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UNIDO CONTRACT NO. 95/037/IR

CONFIDENTIAL

# FINAL REPORT ON SURVEY OF SERVICE NEEDS OF PROCESS CONTROL SYSTEMS IN SOUTH INDIA

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Prepared for

**CENTRE FOR ELECTRONICS DESIGN AND TECHNOLOGY  
CALICUT 673 601 (INDIA)  
PROJECT NO. DP/IND/90/014**

Submitted to

**UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO), VIENNA,  
AUSTRIA**

Prepared by



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**SEPTEMBER 1995**

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UNIDO CONTRACT NO. 95/037/IR

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**CALICUT (INDIA)**

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*Prepared by*

**ABC CONSULTANTS PRIVATE LIMITED  
MANAGEMENT CONSULTANCY SERVICES**

**SEPTEMBER 1995**

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## LIST OF ABBREVIATIONS

|                 |   |
|-----------------|---|
| <b>ABC</b>      | ABC Consultants Private Limited                       |
| <b>CEDT-C</b>   | Centre for Electronics Design and Technology, Calicut |
| <b>CEM</b>      | Cement  |
| <b>CHEM</b>     | Chemical/Petrochemical                                |
| <b>DCS</b>      | Distributed Control Systems                           |
| <b>DOE</b>      | Department of Electronics                             |
| <b>ELET</b>     | Electronics   |
| <b>ENGG</b>     | Engineering   |
| <b>etc</b>      | ET CETERA   |
| <b>FERT</b>     | Fertilizer  |
| <b>FMS</b>      | Flexible Manufacturing System                         |
| <b>GOI</b>      | Government of India                                   |
| <b>I/O</b>      | Input/Output  |
| <b>JV</b>       | Joint Venture   |
| <b>MET</b>      | Metallurgy  |
| <b>MIS</b>      | Management Information System                         |
| <b>MISC</b>     | Miscellaneous   |
| <b>MNC</b>      | Multinational Company                                 |
| <b>PAP</b>      | Paper   |
| <b>PCB</b>      | Printed Circuit Board                                 |
| <b>PC&amp;I</b> | Process Control & Instrumentation                     |
| <b>PLC</b>      | Programmable Logic Controller                         |
| <b>PSU</b>      | Public Sector Unit                                    |
| <b>PVT</b>      | Private   |
| <b>REF</b>      | Petroleum Refinery                                    |
| <b>R&amp;D</b>  | Research and Development                              |
| <b>UNDP</b>     | United Nations Development Programme                  |
| <b>UNIDO</b>    | United Nations Industrial Development Organization    |
| <b>VLSI</b>     | Very Large Scale Integration                          |

## **EXECUTIVE SUMMARY**

---

### **INTRODUCTION**

The study on "Survey of Service Needs of Process Control Systems in South India" conducted for UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION by ABC CONSULTANTS PRIVATE LIMITED is summarized and recommendations presented herein.

The objective of the study is to enable Centre for Electronics Design and Technology, Calicut (CEDT-C), India, to develop a detailed work plan for its future activities in training, consultancy, product design and development to meet the industry needs in Process Control and Instrumentation (PC&I), in South India.

### **STUDY METHODOLOGY**

The study was conducted through a survey covering 70 representative respondents in user and supplier segments.

The 58 respondents in the user segment representing process (Cement, Chemical/Petrochemical, Fertilizer, Metallurgy, Miscellaneous, Paper and Petroleum Refinery sectors), engineering and electronic groups were approached for assessing potential for training and consultancy service needs.

In the supplier segment, 12 major manufacturers, Process Licensors and vendors of hardware, software and systems in PC&I were contacted to ascertain their needs in product design and development.



**CONCLUSIONS OF STUDY**

**Training**

- ♣ With rapid development and obsolescence of technologies in PC&I industry and inadequate exposure of technical manpower in advances in electronics, instrumentation and process control, there exists good scope for offering training services in user segment. The training needs are more pronounced in process and engineering groups.
  
- ♣ The potential participants for training programmes are practicing engineering graduates and diploma holders in user segment. Due to a decreasing trend in employing technicians amongst the user segment, there is limited demand for training this level of manpower.
  
- ♣ The major areas for training in the order of preference by respondents in user segment are as follows:
  - Technological Developments and Future Trends in Process Control Instrumentation
  - Programmable Logic Controllers
  - Flexible Manufacturing System
  - Distributed Control Systems
  - Manufacturing Technology in Electronics
  - Calibration Standards and Techniques
  - Fundamentals of Process Control Instrumentation
  
- ♣ The type of training programmes desired in the order of preference by respondents in user segment are campus (in trainers premises), seminar,

in house (in respondents' premises) and induction programme. In general, the preference for any type of programme, depends on training topics and duration.

- ♣ The desired duration for any type of training programme, except induction programme, is less than one week. For induction programme, the duration preferred is between 15 and 30 days.
- ♣ To cater the needs of the user and supplier segments on a continuous basis, there is scope to offer an institutional Post Graduate programme for engineering graduates covering areas of basic design and technology in electronics, instrumentation and process control.

### Consultancy

- ♣ In the user segment, modifications in hardware, software or both, in the existing PC&I systems are carried out in house and largely with assistance from Process Licensors. The preference of Process Licensors is predominantly due to proprietary status of software and communication protocols. In addition, they also provide upgradation of existing PC&I systems throughout their life at nominal cost and make available contemporary technologies used in developed countries through foreign collaborations.
- ♣ The process licensing in PC&I industry in India is dominated by Multinational Companies (MNCs) who provide total solutions for process control and automation. The range of services offered by them include feasibility, system engineering, software development, installation,

commissioning, contractual training, site acceptance tests, servicing and system upgradation throughout its life.

- ♣ In user segment, most respondents recruit qualified and experienced technical manpower for software development.
- ♣ About 97 percent of respondents were not aware of CEDT-C and its activities. Though awareness level is very low, the respondents in user segment are open for discussion and association for their consultancy needs with CEDT-C.

### Product Design and Development

- ♣ The MNCs in supplier segment do not prefer third party association in product design and development including software. They, by and large import hardware and have no plans for indigenization in the near future.
- ♣ The manufacturers of hardware like control valves, tank gauging systems, flow measuring devices etc, are predominantly Private, Public Sector and Joint Venture companies. These respondents in supplier segment are keen to associate themselves with external agencies for product design and development of prototypes. All respondents prefer products in PC&I backed by proven technology. Therefore, scope exists for CEDT-C to associate themselves with hardware manufacturers in product design and development.

**RECOMMENDATIONS**

- ♣ The thrust area for CEDT-C in future should be training in PC&I. The training should continuously address the needs of technical manpower in user and supplier segments ensuring exposure to modern developments in technology in PC&I. The type of training programmes recommended are as follows :

- **Sponsored Training Programme**

This programme should be based on a bi annual training calendar covering specific topics in PC&I for practicing engineering graduates and diploma holders. Its duration should not be more than five days. The venue for these programmes may be CEDT-C campus or a centre having a cluster of industries.

- **Institutional Post Graduate Programme**

A full time Post Graduate Certificate/Diploma Programme may be offered with specific emphasis on modern technologies and their application in PC&I.

The duration recommended is one and half to two years. The participants should be engineering graduates preferably with prior industry exposure in PC&I. The course design should be modular with flexibility to accommodate sponsored candidates from user and supplier segments for select modules.

■ **Induction Training Programmes**

It is recommended to conduct induction training programmes in PC&I for Public Sector Units and industrial groups which recruit a large number of fresh engineering graduates. The duration for such programmes may be between 15 days to one month. These programmes may be conducted in house covering topics which are specific to needs of the participating companies.

- ♣ For consultancy services, with the existing infrastructure, well equipped laboratories and faculty, CEDT-C may initiate contacts with potential respondents identified during the survey. The institute may identify areas for upgradation and modification in PC&I and conduct prefeasibility studies amongst the potential respondents in user segment. CEDT-C may also offer its services for evaluation and rating of vendors and undertaking site acceptance tests.
- ♣ Since the user segment prefer Process Licensors to conduct feasibility studies and detailed engineering for PC&I, CEDT-C may plan in future for a collaboration with an overseas Process Licensor to offer full fledged consultancy services from feasibility to installation and testing of PC&I systems.
- ♣ For hardware design and development, CEDT-C may initiate preliminary discussions with respondents in supplier segment identified during the survey.
- ♣ As a long term strategy, it may be recommended to initiate either self run or sponsored programmes like Seminars and Workshops in PC&I at

regular intervals in various locations. The objectives in such forum will be to understand service needs of user and supplier segments in South India, to inform about infrastructural facilities available and capabilities of CEDT-C through developing and presenting success case stories in PC&I systems, to promote the various services offered by the institute and to disseminate information on new control strategies/systems and modern technologies. For such sponsored programmes, the institute may associate itself with leading industry representatives/forums like Confederation of Indian Industries (CII), Cement Manufacturers Association, Indian Chemical Manufacturers Association etc.

- ♣ The Western states of Gujarat and Maharashtra have the highest concentration of process group in India. Hence, CEDT-C should in future extend all services to user segment in Western region also.
  
- ♣ With the rapid development and obsolescence of technologies and products in PC&I industry, CEDT-C in future should investigate and review the service needs in user and supplier segments periodically, preferably once in two years, to identify potential clients in the areas of training, consultancy, product design and development.

## 1.1 THE INSTITUTE

The Centre for Electronics Design and Technology, Calicut (CEDT-C), Kerala (India) is an autonomous institution under the Department of Electronics (DOE), Government of India (GOI). CEDT-C, registered on 20th February 1991, is the youngest among all CEDTs in the country. Besides the funding from Government of India, this institute has an assistance of US \$ 1.9 million from United Nations Development Programme (UNDP).

The thrust area of CEDT-C is Process Control and Instrumentation (PC&I). The objectives of the institute are to impart training and provide industrial services such as product and process design and development and technical/technological advice, thereby serving the needs the electronic industry in South India in general and industries using process control equipment and systems in particular.

In order to achieve the objectives, the institute is equipped with state-of-the-art laboratory facilities for Process Control, Product Design and Instrumentation, Software Technology and Manufacturing Technology. In addition, CEDT-C is a participating institute under the project IMPACT by World Bank and Swiss Development Co-operation, which is providing assistance in developing two specialized laboratories for Printed Circuit Board (PCB) and Electronic Design Automation. The institute has been conducting short term courses and undertaking technical consultancy and product development.

## 1.2 STUDY BACKGROUND

In order to understand the current and future industry needs in areas of training, consultancy and product design and development in process control systems, CEDT-C sought a proposal from ABC Consultants Private Limited (ABC) to conduct a survey in South India.

Based on the proposal submitted, United Nations Industrial Development Organization (UNIDO), Vienna commissioned ABC to conduct the study on "Survey of Service Needs of Process Control Systems in South India".

