

Basavarajeshwari Group of Institutions

**SANJAY GANDHI POLYTECHNIC, BALLARI**



Inst. Code No. 459

Y  
2019-2020

**YANTHRIKA**

*Mechanical Engineering News Letter*



## DEPARTMENT OF MECHANICAL ENGINEERING

### VISION

To create globally competent and skilled Mechanical Engineers with sound technical knowledge, innovativeness and social responsibilities

### MISSION

**Mission 1:** To impart quality technical education to students by providing excellent teaching & learning Environment in collaboration with the industry.

**Mission 2:** To encourage ethical values and leadership abilities in the minds of students so as to work towards the growth of the society.

**Mission 3:** Provide industry oriented practical experience and skills necessary for Innovativeness, employability, entrepreneurship and global competency.

## + DEPARTMENT STRUCTURE

**Head of the Department**

**Mr. RAJASHEKAR B** B.E, M.Tech., ISTE

### Teaching Staffs

1. Mr. Gouri Shankar H M
2. Mr. Nagaraj Hugar
3. Mr. M D Ali
4. Ms. John sapna
5. Mr. Syed Assad Basha
6. Mr. Raghu Y V
7. Mrs. Taluri Dhanalaxmi
8. Mrs. Nandhini V R
9. Mrs. Vardhini C
10. Mr. Siddaruda K
11. Mr. Mohan raj V H
12. Mr. B D N prasasd
13. Mr. Maharaj gouda
14. Mr. Amaresh U
15. Mr. Basavaraj G
16. Mr. Venkatesh K
17. Mr. Ramanjneyalu B
18. Mr. Sharabanna
19. Mr. Rajashekar V
20. Mr. Dangi Eranna
21. Mr. M D Mansoor
22. Mr. Ravishekar gouda M P
23. Ms. Shaylaja R
24. Mr. Nagarjuna C V
25. Smt. Anupama

### Technical Staffs

1. Mr. Praveen Kumar M
2. Mr. Veeraiah Swamy S M
3. Mr. Kishore Kumar C
4. Mr. K Ramesh Goud
5. Mr. Muralidhara B V
6. Mr. Rajesh P N
7. Mr. R Manjunath
8. Mr. Hebry Sunny K
9. Mr. Huliganna
10. Mr. Basavaraj
11. Mrs. Jayashree
12. Mrs. Vidhya G T
13. Mr. Channa Veeraiah Swamy
14. Izar Ahmed

## PLACEMENT ORIENTATION & CAREER GUIDANCE

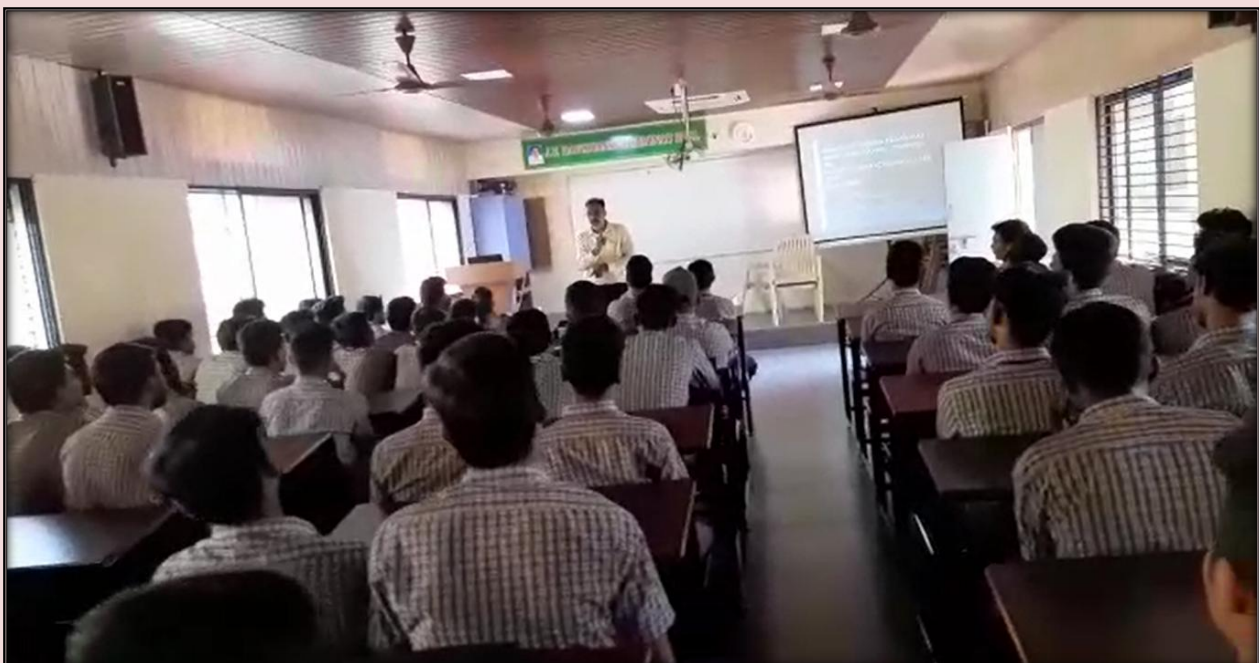
Placement Orientation & Career Guidance event were held at BITM on 29<sup>th</sup> Sept 2019, Auditorium for Final year students. The students are gained knowledge about Career, How to set their goals and improve their skills. **Resource Persons:** Mrs. Namrata Y Director, SGP Ballari, Mr. Nagaraj, Assistant Engineer, JSW Steels Ltd, Ms. Mallika Hiremath, Junior Engineer, KPCL & Mr. Shaikmeeran, Junior Engineer, KPTCL 29<sup>th</sup> September 2019



## TRAINING PROGRAMME

A three days training programme were conducted for III year Mechanical students on **Flexible Manufacturing System**, to develop their skills in Automotive Industry

**Resource Person** Dr. V Venkat Ramana & Asst. Prof. H M Anil Kumar, BITM, Ballari



## STUDENT ACTIVITY

### “Engineering Mathematics” Charts made by mechanical students



### “Machine Tool” models made by Students



## + GUEST LECTURER



As inspiring guest lecture on the key technical aspects of **“Thermal Power Plant Operation”** was held for the budding Mechanical Engineering students under the Mechanical Engineering department. **Mr. Mahesha B.L**, Assistant Engineering (M), BTPS, KPCL. During the lecturing he as discussed the all operations of Thermal Power Plant operations with related theoretical and practical niceties for the students and emphasize the importance of Thermal Power Plants despite the growing support for alternative energy source in India.

