

**A STUDY ON EMPLOYEES PERCEPTION ON THE SAFETY MEASURES
PROVIDED IN M/S. MAGNA ELECTRO CASTINGS LIMITED, POLLACHI**

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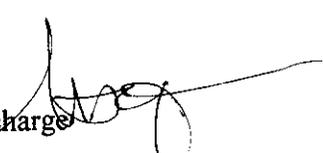
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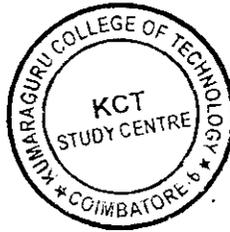
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ABSTRACT

Due to rapid industrialization, mechanical, electrical, chemical, and radiation hazards have increased which result into accidents on and off. The problems of industrial accidents have drawn attention from such disciplines as sociology, psychology, and engineering. Lapse of safety and its resultant impact accident may be defined as an unplanned and uncontrolled event which causes injury to a person. It implies that the event is unplanned and uncontrolled by the person immediately before the occurrence of the event.

The nature of foundry industry particularly iron and steel foundry, make the work highly safety critical. The hot molten metal will be handled with more than 1500 Deg. C and the molds are made with sand with flying particles. Hence it provision of safety requirements to the workers and ensuring adherence to the safety norms is essential in foundry industry.

Though the organization implements various safety measures and provides required Personnel Protective Equipment (PPE), the effectiveness of the efforts are not measured. Hence the study on the employees perception on the safety measures provided is essential to improve compliance and to reduce accidents.

A sample of 181 employees from various categories of people from different age group and education level was selected for the study. Data was collected using a questionnaire covering all the focus areas. The data analysis reveals that the

perception of employees of all groups is found to be in good level. Chi-square tests conducted to test whether there is any relationship between different categories of people from different age and education levels. The organization needs to improve on its safety related training and education systems.

A handwritten signature in black ink, consisting of several fluid, connected strokes, located in the lower right quadrant of the page.

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ALL GREAT MINDS.


C.SATHYAMURTHI

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CHAPTER 1

INTRODUCTION

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INTRODUCTION

1.1. RESEARCH BACKGROUND

Industrialization and growing population have brought certain features in the society which has created problems to human lives in the form of increased accidents and growing concerns for ill health. While these features are of general nature affecting all human beings, industrial workers have been exposed to additional accidents and poor health because of environmental pollution, occupational diseases, and accidents created by rapid industrialization. These aspects of industrial life have started getting additional attention from all concerned – employers, employees and their unions, and Government besides general public and a host of other agencies.

Due to rapid industrialization, mechanical, electrical, chemical, and radiation hazards have increased which result into accidents on and off. The problems of industrial accidents have drawn attention from such disciplines as sociology, psychology, and engineering. Sociologists and psychologists have made attempt to solve the problems of accidents in terms of proper selection, training, and education of workers and their socio-psychological factors that make them prone to accidents. Engineers have made attempt in terms of proper designing of mechanical safety devices. These two orientations suggest that safety and accident prevention is multi-dimensional issue and, therefore, require comprehensive approach.

Lapse of safety and its resultant impact accident may be defined as an unplanned and uncontrolled event which causes injury to a person. It implies that the event is unplanned and uncontrolled by the person immediately before the occurrence of the event. A legal definition has been provided by the Factories Act 1948 which states that “accident is an occurrence in an industrial establishment causing bodily injury to a person which makes him unfit to resume his duties in the next 48 hours”.

As per the factories act the following industries are classified as “Industries having hazardous processes”:

- **Ferrous metallurgical industries-iron, steel, ferrous alloys**
- Non ferrous metallurgical industries
- **Foundries**
- Coal industries
- Power generating industries
- Pulp & paper industries
- Fertilizer industries
- Cement industries
- Petroleum industries
- Drugs & pharma industries

The nature of foundry industry particularly iron and steel foundry, make the work highly safety critical. The hot molten metal will be handled with more than 1500 Deg. C and the molds are made with sand with flying particles. Hence it provision of safety requirements to the workers and ensuring adherence to the safety norms is essential in foundry industry.

1.2 IDENTIFIED PROBLEM

The problem identified for the study is to study the employees perception about the safety measures provided in M/S. Magna Electro Castings Ltd, Pollachi.

1.3 NEED FOR THE STUDY

M/S. Magna Electro Castings Ltd is a foundry industry. This industry is classified as industries having hazardous processes. Though the organization implements various safety measures and provides required Personnel Protective Equipment (PPE), the effectiveness of the efforts are not measured. Hence the study on the employees perception on the safety measures provided is essential to improve compliance and to reduce accidents.

1.4 OBJECTIVES AND SCOPE

Primary Objective:

- ✓ To study the employees perception on the safety measures provided.

Secondary Objectives:

- ✓ To identify the safety measures provided and to determine the gap between regulatory needs.
- ✓ To identify the difficulties faced by the workers in following the safety measures and to suggest solutions to the problems.
- ✓ To suggest actions to be taken by the management to improve safety measures and to eliminate accidents.

Scope

The study is applicable to M/S. Magna Electro Castings Ltd, Pollachi only. This may not be applicable to any other industry of any kind.

1.5 DELIVERABLES

Results of the study on employee perception on safety measures provided in M/S. Magna Electro Castings Ltd, Pollachi.

CHAPTER 2

LITERATURE SURVEY

CHAPTER 2

LITERATURE SURVEY

Various statutory provisions concerning industrial safety have been made under Chapter IV, Sections 21 to 41 of the factories Act. 1948. These safety provisions are absolute and obligatory in their character and the occupier of every factory is bound to follow them. These provisions are as follows:

1. Fencing of Machinery (Sec. 21)
2. Work on or Near machinery in Motion (Sec. 22)
3. Employment of Young Persons on Dangerous machines (Sec. 23)
4. Striking Gear and Devices for Cutting of Power (Sec. 24)
5. Self-acting Machines (Sec. 25)
6. Casing of New Machinery (Sec. 26)
7. Prohibition of Employment of Women and Children Near Cotton openers (Sec. 27)
8. Hoists and Lifts (Sec. 28)
9. Lifting Machines, Chains, Ropes and Lifting Tackles (Sec. 29)
10. Revolving Machinery (Sec. 30)
11. Pressure Plant (Sec. 31)
12. Floors, Stairs and Means of Access (Sec. 32)
13. Pits, sumps, Opening in Floors, etc (Sec. 33)
14. Excessive weights (Sec. 34)
15. Protection of eyes (Sec. 35)
16. Precautions Against Dangerous Fumes (Sec. 36)

17. Precaution Regarding the use of Portable Electric Light (Sec. 36 A)
18. Precautions against Explosive or Inflammable Dust, Gas, etc (Sec. 37)
19. Precautions in case of Fire (Sec. 38)
20. Power to Require Specifications of Defective or Tests of Stability (Sec. 39)
21. Safety of Building and Machinery (Sec. 40)
22. Maintenance of Building (Sec. 40 A)
23. Safety Officers (Sec. 40 B)

The U.S. Bureau of Labor Statistics released the 2004 Injury and Illness rates, which reflect OSHA's recordable cases as well as cases of employees with days away, restricted or transferred (DART) from work. When OSHA decides what firms will be targeted for compliance inspections, it picks industries reflecting the highest rates. The table below displays the 2004 rates with the North American Industry Classification System (NMCS) codes.

The incidence rates represent the number of injuries and illnesses per 100 full-time workers. The rates were calculated using the number of injuries divided by the total hours worked by all employees during the calendar year and by 200,000 (the base for 100 equivalent full-time employees working 40 hr./wk., 50 wk./yr.).

	NAICS'2' Code Code
All Manufacturing	--
Primary Metal Manufacturing/Industries	331
Metalcasting Facilities (All)	3315
Ferrous Metal Facilities	33151
Iron Facilities	331511
Steel Investment Facilities	331512
Steel Facilities--n.e.c.	331513
Nonferrous Metal Facilities	33152
Aluminum Diecasting Facilities	331521
Aluminum Facilities--n.e.c.	331524

	Total OSHA Recordable Injury, Illness Cases		Total DART (1) Cases	
	2004	2003	2004	2003
All Manufacturing	6.6	6.8	3.6	3.8
Primary Metal Manufacturing/Industries	10.0	9.6	5.2	4.8
Metalcasting Facilities (All)	14.0	13.1	7.1	5.6
Ferrous Metal Facilities	16.3	15.2	7.8	6.1
Iron Facilities	17.0	16.0	8.3	5.8
Steel Investment Facilities	11.1	10.6	5.9	6.2
Steel Facilities--n.e.c.	17.0	15.2	7.2	7.2
Nonferrous Metal Facilities	11.0	10.4	6.2	5.0
Aluminum Diecasting Facilities	n.a.	11.7	n.a.	5.4
Aluminum Facilities--n.e.c.	13.2	10.7	7.5	6.0

* n.a. = not available * (1) Days Away, Restricted or Transferred (DART) * (2) North American Industry Classification System (NAICS), 2002 * These statistics reflect occupational injury rates per 100 full-time workers.