## 1.3 SCOPE OF WORK

The scope of work for the study includes:

- ♣ Identify areas as required by the local industries to offer technical consultancy services from CEDT;
- ♣ Identify new areas of technical consultancy services which could be rendered by CEDT in its future activities;
- ♣ Make a survey of local industry needs which can be satisfied by CEDT;
- ♣ Identify the problems related to the specific needs of the industry;
- ♣ Make recommendations to CEDT on the development of the Project Work Plan to address the needs of the local industry.

## 1.4 STUDY OBJECTIVE

The objective of the study is *to enable CEDT-C to develop a detailed work plan for their future activities for training, consultancy, product*



*design and development to meet the industry needs in Process Control and Instrumentation, in South India.*

## 1.5 PLAN OF THE REPORT

The report has been divided into 6 chapters besides the Executive Summary which precedes this chapter. This chapter introduces the reader about the study and report layout.

In chapter 2, details of survey methodology and sample segmentation are introduced.

In chapter 3, the genesis and present status of PC&I industry in South India is discussed.

The chapter 4 analyzes the survey respondents with respect to the current level of manpower and skill for instrumentation, extent of process control and automation and service needs met by external agencies.

The chapter 5 details the findings from survey which provides the basis for recommendations for the study. In this chapter, topics covered include training, consultancy, product design and development needs of industry in South India.

The chapter 6 reinforces the conclusions and the recommendations of the entire study.

A list of abbreviations used in this report is given before this chapter. The supporting diagrams and data are given in Annexures.

## 2 SURVEY METHODOLOGY

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### 2.1 APPROACH

Prior to the study, a team from ABC visited CEDT-C to obtain first hand information of the infrastructural facilities available at the institute. During this visit, detailed discussions were held with top and middle management of CEDT-C to understand the capabilities and range of industry services that can be offered by the institute. The discussions were also held with DOE, GOI in New Delhi on the study approach.

The study was conducted through a detailed survey covering the four states in South India, namely Andhra Pradesh, Karnataka, Kerala and Tamil Nadu. A stratified sampling of respondents was carried out to represent the following :

- ♣ industry segments
- ♣ population of industry
- ♣ technology
- ♣ degree of process automation, and
- ♣ type/size/year of commissioning of the manufacturing/processing unit.

Based on the type of services that could be offered by CEDT-C to potential beneficiaries, the survey sample was divided into two categories, namely

- ♣ user segment - for training and consultancy services
- ♣ supplier segment - for product design and development

## 2 SURVEY METHODOLOGY

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The user segment comprised of respondents using PC&I systems like controllers, relay logic, Distributed Control Systems (DCS), Programmable Logic Controllers (PLC) etc.,.

The supplier segment comprised of manufacturers/Process Licensors/vendors of PC&I hardware, software and systems.

A detailed questionnaire was developed for data collection. In-depth interviews were conducted with contact persons to ascertain the following details:

- ♣ company profile
- ♣ existing manpower/skill level for PC&I
- ♣ existing/proposed control systems
- ♣ expansion/modernization plans, and
- ♣ type and area of services already availed/expected from external agencies.

The questionnaires were filled up by the interviewers so as to obtain an unbiased and qualitative information as required.

### 2.2 SURVEY SAMPLE SEGMENTATION

#### 2.2.1 USER SEGMENT

The user segment was broadly classified into three groups namely: Process, Electronics and Engineering. The Process group comprised of seven sectors namely, Cement, Chemical/Petrochemical, Fertilizer, Metallurgy, Miscellaneous,

## 2 SURVEY METHODOLOGY

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Paper and Petroleum Refinery. The segmentation of industry is shown in Annexure - 1.

### 2.2.2 SUPPLIER SEGMENT

The supplier segment comprised of manufacturers/Process Licensors/vendors of hardware, software and systems for PC&I, either exclusively or in combination.

The PC&i industry comprises of the following : Test and Measuring instruments, Analytical Instruments, Medical Electronics Equipment, Special Application Instruments, Industrial Electronics and Automation Equipment and Process Control Equipment.

The hardware in PC&I includes control valves, flow meters, tank gauging equipment, solenoid valves, transducers etc.,.

The software includes customerized application based software for Man Machine interface. The systems include DCS, PLC, etc.,.

## 2.3 RESPONDENT PROFILE

### 2.3.1 USER SEGMENT

In this segment, the total number of respondents covering all groups was 58. The sectorwise profile of respondents is shown in Annexure - 2. The groupwise details of respondents indicating address, annual sales turnover (that is, company size), company type and year of incorporation are shown in Annexure - 3.

## 2 SURVEY METHODOLOGY

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Based on annual sales turnover between April 1994 and March 1995, the respondents were classified under four categories namely ,

- Small - Less than Rs 1000 million
- Medium - Between Rs 1001 million and Rs 5000 million
- Large - Between Rs 5001 million and Rs 10000 million
- Very Large - Above Rs 10000 million.

In the survey, 84 percent of respondents represented Small and Medium categories.

Based on company type, approximately 55 percent of respondents represented Private Sector (PVT) and 28 percent Public Sector Units (PSUs). The rest were Multinational Companies (MNCs) and Joint Venture (JV).

Among the respondents, 28 companies were commissioned between 1970 and 1990 and 4 units went on stream after 1990.

The respondent profiles by year of incorporation, annual sales turnover and company type are shown in Annexure - 4.

### 2.3.2 SUPPLIER SEGMENT

The survey covered all leading manufacturers/Process Licensors in the country. The total number of respondents in this segment was 12. The details of respondents indicating address, technology collaborators and type of company are shown in Annexure - 5.

## 2 SURVEY METHODOLOGY

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About two-third of the respondents are MNCs and JV, all with foreign technology collaborators. The respondents predominantly comprised of system suppliers of PC&I. The respondent profile based on company type and range of PC&I products supplied is shown in Annexure - 6.

## **3 STATUS OF PC&I INDUSTRY**

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### **3.1 INTRODUCTION**

The PC&I industry is engaged in activities of industrial automation and control technology. The user segment depend heavily on advanced control and instrumentation systems for process optimization and enhanced productivity.

The Industrial Electronics and Automation Equipment and Process Control Equipment sectors have over 80 percent of annual sales in PC&I industry. Since 1950s, the control and instrumentation technology has changed phenomenally to meet the advanced automation needs of user industries. Currently, electronics has become a significant part of the instrumentation industry.

Based on the survey, the genesis and current status of PC&I technology and extent of process control and automation in industry in South India is discussed in this chapter.

### **3.2 TECHNOLOGY TRENDS AND OUTLOOK**

#### **3.2.1 USER SEGMENT**

The instrumentation in user segment was broadly divided as Continuous Control Systems and Safety Interlocking Systems. In the last couple of decades, the technology in both these areas has changed as shown in table herein. The advantages as perceived by the respondents in user segment are ease and flexibility of operation and capability of in-situ configuration.

| LEVEL OF TECHNOLOGY | CONTINUOUS CONTROL SYSTEMS   | SAFETY INTERLOCKING SYSTEMS           |
|---------------------|--|---------------------------------------|
| Lower               | Pneumatic Controllers  | Relay Logic                           |
| Middle              | Electronic Controllers:<br>- Analog/Digital<br>- Single/Multi Loop | Solid State Systems                   |
| Advanced            | Distributed Control System (DCS)                                   | Programmable Logic Controllers (PLCs) |

The modernization and new installations in user segment has resulted in adopting contemporary technology in PC&I.

In user segment, the average period for modernization/upgradation of PC&I was 19 years and 22 years for Continuous Control Systems and Safety Interlocking Systems respectively.

**3.2.1.1 Continuous Control Systems**

Since 1950s, the user segment depended largely on pneumatic controllers in the Continuous Control System. The trend of replacing pneumatic controllers with electronic controllers started in late 1970s. In the Continuous Control regime, microprocessor based Distributed Control System (DCS) with centralized Video Control System made appearance in Petroleum Refineries in 1986. The DCS have been installed particularly in Petroleum Refinery, Chemical/Petrochemical, Paper, Fertilizer, Cement and Metallurgy sectors. A similar trend exists for



retrofitting/new system installation in these sectors in future also.

#### 3.2.1.2 Safety Interlocking Systems

The Safety Interlocking Systems, comprising largely of relay logic changed over to Programmable Logic Controllers (PLCs) since 1980. The PLCs with sequence and fuzzy logic are now accepted for most applications as replacement for relay logic in user segment.

#### 3.2.2 SUPPLIER SEGMENT

This segment was supplying indigenously manufactured process control instruments, predominantly pneumatic and hydraulic instruments to domestic market till late 1960s. The indigenous electronic analog instruments were supplied to all sectors since 1970s. The technology gap between domestic PC&I industry and the counterparts in advanced countries, where most of the process technologies were developed, was wide due to the absence of foreign collaborations. The domestic PC&I industry then comprised of PSU and PVT companies.

The PC&I industry was opened for foreign collaborations in 1980s. The technology for advanced systems like DCS, PLCs, etc. was made available from international leaders in PC&I. During this period, many joint venture projects with financial participation by technology suppliers such Honeywell, Foxboro, Fisher and

### 3 STATUS OF PC&I INDUSTRY

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Yokogawa were set up. Since 1982, except for control valves and flow meters, all components for process automation and control are imported from technical collaborators.

In spite of exposure to latest technologies, the Indian PC&I industry did not invest much on manufacturing facility due to the following reasons :

- Reluctance of the collaborators to pass the technical 'know-why'
- Low volume production resulting in costly infrastructure
- High input cost and poor availability of electronic components in domestic market
- Fast obsolescence of the products

With liberalization of Indian economy in 1991, most of the leading global instrumentation manufacturers have made significant presence in the domestic market. The PC&I industry is currently dominated by MNCs, particularly in electronics instrumentation, and this situation is likely to be unaltered in the future also. Some MNCs in PC&I industry have planned to manufacture and export process control hardware from India.

The present day instrumentation system widely utilize Very Large Scale Integration (VLSI) chips, micro computers, relational data base management, range of peripherals and application software. The business activities of PC&I industry has inturn changed dramatically from about 80 percent of hardware and 20 percent of systems engineering, software, installation, commissioning etc, to 30 percent to 40 percent and 60 percent to 70 percent respectively in terms of value.

### 4.1 INTRODUCTION

In the user segment, service needs of the respondents vary considerably depending on sector and technology adopted for process and PC&I. The service needs in supplier segment vary depending on range of products and technology. In this chapter, a detailed analysis amongst the respondents is presented covering the following areas : existing level of manpower and skill level for instrumentation, degree of process control and automation and adequacy of service needs met by external agencies.

### 4.2 USER SEGMENT

#### 4.2.1 MANPOWER FOR INSTRUMENTATION

The survey revealed that most respondents in all groups except electronics, have manpower for instrumentation with three levels of educational background namely, Engineering Graduates, Diploma Holders/Science Graduates (Electronics/Instrumentation) and Technicians. However, technicians are not preferred in the recent times, particularly in 'Chemical/Petrochemical' and 'Petroleum Refinery' sectors, due to the sophistication of PC&I. In fact, three out of thirteen respondents in user segment commissioned after 1985 do not have any technicians at all. The average strength of technicians is less than that of diploma holders in most sectors.