## + FDP TRAINING PROGRAM

Mechanical Department with the guidance of Principal and Head of Department organized the Faculty development programs for Teaching staffs.

✚ **FDP on Futuristic and innovations in solar energy on 29<sup>th</sup> & 30<sup>th</sup> June 2019.**

✚ **FDP on Emerging Trends in Automotive Technologies on Nov 30<sup>th</sup> & Dec 1<sup>st</sup> 2019**

**All faculties are attended to these FDP's to get Knowledge on modern developments and ideas.**



## ✚ “ENTREPRENEURSHIP DEVELOPMENT”

The management organized **Three days Entrepreneurship Development Program** for final year Mechanical students. The Recourse person **Mr. Janardhan Reddy** and **Mr. Nagaraj C** were explained various entrepreneur ideas. The students got enormous ideas to become an Entrepreneur.

**Date:** 13.02.2020 to 15.02.2020



## ✚ PROJECT EXHIBITION

Mechanical Department organized the project exhibition for final year students. Project exhibition Judges **Asst. Prof. Duda Naik, RYMEC College** and **Mr. Shambulinga Swamy, KPCL** to judge the project exhibited from the students. The students explained the respective projects by the Guidance of Guides how these projects are helpful in social. The **3D Printer** Project got best Project Award.



## WORKSHOP



Workshops were conducted on Modern Tools about Muffle Furnace and Belt Grinder for Mechanical students on 4<sup>th</sup> Jan 2020. The students are benefited from the workshop.

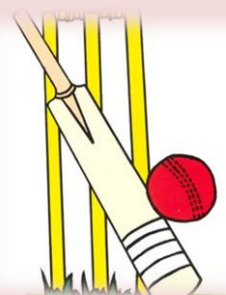
## SPORTS



**Mr. Mansoor Basha**, 4<sup>th</sup> SEM Mechanical Student, He got 1<sup>st</sup> place in **4 × 100 m relay**, in Kalburgi Zone level Dussehra sports, which is held at Kalburgi.



**Rashid M** is one of all rounder Player in Torangal Team; his team won the first place in “U-16 District cricket tournament” held at VIMS, Ground Ballari.



## + ACHIEVEMENTS



### TOPPERS (ODD SEM)

SEM	Reg. No.	Student Name	Marks	Class	Results (%)
I	459ME19022	B SUBHASH	605	Distinction	93.08
	459ME19132	NAGESH KUMAR SAHU	605	Distinction	93.08
III	459ME18184	S M ASIF	673	Distinction	92.83
	459ME18165	RADHAKRISHNA P	669	Distinction	92.28
V	459ME17074	K M MOHAMMED AKRAM	682	Distinction	90.93
	459ME17835	VASE NAGARAJU	658	Distinction	87.73

APRIL MAY 2020

### Automobile Engineering (15ME63A)


459ME17126	MOHIT SONI
459ME17842	WASIM AKRAM A


$\frac{100}{100}$

### TOPPERS (EVEN SEM)

SEM	Reg. No.	Student Name	Marks	Class	Results (%)
II	459ME19132	NAGESH KUMAR SAHU	629	Distinction	96.77
	459ME19022	B SUBHASH	625	Distinction	96.15
IV	459ME18165	RADHAKRISHNA P	691	Distinction	95.31
	459ME18184	S M ASIF	691	Distinction	95.31
VI	459ME17842	WASIM AKRAM A	592	Distinction	94.72
	459ME17074	K M MOHAMMED AKRAM	586	Distinction	93.76

## Toppers for the Programme

	K M MOHAMMED AKRAM 459ME17074						90.52%
	I SEM	II SEM	III SEM	IV SEM	V SEM	VI SEM	
	84.62	97.23	91.17	85.93	90.93	93.76%	

	SHETTY LOKESH GOPIKRISHNA 459ME17199						90.38%
	I SEM	II SEM	III SEM	IV SEM	V SEM	VI SEM	
	91.23	95.54	90.90	90.21	87.60	87.04%	



## GRADUATION DAY CELEBRATION

A Graduation Day Celebrated on 7 of March 2020 for passed out students

**“Every End Has a New Beginning.”**



*Awarding the prizes to the Department Toppers*



**2019-2020 BATCH****Department of Mechanical Engineering - Sec - A****Department of Mechanical Engineering - Sec - B****Department of Mechanical Engineering - Sec - C**

## Cultural Programme



*Invocation Dance by Girls*



*DJ Songs Dance by Royal Mech*



CHETAN VEERAPPA KAVALUR  
(459ME18035)

### FACE PAINTING (Nature Oriented)



S RIKAR VINEETH P  
(459ME18186)







## + INDUSTRIAL VISIT

Industrial visit was organized on 26<sup>th</sup>, 27<sup>th</sup> & 30<sup>th</sup> Sep 2019 for third year students to Ballari Thermal power station, Kuditini. Were 187 students along with staffs visited to plant to gain the knowledge about working units of Thermal Power Plant.



## + PLACEMENTS

Our Mechanical students have placed in Dream Industries like  
JSW, JSW Paints ,L & T, BOSCH, TKM & TIE, etc.

Sl. No.	Name of Company	No. of Students Placed
1	JSW Steel Ltd 	6
2	Bosch Automotive Electronics India Pvt Ltd 	1
3	L & T 	1
4	Toyota Industries Engine India Pvt Ltd 	5
5	Anand Groups 	1
6	JSW Paints Ltd 	4

**18** students got recruited through campus interview and **11** students were selected, off campus, Overall **29** students were placed for the academic year 2019-2020 to reputed companies.

