INDUSTRIAL ORIENTATION REPORT

Bachelor of Technology
in
Mechanical Engineering
by

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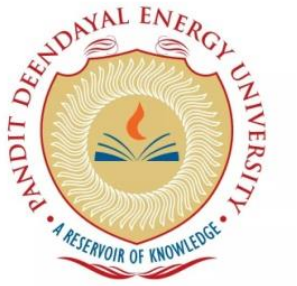

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Nov – 2022

Declaration

I declare that this written submission represents my ideas in my own words and where others' idea or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honestly and integrity and have not misrepresented of fabricated or falsified any idea / data / fact / source in my submission. I understand that any violation of the above will be cause for disciplinary action by the PANDIT DEENDAYAL ENERGY UNIVERSITY.

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(Signature of the Student)

(Kush Patel)

Specimen ‘B’: Approval Sheet

This report entitled ‘Industrial Orientation Report’ by Kush Patel is recommended for the credits of Industrial Orientation.

Sign. of Examiners

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Sign. of Supervisors

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Date:

Place: Gandhinagar

Table of Content

Chapter-1 Introduction

The report is based on the intensive research work carried out for the products from three companies belonging to three different themes assigned. The study of the industries and their products was done via online mode using the information available on the company websites and other online sources and an effort is made to discuss key learnings from the study of one product from each company that was carried out. The first theme is based on Textile Machineries and the company on which the study is carried out is Rabatex Textile Industry which is one of the leading textile machinery manufacturers in the world provides Textile Machinery to all over the world and provide worldwide service. The Product on with their focus is the Textile machinery. The second theme is based on laser technology, which is the future of Heavy industries. The company on which the study is carried out is Sahajanand Laser Technology Ltd. As a technology driven group of companies, they undertake manufacturing of solutions in the fields of Laser Systems, Medical, Diamond & Jewellery, RF & Microwave, Renewable Energy Machine Tools. The third theme is based on Aluminium Tube Industry, which is Siddhi Engineers, who makes the various sizes of aluminium tubes for various industrial and defense application. The company specializes in manufacturing precision aluminium tubes, rods, profiles and cons for different segment application in industry.

Chapter-2 Report on Industrial Orientation

2.1 Theme-1: Rabatex manufacturing industry

2.1.1 History and emerging of the industry

Rabatex was established on February 16th, 1970 . as the crank shaft production was started with subassemblies for textile processing machinery and crank shafts for weaving machines in the beginning of 1962.
The business was started with production of precision parts based on the engineering and textile industries. The company also produced a range of precision compressor valves for M/s. Ingersoll Rand in the USA that were sold all over the world.
In 1980, the company created a sectional warping machine for slow speed weaving machines at their own factory without any help from external companies . they produced sectional warping machine with their own expertise and experience. For the first time in India, the company developed a novel idea in sectional warping. With the most recent knowledge and technology, the company also created a wholly indigenous high speed sectional warping machine at the same time in 1983.
In the early 1990's there were some new concepts introduced. The company introduced a quick flow system in material handling equipment and storage systems for the department that prepares fabrics for weaving in the starting of 1990's. The technology was praised in Indian Textile Sector and Rabatex was affiliated with several well-known textile companies in the nation as well as outside India . main sales were of sectional warping machines. In 2000, Rabatex produced 8 versions of sectional warping machines. Eight models of sectional warping machines are now made by the Rabatex Group of Industries. They also provide a broad selection of material handling tools that can be customized to meet any purpose.

New product developed
Model No. for an Advance High Speed Sectional Warping Machine with Multi-Servo RI -109.
- The RI 8001 Single End and RI 8001 M Multi End Sizing Machines.
- Model No. High Speed Sample Warping Machine RI 6001.
- Battery-Powered Material Handling Equipment (Indo-Italian Collaboration).
- Model No. RI-1201 Ultra Sonic Reed Cleaning Machine for Cleaning of Reeds, Heald wires, Droppers, and Air jet Sub-Nozzles.
- A batching gadget.
- Polybeamer for Technical Textiles with Unwinding & Creel
Quick Vertical Lift Module for Storage System

2.1.2 Man power and Organizational Hierarchy

Workforce of Rabatax is made of broad group of highly qualified workers. The team consist of qualified engineers, designers, scientists, and other professionals. The members of the company work together in an Eco space and they consist of individuals that belong to a different background and work together for the companies growth.

From top to bottom, there are numerous levels of hierarchy. The distribution of the job is done in accordance with hierarchical levels and follows standard operating procedure.

Over the last 6 Decades, Rabatex has developed a strong and dedicated workforce of 200+ people. Since the year 1962, this team is being led by the young, dynamic and foresighted leader, Mr. Haresh Panchal. He brings to Rabatex not only engineering penchant and drive, but also the vision of customer focus and service.

Mr. Haresh Panchal is actively involved in the entire operations of the company at the top management level enabling Rabatex to maximize the value of its products and service offerings. He also heads the R&D cell of the company which is continuously engaged in developing newer products and components that enable Rabatex in maximizing the value of its product and service offerings.

2.1.3 Introduction to selected Products-

- Creel
- Sectional Warping Machine
- Vertical Lift Module

➢ **Creel**

A creel is a platform that stores supply packages during the warping process, such as cones, cheese, or spools. A warping machine is made up of a number of components, including a warping drum, an open reed, a head stock, and more. The metallic frames known as creels are fitted with feeding bobbins, cones, cheese, or spools.

Technical Aspect

• Ceramic eyelet; (open or close type).

• Ratchet type, Tensioner type, or Tiana type.

• Cone holder with trolley-style spindles.

• Electromechanical/photo cell type; stop motion.

• 280 mm (vertical/horizontal) is the standard pitch.

• Standard end | 320, 400, 480, 560, 640, 720, 800, 880, 960, and 1200.

