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DHAVALGIRI, DHARWAD – 580002

(AFFILIATED TO VISVESWARAYA TECHNOLOGICAL UNIVERSITY)

REPORT ON SUMMER INTERNSHIP

"Internship carried at DesignSense Software Technologies Pvt. Ltd: Design and Drafting of Butterfly Valve"

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Mechanical Engineering VII Semester

Submitted in partial Fulfilment of the requirements for the degree of

Bachelor of Engineering

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Department of Mechanical Engineering

CERTIFICATE

This is to certify that the Internship titled **"Internship Carried at DesignSense Software Technologies Pvt. Ltd: Design and Drafting of Butterfly Valve"** is a Bonafide work carried out by **Sankalp A Kale (2SD22ME049)** submitted in partial fulfillment of the requirements for the award of the degree of Bachelor of Engineering in Mechanical Engineering of S.D.M. College of Engineering and Technology, Dharwad, Karnataka. (An autonomous institution affiliated to Visvesvaraya Technological University, Belgaum, Karnataka), during the year 2025-2026.

Dr. SunilKumar S Honnungar   **Dr. AnilKumar H. C**

Internal Guide   HOD Mechanical Dept.

DECLARATION

I hereby declare that this report on summer Internship titled **"Internship at DesignSense Software Technologies Pvt. Ltd: Design and Drafting of Butterfly Valve"** Is carried out by me under the guidence of **Dr. SunilKumar S Honnungar**, Department of Mechanical Engineering, S.D.M. College of Engineering & Technology, in the partial fulfilment of the requirement of the degree of Bachelor of Mechanical Engineering, SDM College of Engineering &Technology, Dharwad. I also declare that I have not submitted this dissertation work to any other university for the award of any other degree.

Sankalp A Kale
2SD22ME049

Place: Dharwad
Date:

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ACKNOWLEDGMENT

We would like to thank our guide **Dr. SunilKumar S Honnungar** Department of Mechanical Engineering, S.D.M. College of Engineering & Technology, for his constant support, invaluable advice, and guidance.

We express our earnest, profound gratefulness to the Internship committee - **Dr. Anilkumar H. C** and Prof. **V. R. Shivannavar** for helping us throughout the project period in every manner.

We thank **Dr. Ramesh L Chakrasali,** Principal and **Dr. Anilkumar H. C,** HOD, Department of Mechanical Engineering, & Deans of S.D.M. College of Engineering and Technology, Dharwad, for being a constant presence of inspiration and support.

I would like to express my sincere gratitude to the management and staff of Designsense for providing me with the opportunity to undertake my internship in their esteemed organization. I am especially thankful to the HR department for their continuous support and guidance throughout the internship period. I extend my heartfelt appreciation to all the engineers, supervisors, and fellow employees who generously shared their knowledge, helped, and made my learning experience enriching and enjoyable. Their encouragement and cooperation played a vital role in the successful completion of my project.

Sankalp A Kale
2SD22ME049

ABSTRACT

During my internship at DesignSense Software Technologies, I had the opportunity to work closely with the Design team, gaining hands-on experience in the field of design development. My primary responsibility was to get knowledge about valve & Design the valve in software. This role allowed me to understand the process of building client relationships and the importance of strategic planning in sales operations.

The design of a valve plays a critical role in controlling the flow, pressure, and direction of fluids in various industrial systems. This project focuses on the conceptualization, analysis, and development of a valve with optimal performance, reliability, and safety. The design process involves determining the appropriate valve type, selecting suitable materials, and performing calculations for flow characteristics, pressure drop, and structural integrity.

Advanced modeling tools and simulation software are utilized to evaluate fluid dynamics and mechanical stresses under operating conditions. The outcome of this design ensures efficient flow regulation, minimal energy losses, and extended service life, making it suitable for applications in hydraulic, pneumatic, and process control systems.

Overall, this internship provided me with practical exposure to the design domain, particularly in generating and managing leads. It helped me develop a professional understanding of design & development processes and strengthened my ability to contribute effectively to a sales team in a real-world business environment.

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Chapter 1: Introduction To DesignSense Software Technology Pvt. Ltd

Figure 1: DesignSense Logo

1.1 Profile:

DesignSense Software Technologies Pvt. Ltd. Bengaluru, INDIA was founded in the year **2013** and is the nation-wide distributor for **BricsCAD and other Bricsys products in India.** We have successfully completed 12 years of representing Bricsys in India, both as a developer and sales-support point for BricsCAD.

1.2 Vision:

We help bring innovative shortcuts, tips and tricks into our customer workflow to make their core CAD design process efficient. Automation is our key mission. We look at automating every possible piece of the customer workflow to help them finish their tasks in a fast, efficient and predictable manner.

1.3 Mission:

We are a sales company because we want to interact with a wide variety of customers and provide them platform solutions. We are a CAD development company also, and by virtue of that, we deliver the best possible automation solutions for our customers. Our

vision is to see our customers let the computer and CAD software do all the boring repetitive tasks, while the designers focus on the core and creative tasks

1.4 Core values:

At DesignSense we work with integrity in everything we do, and embody our principles when working with customers, suppliers and colleagues.

1.5 What They Do:

They are also a complete CAD software development company and have created two of the most popular add-ons for the .drawing industry – GeoTools & CADPower, which run on AutoCAD and BricsCAD platforms.

They also offer CAD customization and process automation services for the design and manufacturing industry. Almost all of our industry solutions are on the CAD, GIS and BIM workflow platforms.

1.6 Introduction:

DesignSense Software Technologies, Is a trusted partner in innovative CAD solutions. As the exclusive nationwide distributor for BricsCAD and Bricsys products in India, They bring over 12+ years of expertise in CAD Customization and Automation.

GeoTools: A geo-data application designed for professionals in GIS data creation, surveying, mapping, and related fields, enhancing productivity and data management.

CAD-BIM automation: They are passionate about building automation in the design industry. Several of our projects on a daily basis includes building bespoke automation for the CAD design workflows. If there is one single investment for growth you need to do today, it must be in automation and AI.

AX3000 form EDV Software: AX3000 is a CAD-based MEP BIM platform that runs on AutoCAD and BricsCAD BIM

Their Offerings:
BricsCAD Solutions: They provide a comprehensive suite of BricsCAD software tailored to meet diverse design needs in 2D, 3D, Civil, Mechanical and BIM.
CADPower: A productivity enhancement tool offering over 400+ Lisp routines and features to supercharge your CAD experience.

1.7 Industry position & Market presence:

Over the past decade, DesignSense has steadily built its reputation as a trusted CAD partner in India. Competing with global software giants, the company's focus has been on value-driven solutions rather than expensive, license-heavy models. This approach has made DesignSense popular among

- Individual professionals seeking affordable CAD alternatives.

- Small and medium enterprises (SMEs) requiring scalable design solutions
  .
- Educational institutions looking to provide students with industry-relevant tools.

- Large organizations in architecture, civil engineering, and manufacturing sectors.

- The company's customer-centric approach, combined with its commitment to continuous innovation, has helped it carve a niche in the highly competitive CAD market.

1.8   Innovation & Development:

Unlike many distributors who solely resell international products, DesignSense invests heavily in R&D and software innovation. Its founder, Rakesh Rao, has been instrumental in developing products like GeoTools and CADPower, which have gained global recognition. These tools address specific gaps in mainstream CAD applications, enabling professionals to work more efficiently and productively.

DesignSense has also embraced the BIM (Building Information Modelling) revolution, offering solutions that help architects, engineers, and contractors collaborate effectively. By integrating global technology with local innovation, the company demonstrates a strong commitment to shaping the future of digital design in India.

1.9   Significance of Internship at DesignSense:

Completing an internship at DesignSense Software Technologies offers students and young professionals a unique opportunity to gain exposure to both internationally recognized CAD platforms and indigenously developed tools. Interns are able to:
Understand the CAD software distribution model and its business significance.
•Gain practical knowledge of tools like BricsCAD, GeoTools, and CADPower.
•Learn how software innovation addresses the real needs of design professionals.
•Experience the dynamics of working in a technology-driven, customer-focused organization. •Contribute to projects that combine software development, technical support, and design problemsolving.
This dual exposure—both technical and business-oriented—makes internships at DesignSense especially valuable for individuals aiming to build careers in CAD software development, civil engineering design, or related IT industries

1.10 Conclusion:

DesignSense Software Technologies stands as a pioneering company in India's CAD ecosystem, blending global partnerships with local innovation. Its role as the exclusive distributor of BricsCAD, combined with its development of specialized plug-ins like GeoTools and CADPower, highlights its versatility and forwardlooking vision.