Saterwhite, Jared, in his article in *Modern Castings* dated Feb 1, 1991, highlights our medical surveillance program, in particular occupational exposure to silica at Lufkin Industries. In place for about two years with different levels of sophistication for various foundry operations, it covers approximately 300 of our 2000 employees. Included here are the important details necessary for program start-up, logistics and some pitfalls to avoid.

Ergonomics, industry hygiene and foundry safety practices formed the program for On Third Foundry Safety Conference held on October 2008 by the AFS (American Foundrymen Society). The record number of 80 conference attendees indicates strong interest in foundry worker safety. Speakers discussed basic safety procedures ranging from responsibility, accountability and accident investigation to specific safe practices such as lockout/tagout, hazard communications and training.

The role of ergonomics was of special interest with safety personnel directing more of their efforts toward improving foundry work stations. While not new,

ergonomics is receiving more attention as increasing evidence seems to indicate that the workplace is the cause of some medical problems. Ergonomics is the interrelationship between humans, work methods, tools, equipment and environmental elements such as, heat, light and sound. Ergonomics considers the capabilities and limitations of the human body in the design of tooling, equipment and individual work stations. It is a multi-disciplinary team effort that can improve safety, health, attendance, worker satisfaction, productivity and product quality.

Gordon Hill, ergonomics consultant and educator, explained that ergonomics makes jobs easier by fitting jobs to the people. He emphasized job documentation as a must in implementing ergonomic solutions. The general characteristics of work, Hill said, that might cause physical harm to on worker are repeated, sustained or forceful exertions; stressful posture; mechanical stress; temperature extremes; and vibration.

The AFS Safety and Health Committee (10-0), Schaumburg, Illinois in its article dated 1st June 2005 examines the guidelines for PPE. Every day, an iron casting facility employee, removes slag off the top of the melt in a furnace. You've worked in the melting operation for years (adding scrap, removing slag, and ladling and pouring iron) without an accident. But one day, a piece of wet scrap falls into the melt. The water immediately becomes steam, expanding to 1,600 times its original volume and produces an explosion in the melt, spraying molten metal everywhere outside the furnace. If you are not wearing the proper protective equipment, you will sustain, or worse-- could be killed!.

The melting area can provide for a reasonably safe working environment, but the hazards of molten iron and steel still can be dangerous. Therefore, it is essential to be properly fitted with special clothing and personal protective equipment (PPE) to minimize or prevent any injuries from happening if an explosion or runout were to occur.

In June, the AFS Safety and Health Committee (10-Q), Schaumburg, Ill., will finalize an updated version of its document, "A Guide for Selection and Use of

Personal Protective Equipment and Special Clothing for Foundry Operations." This guide details the selection and use of PPE in metalcasting operations where there are risks of exposure to hazards. It can be used as a good tool to help facilities complete their job hazard assessments required for the Occupational Safety and Health Administration's (OSHA) PPE Standard 29 Code of Federal Regulations (CFR) 1910.132-139 rules that specify the necessary protective equipment for metalcasters.

Detailed within are various types of clothing and PPE that are essential for as safe a work environment as possible in a ferrous casting facility. Two areas are discussed: primary protective clothing for molten metal exposure; and secondary protective clothing for less-intense environments. Although the guidelines in this article cannot be substituted for the OSHA standards or the required hazard assessment, wearing the proper protective clothing can mean the difference between walking away from a metalcasting catastrophe or being seriously injured or killed.

Primary Protective Clothing

Like any casting environment, ferrous casting facilities are intense when in operation. Conditions that ferrous casters always should be vigilant of are physical contact with molten metal (as a result of splashes and spills) and potential burning from hot metal surfaces.

According to OSHA 29 CFR 1910.132 (d)-Hazard Assessment and Equipment Selection, "The employer shall assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of PPE." Improper flammable clothing is the number one cause of severe burns due to molten metal. Because there always is a risk of hazard in a ferrous casting environment, the OSHA rule garners the use of primary protective clothing.

Gear, such as safety glasses, a face shield, hard hat, jacket, apron, gloves, leggings, spats and cape sleeves, all are forms of primary protective clothing (Fig. 1). This equipment can be made of aluminized fabrics, leather and/or special synthetic

fabrics of treated wool. Primary protective clothing is necessary when conditions call for exposure to radiant heat, molten metal splashing and flame. It always should be worn over secondary clothing during metalcasting plant activities like charging, slagging, tapping, pouring and casting operations when molten metal is in the vicinity.

Eye and Face Protection--Eye and face injuries can occur from molten metal splash, foreign bodies, and infrared and ultraviolet radiation emitted from high-temperature surfaces and furnaces. Safety goggles or glasses with side shields are a standard requirement and must meet American National Standards Institute (ANSI) Z87.1 specifications. Goggles and glasses with filter lenses should be worn near conditions with high radiant energy.

When fitting for tinted lenses, it is best to start with the darkest shade, working toward lighter shades until the employee is most comfortable. For iron casting operations, tinted eye protection levels of shades #3-5 Green are sufficient while shades #8 Green or #6 Cobalt Blue will protect in steel operations. Higher shade numbers are for direct viewing of molten metal for extended periods of time, such as for making quality checks, pouring or slagging. In instances where there is exposure to molten metal, a face shield made of acrylic or #40 is needed in addition to eye protection.

Head Protection--Hard helmets are one of the most essential elements for metalcasting PPE as they protect from falling objects and moving equipment. All helmets must meet ANSI Z89.1 standards. In cases where minor metal splatter may come into contact with the head, treated cotton or wool caps worn under the helmet help protect from burns. Further, aluminized hoods provide the most protection when near high-heat and sparking areas. And remember, visitors also should be made to wear appropriate PPE at all times while in the facility.

Hand Protection--Many ferrous casting facilities operate manually, which furthers the need for adequate hand protection. When working near places where there is heat, heat-resistant/flame-retardant gloves should be worn (if not gloves, then mitts or cover pads of the same caliber should be used). When operating near molten metal,

founders' gloves 14-in. (35.5 cm) long--so that they extend above the wrists--are required. Treated cotton and wool gloves will help protect from heat. The same can be said of leather gloves, especially gauntlet-style gloves if there is no chance of metal being spilled onto or into the glove. More durable glove materials include aluminized fabrics, Kevlar, wool-lined Kevlar, Vinex and Oasis. Further, when selecting a glove, consider the need for dexterity and grip when operating equipment.

Foot Protection--Like the head, feet also must be protected from falling or rolling objects. Foot PPE must meet ANSI Z41 requirements. Pourers' or laceless safety boots are recommended for foot protection from molten substance exposures. These can be removed quickly in case molten metal accidentally gets inside. Metatarsal-guard shoes help protect the top of the foot, and, if worn, they should have a built-in tongue area cover design, or spats or leggings that cover areas where molten metal could lodge. If laced boots are worn, they should be covered with spats, especially near the top where there is danger of molten iron entering.

Body, Arm and Leg Protection--Many PPE suppliers suggest that aluminized outerwear, such as a 50-in. (127-cm) aluminized coat, be used for protection against radiant heat and molten iron/ steel splashing. Aluminized outerwear will reflect 90% of the radiant heat away from the body while shedding molten metal splashes and sparks. When melting ferrous metals at high temperatures, suppliers recommend clothing that has undergone phosphorus-base treatment.

For leg protection, leggings of at least 11 in. (28 cm) should be worn with a securing mechanism, such as Velcro, to keep them stabilized on the leg.

Secondary Protective Clothing

Secondary protective clothing is worn in areas where there is no exposure to molten metal and is used to prevent ordinary clothing from igniting and burning. One example of this is flame-resistant coveralls. Although secondary clothing is not a ticket to complete safety, it will help to reduce burns significantly. In many cases, serious

burns and fatalities have occurred because ordinary clothing caught fire from a small spark or splash, not because of burns caused directly by molten metal.

Along with secondary protective clothing, natural fiber outer clothing, undergarments and socks should be worn. Some synthetic fabrics melt or catch fire increasing the burn hazard. Cotton is frequently recommended as offering good protection without sacrificing comfort or restricting flexibility.

With respect to respiratory and hearing protection, the melt deck must follow the same rules as the other sections of the facility with particular attention given to noise and dust content. Silica dust particles that are diffused throughout the metal casting plant are considered a when inhaled. Further, toxic metals, such as lead and beryllium may have been alloyed with some of the scrap and will emit vapors into the air when melted. Dust also often gathers during the removing and installing of furnace linings. Air-purifying respirators are one method to protect against these hazards. Such respirators should meet the 29 CFR 1910.134 and National Institute for Occupational Safety and Health (NIOSH) certification 42 CFR 84 (part 84) requirements. It should be noted that not all respirators will protect against the same exposures, so operations must be observed before a respirator is selected.

Hearing protection devices commonly used include ear plugs, muffs or caps. Although most earplugs are safe, foam earplugs made of urethane materials may be combustible and should not be used near molten metal.

What to Avoid? While there are many materials to consider for ultimate protection, there are other items that should be avoided.

