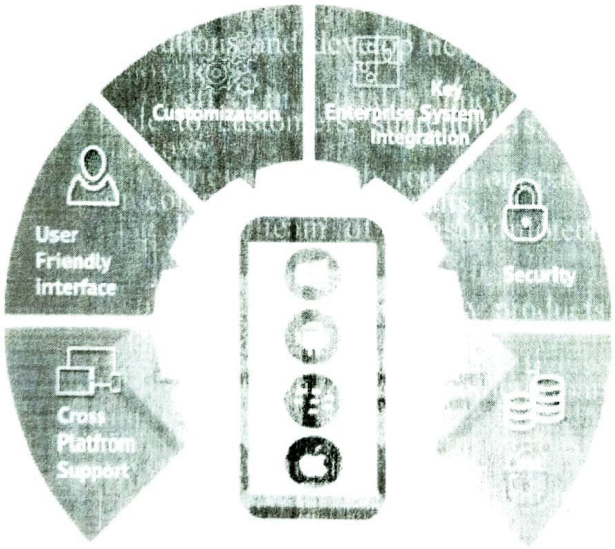

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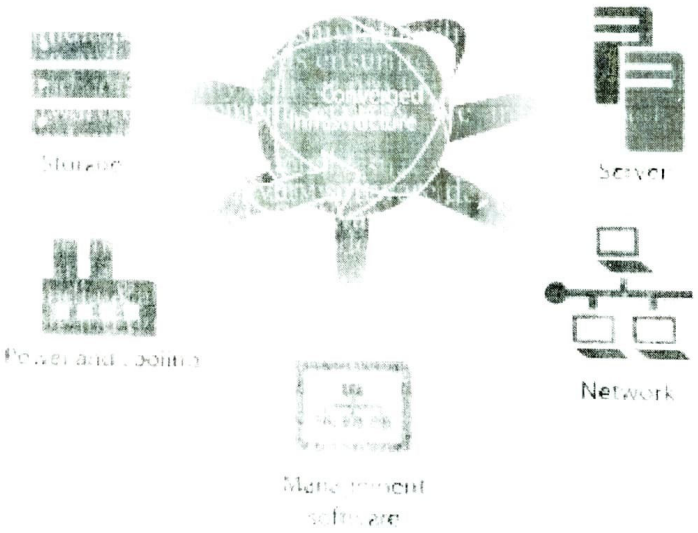

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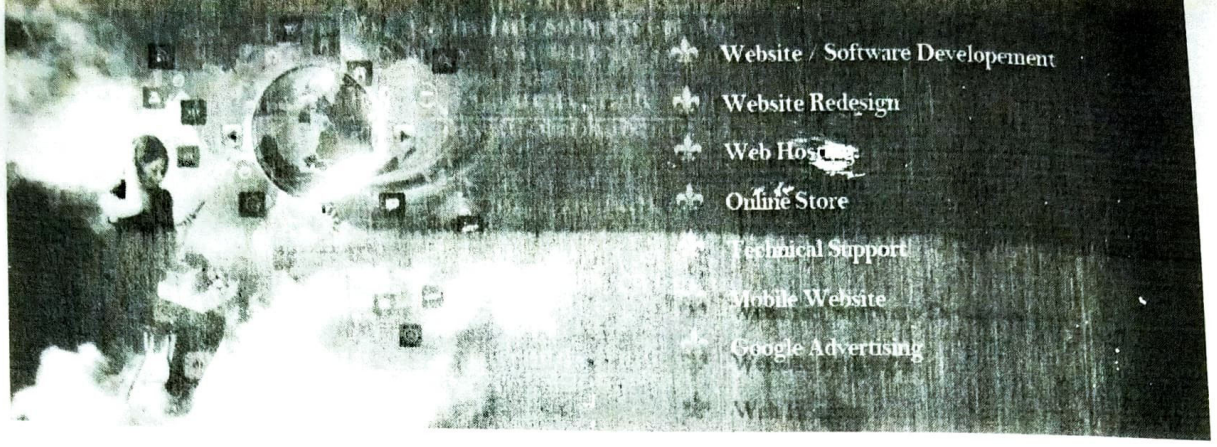

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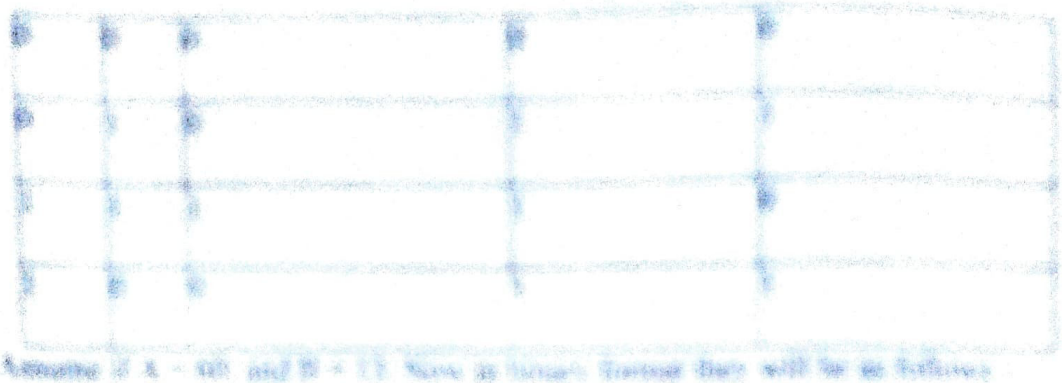
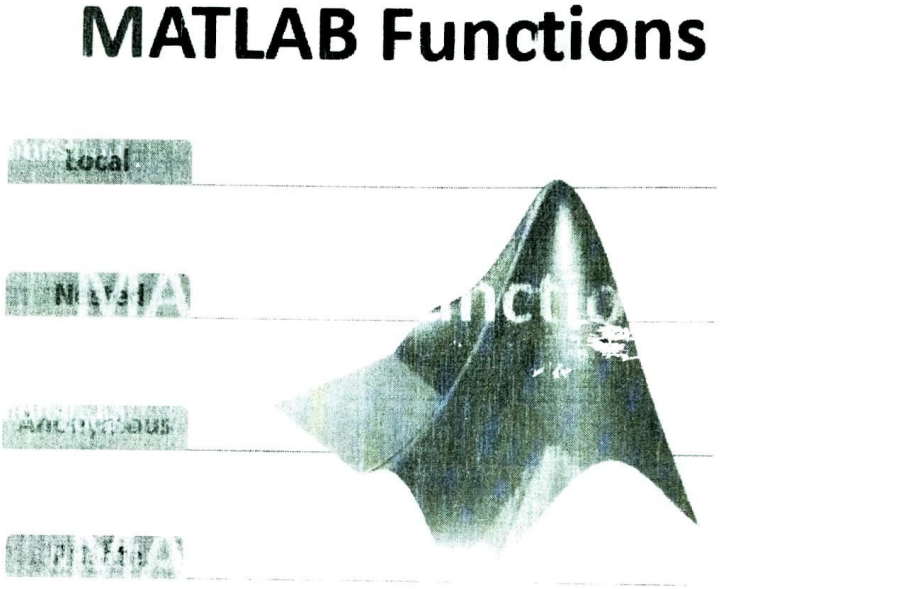
Bitwise operators work on bits and perform bit-by-bit operation. The truth tables for &, |, and ^ are as follows –

P	q	p & q	p | q	p ^ q



- Anonymous Functions.
- Local Functions.
- Nested Functions.
- Private Functions



8. CONCLUSION

As a conclusion, we can say that this sofware offers strong possibilities. The utilisation is pretty easy for simple problem. For advanced problem, it is more complex. Moreover, you can access to introduction course on internet. But for advanced functions, it is more complex for find books or article. Moreover, there is some books and user manual but there are paying and expensive. There is a lot of similarities with Matlab. The graphic interface on scilab is less advanced : it is a simple interface, less developed than Matlab. For example, computation on matrix have similar syntax. Nevertheless, some functions proposed in scilab are limited or complex for a beginner. For example, the matlab to scilab translator is not very efficient and require strong skills of matlab. Some functions such as graphics or data interfacing are complex at the beginning.

CERTIFICATE
OF PARTICIPATION

18185A0343

Sr No:AMZ/STP/2020/79249

This is to certify that

TELLAKULA JAYA VENKATA SAIBABU

of college / University

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

has completed

One-month Online Internship on Design and Developemnt of Go Kart

from ***22nd June 2020*** to ***22nd July 2020***

We wish him/her all the success in future.

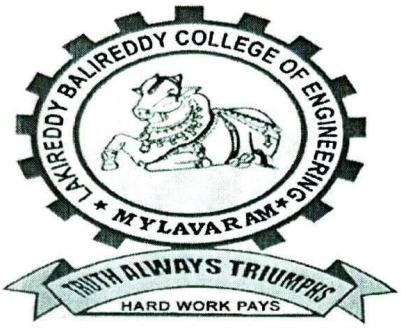
Managing Director

AMZ TECHVERSITY

AMZ AUTOMOTIVE

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

DEPARTMENT OF MECHANICAL ENGINEERING



CERTIFICATE

This is to certify that the INTERNSHIP report entitled "**GO-KART DESIGN AND DEVELOPMENT**" that is being submitted by **THELLAKULA JAYA VENKATA SAI BABU**bearing **18765A0343**in partial fulfilment for the award of the degree of Bachelor of Technology in Mechanical Engineering is a record of the internship work carried out by**him** under our guidance and supervision.

Internshipcoordinator

Head of theDepartment

Dr. S. Pichi Reddy

ACKNOWLEDGEMENT

The Satisfaction that accompanies that the successful completion of any task would be incomplete without the mention of the people whose cease less co-operation made it possible, whose constant guidance and encouragement crown all efforts withsuccess.

I humbly express my thanks to our management and Principal Dr. K. Appa Rao for extending his support for providing us with an environment to complete our internship successfully.

I indebted to our Head of the Department Dr. S. Pichi Reddy who modeled us both technically and morally for achieving greater success in life.

I humbly express my thanks to my guide Mr. K.V. Viswanadh for giving timely valuable suggestions and encouragement that make the completion of the internship successfully.

I am thankful to our internship coordinators MR.A.DHANUNJAY KUMAR for the excellent guidance, timely and valuable suggestions and encouragement that enabled the successfulcompletionof theinternship.

I would like to thank all the teaching and non- teaching staff members of Mechanical Engineering, who have extended their full co-operation during the course of this work.

I am thankful to my friends who helped me sharing knowledge and by providing material to complete the internship in time.

THELLAKULA JAYA VENKATA SAI BABU.
(18765A0343).

INDEX

CHAPTER – 1

INTRODUCTION OF THE COMPANY

AMZ Automotive is a pioneer in the field of providing practicality to the theoretical knowledge acquired by the engineers in the field of engineering. They offer internships and workshops to the students to implement the knowledge obtained by them in the real-world situations. They extract them out of the nutshell and let them face the real-world problems under the guidance of our phenomenal faculty members like, former F1 Marshall, Research Engineers, Rally Car Designers, IT expert, Automation Expert and Rally drivers who have years of experience in Industry.

They promote interactive and complete hands-on training in the Electric vehicle. Hybrid Vehicle, Autonomous car, ATV, Go-kart, Artificial Intelligence, Machine Learning, Automation and Formula prototype vehicles. They have evolved over the time and have taken a comprehensive approach to the latest studies. They have a well-formulated technical programme that includes academic lectures on Dynamics, CAD design, Design Analysis, Electrical Testing, Automation Testing, Machine learning, Artificial Intelligence, Fabrication, etc.

They organize participating internship in different colleges and provide specially Research and Development Learning to benefit the students and help them with all-round development. They focus on polishing not only their engineering skill but also in enhancing their team management and leadership skills. They provide the best environment to evolve engineering student's expertise in scientific understanding, technical competence, and diligent attention to detail, using workshop.

In the designing part they will be discuss about chassis designing and stress analysis of each component and design and vehicle in CAD software, 2D &3D sketching.