For interns, the organization provides a fertile learning environment where theoretical knowledge meets practical application. By working with a company at the intersection of technology, design, and innovation, interns not only enhance their technical proficiency but also develop a broader understanding of how CAD solutions drive efficiency in realworld projects.

Chapter 2: Product Portfolio – DesignSense Software Technologies.

DesignSense Software Technologies is a leading provider of CAD/BIM/Mechanical solutions in India, acting as the exclusive nationwide distributor for Bricsys products, and offering proprietary productivity tools and automation services. Below is a detailed breakdown of product / solution portfolio:

2.1 Brics CAD Lite:

BricsCAD Lite is the entry-level edition of the BricsCAD family, designed primarily for 2D drafting and detailing. It offers a familiar environment for users migrating from other CAD platforms, with full support for the industry-standard DWG format. Unlike many "LT" products, **BricsCAD Lite allows LISP customization,** enabling automation of repetitive tasks and improved workflow efficiency. The software is lightweight, cost-effective, and ideal for consultants, architects, and small businesses that need reliable drafting without the overhead of advanced 3D tools. Its interface is intuitive, reducing the learning curve for users transitioning from AutoCAD. The product also benefits from continuous development by Bricsys, ensuring compatibility and performance improvements with every release. For organizations focused purely on precision 2D documentation, BricsCAD Lite represents a robust and affordable choice.
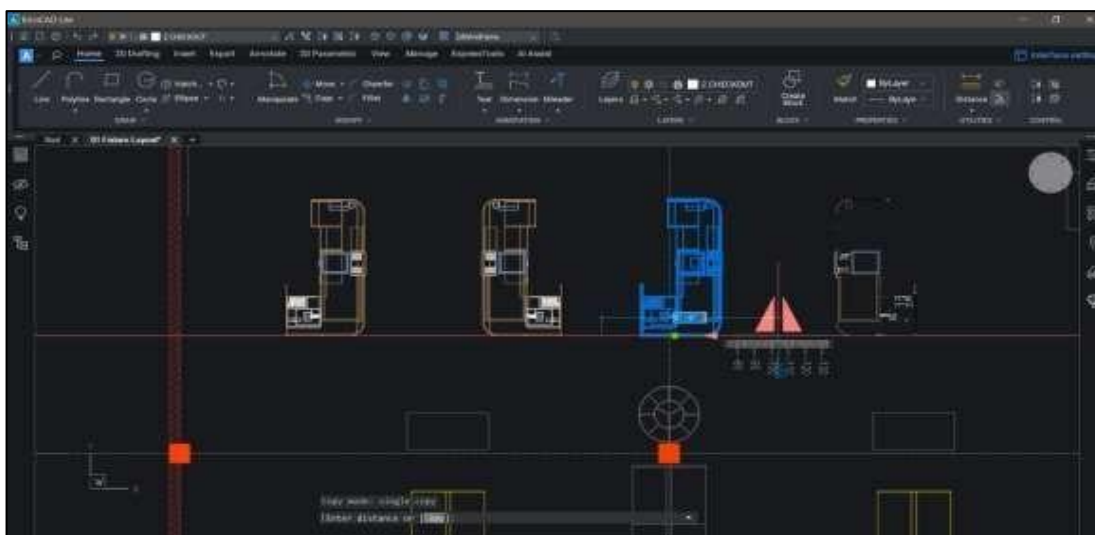

Figure 2.1: BricsCAD Lite Interface

2.2 Brics CAD Pro:

BricsCAD Pro expands upon the Lite edition by adding advanced 3D modelling and parametric design capabilities. It is a versatile platform for professionals who work in **both 2D and 3D,** providing tools for solid, surface, and mesh modelling. One of its key strengths is the powerful 3D constraint engine, which allows for intelligent parametric designs. It also supports point cloud visualization, enabling designers to work directly with laser-scanned data for renovation or infrastructure projects. **Civil and surface modelling tools, such as TIN surfaces,** further extend its applicability to civil engineering and land development projects. BricsCAD Pro is also the foundation for BricsCAD BIM and Mechanical, making it the core edition for multidisciplinary workflows. With its balance of affordability, DWG compatibility, and robust features, BricsCAD Pro is well-suited for organizations that need more than drafting but do not require specialized BIM or mechanical modules.
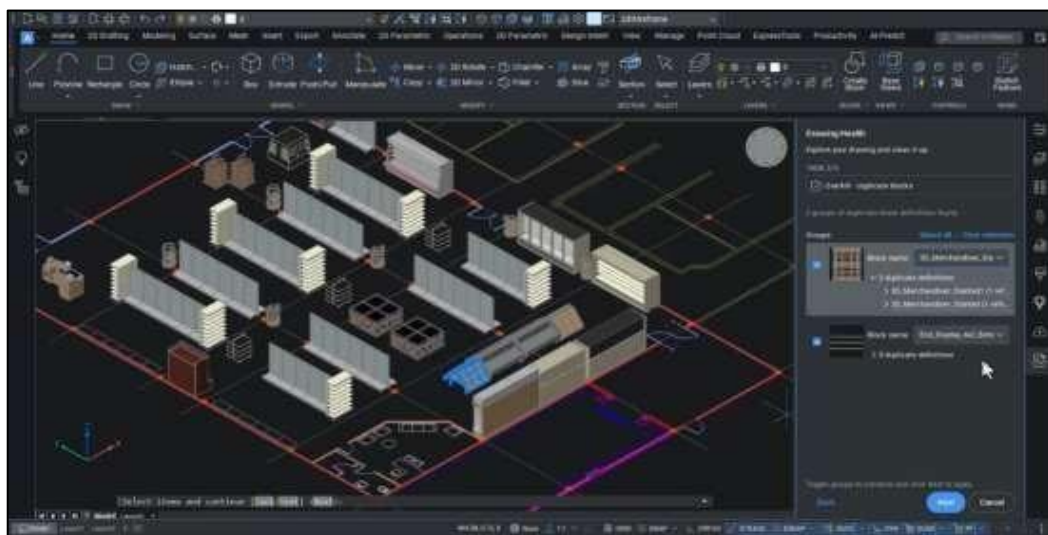

Figure 2.2: Brics CAD Pro Interface

2.3 Brics CAD Mechanical:

BricsCAD Mechanical is tailored specifically for the needs of mechanical engineers and product designers. It offers a complete toolset for 3D parametric modelling, assemblies, and sheet metal design within the DWG environment. One standout feature is its support for assembly modelling, allowing designers to create and manage complex product structures. **The software includes tools for unfolded sheet metal designs, bend tables, and automatic BOM (Bill of Materials) generation.** Exploded views and assembly documentation features streamline the manufacturing preparation process. Because it builds on BricsCAD Pro, Mechanical users also benefit from all general CAD features while gaining specialized tools that rival more expensive mechanical CAD systems. Its compatibility with industry-standard formats, particularly when paired with Communicator, ensures smooth collaboration across different platforms. BricsCAD Mechanical empowers engineers to take concepts through detailed design to **production documentation efficiently and cost-effectively.**
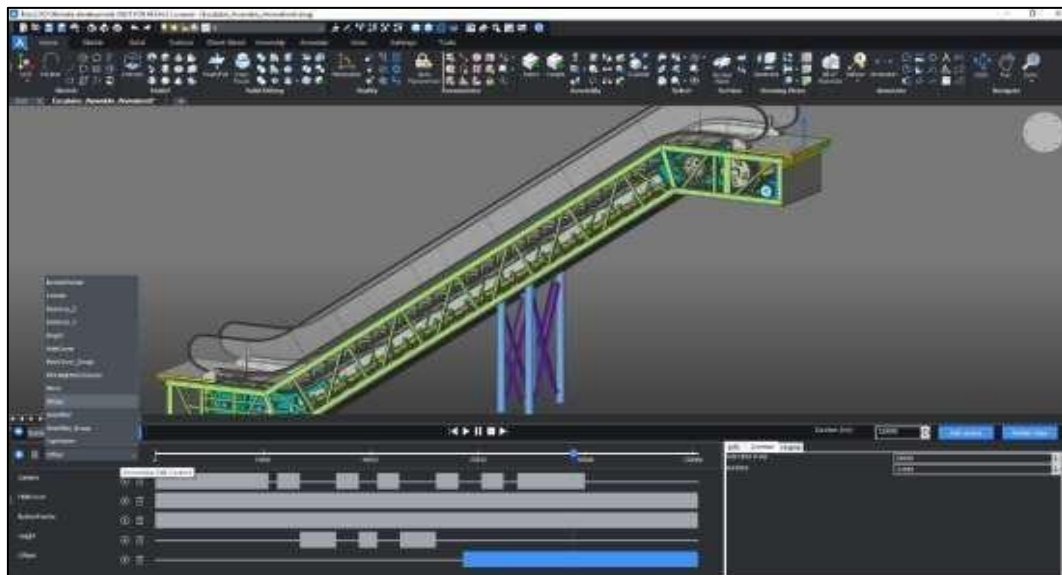
Figure 2.3: Brics CAD Mechanical