• Standard vertical deck: 8; optional: 5; 6; 7; 8; 10; 12

• Pitch available in 200 mm, 280 mm, 300 mm, and 350 mm.

Highlights of Features

• A structure made from MS tubes.

• Manual thread withdrawal from inside to outside of tensioner frame.

• Row-wise indication with stop motion

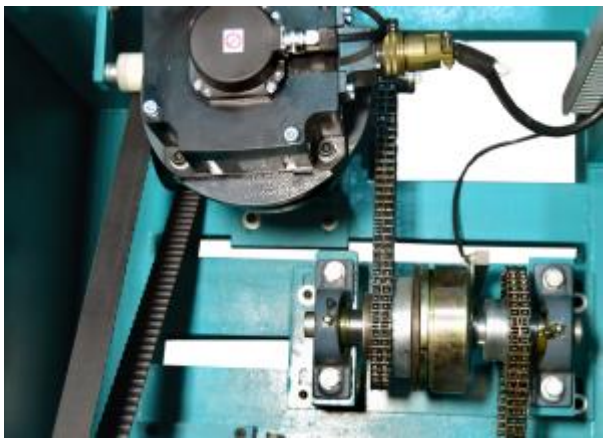
Additional Equipment

• Stop motion static eliminator.

• Ceiling cleaner

- **sectional warping machine**

Section warping involves the division of the warp threads into yarn bands (section), each of which has the same warp density as the weaver's beam. A sectional warping machine is composed of three main components: a creel, a winding drum, and a beaming unit .



Servo Drive Motor

Separate Beaming with Powerful Transmission

Warping Direct Drive

Advance Reed Table

Features and Highlights:

• Large-screen color touch device (HMI).
• Three servo-controlled axes.

• Automatic section start position for a single machine traverse, drum position, X table (reed table), and Y table (feeler roller).
• Constant control of line speed warping.
• Direct drive for beam and warping drum drives for effective energy conservation.
• A programmable leasing device that oscillates a reed during machine operation and moves a split frame to and back.
• Easy troubleshooting through graphical display of all input accessories shooting.
• Laser sensor for automatic feed value setting and yarn built-up measuring.
• Reed table movement controlled by a precise AC digital servo drive.
• Precise ball screws running via linear guides are used to regulate the traverse of the Reed table and Feeler table.
• Feeler roller (kick back type) with separate AC Digital Servo Drive for compact warp beam.
• Deliver the closest yarn to the drum to prevent cross-over ends.
• A warping switchboard that is simple to access.
• Powerful disc brakes that are energy-efficient and fully PLC controlled.
• Beaming and warping safety provisions.
• Internal printing device for processed data page.
• Actual length measurements online.
• Drum rotation in reverse for simple/rapid lease operation.

2.1.4 Manufacturing Processes

Rabatax has four manufacturing facilities with all-modern manufacturing equipment and a quality control method.
Total Area: 1,65,500 square feet.

Manufacturing options include

- CNC Press Break
- CNC Laser Machine
- CNC turning apparatus
- Turn Mill CNC
- Machine for vertical milling
- A rolling device
- Painting booth

Rabatex uses the CAD/CAM software for designing the WARPING MACHINES and other Products they use the SOLIDWORKS for Designing and also do the simulation
The Design of their Warping machine is Based on the need of the costumer and can be modified and add the other technologies in it and even the costumer can able to make their own design and do modification with RABATEX Engineers and have their products

The design is simple and can be easily made and is Cost effective so that the pricing of machine is less and engineers use the latest technology for simulation.

CNC Press Break

CNC Turning Apparatus

CNC Laser Machine

2.1.5 Infrastructure

The Rabatex Group, situated in Ahmedabad, India, operates a cutting-edge assembly facility for the production of machinery and parts. equipped with cutting-edge machinery for the production of all essential and precise parts. equipped with cutting-edge measuring and testing equipment to ensure 100% quality. Company adheres to ISO 9001 certification requirements strictly. As a primary obligation, ensuring customer happiness, human safety, and environmental sustainability.

2.1.6 Process Optimization

At Rabatex staff have been involved in the design, erection, start-up, and management of all phases of manufacturing operations. This practical experience is accompanied by access to meaningful information that represents the real performance and capability of these operations. Examples of these important databases include production cost, labor content, process specification, quality, and process control information gathered from real plants around the world.

- Provide textile product and process benchmarks based on data collected from the industry.
- Provide documentation of procedures and factors necessary for making improvements toward process and product benchmarks.
- Conduct comprehensive process optimization studies for yarn and fabric formation processes.
- Optimize drawing processes so that slivers have the best achievable fiber alignment and weight uniformity.
- Suggest ways to increase productivity without quality losses for yarn production processes.
- Help clients improve all aspects of yarn uniformity from short-term evenness to count variability through process optimization studies encompassing the entire yarn production process.
- Help clients reduce defect levels in yarns.
- Evaluate winding, warping, and slashing processes, and suggest improvements that will lead to lower weaving stops and enhanced fabric quality.
- Enable yarn suppliers to manufacture knitting yarns and to compare their products' quality to industry averages.
- Identify and correct causes of barré in yarn manufacturing.
- Determine the cause of weaving machine stops and recommend measures to correct stop causes.
- Assist plants in the optimization of machine settings for air jet weaving so that maximum efficiency and quality and low stop levels result.
- Rate the level of maintenance and quality for each process in the plant and index this in comparison to competitors.