Nomex materials should not be worn because molten metal tends to stick to the fabric. The same can be said of polyester, nylon and other manmade materials that also can ignite and melt within seconds of exposure to molten metal. Clothing with cuffs, open pockets and loose legging tops can trap molten metal and sparks and should

not be worn. Also, pant legs should not be tucked inside of boots in order to prevent metal from falling into the boots.

Clothing also should be in serviceable condition, meaning it does not have any holes, rips or tears. Its flame-retardant properties must be maintained because these properties can be lost over time due to laundering.

Further, plastic cigarette lighters should be banned from any metalcasting facility to avoid any accidental contamination, or another explosion.

A very important hazard clearly is that of the heat radiating from the process itself, and the severe injury that can result from spillages of molten metal.

However the process generates substantial amounts of metal fumes. For example lead in gun metal, and other alloys, can contribute substantially to the foundry working environment in a very harmful way, especially if methods of control at source including local ventilation are not adequate.

The moulds and cores also present hazards - these range from silica sand, to the various agents which may be used to bind it, ranging from alkalis such as Sodium Silicate through to organic synthetic agents such as isocyanates, furans and phenolics. Some of these carry serious risks of sensitisation.

Foundries are also very prone to hazards from noise which can result in industrial deafness and from vibration (in the fettling process) which can lead to hand arm vibration syndrome. Some of them suffer from poor standards of "housekeeping" with numerous trip hazards etc.

Philbin, Matthew L., in his article titled "The bottom line of safety" published in the modern casting, (Sep 2005) explains , If unreasonable environmental regulations are the "unfunded mandates" of the foundry industry, inplant safety measures are something very different. They are a money saver, and the bottom line

benefits alone are enough reason for management to be aggressively involved in plant safety.

Like most anything else, however, safety initially requires investment. Some foundrymen may not see that investment as the kind that makes better castings, increases productivity, ends up paying for itself. As Charles W. Simpson wrote in the July, 1992 Safety & Health, "Many top managers have not reconciled costs with results even though many times those results mean irreparable people damage. This is why OSHA became a reality and why its presence will remain."

Wise Spending

Question: Would you rather spend money on your people in your plant, or give it to OSHA? Lifts, cranes, conveyors, ergonomic engineering, personal protective equipment and training and education all require cash investment, some more than others. By spending on these things, however, benefits are realized. That money is spent in-house, on your people or your facility, inherently raising the value of both. Medical bills don't add value to your business, and lost time doesn't add it to your employee.

Also, you don't need any more interaction with OSHA than is absolutely unavoidable, and it certainly doesn't need any more of your money. OSHA has been talking lately of only targeted inspections of "high-incident" businesses. Any reduction in accidents in your foundry will likely help move you down the list a ways.

On the other hand, unsafe conditions that lead to serious accidents will certainly draw the unwanted attention of regulators. Last year, an OSHA press release, a New York foundry had a fatality caused by an explosion. A subsequent OSHA inspection uncovered 80 alleged violations of all classes. OSHA's proposed penalties totaled more than \$600,000. Assuming the foundry took the mandated steps to remediate the cited problems (within 15 working days), it ended up spending money on

safety anyway, and in spades. This doesn't even consider the costs of a probable private lawsuit brought by the deceased employee's family.

Basic Math

Fear of OSHA is not the reason a foundry manager should be personally involved in safety. He should be involved because he's aware exactly how much a lost-time accident costs in productivity. Workers Compensation, insurance premiums and paperwork, medical bills, OSHA paperwork, equipment damage, training a replacement worker in the event of a serious accident--are all factors that money from the bottom line.

Fred Kohloff, associate director of environmental affairs for AFS, estimates that for every \$100 of such losses, a firm needs to generate \$10,000 in sales just to make a 1% profit. For losses of \$10,000, that sales figure must be \$1.5 million. These numbers make it clear that neglecting safety is like taking two steps back for every step forward you make in other aspects of your business.

Conversely, if you view safety as a long-term investment, and treat that investment like any other strategy, benefits will come as surely as with any carefully planned, fully supported program. Perhaps even more certainly. Take, for example the case of a small Ohio iron foundry that lists safety as its "foremost concern." The shop recently went 552 days without a lost time accident. The financial payoff: workers compensation rates dropped 38% since the institution of a plant-wide safety policy in 1988. "That money flows right to the bottom line," said the firm's accountant, "and without that cost, we're able to quote lower for jobs than many of our competitors."

The Human Commitment

Of course, understanding that money is at stake isn't enough. As a foundry manager, you must be a visible, tireless champion of working safe. You must also be

aware that safety is a two-way street. You can't demand safe behavior when the necessary investment hasn't been made in educating people as to exactly what that behavior is. Nor can you speak safety without acting on improvements or repairs that address plant safety conditions. You are as responsible as your employees.

Without the direct involvement of high-level management, even the most well thought out, comprehensive safety program is doomed to failure. In the article mentioned earlier, Simpson said the involvement of top managers makes all the difference, citing a Univ. of Nebraska study showing that "firms with top management actively involved in promoting safety awareness had 469% fewer accidents than those without this active support."

Those firms probably had a more loyal workforce, as well. Try thinking of safety as a way to let your employees and their families know you value them. Good companies look for ways to boost morale, to impart a sense of "we're all in this together" Safety is an obvious, practical method for getting that message across. Whatever else a top manager's involvement in promoting safety says, it should tell the worker: "I care whether you work in a safe environment. I care whether you're on the job (or at home). It's important to me that you are healthy."

To get back to the bottom line, morale is as crucial to productivity as avoiding lost time. Happy employees, who feel a part of something and have a sense of responsibility for their work and themselves, are cheaper to maintain than ones. They must be looked at as assets, particularly when the foundry industry is having difficulty attracting good people to its ranks.

It all comes down to sound, responsible business practices. When presented with an opportunity to replace unproductive damage control spending with advantageous investment, what foundry owner wouldn't choose the latter? All that stands in the way of that opportunity is the inability to view safety as a bottom line strategy.

CHAPTER 3

ORGANIZATION PROFILE

CHAPTER 3

ORGANISATION PROFILE

3.1. MANAGEMENT

Magna Electro Castings Limited is a public limited company incorporated under Companies Act 1956. It has registered office at No.43, Balasundaram Road, Coimbatore and factory at Mullupadi Village, Pollachi Taluk, Coimbatore - 642110. The company was promoted by renowned ELGI group of companies in Coimbatore. The company is headed by Mr. N. Krishnasamaraj as its Managing Director and under his able leadership and professional guidance the company is recognised as one of the Top class foundries in Coimbatore.

3.2. MISSION STATEMENT

Magna will provide Quality Assured, Cost Effective and Timely Delivered, Ferrous Components, meeting small to medium volume requirements of customers, while striving to be the most environmental friendly foundry.

The above will be ensured by

- ▣ A clear understanding of the requirements
- ▣ Being the best-cost producer
- ▣ Providing Quality Engineering and warehousing Services
- ▣ Being a green and clean foundry

3.3. QUALITY POLICY

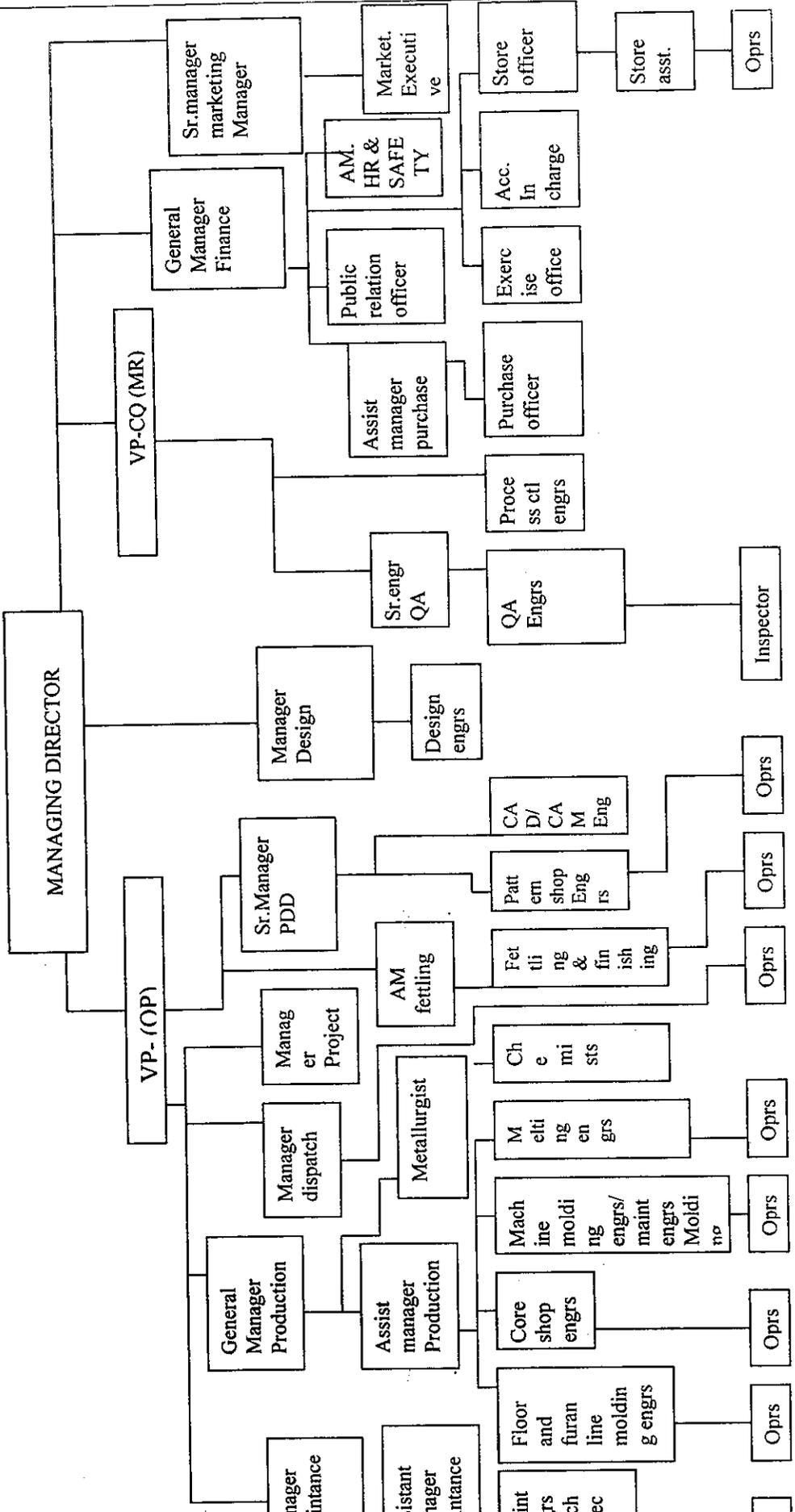
MAGNA will provide customers products and services consistently confirming to clearly established customer requirements at the right cost at the right time.

