DEPARTMENT OF MECHANICAL ENGINEERING

UNIVERSITY OF VISVESVARAYA COLLEGE OF ENGINEERING

(A First State Autonomous Public University on IIT Model)

K.R. Circle, Bengaluru 560001

CERTIFICATE

This is to certify that the Internship/ professional work has been successfully carried out at **V Smart Health Care Device** & Industries by **Kunal Desai** bearing the **USN: U25UV22T074058**, Bonafide student of University of Visvesvaraya College of Engineering (UVCE) during the academic year **2024-2025.** It is certified that all corrections/suggestions indicated for Internal assessment have been incorporated in the report. The Internship report has been approved as it satisfies the academic requirements in respect of Internship work for the said degree.

(Signature of Guide)

Dr. H G HANUMANTARAJU

Professor,

Department of Mechanical Engineering,

Engineering U.V.C.E, Bengaluru.

(Signature of the Chairman)

Dr. H C CHITTAPPA

Professor and Chairman

Department of Mechanical

U.V.C.E, Bengaluru.

Signature with Date

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DECLARATION

I, **Kunal Desai,** Bearing USN **U25UV22T074058**, student of BTech **, Department of Mechanical Engineering, University of Visvesvaraya College of Engineering**, Bengaluru, hereby declare that the internship has been independently carried out by me. V Smart Health Care Device submitted as a partial fulfilment for the award of BTech from UVCE 2024-2025. This work has not been submitted by us in part or full to any other University or Institute for the award of any degree. I also declare that the internship has not been submitted previously for the award of any degree by me, to any institution.

Kunal Desai, U25UV22T074058

Executive Summary

This report presents an overview of my internship experience at V Smart Health Care Device and other Co-ordinate Industries. The internship spanned over a period of Eight weeks i.e. two months, during which I worked as an intern in the domain their company products and development. This report outlines the organization, provides insights into the skills acquired, learning outcomes, internship experience, and concludes with a summary of the overall experience.

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An Internship report on

V SMART HEALTH CARE DEVICE

Submitted by

Kunal Desai – U25UV22T074058

in partial fulfilment of 5th semester for award of

BTech

In

Mechanical Engineering

Under the Guidance of

Dr. H.G. HANUMANTHARAJU

Professor, Department of Mechanical Engineering

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CHAPTER – 1

ABOUT THE ORGANIZATION

V Smart Health Care Device is one of the trusted Dermatology Equipment Manufacturers in Bangalore. Our product range includes Cosmetology Equipment and Homecare Equipment's. The machines that you get from us are of superior quality and are widely tested. To ensure that these will remain stagnant when it comes to excellent performance in the practical world. Our dermatology equipment is backed by clinical studies and real-world results, demonstrating its effectiveness in improving skin health and appearance. Customers can trust that our equipment delivers the results they desire, backed by scientific evidence and patient testimonials.

We are a leading Infant Radiant Warmer Suppliers in Karnataka. We are a company that you can always trust when it comes to investing in high-quality dermatology equipment is a long-term investment in the success of a dermatology practice. We've been engaged in offering Hydra Facial Machine, Derma Chair, Diode Laser, Pico Laser, Cry lipolysis, MNRF, HIFU Machine, CO2 Fractional Laser Machine, UV Therapy Unit, Nd Yag Laser, Infant Phototherapy Unit, Surgical Loupes, Dialysis Chair, Led OT Light in different specifications. Our equipment is built to last, offering durability and reliability for years to come. Customers can trust that our equipment will continue to deliver exceptional performance and results over time.

Noted among the top-notch Dialysis Chair Wholesalers in India. From acne treatment to anti-aging therapies, our dermatology and beauty care equipment offers comprehensive solutions for a wide range of skin concerns. Dermatologists can rely on our equipment to effectively address various skin conditions and achieve optimal results for their patients.

Fig 1.1 Organisation logo

CHAPTER – 2 AREA OF STUDY

1. **ASSEMBLY**
2. **FABRICATION**
3. **LASER CUTTING**
4. **WELDING**
5. **POWDER COATING**
6. **SHEET METAL**
7. **INFANT RADIANT WARMER**

1. ASSEMBLY

Assembly refers to the process of putting together various parts or components to form a finished product. It's a key step in manufacturing, where individual components are combined to create a final product ready for use or distribution. Assembly can take place in many industries, including automotive, electronics, furniture manufacturing, and even consumer goods.

