1.0 OVERVIEW OF THE COMPANY

1.1 HISTORY

SOPAN GROUP was founded with **SOPAN Institute of Engineering & Design (SIED)** in **2010**. Since the time of inception SIED has an aim to improve the level of computer education in our society for various Engineering Branches like Mechanical & Civil.

SOPAN Infotech is an Authorized Value-Added Reseller (VAR) for **SolidWorks 3D CAD Software & it's Solution, ESPRIT CAM System** and **RADAN CAD/CAM** in Gujarat region. It was founded in the year **2012** with a vision to **"Deliver more than promised"** as another subsidiary of **Sopan Group Pvt. Ltd.**

It provides engineering solutions **(CAD / CAM / CAE / Prototyping / Product Presentation / Corporate Training etc.)** for all industry sectors and strongly follow core values like quality, team work, time values & relationships as they are the backbone of our strength.

1.2 DIFFERENT PRODUCT / SCOPE OF WORK

1.2.1 Different Products

Solidworks CAD & Technical Support	CAD/CAM/CAE Services
Esprit CAM & Technical Support	Rapid Prototyping & 3d Printing
Radan CAD/CAM	Corporate Training

Table 1.1 Various Products of SIT

1.2.2 Scope of Work

Scope of work for SIT is extended to all industries who need CAD, CAM & CAE services for their establishments, Manufacturing, R&D and prototyping. Generally, their prospect clients include the majority of Industries setup in Industrial Development Corporations like GLIA, SVIA, etc. Their work deals with Software Sales & Installation, providing Technical Support, taking Design & Development Projects, CAM services, CAE services, 3d printing, etc.

1.3 ORGANIZATION CHART

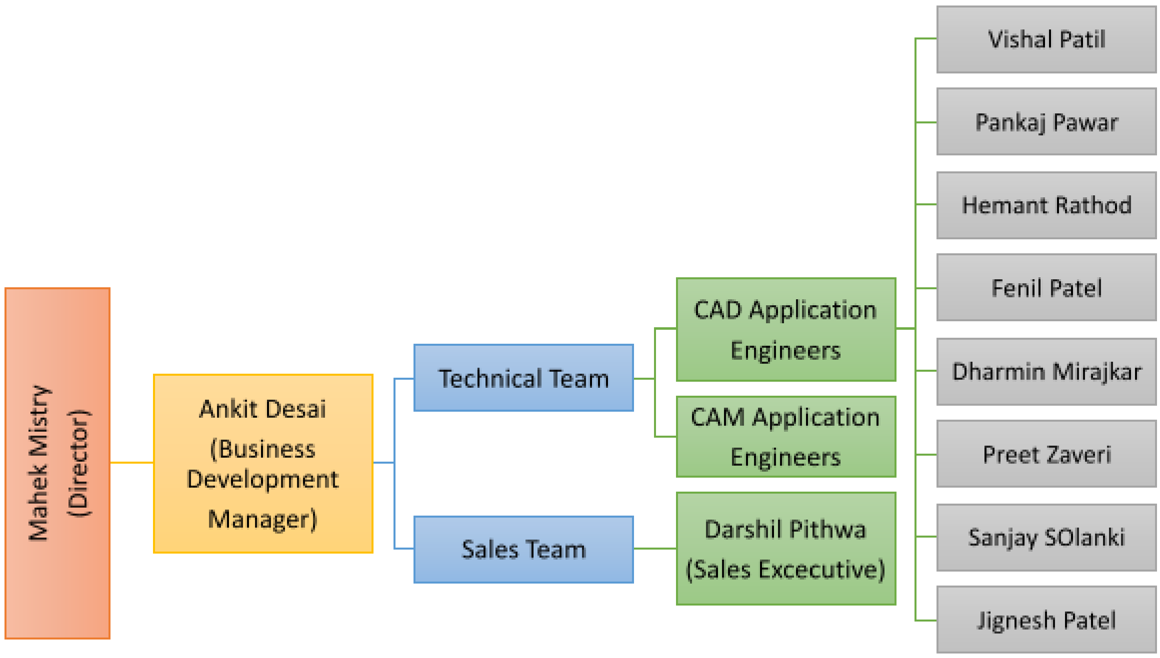


Fig. 1.1 Organization Hierarchy Chart for SIT

1.4 CAPACITY OF TEAM

Sopan Infotech Pvt. Ltd. Takes industrial project works of Designing & Development including analysis work and Corporate Training too. Hence, the capacity is expressed in terms of number of Simultaneous Projects and Corporate employees trainable at a time.

Max. Simultaneous Projects = 5

Max. Corporate Employees Trainable Simultaneously = 300

Max. Rapid Prototyping = 1 to 10 (if arranged in single stl file within 150 x 150 mm)

Max. Software Installations = 100/da

2.0 OVERVIEW OF DIFFERENT DEPARTMENT AND PROCESS LAYOUT

2.1 OVERVIEW OF DIFFERENT DEPARTMENT

2.1.1 SIT: - Industrial Services

- **Sales Team**: - Deals with software sales, creation of database of prospect clients, contact & reach out to customers and marketing of software products.
- **Technical Team**: - technical support, industrial CAD, CAM & CAE services, provides Corporate Training.

2.1.2 SIED: - Deals with student training courses

- **Mechanical Dept.**: - Provides Training to students in AutoCAD, Solidworks, Esprit CAM and holds several seminars & Webinars. Also teaches specific courses for complete functional design of Industrial components like Heat Exchangers, Motors, Gearboxes, etc.
- **Civil Dept.**: - Provides Training to students in AutoCAD, 3dsMax, Sketchup, Revit & Staad pro and holds several seminars & Webinars.
- **Sales Team**: - Marketing of courses, creation of student database for prospective future customer, contacting colleges to arrange webinar & Seminars, etc.

2.2 TECHNICAL SPECIFICATIONS OF MAJOR EQUIPMENT USED IN EACH DEPARTMENT:

2.2.1 SIT (Technical Team)

Specifications	**Laptops (QTY.: - 8)**	**WorkStation (PC) (QTY.: - 2)**
Ram	8 GB	16 GB
Processor	Intel Core i7 8th Gen	Intel Core i7 10th Gen
GPU	4GB Nvidia GTX 1650Ti	8 GB Nvidia RTX 3050
Primary Storage	256 GB NVME M.2 SSD	512 GB NVME SSD
Secondary Storage	512 GB SATA HDD	1 TB SATA HDD
OS	Windows 10 Pro	Windows 10 Pro

Table 2.1 Specifications of SIT Technical m/c

Tools: Vernier Calliper (LC: - 0.02mm), Micrometre Screw Gauge (LC: - 0.01mm), Screwdriver & Adjustable Wrenches Full Set and Slip Gauge Set.