2.1.7 Environmental Effects

They have a dedicated waste recycling facility at the business that follows all governmental regulations while processing or recycling waste. They take care to abide with the Hazardous Act's regulations. More trees have been added to the factory's grounds. The environment outside and inside the organization is clean and green.
For the employees of the organization, health is their first priority. They periodically hold medical checkups on the grounds of the business to ensure that everyone on staff is in excellent health as part of our effort to monitor employee health. so that they can contribute to the company's continued growth

2.1.8 Market Demands

They have a wide network of distributors and offices, which are always there to assist their clients in meeting all of their requirements with utmost precision and within time. their teams of technically sound sales persons ensure prompt delivery of goods and provide friendly assistance with round the clock services to the valued customers.
They have installed more than 3050 sectional warpers worldwide and more than 5300 material handling and storage equipment.
The company not only holds a wide share of the Indian market but has made a name for itself in the international markets as well. However, the company has introduced more products in the Indian market. The company has its reach over 28 countries across the globe. Almost 23% of the total sales is for export, which is a significant share considering the increasing potential of this business.

The company has its service centres in all major Indian cities operated by a team of 180 competent professionals. With a strong strategy and efficient leaders, the company aims to realize its full potential in the Indian market for the current products available and to make a strong foundation for the new products that are yet to enter the market.

Rabatex is also working towards increasing the exports to 35-40% of total sales. The company aims to double its turnover by 2023. To achieve these goals, it has come up with new developments in the material handling and storage solution

2.1.9 Technological and business challenges

The whole machine level is low
The textile machinery manufacturing of our country is complete, the traditional fibre processing machinery still occupies the dominant position of textile machinery products. Although the domestic spinning machine has certain advantages in market share, it still has a large gap with international advanced level in terms of spinning technology level and spinning process control.
Economic inefficiency
It's still lower in the better case. Because of the poor economic benefits, the investment in technology research and development should not be high. The long-term continuance of this situation is bound to cause enterprises to have insufficient strength, which greatly limits the healthy development of the industry.
The awareness of rights is unclear

The spinning machine is the carrier of many scientific and extensive applications, and the public technology covers all product categories. Although the industry has been transformed from a planned economy into a market economy for more than a decade, the concept of industrial division of labour is far from being changed. In particular, the wide application of public technology has not formed effective business operation mode. Due to the lack of effective commercial public technology platform, the product development and new products are restricted.

Chapter-2 Report on Industrial Orientation

2.2 Theme-2: Manufacturing Industry – SAHJANAND INDUSTRY

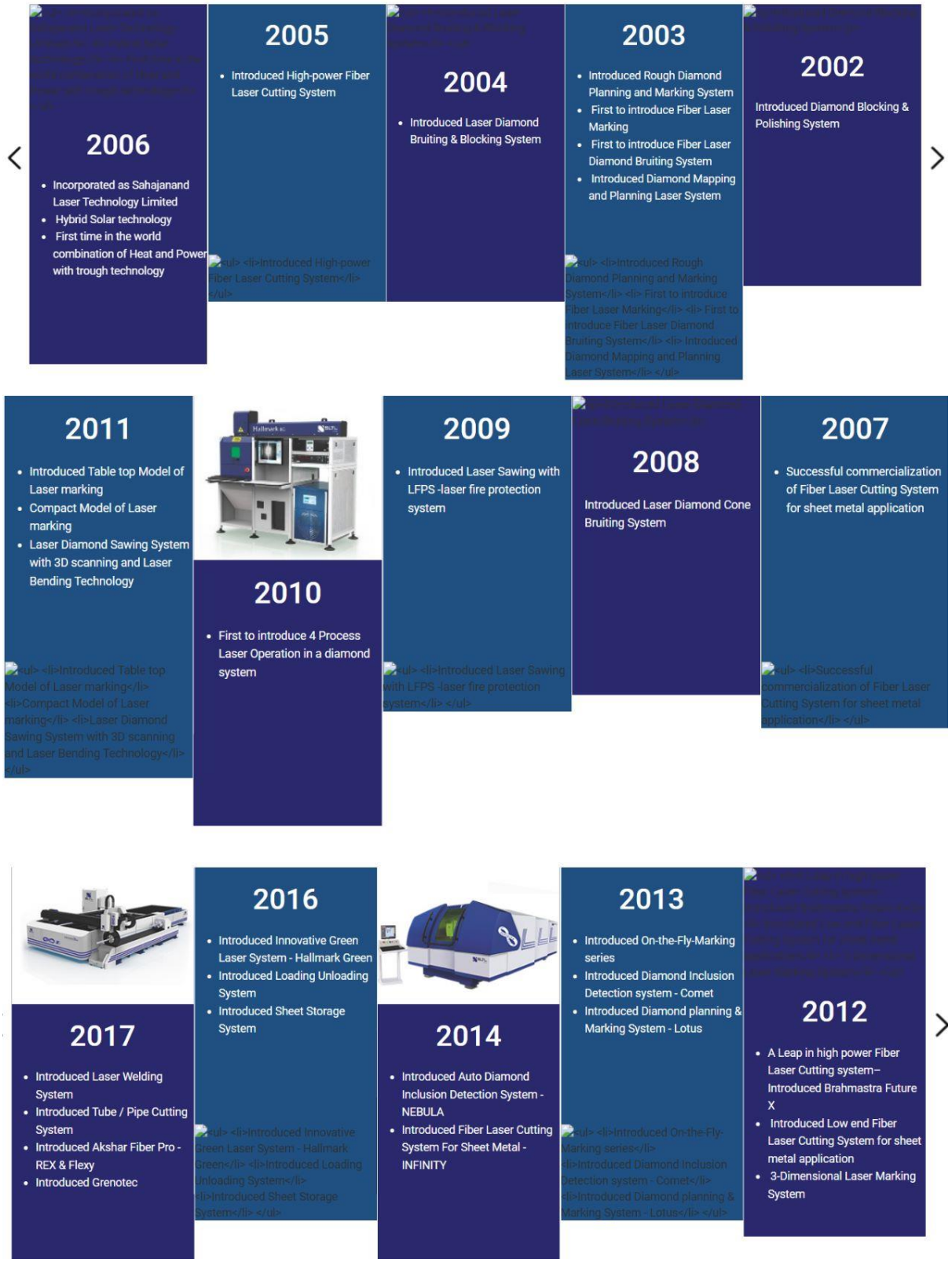
2.2.1 History and emerging of the industry

Sahajanand laser technology limited was started in 1992 with introduction of laser diamond sawing system in India. The SLTL market has been prosperous for more than 30 years and is a world leader in industrial laser technology. In the past ten years, SLTL has improved laser development for processing industrial materials through technical advancement and has been steadily growing its product line.