In the part of fabrication, they will be fabricating the vehicles from very scratch which includes Cutting and Bending of chassis members, welding grinding of chassis members, engine

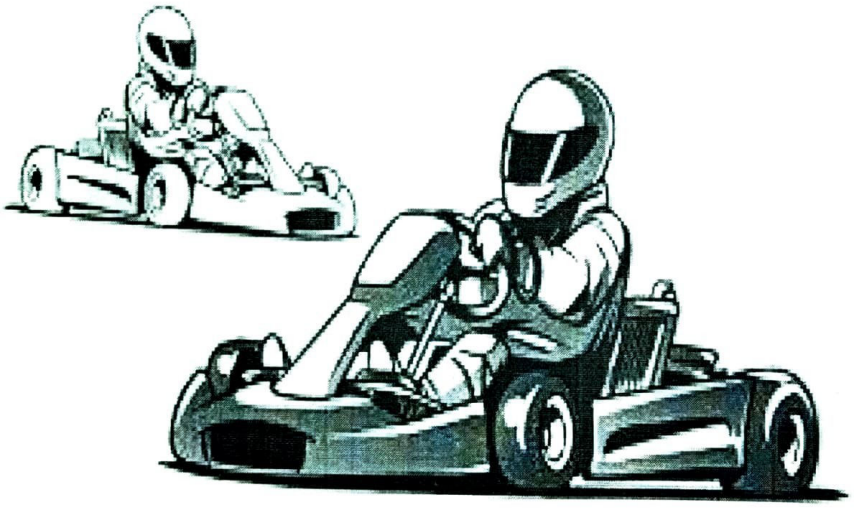
mounting wheel assembly, steering and suspension components manufacturing, braking system installation Tire pressure calibration, cornering ability test and many more.

1.1 CERTIFICATION AND BENEFITS:

- ✓ All the participants will get ISO 9001: 2015 certificate of Industrial Internship which is internationally valid.
- ✓ Separate certificates will be provided for training & project.
    - ➢ Study Materials will be provided to the participating students according to their selection of course.
    - ➢ Live Development based Practical Training by Industrial Experts.
    - ➢ Interaction with various latest Industrial Tool & Technologies.
- ✓ Curriculum has a less theory and more practical hands on experience.
- ✓ We will get a chance to participate in the Research Project offer by the various company.

CHAPTER – 2

INTRODUCTION OF THE PROJECT



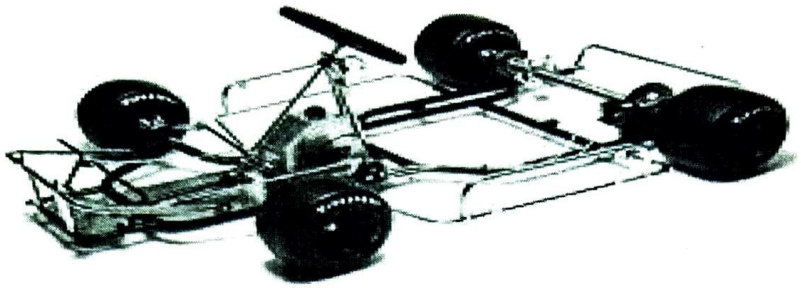


Fig 2.1 Go kart

In the 1950's group of tinkerers and thrill seekers in Southern California welded together a crude frame from steel tubing mounted it on wheels intended for wheels barrows, powered the contraption with a small 3 HP engine intended for lawn mowers and race it around the parking lot of the Rose Bowl in Pasadena. These vehicles, now called "go-karts" have grown into a multi-billion- dollar industry in the USA and throughout the developed world. They are made, sold, and used exclusively as recreational racers. They are not designed for transportation and it is illegal in most places to drive them on the road

These vehicles are typically 30" wide, 4 to 5 feet long and weight between 50 and 70 pounds. They are simple and inexpensive to build and operate and they can travel on rough terrain and roads at speed exceeding 20 miles per hour.It is estimated that large volume export OEM contracts could be negotiated somewhere near half this amount. Alternate Asian sources particularly China or S.korea might yield lower cost design.Chinese- made 4-cycle irrigation pump engine are widely available in Asia for around $100 and these may be substitude for lawn power engines design. An additional consideration in favor of the irrigation pump engines is that 4- cycle engines are less polluting and many countries in Asia are phasing out the use of 2 cycle engines for that reason.

Normally a 30" wheel base is used with 1" by 36" threaded axles and 3 to 6 inches of ground clearence depending on the type of terrain the vehicel is expected to traverse. A very elementary steering system of the tie-and-rod variety is sufficient. Brakes may be 4-1/2inch band or drum design 8" to 14" standard wheels from the garden supply industry may be utlized. The other significant components are the clutch and sprocket assembly, bearings and throttle control assembly.

Even in their most primitive forms go karts may be adapted as transportation technology in developing countries to leverage economic growth and poverty alleviation. Go karts offer a simple and inexpensive technology that meets many rural transportation needs. The technology is a bridge between simple pushcarts and rickshaws on one hand and the automobile and truck technology designed to western specifications on the other. The relative inefficiency of the former technology is very cause of poverty in many areas while the cost and technology burden of the latter make them inaccessible to the poor.

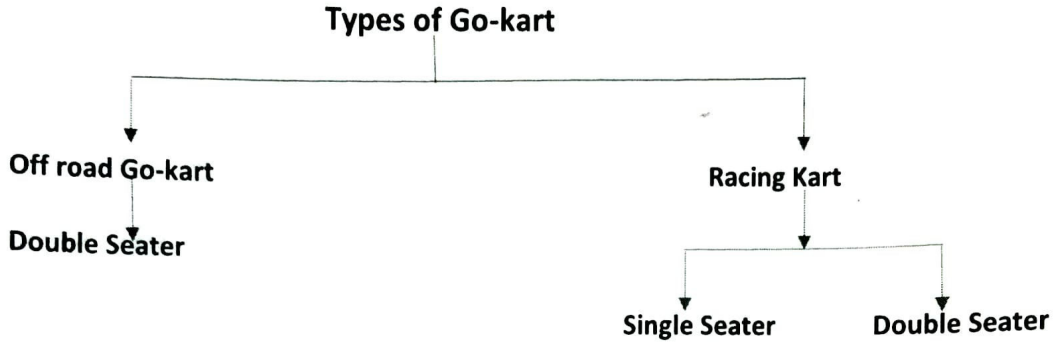
There are many motors sports in the world. Bikes, cars, Formula one is example of them. The drivers in these are very professional and accurate. They can drive it very fast. But there are also motors sports which do not need professional drivers and no need to high speed. The vehicle used are also very cheap. Such as A motor sports in Go karting. They reassemble to the formula one cars but it is not as faster as F1 and also cost is very less. The drivers in go-karting are also not professionals. Even children can also drive it. Go-karts have 4 wheels and a small engine. They are widely used in racing in US and they are getting popular in India.

2.1 Scope of the Project:

Go-Kart is a big craze to the Americans and Europeans. It is initially created in United States in 1950 and used as a way to pass spare time. Gradually it became a big hobby and other countries followed it. In India Go-karting is getting ready to make waves. A racing track is ready in Nagpur for Go-karting and Chennai is also trying to make one.

Indian companies are also producing go-karts in small scale. MRF and Indus motors are the major bodies in karts and they are offering karts between 1 lakh and 3 lakhs. But to make go-kart popular, the price most come down. For that, many people are trying to build one under 1 lakh ad we had also take up the challenge. A go-kart just under Rs.25000/- so, we are sure that our project will have a high demand in the industry and we are hoping to get orders from the racing guns.

2.2 ABOUT GO-KARTS:



Go-kart is a simple four-wheeled, small engine, single seat racing car used mainly in United States. They were initially created in the 1950s. Post -war period by airmen as a way to pass spare time. Art generally accepted to be the father of karting. He built the first kart in Southern California in 1956. From them, it is being popular all over America and also Europe.

A Go-kart by definition, has no suspension and no differential. They are usually raced on scaled down tracks, but the sometimes driven as entertainment or as a hobby by non-professionals. Karting is commonly perceived as the sleeping shone to the higher and more expensive ranks of motor sports. Kart racing is generally accepted as the most economic form of motor sport available. As a free-time activity, it can be performed by almost anybody and permitting licensed racing for anyone from the age of 8 onwards.

Kart racing is usually used as a low-cost and relatively safe way to introduce drivers to motor racing. Many people associate it with young drivers, but adults are also very active in karting. Karting is considered as the first step in any serious racers career. It can prepare the driver for high-speed wheel-to-wheel racing by helping develop guide reflexes, precision car control and decision-making skills. In addition, it brings an awareness of the various parameters that can be altered to try to improve the competitiveness of the kart that also exist in other forms of motor racing.

2.3 GO-KART IN INDIA:

Go-kart emerged in India in 2003 from MRF, which has a 250cc two-stroke engine, which produce 15bhp of power, which costs around3 lakh Indus Motors are also offering Go-karts for 1 lakh to 3 lakhs. There are racing tracks in Nagpur for Go-karting, which is known as the home of go-karts in India. Many people take part in the racing and it's getting popular.

2.4. GO-KART IN FOREIGN COUNTRIES:

Go-karts in foreign countries have much more performance than the Indians. One type is a single engine 160cc 4-stroke kart with a maximum speed of around 40mph and second type is twin-engine 320cc 4-stroke kart used in outdoor with a maximum speed of 70mph. There are hundreds of racing tracks in US for karting and also, they are much more professional than the Indians.

2.5 FUTURE SCOPE OF GO-KARTS:

In future the scope of go-karts can develop by using 4-stroke engine. Bio-fuels which are of low cost can be used in place of petrol. Solar Energy can also utilize by solar panels where they are pollution free with moderate cost. Suspensions system can also be added in system to lower vibrations and shocks.

2.6 FEASIBILITY OF A SUSTAINABLE GO-KART:

The necessary conditions for sustainability of a go-kart project for rural development include economic, social, and technical issues. Some of the question that must be addressed include the following:

- ✓ **Transport Infrastructure:** Can the existing rural road network be used by go-karts?
- ✓ **Demand for new services:** Will the villages use this technology? Do they need it?
- ✓ **Financial feasibility:** Will capital be available for investment in go-kart manufacturing?
- ✓ **Financial feasibility:** Can the villagers afford to purchase, operate, and maintain go-karts? Will credit be available?
- ✓ **Economic feasibility:** Will the use of go-karts by villagers increase their standard of living?
- ✓ **Technical feasibility:** Does the technical expertise exist among villagers to operate and maintain the machines?
- ✓ **Industrial feasibility:** Does an industrial infrastructure exists that can supply parts and labour for the manufacture of go-karts?
- ✓ **Political feasibility:** Will go-karts and their environmental and economic impact on rural life be acceptable to those in power?
- ✓ **Social feasibility:** Will the new technology be adopted as an integral part of the rural society and will benefits of improved transport reach all sections of the community? Will it help the poor?

A well-developed cottage industry infrastructure exists in Bangladesh even in rural areas for the introduction of go-karts technology. Both machine shops and welding shops may be found at most small population centre throughout the country and the operator are skilled in their work. Small two-cycle engines have been adapted for urban and the rural transport as "Baby tax" and "Tempos" throughout the country. These are three-wheeled passenger as well as freight vehicles. Their maintenance and chassis manufacture are a wide-scale cottage industry in urban and rural areas.

Bicycles, Rickshaws, and Rickshaws-based freight vehicles called "Vans" are also manufactured in small shops throughout the country. Truck maintenance shops provided yet another source of technical skill that may be adapted for the introduction of go-karts to the country as a cottage industry in a de-centralized implementation. There are many motors sports in the world. Biles, Cars, Formula one is the example of them. The drivers in these are very professional. They can drive it very fast. But there are also motors sports which do not need professional drivers and no need high speed. The vehicles used are also very cheap. Such as motor sports in go-karting.