Software: Solidworks 2022 SP1.0, Esprit CAM 2020R1

Creality 3d Printer

2.2.2 SIT (Sales Team)

Specifications	**Laptops (QTY.: - 2)**
Ram	8 GB
Processor	Intel Core i5 12th Gen
Primary Storage	512 GB NVME M.2 SSD
OS	Windows 11

Table 2.2 Specifications of SIT Sales m/c

2.2.3 SIED (Mechanical & Civil)

Specifications	**Laptops (QTY.: - 4)**	**WorkStation (PC) (QTY.: - 30)**
Ram	8 GB	8 GB
Processor	Intel Core i5 10th Gen	Intel Core i5 8th Gen
GPU	4GB Nvidia GTX 1050	4 GB Nvidia GT 730M
Primary Storage	512 GB NVME M.2 SSD	256 GB NVME SSD
OS	Windows 10 Pro	Windows 10 Pro

Table 2.3 Specifications of SIED m/c

2.3 FLOW CHART FOR END PRODUCT DELIVERABLES

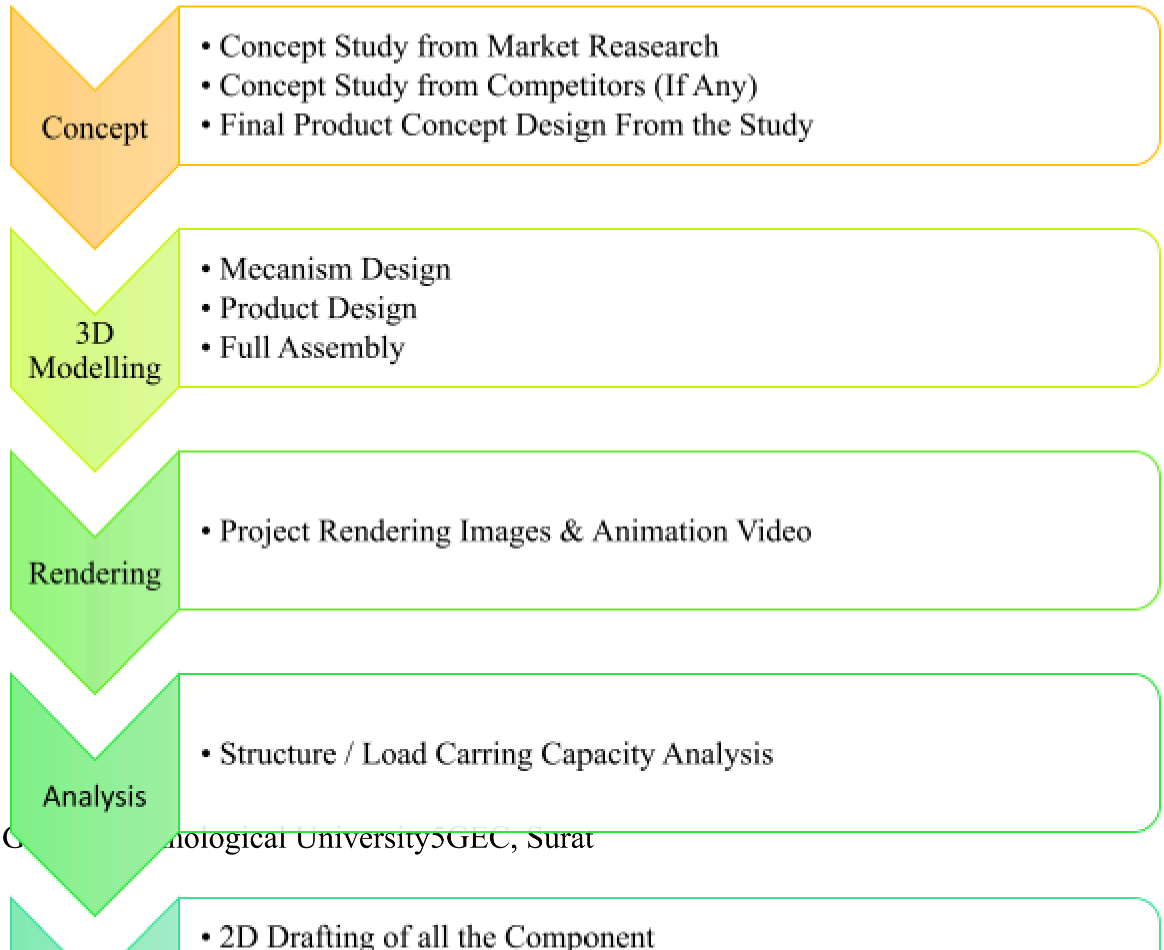


Fig. 2.1 Flow Chart for Project Deliverables

2.4 DETAILS ABOUT EACH STAGE OF FLOW CHART

- **Concept: -** The rough design concept of the product to be designed for project delivery is created during this phase. Extensive market research and analysis of present similar products in market is done for creating a reference. A rough free hand sketch is created for concept clarity and presented to all team members and clients for suggestions & changes leading to finalized concept to be designed from this study.

- **3D Modelling: -** After the concept is finalized, the design & Modelling of the concept begins in Solidworks software. This phase includes the basic design of mechanism (if required), product components & assembly itself in the software and check for inconsistency b/w various mating parts and interference detection.

- **Rendering: -** In this phase, now the computer rendered images are processed for client verification and for any possible changes in appearance and design if required by client. For mechanisms, Video animation is to be rendered as well to show the relative motion of several components during operation.

- **Analysis: -** After the rendering is completed and changes have been incorporated in the 3D Models, the phase of Analysis starts using Solidworks Simulation Express. In this phase all the fixed geometries are identified and possible loads on several components are designated in required directions, frequency & types. Then static & dynamic load simulations are meshed as per requirement and analysis report is generated. Then, the data is checked for product operation and any changes if required are made in models.

- **2D Drawing: -** After successful analysis & iterations have been completed, all the components of the product along with sub-assemblies & assemblies are drafted in sheets of required size using suitable scale as per customer's standard format. Inclusion of GD & T and manufacturing notes like machining symbols, welding symbols and finishing symbols, etc are also included as requirement. Then solidworks drawing files are “Packed & Go” to Draftsman and checked for errors or missing dimensions and corrected if any. Then, they are also saved as “PDF” for plotting purposes. Both the slddrw and pdf files are delivered.

- **Patent Approval Support: -** If the project was of R&D work, then patent registration & approval support are also provided in the form of necessary documentation, presentations & reports. The customer is provided guidance at every step including Patent Query Solving until the patent is registered.

- **Manufacturing Support: -** If the customer further wishes to produce the product, then the vendor (with required m/c setup) support & contact are provided with our team as mediator between them. This allows for easy & smooth mfg. as the development data doesn’t need to be completely handed over. Rather, since the data is with our team, they can directly instruct the vendor for required tolerances and mfg. sequences.