2.4 Brics CAD BIM:

BricsCAD BIM provides a unique "Design First" approach to Building Information Modelling, focusing on creative freedom before enforcing classification or standards. Unlike traditional BIM platforms that rely heavily on predefined parametric families, BricsCAD BIM uses CADaccurate solid modelling, giving designers more flexibility and precision. AI-powered tools such as BIMIFY automatically classify building elements into BIM categories, while PROPAGATE replicates design details across a model, reducing repetitive work. It also supports continuous **Level of Development (LOD),** allowing projects to evolve seamlessly from concept to detailed BIM without rework. Full IFC support enables **openBIM collaboration,** ensuring interoperability with other platforms in the AEC ecosystem. The software integrates architecture, structural, and MEP design in a single environment, reducing the need for multiple tools. For firms seeking a cost-effective yet powerful BIM solution, BricsCAD BIM provides a strong alternative to established players like Revit or ArchiCAD.
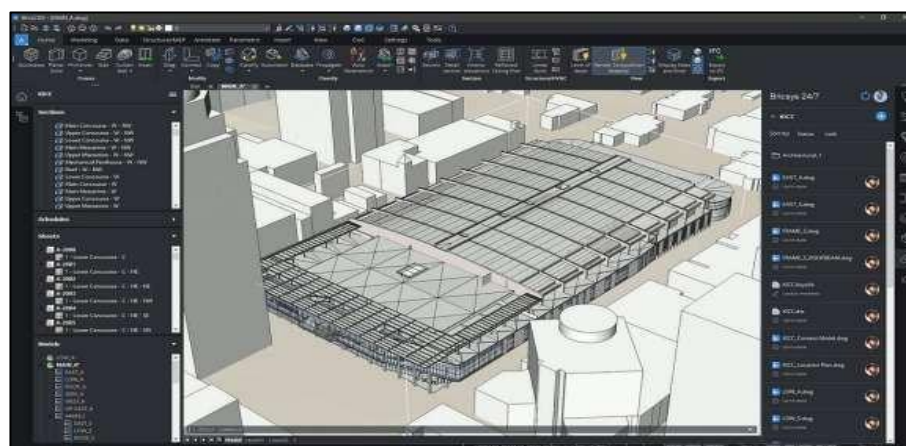

Figure 2.4: BricsCAD BIM

2.5 Brics CAD Ultimate:

BricsCAD Ultimate is the all-in-one package that combines the full functionality of Lite, Pro, Mechanical, and BIM into a single installer and license. It is designed for organizations or professionals who work across multiple disciplines, ensuring that they do not need to choose between drafting, 3D design, mechanical engineering, or BIM. This unified edition simplifies licensing management and provides maximum flexibility in workflows. Teams can seamlessly transition between drafting, product design, and architectural modelling without switching software. The Ultimate package is particularly valuable for large firms or multidisciplinary consultancies, where different departments require different tools but prefer to maintain consistency in their CAD environment. By consolidating all BricsCAD editions, Ultimate ensures maximum ROI and eliminates the need to purchase separate software packages. It also supports the Communicator add-on, making it a complete design ecosystem.
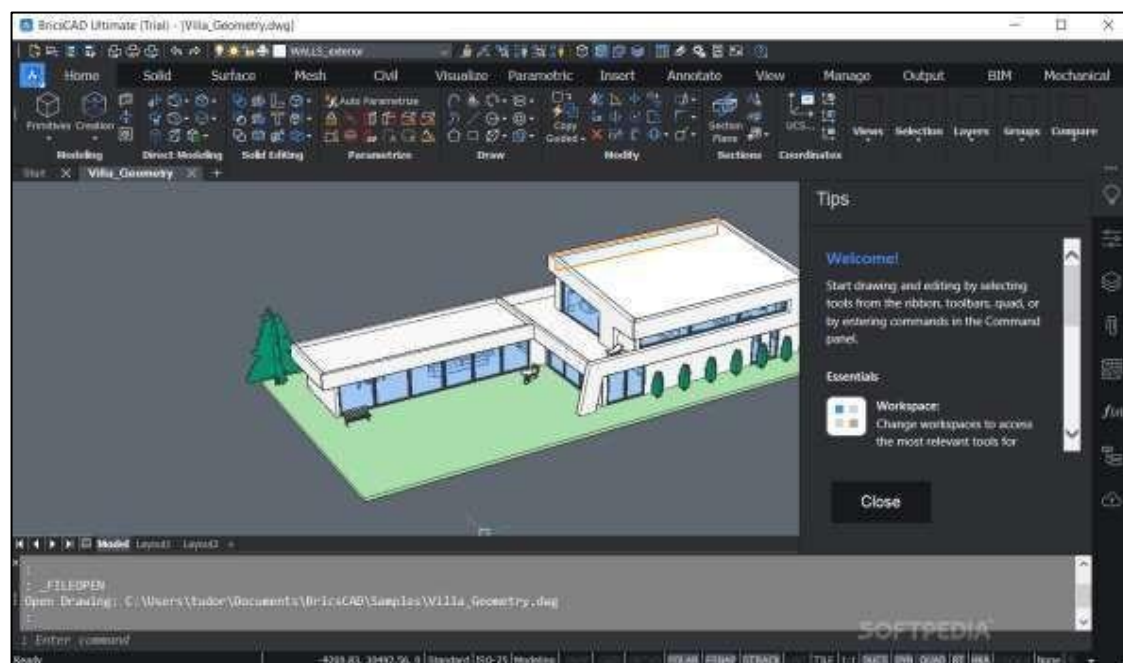
Figure 2.5: Brics CAD Ultimate

2.6 Brics CAD Shape:

BricsCAD Shape is a free conceptual modeling tool derived from the BricsCAD platform. It offers an intuitive push-pull modeling interface that enables users to quickly create and modify 3D concepts without being bogged down by technical constraints. Shape is intended for architects, designers, and students who want to sketch ideas in 3D before committing to detailed design. The tool includes a library of parametric objects such as walls, doors, and windows, helping users build space quickly. Since Shape is DWG-based, designs created here can be opened directly in BricsCAD Pro or BIM for further development. Despite being free, Shape maintains the accuracy and reliability of BricsCAD's modeling engine, making it more precise than other lightweight conceptual