# “DESIGN AND FABRICATION OF 3D PRINTER”

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<sup>4</sup>Lecturer, Department Of Mechanical Engineering, Sanjay Gandhi Polytechnic College Ballari-583104

## Abstract

*The main aim of this research is to print objects, or models, and of any shapes, with high accuracy and low cost there are many different 3D printing techniques. The best-known techniques are: selective laser sintering (SLS), stereo lithography (SLA), and fused deposition modeling (FDM), the biggest problem in ‘SLS’ technology is that the fabricated part can be porous and have a rough surface. The SLA technology has relatively weak mechanical property and filaments are of limit colors are at higher price.*

*The project is based on fusion deposition modeling FDM; time taken for printing of a model is reduced compared to the other two methods. The design for a printer to print a model, initially we designed the model in CAD software and, then converted into STL file and based on requirements the G-codes and M-codes are generated using Cura software and the model is loaded in the external storage device for the execution of printing process the parts produced are of low cost. Even the cost of the printer is reduced to minimum, and the efficiency of the printer is also increased. The filament used is PLA and composites which are easily available. The power consumption of 3D Printer is very low which makes the printer economical. It can produce complex and intricate parts. It comes with an adjustable bed gives the freedom as the results there are no issues of bed leveling. This project would be very beneficial to the society for the new start-ups and small scale industries.*

**Key Words:** FDM, 3D printer, Cura Software, PLA.

## 1. Introduction

There are many different 3D printing techniques. The best known techniques are: selective laser sintering (SLS), stereo lithography (SLA), and fused deposition modeling (FDM), the biggest problem in ‘SLS’ technology is that the fabricated part can be porous and have a rough surface. Another problem, mainly for polymer parts, is thermal distortion. These elements enable us to choose FDM method. FDM technology is most popular one among all the 3D printing technologies. In FDM technology, filaments are available in different colours and flexible materials. In FDM it is easy to remove the supports of finished parts by using some tools. Compare to other 3D printing technologies it is low cost. Because of above features we choose fused deposition modeling (FDM) 3D printing technology as our new customized design.

In Recent researches focus on evaluation of the quality of the FDM and applications of FDM for medical field [1]. For developing and refining the FDM technique, many vendors not only supply different AM systems to the market but also support the open source for users to develop the control system for

specific applications. [2]. In consideration of the printed part's quality with FDM technique, evaluation of open source as well as material properties have been carried out [3]. One of important applications of the FDM technique is for education field with graphic design and rapid prototyping courses [4]. User can make any complex shape on 3D printer by just making on CAD software or by scanning with 3D scanning. [5]. Once the machine is provided with the point list, it starts the preparations for printing. It preheats the printing head and bed as per the requirement.[6]In Europe, EOS GmbH was founded and created the first EOS—Stereos system for industrial prototyping and production applications of 3D printing. [7] In Europe, EOS GmbH was founded and created the first EOS—Stereos system for industrial prototyping and production applications of 3D printing. Its industrial quality is today recognized worldwide in SLS technology for plastics and metals. The 1990s were also the decade of the first application of 3D printing by medical researchers, who started to combine medicine and 3D printing, opening the path to many uses.[8]In Europe, EOS GmbH was founded and created the first EOS—Stereos system for industrial prototyping and production applications of 3D printing. Its industrial quality is today recognized worldwide in SLS technology for plastics and metals. The 1990s were also the decade of the first application of 3D printing by medical researchers, who started to combine medicine and 3D printing, opening the path to many uses.[9]]In Europe, EOS GmbH was founded and created the first EOS—Stereos system for industrial prototyping and production applications of 3D printing. Its industrial quality is today recognized worldwide in SLS technology for plastics and metals. The 1990s were also the decade of the first application of 3D printing by medical researchers, who started to combine medicine and 3D printing, opening the path to many uses.[10].

## 2. Methodology

### 2.1 Selected and manufactured Components:

#### 1. Frame

After reviewing the whole electronics part now it is the time for the mechanical structure to be decided and to fit our electronics in it.

- Decide the frame structure.
- Assemble the structure using rods or waveguide structure and integrate electronics in it.
- For our project Kossel model is selected.

Shown below is the basic structure of the Kossel model. It can be varied according to the need.



Figure 1 (a): Selected frame



Figure 1(b): Manufactured frame

## 2. Print Bed

The print bed is the surface that your objects are printed on to. Typically it will consist of a sheet of glass, a heating element, and some kind of surface on top to help the plastic stick.

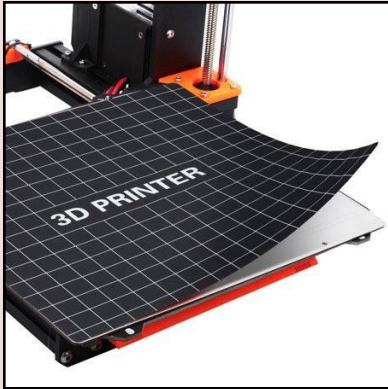


Figure 2(a): Selected bed

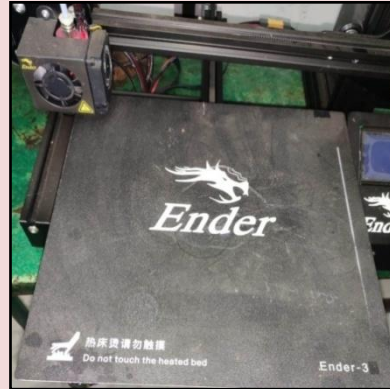


Figure 2(b): Manufactured bed

## 3. Hobbed Gear

This gear bites the filament and pushes it down through the hot end



Figure 3: Hobbed Gear

## 4. Idler gear

The idler is a spring loaded wheel that pushes the filament up against the hobbed gear. Most printers have a way to adjust the tension on the idler, so that it neither squeezes the filament too hard or too little.