3.0 INTERNSHIP AND INTERNSHIP MANAGEMENT

3.1 INTERNSHIP SUMMARY

This Internship provided me an opportunity to work on actual Industrial projects and get a chance to apply my curriculum's theoretical knowledge to them. As a result, I was able to get a better understanding of current required skills in industry and how they are applied.

I worked on several projects' components like designing of Ovens & Furnaces, Platforms support structures, cooling towers, 3d printed parts & Textile m/c parts. There were also several parts provided to me for modelling in order to get at par with at least the new recruits of the team. These components included Robotic Arm, Bicycle & Shaper m/c.

After modelling all the provided parts and drafting several sheets, I also came to learn about template creation, sheet formats & drafting standard creation along with auto-populating the title box for semi-automating the drafting data management. I managed to create custom property, material libraries and linking them to their referenced sheets.

3.2 PURPOSE

1. Learning the basic knowledge for industries.
2. Understanding work culture of industry first-hand.
3. Developing Drawing reading abilities required.
4. Developing skills for CAM software.
5. Learning templates & sheet formats creation for industry.
6. Understanding CAD & CAM Simulations.
7. Developing skills on various advanced 3d modeling tools of solidworks like sheet metals, weldments, surfaces, etc.
8. Semi-automating the drafting title-block for various components using property tab builder & Link properties to annotations.

9. Modeling of creative components without any reference dimensions for 3d-printing.

3.3 OBJECTIVES

1. To understand the psychology of the workers and their habits, attitudes and approach to problem solving.
2. To strengthen industry-institute linkage and increase employability of the students.
3. To learn applying the technical knowledge in real industrial situations.
4. To give exposure of the current technological developments relevant to the subject area of training to the students.
5. To become competent professionals for the industry.
6. To provide possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job.
7. To become familiarize with various materials, processes, products and their applications along with relevant aspects of quality control.
8. To give exposure to the students about responsibilities and ethics of the engineer.
9. To gain experience in technical/project report writing.
10. To understand the social, economic and administrative considerations that influence the working environment of industrial organizations.

3.4 SCOPE

Designing is a very vast field which can be applied to many sectors of industries. Any new innovation or concept needs to be designed to create visible or applicable deliverable.

Particularly, design using Computers is much more widely accepted and implemented because of its several advantages over conventional methods. The products we designed during our internship using Solidworks were used in Oven & Furnace industries, Cooling Tower mfg. industries & textile m/c mfg. industries.

However, the knowledge of this design is not restricted to these industries only and can also be used to manage and develop products for other industrial sectors for reverse engineering, R&D, Plastic Toys mfg. industries, press tools & Sheet metal design industries, Die & Mould industries and many more.

3.5 TECHNOLOGY AND LITERATURE REVIEW

As we all know in ancient times, the designing was done based on trail & error methodology. Any new idea was roughly made and tested for various possible criteria and changed after each test until satisfactory results were obtained.

Later, several rules were developed several calculative equations were made and even some imperial relations were developed to determine the dimensions of some standard components and also know the standard loads, their magnitudes & nature on several elements. After that drawing was done on sheet using pencils, scales, and such drafting tools to draft a mfg. drawing and store the data in the file cabin. This data may change and need to be newly created manually in case of changes in design after testing and experimentation. Even the data couldn't be preserved for much longer and multitude of files needed to be managed as the number of tests increased.

Today, using modern technology we can create 3d models and even draft them directly in 2d using various CAD software like AutoCAD, Solidworks, Creo, NX & CATIA, etc. We can even do the testing & evaluation in the software itself, then make the necessary changes in the 3d model which automatically extends to all sheets and assemblies easily at a single click. Even the dimensions & geometry can be set in such a way that they are all dependent on variables by means of equations resulting in very high-speed changes in whole development & design. Just by changing one variable all the geometry and dimensions would change across all files.

Even the method of storing the data and test results is simpler as they are linked to the main part file itself and can be retrieved easily anytime you want. Thus, storing and managing these results and data also became a lot easier than as compared to conventional design methods.