They have been navigating the domains and sectors on their own since their incorporation. Their primary focus is on value generation, which stems properly from everything else.

Along the road from a handful to a full hall, they consistently set new standards. Many people all throughout the world have honored this voyage.

Sahajanand Laser Technology Limited brings the next-door technology to every small- and large-scale industries. They opened up the solutions to a wide range of Industries by making them more precise, cost-effective, and future-proof. They are currently a market and technological leader in laser cutting and engraving equipment specifically designed for the manufacturing sector. Virtually every industry, from software to high-tech electronics for smart factories, depends on their inventions. One of the few producers offering specialised Computer Numeric Controlled (CNC) laser solutions worldwide is Sahajanand Industry. It was established as Tata Engineering and Locomotive Co. Ltd. (TELCO) in 1945 under the leadership of J.R.D Tata.



2.2.2 Man power and organizational hierarchy

There are 750+ Employees working for the company. The team comprises of 5% Scientist, 18% Leaders and 77% Engineers. Clients and Partners are present in more than 30+ Countries. Some of the big clients for the SLTL are Baja,

Bosch, Moserbaer, Sintex, Tata etc. There are different hierarchy order present in the company, varying from lowest to top management system.
Sahjanand Industry has tried to transform their organisational structure. Their workforce includes various personnel possessing degrees and scholarships from various established institutions. Their workforce comprises of following qualified personnel:

- Research scholars
- Software engineers
- Electronic engineers
- Mechanical engineers
- Instrumentation engineers
- Laser specialists
- Quality auditors and others

2.2.3 Introduction to the Selected Product – Laser Cutting Machine

SLTL has invented the world's First Fiber Laser Cutting machine. A machine, which went on to become the game changer for the metal forming industry. Eventually they have emerged as the company accounted for laser revolution across the globe. Innovation is the foundation of their group and they aim to make metal forming process simpler and quicker than ever.

Laser cutting machine

Features in Laser Cutting Machine:

- Excellent Productivity

  Prime is equipped with High-end 64-bit CNC controller along with an user-friendly operating interface. This magnificent controller responds within nanoseconds which makes the machine super responsive. The laser starts at a predetermined point, and continues along the course of the line until the shape has been cut out. Not only this, but also the Linear Motor Drive built with robust gantry structure enables 3G acceleration and thus increases productivity by saving time and executes precision finish.

- Auto sheet Orientation
  Prime has a smart function which allows to automatically sense the orientation of sheet, and then make the necessary adjustments in the program itself which allows in minimizing operator errors. This not only helps in increasing the flexible operations but also increases the productivity with minimum time duration.

- Highly Intelligent Nesting
  The optimized nesting software has a greater role to play in reducing the material wastage & working time. Features like common Cut, Dream Sequence, Late Cut, Corner Loop & much more provides the most efficient planning for the profile.

- Dynamic motorized lens
  The tool is installed in laser head for self- driven operation. It automatically changes the focus of the lens as per the object & the application

- Multiple Auto gas selection with auto adjustable pressure
  Prime comes with an intelligent feature which allows to select the gas automatically just by providing the material type (S.S , AL. G.I..etc.) and thickness of the job. The machine not only automatically selects the gas (n2, o2, air) as per its suitability but also select the optimum level of gas pressure which reduces the consumption of gas.

- Integrated casting machine body
  Prime has designed with rigidity, stability and anti-shocking property. Fabricated with perfect cooling, lubrication and dust-removal system to ensure stable, efficient and endurable operation.

Technical specifications of Laser Cutting Machine

Specification		Unit	Working Range	
			3015	4020
MAX. Working Range	X- Axis	mm	1550	2100
	Y-Axis	mm	3100	4100
	Z-Axis	mm	300	300
MAX. Working Weight		mm	900	1650
Positioning Precision		mm	0.05	0.05
Repeatability		mm	0.02	0.02
Tube Cutting				
			3mtr	6mtr
Max. Working Range(Axis)	XxYyZ	mm	220x3100x300	
Maximum pipe size	Round	mm	25 to 180	
	Square	mm	25 to 150	
	Rectangle	mm	25 to 150	
Maximum job weight		Kgs	70	140
Maximum pipe cutting length		mm	2500	5500
4 jaw chuck dia.(feeding chuck)	Size	mm	200	
	Operation		Manual/Auto	

Applications of Laser Cutting Machine

- **Decorative industry**

Stainless steel is widely used in the decoration engineering industry because of its strong corrosion resistance, high mechanical properties, long-lasting non-fading surface, and colour changes with different lighting angles. For example, in the decoration and decoration of various top clubs, public leisure places and other local buildings, it is used as an applied material for decorations such as curtain walls, hall walls, elevator decoration, sign advertisements, front screens and so on.

- **Advertisement Industry: -**

The advertising industry has always been one of the main areas where laser processing technology has been widely used, and the application of laser cutting machines on advertising signs and signs is even more incisive. The advertising industry has always

been one of the main areas where laser processing technology has been widely used, and the application of laser cutting machines on advertising signs and signs is even more incisive. With the development direction of the advertising industry, the cost of laser cutting machines continues to decrease, and the demand for laser cutting machines in the advertising industry is increasing at a rate of more than 20% per year. According to statistics, the current penetration rate of laser processing equipment in the industry is still less than 5%. With the scale development of the industry, the replacement demand for upgrading the original tool processing equipment to laser cutting machines will accelerate, and the advertising industry will produce in the future. The market demand for more than 50,000 laser cutting machines is about 28 times the current market size.