## 5. Hot end - All Metal vs. PEEK/PTFE

By not using any plastic insulators in their construction, all metal hot ends are able to reach much higher temperatures and print a wider range of materials. However, they require active cooling.

## 6. Hot end - Heat Sink / Hot End Fan

This ensures that heat does not travel up the plastic and melt it prematurely before it reaches the nozzle. This phenomenon is called heat creep and it causes jams, especially with PLA. This fan should be running whenever the hot end is warm.

## 7. Heater Cartridge

The heater cartridge is pretty self-explanatory. It heats the plastic. It is simply a high power resistor. Almost all modern printers use cartridge heaters, but many older printers used coils of nichrome wire (like the kind in a toaster). If you are replacing your heater cartridge, or even your entire hot end, make sure you know if your system is running 12v or 24v.



Figure 4: Heater Cartridge

## 8. Thermo resistor/Thermocouple/RTD

These are all various types of sensors for determining the temperature of the hot end. They are essentially electronic thermometers. Thermo resistors are the most common type of sensor, but some printers will use thermocouples for extremely high temperature printing.

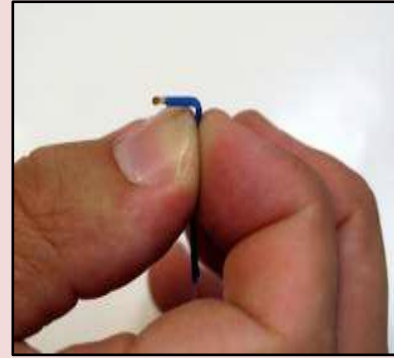


Figure 5: Thermo Resistor

## 9. Nozzle

The nozzle is simply a piece with a small hole for the melted filament to come out of. Nozzles are interchangeable, and come in various sizes; 0.4 mm is normal, while you might use a smaller nozzle for finer detail or a larger nozzle to print faster.



Figure 6: Nozzle

## 10. Layer cooling fan

This fan cools off the plastic immediately after it is deposited by the nozzle. It helps the object hold its shape. It is not to be confused with the heat sink fan, which cools the hot end itself and not the printed object.



Figure 7: Cooling Fan

## 11. Motion Control - X, Y, Z Axis

Delta VS Cartesian

**\*Cartesian printers** move one or two motors along each of the X, Y, and Z axes and the name was derived from the Cartesian coordinates system. They typically have a rectangular build area and the printers themselves tend to have a cube-like shape. The Lulzbot Mini is a fine example of these types of printers.

**\*Delta printers** have three arms that come together in the centre to suspend the extruder above the build area. Deltas also use a Cartesian coordinates system to move around in, but instead of moving one motor per axis at a time, all three arms move at different rates or times to precisely move the nozzle with triangulation.

## 12. Screw rods / Lead screws

These are usually used on the printer's Z axis. They rotate, thus forcing nuts to move up and down. Inexpensive printers will use simple threaded steel rods, which are essentially extra-long bolts. Higher quality printers have smooth chrome plated lead screws designed to minimize backlash.



Figure 8: Screw Rod

### 13. Belts

Belts move things. The X and Y motors have sprockets that drive the belts. Most printers also have some way of adjusting the tension on the belts.



Figure 9: Belt

After selection of the components and accessories, all parts were assembled, as shown in Figure 11.

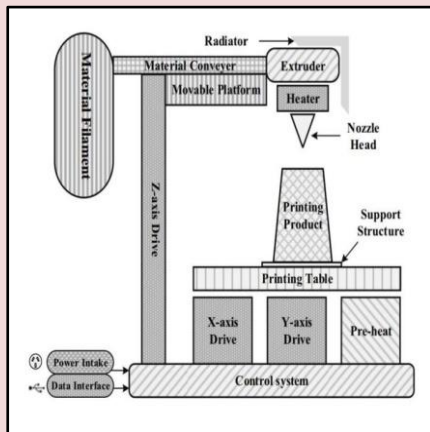


Figure 10: Schematic representation of 3D printer



Figure 11: Assembled 3D printer

### 2.2 3D Modeling:

To print any model using the 3D printer there must be a suitable file format which can be easily designed using the 3D modeling software's through which parts can be designed easily the some of the software's available are listed below.

- Solid works
- Auto cad
- Autodesk mud box
- Autodesk 3DX Max

These are the some of the software's available for the free and can be used for the 3D modeling for printing models using the printer

The preparation of the model has step by step procedure in order to print the desired object are as follows

- 3D modeling
- Conversion of the file into STL format
- Generating the G-codes M-codes

## 2.3 General steps for conversion of 3D model into prototype

1. **3D modeling:-** In this step the desired 3D model is prepared using the software's available the preferred software for this printer is solid works which has a good accuracy of the parts designed by this software the model is prepared using the required dimensions and scale for the accurate printing of the products the below figure shows the 3D model.

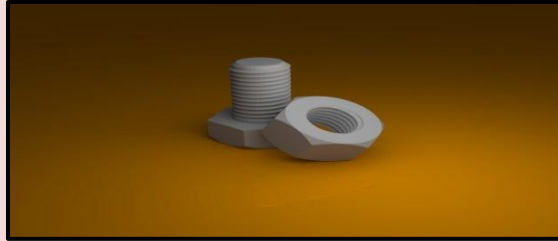


Figure 12: Nut and Bolt

2. **Conversion of the file into STL format:-** This process involves converting the file saved by default format in the software into the STL (stereo lithography) which is suitable for this printer the below file shows the STL format of the model to be printed
3. **Generating G-codes and M-codes:-** The file converted into STL format needs to be further converted into the G-codes to carry on the further process of the printing the model as the printing process carries out by the control unit hence the file needs to be generate its G-codes & M-codes for the co-ordinates, the software used is "Ultimate Cura" to convert the file into G-codes & M-codes. After the completion of all the process the file is ready to be printed which can be inserted into the printer input unit and then select the suitable PLA heat the extruder and the printing can be started the time can be calculated depends on the dimensions of the model to be printed the time can be calculated using the Ultimate Cura software.