2. FABRICATION

Fabrication generally refers to the process of creating products or structures by assembling various materials through different techniques. The term can be applied to many industries, including manufacturing, construction, and even arts and crafts. There are different fabrication types. They are:

1. Manufacturing Fabrication
2. Construction Fabrication
3. Sheet Metal Fabrication
4. Textile Fabrication
5. Artistic Fabrication

Key Considerations in Fabrication:

- Materials: Choosing the right material is essential to ensure that the final product performs as expected. This could involve metals (steel, aluminium), plastics, composites, wood, or fabric.

- Precision: Fabrication often requires high levels of precision to ensure that all parts fit together correctly and meet design specifications.
- Tools & Equipment: Specialized tools like CNC machines, welding machines, and 3D printers are often used in fabrication processes.

3. LASER CUTTING

Laser cutting is a popular and highly precise method of cutting or engraving materials using a focused laser beam. It's commonly used in industries such as manufacturing, automotive, aerospace, electronics, and even art. This technique offers high precision, efficiency, and versatility when working with various materials, such as metals, plastics, wood, glass, and textiles.

How Laser Cutting Works:
Laser cutting involves using a laser to melt, burn, or vaporize a material in a controlled manner. The laser is focused into a beam and directed onto the material's surface, where it either melts, burns, or vaporizes a narrow path, creating a cut. The process can be adjusted for different material types and thicknesses.

Main Components of Laser Cutting:

- **Laser Source:** The type of laser used (CO2, Fiber, or Nd:YAG lasers) depends on the material and thickness being cut.
  - **CO2 Lasers:** Typically used for cutting non-metallic materials (e.g., wood, plastics, textiles).
  - **Fiber Lasers:** Ideal for cutting metals, such as stainless steel, aluminium, and brass.
  - **Nd:YAG Lasers:** Used for high-precision applications and materials like metals and ceramics.
- **Laser Beam:** The focused laser beam is the core cutting tool. The energy in the beam is concentrated to generate enough heat to cut through materials.
- **Assist Gas:** A stream of gas, often oxygen, nitrogen, or compressed air, is blown at the cutting area to:
  - Cool the material.
  - Blow away molten material or debris.
  - Improve cut quality by controlling oxidation (especially when cutting metals).
- **Cutting Head:** This directs the laser beam to the material. It typically contains lenses to focus the beam and allow for precise cutting control.
- **Material:** Various materials can be cut depending on the type of laser used. Popular materials include metals (stainless steel, aluminium, carbon steel), plastics (acrylic, PVC), wood, and textiles.

Types of Lasers Cutting:

- Fusion Cutting: The material is melted using the laser, and the molten material is blown away by the assist gas. Commonly used for cutting metals.

- Flame Cutting: The laser ignites the material, causing it to burn and oxidize. This method is used primarily for materials like steel and requires oxygen as the assist gas.
- **Vaporization Cutting:** The laser heats the material until it vaporizes, leaving a clean cut. This method is ideal for materials that are difficult to cut with traditional methods.
- **Melt and Blow Cutting:** A combination of melting and blowing the molten material away, typically used for metals.

Advantages of Laser Cutting:

1. Precision and Accuracy
2. Minimal Material Waste
3. No Physical Contact
4. Versatility
5. Complex Shapes
6. Clean Edges
7. Automation

Limitations of Laser Cutting:

1. **Material Thickness:** While laser cutting is suitable for thin to medium-thick materials, very thick materials (especially metals) may require more power, slower speeds, and result in higher operational costs.
2. **Cost:** High-quality laser cutting machines can be expensive, both in terms of initial investment and maintenance. Operating costs can also be higher due to energy consumption and the need for specialized gases and optics.
3. **Heat**-Affected Zone (HAZ): The area around the cut can become heat-affected, which may lead to slight changes in material properties or appearance, especially for heat-sensitive materials.
4. **Speed:** For some materials, laser cutting can be slower compared to other traditional cutting methods like plasma or waterjet cutting.
   Considerations for Laser Cutting:

- **Material Type and Thickness:** The choice of laser (CO2, Fiber, or Nd:YAG) and cutting parameters will depend on the material and its thickness. For instance, CO2 lasers are ideal for thicker materials like wood and plastic, while Fiber lasers are better for metals.
- **Cutting Speed:** Depending on the material, the laser's power settings, and the assist gas, the speed of cutting can vary. Slower cutting speeds can improve precision but may not be ideal for high-volume production.
- **Safety:** Since laser cutting involves powerful lasers, safety precautions are important, including protective eyewear and ventilation systems to handle fumes generated

during cutting.

LASER CUTTING MACHINE

4. WELDING

Welding is a manufacturing process that involves joining two or more materials (usually metals or thermoplastics) by applying heat, pressure, or both. The process causes the material to melt at the joining point, allowing it to fuse together as it cools and solidifies. Welding is used in various industries, including automotive, aerospace, construction, and shipbuilding, for creating durable and strong connections between components.