2.2.4 Introduction to the Selected Product – 3D Fiber Laser Cutting System Arm X5

SLTL is the Leading & Prime Manufacturer, Trader, and Supplier of 3D Laser Cutting System. SLTL Group being an innovative leader presents 5 axis laser cutting machine to address various problems. The machine is capable of cutting any complex part because of its 5-axis advanced technology. Application on Stainless Steel, Mild steel, Aluminum, Brass, Copper & other reflective metals, Arm 5 can reach to critical points on the components with adjusting it. The complex cutting task is made easy by just one-time programming which eliminates other systems for component adjustments. The machine could rapidly operate over the diverse components.

Features in 3D Fiber Laser Cutting System Arm X5:

- Easy and one time programming

One-time programming simplifies the challenging cutting operation and does away with the need for additional systems for component modifications. The device may quickly work across the component.

- Highly Efficient

The 3D Fiber Arm 5 is designed to provide cutting capabilities that are extremely accurate while also having the most energy-efficient footprint in the industry. The 3D fiber Arm 5 achieves a level of quality and throughput that is unheard of for a laser system of any price with its high-performance motion system and fiber sources.

Technical specifications

PARAMETERS	**UNIT**	**Standard**	**Pro**
CNC axis Working Area (overhead Gantry X-Y-Z & A-C axis)			
X-axis (Gantry linear axis Rack & pinion)	mm	3000	3000
Y-axis (Gantry linear axis Rack & pinion)	mm	1500	1500
Z-axis (Vertical axis - Ball screw)	mm	750	750
A axis (Rotary axis)	Degree	n360	n360
C Axis (Indexing axis)	Degree	±90	±90
Max. Positioning Speed			
Axis Parallel (X)	m/min	50	60
Axis Parallel (X)	m/min	50	60
Axis Parallel (Y)	m/min	50	60
Vertical Axis (Z)	m/min	20	60
C Axis	º/S	360º	360º
A Axis	º/S	360º	360º
Accuracy*1			
Smallest Programmable Increment	mm	0.001	0.001
Positioning Accuracy (linear axis)	mm	±0.100	±0.100
Repeatability (linear axis)	mm	±0.050	±0.050
Electrical Consumption*2	kW	16 – 25	16 – 25

Cutting Gas Consumption*3	I/hr	500 – 2000	500 – 2000
Dimensions and Weights*4			
Length	mm	11500	11500
Width	mm	7500	7500
Height	mm	3000	3000
Weight	kg	12500	12500
Additional Features			
3D Cutting (5-Axis Head)			
Lens 5” for cutting up to 5 mm			
# All specifications are subject to change without prior notice			
*1 Value Measured over 1m. Work piece tolerances depend upon the work piece type,			
pre-treatment, sheet size and location in the working area			
*2 Inclusive of suction, control & cooling unit			
*3 Depends upon requirement			
*4 approximate values			

Applications of 3D Fiber Laser Cutting System Arm X5:

- Precise finish for automotive Parts

- Mass Production for Manufacturing & Construction industry
  - Accessories
  - Sensing of Auto Sheet Height (ASHS)
  - Head Crash Protection Retracting Function Auto Sheet Orientation Automated Multiple Sheet Cutting Cycle
  - pallet mechanism with motors

2.2.5 Environmental Impacts

With every industry comes adverse effects on the environment, with every building up of a factory comes adverse effects. The manufacturing of the machines by Sahjanand laser Technology causes several emissions of highly acidic and basic chemicals into the beautiful nature. However, the ethics of the business of Sahjanand Laser Technology doesn't allow them to dump these wastes without reducing the magnitude of harmful effects. They make sure that each of these chemicals are properly treated before they are released into the wild.

- Initially, chisel and knives were used to carve out something on surfaces, then the era of machining emerged which helped us saving time.

- After that laser cutting machine came into existing. This technology instead of generating waste products it was evaporating the material with the help of laser.

- Due to this evaporating of material the overall efficiency of the process has increased significantly.

- In addition, laser cutting machine consumes a large amount of energy which is a great disadvantage for our environment and to produce that large amount of energy we are going to burn coal which will emit ample number of fumes which will again harm our environment.

2.2.6 Technological and business challenges

Sahajanand industry is an ISO 9001: 2015 certified company. This certification signifies that processes work efficiently and effectively, and are consistent with the international best practices (aka The Standard). the following are the company strengths: -

- Govt. approved In-house R&D set up
- 7+ Industry Segments served
- 21+ Patents related to Laser applications
- Ability to respond market need promptly
- Brand name recognition in the market
- 22+ International installation base

- 25+ years of experience in the industry
- 10,000+ installations around the World
- #1 in India for Industrial laser systems
- #1 In the World for Diamond laser systems

Laser Cutting Machine concept was a great concept. With the exception of a few rare circumstances, drilling a small hole in the sheet metal is often required for any type of hot cutting technology. Prior to the laser starting to cut through the hole, a hole was punched out with the punch mould in the laser stamping machine. At the start we Sahajanand industry were using blasting perforation but later to increase the efficiency pulse perforation was implemented.

2.2.7 Market Demands

Sahajanand Laser Technology Limited is an unlisted public company incorporated on 23 April, 2002. It is classified as a public limited company and is located in Gandhinagar, Gujarat. Its authorized share capital is INR 26.80 crore and the total paid-up capital is INR 20.37 cr. Sahajanand Laser Technology Limited's operating revenues range is INR 100 crore - 500 crore for the financial year ending on 31 March, 2022. It's EBITDA has increased by 234.24 % over the previous year. At the same time, it's book net worth has increased by 5.75 %.