## 2.4 Executed Models of the Project

In this research Plummer block cap is taken as to understand simplicity of execution, the below steps shows the printing of plummer block cap those are,

### Step 1: 3D modeling of Plummer block Cap in solid works

The first and foremost step in the process of 3D printing is to design the part or model to be printed in any of the 3D modeling software's such as Pro-e, Catia, solid works...etc.

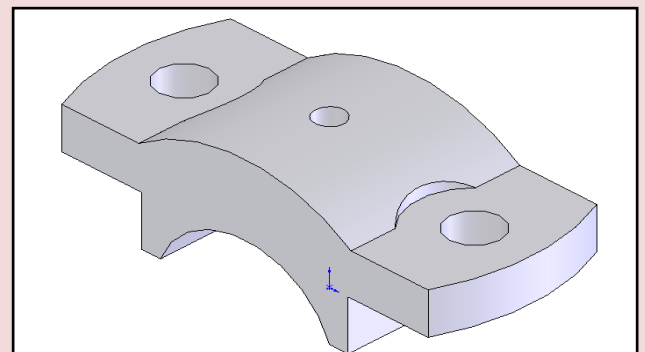


Figure 13: 3D view

In our case we had used solid works 3D modeling software to design a part for example in this case a plummer block Cap.

## Step 2: Saving the Design model in STL Format in solid works

## Step 3: Generating G and M Codes in Cura Software

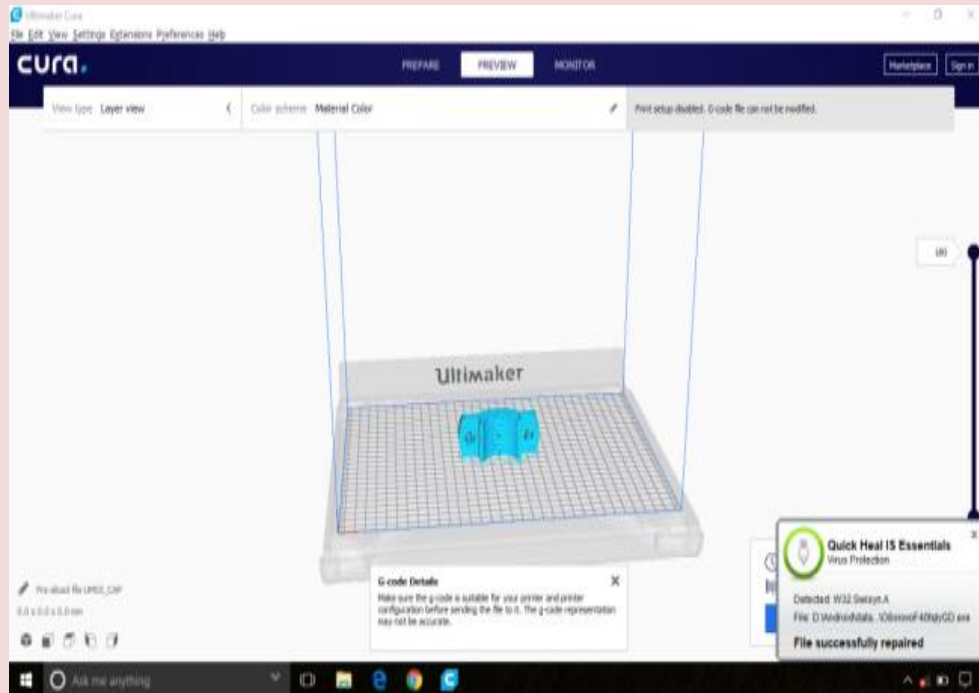


Figure 14: Generating G-CODES

STL File is opened in Cura software where the view of the object or the position in which the object would be printed can be seen in Figure 14.

## Step 4: Conversion of 3D Model into Actual Prototype in Present 3D Printer



Figure 15: Plummer Block Cap

The files created are then loaded in the Pronterface which connects Arduino with the computer. From the Pronterface software we can give print command. The Arduino mega will thus send command to the stepper motor and we get a 3d model.

Not only this PLUMMER BLOCK CAP but different types of parts were manufactured during the trails and we also find that the parts manufactured using this technique was cheaper than any other means of manufacturing.



Figure 16: Robotic Part



Figure 17: Link Joint



Figure 18: Washer



Figure 19: Spur Gear



Figure 20: Extension Box

## 4. Results

Table 1

Accuracy check on printed plumber block and 3D model of plumber block

SL NO	COMPONENT NAME	3D MODEL DIMENSION [A] in mm		PROTO TYPE DIMENSION [P] in mm		ERROR [A-P] in mm
1	PLUMMER BLOCK	L	86	L	85.9	0.1
		H	22	H	22	0
		W	36	W	35.88	0.12
		D	10.5	D	10.25	0.25
2	EXTENSION BOX	Do	70	Do	69.75	0.25
		Di	14	Di	13.75	0.25
3	WASHER	Do	10	Do	9.75	0.25
		Di	5	Di	5	0

The quality test is carried after printing the plumber block, to evaluate the accuracy of 3D printer that can be shown in above Table1. The error values were noticed are acceptable and negligible. At the same cost of 3D printer is compared with the readily available printers in market and noticed that most economical than other.

## 5. Discussion

According to the plan and design the project model is fabricated and results are been achieved with greater accuracy, our 3D printer is comparatively economical nearly 36% to other printers. This can be stated by viewing the above Table1

## 6. Conclusions

Overall, the use of 3D printing is not likely to completely replace traditional Manufacturing in short time. However, the technology does have incredible utility for small, one-off production runs and the manufacture of small custom work pieces that would normally need a lot of specialized tooling to make. That can be achieved in our project as follows:

- The study of different methods of 3D printing and their applications have been studied and then we have come to an conclusion of the 3D printing with fixed depositing method which is more advantageous rather than any other 3D printing method
- This 3D printer enables us to print complex and intricate objects.
- The design and fabrication of the 3D printer is carried out in such a way that the cost has been reduced compared to other printing technologies.