3.6 PARTS FOR PRACTICE

3.6.1 Robotic Arm

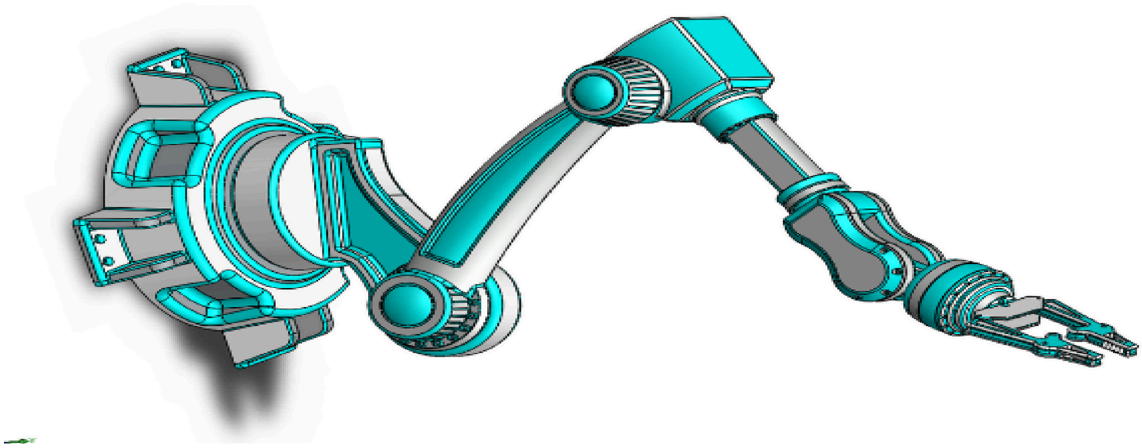


Fig. 3.1 Assembly of Robotic Arm Gripper

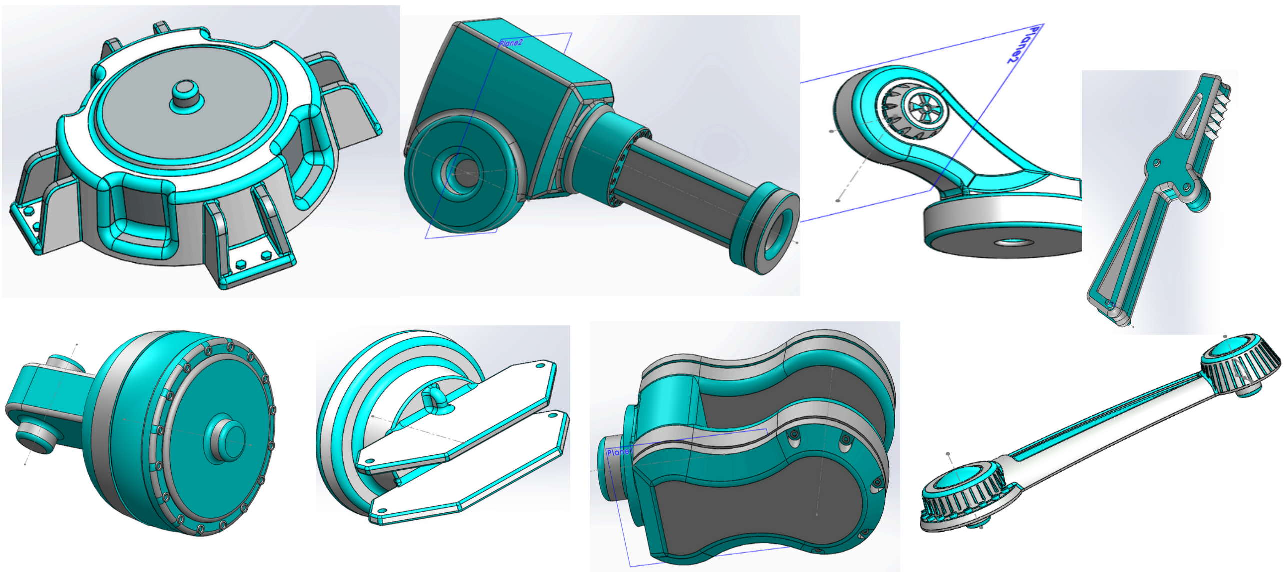


Fig 3.2 Various components of Robotic Arm

3.6.2 Bicycle

Fig. 3.3 Assembly of Bicycle

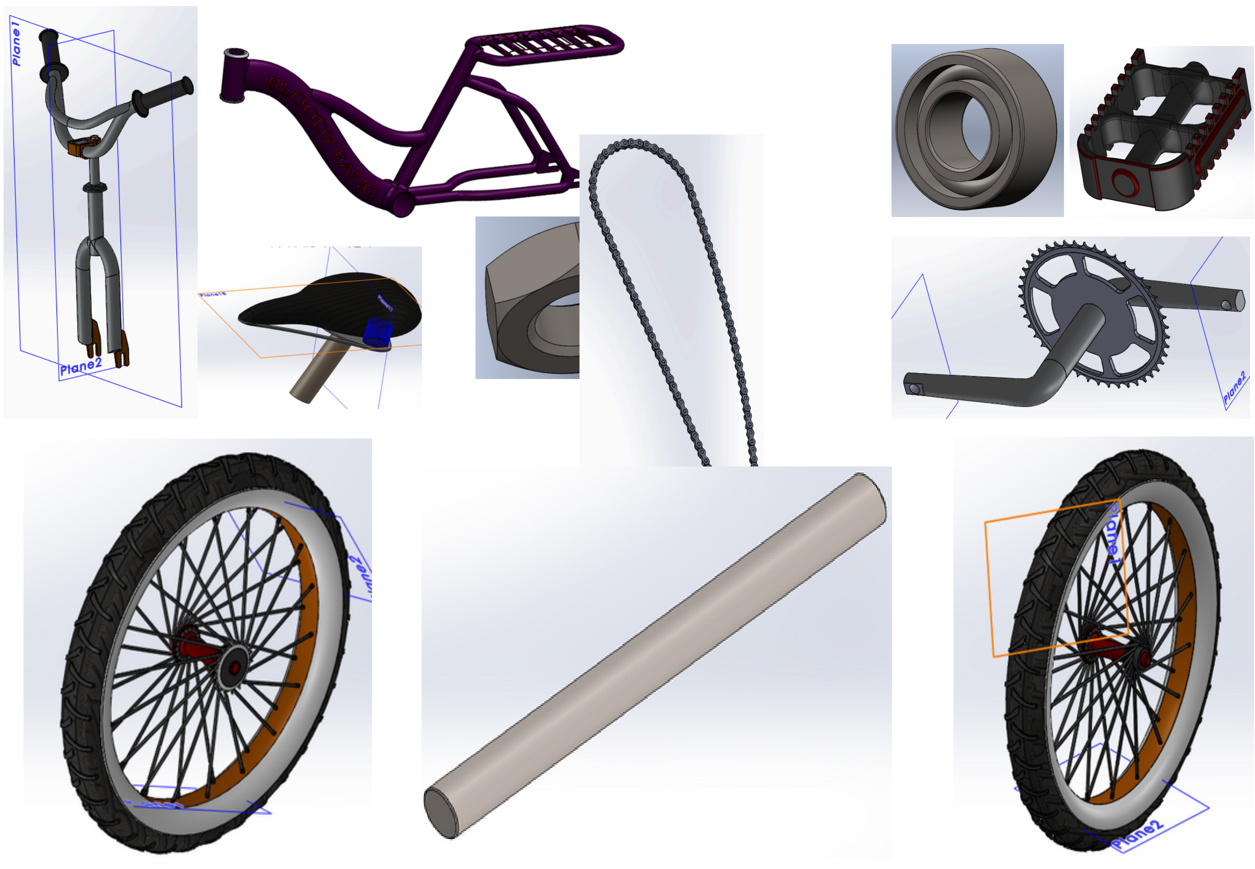


Fig 3.4 Various Parts of Bicycle

3.6.3 Shaper m/c assembly from drawing with modifications

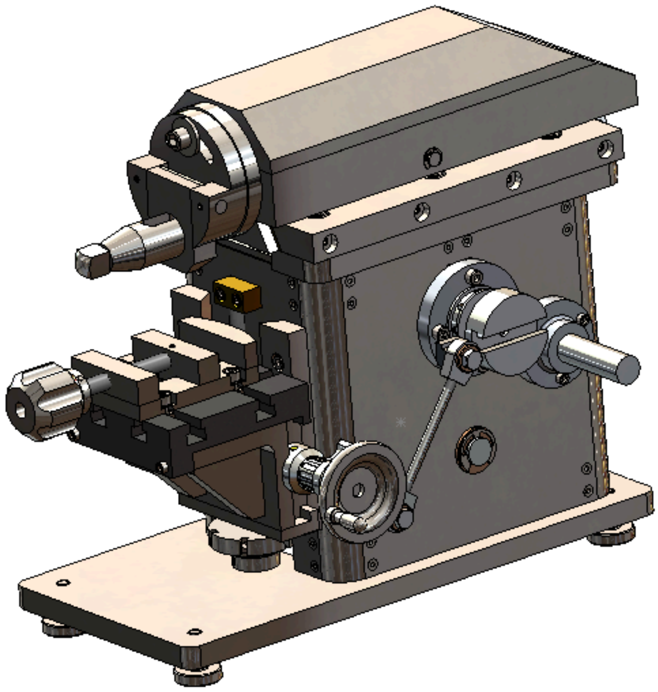
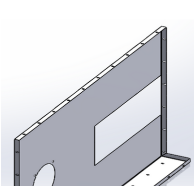


Fig. 3.5 Shaper Assembly

3.6.4 Model Mania Parts for Static load Analysis Practice

Fig 3.6 Various Model Mania Parts

3.6.5 Various Industrial Components from Step files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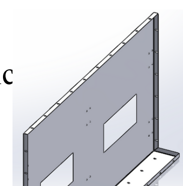
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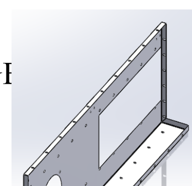
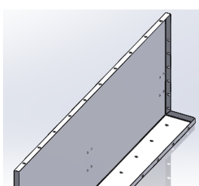
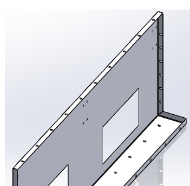




Fig 3.7 Industrial Components Modelled from Step files data (by courtesy of SIT)

3.7 UNIQUELY DESIGNED PARTS FOR 3D PRINTING (FOR DEVELOPING CREATIVE THINKING)

Fig. 3.8 Various Parts modelled to be 3d printed

3.8 INTERNSHIP PLANNING

3.8.1 Internship Approach and Justification

Several new methodologies and approaches to design were introduced to me during the internship for Design & Development of several engineering products.