Operating Revenue	INR 100 cr - 500 cr
EBITDA	▲ 234.24 %
Networth	▲ 5.75 %
Debt/Equity Ratio	0.56
Return on Equity	5.56 %
Total Assets	▲ 4.13 %
Fixed Assets	▼ -3.82 %
Current Assets	▲ 10.13 %
Current Liabilities	▲ 4.32 %
Trade Receivables	▲ 37.71 %
Trade Payables	▲ 0.62 %
Current Ratio	1.51

2.2.8 Competitors and other threats for existence

The prices for Laser Cutting System lies around 50 lakhs for the all the model . It competes with the likes of Lancerfab Tech Pvt Ltd MB Engineering Industries, Siddhivinayak Laser Fabrication Pvt Ltd, A Innovative International Ltd, Angle India Cad Cam Pvt Ltd

The Laser Cutting System is trying to managed to all its rivals that include all the big names that are mentioned earlier. It now commands a 41.15 per cent market influence which is significantly higher than the long-standing Mahindra XUV500. When we combine the sales of Harrier and Hexa, Tata takes up almost half the mid-size market alone. Things have got better after the addition of automatic transmission option in Harrier. It is expected to get much better after Tata launches a 7-seat version of the Harrier.

Chapter-3 Report on Industrial Orientation

2.3 Theme-3: Manufacturing Industry – Siddhi and samruddhi Engineering

2.3.1 History and emerging of the industry/research institute

Siddhi Engineering: -

Siddhi Engineers is the first Indian ISO 9001 certified firm, having been established in 1988. Siddhi Group began with a revenue of 11 lacks in 1988–1989 and has now increased to 11 crores. There are about 2000 of them and they are scattered out over 22 different nations. It was founded in 1988 by two ambitious young mechanical engineers, Mr. Prashant Gandhi and Mr. Bhagwat Patel, who wanted to launch their own company. It now comprises of four distinct companies. They had both been close friends and roommates in college, and they each had a desire to launch their own company.
The business claims to be the largest Indian provider of high-quality Cops, Pirns, and Bobbins today. They are India's largest and only ISO-certified firm in their sector, and they specialize in aluminum tubes. All four businesses are ISO-certified, which they have been for eight years.
We manufacture and export a variety of goods, including drawn aluminum tubes, pipes, and rods. Steel cops, bobbins, aluminum products, mopping equipment handles, sleeves for yarn winding cops, aluminum tubes, pneumatic cylinder barrel tubes, Alu press, Alu core cots tubes, roller tubes, telescopic tubes, button casting rod tubes, luggage trolley handle tubes, and heat high grade extruded aluminum that is purchased from the market to ensure the highest quality in the finished product are all included in our product line. We can create these precision tubes employing 14 various alloys in order to satisfy the demands of our respected clientele.
With the assistance of our state-of-the-art manufacturing unit, along with hi-tech machines and equipment, we have been able to manufacture our range in compliance with the set quality standards. Further, we have also enhanced our production capacity and doubled it in the year 1991. All these aspects have enabled us to garner reputed clientele from the regions of Brazil, South Africa, Canada, Sri Lanka, Chile, Spain, Dubai and Switzerland. Further, our export market is also spread England, Taiwan, France, Thailand, Germany, turkey, Indonesia, uk, Iran, USA, Israel, Vietnam Korea, Zambia and Peru.

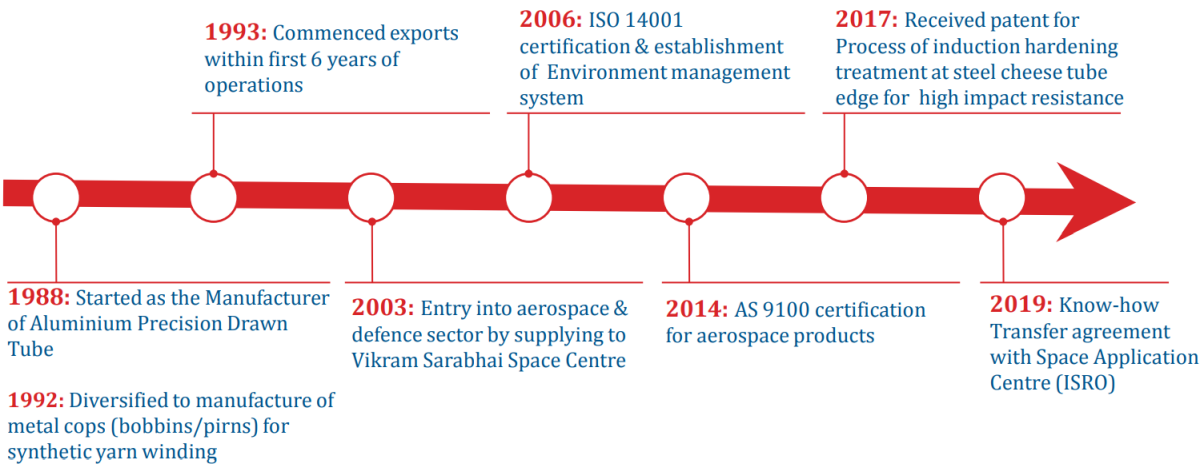
samruddhi engineering: -

samruddhi engineering provide a high-quality adhering range of goods thanks to our vast domain specialty, paired with the tireless efforts of our professional employees. We are strengthened by the efforts of our personnel, who work hard to give customers items of the highest caliber. In order to provide our customers with a line of products free of flaws, our exacting quality auditors ensure that our products are produced in accordance with international quality standards and put them through a variety of tests. Additionally, we have

a technologically sophisticated infrastructure that makes it possible to produce high-quality goods in large quantities. In addition to this, we provide tailored solutions to increase client satisfaction. We are well-known for our moral business conduct, TQM principles, and prompt delivery.
We have reached new success heights and frontiers thanks to our mentor's educated and astute assistance. His profound knowledge, outstanding managerial abilities, and a passionate desire to serve our clients have helped us overcome many obstacles and succeed.