How the Welding Process Works:

The basic idea behind welding is to create a localized heat source that melts the material at the joint, allowing it to flow and bond. Some welding processes also add a filler material to

reinforce the joint. Once the material cools and solidifies, the joint is formed.

The specific method used for welding depends on factors like the type of material, the thickness of the materials being welded, the desired strength of the joint, and whether or not a filler material is required.

Welding is a fundamental and versatile process in modern manufacturing, offering strong, permanent, and durable connections between materials. From simple, low-cost processes like arc welding to high-tech methods like laser welding, the choice of welding method depends on factors like material type, joint configuration, precision, and cost.

5. POWDER COATING

Powder coating is a popular finishing process used to apply a protective and decorative layer of coating to a variety of materials, particularly metals. This process involves applying a dry powder to the surface of the workpiece, which is then cured under heat to form a durable and attractive coating. Unlike traditional liquid painting, powder coating is an environmentally friendly and efficient way to finish products with excellent results.

How Powder Coating Works:

1. **Preparation**:
    - **Surface Cleaning**: The first step in powder coating is preparing the surface of the object. This involves cleaning the workpiece to remove oils, dirt, rust, or other contaminants that could affect the adhesion of the coating. Common cleaning methods include sandblasting, chemical cleaning, or using a phosphating process.
    - **Pre-treatment**: After cleaning, the surface may undergo a treatment process like applying a chemical primer or a conversion coating (such as a zinc phosphate or chromate conversion) to improve adhesion and corrosion resistance.
2. **Application**:
    - **Electrostatic Spray Application**: The dry powder is typically applied to the object using a spray gun that imparts an electrostatic charge to the powder particles. The part being coated is grounded, causing the charged powder particles to be attracted to the surface. This creates an even layer of powder over the surface.

- **Types of Powder**: The powder itself is made of fine particles of pigment and resin, which can vary based on the desired finish. The powder can be composed of thermosetting resins (which cure when heated) or thermoplastic resins (which melt and fuse upon heating). Common powders include epoxy, polyester, polyurethane, and acrylic-based formulations.

3. **Curing**:

- **Electrostatic Application**: The electrostatic spray gun charges the powder particles as they exit the nozzle. These particles are attracted to the object being coated, creating an even, uniform layer on its surface. The thickness of the powder coating layer depends on factors like the distance of the spray gun from the surface, the electrostatic charge, and the speed of application.

4. **Cooling**:

- After the powder is applied, the object is placed in an oven where it is heated to a specific temperature (typically between 160°C and 210°C, or 320°F to 410°F) for a set period. This curing process causes the powder to melt and chemically bond to the surface, forming a smooth, hard, and durable finish.
- The heat causes the thermosetting powder to undergo a chemical crosslinking process, making it a strong, long-lasting finish. In the case of thermoplastic powders, they melt and fuse together when heated but do not undergo a chemical change.

- Once the curing process is complete, the coated workpiece is removed from the oven and allowed to cool. The cooling process helps solidify the coating, making it hard and durable.

Advantages of Powder Coating:

1. Durability
2. Environmental Benefits
3. Cost-Effective
4. Wide Range of Finishes
5. Corrosion Resistance
6. High Efficiency
7. No Drips or Runs

Powder coating is a highly effective and environmentally friendly method for providing durable, long-lasting, and attractive finishes to a wide range of products. Its benefits include high resistance to wear, chipping, and corrosion, making it ideal for application in automotive, industrial, and consumer goods. The process is versatile, offering a variety of finishes and colours, and is cost-efficient for high-volume production.

POWDER COATING EQUIPMENT

6. SHEET METAL

What is Sheet Metal?

Sheet metal is a thin, flat piece of metal formed during industrial processes. It's commonly made from steel, aluminum, brass, copper, and other metals, and is used in a wide variety of industries for both functional and decorative purposes.

Sheet metal typically comes in varying thicknesses, referred to as gauges (the lower the gauge, the thicker the metal).