As per curriculum, first we calculate all the dimensions using equations and then create drawings. But the approach used here was to first directly create a basic geometric model using Solidworks and then run Simulation & Analysis on it. Later, as per requirement various parameters like thickness, length, material and shape, etc. can be changed and optimized.

Now once the design is successful in analysis, then it is to be drafted by creating link between drawing file and part files. This helps in auto-updating the dimensions if any changes again occur after physical implementation of the product.

Later after checking these sheets for inconsistencies or missing dimensions, they can be copied to clint's standard sheet format and drafting annotation and also save in the form of pdfs for plotting purpose.

3.8.2 Internship Effort and Time, Cost Estimation

I did a full-time internship with schedule of Mon-Sat from 09:00 am to 06:00 pm with a stipend of Rs. 4000 per month. During this time, we would always be provided workload in the form of small tasks and then continue the process until the project was completed.

Initially, we were given practice models to get our skills at par with at least a new recruit of the company. These included 3d Models from Model Mania and their Static force analysis study, several pre-made industrial components in the form of step files, some common parts available through the internet like Robotic Arm & Bicycle, etc.

Later, we put effort on a regular basis working on the small parts of the projects. These included 3d modelling from rough sketches, drafting these models and reporting the work done and updating it in the database.

All the projects we worked on were contracted b/w the range of 4 lakhs to 28 lakhs with durations b/w 1 month to 3 months. Majority of the high-cost projects were basically R&D parts or some new design of component to be tested and prototyped for industrial application.

3.8.3 Roles and Responsibilities

I was allotted various parts to models, create drawings & pdfs on a daily basis as per specific client's requirement and share workload among each other while collaborating for modifications in interconnected parts & their respective geometry. It was compulsory to report the work done for the day and update about the same in the main database for the project, so our supervisor can decide the next steps.

It was my responsibility to share my opinions and possible alterations in any part file possible after discussing the design approach of ongoing projects with the supervisor and noting the doable modifications regarding it. This helped to create a much more friendly approach for grasping this new data & learning various advanced skills of designing, modelling & drafting.

Moreover, the on-the-time deadlines helped me to understand the importance of Time Management and Punctuality as a responsibility of all Industrial employees as well as interns for successful execution of any Industrial Project.

We were also required to complete the daily tasks (which were very intriguing and fun) timely and report about whatever modifications, corrections & completion for data management.

3.8.4 Group Dependencies

All the projects were done by utmost care using the coordination and collaboration of ideas and knowledge among all members of SIT. First, Mr. Ankit Desai would decide the time, personnel & resources to be allocated to project and then delegate responsibility to the senior of that Project's team.

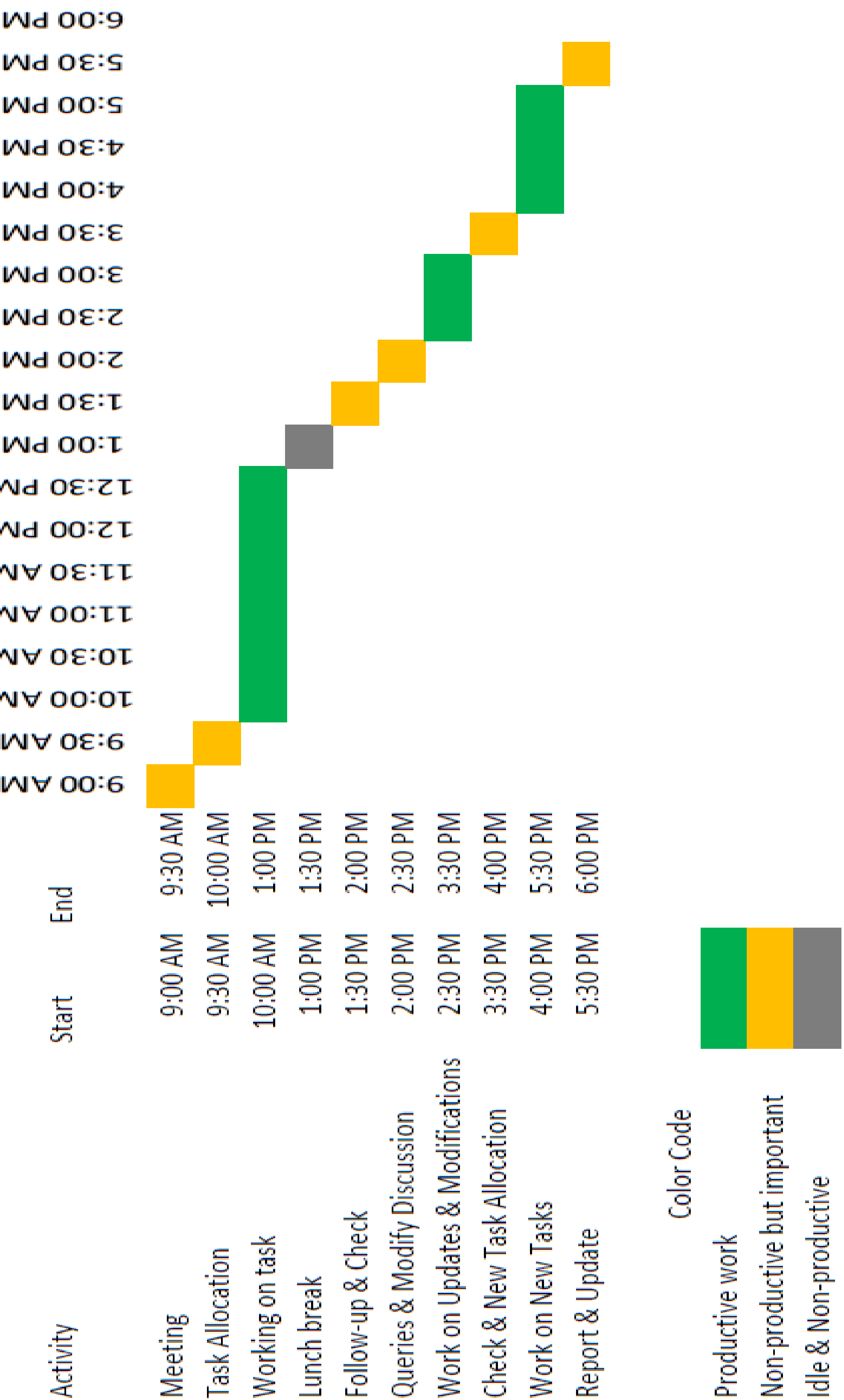
The project was divided into number of small tasks each with their own deadlines, efforts & changes if required. These tasks were distributed among the team members and were to be completed as per provided schedule.