Basic Information

Nature of Business	Exporter and Manufacturer
Additional Business	Exporter
Company CEO	Bhagwat Patel
Registered Address	"SIDDHI HOUSE " 6, Virkunj Society, Near Vidyanagar School, Usmanpura, Ahmedabad- 380 014, Gujarat, India
Total Number of Employees	51 to 100 People
Year of Establishment	1996
Legal Status of Firm	Partnership Firm
Annual Turnover	Rs. 5 - 10 Crore
Export Percentage	20-40%



2.3.2 Man power and organizational hierarchy

Around 100+ skilled workers are employed by Siddhi Engineers and Samruddhi Engineers to perform a variety of tasks, such as producing pipes using plastic molding, attaching caps to pipe ends, forming smooth curves at pipe ends, cutting pipes, drawing pipes, and other tasks that advance the business.
The organizational hierarchy of Siddhi Engineers and Samruddhi Engineers is not overly complicated. Executive Directors are found at Level 1 Grade, followed by Managerial Grade, Supervisory Grade, and Laborers at the bottom of the hierarchy's four levels. These hierarchies aid the business in completing its consignments and delivering them on schedule.

Siddhi Group is promoted by three industrialists, with more than 25 years of experiences in their respective industry segment. All three have an Engineering background and owning a Master's Degree from the country's reputed institutes. They are also associated with various industry associations, organization and government bodies for years.
Mr. Bhagwat Patel and Mr. Prashant Gandhi, Classmates during engineering days jointly started manufacturing business at a young age by establishing an aluminum tube drawing unit which was first of its kind in western India.

BHAGWAT PATEL Founder Partner of Siddhi Group from the year 1988.
Vice President - GSSIF.

Presently taking care of manufacturing and operations of Siddhi Group.

Area of interest: Productivity, Product Innovation and social reforms.

PRASHANT GANDHI

Founder Partner of Siddhi Group from the year 1988.

Presently looking after marketing, other commercial functions and new products development.

Area of interest: Innovations, Customers' interaction, Research & Development and Systems.

SHAILESH PATEL

Joined Siddhi Group in 1991.
- Ex President - GSPMA.

Area of interest: Exports, communication and systems, The present focus is on global exports.

2.3.3 Aluminum Precision Drawn Tube

For typical heat exchangers made using mechanically expanded round tubes, flat oval tubes, and various forms of the tube as per bespoke requirements, precision-drawn aluminum tubes are the lightweight option.
The seamless drawn aluminum tube, old drawn aluminum tube, capillary tube, peanut tube, internal threaded tube, and seamless drawn aluminum tube are only a few examples of the high-precision drawn aluminum tube, also known as aluminum cold drawn tube, which is frequently used for heat exchangers. It is a crucial component of end goods such water tanks, air conditioners for residential and commercial buildings, car air conditioners, radiator condensers a and water heaters.

Advantages
Very close Dimensional Tolerances :- +/- 0.02 mm
Very Good surface finish :– Ra 0.4 µ
Added Mechanical / Physical Properties
Accurate Straightness :– 1:4000 mm
Very small (from 1 mm diameter) very thin (from 0.2 mm) section is possible
Non-heat treatable, alloy can be given in work Hardened Condition. Which results in added mechanical properties
Very precise Quality and Eccentricity
Special Shapes with High Accuracy in Dimension
Telescopic Profile with close dimension is possible
Product Quality supported by own state-of-the-art Quality Assurance Laboratory having all modern testing equipment
Special process like precision cutting in small pieces (Tolerance of ± 0.2 mm)
Bending, Flaring, Punching, Hard Anodizing and color Anodizing can also be carried out on request

Applications
Aerospace & Defence Applications
Telescopic Tubes for Communication Mast, Safety Mast and Bomb Disposal Manipulator
Mortar Tube
Missile Project
Tube For Amphibian Tank
Tube for Cryogenic Fuel Supply
Heat Pipe Application
Helicopter Engine Cooler Application
Tube For 70 mm Rocket
Special alloy High Strength Rod to make Aerospace V65 grade Rivet
Pneumatic Cylinders Barrel
Compressed Air Piping
Alupress Cots/ Alufit Cots for Cotton Spinning Industry
Rectangular & Round Wave Guide for Satellite / Space Communication Telecommunication Purpose
Automotive Component Application
Exhibition Display System
Carburetor Float Pin Application
Hydrogen Cell for Back-up Power
Mining & Drilling

Mosquito Repellent
Heat Exchanger
Marine Application
Button Making – Nylon / PP Rod Casting
Moping Equipment Handle
Sealing Ring for Disposable Blood Bags
Roller for Conveyors
Aluminum Tube For Automobile

Firstly, aluminum tube is collected from their storage area and transfer to conveyer with the help of roller.
After that Aluminum rolling lubricants is applied on tube. The role of the lubricant is threefold: to reduce/prevent direct contact between the roll and aluminum surfaces, to extract heat generated by friction and deformation, to transport metal fines and debris from the roll bite area to the filter.
After that mandrel is applied between tube. The mandrel is of importance to improving both the forming limit and the bending quality. So, the research on the role of the mandrel is of great significance in the thin-walled tube bending process.
Now tube will move towards die section where tube size is going to be drawn as per requirement of customer. An die is a thick steel disk with an opening — and malleable aluminum alloy passes through it during the process.
The opening in the die matches the cross-sectional profile that's specified by the extrusion designer.
Typically, dies are produced from H13 steel and heat-treated, making them strong enough to withstand the intense pressure — up to 15,000 tons of it — that can be involved in the extrusion process.
They come with support tools — also usually made from H13 steel — to help withstand this pressure and lengthen die life.
Now this tube is transfer to section where annealing process of tube will take place to provide extra strength of tube and also help to decrease oxidation of tube.