In fertilizer and petroleum refinery sectors, the average manpower for instrumentation is high followed by Paper, Metallurgy, Cement and Chemical/Petrochemical sectors. The average manpower for instrumentation in user segment is shown in Annexure - 7.

In electronics group, though manpower for instrumentation in the three levels of educational background exist, there is a wide variation amongst respondents depending on size of company and type of products manufactured. The average strength of manpower varies between 5 and 200 for each level.

### 4.2.2 PROCESS CONTROL AND INSTRUMENTATION

#### 4.2.2.1 Continuous Control Systems

It was found that since 1980s, **electronic controllers** have been fast replacing pneumatic controllers amongst respondents in process and engineering group. Between 60 % and 100 % of pneumatic controllers have been replaced with electronic controllers by 21 respondents. Also, between 40 % and 60 % of pneumatic controllers have been replaced with electronic controllers by 9 respondents. 11 respondents have replaced pneumatic controllers to an extent less than 40 %. Only 10 respondents are reported to have no electronic controllers at present. The replacement of pneumatic to electronic controllers was one to one.

The degree of replacement of pneumatic with electronic controllers was less than 20 percent in engineering group and miscellaneous sector. With modernization and new installation among user segment, the extent of electronic controllers use increases. This trend has been observed in approximately 80 percent of the process group which underwent modernization or installed new processing facilities in 1990s.

It was also observed that average modernization cycle for Continuous Control Systems in process group is about 19 years.

DCS was found to be gaining importance in user segment, process group in particular. Amongst the respondents, the first DCS was installed in petroleum refinery in 1986. By 1990, six respondents had installed DCS, of which three in petroleum refinery and two in cement and one in petrochemical sectors.

Since 1991, trend in installing DCS for process control and automation is on the increase. Till date, out of the 41 respondents in process group, 18 respondents have installed DCS. Another 10 respondents have firm plans implement DCS by 1997. About 97 percent of DCS installations will be in the process group by 1997.

In the process group, all respondents in petroleum refinery and paper sectors, between 75 percent and 85 percent in fertilizer and chemical/petrochemical sectors, 50 percent in Metallurgy and 66 percent in Cement sector will have DCS by 1997. In miscellaneous sector, DCS penetration is very poor with no plans by any respondent to install DCS.

In engineering group, only one respondent will have DCS installed by 1997.

The status of DCS installations amongst user segment is shown in Annexure - 8.

#### 4.2.2.2 Safety Interlocking Systems

The conventional relay logic in this system are being phased out rapidly. Since 1980s, process control and automation using PLCs are commonplace in process and engineering group.

About 33 percent of respondents in the above groups use PLCs for safety interlocking. About 39 percent of respondents still continue to use only relay logic.

The share of PLCs in safety interlocking systems under process and engineering groups which were either installed or modernized during 1990's, is over

60 percent. The average modernization cycle for safety interlocking was found to be about 22 years, which is higher than Continuous Control Systems. This could be due to faster technological advancement in the field of Electronic Controllers.

In the process group, all respondents in petroleum refinery sector, between 75 percent and 85 percent in Cement, Chemical/Petrochemical, Metallurgy and Miscellaneous sectors use PLC for safety interlocking. In Fertilizer, Paper and Engineering sectors, between 35 percent and 50 percent use PLCs. After 1995, five respondents in Chemical/Petrochemical, Metallurgy and Petroleum Refinery have planned to install PLCs for safety interlocking.

A sectorwise PLC installation amongst respondents is shown in Annexure - 9.

#### 4.2.2.3 Flexible Manufacturing System

None of the respondents have Flexible Manufacturing System (FMS) at present. The awareness level about FMS is low and no respondent has any plans to incorporate FMS in the near future.

**4.2.2.4 System Modifications in Progress**

About 37 percent, that is 19 respondents in process and engineering group are either modifying or upgrading existing process control systems. These includes installation of advanced systems such as Electronic Controllers, DCS, PLC either as add on or complete replacement. Of these, 17 respondents are in the process group alone. The groupwise status of system modification is shown in Annexure - 10.

**4.2.3 STATUS OF TRAINING/CONSULTANCY SERVICES AVAILED**

**4.2.3.1 Training Services**

About 62 percent of respondents reported that continuous training for their employees is imparted in various subjects of instrumentation. In process group, 61 percent of respondents placed great importance for training. The importance of training is more recognized in PSUs compared to other type of companies.

Over 80 percent of PSUs are regular sponsors of training programmes in PC&I. However, training programmes have gained greater importance in all groups in recent times, due to the enhanced efforts for obtaining/retaining ISO 9000 Certification. The



#### 4 SURVEY ANALYSIS

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present training pattern amongst respondents is shown in Annexure - 11.

Besides the structured 'On the Job Training', respondents avail training largely from the following sources:

- Process Licensor/Vendor (Equipment Supplier)
- Research/Training Institutions
- Overseas Technology Collaborators

The Process Licensors/Vendors and Research/Training Institutions offer both campus based and in-house (conducted on respondents premises) programmes.

In process and engineering group, it was observed that respondents have undergone training conducted predominantly by Process Licensors/Vendors followed by Research/Training Institutions. In electronics group, training is availed only from Overseas Technology Collaborators. In most of the training programmes, the sponsored include Engineering Graduates and Diploma Holders only.

Amongst the respondents, in house programmes conducted by external agencies are less. Two respondents, one each in Chemical/Petrochemical sector and Engineering group representing large

## 4 SURVEY ANALYSIS

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industrial groups, have exclusive training centres for employees in group companies. In addition to internal faculty, these training centres are in constant association with external faculty pooled from research, training and educational institutions.

For Cement sector, Southern Regional Training Centre has been set up in 1993 at Dalmiapuram, Tamil Nadu through a bilateral agreement between Government of India and Danish Government to impart training in all technological aspects including instrumentation.

In Petroleum Refinery sector, Refinery School of Engineering and Technology has been set up at Madras. This institute offers training to employees of all PSUs since 1986.

The details of industry sponsored training institutes is shown in Annexure - 12.

### 4.2.3.2 Consultancy Services

In the process and engineering groups, 19 respondents are either modifying or upgrading existing process control systems. While 9 respondents have already commenced installing PC&I systems, 10 respondents are yet to initiate the activity.

## 4 SURVEY ANALYSIS

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Based on the survey, the consultancy offered by external agencies for PC&i amongst these respondents can be broadly classified as ;

- Feasibility Study
- System Engineering and Software
- System Modernization/Upgradation
- Process Licensor/Vendor Evaluation
- Process Licensor/Vendor Selection
- Performance Guarantee Test

For all respondents, the feasibility study for process control and automation was conducted by Vendors or Process Licensor at no cost.

Depending on the technology and process, experts in related process areas, particularly Chemical/Petrochemical, Fertilizers and Cement are preferred by all respondents.

About 77 percent of respondents who have availed consultancy, use these process experts either for selection, pre feasibility, detailed system engineering, implementation and commissioning in the following areas:

- Inputs and Outputs (I/Os) points for control referred as I/O counts
- Control System Engineering

- Loop Diagrams
- Control and Safety Interlock Strategies
- Compliance of Vendors in PC&I system supplied
- Adequacy/Selection of Sensors and specifications
- System integration/interfacing non-proprietary items like PLC, transmitters etc.,
- Documentation of PC&I system
- Site Acceptance Tests

About 69 percent of respondents who have commissioned processing facilities after 1990 have indicated that process experts have sourced software for the process control, conforming to Open Control Systems, from third parties for better connectivity and interoperability of system components.

In the total solution package for process control and automation, software and communication protocol supplied by over 89 percent of Process Licensors is proprietary.

About 60 percent of respondents have involved consultants during performance guarantee trials/site acceptance tests for process controls installed. None of the respondents have used any government/autonomous bodies for consultancy in PC&I.

### 4.3 SUPPLIER SEGMENT

#### 4.3.1 RANGE OF PRODUCTS AND SERVICES

The PC&I industry in India is currently dominated by MNCs. The range of system components comprising of hardware and software supplied by the respondents broadly include ;

- Distributed Control System
- Loop Controller
- Programmable Logic Controller
- Smart transmitter
- Data Acquisition System
- Sensors
- Application Software

Except for non proprietary systems like PLC, transmitters and sensors, all other PC&I systems are developed based on requirement of user segment only and not on market demand. All respondents in this segment, offer contemporary technologies available in other parts of the world. Of the 12 respondents in supplier segment, all MNCs are process licensors supplying total solution for process control and automation.

Amongst all MNC respondents, the software developed for PC&I system is proprietary including the communication protocols.

Considering developing control systems based on standards, there is a shift by supplier segment to Open Control System. It is

reported that such a move is to reduce dependency on proprietary hardware and ease for future expansion by user segment.

#### 4.3.2 SOURCE FOR PRODUCT RANGE

Though all respondents have manufacturing facilities in India, most hardware like electronic cards, microprocessors, cathode ray tubes, sensors etc., are sourced from their overseas facilities and assembled in India. At present, only one respondent, manufactures DCS in India with a significant percentage of imported hardware. Amongst all respondents, Process Licensors in particular, software is developed in-house largely or by vendors and is customized to suit the process application.

The respondents in lower and medium end of technology, like control valves, flowmeters, tank gauging system, safety relief valves etc., have indigenized the product range. Most sensors are bought-out internationally or sourced locally sometimes.

All MNCs in this segment source advanced contemporary technologies in PC&I from parent company overseas. All JV and PVT respondents source technologies and hardware repetitively from collaborators to remain competitive in the market.

#### 4.3.3 RESEARCH AND DEVELOPMENT

At present, though all Licensors have in house Research and Development (R&D) facilities, it is reported that no serious attempt is made to develop/indigenize PC&I technologies/products totally.

On the whole, the R&D in this segment is engaged in only application engineering to customize system to user requirement. Only one respondent has indigenized certain housings for pressure transmitters to meet local needs in government sector. The indigenization of non electronic components has been by and large achieved by all the respondents.

Only two respondents namely, Instrumentation Limited and Allen Bradley (India) Limited have sponsored product development projects to external agencies in the past. The institutes associated are Fluid Control Research Institute, Palakkad, Indian Institute of Technology New Delhi and Indian Institute of Science, Bangalore.

### 4.3.4 TRAINING

All respondents have training institutes for technology/products of collaborators supplied to user segment. The training offered to user segment is largely contractual only, prior to supplying and after commissioning PC&I system.

The training in PC&I by supplier segment is based on annual training calendars to user segment as well as individuals.

Besides training on technology of Process Licensors, exposure courses in DCS, PLC and System Maintenance are offered but to a very limited extent. The trainers at these centres are trained overseas by collaborators in system design, engineering, development, software etc.

### 5.1 INTRODUCTION

The survey findings with reference to service needs in areas of training, consultancy, product design and development in user and supplier segments are discussed in this chapter.