tools. It is an excellent entry point for new users who want to experience BricsCAD's capabilities before upgrading to paid editions.
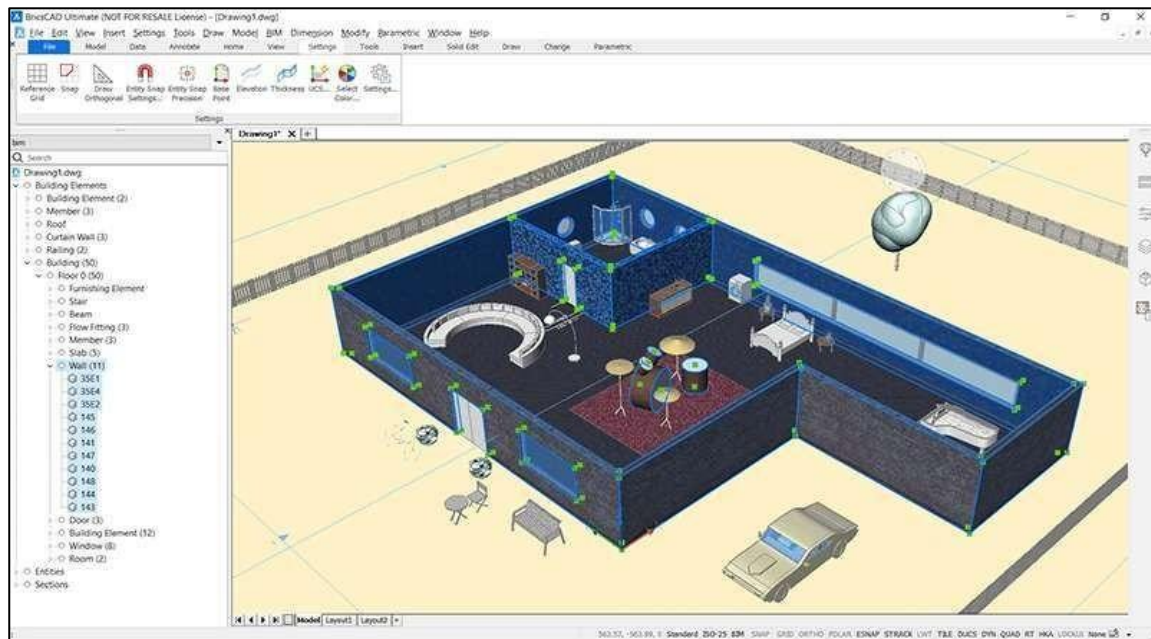
Figure 2.6: Brics CAD Shape

Chapter 3: Work Assigned by the Company – 1

3.1   Introduction to Valves:

Figure 3.1: Valve

Valve is a mechanical device that regulates directs or controls the flow of fluid by opening, closing, or partially opening the package. Mechanical actions – Valve operates using various mechanism, such as a hinged flap that swings open or closed, a rotating ball that blocks or opens a passage, or a sliding disk by changing the size of the opening, a valve can start or stop a flow, adjust its rate (throttling) or direct to a specific path

3.2 Types of Valves:

- Rotary Valve
- Globe Valve
- Needle Valve
- Axial Valve
- Ball Valve
- Butterfly Valve
- Knife Gate Valve
- Linear Valve
- Gate Valve

- Rising Stem valve
- Pinch Valve

Figure 3.2: Types of Valves

3.3 Uses of Valves:

Valves are used to control the flow, direction, & pressure of liquids, gasses, & slurries in a wide range of industries & applications, including water & wastewater systems, oil & gas, food production, & residential plumbing. They achieve this by starting / stopping flow, throttling the flow rate, redirecting fluids, regulating pressure over – pressurization & relieving systems pressure in emergencies Main uses are on/off control, flow control, directional control, pressure relief, excess flow protection, preventing backflow

3.4 Advantages of Valves:

Valves offer advantages like precise flow control, preventing backflow, rapid opening and closing, low fluid resistance, durability, and versatility for a wide range of applications and media. They can also be pressure relief devices, ensuring system safety, and provide tight shutoff to prevent leaks. Butterfly valves are lightweight with a wafer-form body. The low weight and compact size make them favourable for use in many applications. Butterfly valves are relatively cheaper than other valves. This may be because of the low weight

and that a small number of components are used in their construction. The installation costs are low.

The design is not complicated. A small number of parts are used in the construction of butterfly valves. It is reasonably convenient and easy to repair butterfly valves. So we can say they are maintenance friendly. Butterfly valves can transfer mud with a little fluid deposit in the outlet of the pipe.

3.5 Disadvantages of Valves:

Disadvantages of valves include high maintenance, potential leakage, limited flow control in some types (like ball valves) and slow operation, especially in gate valves. Certain valves require excessive space for installation and maintenance, while others, like mechanical heart valves, increase the risk of blood clots requiring medication. Valves are also not universally suitable for all fluids, as some are incompatible with high-temperature, high-pressure, or viscous media. The external dimension and opening height are large, and the space for installation is also large.

In the process of opening and closing, the sealing surface is relatively friction, and the friction is large, even it is easy to cause abrasion phenomenon in high temperature. Generally, gate valves have two sealing surfaces, which add some difficulties to processing, grinding and maintenance: The opening and closing time is long.

3.6 Top Valve Manufacturers in INDIA:

• L & T Valves
• Kirloskar brothers limited
• Amtech Valves
• VIP Valves
• Oswal Valves
• Aira Euro Automation Pvt.Ltd
• Micro Finish
• Prime Industrial Valves Mfg. Co
• Immortal Valves Pvt.Ltd

Chapter 4: Work Assigned by the Company- 2
Studying The R & D Document of Valves By 2L Engineers

4.1 Design & Development of Valves:

Design Input & Reviews
• Design Output & Reviews
• Design changes & Modification
• Design Verification
• Design Validation
• Inspection (Applicable or not)
• Final Approval

4.2 Design & Development- Input & Reviews:

• Environment & Operational Condition
• Methodology assumption
• Legal requirement
• Material
• Testing
• NDE Requirements - Testing

4.3 Design & Development Calculations:

Calculations of Valve torque, Seat torque, Bearing torque, Key strength calculations, Finding the weakest section outside primary boundary disc thickness calculations body shell thickness calculations

4.4 Design & Development Verification & Final review:

Design & development verification of a butterfly valve involves simulations, material validation, and prototype testing to ensure it meets performance, safety, and regulatory requirements, such as API standards. The final review includes a comprehensive report detailing the design, testing, and post-test inspections of the valve and its components for wear and damage to confirm its suitability for the intended application

4.5 Validation & Final Review:

Validation and final review approval of a butterfly valve involves several stages, including submission of technical documentation and drawings for design approval, performance

testing to verify functionality and pressure integrity, and adherence to relevant standards and specifications. The process typically culminates in the submission of final documentation, including test reports and certification, for the customer's final review and approval before the valve is accepted and released for service.

4.6 Wafer Type Butterfly Valve 2D Drafting:

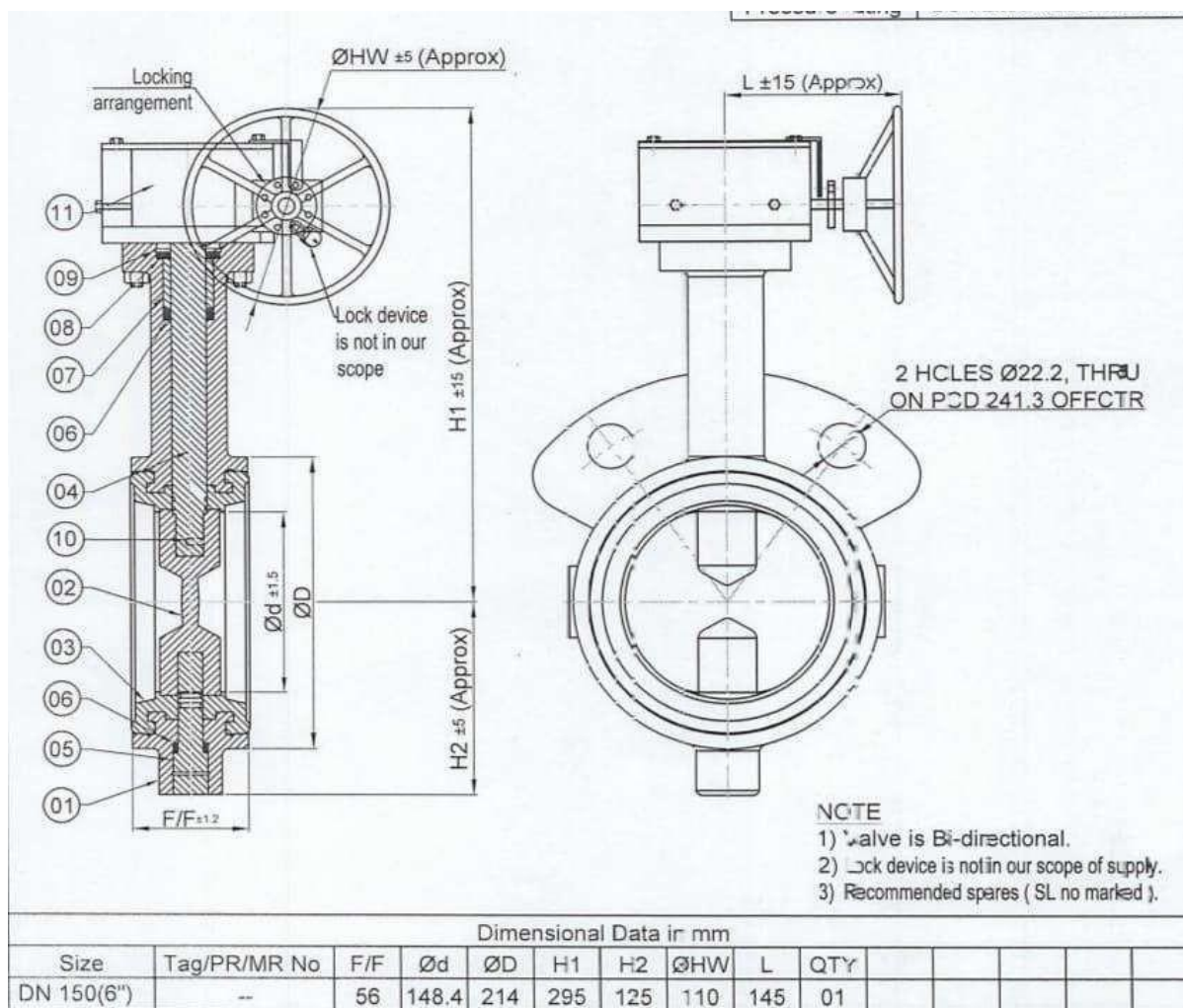| Dimensional Data in mm													
Size	Tag/PR/MR No	F/F	Ød	ØD	H1	H2	ØHW	L	QTY				
DN 150(6")	--	56	148.4	214	295	125	110	145	01				