- This 3D printer helps us to print complex parts and has accuracy of ( $\pm 1$  mm).
- This printer can be used to print the wide range of the products and also those parts where the conventional and non-conventional machines cannot be implemented to produce complicate parts in that case this 3D printer can be the most helpful device

The size of objects created with 3D printers is currently limited however, in the near future; large items such as architectural structures can be created using 3D printing.

Traditional manufacturing of products has an enormous range of raw materials that can be used. Presently 3D printers can work up to approximately 100 different raw Materials and creating products that uses more raw materials are still under Development.

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# **“REVERSE GEAR MECHANISM IN THREE WHEELER FOR PHYSICALLY CHALLENGED PEOPLE”**

<sup>1</sup>Maharaj Gouda   <sup>2</sup> Kiran Kumar M   <sup>3</sup> MD Asif Khan

<sup>1</sup>Lecturer   <sup>2, 3</sup> Students

<sup>1, 2, 3</sup> Dept. of Mechanical Engineering, Sanjay Gandhi Polytechnic, Ballari.

## **Abstract**

*The handicapped people facing many problems related to their transportation, there is need to help them for their easy convenience for travelling. Presently, handicapped people drive two wheelers with extra support wheels. They face difficulty in reversing the vehicle while travelling; by using this mechanism the handicapped people can easily move the vehicle backward. At present, there is no system available to back the vehicle. Automobile is a vehicle driven by an internal combustion engine and it is used for transportation of passengers and goods on the ground. Automobile can also be defined as a vehicle which can move by itself. At times when the front wheel gets into a trench it is very difficult to take the vehicle from parking. Even normal people face much problem to take the vehicle out of the parking at that time. In this paper, proposes and designed a gear box which will be fitted into those vehicles without much altering the existing transmission system. The now common constant-mesh gearboxes, which can include non-synchronized or synchronized/synchromesh systems, where typically diagonal, cut helical (or sometimes either straight-cut, or double-helical) gear sets are constantly “meshed” together, and a dog clutch is used for changing gears. On synchromesh boxes, friction cones or “synchronizes” are used in addition to the dog clutch to closely match the rotational speeds of the two sides of the (declutched) transmission before making a full mechanical engagement.*

**Key Words:** Synchronizes, Gear, Gearbox,

## **1. Introduction**

As a design do not get directly related design with this work. This uses gear box system designed, such as the control and stability analysis of two wheeled road vehicles by “simosevangelou” he worked on control and stability of vehicles also this control and stability is the main thing to move back word. Design and study of four speed sliding mesh gear box by “Artehur Mani Anta Reddy, Akash.k, department of mechanical engineering, R.M.K. Engineering college, Anna University, Chennai, India he works on gear box but not for reverse gear. The purpose of transmission is to provide natural, forward gear speeds or ranges and reverse. They must be able to provide a gear ratio that is low enough, when multiplied with the final drive ratio to increase the engines torque sufficiently to accelerate the vehicle at the desire rate. Reverse might be roughly the same ratio as first since vehicle will be starting from a stop in both cases (Birch T. and Rockwood C. 2007). For any given vehicle, transmission gear ratio is selected to satisfy performance requirements of edibility, fuel economy, acceleration and ease of operation.

Fuel economy consideration are essential the selection of gear ratio. Basically, too high a gear ratio causes the engine to run too fast and thus, failing to operate at optimum fuel efficiency. Otherwise, an extremely low numerical gear ratio will be affecting the vehicle performance such as acceleration. Hence, Acceleration is also important concern in gear ratio selection.

## 2. Methodology

### 2.1 Selected and manufactured Components:

In the manufacture of mechanical parts, knowledge of material properties, cost, design concepts and their interactions are required. The large number of available materials, together with the complex relationships between the various selection parameters, often makes the selection process a difficult task. When selecting materials, a large number of factors must be taken into account. These factors are mechanical properties, physical and electrical properties, corrosion resistance, environmental friendliness and economy. In mechanical design, however, mechanical properties are the most important. The most important mechanical material properties usually encountered in material selection process are fatigue strength, tensile strength, yield point, hardness, stiffness, toughness, creep resistance and density.

Following are the essential components listed below,

1. Engine	6. Gear train
2. Ball bearing	7. Pinion
3. Spur gear wheel	8. Gearbox
4. Differential	9. Hand start
5. Hand lever for gear shifting	10. Chassis

### 2.2 Working:

We have selected TVS Excel 50 cc vehicle, and then designed and modified it into a three wheeler. Reverse drive for the vehicle is given by the same engine through a gear box operated by a hand lever. A gear box has been designed using a compound gear train of spur gears and a differential mechanism. When the gears are in neutral position, vehicle moves in forward direction as usual.

When the gear lever is shifted to reverse position, vehicle moves in reverse direction. Rear wheel of the two wheeler has been removed and a gear box is installed at its place. The chassis has been designed keeping in mind comfort and safety of the rider.

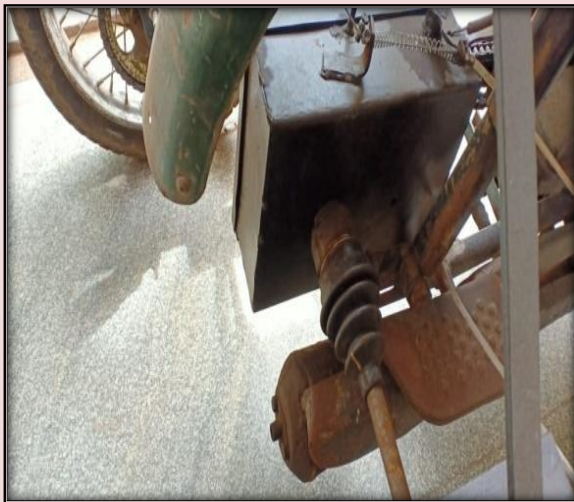


Figure 1: Various views of Model of reverse gear three wheeler

### 2.3 Technical specification of TVS XL 50CC:

SL. NO.	NAME	SPECIFICATION
1	Engine	2-stroke /petrol
2	transmission	automatic
3	Engine displacement	50cc
4	Max power.	3.5bhp @5,000 rpm
5	Max torque	5nm @3,750 rpm
6	Ignition	Fly wheel magneto 12v, 50w electronic ignition

### 3. DESIGN OF REVERSE GEAR THREE-WHEELER:

**3.1 Design of chassis:** A chassis is the load bearing framework of an artificial object, which structurally supports the object in its construction and function. An example of a chassis is a vehicle frame, the under part of a motor vehicle, on which the body is mounted; if the running gear such as wheels and transmission, and sometimes even the driver's seat, are included, then the assembly is described as a rolling chassis.