### 5.2 USER SEGMENT

#### 5.2.1 TRAINING SERVICE NEEDS

##### 5.2.1.1 Topics for Training

It was very encouraging to note that, during the survey, 56 respondents representing about 97 percent in this segment have shown interest in technical training programmes in the area of PC&I. The course topics differ widely in accordance with group, sector and technology.

In process and engineering group, the most preferred topic was Technological Developments and Future Trends in Process Control Instrumentation. With about 70 percent of preference to this course, respondents had indicated that the course coverage includes details on application areas of new technologies to identify areas for technological upgradations in processing facilities.



Ten respondents have indicated the following specific areas for training as part of the course already mentioned :

- Advance Control Strategies (Loop Tuning)
- Digital Integration
- Open Architecture
- Data Highway
- Fault Tolerant Control System (Triple Modular Redundancy) and,
- Intercommunication Networking between Controllers

The respondents even look for specialized courses on such modules separately, as shown above. The middle and senior level of technical cadre comprising of engineers only is the participant profile for this course.

An ***Exposure Course in PLC*** is the next most desired programme from 60 percent of respondents in user segment. The respondents expect the course to cover mainly System Design and Modification. Only 10 percent of respondents desire a course on Maintenance of PLC Systems alone. The participant profile for this course are Engineers and Diploma Holders.

A ***Basic Course in DCS*** was desired by 50 percent of respondents in process and engineering segment. Though Process Licensors of PC&I system impart contractual training on system configuration and maintenance, the respondents are of the opinion that, such training is focussed only on operational aspects.

The respondents displayed keenness in functional aspects and capabilities of DCS to ensure maximum benefits of the system.

It was indicated the above course cover following specific areas :

- Benefits of Process Optimization
- Networking for Management Information System (MIS)
- Surveillance Intelligence
- Software Programming

The participant profile for this course are Engineers and Diploma Holders.

The ***Calibration Standards and Techniques*** was found to be desired by about 20 percent of respondents in user segment. The participant for this course are either Engineers or Diploma Holders.

In addition, other topics indicated by the respondents largely for Engineers and Diploma Holders are as follows:

- Microprocessor Based Control System (Loop Controllers)
- Control Valve Selection (Flow Measurement and Calculation of Pressure and Temperature)
- Maintenance of Controllers (Mainly electronic)
- New Instruments (Smart Transmitters, Photo Sensors etc.,)

About 50 percent of respondents in process and engineering groups have shown interest in refreshing/exposing technicians in **Fundamentals of Process Control Instrumentation**, with emphasis on Digital Instrumentation.

Due to outdated technology in process group, about 16 percent of respondents have shown interest in training for Digital Instrumentation alone. The course should cover the following areas :

- Maintenance of Boiler Plant Instrumentation
- Control Valve Servicing
- Testing of Impulse Plates
- Calibration Techniques and,
- Gas Analyzer Maintenance

About 60 percent of respondents in engineering group have shown interest in exposing mainly Senior and Junior level technical executives in concepts of ***Flexible Manufacturing Systems*** (FMS). Amongst the respondents, particularly in automobile, automobile ancillaries and machine tools industry, the awareness of FMS was low.

Approximately, 40 percent of respondents in electronics group desired inputs in ***Manufacturing Technology in Electronics*** covering Advanced Soldering Techniques, Wave Winding etc., for technicians only.

The topics of training programme based on preference by respondents covering all groups are given in Annexure - 13.

### 5.2.1.2 **Type of Training Programmes**

All respondents prefer training programmes in a combination of atleast any one of the following :

- In-House Programme
- Campus Programme (at CEDT-C)
- Seminar
- Induction Programme

Most respondents prefer the topic *Technological Developments and Future Trends in Process Control Instrumentation* as seminar. For remaining course/programmes, about 75 percent prefer Campus Programme.

Covering all groups, 17 respondents have shown an inclination towards *Induction Programme* for Engineering Graduates who have completed two to six months of orientation in their respective process plants. The main objective of this programme amongst all respondents is to reinforce both theoretical and practical knowledge in advancement in PC&I technology. The list of companies interested in 'Induction Programmes' is given in Annexure - 14.

One respondent, Mangalore Refineries and Petrochemicals Limited, had specifically indicated a desire for six month long Induction Programme for its incumbents. The educational qualification of these incumbents is Intermediate/Pre University Course with prior training in basic electronics engineering concepts. The respondent desires that these incumbents to be re trained in instrumentation.

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### 5.2.1.3 Participant Profile

Based on the entire respondent sample, it was found that about 85 percent of respondents in user segment favored training programmes for Engineering Graduates and Diploma Holders. Only one-third of these respondents preferred training their technicians. The participant profile is indicated in Annexure - 15.

It was also indicated by respondents that number of participants in one batch should be between 10 and 25 only. However, the respondents felt that the number of participants in seminar can go upto 50.

### 5.2.1.4 Location for Training Programmes

Roughly three-fourth of the respondents tend to favor training programmes away from factory. These respondents perceive that since the number of participants for a specific programme is small, in-house programmes may not be economically feasible.

Moreover, the respondents prefer to keep the participants away from their routine work to maximize the benefits of such programmes. Excepts seminars, respondents have favored training institute campus for all training programmes.

**5.2.1.5 Duration for Training Programmes**

Paradoxically, though the respondents openly acknowledge the need for technical training courses, most respondents were unwilling to release their employees from work.

All respondents have specific constraints, both financial and manpower, and generally prefer to have short duration for training programmes.

The maximum duration for training programme by any respondent was one week, except for 'Induction Programmes'. The desired duration for various programmes are mentioned in Annexure - 16.

**5.2.2 CONSULTANCY SERVICE NEEDS**

In process and engineering group, though 10 respondents have plans to install PC&I system, none have initiated any further action. A positive trend emerges in process group for modification and/or retrofitting in PC&I systems.

Only one respondent, The Kerala Minerals and Metals Limited, Chavara, Quilon has budgeted approximately Rs 8.5 million for PC&I system.

All the 10 respondents desire to install PC&I systems comprising of any one or in combination of the following :

- Distributed Control System
- PC Based Control System
- Replacing Pneumatic with electronic controllers
- Data Acquisition System

All respondents have been undertaking modifications in PC&I system either in house or with assistance from Process Licensor since the latter maintains and upgrades the PC&I system throughout its life.

Except two respondents, about 97 percent of respondents were not aware of CEDT-C and its activities. Though awareness level is very low, the respondents in user segment are open for discussions and association for their consultancy needs with CEDT-C.

The list of potential client for consultancy services in PC&I based on the survey in user segment is given herein.



| NAME OF ORGANIZATION                        | SECTOR | FUTURE PLANS   |
|---|--------|--|
| MALABAR CEMENTS LIMITED                     | CEM    | <ul style="list-style-type: none"> <li>Decided to install DCS</li> <li>In Planning stage only</li> </ul>   |
| THE KERALA MINERALS AND METALS LIMITED      | MET    | <ul style="list-style-type: none"> <li>To install DCS by 1997</li> <li>Budget Rs 8.5 million</li> <li>To install PLCs in a limited way</li> </ul>  |
| TRAVANCORE COCHIN-CHEMICAL LIMITED          | CHEM   | <ul style="list-style-type: none"> <li>Plan to install PLC in Hydrochloric Acid Unit by 1996</li> <li>To install DCS by 1998 during conversion of Mercury Cell with Membrane Cell in Caustic Soda plant</li> </ul> |
| APOLLO TYRES LIMITED                        | ENGG   | <ul style="list-style-type: none"> <li>Replacing relay logic with PLC in near future</li> </ul>  |
| SESHASAYEE PAPER AND BOARD LIMITED          | PAP    | <ul style="list-style-type: none"> <li>Plan to install additional DCS by 1998 under Rs 2000 million expansion plan</li> </ul>  |
| DCW LIMITED                                 | CHEM   | <ul style="list-style-type: none"> <li>Plan to install DAS by 1997</li> <li>To install PLC in Hydrochloric acid reactor by 1996</li> </ul>   |
| SRF LIMITED                                 | CHEM   | <ul style="list-style-type: none"> <li>To install DCS (Supervisory Control) by 1998</li> <li>Plan to eliminate relay logic</li> </ul>  |
| TRICHY DISTILLERIES AND CHEMICALS LIMITED   | CHEM   | <ul style="list-style-type: none"> <li>To install PC based Control systems by 1997</li> </ul>  |
| MANGALORE CHEMICALS AND FERTILIZERS LIMITED | FERT   | <ul style="list-style-type: none"> <li>To install DCS and PLC in future. Plans not clear.</li> </ul>   |

**5.3 SUPPLIER SEGMENT**

**5.3.1 TRAINING SERVICES NEEDS**

Only one respondent, KELTRON CONTROLS, Aroor, had shown keen interest in training their design engineers in following areas:

- Control Lcops Tuning
- Process Modelling
- Packaging Techniques
- Real-time Application with 32 bit Microprocessor and Computers

In fact, this respondent also indicated since the above areas are not available in any curriculum, the same be introduced at Post-Graduation programme for Instrumentation/Industrial Electronics Engineering.

**5.3.2 NEEDS FOR PRODUCT DESIGN AND DEVELOPMENT**

The survey witnessed a lukewarm response from respondents for sponsored projects in product design and development.

Three respondents, all hardware manufacturers, as given herein, have showed interest in associating themselves with external agencies for product design and development.

INSTRUMENTATION LIMITED, PALAKKAD  
LARSEN & TOUBRO LIMITED, MYSORE  
MOORCO (INDIA) LIMITED, VIRALIMALAI

The respondents had clearly specified that in sponsored projects, the exclusive rights to products designed and developed by the institute will remain with the sponsor.

All MNC respondents had indicated that due to collaborations with overseas companies, any association with third party is not desirable in areas of software development and R&D for hardware.

#### 5.4 OTHER SEGMENTS

##### 5.4.1 POST GRADUATE PROGRAMME

Most respondents in user and supplier segments, especially in the process and electronics group, opine that an electrical/electronics graduate no longer suffice for realizing the full potential of latest technologies.

A specialization, preferably, Post Graduation, in the field of instrumentation was desired by over 70 percent of respondents. The current under graduate courses in instrumentation was felt to be very narrow in its scope. Most respondents preferred Post Graduate courses for electronics/electrical engineers.

Though there are a number of institutes offering post graduate course in instrumentation, the respondents felt that the curriculum of most of the institutes is not sufficiently updated.

## 5 SURVEY FINDINGS

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It was felt that any new institute getting into this field should necessarily offer latest courses such as Packaging Techniques, Process Modelling, Real-time applications using 32-bit microprocessors etc.

## 6 CONCLUSIONS AND RECOMMENDATIONS

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### 6.1 INTRODUCTION

In this chapter, based on the survey findings, conclusions in areas of training, consultancy, product design and development have been made. The recommendations have been presented to develop a detailed work plan to address the service needs of user and supplier segments in South India.