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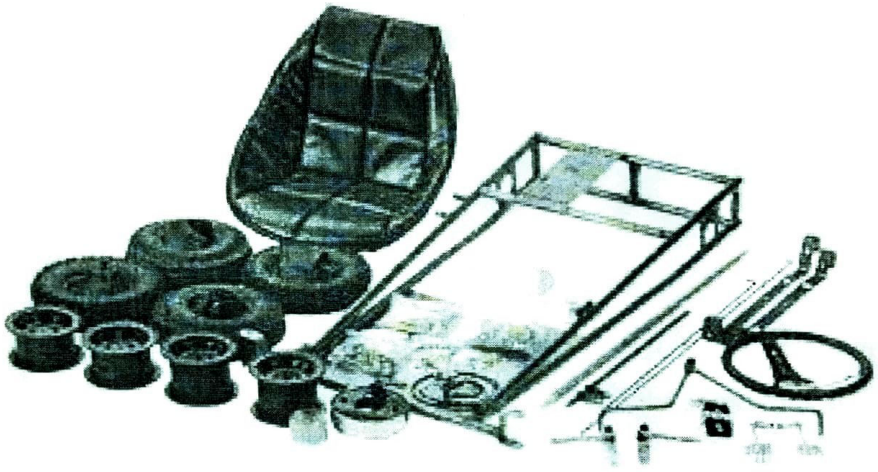
CHAPTER – 3

PARTS OF GO-KARTS



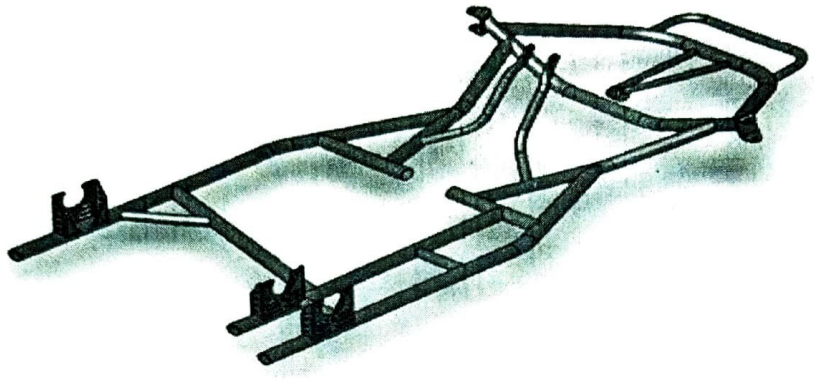


Fig3.1: Chassis

3.1 - CHASSIS:

The Chassis is an extremely imported element of the go-kart, as it must provide, via flex, the equivalent of suspension to give good grip at the front. Karts have no suspension, and are usually no bigger than is needed to mount a seat for the driver and a small engine. Chassis construction is normally of a square tube construction typically MS with different grades. In this go-kart we use MS tube with 1" diameter. The chassis support the power unit, power train, the running system etc.

3.1.1 The Chassis Construction:

The Chassis of a Go-Kart consists of following components suitably mounted:

I. Engine
II. Transmission system consisting of the chain sprocket, rear axle.
III. Road Wheels
IV. Steering System
V. Brake
VI. Fuel Tank

All the components listed above are mounted on the conventional construction, in which a separate frame is used and the frameless or unitary construction in which no separate frame is employed.

3.1.2Conventional Construction: In this type of chassis construction the frame is the basic unit to which various components are attached and body is bolted onto the frame later on.

Function of the frame:

I. To Support the chassis components and body.

II. To withstand static and dynamic loads without under deflection or distortion.

Loads on the frame:

I. Weight of the vehicle and the passenger, which causes vertical bending of the side members.

II. Vertical loads when the vehicle comes across a bump or hollow, which results in longitudinal torsion due to one wheel lifted (or lowered) with other wheels at the usual road level.

III. Loads due to road chamber, side wind and cornering force while taking a tern, which results in lateral bending of side members.

IV. Load due to wheel with road obstacles may causes that particular wheel to remain obstructed while the other wheel tends to move forward, distorting the frame to parallelogram shape.

V. Engine torque and braking torque tending to bend the side members in the vertical plane.

VI. Sudden impact loads during a collision, which may result in a general collapse.

3.1.3 Materials for frame: There are show many materials can be used for making frame like steel, iron. We are used mild steel for chassis.

3.1.4 Defects in frame: The only prominent defect that usually occurs in the frames due to accidents is the alignment fault. This may be checked by means of a plumb line. The vehicle is placed on a level surface and by suspending plumb line from four different points on each side of the frame their position on the ground is marked. The vehicle is then taken away and the diagonals are measured between corresponding points. These should not

differ by more than 7 or 8 mm. If any of the corresponding diagonals do differ by more than this amount, the frame is out of alignment. The possible cause then may be any one of the following:

i. The front cross or side members may be bent.

ii. Cross members may be faulty.

iii. Some rivets may be loose or broken.

If the damage of the frame members is small, they can be repaired by means of a hydraulic jack and swinging arms. If the damage is more the bent frame member may be heated to straighten it. Another alternative may be to cut the damaged part and weld a new one instead.

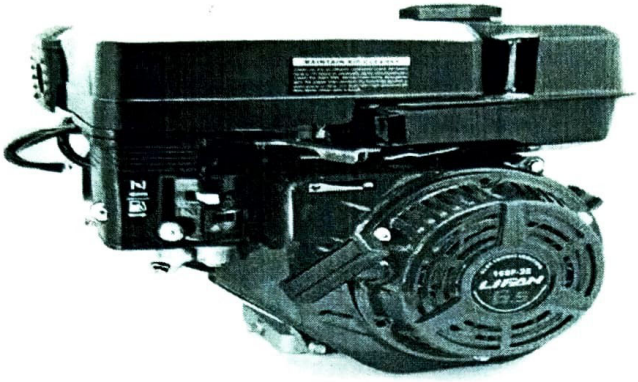


Fig 3.2 Engine

3.2 – ENGINE:

An engine of a go-kart is usually a small one. About 100-200cc. In this kart, we use a Kinetic Honda Single Cylinder 98cc 2-stroke petrol engine, which produces about 7.7 BHP of power at 5600rpm. We use 2-stroke engine because this is used for racing. So, there is no need of mileage.

3.2.1 Do go-kart engine work?

As the piston moves up and down, it rotates a large crank that's attached to the drive shaft via a gear. As the gear rotates, it spins the drive shaft, which in turn spins the go-kart's axle. The spinning of the drive shaft transfers torque from the motor's piston to the axle and ultimately to the go-kart's wheels.

3.2.2 List of Best Go-Kart Racing Engines:

- DuroMaxXP7HP (Score: 98%)
- Titan TX200 (Score: 97%)
- LifanLF168F-2BDQ (Score: 97%)
- Briggs and Stratton 550 Series (Score: 95%)
- Predator 6.5 HP (Score: 94%)

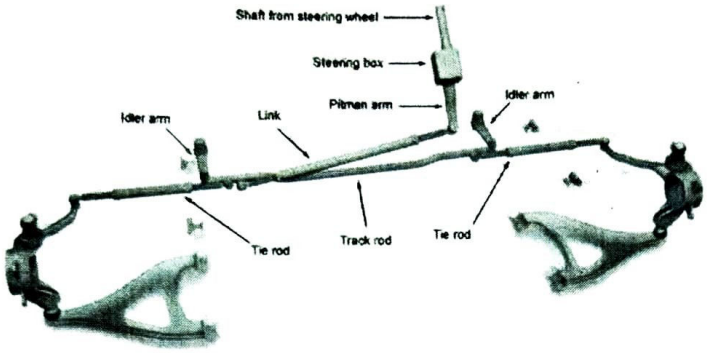


Fig 3.3 Steering system

3.3 – Steering System:

The steering system is of important part of the dynamic design of any automobile to facilitate a smooth change of directions and make use of the tires ability to generate lateral forces to the highest extent. A racing driver's sensory inputs supply visual, tactile, and inertial information used in developing a "feel" for car handling and performance. This feedback is necessary in enabling the driver to extract maximum performance from the race car. Hence the steering is an important feedback mechanism giving the driver information on stability and directional control. The control of an automobile is done by means of steering system which provides of directional changes to the moving automobile. The intention of Ackermann geometry is to prevent the tyres from slipping outwards when the wheels follow around a curve while taking a turn. The solution for this is that all wheels to have their axle settled as radii of circles with a common centre point. Since the rear wheel are fixed, this centre point must lie on a line extended from the rear axle. So, we need to intersect the front axle to this line at the common centre point. While steering, the inner wheel angle is greater than outer wheel angle. So, for obtaining different results we need to vary the parameters in order to obtain desired steering geometry.

The steering of go-kart is very sensitive. Because of lack of a differential, a kart's natural direction of travel, forwards, is very difficult to change. However, the two rear

wheels are attached by a solid axle, and must therefore move together, so in order to turn, one of the wheels need to skid over the track surface. In this kart we use a special kind of steering system, disc and link mechanism. This mechanism with modification is widely used in racing cars especially formula one cars.

In this system, the steering spindle is connected to a disk or plate and this disk is connected to the front two wheels using two links. When steering rotates, the disk also rotates and as a result, the link actuates and the wheel will turn according to the rotation of steering.

3.3.1 Principal of Steering:

- Maximum road bank angle is 20 degree
- Optimum kingpin inclination angle range is 4 degree to 8 degree.
- Front to rear weight ratio is 40:60.
- Taking acceleration due to gravity as 10m/s^2

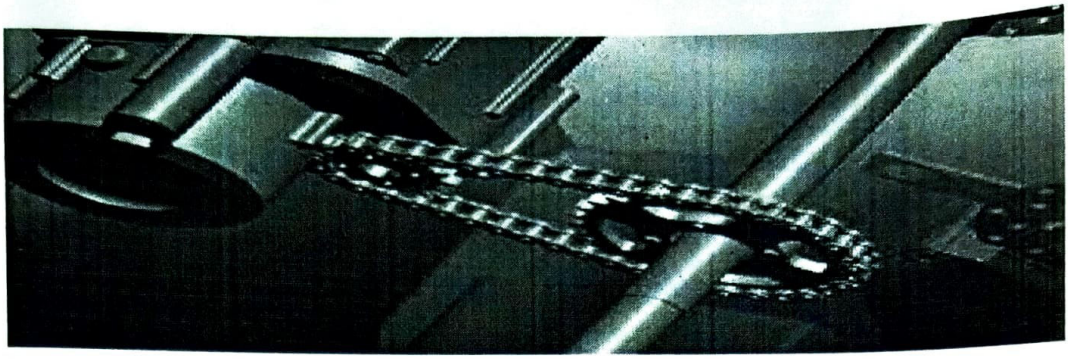


Fig 3.4 Transmission system

3.4 – TRANSMISSION SYSTEM:

Transmission is the device or machine that consists of power source and power transmission system, which provides controlled application of the power. Often the term transmission refers simply to the gear box that uses gears and gears trains to provide speed and torque conversion from a rotating power source to another machine device. The most common use is in the motor vehicle, where the transmission adapts the output of the internal combustion engine to the drive wheels. Such engines need to operate at a relatively high rotational speed, which is inappropriate for starting, stopping, and slower travel. The transmission reduces the higher engine speed to the slower wheel speed, increasing torque in the process. Often, a transmission has multiple gar ratios (or simply "gears") with the ability to switch between them as speed varies. This switching may be done manually or automatically.

Transmission means the whole of the mechanism that transmits the power from the engine crankshaft to the rear wheels. In this vehicle, the power from the engine is transmitted to the sprockets using chain, i.e. this is chain drive. The driver sprocket has 10 teeth and driven sprocket has 44 teeth. Usually, go-karts do not have a differential and so we eliminate differential from our vehicle also. And also, this go-kart has no clutch and gears because this is automatic transmission. Belt and Pulley type CVT issued in this kart. The power from the engine is transmitted to the rear two wheels using chain drive. We use chain drive because it is capable of taking shock loads.

3.4.1 Purpose of Transmission System:

There are three reasons for having a transmission in the automotive power train or drive train. The transmission can:

- Provide torque needed to move the vehicle under a velocity of road and load condition. It does this by changing the gear ratio between the engines and crankshaft and vehicle drive wheel.
- Be shifted into reverse so the vehicle can move backward.
- Be shifted into neutral for starting the engine and running it without turning the drive wheels.

3.4.2 Objective:

- To achieve maximum possible speed using gears.
- To achieve maximum torque at the starting and continues.
- To reduce the major and minor power losses.

3.4.3 Necessity of the Transmission:

- Variation of resistance to the vehicle motion at various speeds.
- Variation of attractive effort of the vehicle available at various speeds.
- It's provides torque needed to move the vehicle of road and load condition.