Figure 4: Butterfly valve Drafting

Chapter 5: Work Assigned by the Company- 3

5.1 2D Drawing of butterfly Valve:
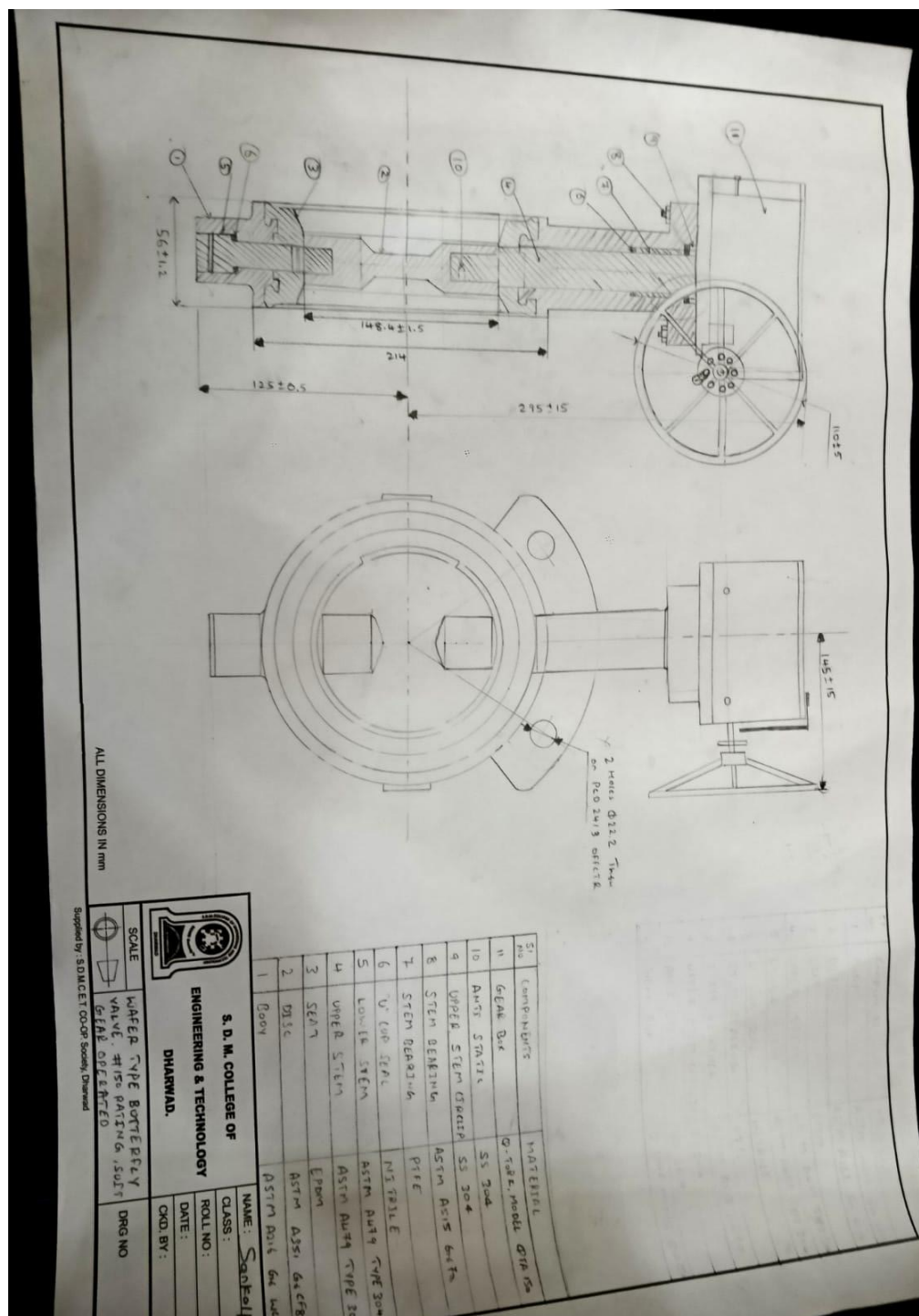
Figure 5: 2D drawing of Butterfly Valve

5.2 Bill of Materials:

Table 1: Bill of Materials

SL. No	Components	Material
1	Body	ASTM A216 Gr. WCB
2	Disc	ASTM A351 Gr. CF8
3	Seat	EPDM (REPLACEABLE)
4	Upper Stem	ASTM A479 TYPE 304
5	Lower Stem	ASTM A479 TYPE 304
6	'U' Cup Seal	NITRILE
7	Stem Bearing	PTFE
8	Stem Retainer	ASTM A515 Gr. 70
9	Upper Stem Circlip	SS304
10	Anti-Static	SS304
11	Gear Box	Q-TORK, MODEL: QTA-150

Chapter 6: Work Assigned by the Company - 4

3D Part Drawing, Assembly & Drafting of Butterfly Valve

6.1 3D Parts of Butterfly Valve:

Figure 6.1: BODY DN150 (NPS 6)
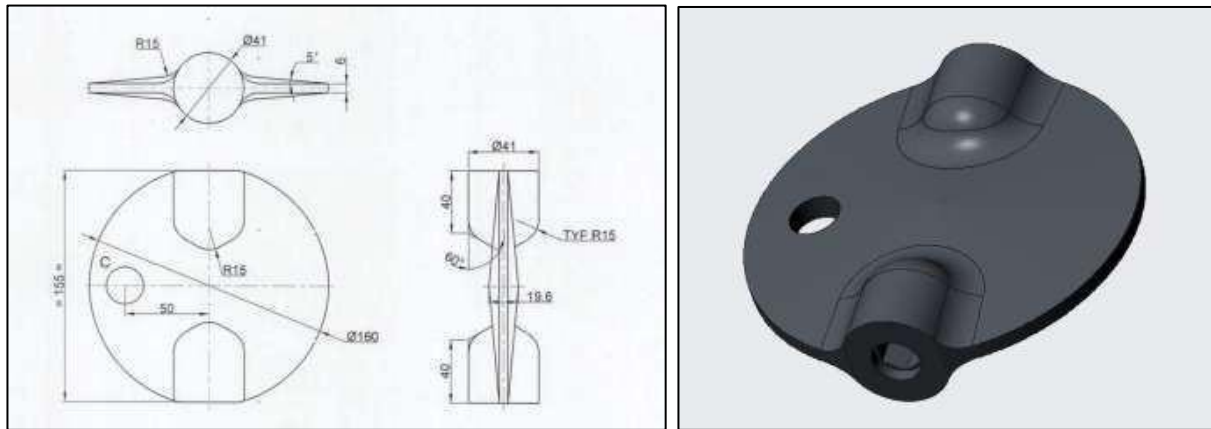

Figure 6.2: BODY DN150 (NPS 6)