### 6.2 CONCLUSIONS

#### 6.2.1 USER SEGMENT

##### 6.2.1.1 Training

With rapid development and obsolescence of technologies in PC&I industry and inadequate exposure of technical manpower in advancements in electronics, instrumentation and process control, there exists good scope for offering training services in user segment.

The training needs are more pronounced in process and engineering groups.

The practicing engineering graduates and diploma holders are the potential participants for training programmes. Due to a decreasing trend in employing

## 6 CONCLUSIONS AND RECOMMENDATIONS

technicians amongst the user segment, there is limited demand for training this level of manpower.

The major areas for training in the order of preference by respondents are as follows :

| AREAS FOR TRAINING  | GROUP          | RESPONSE (PERCENT) |
|---|----------------|--------------------|
| Technological Developments and Future Trends in Process Control Instrumentation | PROCESS & ENGG | 70                 |
| Programmable Logic Controllers  | PROCESS & ENGG | 60                 |
| Flexible Manufacturing System   | ENGG           | 60                 |
| Distributed Control Systems   | PROCESS        | 50                 |
| Manufacturing Technology in Electronics   | ELET           | 40                 |
| Calibration Standards and Techniques  | PROCESS        | 20                 |
| Fundamentals of Process Control Instrumentation                                 | PROCESS        | 16                 |

About 85 percent of respondents prefer imparting training to Engineering Graduates and Diploma Holders for one or more courses.

The type of training programmes desired in the order of preference by respondents are campus (in trainers premises), seminar, in house (in respondents' premises) and induction programme.

## 6 CONCLUSIONS AND RECOMMENDATIONS

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This segment prefers campus programmes with response of 75 percent. The response for seminar and induction programme are 71 percent and 30 percent respectively.

The in house programme is preferred by 29 percent of respondents.

The desired duration for any type of training program, except induction programme, is less than one week. For induction programme, the duration preferred is between 15 and 30 days.

### 6.2.1.2 Consultancy

The modifications in existing PC&I system are carried out by all respondents in house and with assistance from Process Licensors. The preference of the latter is primarily due to the following reasons :

- proprietary status of software and communication protocols
- upgradation of system throughout its lifetime at nominal cost
- availability of contemporary technologies due to foreign collaborations

The PC&I industry is dominated by MNCs who provide total solutions for process control and automation.

## **6 CONCLUSIONS AND RECOMMENDATIONS**

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The range of services offered by them include feasibility, system engineering, software development, installation, commissioning, contractual training, site acceptance tests, servicing and system upgradation throughout its life.

There is limited scope for offering consultancy in software development in user segment. Most respondents recruit only qualified and experienced manpower for software development.

About 97 percent of respondents were not aware of CEDT-C and its activities. Though awareness level is very low, the respondents in user segment are still open for discussions and association in their consultancy needs with CEDT-C.

### **6.3 SUPPLIER SEGMENT**

#### **6.3.1 PRODUCT DESIGN AND DEVELOPMENT**

The MNCs do not prefer third party association in product design and development including software. This is carried out only by the parent organization.

Moreover, all MNCs do not have any plans for indigenization of hardware in the near future.



## **6 CONCLUSIONS AND RECOMMENDATIONS**

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The manufacturers of hardware like control valves, tank gauging systems, flow measuring devices etc, are keen to associate themselves with external agencies for product design and developing prototypes. All respondents prefer new products in PC&I backed by proven technology.

The respondents had clearly specified that in sponsored projects, the exclusive rights to products designed and developed by the agency will remain with the sponsor.

Therefore, scope exists for CEDT-C to associate themselves with hardware manufacturers in product design and development.

### **6.3.2 TRAINING**

All the respondents in this segment, system suppliers in particular, have full fledged training institutes to cater to needs of user segment as well as their technical manpower. The trainers in these institutes are trained in system engineering, design, software and maintenance by overseas collaborators. Hence, limited scope exists for training of trainers in this segment.

### **6.4 OTHER SEGMENTS**

Most respondents in user segment are handicapped with shortage of technical manpower in instrumentation with adequate exposure to advances in electronics.

## 6 CONCLUSIONS AND RECOMMENDATIONS

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Considering the demand for engineers in user and supplier segments and infrastructure available at CEDT-C, there is scope for offering Post Graduate Programmes with an updated curriculum covering contemporary technologies in electronics, instrumentation and process control.

### 6.5 RECOMMENDATIONS

- ♣ The thrust area for CEDT-C in future should be training in PC&I. The training should continuously address the needs of technical manpower in user and supplier segments ensuring exposure to advancements in technology in PC&I. The type of training programmes recommended are as follows :

- **Sponsored Training Programme**

A bi annual calendar should be developed for conducting sponsored training programme in specific areas of PC&I for practicing engineering graduates and diploma holders. The duration may be between one and five days. The venue for the programme may be CEDT-C institute or a centre having a cluster of industries. The programmes having duration of over two days may be conducted at the institute itself.

Some of the recommended topics are given herein:

- Technology Development & Future Trends in Process Control Instrumentation
- Exposure Course in PLC

## 6 CONCLUSIONS AND RECOMMENDATIONS

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- Basic Course in DCS
- Fundamentals of Instrumentation
- Digital Instrumentation
- Calibration Standards & Techniques
- Microprocessor Based Control System
- Control Valve Design
- Maintenance of Controllers (Mainly Elect)
- New Instruments (Smart Transmitters)
- Gas Chromatography
- Loop Tuning
- Card Replacing
- Computer Networking for AC Drives
- PC Based Preventive Maintenance
- Manufacturing Technology in Electronics (Process Modelling, Packaging Techniques etc.)
- FMS
- Semiconductor Technology (Insulated Gate Bipolar Transistors)

### ■ Institutional Post Graduate Programme

A full time Post Graduate Certificate/Diploma Programme may be offered with specific emphasis on modern technologies and their applications in PC&I.

- The duration recommended is one and half to two years.
- The participants should be engineering graduates preferably with prior industry exposure in PC&I.

## 6 CONCLUSIONS AND RECOMMENDATIONS

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- The course design should be modular with flexibility to accommodate sponsored candidates for select modules.

- **Induction Training Programmes**

It is recommended to conduct induction training programmes in PC&I for PSUs and industrial groups which recruit a large number of fresh engineering graduates. The duration for such programmes may be between 15 days to one month. These programmes may be conducted in house covering subjects which are specific to needs of the participating companies.

- ♣ For consultancy services, with the existing infrastructure, well equipped laboratories and faculty, CEDT-C may initiate contacts with potential respondents identified during the survey. The institute may identify areas for upgradation and modification in PC&I and conduct prefeasibility studies amongst the potential respondents in user segment. CEDT-C may also offer its services for evaluation and rating of vendors and undertaking site acceptance tests.
- ♣ Since the user segment prefer Process Licensors to conduct the feasibility study and detailed engineering for PC&I, CEDT-C may plan in future for a collaboration with an overseas Process Licensor to offer full fledged consultancy services from feasibility to installation and testing of PC&I systems.

## 6 CONCLUSIONS AND RECOMMENDATIONS

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- ♣ CEDT-C may initiate preliminary discussions with respondents in supplier segment identified during the survey for hardware design and development.
  
- ♣ As a long term strategy, it may be recommended to initiate either self run or sponsored programmes like Seminars and Workshops in PC&I at regular intervals in various locations. The objectives in such forum will be to understand service needs of user and supplier segments in South India, to inform about infrastructural facilities available and capabilities of CEDT-C through developing and presenting success case stories in PC&I systems, to promote the various services offered by the institute and to disseminate information on new control strategies/systems and modern technologies. For such sponsored programmes, the institute may associate itself with leading industry representatives/forums like Confederation of Indian Industries (CII), Cement Manufacturers Association, Indian Chemical Manufacturers Association etc. (Refer Annexure-17).
  
- ♣ The Western states of Gujarat and Maharashtra have the highest concentration of process group in India. Hence, CEDT-C should in future extend all services to user segment in Western region also.
  
- ♣ With the rapid development and obsolescence of technologies and products in PC&I industry, CEDT-C in future should investigate and review the service needs in user and supplier segments periodically, preferably once in two years, to identify potential clients in the areas of training, consultancy, product design and development.



ANNEXURES

**ANNEXURE - 1**

**SURVEY SAMPLE SEGMENTATION : USER SEGMENT**

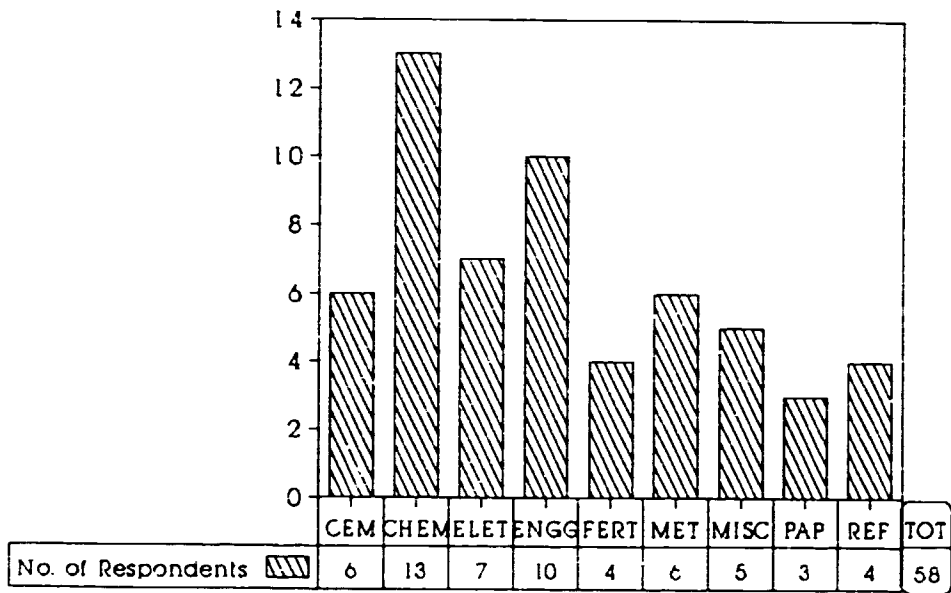
| <b>GROUP/SECTOR</b>        | <b>CODE</b> | <b>PRODUCTS MANUFACTURED</b>  |
|----------------------------|-------------|---|
| CEMENT                     | CEM         | PORTLAND CEMENT, POZZOLANA CEMENT, WHITE CEMENT AND CEMENT PAINT                        |
| CHEMICAL/<br>PETROCHEMICAL | CHEM        | INORGANIC CHEMICALS, MAN MADE FIBRES, BULK DRUGS ETC.,                                  |
| ELECTRONICS*               | ELET        | CONSUMER ELECTRONICS, SCIENTIFIC AND MEASURING EQUIPMENT, THYRISTORS                    |
| ENGINEERING*               | ENGG        | AUTOMOBILES, AUTOMOBILE ANCILLARIES, ROTATING MACHINERIES, TYRES, CABLES, MACHINE TOOLS |
| FERTILIZER                 | FERT        | COMPLEX, UREA AND PHOSPHATIC  |
| METALLURGY                 | MET         | SPONGE IRON, TITANIUM DI OXIDE, IRON ORE PELLETS, ALUMINIUM EXTRUSIONS AND INGOTS, ZINC |
| MISCELLANEOUS              | MISC        | GLASS, RUBBER PRODUCTS, BEER, ALCOHOL   |
| PAPER                      | PAP         | NEWSPRINT, PAPER AND PAPER BOARDS   |
| PETROLEUM<br>REFINERY      | REF         | PETROLEUM PRODUCTS  |