This is achieved through

- Total employee involvement
- Implementing and maintaining QMS as per ISO 9001 : 2000 and ISO/TS 16949:2002 and continually improving the effectiveness of QMS
- Training
- Plant Improvements
- Robust Product development process

MAGNA ELECTRO CASTINGS LIMITED

ORGANISATION CHART



3.4. AWARDS AND CERTIFICATION

1. In 2009 Exemplary performance supplier award given by M/s. Flowserve India, Bangalore
2. In 2007 – Best Exporter of Casings award given by Indian Institute of Foundrymen, Coimbatore Chapter.
3. One of the Top 500 Indian Manufacturing SMBs for 2007 award given by Industry2.0
4. In 2004 – ISO/TS 1649 Certification was awarded by DNV
5. In 2004- Best Foundry award given by Indian Institute of Foundrymen, Coimbatore Chapter.
6. In 2003 – PED/97/23 EC (Pressure Equipment Directive) was awarded by TUVNORD.
7. In 2002 – ISO 9001-2000 Certification was awarded by DNV
8. In 1999-2000 Export Excellence award given by Engineering Export Promotion Council
9. In 1998-99 Highest Exporter Award given by Engineering Export Promotion Council
10. In 1998 - ISO 9002 Certification was awarded by DNV

3.5. PRODUCT PROFILE

Magna is in the Business of Manufacturing and Supplying Ferrous Components in small and medium volumes to users worldwide.

Magna specializes in the manufacture of Ductile Iron and Gray Iron casting in the weight range of 300 grams to a maximum of 3000 Kilograms. Magna also adds value by heat treatment, surface treatments and machining so that the products are ready to assemble.

Magna also produces fully machined components, utilizing its in-house CNC machine shop and other facilities as well.

Magna produces castings meant for the following

- Valves
- Refrigeration
- Railroad
- Printing
- Hydraulics
- Automotive
- Electricals
- Windmills

Machined components for

- Rail road
- Hydraulics
- Off Highway
- Windmills
- Automotive

3.6. COMPETITIVE STRENGTH

Magna has extensive experience in the supply of safety requirement components in the casting and fully machined forms. The components meet stringent requirements in terms of Radiographic Quality and Metallurgical Control.

Magna has established warehousing in the USA, this facility along with bi-weekly container shipments, allows them to cater to low volume requirements. Also their warehousing capability enables them to supply products just in time, to customers in the United States of America.

Magna proposes to establish similar facilities to provide the same to the European consumers in near future.

3.6.1 INFRASTRUCTURE

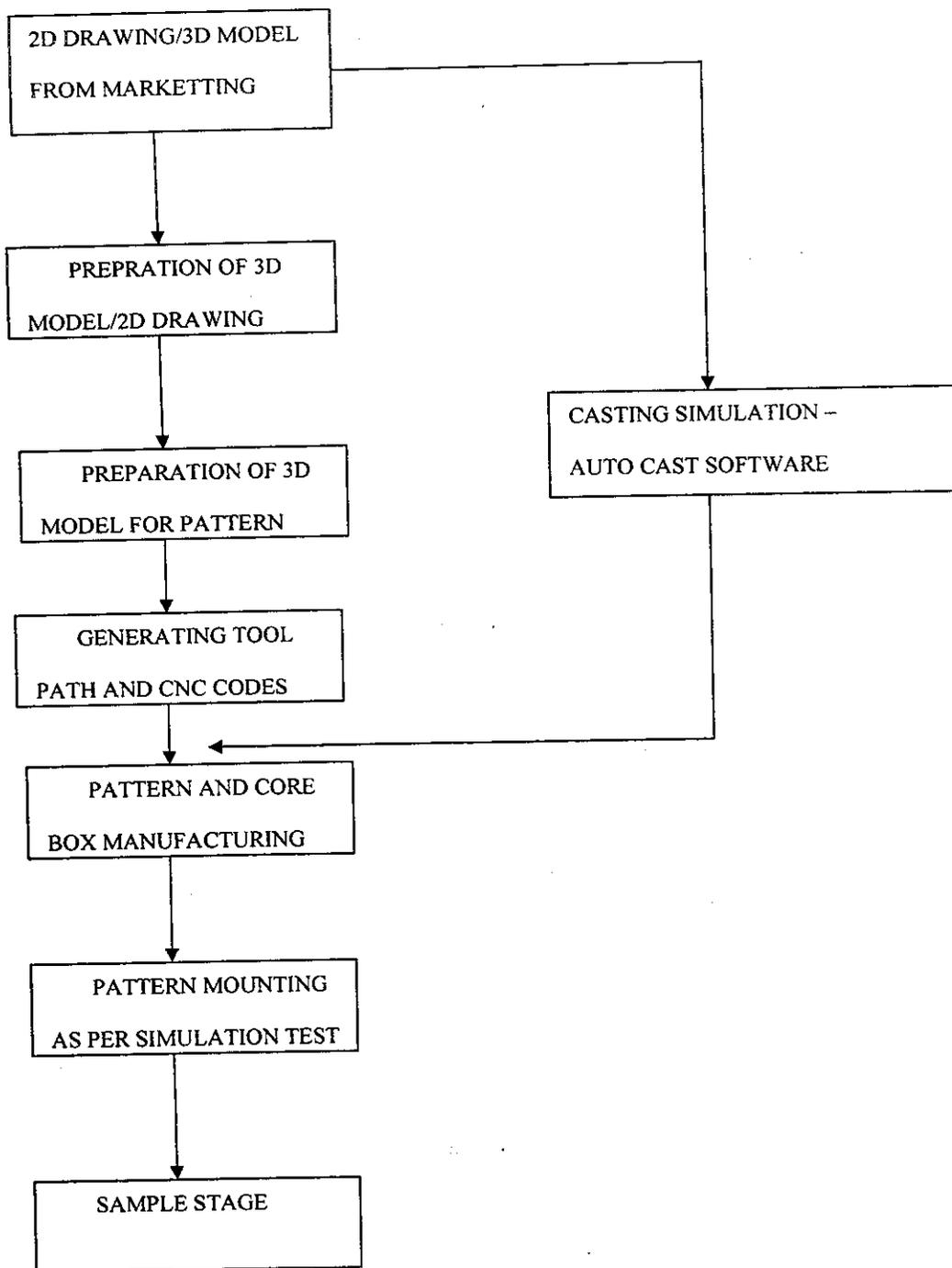
- The total built up area - 1,50,000 sqft
- Land - 20 Acres
- Manufacturing machines - Melting – Induction furnaces – 4 nos. with a total capacity of 5.5 tons per hour
- High pressure automatic moulding line for green sand moulding
- Continuous mixer
- Shot blasting and heat treatment facilities
- Universal testing machine
- Metallurgical microscope with image analyser
- Ultrasonic tester
- Online compactability controller
- Ultrasonic tester

3.7. DESCRIPTION OF VARIOUS FUNCTIONAL AREAS

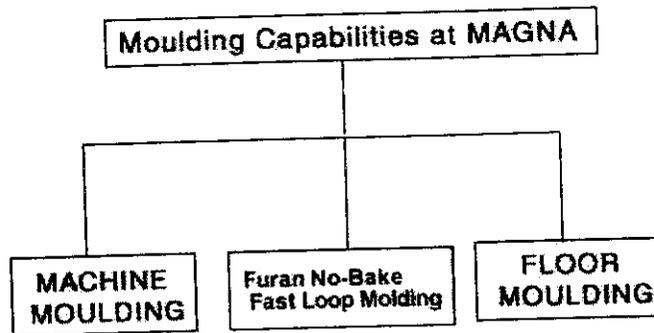
The company has the following very important functional areas