Figure 6.3: DISC DN150 (NPS 6)

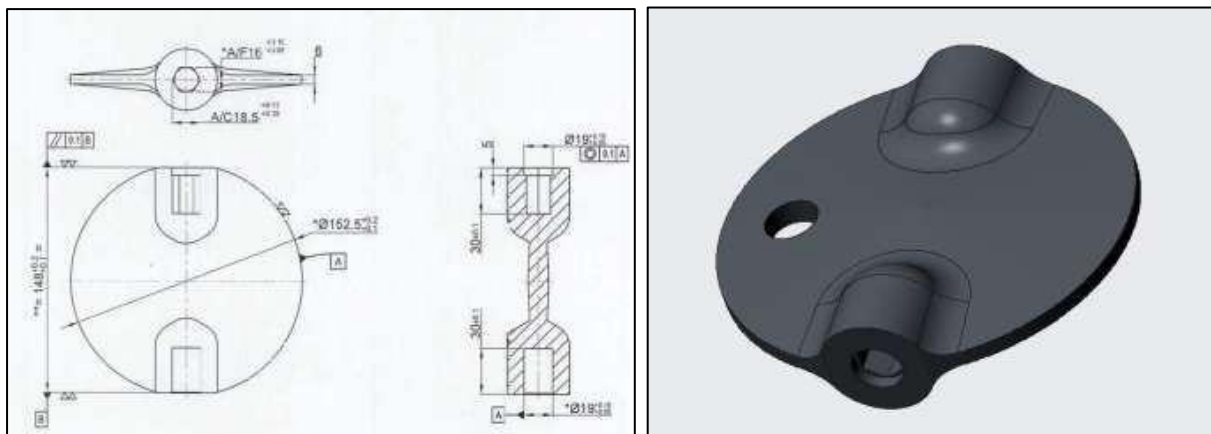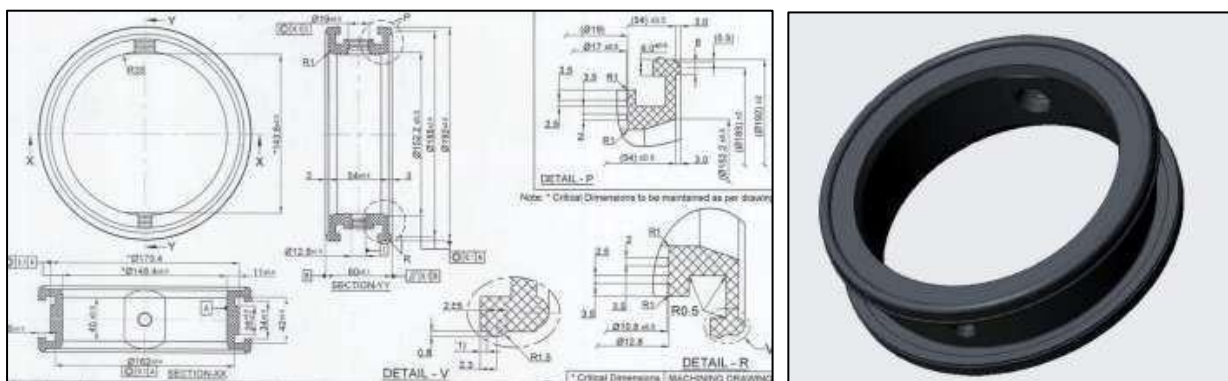
Figure 6.4: BODY DN150 (NPS 6)

Figure 6.5: SLEEVE DN150 (NPS 6)

Figure 6.6: UPPER STEM DN150 (NPS 6)
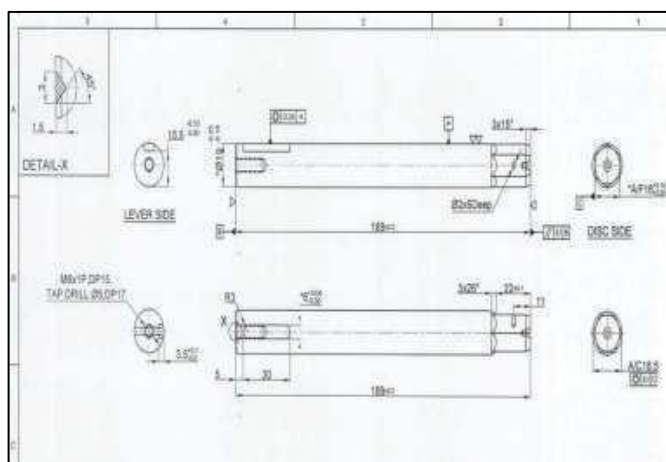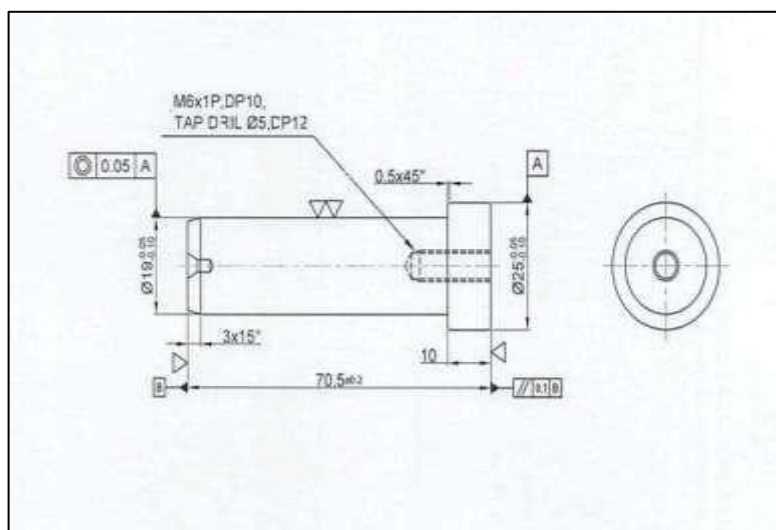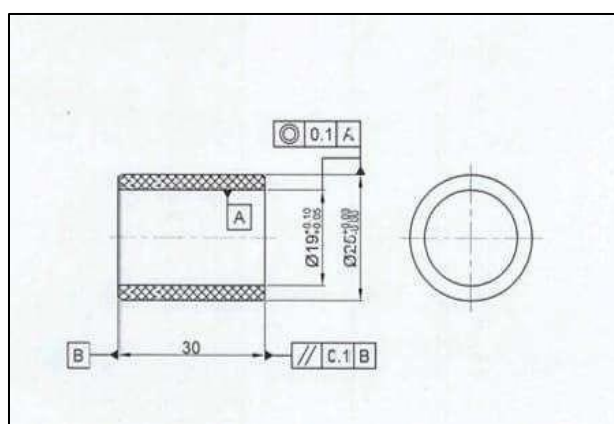

Figure 6.7: LOWER STEM DN150 (NPS 6)