When it was not possible to complete the work on time, members from team working on other projects with later deadlines would help out and guide for smoothening the hasty workflow. It was also made sure while working of assemblies that parts having similar feature and having dependent dimensions on other sub-assemblies were to be done by one person only

In this manner, all the work completed was reported individually by all members after completion to team senior at end of day and databases were updated and reports were also sent to client for his planning at the establishment.

3.9 DAILY INTERNSHIP WORK SCHEDULE

Fig. 3.9 Gantt Chart for daily Internship Schedule



4.0 SYSTEM ANALYSIS

4.1 STUDY OF CURRENT SYSTEM

Currently the models and designs are being made based on past experiences, equation driven geometries and geometric relationship among sketch entities. Then, these equations are modified one-by-one to reflect changes in geometry as per requirement. The Figure of the layout sketch created using this technique can't be shared due to client's confidentiality & copyright issues.

Moreover, one design of Gearbox & Motor support bracket for cooling tower is being worked on. The design includes the mounting of motor & gearbox on their respective platform supported by bent flanges with corner breaks as shown in below figure.

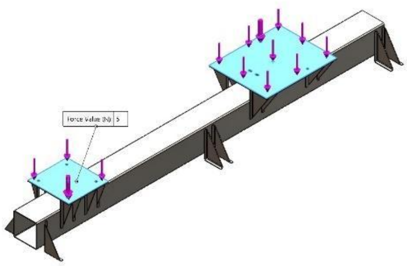


Fig. 4.1 3D Model of Current Gearbox & Motor Support Bracket Design

4.2 PROBLEM AND WEAKNESSES OF CURRENT SYSTEM

- For changing the equations one by one in all assemblies & part files and checking them takes a lot of time & effort during re-modifications across several PCs.
- Even a slight error in equation change can cause design to be invalid, under constrained or over constrained.
- Requires very skilled and learnt person to overcome faults in equations during re-modifications.

- For mfg. of such complex flanges more time & labour efforts are wasted.
- The modelling of such flanges itself takes considerable time & carefulness.
- Modifications in the flanges are tricky and hard to interpret.

4.3 REQUIREMENTS OF NEW SYSTEM

- Easy & quick facility to change and modify the geometry.
- Minimize the possibility of errors in constraints during updating
- Could be done by freshers as well.

- Minimum mfg. time with same functionality.
- If possible, should be cheaper or of same cost with simplicity.

4.4 SYSTEM FEASIBILITY

4.4.1 Does the new system contribute to the overall objectives of the organization?

Yes, the overall objective of the organization is to deliver more than promised in terms of better design, functionality and long service-life products within specified time duration or before it. By implementing the global variable-based equation driven models, the time & effort required for modifications & iterations is vastly reduced and can be experienced first-hand by the user.

Regarding the new Gearbox & Motor support bracket design, it reduces the client's mfg. cost & time and makes the design much simpler comparatively. Thereby, increasing the customer satisfaction.

4.4.2 Can the new system be implemented using the current technology and within the given cost and schedule constraints?

Yes, the proposed system & Design can easily be implemented using present technology, cost & time constraints of organization as well as clients without much changes in actual material or affecting the performance.

4.4.3 Can the new system be integrated with other systems which are already in place?

Yes, the proposed system & design can be integrated without any changes in other systems in place. It also doesn't require any form of hidden changes or failure which can follow during its lifetime as part of functional elements of system.

4.5 PROCESS IN PROPOSED SYSTEM

The proposed methodology includes use of Pre-set Global variables in Equations Folder on which a majority of dimensions are related. For instance, no. of supporting columns, Maximum width, Maximum Height, etc. Using these variables equations are generated which are further input in the dimension fields during Layout sketch.

For the Gearbox & Motor Support Bracket, the complex flanges are replaced with standard size pipes with welded gussets and multiple plates (if required for non-planar heights of platform). These pipes just need to be cut in required length and then welded with gussets rather than cutting the whole geometry of flange and then bending it to be ready for welding.

4.6 FEATURES OF PROPOSED SYSTEM

- The new system includes features like easy changeover in geometry and dimensions.
- Easy to understand geometry & relationship constraints among entities for reference of different parts.
- Fast and fewer steps for remodification & iterations for client requirements.

- As for the support bracket, it included features like simple design.
- Faster mfg. and lower labour costs with suitability for fast assembly.

4.7 TECHNIQUES OF PROPOSED SYSTEM / MAIN COMPONENTS

The Technique of Global Variable set-up before beginning of 3d modelling is employed here, so that the identification of changing entities can be done and setup in the Equations folder of the file itself.

The main components of the Gearbox & Motor Bracket support included: -

- Metal plates used as platforms (same as previous design),
- Standard Pipe cut-outs with gussets for supporting the Platforms & Main Pipe itself,
- Main pipe with end caps

CHAPTER: 5 SYSTEM DESIGN

5.1 SYSTEM DESIGN & METHODOLOGY

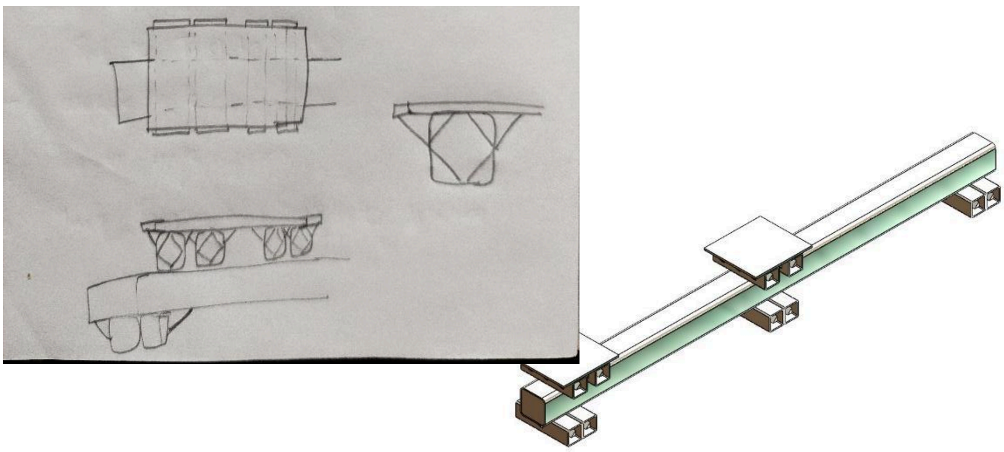
The system was designed using global variable-based equation driven geometry. This allows for pre-decided setup of various parameters

First the practice of inputting the variation in equation manually was seen and timed and similar procedure was done for the new system. It included first creating equations folder containing all the Global variables and their values with interdependent relationship even among variables.