2.3.4 Manufacturing Process of aluminum precision tube :

They have the infrastructure to produce pipes of any given cross-section. Provided structural integrity and strength is a contributing factor to the production processes through the machines. These pipes are made out of a drawing machine. An aluminum rod of greater dimensions is placed into the machine. The machine involves rollers attached to motors that aid the feeding of the long rod to the region which contains dies. These dies receive the aluminum, material at a heated temperature. The dies are made out of cast iron so that they are able to withstand a great amount of pressure and heat. The dies remove the excess material from the heated aluminum of greater dimension than the desired product. The chips are removed from a port below the dies and the finished aluminum of the desired dimension is obtained. Mind that the machine produces aluminum tubes or pipes of length in accordance to the length of the aluminum rod inserted. It I s also important to mention that each machine can be operated with a band saw attached at the end of these drawing machines. So, any length can be cut out then there is a long reel of aluminum is used. The products are then set to go through a series of tests. These tests include the Ultimate tensile test, bending test, a test that ensures the dimensions of the products, a test that ensures the eccentricity of the pipes and tubes, and whether the product is perfect in shape, that is circular cross-section or rectangular cross-section (Rotational Datum Method).

Siddhi engineers Also find their prowess in producing bobbins for the textile industry. They had one single machine extracting a lot of bobbins per day. The functioning of the machine was quite simple to understand. The raw materials were fed into an overhead hopper. The raw materials are fed into the hopper in granular form. The granules of the desired color and size are fed into the hopper. From the hopper, the granules are sent to be melted. The melted material is then extruded, into a long rod-like structure. This structure is then fed into a die which gives out a long cylindrical structure. The cylindrical structure is then cut into the desired length to give out the finished product. The product is then made to go under a shaping machine. This machine ensures that the shape of each product is cylindrical. The bobbins are then put into box and sent to customers all over the country.

2.3.5 Market Demands

- Supply to Defense / Government PSU
  Telescopic Tubes
  Cryogenic Fuel Supply Tubes and Heat Pipes
  Satellite Waveguides
  Tubes for Missile Applications
  Tubes for Akash Missile Project
  Fuel Supply Tubes for Amphibian Tanks
  Tubes for Guns, Shells and Fuse
  I/O Connector & Fiber optic Back shell

The company has nurtured the culture of innovation and participation. The employees and owners start the day with exercise, prayer and positive news sharing. Since the group is involved in developing import substitute products and is exporting globally to more than 28 countries, the meaning of impossible at Siddhi is - I M Possible.

For participation in the management process at Siddhi every six-month, Management Review Meetings are organized. Also, at the same interval, Workers Management Review Meetings are also organized, making presentation about the objective, target achievement, complaints, the solutions to complaints, infrastructure requirements and such other things. At Siddhi, knowledge sharing is part of daily culture. The group is also building book library in every Siddhi family by distribution of knowledge-based books every month.

2.3.6 Environmental Impacts

Siddhi engineers manufactures precision tubes of required length but when it is delivered to consumers, they need to weld them in order to make them work. In welding, inert gases like hydrogen, oxygen, argon, helium, CO2, etc to provide the shield around the weld. This is harmful for environment as it causes air pollution. In all types of welding, fumes and gases are released as air pollutants and due to high temperature during welding, different substances from arc are vaporized. Different parameters in welding causes the air pollution for e.g.: ampere, current, voltage, arc and gas pressure and temperature, the electrodes used for welding, and the main point duration of welding.

2.3.7 Competitors and other threats for existence:

The company manufacturers three main product ranges:

1. Precision Aluminum re-drawn tubes
2. Bobbins and cops (textile machine accessories)
3. Engineering Plastic extrusion (ABS pipes etc.)

The competition for these product ranges is from the foreign players as well. This scenario of competition is shown in Table can be summarized as below:

Product Range	Competitors at National Level	Competitors at International Level
Aluminium Precision re-drawn tubes	About 25 players located at Calcutta, Delhi and Ahmedabad	About 50 players located in Korea, Japan, EU (Germany, Italy, Switzerland, UK) and some in USA
Textile Machine Accessories - Cops, Bobbins	1 in Rajasthan	In Korea, Turkey and Italy
Plastic Extrusion (ABS pipes)	3 in India (1 in Silvasa, South Gujarat and 2 in Modinagar)	Korea, Indonesia, Thailand, Turkey

Learning from industrial orientation:

I have learnt many things from the industrial visits conducted by the Pandit Deendayal Energy University. I was able to understand how the real life factories and companies work and how do they manage the staff and the work load. How the real-life problems are solved on the spot through experience and not using the technical theories that we study in our theory classes. I also learned the importance of team work in the smooth functioning of industry. Without proper team work and trust on the workers, no industry can function properly. Industry visits also taught me how to apply the knowledge that we gain in the class to the real-life example and practical use.

Able to interact with the Industrial Experts: I got the opportunity to interact with the industrial experts and learn from their experience. It gives me a precise understanding of how the actual industry works and also helps them to get inspired by their management skills and leadership qualities.

Learning Management Concept: During the industrial visits, we got to learn how professionals perform at work and they implement certain industry-specific concepts such as benchmarking, quality analysis, just-in time production, etc. We got to learn how professionals handle hundreds of workers at the same time, but still maintain the quality norms and targets of the organization. We also learnt how the different segments of professionals such as workers, engineers, and managers work in harmony to achieve a common target.

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Samruddhi Engineering | Molding machines | Injection molding machines
Samruddhi Engineering - Manufacturer from G.I.D.C, VATVA, Ahmedabad, India | About Us (indiamart.com)
Services: Samruddhi Engineering (samruddhiengg.com)
Samruddhi Engineers