- i) Product Development Department
- ii) Moulding Department
- iii) Machining Department
- iv) Metallurgical department
- v) Packaging Department

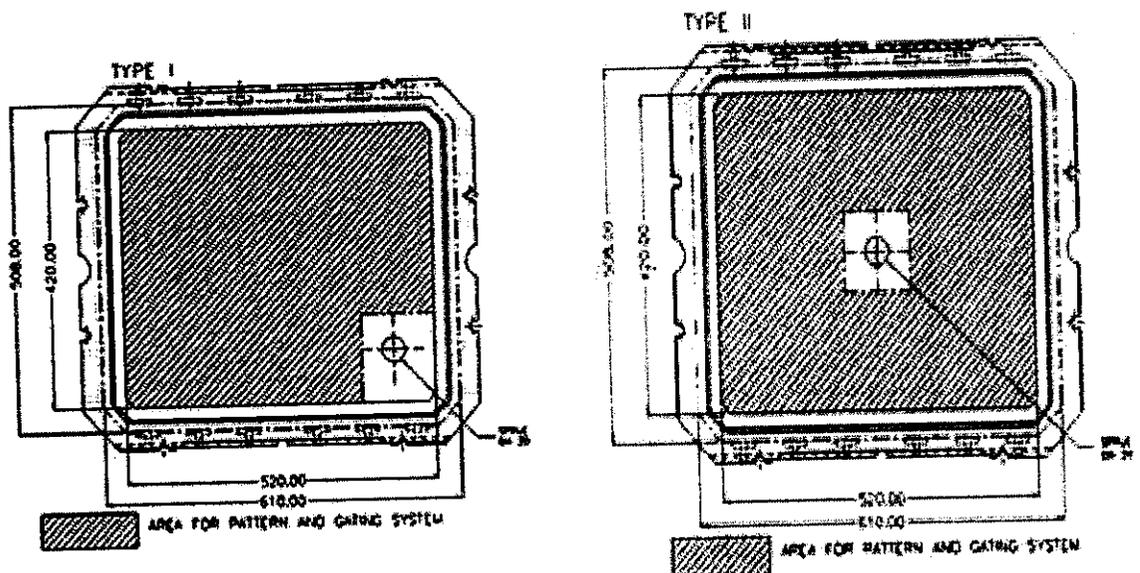
3.7.1. Product Development Department

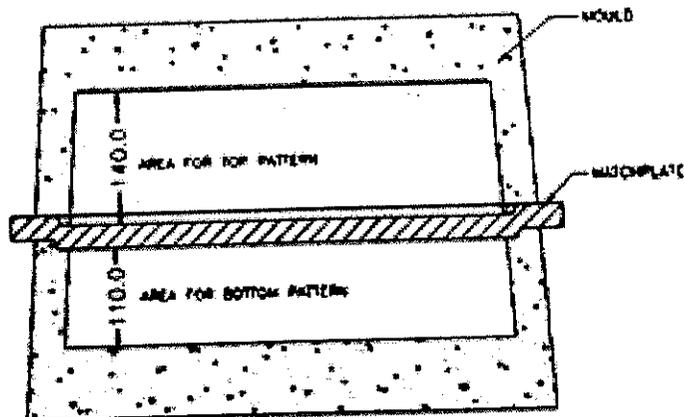


3.7.2. Moulding capabilities



Machine Moulding





Furan No-Bake Fast Loop Moulding

Maximum size: 1250mm X 1100mm X 400mm per single cake

Furan No-Bake Floor moulding

Maximum Size: 1750 mm X 1750 mm X 1000mm per single cake

3.7.3. Machining capabilities

The company has 10 nos. CNC machines including Vertical Milling Centre (VMC) and Horizontal Milling Centre (HMC) machines for machining of castings which makes further value addition to the finished goods.

3.7.4. Metallurgical capabilities

The company possess German make imported spectrometer which has the capacity to check 23 elements presence in the metal. This is used to check not only the finished goods composition but also the steel scrap which is a major input for production of the castings.

3.7.5. Packaging department

The company has state of the art packaging department and it mainly uses ISPM certified heat treated wooden planks for packing of finished goods. The company also uses stretch wrapping machine for packing the pallets and has Fork lifts for loading finished goods into the container.

3.8. TURNOVER OF THE COMPANY

The company's turnover during past 6 years are as below;

Table 3.1 Turnover of the company

Rs. in lakhs

YEAR	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09
Sales	2176.44	3008.77	4532.41	4681.59	5429.02	6206.27
Export	1260.72	1808.28	3263.77	3257.07	3792.68	4089.29
Profit	259.62	234.14	418.69	577.04	395.11	155.11

3.8.1 Major customers

The major customers of the company are

Domestic customers : Mahindra & Mahindra Limited, Mumbai

Rane TRW Power steering Limited, Trichy

Vestas Wind Turbines, Chennai

Bonfiglioli Transmissions Ltd, Chennai

Overseas customers : General Electric & Transportation Systems Inc, USA

Rockford Power Train Inc. USA

Regel Technik – Germany

Spirax Sarco – UK etc.

CHAPTER 4

MACRO AND MICRO ANALYSIS

3.9. FUTURE PLANS OF THE COMPANY

The company proposes to establish a warehousing facility in Europe to cater to the customers in that region. Though the world economic recession hit the company's turn over during 2008-2009 and 2009-2010, the company is hopeful of achieving 100 crores turn over in the near future.

The company plans to implement the Phase II of the expansion for increasing the capacity from 900 MT per month to 1500 MT per month during the current period . The company is evaluating alternate technologies which show more promise than the previous Furan based technology and this the company plans to implement as stated above.

The company is implementing the requirements of environmental certification ISO 14000 and hopeful getting it during this financial year.

CHAPTER 4

MACRO AND MICRO ANALYSIS

4.1 MACRO ANALYSIS

Today India is poised to surpass South Korea in terms of total GDP which will make India 3rd largest economy in Asia, after Japan and China. Already on Purchasing Power Parity (PPP) basis, India is 4th largest economy in the world. Since 1991, the Indian Government has adopted an increasingly liberal attitude towards foreign investments and has taken several steps to ensure a conducive business environment for multinational companies. The automotive sector currently accounts for about 4.2% of India's GDP.

Metal castings have played an important role in Indian from antiquity. Castings in gold and silver dating to 3000 BC have been found in India. According to the Indian Institute of Foundrymen (IIF) India has more than 5000 foundries and a capacity of 7.5 M metric tonnes per year. IFF indicates that over 95% of these foundries falling under the category of small scale industry. IFF groups the foundry industry into five geographic "clusters" in and near the cities of Belgaum, Batala / Jalandhar, Coimbatore, Kolhapur and Rajkote.

While the small foundries will continue to play a role in Indian metal casting, a very significant development has been underway for some time in the growth of larger foundry operations. The trend favouring the foundries in India will continue and most likely accelerate due to the growing expectations of the OEMs regarding quantity and quality of the castings. Additionally size and scope are required to address investment requirements, power shortages, and a talent crunch. The significant developments at several major casters in India are representative of the rapid changes underway.

4.1.1 OPPORTUNITIES AND CHALLENGES FOR INDIAN FOUNDRIES

The Indian metal casters are blessed with strong domestic demand and an exploding middle class that seems likely to remain strong for years to come. Additionally the ongoing huge investment in infra structure bodies well for Indian market casters. India has got some favourable factors in terms of casting costs. For example, labour costs in Indian foundries are perhaps the lowest in the world.

Unskilled labour costs in many foundries are well below \$100 per month. Skilled labour is between \$200 to \$400 per month. Newly degreed metallurgical engineers from good universities can be readily hired for less than \$6000 annually. However keeping younger people enthused by a career in metal castings is a challenge in India as the Industry tends to a lag in pay for experienced personnel and foundry environments are not as attractive as manufacturing in many other growing segments. Likewise, as has happened repeatedly in other developing markets, Indian metal casters will need to upgrade the Safety, Health and Environmental aspects.

Construction costs for new foundries as well as time to complete construction and permitting is currently a major advantage for Indian metal casters. Equipment in larger more modern foundries is often imported and is state of the art. Compliance cost are much less for Indian foundries. For example there are virtually no compliance requirements on Health and Safety relating to foundry binders. Tooling costs are significantly lower than in developed countries although tooling quality is still lagging.

Other casts however are more significant for Indian foundries, including some consumable costs and the quality and capability of consumables is often limited. Energy costs are some what subsidized by the government as the utilities and even the oil companies are state owned India. The Industry has a good trade association in India and the leaders in the industry encourage actively participation. Likewise many colleges and universities have programs in metal casting although the actual physical facilities are often dated and not very useful in terms of modern metal casting

technology. To meet the needs of the industry long term, more investment in educational infrastructure targeting metal castings will be needed.