Figure 2: Chassis frame

Diameter of chassis pipe: 35mm, Length of chassis: 750mm thickness of chassis pipe: 2mm  
Overall length of chassis: 1040mm.

### 3.2 Gear box fabrication:



Figure 2: Gear box fabrication

### 3.3 Gear specification:

Number of teeth: 66.

Speed ratio: 1.62.

Gear material: Grey Cast Iron.



Figure 3: Gear box fabrication

### 3.4 Reverse gear lever:

A gear sticks (rarely spelled gearstick), gear lever (both UK English), gearshift or shifter is a metal lever attached to the shift assembly in a manual transmission-equipped automobile and is used to change gears.



Figure 4: Reverse Gear lever

### 4. Benefits:

- It requires simple maintenance cares.
- Repairing is easy, replacement of parts is easy.
- Checking and cleaning are easy.
- Reverse driving is easy for physically challenged and does not require any assist to pull the moped backward.
- This mechanism can be installed in any moped vehicle.
- This mechanism is light in weight & compact.

## 5. Results:

Table 1 represents the costing of each component of the vehicle.

Sl. No	Materials	Cost of Material
1.	Materials	690/-
2.	bearings	360/-
3.	Shock absorber and chain	700/-
4.	Chain adjuster, oil pipe and clutch wire	190/-
5.	Bolts and nuts	230/-
6.	Chain sprocket	550/-
7.	tube	150/-
8.	Cap and handle car	50/-
9.	Black paint	140/-
10.	brushes	60/-
11.	watcher	25/-
12.	reverse gear wire	25/-
13.	tyre with puncher	270/-
14.	Petrol for project bike	80/-
15.	Bike cost	6000/-
16.	All materials for bike	6000/-
17.	pipes	500/-
18.	grease	70/-
19.	Labour charge with advance	5600/-
20.	Total Petrol charge	650/-
21.	Petrol cap	80/-
<b>Total</b>		<b>22420/-</b>

Moreover this project is carried on second hand bike (50cc TVS EXEL, Heavy Duty), hence was ended up with reasonable price and can be easily affordable by physically challenged people.

## 6. Discussion:

According to the plan and design the project model is fabricated and is most satisfactory and economical for physically handicapped people were found.

## 7. Conclusions:

- ❖ Achieved better convenient chariot ride feel while driving in roadways to physically challenged people.
- ❖ Suitable for the persons who have problem in legs.
- ❖ Suitable for the persons who have problems in ears.

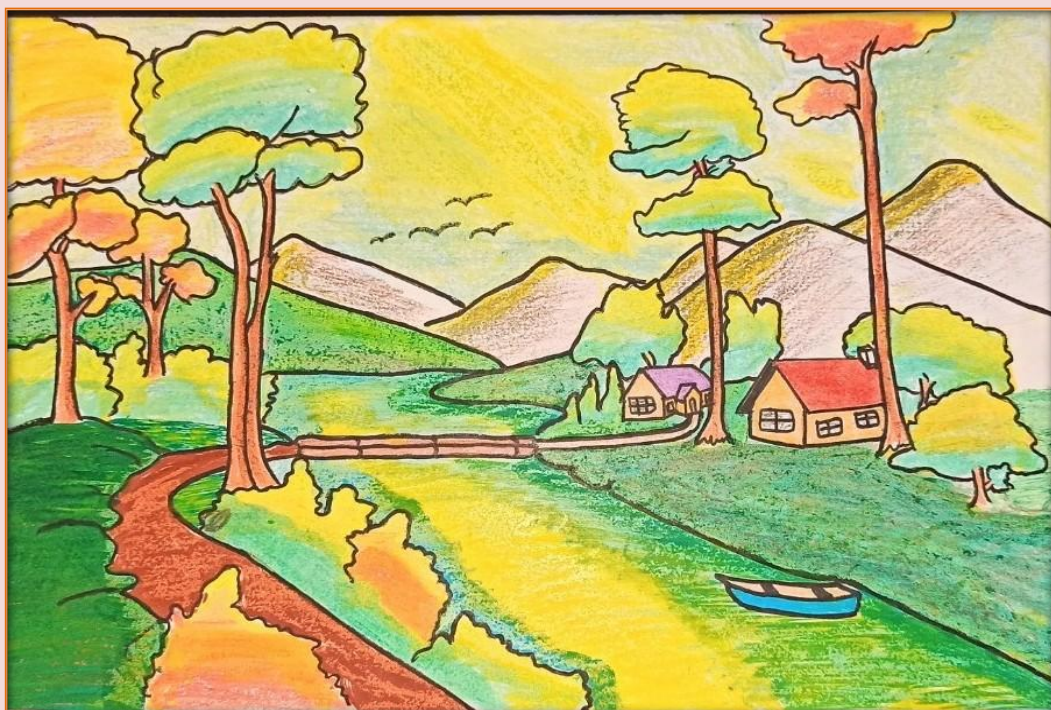
## References:

- [www.en.wikipedia.org](http://www.en.wikipedia.org).
- Theory of Machines by R. S. Khurmi.
- Strength of Material by Bhavi Katti.