NOTE - "USER" INCLUDES FOLLOWING GROUPS; "PROCESS", "ENGG" AND "ELET"

\* INDICATES GROUP

"PROCESS" INCLUDES FOLLOWING SECTORS; CEMENT, CHEMICAL/PETROCHEMICAL, FERTILIZER, METALLURGY, MISCELLANEOUS, PAPER AND PETROLEUM REFINERY

**ANNEXURE - 2  
RESPONDENT PROFILE - SECTORWISE :  
USER SEGMENT**



**NOTE** ELET and ENGG represent group



**ANNEXURE - 3**

**RESPONDENT DETAILS : USER SEGMENT**

| <b>GROUP - PROCESS / SECTOR - CEMENT</b> |  |                       |                            |                    |
|--|--|-----------------------|----------------------------|--------------------|
| <b>S.NO</b>                              | <b>NAME AND ADDRESS OF RESPONDENT</b>  | <b>YEAR OF INCORP</b> | <b>SALES TO/PA Rs MILL</b> | <b>TYPE OF CO.</b> |
| 1.                                       | ASSOCIATED CEMENT COMPANY LIMITED<br>MADUKKARAI, COIMBATORE 641 105<br>(TAMIL NADU) INDIA        | 1934                  | 2100                       | PVT                |
| 2.                                       | ASSOCIATED CEMENT COMPANY LIMITED<br>WADI CEMENT WORKS, P.O. WADI 585 225<br>(KARNATAKA) INDIA   | 1967                  | 2400                       | PVT                |
| 3.                                       | DALMIA CEMENTS (BHARAT) LTD<br>DALMIAPURAM, DIST. TRICHY 621 651<br>(TAMIL NADU) INDIA           | 1953                  | 1800                       | PVT                |
| 4.                                       | MALABAR CEMENTS LIMITED<br>WALAYAR P.O, PALAKKAD DIST. 678 001<br>(KERALA) INDIA                 | 1982                  | 900                        | PSU                |
| 5.                                       | RAASI CEMENTS LTD<br>VISHNUPURAM, WADAPALLI 508 355<br>NALAGONDA DIST.<br>(ANDHRA PRADESH) INDIA | 1982                  | 2140                       | PVT                |
| 6.                                       | THE TRAVANCORE CEMENTS LIMITED<br>NATTAKOM, KOTTAYAM 686 013<br>(KERALA) INDIA                   | 1948                  | 250                        | PSU                |

**NOTE -**

YEAR OF INCORP

SALES TO/A Rs MILL

TYPE OF CO.

PVT

PSU

MNC

JV

- YEAR OF INCORPORATION

- SALES TURNOVER PER ANNUM Rs MILLION

- TYPE OF COMPANY

- PRIVATE

- PUBLIC SECTOR UNIT

- MULTI NATIONAL COMPANY

- JOINT VENTURE

**ANNEXURE - 3 (CONTD..)**

**RESPONDENT DETAILS : USER SEGMENT**

| <b>GROUP - PROCESS / SECTOR - CHEMICAL/PETROCHEMICAL</b> |  |                       |                            |                    |
|--|--|-----------------------|----------------------------|--------------------|
| <b>S.NO</b>  | <b>NAME AND ADDRESS OF RESPONDENT</b>  | <b>YEAR OF INCORP</b> | <b>SALES TO/PA Rs MILL</b> | <b>TYPE OF CO.</b> |
| 7  | ANDHRA PETROCHEMICALS LIMITED<br>VISHAKAPATNAM 530 001<br>(ANDHRA PRADESH) INDIA                 | 1993                  | 2000                       | JV                 |
| 8  | BASF INDIA LIMITED<br>SWEET HOME<br>JANATA COLONY ROAD<br>SURATHKAL 574 158<br>(KARNATAKA) INDIA | 1998                  | 1250*                      | MNC                |
| 9  | CHEMINOR DRUGS LIMITED<br>7-1-27 AMEERPET, HYDERABAD 500 016<br>(ANDHRA PRADESH) INDIA           | 1980                  | 600                        | PVT                |
| 10   | DCW LIMITED<br>SAHUPURAM, ARUMUGANERI P O 628 202<br>DIST CHIDAMBARANAR<br>(TAMIL NADU) INDIA    | 1960                  | 2500                       | PVT                |
| 11   | HINDUSTAN ORGANIC CHEMICALS LIMITED<br>AMBALAMUGAL, DIST ERNAKULAM 682 302<br>(KERALA) INDIA     | 1987                  | 1900                       | PSU                |
| 12   | Indian Additives Limited<br>EXPRESS HIGHWAY<br>MANALI, MADRAS 600 068<br>(TAMIL NADU) INDIA      | 1993                  | 1200                       | JV                 |
| 13   | MANALI PETROCHEMICAL LTD.,<br>PONNERI HIGH ROAD<br>MANALI, MADRAS 600 068<br>(TAMIL NADU) INDIA  | 1991                  | 1000                       | JV                 |

**NOTE -**

YEAR OF INCORP  
SALES TO/A Rs MILL  
TYPE OF CO.

PVT  
PSU  
MNC  
JV  
#

- YEAR OF INCORPORATION  
- SALES TURNOVER PER ANNUM Rs MILLION  
- TYPE OF COMPANY  
- PRIVATE  
- PUBLIC SECTOR UNIT  
- MULTI NATIONAL COMPANY  
- JOINT VENTURE  
- PROJECTED TURNOVER

**ANNEXURE - 3 (CONTD..)**

**RESPONDENT DETAILS : USER SEGMENT**

| <b>GROUP - PROCESS / SECTOR - CHEMICAL/PETROCHEMICAL (CONTD.)</b> |   |                       |                                    |                    |
|---|---|-----------------------|------------------------------------|--------------------|
| <b>S.NO</b>   | <b>NAME AND ADDRESS OF RESPONDENT</b>   | <b>YEAR OF INCORP</b> | <b>SALES TO/PA<br/>Rs<br/>MILL</b> | <b>TYPE OF CO.</b> |
| 14  | SPIC<br>HEAVY CHEMICALS DIVISION<br>EXPRESS HIGHWAY, MANALI<br>MADRAS 600 068<br>(TAMIL NADU) INDIA                             | 1979                  | 600                                | PVT                |
| 15  | SRF LIMITED<br>FIBRES & PLASTICS GROUP<br>MANALI INDUSTRIAL AREA<br>MANALI, MADRAS 600 068<br>(TAMIL NADU) INDIA                | 1974                  | 2000                               | PVT                |
| 16  | STILBENE CHEMICALS LIMITED<br>IDA, PYDIBEEMAVARAM,<br>RANASTHALAM MANDALAM<br>DIST SRIKAKULAM 532 409<br>(ANDHRA PRADESH) INDIA | 1995                  | 400                                | PVT                |
| 17  | THE TRAVANCORE-COCHIN CHEMICALS<br>LTD.<br>UDYOGMANDAL P.O, KOCHI 683 501<br>(KERALA) INDIA                                     | 1952                  | 800                                | PSU                |
| 18  | TRICHY DISTILLERIES AND CHEMICALS<br>LIMITED<br>TRICHY 620 004<br>(TAMIL NADU) INDIA  | 1964                  | 350                                | PVT                |
| 19  | Tamilnadu Petroproducts Limited<br>MANALI EXPRESS HIGHWAY<br>MANALI, MADRAS 600 068<br>(TAMIL NADU) INDIA                       | 1986                  | 3500                               | JV                 |

**NOTE -**

YEAR OF INCORP

SALES TO/A Rs MILL

TYPE OF CO.

PVT

PSU

MNC

JV

- YEAR OF INCORPORATION

- SALES TURNOVER PER ANNUM Rs MILLION

- TYPE OF COMPANY

- PRIVATE

- PUBLIC SECTOR UNIT

- MULTI NATIONAL COMPANY

- JOINT VENTURE

**ANNEXURE - 3 (CONTD..)**

**RESPONDENT DETAILS : USER SEGMENT**

| <b>GROUP - ELECTRONICS</b> |   |                       |                            |                    |
|----------------------------|---|-----------------------|----------------------------|--------------------|
| <b>S.NO</b>                | <b>NAME AND ADDRESS OF RESPONDENT</b>   | <b>YEAR OF INCORP</b> | <b>SALES TO/PA Rs MILL</b> | <b>TYPE OF CO.</b> |
| 20                         | BPL LIMITED<br>64, DYNAMIC HOUSE, CHURCH ROAD<br>BANGALORE 560 001 (KARNATAKA) INDIA  | 1982                  | 10000                      | PVT                |
| 21                         | CONTROLS & DRIVES COIMBATORE (P)<br>LTD.,<br>60-B/67-A-1 ATHIPALAYAM ROAD<br>GANAPATHY, COIMBATORE 641 006<br>(TAMIL NADU) INDIA            | 1971                  | 250                        | PVT                |
| 22                         | INDCHEM INSTRUMENTATION LIMITED<br>SURVEY NO. 36, OLD MAHABALIPURAM<br>ROAD, PERUNGUDI, MADRAS 600 096<br>(TAMIL NADU) INDIA                | 1982                  | 850                        | PVT                |
| 23                         | KELTRON<br>Industrial Electronic Product Division<br>KELTRON EQUIPMENT COMPLEX<br>KARAKULAM<br>THIRUVANANTHAPURAM 695 564<br>(KERALA) INDIA | 1973                  | 100                        | PSU                |
| 24                         | O/E/N Connectors L'd<br>ELECTROGIRI, MULANTHURUTHY<br>VIA COCHIN 682 314 (KERALA) INDIA   | 1982                  | 240                        | MNC                |
| 25                         | PREMIER INSTRUMENTS & CONTROLS LTD<br>POST BOX 4209, PERIANAICKENPALAYAM<br>COIMBATORE 641 020<br>(TAMIL NADU) INDIA                        | 1972                  | 850                        | PVT                |
| 26                         | ROOTS INDUSTRIES LIMITED<br>ULAVAGAM, GANAPATHY<br>COIMBATORE 641 006<br>(TAMIL NADU) INDIA   | 1985                  | 200                        | PVT                |

**NOTE -**

YEAR OF INCORP  
SALES TO/A Rs MILL  
TYPE OF CO.  
PVT  
PSU  
MNC  
JV

- YEAR OF INCORPORATION  
- SALES TURNOVER PER ANNUM Rs MILLION  
- TYPE OF COMPANY  
- PRIVATE  
- PUBLIC SECTOR UNIT  
- MULTI NATIONAL COMPANY  
- JOINT VENTURE