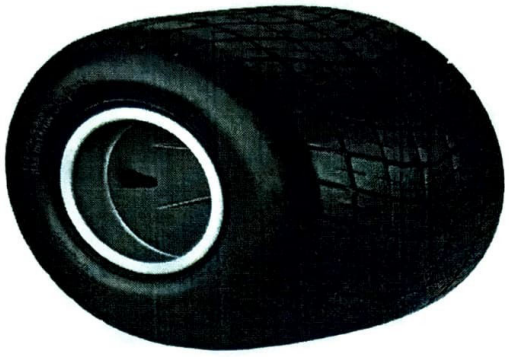


Fig 3.5 Tyres

3.5 - Tyres:

For go-kart, wheels and tyres are much smaller than those used on a normal car. The types will have increased grip and a hard one. And also, it can withstand the high temperature. In this kart, we use types having 15" diameter for front and for rear. This is used for an aerodynamic shape. The tyres must have pressure of at least128 psi.

3.5.1 Introduction:

The importance of which and tyres in automobile is obvious. Without the engine the car may be towed, but even that is not possible without the wheels. The wheels along the tyre has to take the vehicle load, provide a cushioning effect and cope with the steering control. The various requirement of automobile wheel is:

- It must be strong enough to perform the above function.
- It should be balanced both statically as well as dynamically.
- It should be lightest possible so that the un sprung the wheel easily.
- It should be possible to remove or mount the wheel easily.
- Its material should not deteriorate with weathering and age. In case, the materials are susceptible to corrosion, it must be given suitable protective treatment.

3.5.2 Types of tyres:

The use of solid tyre on automobile is now obsolete and only the pneumatic tyres are universally. There pneumatic tyres may be classified according of following consideration:

- Basic Construction
- Use
- Ability to run flat

3.5.3 Tyre specification:

1 – Tyre Width:

The 75 is the width of the tyre in mm, measured from sidewall. Since this measure is affected by the width of the rim, the measurement is for the tyre when it is on its intended rim size.

2 – Aspect Ratio:

This number tells you the height of the tyre, from the bead to the top of the tread. This is described as a percentage of the tyre width. In our example, the aspect ratio is 75, so the tyres height is 75 percent of its width, or 56.25mm (75*75 = 56.25 mm, or 2.25 in). The smaller the aspect ratio, the wider the tyre in relation to its height. Two tyres with different aspect ratio but the same overall diameter high performance tyres usually have a lower aspect ratio than other tyres. This is because tyres with a lower aspect ratio provide better lateral stability. When a car goes around a turn lateral forces are generated and the tyre must resist these forces. Tyres with a lower profile have shorter, stiffer sidewalls so they resist covering forces better.

3 – Rim Diameter:

This number specifies, in inches, the wheels rim diameter the tyre is designed for. The service description consists of two things.

4 – Calculating the Tyre Diameter:

Now that we know what these numbers mean, we can calculate the overall diameter of a tyre. We multiply the tyre width by the aspect ratio to get the height of the tyre. Tyre height = 75*75 percent = 56.25 mm (2.25") Then we add twice the tyre height to the rim diameter. 2*2.25 "+

[illegible]

4. CONCLUSION

While working on this internship we came across to know about the GO KARTS and evolution GO KARTS in India and the role of use of GO KARTS in foreign countries, future scope of GO KARTS and feasibility of a sustainable GO KART vehicle.

In this Internship we studied about the parts of GO KART like Chassis, Steering system, Transmission system, Tyres and calculations of tyre diameters, rim diameter, Types of tyres.

We have designed the chassis, engine, transmission system and other necessary parts required for making a GO KART in SOLIDWORKS software.

CERTIFICATE
OF PARTICIPATION

18765A0344

Sr No:AMZ/STP/2020/79241

This is to certify that

VEMULA DEVARAJA

of college / University

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

has completed

One-month Online Internship on Design and Developemnt of Go Kart

from ***22nd June 2020*** to ***22nd July 2020***

We wish him/her all the success in future.

Managing Director

AMZ TECHVERSITY

AMZ AUTOMOTIVE

INTERNSHIP REPORT

SUMMER INTERNSHIP AT AMZ AUTOMOTIVE

ABOUT GO-KART DESIGN AND DEVELOPMENT

An Internship Work report submitted to

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, KAKINADA

In partial fulfilment for the award of the Degree of

BACHELOR OF TECHNOLOGY

IN

MECHANICAL ENGINEERING

By

VEMULA DEVARAJA

(18765A0344)

Under the esteemed guidance of

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DEPARTMENT OF MECHANICAL ENGINEERING

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING (AUTONOMOUS)

(Approved by AICTE. Affiliated to JNTUK, KAKINADA. Accredited by NBA,

NAAC and an ISO 9001-2015 certified Institution)

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ANDHRA PRADESH

MAY/JUNE-2019

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

DEPARTMENT OF MECHANICAL ENGINEERING

CERTIFICATE

This is to certify that the INTERNSHIP report entitled **"GO-KART DESIGN AND DEVELOPMENT"** that is being submitted by **VEMULA DEVARAJA**bearing **18765A0344**in partial fulfilment for the award of the degree of Bachelor of Technology in Mechanical Engineering is a record of the internship work carried out by**him** under our guidance and supervision.

Internshipcoordinator

Head of theDepartment

Dr. S. Pichi Reddy

ACKNOWLEDGEMENT

The Satisfaction that accompanies that the successful completion of any task would be incomplete without the mention of the people whose cease less co-operation made it possible, whose constant guidance and encouragement crown all efforts withsuccess.

I humbly express my thanks to our management and Principal Dr. K. Appa Rao for extending his support for providing us with an environment to complete our internship successfully.

I indebted to our Head of the Department Dr. S. Pichi Reddy who modeled us both technically and morally for achieving greater success in life.

I humbly express my thanks to my guide Mr. K.V. Viswanadh for giving timely valuable suggestions and encouragement that make the completion of the internship successfully.

I am thankful to our internship coordinators MR.A.DHANUNJAY KUMAR for the excellent guidance, timely and valuable suggestions and encouragement that enabled the successfulcompletionof theinternship.

I would like to thank all the teaching and non- teaching staff members of Mechanical Engineering, who have extended their full co-operation during the course of this work.

I am thankful to my friends who helped me sharing knowledge and by providing material to complete the internship in time.

VEMULA DEVARAJA.
(18765A0344).

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CHAPTER – 1
INTRODUCTION OF THE COMPANY

AMZ Automotive is a pioneer in the field of providing practicality to the theoretical knowledge acquired by the engineers in the field of engineering. They offer internships and workshops to the students to implement the knowledge obtained by them in the real-world situations. They extract them out of the nutshell and let them face the real-world problems under the guidance of our phenomenal faculty members like, former F1 Marshall, Research Engineers, Rally Car Designers, IT expert, Automation Expert and Rally drivers who have years of experience in Industry.

They promote interactive and complete hands-on training in the Electric vehicle. Hybrid Vehicle, Autonomous car, ATV, Go-kart, Artificial Intelligence, Machine Learning, Automation and Formula prototype vehicles. They have evolved over the time and have taken a comprehensive approach to the latest studies. They have a well-formulated technical programme that includes academic lectures on Dynamics, CAD design, Design Analysis, Electrical Testing, Automation Testing, Machine learning, Artificial Intelligence, Fabrication, etc.

They organize participating internship in different colleges and provide specially Research and Development Learning to benefit the students and help them with all-round development. They focus on polishing not only their engineering skill but also in enhancing their team management and leadership skills. They provide the best environment to evolve engineering student's expertise in scientific understanding, technical competence, and diligent attention to detail, using workshop.

In the designing part they will be discuss about chassis designing and stress analysis of each component and design and vehicle in CAD software, 2D &3D sketching.

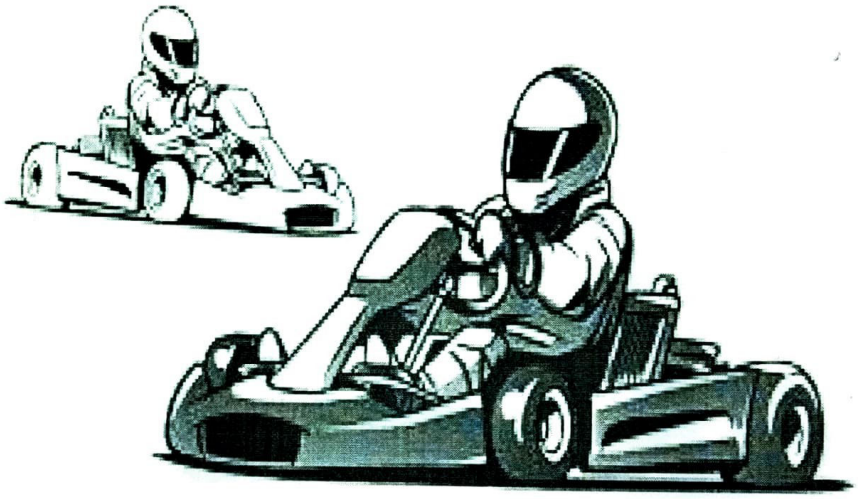
In the part of fabrication, they will be fabricating the vehicles from very scratch which includes Cutting and Bending of chassis members, welding grinding of chassis members, engine

Mounting wheel assembly, steering and suspension components, manufacturing, braking system installation, tire pressure calibration, cornering ability test and many more.

1.1 CERTIFICATION AND BENEFITS

- All the participants will get [illegible] certificate of Industrial Internship which is internationally valid
- Separate certificates will be provided for training & project
  - Goods (Materials) will be provided to the participating students according to their selection of course
  - Live Development based Practical Training by Industrial Experts
  - Interaction with various latest Industrial Tool & Technologies
- Curriculum has a less theory and more practical hands on experience
- We will get a chance to participate in the Research Project offer by the various company

CHAPTER – 2
INTRODUCTION OF THE PROJECT



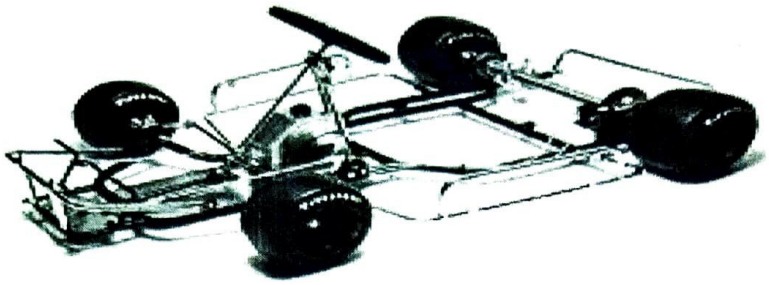


Fig 2.1 Go kart

In the 1950's group of tinkerers and thrill seekers in Southern California welded together a crude frame from steel tubing mounted it on wheels intended for wheels barrows, powered the contraption with a small 3 HP engine intended for lawn mowers and race it around the parking lot of the Rose Bowl in Pasadena. These vehicles, now called "go-karts" have grown into a multi-billion- dollar industry in the USA and throughout the developed world. They are made, sold, and used exclusively as recreational racers. They are not designed for transportation and it is illegal in most places to drive them on the road

These vehicles are typically 30" wide, 4 to 5 feet long and weight between 50 and 70 pounds. They are simple and inexpensive to build and operate and they can travel on rough terrain and roads at speed exceeding 20 miles per hour.It is estimated that large volume export OEM contracts could be negotiated somewhere near half this amount. Alternate Asian sources particularly China or S.korea might yield lower cost design.Chinese- made 4-cycle irrigation pump engine are widely available in Asia for around $100 and these may be substitude for lawn power engines design. An additional consideration in favor of the irrigation pump engines is that 4- cycle engines are less polluting and many countries in Asia are phasing out the use of 2 cycle engines for that reason.

Normally a 30" wheel base is used with 1" by 36" threaded axles and 3 to 6 inches of ground clearence depending on the type of terrain the vehicel is expected to traverse. A very elementary steering system of the tie-and-rod variety is sufficient. Brakes may be 4-1/2inch band or drum design 8" to 14" standard wheels from the garden supply industry may be utlized. The other significant components are the clutch and sprocket assembly, bearings and throttle control assembly.