The global outlook for the Foundry industry looks promising over the next 5 years though the recession prevailing though there is a sign of improvement now. To come out of this slow down emerging economies should consume more and save less and vice versa with developed countries.

“In economics a recession is a general slow down in economic activity over a sustained period of time, or a business cycle contraction. During recessions, many macro economic indicators vary in a similar way. Production as measured by Gross Domestic Product (GDP), employment, investment spending, capacity utilization, household incomes and business profits all fall during recessions.”

To come of out this slow down different economies adopt different policies mainly under the heads of Fiscal policy and Monetary policy. The countries in the world are adopting different strategy to overcome the recession according to their economy and is expected to return normal within a year.

If the recession receded there will be a promising future for the foundry industry both in domestic and export market. With the advanced countries like USA, Japan and Germany unlikely to add substantial capacities in the near future they are moving away from the industry slowly, there is a tremendous potential available in the global market which can be properly tapped by the company.

4.2. MICRO ANALYSIS OF THE COMPANY

The company having made adequate investment in building additional capacities in the last couple of years is gearing up to meet the challenges thrown open. The company has effected substantial product yield improvement. The company has also rationalised its pricing policy for its exports contracts, which should result in better price realisation from the coming year onwards. Apart from this the various measures taken by the company like achieving cost reduction in operations, adding more value added products and diversifying into non US Dollar markets will enable the company to reap benefits from the coming year onwards.

The augmented capacity will also help the company in planning its product mix effectively. The company turns the recession into an opportunity and effectively implemented cost reduction schemes and drastically reduced its fixed costs in all departments. The company's newly launched Cost Reduction Programme (CRP) which mandates all employees in the company to show saving of some fixed amount during every month irrespective of their cadre in addition to their normal routine work. This programme not only provided a good result for the company but also active involvement all its employees to achieve their goals.

This will help the company to maintain its profits in percent despite the recession affected badly.

CHAPTER 5

METHODOLOGY

CHAPTER 5

METHODOLOY

5.1. TYPE OF STUDY

The research design is the blue print of the research study for the collection, measurement and analysis of data.

5.2. TARGET RESPONDANTS

Target respondents for this study include permanent workers, contract workers and staff.

5.3. ASSUMPTIONS, CONSTRAINTS AND LIMITATIONS

The the study is conducted based on sample data, hence there is a chance for incorrect data.

5.4 TYPE OF DATA

Primary and secondary data

5.5 TOOLS FOR DATA COLLECTION

Questionnaires and Interviews

5.6 TOOLS USED FOR ANALYSIS

Percentage analysis and Chi-Square Analysis

5.7 TYPE OF SAMPLING AND SAMPLING METHODS

Convenience sampling is used to collect samples and analyze the data. The following criteria were used for selecting the samples:

- Minimum work experience 3 years
- Working in shop floor production activities

Table 5.1: Respondent Details

Category	Total No of employees	No of samples chosen for analysis	% of sample
Permanent workers	170	122	72
Staff	85	39	46
Contract workers	65	20	31
Total	320	181	57

Inference: From the above table it is clear that about 181 samples were selected which is about 57% of the total employee strength of the company. Permanent workers constitute about 170 employees from which 122 samples were taken, followed by staff and contract workers.

CHAPTER 6

DATA ANALYSIS AND INTERPRETATION

CHAPTER 6

DATA ANALYSIS AND INTERPRETATION

6.1. INTRODUCTION

Data collection is done with the questionnaire prepared (Appendix II). Responses were collected from 181 samples selected and used for data analysis. The questionnaire was designed to capture the employees perception in 7 key focus areas namely:

- Work environment
- Process related safety measures
- Provision and use of Personnel Protective Equipment
- Safety related training and systems
- Management commitment
- Health and hygiene
- Accident management

6.2. PERCENTAGE ANALYSIS

The collected data are grouped by type of employment (Staff, Permanent workers and Contract workers), Educational qualification and Age.

Table 6.1 : Respondents by type of Employment

Type of Employment	No of respondents	Percentage, %
Permanent worker	122	67
Staff	39	22
Contract Labour	20	11
Total	181	100

Inference: In the sample permanent workers are more with 67%, which is followed by staff with 22% and contract workers with 11%.

Figure 6.1: Respondents by type of employment

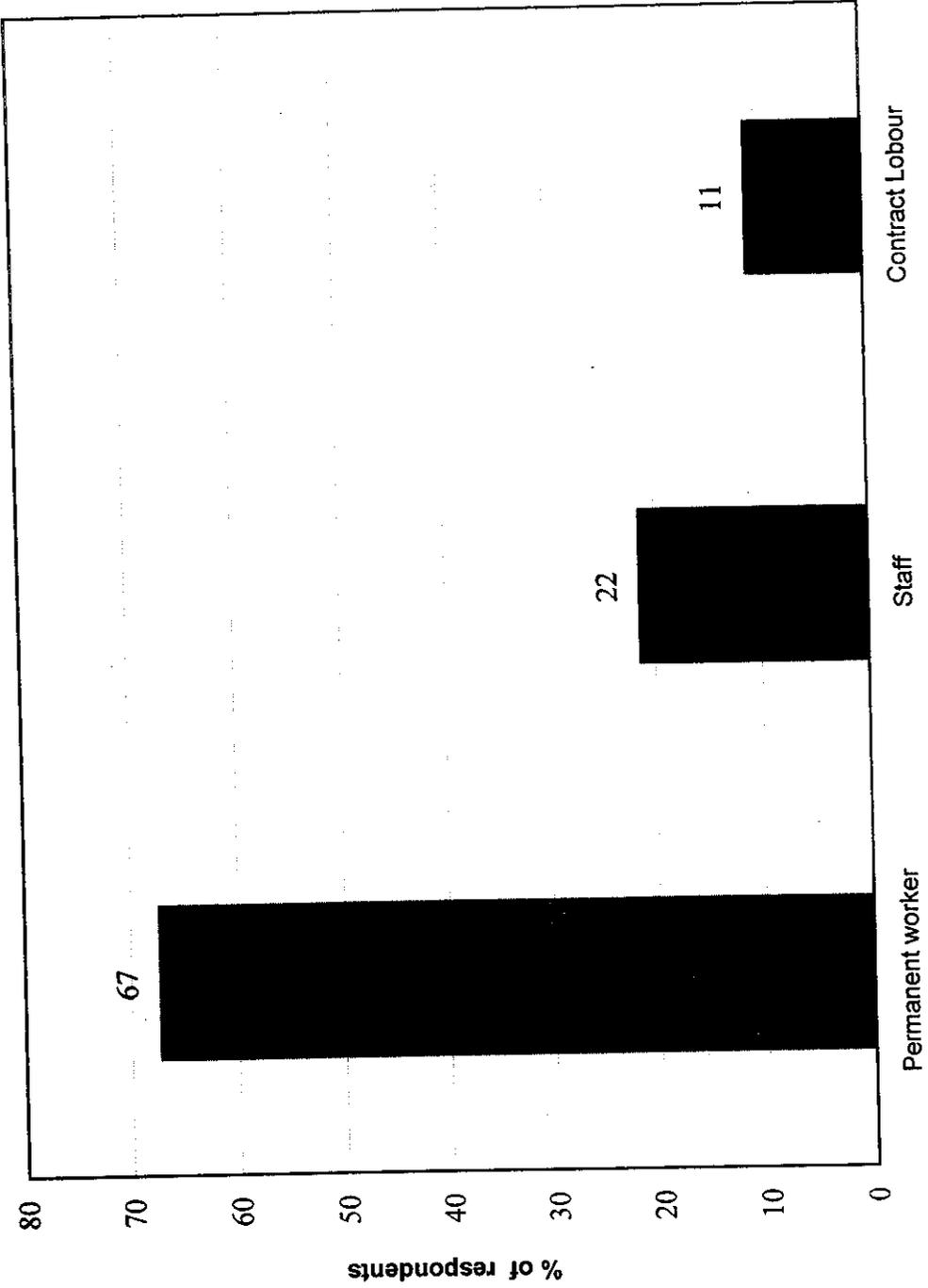


Table 6.2 : Respondents by educational Qualification

Educational Qualification	No of respondents	Percentage, %
School level	121	67
Above school level	60	33
Total	181	100

Inference: In the sample employees with school level are more with 67%. The respondents with higher educational qualification constitute 33%. This is because most of the workers and contract workers are within school level education.

Table 6.3 : Respondents by Age

Age Group	No of respondents	Percentage, %
Below 28	67	37
28 – 35	68	38
Above 35	46	25
Total	181	100

Inference: All the samples with different age group is more or less evenly distributed. Respondents with below 28 years of age constitute 37% and with age 28 – 35 constitute 38% and more than 35 years constitute 25%.

Figure 6.4 shows the employee perception levels on various focus areas. Safety related training and systems shows lowest ratings. After this low perception prevails in process related safety measures and accident management.