## ANNEXURE - 3 (CONTD..)

## RESPONDENT DETAILS : USER SEGMENT

| GROUP - ENGINEERING |  |                |                     |             |
|---------------------|--|----------------|---------------------|-------------|
| S.NO                | NAME AND ADDRESS OF RESPONDENT   | YEAR OF INCORP | SALES TO/PA Rs MILL | TYPE OF CO. |
| 27                  | APOLLO TYRES LTD.<br>P.O PERAMBRA, DIST TRICHUR 680 689<br>(KERALA) INDIA                          | 1977           | 4500                | PVT         |
| 28                  | Ashok Leyland Limited<br>ENNORE, MADRAS 600 057<br>(TAMIL NADU) INDIA                              | 1960           | 1300                | PVT         |
| 29                  | KIRLOSKAR ELECTRIC COMPANY LTD<br>RAJAJI NAGAR, BANGALORE 560 010<br>(KARNATAKA) INDIA             | 1975           | 6000                | PVT         |
| 30                  | Lakshmi Electrical Control Systems Ltd<br>ARASUR, COIMBATORE 641 407<br>(TAMIL NADU) INDIA         | 1984           | 260                 | PVT         |
| 31                  | Lakshmi Machine Works Limited<br>ARASUR, COIMBATORE 641 407<br>(TAMIL NADU) INDIA                  | 1988           | 330                 | PVT         |
| 32                  | PREMIER TYRES LIMITED<br>KALAMASSERY 683 104<br>(KERALA) INDIA                                     | 1962           | 20                  | JV          |
| 33                  | ROYAL ENFIELD MOTORS LIMITED<br>THIRUVOTTIYUR, P B No 5284<br>MADRAS 600 019<br>(TAMIL NADU) INDIA | 1950           | 200                 | PVT         |
| 34                  | RPG Telecom<br>HEBBAL INDUSTRIAL AREA<br>BELAVADI POST, MYSORE 571 186<br>(KARNATAKA) INDIA        | 1987           | 1400                | PVT         |
| 35                  | Steel Authority of India Limited<br>Salem Steel Plant<br>SAL :M 636 013 (TAMIL NADU) INDIA         | 1983           | 110000              | PSU         |
| 36                  | TEXT COL COMPANY LIMITED<br>GANAPATHY, COIMBATORE 641 006<br>(TAMIL NADU) INDIA                    | 1946           | 2500                | PVT         |

## NOTE

YEAR OF INCORP  
SALES TO/A Rs MILL  
TYPE OF CO.

- YEAR OF INCORPORATION  
- SALES TURNOVER PER ANNUM Rs MILLION  
- TYPE OF COMPANY

**ANNEXURE - 3 (CONTD..)**

**RESPONDENT DETAILS : USER SEGMENT**

| <b>GROUP - PROCESS / SECTOR - FERTILIZER</b> |   |                       |                            |                    |
|--|---|-----------------------|----------------------------|--------------------|
| <b>S.NO</b>                                  | <b>NAME AND ADDRESS OF RESPONDENT</b>   | <b>YEAR OF INCORP</b> | <b>SALES TO/PA Rs MILL</b> | <b>TYPE OF CO.</b> |
| 37   | COROMANDEL FERTILIZERS LIMITED<br>PO BOX 125, VISHAKAPATNAM 530 001<br>(ANDHRA PRADESH) INDIA                   | 1965                  | 3000                       | PVT                |
| 38   | MADRAS FERTILIZERS LIMITED<br>MANALI, MADRAS 600 058<br>(TAMIL NADU) INDIA                                      | 1971                  | 11000                      | PSU                |
| 39   | MANGALORE CHEMICALS & FERTILIZERS LTD<br>PANAMBOOR, MANGALORE 575 010<br>(KARNATAKA) INDIA                      | 1976                  | 2500                       | PVT                |
| 40   | THE FERTILIZERS AND CHEMICALS TRAVANCORE LTD.<br>COCHIN DIVISION<br>AMBALAMEDU, KOCHI 682 303<br>(KERALA) INDIA | 1950                  | 10000                      | PSU                |

**NOTE -**

|                    |                                       |
|--------------------|---------------------------------------|
| YEAR OF INCORP     | - YEAR OF INCORPORATION               |
| SALES TO/A Rs MILL | - SALES TURNOVER PER ANNUM Rs MILLION |
| TYPE OF CO.        | - TYPE OF COMPANY                     |
| PVT                | - PRIVATE                             |
| PSU                | - PUBLIC SECTOR UNIT                  |
| MNC                | - MULTI NATIONAL COMPANY              |
| JV                 | - JOINT VENTURE                       |

**ANNEXURE - 3 (CONTD..)**

**RESPONDENT DETAILS : USER SEGMENT**

| <b>GROUP - PROCESS / SECTOR - METALLURGY</b> |  |                       |                            |                    |
|--|--|-----------------------|----------------------------|--------------------|
| <b>S.NO</b>                                  | <b>NAME AND ADDRESS OF RESPONDENT</b>  | <b>YEAR OF INCORP</b> | <b>SALES TO/PA Rs MILL</b> | <b>TYPE OF CO.</b> |
| 41   | BINANI ZINC LIMITED<br>BINANIPURAM 683 502<br>(KERALA) INDIA   | 1967                  | 1300                       | PVT                |
| 42   | ESSAR PELLETIZATION<br>VISHAKAPATNAM 530 001<br>(ANDHRA PRADESH) INDIA   | 1995                  | 500                        | PVT                |
| 43   | INDIAN ALUMINIUM CO. LTD.<br>P B NO. 30, KALAMASSERY 683 104<br>(KERALA) INDIA   | 1942                  | 1710                       | MNC                |
| 44   | KUMAR METALLURGICAL CORPORATION<br>LIMITED<br>VATTIMARTHI VILLAGE<br>CHITTIYALA MANDALAM<br>NALGONDA DIST.<br>(ANDHRA PRADESH) INDIA | 1992                  | 300                        | PVT                |
| 45   | TRAVANCORE TITANIUM PRODUCTS LIMITED<br>THIRUVANANTHPURAM 695 021<br>(KERALA) INDIA  | 1948                  | 530                        | PSU                |
| 46   | The Kerala Minerals and Metals Ltd.<br>SANKARAMANGALAM<br>CHAVARA, QUILON 691 583<br>(KERALA) INDIA                                  | 1984                  | 1400                       | PSU                |

**NOTE -**

|                    |                                       |
|--------------------|---------------------------------------|
| YEAR OF INCORP     | - YEAR OF INCORPORATION               |
| SALES TO/A Rs MILL | - SALES TURNOVER PER ANNUM Rs MILLION |
| TYPE OF CO.        | - TYPE OF COMPANY                     |
| PVT                | - PRIVATE                             |
| PSU                | - PUBLIC SECTOR UNIT                  |
| MNC                | - MULTI NATIONAL COMPANY              |
| JV                 | - JOINT VENTURE                       |

**ANNEXURE - 3 (CONTD..)**

**RESPONDENT DETAILS : USER SEGMENT**

| <b>GROUP - PROCESS / SECTOR - MISCELLANEOUS</b> |  |                       |                            |                    |
|---|--|-----------------------|----------------------------|--------------------|
| <b>S.NO</b>                                     | <b>NAME AND ADDRESS OF RESPONDENT</b>  | <b>YEAR OF INCORP</b> | <b>SALES TO/PA Rs MILL</b> | <b>TYPE OF CO.</b> |
| 47  | EXCEL GLASS LIMITED<br>PATHIRAPALLY P.O, ALAPUZHA 688 521<br>(KERALA) INDIA                            | 1974                  | 150                        | JV                 |
| 48  | HINDUSTAN LATEX LIMITED<br>PB NO.2, PEROORJADA PO<br>THIRUVANANTHAPURAM 695 005<br>(KERALA) INDIA      | 1968                  | 200                        | PSU                |
| 49  | MCDOWELL & CO. LTD. CHERTHALA<br>ALAPUZHA DIST 688 524<br>(KERALA) INDIA                               | 1959                  | 2000                       | PVT                |
| 50  | MYSORE BREWERIES LIMITED<br>JALAHALLI CAMP ROAD<br>YESHWANTPUR, BANGALORE 560 022<br>(KARNATAKA) INDIA | 1974                  | 300                        | PVT                |
| 51  | PREMIER BREWERIES LIMITED<br>KANJIKODE WEST, PALAKKAD 678 623<br>(KERALA) INDIA                        | 1978                  | 350                        | PVT                |

**NOTE -**

|                    |                                       |
|--------------------|---------------------------------------|
| YEAR OF INCORP     | - YEAR OF INCORPORATION               |
| SALES TO/A Rs MILL | - SALES TURNOVER PER ANNUM Rs MILLION |
| TYPE OF CO.        | - TYPE OF COMPANY                     |
| PVT                | - PRIVATE                             |
| PSU                | - PUBLIC SECTOR UNIT                  |
| MNC                | - MULTI NATIONAL COMPANY              |
| JV                 | - JOINT VENTURE                       |



**ANNEXURE - 3 (CONTD..)**

**RESPONDENT DETAILS : USER SEGMENT**

| <b>GROUP - PROCESS / SECTOR - PAPER</b> |   |                       |                            |                    |
|---|---|-----------------------|----------------------------|--------------------|
| <b>S.NO</b>                             | <b>NAME AND ADDRESS OF RESPONDENT</b>   | <b>YEAR OF INCORP</b> | <b>SALES TO/PA Rs MILL</b> | <b>TYPE OF CO.</b> |
| 52                                      | HINDUSTAN NEWSPRINT LIMITED<br>NEWSPRINT NAGAR<br>KOTTAYAM DIST 686 616<br>(KERAL A) INDIA        | 1982                  | 2170                       | PSU                |
| 53                                      | SESHASAYEE PAPER AND BOARDS LIMITED<br>ERODE 638 007<br>(TAMIL NADU) INDIA                        | 1962                  | 1400                       | PVT                |
| 54                                      | Tamil Nadu Newprint and Papers Limited<br>KAGITHAPURAM, TRICHY DIST 639 136<br>(TAMIL NADU) INDIA | 1985                  | 2400                       | PSU                |

**NOTE -**

YEAR OF INCORP

SALES TO/A Rs MILL

TYPE OF CO.