Even in their most primitive forms go karts may be adapted as transportation technology in developing countries to leverage economic growth and poverty alleviation. Go karts offer a simple and inexpensive technology that meets many rural transportation needs. The technology is a bridge between simple pushcarts and rickshaws on one hand and the automobile and truck technology designed to western specifications on the other. The relative inefficiency of the former technology is very cause of poverty in many areas while the cost and technology burden of the latter make them inaccessible to the poor.

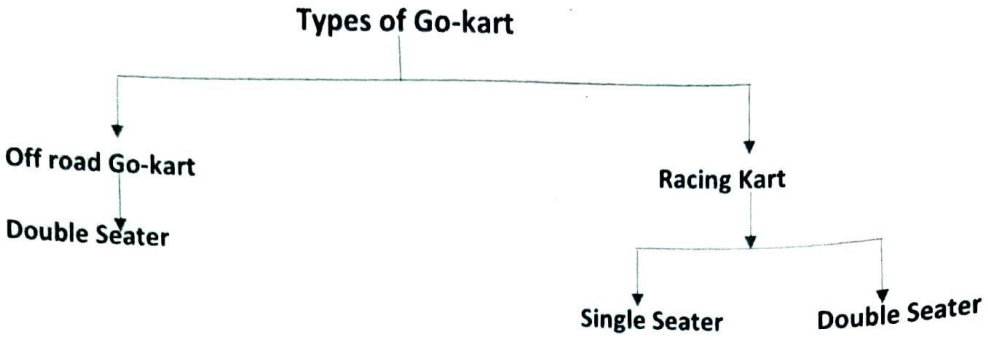
There are many motors sports in the world. Bikes, cars, Formula one is example of them. The drivers in these are very professional and accurate. They can drive it very fast. But there are also motors sports which do not need professional drivers and no need to high speed. The vehicle used are also very cheap. Such as A motor sports in Go karting. They reassemble to the formula one cars but it is not as faster as F1 and also cost is very less. The drivers in go-karting are also not professionals. Even children can also drive it. Go-karts have 4 wheels and a small engine. They are widely used in racing in US and they are getting popular in India.

2.1 Scope of the Project:

Go-Kart is a big craze to the Americans and Europeans. It is initially created in United States in 1950 and used as a way to pass spare time. Gradually it became a big hobby and other countries followed it. In India Go-karting is getting ready to make waves. A racing track is ready in Nagpur for Go-karting and Chennai is also trying to make one.

Indian companies are also producing go-karts in small scale. MRF and Indus motors are the major bodies in karts and they are offering karts between 1 lakh and 3 lakhs. But to make go-kart popular, the price most come down. For that, many people are trying to build one under 1 lakh ad we had also take up the challenge. A go-kart just under Rs.25000/- so, we are sure that our project will have a high demand in the industry and we are hoping to get orders from the racing guns.

2.2 ABOUT GO-KARTS:



Go-kart is a simple four-wheeled, small engine, single seat racing car used mainly in United States. They were initially created in the 1950s. Post -war period by airmen as a way to pass spare time. Art generally accepted to be the father of karting. He built the first kart in Southern California in 1956. From them, it is being popular all over America and also Europe.

A Go-kart by definition, has no suspension and no differential. They are usually raced on scaled down tracks, but the sometimes driven as entertainment or as a hobby by non-professionals. Karting is commonly perceived as the sleeping shone to the higher and more expensive ranks of motor sports. Kart racing is generally accepted as the most economic form of motor sport available. As a free-time activity, it can be performed by almost anybody and permitting licensed racing for anyone from the age of 8 onwards.

Kart racing is usually used as a low-cost and relatively safe way to introduce drivers to motor racing. Many people associate it with young drivers, but adults are also very active in karting. Karting is considered as the first step in any serious racers career. It can prepare the driver for high-speed wheel-to-wheel racing by helping develop guide reflexes, precision car control and decision-making skills. In addition, it brings an awareness of the various parameters that can be altered to try to improve the competitiveness of the kart that also exist in other forms of motor racing.

2.3 GO-KART IN INDIA:

Go-kart emerged in India in 2003 from MRF, which has a 250cc two-stroke engine, which produce 15bhp of power, which costs around3 lakh Indus Motors are also offering Go-karts for 1 lakh to 3 lakhs. There are racing tracks in Nagpur for Go-karting, which is known as the home of go-karts in India. Many people take part in the racing and it's getting popular.

2.4. GO-KART IN FOREIGN COUNTRIES:

Go-karts in foreign countries have much more performance than the Indians. One type is a single engine 160cc 4-stroke kart with a maximum speed of around 40mph and second type is twin-engine 320cc 4-stroke kart used in outdoor with a maximum speed of 70mph. There are hundreds of racing tracks in US for karting and also, they are much more professional than the Indians.

2.5 FUTURE SCOPE OF GO-KARTS:

In future the scope of go-karts can develop by using 4-stroke engine. Bio-fuels which are of low cost can be used in place of petrol. Solar Energy can also utilize by solar panels where they are pollution free with moderate cost. Suspensions system can also be added in system to lower vibrations and shocks.

2.6 FEASIBILITY OF A SUSTAINABLE GO-KART:

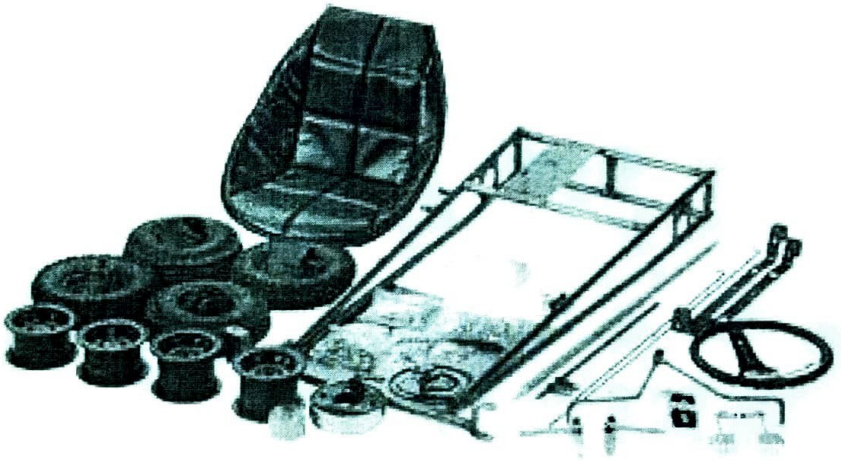
The necessary conditions for sustainability of a go-kart project for rural development include economic, social, and technical issues. Some of the question that must be addressed include the following:

- ✓ **Transport Infrastructure:** Can the existing rural road network be used by go-karts?
- ✓ **Demand for new services:** Will the villages use this technology? Do they need it?
- ✓ **Financial feasibility:** Will capital be available for investment in go-kart manufacturing?
- ✓ **Financial feasibility:** Can the villagers afford to purchase, operate, and maintain go-karts? Will credit be available?
- ✓ **Economic feasibility:** Will the use of go-karts by villagers increase their standard of living?
- ✓ **Technical feasibility:** Does the technical expertise exist among villagers to operate and maintain the machines?
- ✓ **Industrial feasibility:** Does an industrial infrastructure exists that can supply parts and labour for the manufacture of go-karts?
- ✓ **Political feasibility:** Will go-karts and their environmental and economic impact on rural life be acceptable to those in power?
- ✓ **Social feasibility:** Will the new technology be adopted as an integral part of the rural society and will benefits of improved transport reach all sections of the community? Will it help the poor?

A well-developed cottage industry infrastructure exists in Bangladesh even in rural areas for the introduction of go-karts technology. Both machine shops and welding shops may be found at most small population centre throughout the country and the operator are skilled in their work. Small two-cycle engines have been adapted for urban and the rural transport as "Baby tax" and "Tempos" throughout the country. These are three-wheeled passenger as well as freight vehicles. Their maintenance and chassis manufacture are a wide-scale cottage industry in urban and rural areas.

CHAPTER – 3

PARTS OF GO-KARTS



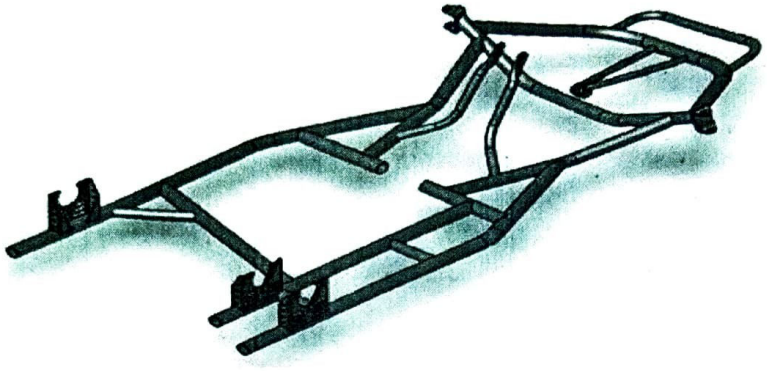


Fig3.1: Chassis

3.1 - CHASSIS:

The Chassis is an extremely imported element of the go-kart, as it must provide, via flex, the equivalent of suspension to give good grip at the front. Karts have no suspension, and are usually no bigger than is needed to mount a seat for the driver and a small engine. Chassis construction is normally of a square tube construction typically MS with different grades. In this go-kart we use MS tube with 1" diameter. The chassis support the power unit, power train, the running system etc.

3.1.1 The Chassis Construction:

The Chassis of a Go-Kart consists of following components suitably mounted:

I. Engine
II. Transmission system consisting of the chain sprocket, rear axle.
III. Road Wheels
IV. Steering System
V. Brake
VI. Fuel Tank

All the components listed above are mounted on the conventional construction, in which a separate frame is used and the frameless or unitary construction in which no separate frame is employed.

3.1.2Conventional Construction: In this type of chassis construction the frame is the basic unit to which various components are attached and body is bolted onto the frame later on.

Function of the frame:

I. To Support the chassis components and body.

II. To withstand static and dynamic loads without under deflection or distortion.

Loads on the frame:

I. Weight of the vehicle and the passenger, which causes vertical bending of the side members.

II. Vertical loads when the vehicle comes across a bump or hollow, which results in longitudinal torsion due to one wheel lifted (or lowered) with other wheels at the usual road level.

III. Loads due to road chamber, side wind and cornering force while taking a tern, which results in lateral bending of side members.

IV. Load due to wheel with road obstacles may causes that particular wheel to remain obstructed while the other wheel tends to move forward, distorting the frame to parallelogram shape.

V. Engine torque and braking torque tending to bend the side members in the vertical plane.

VI. Sudden impact loads during a collision, which may result in a general collapse.

3.1.3 Materials for frame: There are show many materials can be used for making frame like steel, iron. We are used mild steel for chassis.

3.1.4 Defects in frame: The only prominent defect that usually occurs in the frames due to accidents is the alignment fault. This may be checked by means of a plumb line. The vehicle is placed on a level surface and by suspending plumb line from four different points on each side of the frame their position on the ground is marked. The vehicle is then taken away and the diagonals are measured between corresponding points. These should not

differ by more than 1 or 2 mm. If any of the corresponding diagonals do differ by more than this amount, the frame is out of alignment. The possible cause then may be any one of the following

I. The depth cross or sub members may be bent

II. Cross members may be bulged

III. Some rivets may be loose or broken

If the damage of the frame members is small, they can be repaired by means of a hydraulic jack and wringing cross. If the damage is more the bent frame member may be heated to straight it. Another alternative may is can be damaged part and weld a new one instead

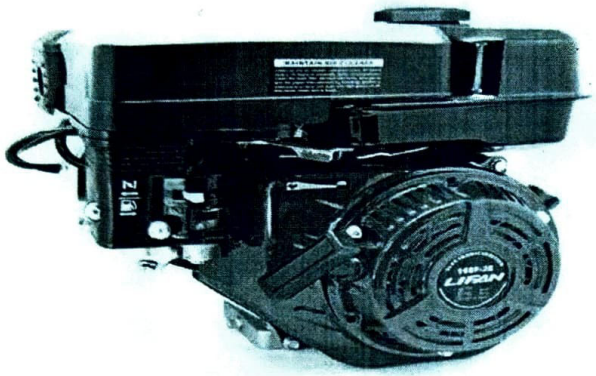


Fig 3.2 Engine

3.2 – ENGINE:

An engine of a go-kart is usually a small one. About 100-200cc. In this kart, we use a Kinetic Honda Single Cylinder 98cc 2-stroke petrol engine, which produces about 7.7 BHP of power at 5600rpm. We use 2-stroke engine because this is used for racing. So, there is no need of mileage.