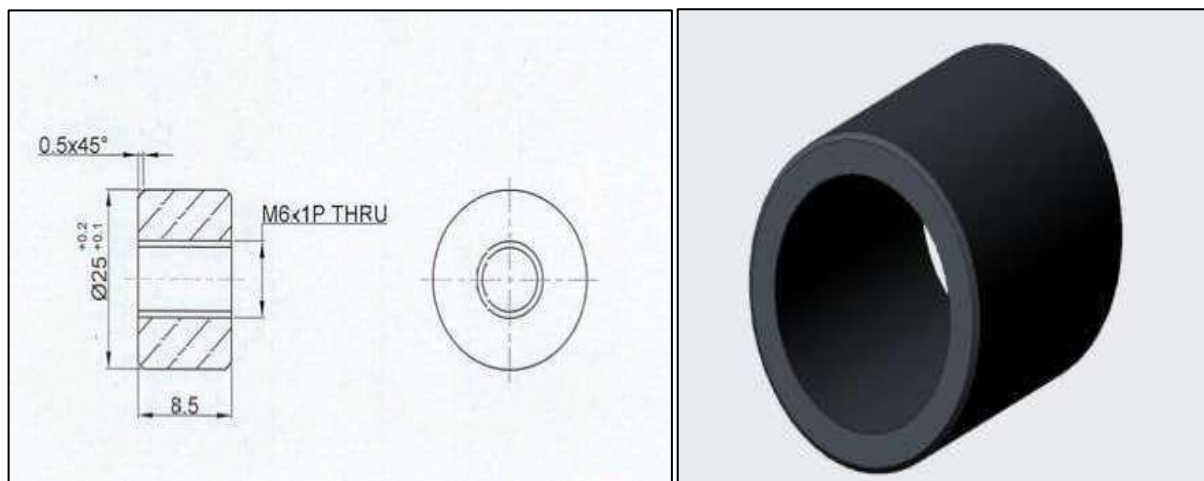Figure 6.8: BUSH BEARING DN150 (NPS 6)
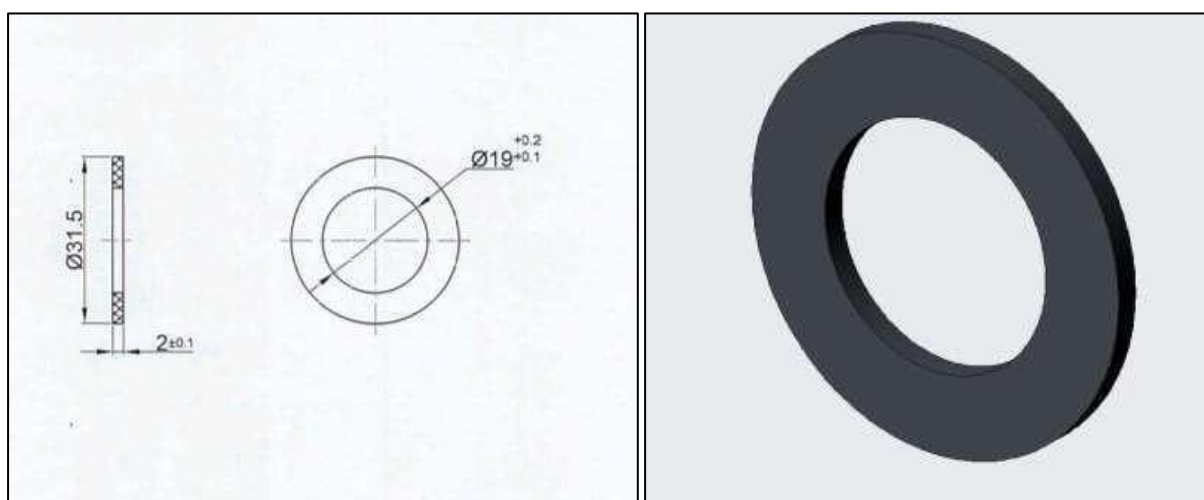
Figure 6.9: LOWER STEM DN150 (NPS 6)

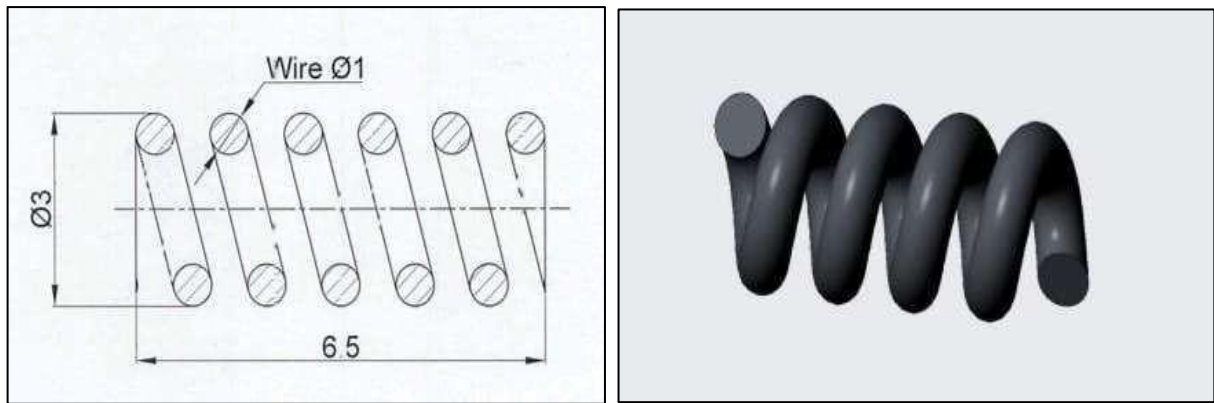Figure 6.10: STEM RETAINER DN150 (NPS 6)

Figure 6.11: BALL(ANTI-STATIC)

Figure 6.12: SPRING (ANTI-STATIC)

6.2 Assembly Drawing of Butterfly Valve:

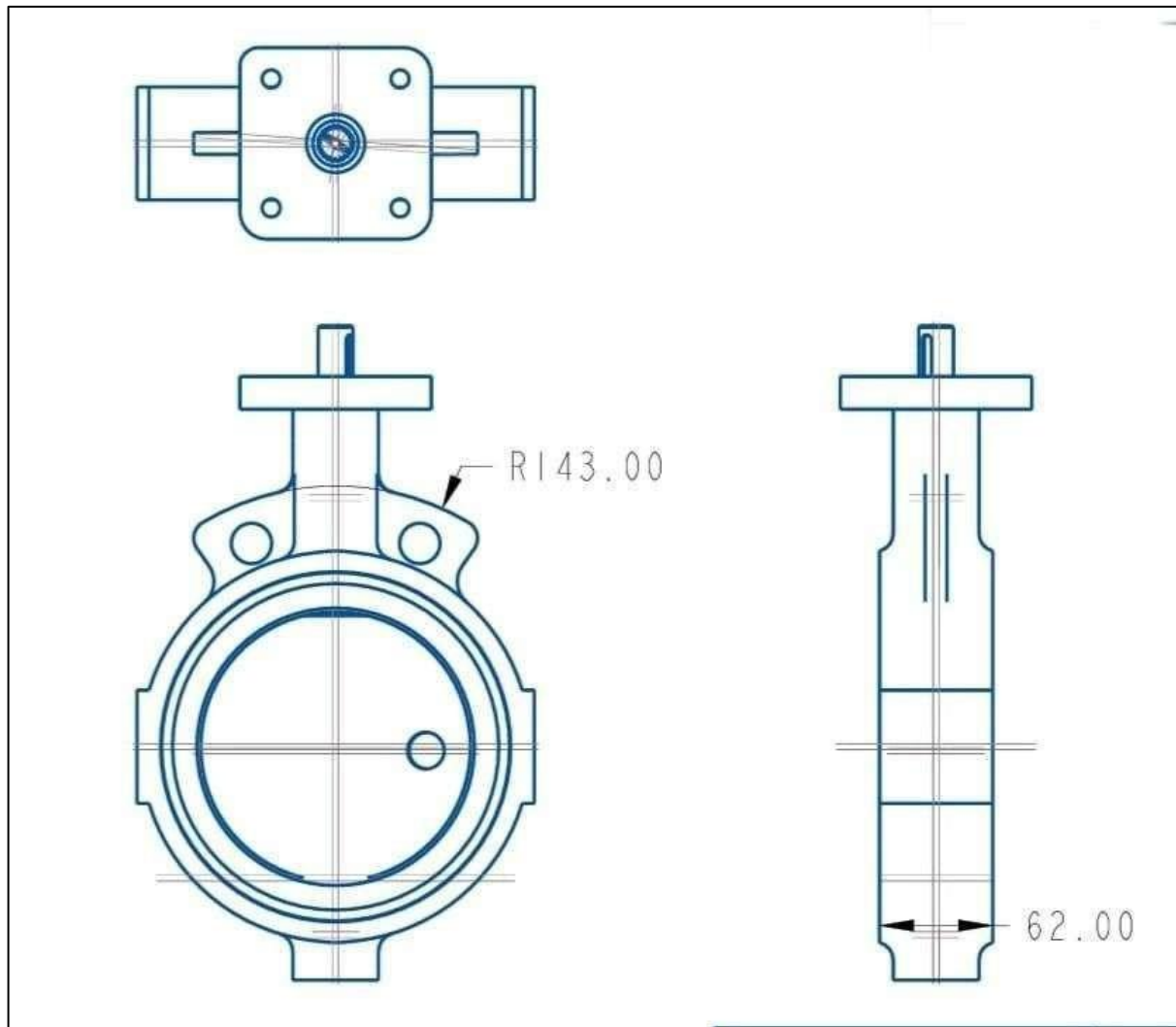Figure 6.13: Assembly Drawing

6.3 ButterFly Valve Drafting:

Figure 6.14: Drafting of Butterfly Valve

Chapter 7: Work Assigned by the Company – 5
Industrial Visit To 2L Engineers

7.1 About 2L Engineers:

2L Engineers is Valve manufacturing company located in, Rayapur industrial Area Dharwad. 2L engineers was established in 2015, it has been committed to manufacturing high-quality valves for critical applications. At 2L, the passion for engineering and design ensures precision manufacturing and accuracy, meeting international specifications. These standards include ISO, API, NACE, ASME, ASTM, MSS-SP, BS EN, and PED, among others.