Figure 6.2: Respondents by Educational Qualification

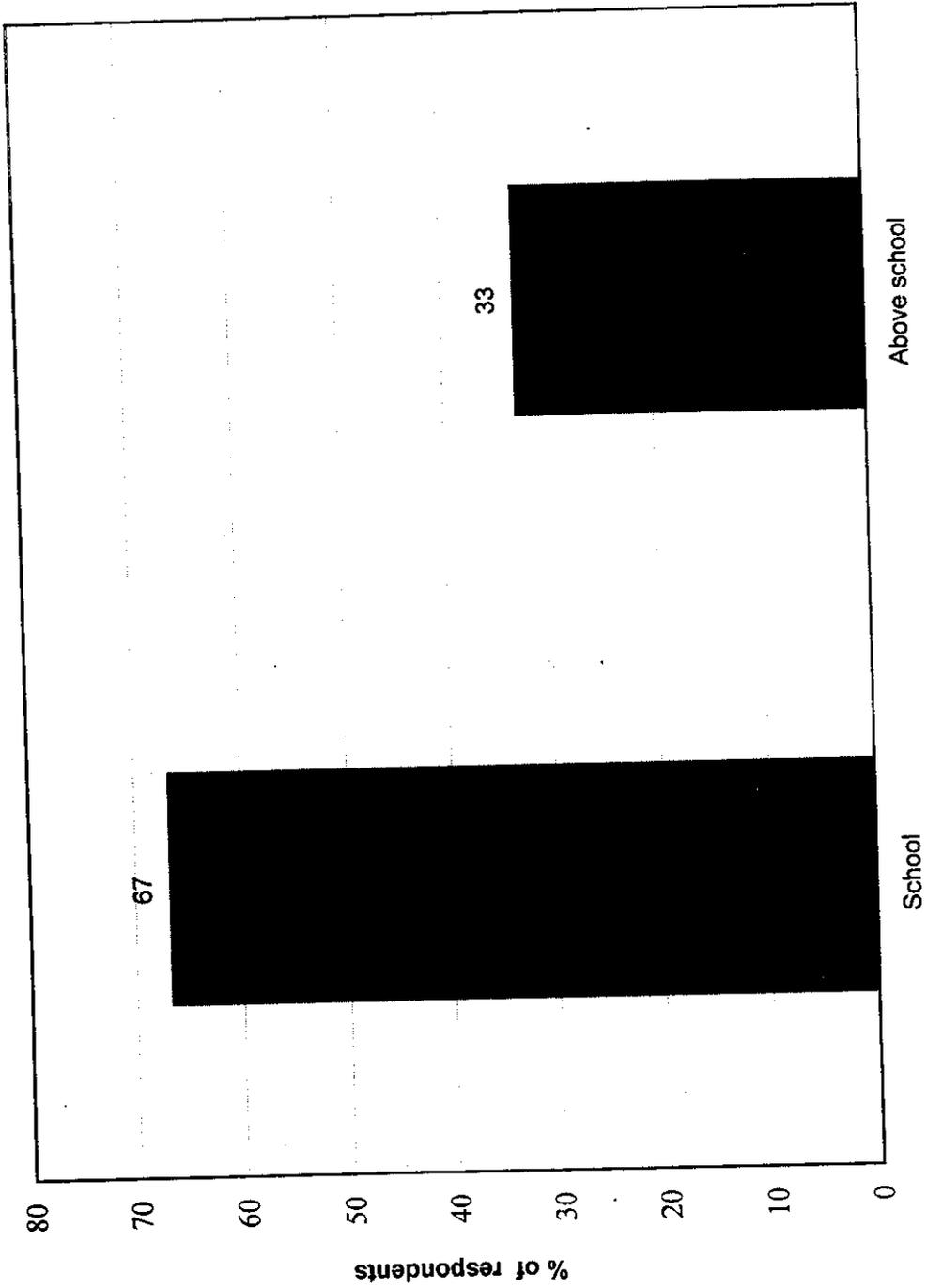


Figure 6.3: Respondents by Age

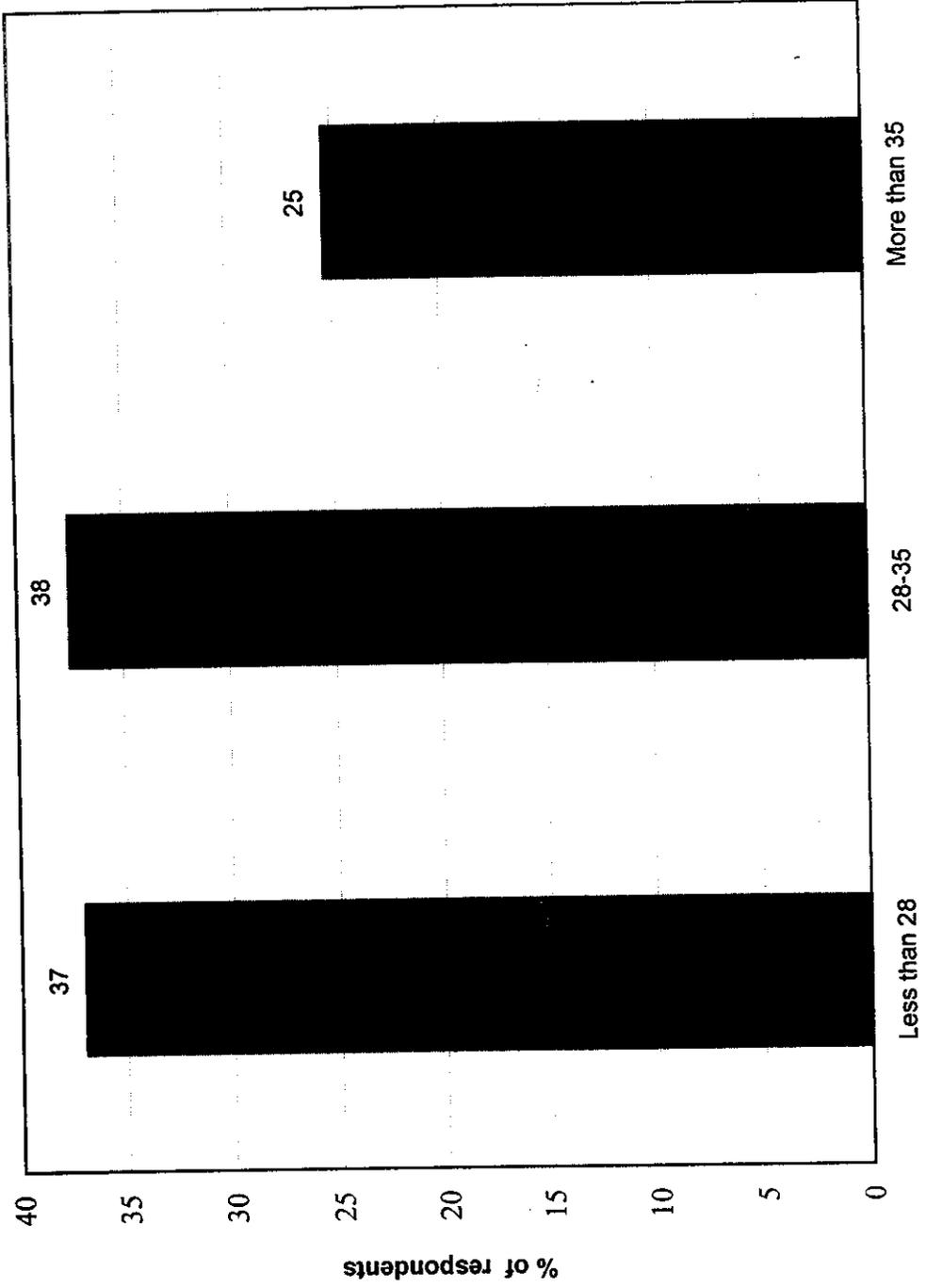
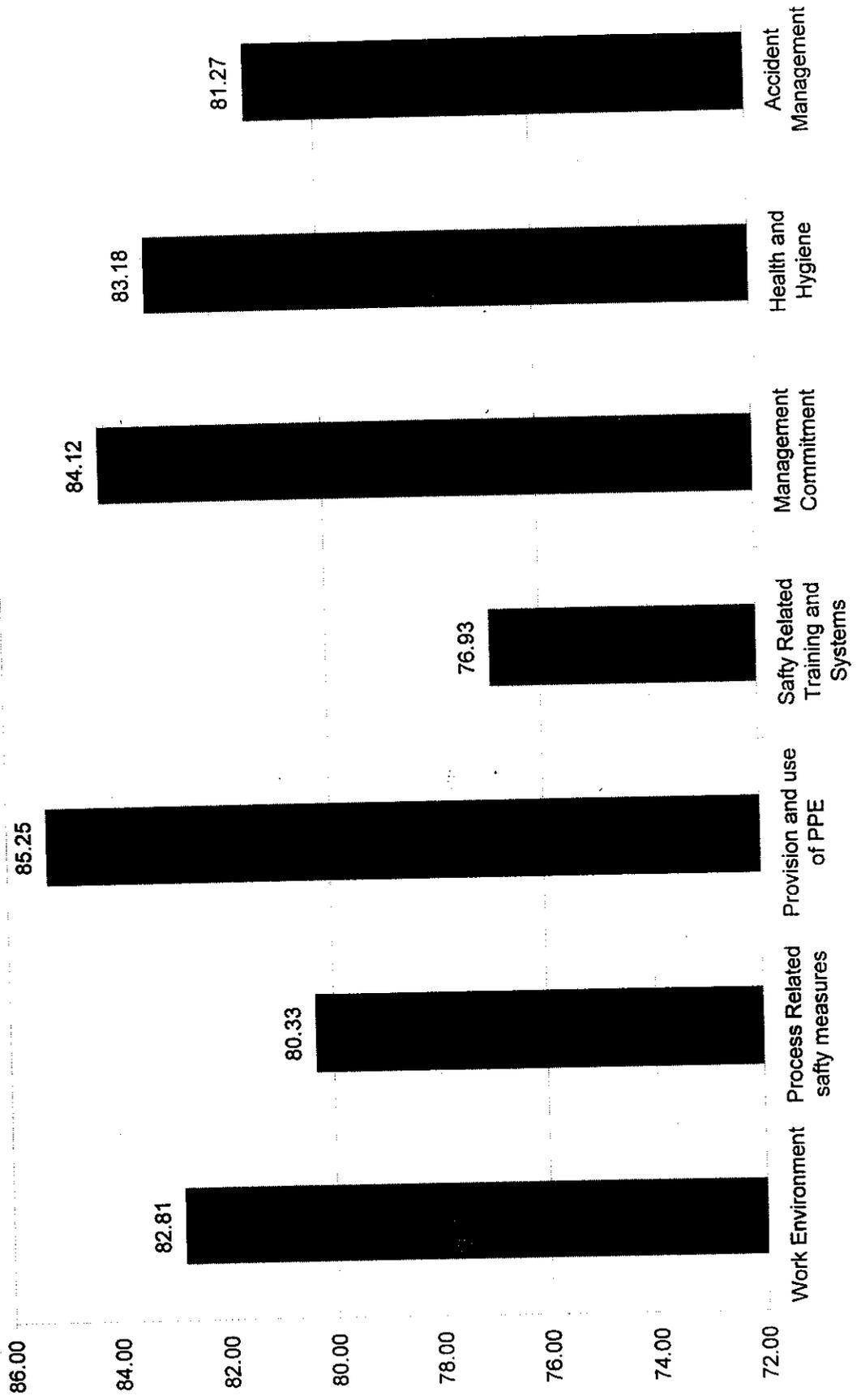