3.2.1 Do go-kart engine work?

As the piston moves up and down, it rotates a large crank that's attached to the drive shaft via a gear. As the gear rotates, it spins the drive shaft, which in turn spins the go-kart's axle. The spinning of the drive shaft transfers torque from the motor's piston to the axle and ultimately to the go-kart's wheels.

3.2.2 List of Best Go-Kart Racing Engines:

- DuroMaxXP7HP (Score: 98%)
- Titan TX200 (Score: 97%)
- LifanLF168F-2BDQ (Score: 97%)
- Briggs and Stratton 550 Series (Score: 95%)
- Predator 6.5 HP (Score: 94%)

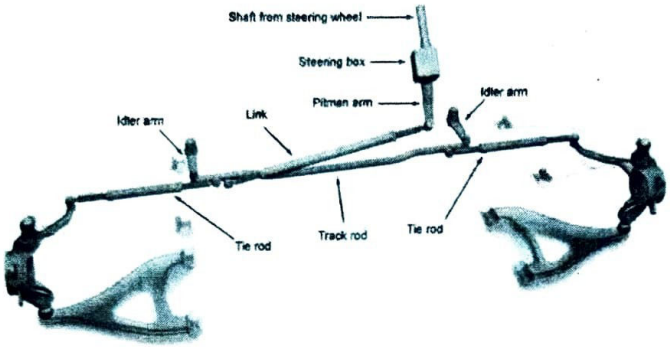


Fig 3.3 Steering system

3.3 – Steering System:

The steering system is of important part of the dynamic design of any automobile to facilitate a smooth change of directions and make use of the tires ability to generate lateral forces to the highest extent. A racing driver's sensory inputs supply visual, tactile, and inertial information used in developing a "feel" for car handling and performance. This feedback is necessary in enabling the driver to extract maximum performance from the race car. Hence the steering is an important feedback mechanism giving the driver information on stability and directional control. The control of an automobile is done by means of steering system which provides of directional changes to the moving automobile. The intention of Ackermann geometry is to prevent the tyres from slipping outwards when the wheels follow around a curve while taking a turn. The solution for this is that all wheels to have their axle settled as radii of circles with a common centre point. Since the rear wheel are fixed, this centre point must lie on a line extended from the rear axle. So, we need to intersect the front axle to this line at the common centre point. While steering, the inner wheel angle is greater than outer wheel angle. So, for obtaining different results we need to vary the parameters in order to obtain desired steering geometry.

The steering of go-kart is very sensitive. Because of lack of a differential, a kart's natural direction of travel, forwards, is very difficult to change. However, the two rear

wheels are attached by a solid axle, and must therefore move together, so in order to turn, one of the wheels need to skid over the track surface. In this kart we use a special kind of steering system, disc and link mechanism. This mechanism with modification is widely used in racing cars especially formula one cars.

In this system, the steering spindle is connected to a disk or plate and this disk is connected to the front two wheels using two links. When steering rotates, the disk also rotates and as a result, the link actuates and the wheel will turn according to the rotation of steering.

3.3.1 Principal of Steering:

- Maximum road bank angle is 20 degree
- Optimum kingpin inclination angle range is 4 degree to 8 degree.
- Front to rear weight ratio is 40:60.
- Taking acceleration due to gravity as 10m/s^2

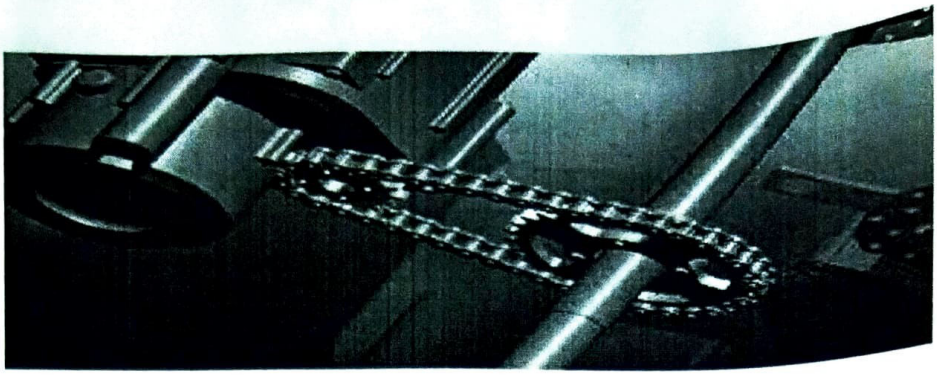


Fig 3.4 Transmission system

3.4 – TRANSMISSION SYSTEM:

Transmission is the device or machine that consists of power source and power transmission system, which provides controlled application of the power. Often the term transmission refers simply to the gear box that uses gears and gears trains to provide speed and torque conversion from a rotating power source to another machine device. The most common use is in the motor vehicle, where the transmission adapts the output of the internal combustion engine to the drive wheels. Such engines need to operate at a relatively high rotational speed, which is inappropriate for starting, stopping, and slower travel. The transmission reduces the higher engine speed to the slower wheel speed, increasing torque in the process. Often, a transmission has multiple gar ratios (or simply "gears") with the ability to switch between them as speed varies. This switching may be done manually or automatically.

Transmission means the whole of the mechanism that transmits the power from the engine crankshaft to the rear wheels. In this vehicle, the power from the engine is transmitted to the sprockets using chain, i.e. this is chain drive. The driver sprocket has 10 teeth and driven sprocket has 44 teeth. Usually, go-karts do not have a differential and so we eliminate differential from our vehicle also. And also, this go-kart has no clutch and gears because this is automatic transmission. Belt and Pulley type CVT issued in this kart. The power from the engine is transmitted to the rear two wheels using chain drive. We use chain drive because it is capable of taking shock loads.

3.4.1 Purpose of Transmission System:

There are three reasons for having a transmission in the automotive power train or drive train. The transmission can:

- Provide torque needed to move the vehicle under a velocity of road and load condition. It does this by changing the gear ratio between the engines and crankshaft and vehicle drive wheel.
- Be shifted into reverse so the vehicle can move backward.
- Be shifted into neutral for starting the engine and running it without turning the drive wheels.

3.4.2 Objective:

- To achieve maximum possible speed using gears.
- To achieve maximum torque at the starting and continues.
- To reduce the major and minor power losses.

3.4.3 Necessity of the Transmission:

- Variation of resistance to the vehicle motion at various speeds.
- Variation of attractive effort of the vehicle available at various speeds.
- It's provides torque needed to move the vehicle of road and load condition.

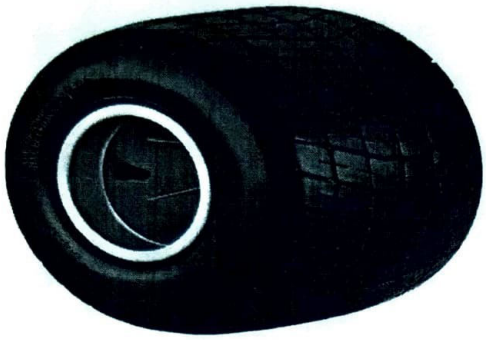


Fig 3.5 Tyres

3.5 - Tyres:

For go-kart, wheels and tyres are much smaller than those used on a normal car. The types will have increased grip and a hard one. And also, it can withstand the high temperature. In this kart, we use types having 15" diameter for front and for rear. This is used for an aerodynamic shape. The tyres must have pressure of at least128 psi.

3.5.1 Introduction:

The importance of which and tyres in automobile is obvious. Without the engine the car may be towed, but even that is not possible without the wheels. The wheels along the tyre has to take the vehicle load, provide a cushioning effect and cope with the steering control. The various requirement of automobile wheel is:

- It must be strong enough to perform the above function.
- It should be balanced both statically as well as dynamically.
- It should be lightest possible so that the un sprung the wheel easily.
- It should be possible to remove or mount the wheel easily.
- Its material should not deteriorate with weathering and age. In case, the materials are susceptible to corrosion, it must be given suitable protective treatment.

Types of tyres:

use of solid tyre on automobile is now obsolete and only the pneumatic tyres are ersally. There pneumatic tyres may be classified according of following consideration:

- Basic Construction
- Use
- Ability to run flat

5.3 Tyre specification:

– Tyre Width:

he 75 is the width of the tyre in mm, measured from sidewall. Since this measure is affected y the width of the rim, the measurement is for the tyre when it is on its intended rim size.

2 – Aspect Ratio:

This number tells you the height of the tyre, from the bead to the top of the tread. This is described as a percentage of the tyre width. In our example, the aspect ratio is 75, so the tyres height is 75 percent of its width, or 56.25mm (75*75 = 56.25 mm, or 2.25 in). The smaller the aspect ratio, the wider the tyre in relation to its height. Two tyres with different aspect ratio but the same overall diameter high performance tyres usually have a lower aspect ratio than other tyres. This is because tyres with a lower aspect ratio provide better lateral stability. When a car goes around a turn lateral forces are generated and the tyre must resist these forces. Tyres with a lower profile have shorter, stiffer sidewalls so they resist covering forces better.

3 – Rim Diameter:

This number specifies, in inches, the wheels rim diameter the tyre is designed for. The service description consists of two things.

4 – Calculating the Tyre Diameter:

Now that we know what these numbers mean, we can calculate the overall diameter of a tyre. width by the aspect ratio to get the height of the tyre. Tyre height = 75*75 height to the rim diameter. 2*2.25 "+

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Now that we know what these numbers mean, we can calculate the overall diameter of a tyre. We multiply the tyre width by the aspect ratio to get the height of the tyre. Tyre height = 75*75 percent = 56.25 mm (2.25") Then we add twice the tyre height to the rim diameter. 2*2.25 "+

the diameter will decrease.

4. CONCLUSION

While working on this internship we came across to know about the GO KARTS and evolution GO KARTS in India and the role of use of GO KARTS in foreign countries, future scope of GO KARTS and feasibility of a customizable GO KART vehicle.

In this Internship we studied about the parts of GO KART like Chassis, Steering system, Transmission system, Tyres and calculations of tyre diameters, rim diameter, Types of tyres.

We have designed the chassis, engine, transmission system and other necessary parts required for making a GO KART in SOLIDWORKS software.

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Date: 29-06-2019

CERTIFICATE

This is to certify that **Mr. AINALA NAGARJUNA (Regd. No. 18761E0001)** MBA student from **"LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING"**, Mylavaram, Krishna Dist.. He has successfully completed his project work in our organization **"A STUDY ON WORKING CAPITAL THROUGH RATIO ANALYSIS"**, during the period **27-05-2019 to 24-06-2019** as a partial fulfillment for the award of Master of Business Administration.

For HETERO DRUGS LIMITED

HETERO DRUGS LIMITED CORPORATE OFFICE HYDERABAD-18.

(CH. SURYA NARAYANA)
Asst. Manager

Factory : Survey No.2013, 214 and 255, Bonthapally Village, Jinnaram Mandal, Medak Dist. -502 313, Telangana, INDIA
Phone : 0091-8458-275271, 275314, 2752777

HETERO DRUGS LIMITED

"Hetero Corporate", 7-2-A2, Industrial Estates, Sanath Nagar, Hyderabad-500 018, Telangana, India
Tel : 0091-40-23704923/24/25, Fax : 0091-40-23704035, 23813359
Email : contact@heterodrugs.com URL : http/www.heterodrugs.com

Date: 24-05-2019

To the Principal
Lakireddy Balireddy College of Engineering,
Mylavaram, Krishna Dist.

Sub : Project Work of MBA Student – Permission

We are giving permission to do the project work on **"A STUDY ON WORKING CAPITAL THROUGH RATIO ANALYSIS"** in our organization to **Mr. AINALA NAGARJUNA (Roll No. 18761E0001)** from **27-05-2019 to 24-06-2019.**

We wish all the Best.