# Art Gallery



*Radhakrishna P (459ME18165) 4<sup>th</sup> Sem*



*Thota Abhishek (459ME18834) 4<sup>th</sup> Sem*

## Social Program



A one day program of blood donation camp was organized on 1<sup>st</sup> Feb 2020 at Sanjay Gandhi Polytechnic in which most of the Staff and Students donated their blood to blood bank for the benefit of needy.

## Student Co-ordinator

A lot had to be done practically, fulfilling many deadlines, timelines to be met, events to be organized and



finished satisfactorily and then comes giving the finishing touch to the **NEWS LETTER**- Yanthrika in written format that doesn't do justice to the number of hours of experience gained and beautiful moments spent in our beloved college. Here is a small effort to put those beautiful memories into words, it felt very endearing to be a part of our class, department and the college as a whole and to be part of the event is a



**S L Gopi Krishna-6<sup>th</sup> Sem** fulfilling experience. We will definitely miss

**M Pavan-4<sup>th</sup> Sem**

our days in the college and feel deeply nostalgic whenever we visit these experiences in our memory.

## Editor



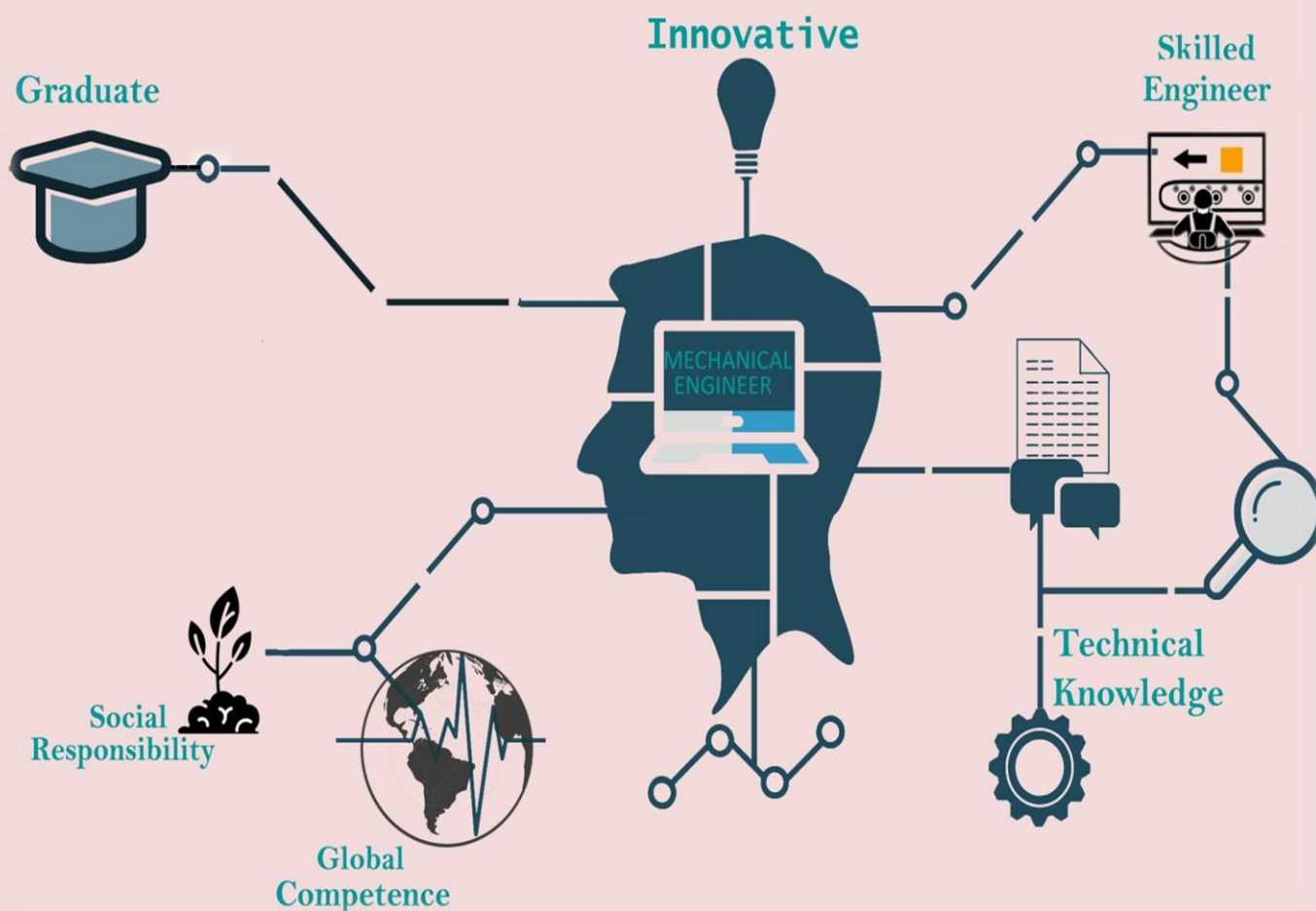
**Mr. Rajashekar B** working as a Head of the Department of Mechanical Engineering and Vice Principal in Sanjay Gandhi Polytechnic, Ballari. He has done B.E in RYMEC, Ballari and M.Tech in Production Management at RYMEC, Ballari. His area of interest is Management skills; He guided and motivated all Student and Staff members in all curricular and co-curricular activities.

## Chief Editor



**THE JOURNEY OF THOUSAND BEGINS WITH SINGLE STEP** this motto was the corner stone while this **News letter – Yanthrika** was taking shape, it was not possible by a single student, staff, Hod or Principal but it was the combined effort of every student, staff, Hod and Principal who gave their efforts in to making this News letter successful. We look forward publishing many more **NEWSLETTERS** in the forth coming years.

Mr. AMARESH U Lecturer, NSS Co-Ordinator



*"There's nothing I believe in more strongly than getting young people interested in science and engineering, for a better tomorrow, for all humankind."*

**Mr. Rajashekar B, B.E, M.Tech**  
**Head of the Department**  
**Department of Mechanical Engineering**