Then, the dimensions are entered in equation containing these global variables and constrained geometrically to entities.

5.2 STRUCTURE DESIGN

The diagram of structure design for layout of cooling tower made using global variable equation driven geometry can't be shared as it is confidential copyrighted data of the respective owner of the project contract.



The proposed system's structure is shown in the fig. 5.1 as iterated by me under our internship supervisor's guidance.

Fig. 5.1 Structure Design (Rough Sketch & 3D model) of Proposed System
(By courtesy of SIT)

6.0 IMPLEMENTATION

6.1 IMPLEMENTATION PLATFORM

6.1.1 Global Variable-based Equation-Driven Design

For Implementing the proposed system of Global variable, we started to input the variables at the beginning of file creation for part modelling itself. Then, all the dimensions where required to be continuously modified as per requirement of varying changes.

All the variables were denoted by a standard term as decided after discussion with client and all the equations for dimensions of layout were inputted in the form of these variables rather than numeric data in Solidworks platform.

6.1.2 Modified design of Motor & Gearbox support bracket

The new design was first implemented in Solidworks to get a conceptual idea of its appearance and then will be implemented in real environment of humid atmosphere after successful analysis, simulation & Cost consideration check by client.

The weight carrying capacity were to be same as previous but it was cheaper, faster & easier to manufacture comparatively. The cost of mfg. and labour were calculated & compared directly by the client as the cost data was confidential.

6.2 TECHNOLOGY SPECIFICATION

Solidworks 2022 was used to implement the proposed system at the design phase in a standard workstation having specification same as topic 2.2.

Several costing, static load & feasibility analysis were carried out using Simulation Xpress, Solidworks Costing tools (inbuilt with Solidworks) the details of which are covered under confidential data of R&D dept. of client.

6.3 RESULTS

- Using Global variable driven design reduced the time to create a new structure from copy of previous one as compared to old numeric equation driven design. Changing the design became much easier & simpler to understand. Though timely checks for extra columns & rows of support would need to added & verified.

- The Gearbox & Motor support bracket's new design greatly reduced the efforts & time required for mfg. and assembling of the components on site as verified by the client's analysis.

6.4 RESULT ANALYSIS

6.4.1 Global Variable Based Equation Driven Design

- Compared to before, the creation of new layout took approximately only half the time, once the geometric relations and dependencies were set b/w sketch elements.
- Need of checking, after changing variables for underdefined, over defined or inconsistent geometry (rarely).

6.4.2 Motor & Gearbox support bracket

- 60% less time to manufacture.
- Reduced overall cost by 30% (including both labour & material cost).
- Simple & easy to understand.
- Having minimum redundant support elements.
- Need mindfulness to use more plates in case height is varying for both platforms.

7.0 TESTING

7.1 TESTING STRATEGY

The testing of system of using Global variable driven design method was tested on the spot after discussion with internship supervisor. The test consisted of creating new layout file from the previously made file's copy and modifying them as per requirement.

The time taken for changing & setting up the new files' copy up to the point of complete modification was noted and compared along with personal experience in ease of changing the dimensions' equations.

As for the Gearbox & Motor Support Bracket, the design was tested using static simulation analysis of solidworks simulation express wizard tool at maximum mesh density and setting the same loads with factor of safety of 2. The stress generated in both the cases were noted and are checked for to be within permissible limits.

7.2 TESTING RESULTS & ANALYSIS

7.2.1 Study Properties

Study name	Static 1
Analysis type	Static
Mesh type	Mixed Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	Automatic
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic

Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off

Table 7.1 Test Properties & Setup Information

7.2.2 Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

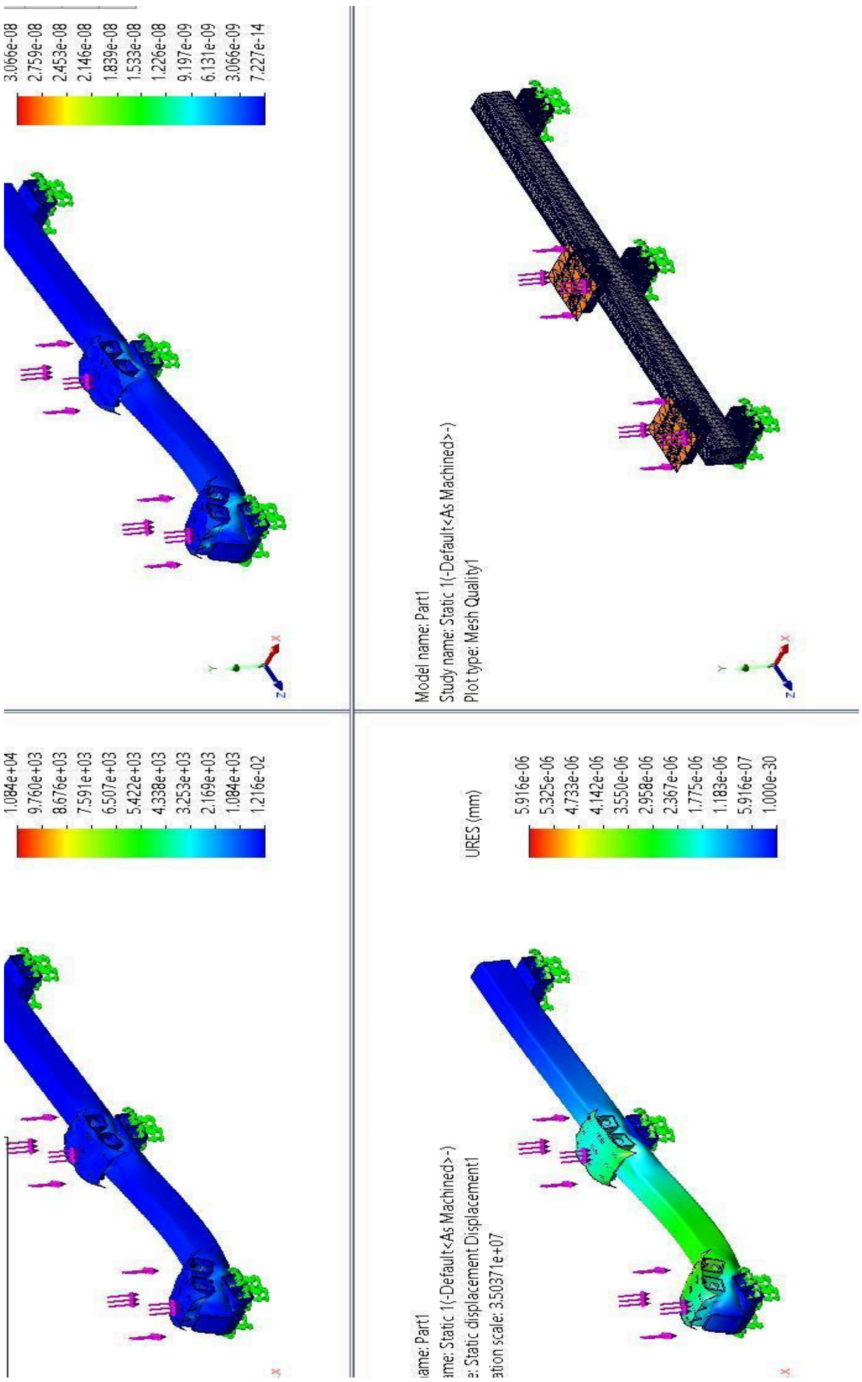
Table 7.2 Units of Measurement for Test Data