For HETERO DRUGS LIMITED

HETERO DRUGS LIMITED * CORPORATE OFFICE * HYDERABAD-18. *

(CH. SURYA NARAYANA)
Asst. Manager

Factory : Survey No.2013, 214 and 255, Bonthapally Village, Jinnaram Mandal, Medak Dist. -502 313, Telangana, INDIA
Phone : 0091-8458-275271, 275314, 2752777

BIG BAZAAR

Is se *sasta* aur *accha* kahin nahi!

future group

Udhna hai Aaj Abhi

Date: 24th June, 2019

CERTIFICATE

This is to certify that **Ms. ATLURI BHAVANI** a student from **"Lakireddy Balireddy College of Engineering", Mylavaram,** bearing **Roll No: 18761E0002** has completed the project on **"Customer Satisfaction"** as a partial fulfillment for award of her **MBA** in our Organization from 24th May, 2019 to 24th June, 2019.

During the above training program the student has been associated with various department and activity contributed to experimental learning process.

BIG BAZAAR • HYDERABAD •

R. Rajender Reddy

(General Manager)

BIG BAZAAR

Is se *sasta* aur *accha* kahin nahi!

CONFIRMATION LETTER

TO,

THE HEAD OF THE DEPARTMENT,

LAKKI REDDY BALI REDDY COLLEGE,

MYLAVARAM - 521230.

Dear Sir & Madam

This is further to discussion with your student **Ms.BHAVANI ATLURI** hall ticket no. **18761E0002** MBA (Marketing). We are pleased to accept and provide permission for doing project at concern for the project title on "**A STUDY ON CUSTOMER SATISFACTION"** for the period of 30 days. Under the guidance of **Mr. D.KAMAL** during this project period, she will be designated as "trainee".

Detailed materials and scope of her project will be provided to her on her first day of training at the company. Upon successful completion of training she will be issued a certificate. She will be required to submit a copy of the detailed project report before issuing the certificate to the student.

This training period with our company will entail dealing with important and sensitive information records and such other matters of the company. She will, therefore, be required to sign a "code of conduct and secrecy agreement" of our company on the first day training.

Thanks & Regards.

BEHALF OF: - BIG BAZAAR PVT LTD.

D.KAMAL

Sr.Marketing Manager

Big Bazaar Hyderabad

Heritage FOODS (INDIA) LIMITED

Date: 23/06/2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Mr. AVULA SRIKANTH**, bearing Hall ticket no: 18761E0003, MBA. **LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING (AUTONOMOUS)**, MYLAVARAM, KRISHNA (DT), has successfully completed his project on **"RURAL MARKETING "** as part of the Academic course circular in our organization.

He has done the project during the period 27/05/2019 to 23/06/2019, under the guidance of **Mr. RAGHUNATH**, Asst. Manager Marketing, in **HERITAGE FOODS (INDIA) LIMITED**, Hyderabad.

He has completed the assigned project well within the time frame. He is sincere, hard working and his conduct during the period is commendable.

We wish all the best in his future endeavors.

For Heritage Foods (India) Limited,

Asst. Manager Marketing.

RAGHUNATH

Heritage Foods (India) Limited: 6-3-541/C, Panjagutta, Hyderabad-500 082, Tel: 040-2339 1221 Fax: 040-3068 5458, Email: hfil@heritagefoods.co.in

03

HEALTH Heritage HAPPINESS

Heritage FOODS(INDIA)LIMITED

To,

The Principal,

LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING (AUTONOMOUS),
Mylavaram,

Krishna (Dt).

Dear Sir / Madam,

Sub: - Academic Project – **Rural Marketing**

Ref: - **AVULA SRIKANTH**, Roll No: **18761E0003**

Accepting your letter, giving permission to do Academic Project with **Heritage Foods (India) Limited**. **Mr. Avula Srikanth**, will be given work In-house & field project with full support and knowledge within the time frame during the period 27/05/2019 to 23/06/2019.

For Heritage Foods (India) Limited,

HERITAGE FOODS (I) LTD

Asst. Manager Marketing.

RAGHUNATH

AUTOFIN LTD TATA MOTORS

Ref: HR/TATA/2019/

Date: 23/06/2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that **Mr. BHADRADRI SAI MEGHANA (H.T. No.: 18761E0004),** a student of M.B.A, (Marketing) of **LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING (AUTONOMOUS),** MYLAVARAM, KRISHNA (DT), has done his project work on the subject name of **"SALES & PROMOTIONAL ACTIVITIES"** of our organization from 27/05/2019 to 23/06/2019, At Hyderabad,

During the period of his project work with us, we found his conduct and character are Good.

We wish good luck and all the best in his Career.

Thanks & Regards,

(KRANTHI T)

Sr. Asst. Manager (IR & HR)

Autofin Ltd TATA Motors

Address: 140, PG Road, Paradise, Secunderabad, Hyderabad- 500003, Opposite Wesley Junior College **Phone:** (040) 27847112, (040) 27847113

AUTOFIN LTD TATA MOTORS

To,

The Principal,

LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING (AUTONOMOUS),

Mylavaram,

Krishna (Dt).

Sub: - Permission to undertake Project Work on Marketing

(SALES & PROMOTIONAL ACTIVITIES)

Dear Sir / Madam,

With reference to your letter we pleased to inform you that **Ms. BHADRADRI SAI MEGHANA (18761E0004)**, MBA of your college is permitted to execute a project in our organization for a period of 27/05/2019 to 23/06/2019.

Kindly note that no stipend or conveyance expenses shall be given, during the Project work.

Thanks & Regards,

(KRANTHI T)

Sr. Asst. Manager (IR & HR).

Autofin Ltd TATA Motors

Address: 140, PG Road, Paradise, Secunderabad, Hyderabad- 500003, Opposite Wesley Junior College **Phone:** (040) 27847112, (040) 27847113

Sharekhan

Date: 13/07/2019

To
The Head of the department,
Lakireddy Balireddy College of Engineering,
Mylavaram,

Sub: Project Work Completion

Dear Sir/Madam,

We are pleased to inform you that your student **Mr. BOBBARAPALLI SRI VAMSI, Regd.No. 18761E0005** of MBA has successfully completed the Project required for the curriculum of MBA Programme on the Topic **"A STUDY ON PERFORMANCE OF TOP FIVE MUTUAL FUNDS"** in our organization for a Period from 27-05-2019 to 23-06-2019.

Yours faithfully.
For SHAREKHAN LIMITED,

(SYAM PRASAD PUVVADA)
Branch In Charge

SHAREKHAN LIMITED
VIJAYAWADA

SHAREKHAN LIMITED

Sharekhan
www.sharekhan.com

Date: 23/05/2019

To

The Professor & Head of the department,
School of Management Studies,
Lakireddy Bali Reddy College of Engineering,
Mylavaram.

Sub: Permission for Academic Project Internship

Dear Sir//Madam,

With reference to your letter, we are pleased to inform you that your student **Mr. BOBBARAPALLI SRI VAMSI, RollNo. 18761E0005,** of MBA has given permission for the Project work in our Organization in the area of Finance department for a Period from 27.05.2019 to 23.06.2019.

Yours faithfully.
For SHAREKHAN LIMITED,

SHAREKHAN LIMITED ★ VIJAYAWADA-10. ★

(SYAM PRASAD PUVVADA)
Branch In Charge

MARUTI SUZUKI ARENA

06

TO WHOM – SO - EVER IT MAY CONCERN

This is to certify that **Mr. B Ajay Babu** S/o **Srinivas Reddy** bearing Enrolment Roll **No. 18761E0006** studying MBA in Lakireddy Bali Reddy College of Engineering, Mylavaram has successfully completed his **Summer Project Internship** from **27.05.2019 to 23.06.2019**

We found him to be honest & his character and conduct are satisfactory.

for Gem Motors India Pvt. Ltd.

GEM Motors India Pvt. Ltd. Hyderabad

MANAGER-HR

Date: 24.06.2019

MARUTI SUZUKI ARENA

06

To

The Principal,

LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING (AUTONOMOUS),

Mylavaram,

Krishna (Dt)

Dear Sir / Madam,

Sub: - MBA Academic Project Permission

Ref: - **Mr. B. Ajay Babu** , Roll No: **18761E0006**

Accepting your letter, giving permission to do Academic Project with Our Organization . **Mr. B. Ajay Babu** , will be given work In-house & field project with full support and knowledge within the time frame of 27/05/2019 to 23/06/2019.

for Gem Motors India Pvt. Ltd.

GEM Motors India Pvt. Ltd. Hyderabad

MANAGER-HR

Survey No. 64, Hitech City, Madhapur, Kondapur, Hyderabad - 500 084. Ph.: 040 - 40 50 60 70, E-mail: gem.hyd.sm1@marutidealers.com
CIN: U34300AP2007PTC052591 | GST: 36AACCG7660H1ZH

Ref: AIRTEL/PROJ—MARKETING/2019/ Date:23/06/2019

TO WHOM SO EVER IT MAY CONCERN

This is to certify that Mr. BOLLAREDDY JAGADEESH, (H.T. No.: 1876IE 0007), of **(MBA),** LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING (AUTONOMOUS), MYLAVARAM, KRISHNA (DT), has successfully completed the project titled **"A STUDY ON THE IMPACT OF BRAND EUITY OF SALES & AVERTISING AT AIRTEL", Hyderabad, for partial fulfillment of his** MBA from 27/0 5/2019 to 23/06/2019.

His conduct is good.

We wish him good luck and all the best in his future endeavors.

For Airtel Services Limited,

RAVI KUMAR
Asst. Manager Marketing.

6-3-1192/1, 8''' Floor Block A, White House, Kundan Bagh, Begumpet, Hyderabad — 5000 016

Tel : 040-30261515, www.airtel.com, Email : info@airtel.com

07

Ref: AIRTEL/PROJ-MARKETING/

To

The Principal,

LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING (AUTONOMOUS),

Mylavaram,

Krishna (Dt) .

Dear Sir / Madam,

Sub: - MBA Program– Project Work – REG.

This is with reference to your letter, we are pleased to accept your letter and provide permission for doing project at our concern for **Mr. BOLLAREDDY JAGADEESH,** Reg. No: **18761E0007,** of Lakireddy Balireddy College Of Engineering (Autonomous), for the duration of 27/05/2019 to 23/06/2019, with the subject name of **"SALES & ADVERTISING".**

For Airtel Services Limited,

AIRTEL SERVICES HYD.

RAVI KUMAR

Asst. Manager Marketing.

APHMEL
(An ISO 9001 : 2015 Company)
Subsidiary of The Singareni Collieries Company Limited (A Government Company)

ANDHRA PRADESH HEAVY MACHINERY AND ENGINEERING LTD. Kondapalli 521 228

REF APHMEL/PER/2020/ 9/1

Dt 21 05 2020

CERTIFICATE

This is to certify that Ms Chitneni Mounica, Regd No 18761E0010, MBA student of Lakkireddy Bali Reddy College of Engineering (Autonomous), Mylavaram, Krishna District has undergone Project Work in M/s. Andhra Pradesh Heavy Machinery Engineering Ltd Kondapalli, at our HR Department on "**A STUDY ON EMPLOYEE JOB SATISFACTION**" from 25.05.2019 to 23.06.2019.

During the above training period her attendance, behavior and performance found to be Satisfactory

CHIEF (PERSONNEL)

A.P. HEAVY MACHINERY & ENGG. LTD. KONDAPALLI PIN 521 228

CIN U29219 AP1976 SGC 002071
Phones: 0866 - 2872241, 42, 43 & 2871190, FAX 0866 - 2871350
E-Mail aphmel@gmail.com Visit us at www.aphmel.com
Regd Office & Factory APHMEL, KONDAPALLI – 521 228, A.P. India

ANDHRA PRADESH HEAVY MACHINERY AND ENGINEERING LTD.

Ref No APHMEL/PER/2019/111

Dt 16.05.2019

Dr A Adhisesha Reddy,
Lakireddy Bali Reddy College of Engineering,
Mylavaram-521 230.

Sub Permission for Internship – Reg
Ref Yr Lr., Dt.18.04.2019

.. .. ..