Our manufacturing facility near Hubli, Karnataka, has a rich history of producing quality valves in India. We are an ISO 9001:2015, ISO 14001:2015, ISO 45001:2018, EIL and CE/PED certified company, with the capability to offer API 6D Monogrammed Ball Valves and Check Valves. We deliver valves to both domestic and international markets, serving specialized fields such as petrochemical, chemical, power, steel, food industry, pulp, oil & gas, wastewater management, and general industry

Over the years, 2L Engineers has developed a comprehensive range of standard and customdesigned valves for various industries. We are committed to delivering innovative valve designs with an emphasis on

safety and quality at every step of the process. At 2L, every valve is built on the passion, skill, and experience of our dedicated team. Throughout product development, we focus on delivering valves with long service lives and low in-line maintenance.

For each member at 2L, excellence is not just a value—it is a discipline. We take pride in crafting our products with a great passion for engineering, ensuring high standards for our customers.

7.2 Butterfly Valve:

The wafer style butterfly valve is designed to maintain a seal against bi-directional pressure differential to prevent any back flow in systems designed for unidirectional flow. It accomplishes this with a tightly fitting seal, i.e., gasket, precision machined, and a flat valve face on the upstream and downstream sides of the valve. The drawback is that wafer butterfly valves only have a small flow control range. The pressure drop across wafer butterfly valves may be greater. Wafer butterfly valves are prone to clogging due to their design

Figure 7.1: Butterfly Valve Image

7.3 Ball Valve:

Figure 7.2: Ball Valve

Ball valves are the most used mechanical devices for different household and industrial applications. The valves have multiple types designed according to the nature of the application. A ball valve is the most commonly used type of valves . It uses to control the different fluids such as liquids, gases, and vapors. This article explains the ball valve working, its types, applications, and parts.

7.4 Globe Valve – Gear Operated:

A globe valve, different from ball valve, is a type of valve used for regulating flow in a pipeline, consisting of a movable plug or disc element and a stationary ring seat in a generally spherical body.

Globe valves are named for their spherical body shape with the two halves of the body being separated by an internal baffle. This has an opening that forms a seat onto which a movable plug can be screwed in to close (or shut) the valve. The plug is also called a disc In globe valves, the plug is connected to a stem which is operated by screw action using a handwheel in manual valves. Typically, automated globe valves use smooth stems rather than threaded and are opened and closed by an actuator assembly.

Figure 7.3: Gear Operated Gate Valve

7.5 3 – Piece Ball Valve:

A 3-piece floating ball valves consist of three pieces, two end connections & a body. The end connections are typically Flanged, threaded, or welded to the pipe. Users can easily remove the main body for cleaning or repair without removing the end connection. Hence, it is vital to prevent a line shutdown if maintenance is required. Our engineers have incarnated perfection in the valve design to make it an easy & smooth functioning valve. FlowBiz 3-piece Floating Ball Valves are easy to disassemble for maintenance and easy swapping of internal parts.

Figure 7.4: 3-Piece Ball Valve

7.6 Ball Valve Actuator Operated:

An actuated ball valve's principle is to remotely control fluid flow using an actuator—like a pneumatic, electric, or hydraulic device—that rotates the valve's internal ball via a connected stem, thereby opening or closing the bore and regulating the media's movement. The actuator translates an input signal into the mechanical motion needed to turn the stem, which is directly connected to the ball, changing the ball's position to control the flow.

Figure 7.5: Ball Valve Actuator Operated

7.7 Lever Operated – Ball Valve:

A lever-operated ball valve works on the simple principle of rotating a perforated ball, using a lever, to control flow through a pipe. When the lever is turned 90 degrees, the ball's internal hole aligns with the pipe, allowing fluid to pass through (open valve). The lever is then rotated 90 degrees to position the ball's solid side across the flow path, blocking the opening and shutting off the flow.

Figure 7.6: Lever Operated- Ball Valve.

7.8 Valve Stem with Valve Disc:

Disc valves typically function by utilizing a circular disc mounted on a central shaft or hinge. The disc can move to open or close the flow path.

A valve stem is a self-sealing one-way valve, commonly found on pneumatic tires, that acts as a port for adding or releasing air. It consists of a body, a valve core that opens and closes to control air flow, and a cap to protect the core from dirt and moisture.

Figure 7.7: Valve Stem with Valve Disc

7.9 Gate Valve:

A gate valve, also known as a sluice valve, is a valve that opens by lifting a barrier (gate) out of the path of the fluid. Gate valves require very little space along the pipe axis and hardly restrict the flow of fluid when the gate is fully opened. The gate faces can be parallel but are most commonly wedge-shaped

Figure 7.8: Drafting of Butterfly Valve

7.10 Group Photo of Industrial Visit:

Figure 7.9: Group Photo of Industrial visit

Fig 10: Group Photo

Chapter 8: Results and Conclusion

8.1 Results:

The internship at DesignSense Software Technologies provided substantial practical exposure to both the technical and business aspects of the CAD software industry, particularly in relation to BricsCAD software and valve design technologies. The following results summarize the key learnings and outcomes from the internship period:

- **Technical Knowledge Enhancement:** The detailed work on valve design development, especially the butterfly valve, required a thorough study and application of engineering principles including valve types, their uses, and design calculations such as torque, strength, and material validation. The successful creation of 2D and 3D CAD drawings for the butterfly valve parts and assembly highlighted the application of CAD tools and software customization features. This outcome reflects a strong alignment between theoretical mechanical engineering concepts and practical CAD-based design tasks.

- **Software Proficiency:** Exposure to the BricsCAD product suite, including Lite, Pro, Mechanical, BIM, Ultimate, and Shape versions, enabled significant skill acquisition in 2D drafting, 3D modeling, mechanical assembly, and building information modeling. The hands-on experience with CAD customization and process automation, especially using DesignSense's proprietary tools like GeoTools and CADPower, enhanced efficiency in design workflows.

- **Design Documentation and Verification:** The internship involved reviewing R&D documents, design input and output verifications, prototype testing, and validation of valve designs against industry standards (API, ISO, etc.). Mastery over design verification steps and final approval protocols reinforced the importance of quality assurance and safety compliance in engineering design.

- **Industrial Exposure:** The industrial visit to 2L Engineers gave practical insights into valve manufacturing and quality control processes. Observations of various valve types, manufacturing standards, and operational constraints provided a holistic view of product lifecycle—from design to production to market delivery.

These results collectively demonstrate an effective blend of technical education with real-world applications in software, design engineering, and sales operations, fulfilling the dual objectives of the internship program.

8.2 Conclusion:

The internship at DesignSense Software Technologies was an invaluable experience that bridged academic knowledge and industrial practices in mechanical design and CAD software applications. The following conclusions can be drawn from the work performed and the knowledge gained:

- DesignSense's role as a national distributor and innovator in CAD software provided a fertile learning environment, especially through involvement in their extensive product portfolio including BricsCAD Mechanical and BIM tools. The opportunity to work with cutting-edge software, integrated with local customization efforts, allowed an appreciation of both global technological trends and regional market needs.

- Hands-on practice in valve design—covering everything from fundamental concepts to detailed 3D modeling and documentation—highlighted critical design considerations such as material selection, structural integrity, and compliance with industry standards. This practical validation of mechanical engineering principles was enhanced by direct participation in design verification and validation processes.

- The industrial visit underscored the importance of collaboration between design engineers and manufacturing teams, emphasizing quality assurance and adherence to international certifications. This reinforced the need for interdisciplinary knowledge and communication skills in professional engineering roles.

Overall, the internship significantly advanced technical competencies in CAD and valve engineering while fostering soft skills such as teamwork, communication, and client engagement. The experience has prepared for future career challenges by instilling confidence in applying engineering principles through modern design tools and industry practices.

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