7.2.3 Material Properties

Name:	Cast Stainless Steel
Model type:	Linear Elastic Isotropic
Default failure criterion:	Unknown
Elastic modulus:	1.9e+11 N/m^2
Poisson's ratio:	0.26
Mass density:	7,700 kg/m^3
Shear modulus:	7.9e+10 N/m^2
Thermal expansion coefficient:	1.5e-05 /Kelvin

7.2.4 Load & Fixture Setup & Results

Fig. 7.1 Simulation Analysis Result Data (By courtesy of SIT)



8.0 CONCLUSION & DISCUSSION

8.1 OVERALL ANALYSIS OF INTERNSHIP VIABILITIES

By the time this report is being submitted, the proposed system of global variable-based equation driven design method of modelling and gearbox & motor support bracket have already been analysed using simulation & evaluate.

They have already implemented the use of the global variables set-up at beginning wherever plausible and achieved much more stable and easier to modify design setup models.

The Gearbox & Motor Support Bracket also has been successfully been utilized for various cooling tower prototype setups without any alterations to existing component setup of towers and is planned to use for future designs as well (as long as standard pipes are part of design and to be replace with other standard part like beam if used in assembly).

8.2 PHOTOGRAPHS OF SUPERVISOR GUIDANCE AT WORK FOR DIFFERENT COMPONENTS

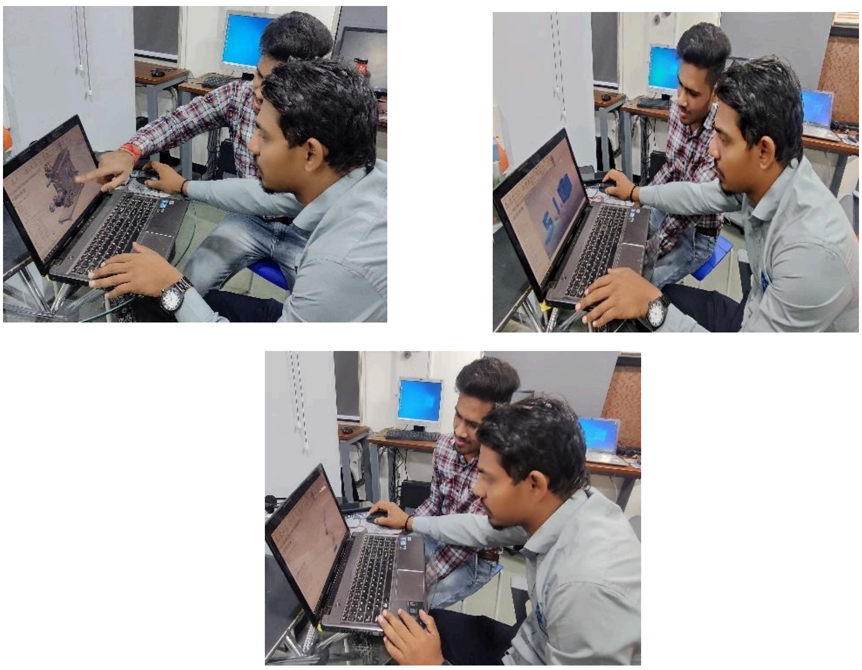


Fig 8.1 Photographs at work during internship (by courtesy of SIT)

8.3 Dates of Continuous Evaluation (CE-1 & CE-2)

The CE-1 was conducted on 19th March, 2022. The follow up on the work being carried out in internship, our learning experience, projects being worked on, internship experience so far, any possible queries and problems/difficulties faced so far were discussed with mentor. After this the instructions for CE-2 were provided on getting the PPT, weekly log & monthly attendance signed by Internship Supervisor ready.

The CE-2 was conducted on 25th March, 2022. All the documents like weekly log & monthly attendance (updated till latest day) were checked and signed. We were asked to present the work carried out so far at Internship in the form of PPT.

8.4 PROBLEMS ENCOUNTERED & THEIR SOLUTIONS

PROBLEM	SOLUTIONS
Title-block don't auto-update for cutlist bodies	Saving bodies as individual parts first then calling part files in drawing after creating custom properties for each part file.
Too much effort & time in changing the equations for new design	Make all equations based on global variable and just change values of these variables only once.
Too much complex & hard to manufacture design	Try to used standard or similar parts in sub-assemblies and reduce no. of operations for individual parts.

Table 8.1 Problems & their solutions

8.5 CONCLUSION TO INTERNSHIP WORK

I had a worthwhile experience at my 12-week internship at Sopan Infotech Pvt. Ltd. Getting to learn so many new things and gaining a brief industrial exposure at the end of this internship, I successfully managed to learn Drawing Reading, Solidworks Professional Designing, Esprit CAM and several other relevant data thanks to our Supervisor & Colleagues' skills & expertise in the field and our Internal Guide's help to get this internship.
I also managed to modify the conventional methodology of 3d modelling using global variables and also modifying a sub-assembly of ongoing project on cooling towers to simplify and reduce the mfg. time & cost for client.

It was definitely helpful in reinforcing my knowledge foundation and getting me ready for industry. This has made me realize that I would definitely love to create a career in this filed and develop myself further.

8.6 LIMITATIONS & FUTURE IMPROVEMENTS ON SELF

The experience gained so far was in the short duration of 12 weeks but had the information of about several years' worth of experience from experts in the field. A little more time would have ensured a better grasping of practical applicable solutions and many more such new innovations from me.

It also took a while to get out of shell of curriculum theoretical knowledge and push forward to open up and gain some new insights directly by learning on-hands. Thus, I need to develop a broader perspective for several such things and always accept new data and be open to try different things to develop my creativity and to incorporate new innovations while working on new projects.

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