01 Further reference to your letter cited above, permission is here by accorded to **Ms. Regala Hima Bindu, Regd.No:18761E0043, Ms.Maddali Rama Devi Regd.No:18761E0025, Ms.Chitineni Mounika Regd.No:18761E0010, & Ms.Dadi Praneetha, Regd No:18761E0012** MBA Students of your college to undergo Internship in H R/Marketing/Finance from 27.05.2019 to 23.06.2019 subject to the following terms and conditions.

a Your students have to pay an amount of Rs.2360/- (Including GST) per person towards Fee for undergoing Industrial Training/ Project Work
b The permission so accorded shall not be detrimental to the working of the Company.
c The facility to undergo industrial training is accorded as a part of your curriculum and at your request.
d The facility are extended to your student entirely at your own risk and APHMEL shall not in any way be responsible for any injury or mishap occurring during the period of project work and your student shall not be entitled for payment of compensation/benefit under the Employees Compensation Act, 1923.
e Your students are not eligible for payment of T.A & D.A.
f Any damage to APHMEL Property on account of your students shall be made good by your college.
g Your students are expected to remain at work spot during the working hours.
h Your students are not eligible for payment of stipend / honorarium / remuneration for Industrial Training.
i Your student shall abide by the rules and regulations of Company Officials issued from time to time.
j Your students are execute an Indemnity Bond individually on a stamped paper worth of Rs.5/- at time of joining.
k Your students should follow all the safety precautions.

02 If the above terms and conditions are acceptable to your students, you may depute them for undergoing internship from 27.05.2019.

CHIEF (PER., ADMN & VIG)

Student Through - Head of Department
Lakireddy Bali Reddy College of Engineering

CC to MD for kind information
CBD/CFO
SMP/SPP/SMK/SDN
ASI

Angel Broking Pvt. Ltd.

Date: 13/07/2019

To
The Head of the department,
Lakireddy Balireddy College of Engineering,
Mylavaram.

Sub: Project Work Completion

Dear Sir/Madam,

We are pleased to inform you that your student **Mr.** CHITTIBOINA KOTESWARA RAO, Regd.No.18761E0011 MBA has successfully completed the Project required for the curriculum of MBA Programme on the "ASTUDYON PERFORMANCEOF SELECTEDELSSSCHEEMSBYUSING SHARPERATIO" in our Organization for a Period from 27-05-2019 to 23-06-2019.

With Regards,

ANGEL BROKING LTD. VIJAYAWADA

Asst. Manager

Vijayawada Branch Off: 40 1 9, 2nd Fir, Kanaka Motor Show Room, M G Road, Bandar Road Junction, Vijayawada, 520 010
Tel: (0866) 398 4600

CSO & Regd Office: G 1, Ackruti Trade Centre, MIDC, Road No. 7, Andheri (E), Mumbai - 400 093
Tel: (022) 3083 7700 Fax: (022) 2835 9811 E-mail: ... Website: ...

Angel Broking Pvt. Ltd.

Date: 24/05/2019

To
The Professor & Head of the department
Lakireddy Bali Reddy College of Engineering,
Mylavaram.

Sub: Project Work Acceptance

Dear Sir/Madam,

With reference to your letter dated on 18-04-2019, we wish to inform you that **Mr. CHITTIBOINA KOTESWARA RAO,** with **Reg.No.18761E0011**, MBA student of your College is hereby permitted to undergo project work in our organization (Finance Department) for a period from 27-05-2019 to 23-06-2019.

Thanking you.

With regards,

Asst. Manager

ANGEL BROKING LTD. VIJAYAWADA

Vijayawada Branch Off: 40-1-9, 2nd Flr, Kusalava Motor Show Room, M.G Road, Bandar Road, Labbipet, Vijayawada - 520 010.
Tel: (0866) 398 4600.

CSO & Regd Office: G-1, Ackruti Trade Centre, MIDC, Road No. 7, Andheri (E), Mumbai - 400 093
Tel: (022) 3083 7700 Fax: (022) 2835 8811 E-mail: feedback@angelbroking.com Website: www.angelbroking.com

APHMEL
(An ISO 9001 : 2015 Company)
ANDHRA PRADESH HEAVY MACHINERY AND ENGINEERING LTD. Kondapalli 521 228
Subsidiary of The Singareni Collieries Company Limited (A Government Company)

REF: APHMEL/PER/2020/ 702/3

Dt.12.03.2020

CERTIFICATE

This is to certify that Ms. Dadi Praneetha, Regd No. 18761E0012, MBA student of Lakkireddy Bali Reddy College of Engineering (Autonomous), Mylavaram, Krishna District has undergone Project Work in M/s. Andhra Pradesh Heavy Machinery Engineering Ltd. Kondapalli., at our Finance & Accounts Department on **"A STUDY ON FINANCIAL STATEMENT ANALYSIS "** from 27.05.2019 to 23.06.2019.

During the above training period her attendance, behavior and performance found to be Satisfactory.

CHIEF (PERSONNEL)

A.P. HEAVY MACHINERY & ENGG. LTD. KONDAPALLI PIN 521 228

CIN: U29219 AP1976 SGC 002071
Phones: 0866 - 2872241, 42, 43 & 2871190; FAX: 0866 - 2871350.
E-Mail: aphmel@gmail.com ; Visit us at: www.aphmel.com
Regd.Office & Factory: **APHMEL, KONDAPALLI – 521 228**, A.P.,India

ANDHRA PRADESH HEAVY MACHINERY AND ENGINEERING LTD.

Ref No APHMEL/PER/2019/111

Dt 16.05.2019

Dr A Adhisesha Reddy,
Lakireddy Bali Reddy College of Engineering,
Mylavaram-521 230.

Sub Permission for Internship – Reg
Ref Yr Lr., Dt.18.04.2019

.. .. ..

01 Further reference to your letter cited above, permission is here by accorded to **Ms. Regala Hima Bindu, Regd.No:18761E0043, Ms.Maddali Rama Devi Regd.No:18761E0025, Ms.Chitineni Mounika Regd.No:18761E0010, & Ms.Dadi Praneetha, Regd No:18761E0012** MBA Students of your college to undergo Internship in H R/Marketing/Finance from 27.05.2019 to 23.06.2019 subject to the following terms and conditions.

a Your students have to pay an amount of Rs.2360/- (Including GST) per person towards Fee for undergoing Industrial Training/ Project Work
b The permission so accorded shall not be detrimental to the working of the Company.
c The facility to undergo industrial training is accorded as a part of your curriculum and at your request.
d The facility are extended to your student entirely at your own risk and APHMEL shall not in any way be responsible for any injury or mishap occurring during the period of project work and your student shall not be entitled for payment of compensation/benefit under the Employees Compensation Act, 1923.
e Your students are not eligible for payment of T.A & D.A.
f Any damage to APHMEL Property on account of your students shall be made good by your college.
g Your students are expected to remain at work spot during the working hours.
h Your students are not eligible for payment of stipend / honorarium / remuneration for Industrial Training.
i Your student shall abide by the rules and regulations of Company Officials issued from time to time.
j Your students are execute an Indemnity Bond individually on a stamped paper worth of Rs.5/- at time of joining.
k Your students should follow all the safety precautions.

02 If the above terms and conditions are acceptable to your students, you may depute them for undergoing internship from 27.05.2019.

CHIEF (PER., ADMN & VIG)

Student Through - Head of Department
Lakireddy Bali Reddy College of Engineering

CC to MD for kind information
CBD/CFO
SMP/SPP/SMK/SDN
ASI

(13)

PHOENIX Phoenix Motors (M/C Div.) Pvt. Ltd.

Hero

Ref: HERO/HR/PROJ/

TO WHOM – SO - EVER IT MAY CONCERN

This is to certify that **Mr. Dasari Anil Kumar** bearing Enrolment Roll **No. 18761E0013** studying MBA in Lakireddy Bali Reddy College of Engineering, Mylavaram has successfully completed his **Summer Project Internship** from **27.05.2019 to 23.06.2019**

We found him to be honest & his character and conduct are satisfactory.

For Phoenix Motors (M/C Div.) Pvt. Ltd.,

ANIL KUMAR
Asst. Manager Finance

15-20-150/G8, Beside Genpact, Tarnaka Road, Hubsiguda, Hyderabad – 500 017
Tel: +91-40-2717 7335/6, 2717 0007/8/9. Fax: +91-40-2717 7335

PHOENIX Phoenix Motors (M/C Div.) Pvt. Ltd.

Hero

Ref: HERO/HR/PROJ/

To

The Principal,

LAKIREDDY BALIREDDY COLLEGE OF ENGINEERING (AUTONOMOUS),

Mylavaram,

Krishna (Dt)

Dear Sir / Madam,

Sub: - MBA Academic Project – **Funds Flow Statement**

Ref: - **DASARI ANIL KUMAR**, Roll No: **18761E0013**

Accepting your letter, giving permission to do Academic Project with **Hero MotoCorp Limited**. **Mr. Dasari Anil Kumar**, will be given work In-house & field project with full support and knowledge within the time frame of 27/05/2019 to 23/06/2019.

For Phoenix Motors (M/C Div.) Pvt. Ltd.,

ANIL KUMAR
Asst. Manager Finance.

15-20-150/G8, Beside Genpact, Tarnaka Road, Hubsiguda, Hyderabad – 500 017

Tel: +91-40-2717 7335/6, 2717 0007/8/9. Fax: +91-40-2717 7335

The Krishna District Milk Producers' Mutally Aided Co-op Union Ltd.,
(Regd No. 2001/355)

Dt.24-02-2020

CERTIFICATE

This is to certify that Mr.D.Karun Kumar Student of Department of Business Administration Lakireddy Bali reddy College of Engineering (Autonomous), Mylavaram, Krishna District Affiliated to Jawaharlal Nehru Technological University, Kakinada. Register No: 18761E0014 , has done his academic project work in our finance & Accounts section and has submitted " COST SHEET "in Krishna District Milk Producers Mutually Aided Co. Operative Union Limited, Vijayawada. He worked with us for a period from 27th May2019to 23rd June2019

Throughout his association with us, his conduct is found to be sat is factory.

We wish him every success in all his future endeavours.

GENERAL MANAGER (F&A).
The Krishna District Milk Producers
Mutually Aided Co-Operative Union Ltd
Milk Products Factory,
VIJAYAWADA-520 009

MILK PRODUCTS FACTORY, CHITTINAGAR,
VIJAYAWADA -520 009. ANDHRA PRADESH - INDIA.
Ph: 0866 - 2516461 - 67, Fax: 0866 - 2514817/2510675/2518465
E-mail : kmuvja@gmail.com
TIN : 37060241399 CST No. VJI-02-02-1050/8-2-85

The Krishna District Milk Producers' Mutually Aided Co-op Union Ltd.,
(Regd. No 2001/355)

To,
To,
The Head of the Department,
Lakireddy Bali Reddy College of Engineering,
MYLAVARAM,
Krishna (Dt) – 521230

Letter. No 729/Admn/A9/2010. Dated : 27.05.2019.

Sir,

Sub: - K.D.M.P.M.A.C.U. Limited – Milk Products Factory, Vijayawada – Project work to **Mr.D.KARUN KUMAR, M.B.A** Student – Project Permission – Accorded- Regarding.

Ref:- Lr No. Nil, dated: 27.05.2019.

...:0o0o0:..

With reference to your letter cited, I wish to inform that **Mr. D.KARUN KUMAR, Regd. No.18761E0014, M.B.A Student** is hereby permitted to undergo Project Work in **Finance Department** to collect the required information in our organization from **27.05.2019 to 23.06.2019.**

Subject to the following conditions:-

- No lodging and boarding facilities are available in Milk Products Factory, Vijayawada.
- The students have to maintain strict discipline and obey the orders of the officers of this organization.
- Any loss accrued to the property of this unit due to negligence and careless of the student shall be recovered by the students of the college /institution.
- No stipend will be paid to the student during the project work/training period.
- Strictly not allowed to take photos through Camera's and Mobiles of the Factory.

Yours faithfully

27/5/19

27/5/19 For MANAGING DIRECTOR

Copy to the General Manager(F&A), Milk Products Factory, Vijayawada
with a request to issue necessary Guidelines to the above student as and when approached and issue necessary certificate at the end of the Project Period.

MILK PRODUCTS FACTORY,CHITTINAGAR,
VIJAYAWADA- 520069, Andhra Pradesh- India.
Ph : 0866 -2518461 – 67. Fax :0866-2514817 / 2510675 / 2518465
E-mail : kmuvja@gmail.com
TIN : 37060241399 CST No. VJI-02-02-1050/8-2-85