Advantages of Sheet Metal

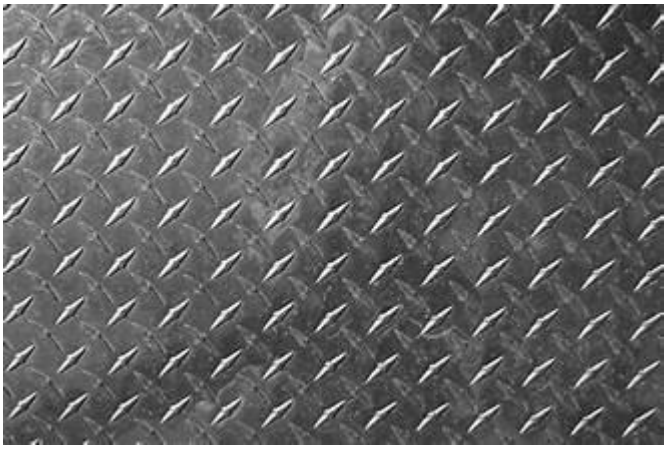
- Lightweight yet Strong
- Offers excellent strength-to-weight ratio.
- Cost-Effective Production
- Easily mass-produced using stamping, cutting, and bending.
- Highly Customizable
- Can be shaped into almost any design.
- Durability
- Resistant to corrosion (especially stainless steel and treated materials).
- Recyclable
- Environmentally friendly; metal can be reused.
- Quick Fabrication
- Fast prototyping and production due to modern tools (CNC, laser cutting).

Applications of Sheet Metal

- Automotive Industry
- Car bodies, panels, chassis parts.
- Aerospace
- Aircraft skins, structural components.
- Construction
- Ductwork, roofing, cladding, framing.
- Electronics
- Enclosures, brackets, cooling systems.
- Furniture and Appliances
- Cabinets, shelves, washers, ovens.
- Medical Devices
- Housings, surgical equipment casings.
- HVAC Systems
- Vents, ducts, air conditioning components.

How Sheet Metal Reduces Cost & Improves Efficiency

- Mass Production Friendly
- Once the tools are set, thousands of identical parts can be made quickly.
- Material Optimization
- Can be cut with minimal waste using CNC and nesting software.
- Lower Labor Costs
- Automated bending, cutting, and welding reduce manual labor.
- Easy to Assemble
- Fasteners, folds, and welds simplify the assembly process.
- Transport Efficiency
- Flat and lightweight, making it cheaper to ship in bulk.
- Long Lifespan
- Reduced need for replacements or maintenance in many applications.



7. INFANT RADIANT WARMER

What is an Infant Radiant Warmer?

An Infant Radiant Warmer is a medical device used to provide controlled warmth to newborns, especially premature or critically ill infants, who cannot regulate their body temperature on their own.

Instead of enclosing the baby (like in an incubator), it uses overhead infrared heat to keep the infant warm while allowing easy access for doctors and nurses during medical procedures.

Advantages of Infant Radiant Warmers

Immediate Access to Infant

- Open design allows for procedures like intubation, resuscitation, or IV access.
- Precise Temperature Control
- Prevents hypothermia by maintaining a stable thermal environment.
- Integrated Monitoring
- Some models include vital sign monitors, pulse oximetry, and weight scales.
- Quick Warm-Up
- Radiant heat is effective and fast, suitable for emergency care.
- Mobility
- Many warmers are portable, allowing use in delivery rooms or neonatal units.

Applications

- Neonatal Intensive Care Units (NICUs)
- Delivery Rooms (especially for high-risk births)
- Post-Operative Warming
- Emergency Resuscitation
- Transport of Preterm Infants (with portable models)

How Does It Work?

- The baby lies on an open flat platform.
- An infrared heating element above the infant delivers radiant heat directly to the body.
- A skin temperature probe attached to the baby helps monitor body temperature.
- A microprocessor adjusts the heat automatically to maintain the correct body temperature (automatic mode) or allows manual control.

CHAPTER – 4

OUTCOMES

- **Process Optimization**: Each of these processes can be optimized to reduce waste, increase efficiency, and ensure product quality. Whether through precise cutting (laser cutting), customized part creation (fabrication), or high-speed production (punching), you learn how to leverage the right process for specific needs.
- **Material Compatibility**: You gain insights into selecting the right materials for each process. For example, plastics are suited for injection moulding, while metals are ideal for welding and fabrication.
- **Efficiency Gains**: Automated processes (such as laser cutting and injection moulding) allow for higher production volumes with fewer errors. Understanding these methods leads to more efficient manufacturing and higher throughput.
- **Design for Manufacturability**: The processes you learn highlight the importance of designing products with the manufacturing process in mind. For example, understanding injection moulding helps in designing parts that are easier to mould, and knowing bending limits prevents material failures.
- **Quality Control and Precision**: The processes provide a foundation for ensuring the final product meets strict quality and performance standards. For example, powder coating ensures durability and aesthetics, while welding ensures structural integrity.
- **Customization and Flexibility**: Whether through fabrication or bending, you understand how each process allows for customization of parts, making it easier to meet specific client needs or project requirements.