Figure 6.4 Employee Perception by Focus Area



6.3. CHI-SQUARE ANALYSIS

Chi-Square tests were conducted to study the relationship between different groups of samples.

Chi Square test to test the relationship between different employment types

Table 6.4 : Chi-Square Test for different employment type

Type of Emp	Strongly disagree	Disagree	Somehow agree	Agree	Strongly agree	Total
Staff	0	0	8	24	7	39
Permanent worker	0	0	13	64	45	122
Contract Labour	0	0	0	17	3	20
	0	0	21	105	55	181

Null Hypothesis (H₀): Nature of employment is independent of employee perception of safety measures provided.

Alternate Hypothesis (H₁): Nature of employment is dependent of employee perception of safety measures provided.

Degree of freedom: 8

Level of significance : 0.05

Calculated value = 13.56

Table Value = 15.507

Conclusion: The calculated value 13.56 is less than the table value of 15.507 at 8 degrees of freedom and level of significance at 5% ($\alpha = 0.05$), hence null Hypothesis (H₀) is accepted.

Inference: From the above conclusion we can infer that the nature of employment is independent of employee perception of safety measures provided.

Chi Square test to test the relationship between different education levels

Table 6.5 : Chi-Square Test for different education levels

Educational Qualification	Strongly disagree	Disagree	Somehow agree	Agree	Strongly agree	Total
School	0	0	13	67	41	121
Above school	0	0	8	38	14	60
Total	0	0	21	105	55	181

Null Hypothesis (H₀): Education level of employee is independent of employee perception of safety measures provided.

Alternate Hypothesis (H₁): Education level of employee is dependent of employee perception of safety measures provided.

Degree of freedom: 6

Level of significance: 0.05

Calculated value = 2.13

Table Value = 9.488

Conclusion: The calculated value 2.13 is less than the table value of 9.488 at 6 degrees of freedom and level of significance at 5% ($\alpha = 0.05$), hence null Hypothesis (H₀) is accepted.

Inference: From the above conclusion we can education level of employee is independent of employee perception of safety measures provided.

Chi Square test to test the relationship between different age groups

Table 6.6 : Chi-Square Test for different age groups

Age	Strongly disagree	Disagree	Somehow agree	Agree	Strongly agree	Total
Less than 28	0	0	12	41	14	67
28-35	0	0	4	43	21	68
More than 35	0	0	5	21	20	46
Total	0	0	21	105	55	181

Null Hypothesis (H₀): Age is independent of employee perception of safety measures provided.

Alternate Hypothesis (H₁): Age is dependent of employee perception of safety measures provided.

Degree of freedom: 8

Level of significance : 0.05

Calculated value = 10.47

Table Value = 15.507

Conclusion: The calculated value 10.47 is less than the table value of 15.507 at 8 degrees of freedom and level of significance at 5% ($\alpha = 0.05$), hence null Hypothesis (H₀) is accepted.

Inference: From the above conclusion we can education level of employee is independent of employee perception of safety measures provided.

CHAPTER 7

CONCLUSION

CHAPTER 7

CONCLUSION

7.1 SUMMARY OF FINDINGS

1. In the sample size permanent workers are 67%.
2. In the sample size employees within school level are 67%.
3. In the sample size different age group of employees are evenly distributed.
4. Nature of employment is independent of employee perception of safety measures provided.
5. Education levels of employee are independent of employee perception of safety measures provided.
6. Age is independent of employee perception of safety measures provided.
7. In a nutshell the employees perception about the safety measures provided by the company is found to be good.
8. The company needs to provide more safety related training systems.

7.2 SUGGESTIONS AND RECOMMENDATIONS

1. The company can plan and implement a safety training and education system.
2. The training and education system shall have the ways to identify the training and education needs, identification of trainer, provision of the training and measuring the evaluation of the effectiveness of the training provided.
3. The company can plan to achieve ISO 14001 and OSHA certification. This will improve the employee and stakeholders perception about the company and will reduce the causes for accidents.
4. The company can arrange for third party safety audits to assess the safety measures provided and implemented periodically.
5. Mock drills can be conducted periodically to improve the awareness on emergency preparedness.

QUESTIONNAIRE TO STUDY THE EMPLOYEES PERCEPTION ON THE SAFETY MEASURES PROVIDED IN M/S. MAGNA ELECTRO CASTINGS LTD, POLLACHI.

Employee name:

Employee code:

Department:

Age:

Educational qualification:

Years of experience:

1. Inside Magna:
2. Outside Magna:

Provide tick () mark in the appropriate column as per the rating you like to give:

1 – strongly disagree, 2 – disagree, 3 – somehow agree, 4 – agree, 5 – strongly agree

Sl no	Description	1	2	3	4	5
	Work environment					
1	Work environment provided by the company is suitable to perform the work without any difficulty.					
2	Ventilation provided is sufficient.					
3	Lighting provided is adequate to perform the work.					
4	Working area is kept clean.					
5	Drinking water facility provided nearer to the working area.					
	Process related safety measures					
6	Adequate fume extraction system is provided to furnaces.					
7	Electrical insulation is good for the furnaces.					
8	Dust collection system for sand plant is effective.					
9	GLD (Ground Leakage Detector) is working always.					
10	Safety sensors are always working in high pressure moulding line.					
11	Cranes are provided with over load trip sensors.					
12	Chains and ropes used in cranes are tested and approved.					

Sl no	Description	1	2	3	4	5
	Provision and use of Personnel Protective Equipment					
13	Appropriate Personnel protective equipment like helmets, goggles, gloves, ear plugs are provided.					
14	Required personnel protective equipments are used by workers as appropriate.					
	Safety related training and systems					
15	Adequately trained to use the PPEs.					
16	Training provided to use fire extinguishers.					
17	Training provided to how to react to an emergency situation.					
18	In all the working areas displays are available about the points to be followed regard to safety.					
19	Training provided in operation of cranes.					
	Management commitment					
20	There exists a safety committee in which workers are members.					
21	Concerns raised by the workers are resolved by the management in time.					
22	Direction of superiors encouraged adherence to safety norms.					
23	Emergency exits are provided at appropriate locations.					
	Health and hygiene					
24	The company provides hygiene food.					
25	The company provided clean drinking water.					
26	The company provides hygiene toilet facilities.					
27	The company provided adequate refreshment and rest room facilities.					
	Accident management					
28	Trained personnel available during the working hours for first aid.					
29	First aid boxes are available are appropriate locations with medicines.					
30	Adequate medical treatment provided to workers meeting with unexpected accidents.					
31	Medical treatment provided by the company approved medical centres.					

CHAPTER 8

BIBLIOGRAPHY

CHAPTER 8

BIBLIOGRAPHY

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