PVT

PSU

MNC

JV

- YEAR OF INCORPORATION

- SALES TURNOVER PER ANNUM Rs MILLION

- TYPE OF COMPANY

- PRIVATE

- PUBLIC SECTOR UNIT

- MULTI NATIONAL COMPANY

- JOINT VENTURE

**ANNEXURE - 3 (CONTD..)**

**RESPONDENT DETAILS : USER SEGMENT**

| <b>GROUP - PROCESS / SECTOR - PETROLEUM REFINERY</b> |   |                       |                                    |                    |
|--|---|-----------------------|------------------------------------|--------------------|
| <b>S.NO</b>  | <b>NAME AND ADDRESS OF RESPONDENT</b>   | <b>YEAR OF INCORP</b> | <b>SALES TO/PA<br/>Rs<br/>MILL</b> | <b>TYPE OF CO.</b> |
| 55   | COCHIN REFINERIES LIMITED<br>POST BAG NO.2, AMBALAMUGAL<br>DIST ERNAKULAM 682 302<br>(KERALA) INDIA     | 1966                  | 20000                              | PSU                |
| 56   | HINDUSTAN PETROLEUM CORPORATION<br>GAZUWAKA, VISHAKAPATNAM 530 001<br>(ANDHRA PRADESH) INDIA            | 1960                  | 125000                             | PSU                |
| 57   | MADRAS REFINERIES LIMITED<br>MANALI, MADRAS 600 068<br>(TAMIL NADU) INDIA                               | 1969                  | 18000                              | PSU                |
| 58   | MANGALORE REFINERY AND<br>PETROCHEMICALS LTD<br>KUTHETHUR P.O<br>MANGALORE 574 149<br>(KARNATAKA) INDIA | 1997                  | 50000*                             | JV                 |

**NOTE -**

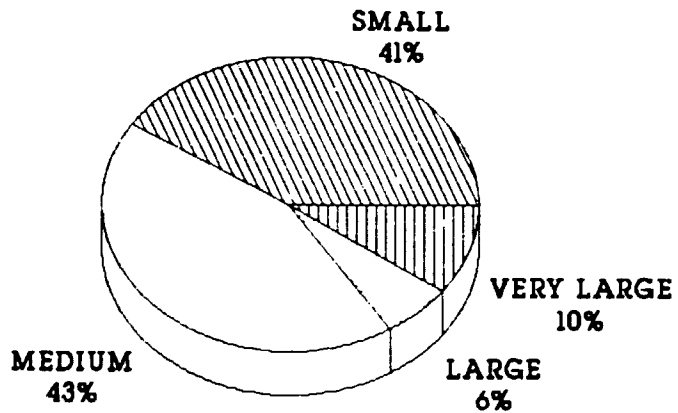
YEAR OF INCORP  
SALES TO/A Rs MILL  
TYPE OF CO.

PVT  
PSU  
MNC  
JV  
#

- YEAR OF INCORPORATION  
- SALES TURNOVER PER ANNUM Rs MILLION  
- TYPE OF COMPANY  
- PRIVATE  
- PUBLIC SECTOR UNIT  
- MULTI NATIONAL COMPANY  
- JOINT VENTURE  
- PROJECTED TURNOVER

**ANNEXURE - 4**  
**RESPONDENT PROFILE - COMPANY SIZE :**  
**USER SEGMENT**

**TOTAL RESPONDENTS - 58**



NOTE

Company size based on Annual Sales Turnover (In Million Rs)  
for financial year between April 1994 and March 1995

SMALL Less than 1000

LARGE

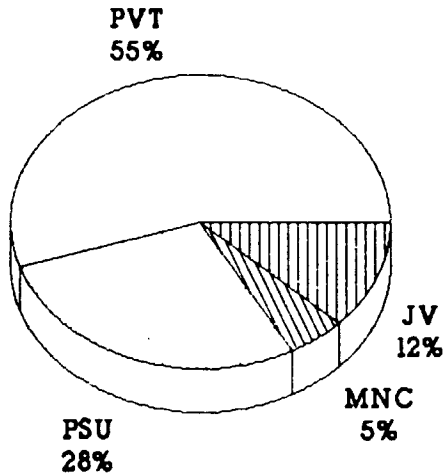
Between 5001 and 10000

MEDIUM Between 1001 and 5000

VERY LARGE Above 10000

ANNEXURE - 4 (CONTD.)  
RESPONDENT PROFILE - COMPANY TYPE :  
USER SEGMENT

TOTAL RESPONDENTS - 58

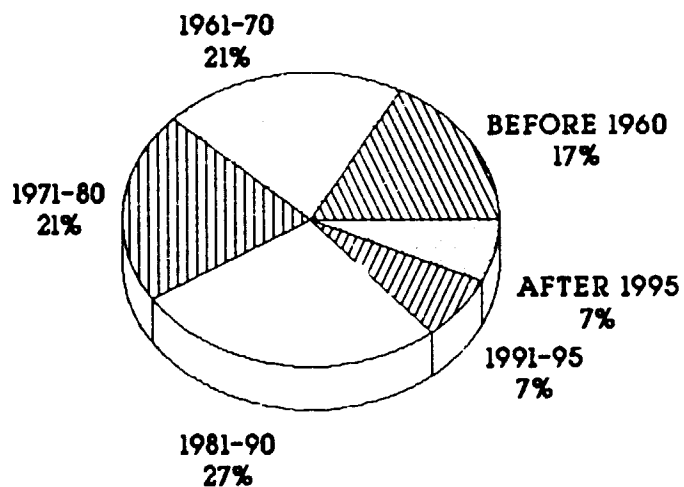


NOTE

PVT PRIVATE  
PSU PUBLIC SECTOR  
UNIT  
MNC MULTINATIONAL  
COMPANY  
JV JOINT VENTURE

**ANNEXURE - 4 (CONTD.)  
RESPONDENT PROFILE - YEAR OF  
INCORPORATION : USER SEGMENT**

**TOTAL RESPONDENTS - 58**



**ANNEXURE - 4 (CONTD..)****RESPONDENT PROFILE - GROUP/SECTOR AND COMPANY SIZE :****USER SEGMENT**

| GROUP /<br>SECTOR          | COMPANY SIZE |           |          |               |           |
|----------------------------|--------------|-----------|----------|---------------|-----------|
|                            | SMALL        | MEDIUM    | LARGE    | VERY<br>LARGE | TOTAL     |
| CEMENT                     | 2            | 4         | 0        | 0             | 6         |
| CHEMICAL/<br>PETROCHEMICAL | 5            | 8         | 0        | 0             | 13        |
| ELECTRONICS                | 5            | 0         | 1        | 0             | 6         |
| ENGINEERING                | 5            | 4         | 1        | 1             | 11        |
| FERTILIZER                 | 0            | 2         | 1        | 1             | 4         |
| METALLURGY                 | 3            | 3         | 0        | 0             | 6         |
| MISCELLANEOUS              | 4            | 1         | 0        | 0             | 5         |
| PAPER                      | 0            | 3         | 0        | 0             | 3         |
| PETROLEUM<br>REFINERY      | 0            | 0         | 0        | 4             | 4         |
| <b>TOTAL</b>               | <b>24</b>    | <b>25</b> | <b>3</b> | <b>6</b>      | <b>58</b> |

NOTE -

COMPANY SIZE BASED ON ANNUAL SALES TURNOVER (IN MILLION RUPEES)  
FOR FINANCIAL YEAR BETWEEN APRIL 1994 TO MARCH 1995.

|            |                          |
|------------|--------------------------|
| SMALL      | - LESS THAN 1000         |
| MEDIUM     | - BETWEEN 1001 AND 5000  |
| LARGE      | - BETWEEN 5001 AND 10000 |
| VERY LARGE | - ABOVE 10000            |

**ANNEXURE - 5**

**RESPONDENT DETAILS : SUPPLIER SEGMENT**

| S.NO | NAME AND ADDRESS OF RESPONDENT   | COLLABORATION WITH  | TYPE OF CO. |
|------|--|---|-------------|
| 59   | ALLEN-BRADLEY INDIA LIMITED<br>88 S B TOWERS, M G ROAD<br>BANGALORE 560 001<br>(KARNATAKA) INDIA                           | ROCKWELL<br>INTERNATIONAL<br>USA  | MNC         |
| 60   | BELLS CONTROLS LIMITED<br>37 WHITES ROAD, MADRAS 600 014<br>(TAMIL NADU) INDIA   | FOXBORO, USA  | JV          |
| 61   | Birla Kent-Taylor<br>4 KHADER NAWAZ KHAN ROAD<br>MADRAS 600 006<br>(TAMIL NADU) INDIA                                      | ABB, SWEDEN   | MNC         |
| 62   | Fisher-Rosemount (India) Limited<br>103 JHAVER PLAZA<br>1-A NUNGAMBAKKAM HIGH ROAD<br>MADRAS 600 034<br>(TAMIL NADU) INDIA | FISHER, USA   | JV          |
| 63   | FISHER-XOMOX (INDIA) LIMITED<br>147 KARAPAKKAM VILLAGE<br>MADRAS 600 096<br>(TAMIL NADU) INDIA                             | XOMOX, USA  | JV          |
| 64   | INSTRUMENTATION LIMITED<br>KANJIKODE WEST<br>PALAKKAD 678 623<br>(KERALA) INDIA  | NARTMAN AND<br>BRAUN, GERMANY<br>IMATACHI<br>HONEYWELL,<br>JAPAN,<br>NAVAPENOE, ITALY | PSU         |
| 65   | KELTRON CONTROLS<br>AROOR<br>ALAPUZHA 688 534<br>(KERALA) INDIA  | HITACHI, JAPAN  | PSU         |
| 66   | LARSEN & TOUBRO LIMITED<br>KIADB INDUSTRIAL AREA<br>HEBBAL, HOOTAGALLI<br>MYSORE 571 186<br>(KARNATAKA) INDIA              |   | PVT         |

**NOTE -**

|             |                          |
|-------------|--------------------------|
| PVT         | - PRIVATE                |
| PSU         | - PUBLIC SECTOR UNIT     |
| MNC         | - MULTI NATIONAL COMPANY |
| JV          | - JOINT VENTURE          |
| TYPE OF CO. | - TYPE OF COMPANY        |

**ANNEXURE - 5 (CONTD..)**

**RESPONDENT DETAILS : SUPPLIER SEGMENT**

| <b>S.NO</b> | <b>NAME AND ADDRESS OF RESPONDENT</b>  | <b>COLLABORATION WITH</b> | <b>TYPE OF CO.</b> |
|-------------|--|---------------------------|--------------------|
| 67          | MOORCO (INDIA) LIMITED<br>89/4 VADUGAPATTI VILLAGE<br>VIRALIMALAI 621 316<br>(TAMIL NADU) INDIA                        | MOORCO, USA               | JV                 |
| 68          | RAMCO SYSTEMS<br>3 NUNGAMBAKKAM HIGH ROAD<br>MADRAS 600 034<br>(TAMIL NADU) INDIA                                      |                           | PVT                |
| 69          | TATA HONEYWELL LIMITED<br>ARJAY APEX CENTRE<br>WESTERN WING<br>24 COLLEGE ROAD<br>MADRAS 600 006<br>(TAMIL NADU) INDIA | HONEYWELL, USA            | MNC                |
| 70          | Yokogawa Blue Star Limited<br>40/4 LAVELLE ROAD<br>BANGALORE 560 001<br>(KARNATAKA) INDIA                              | YOKOGAWA, JAPAN           | MNC                |

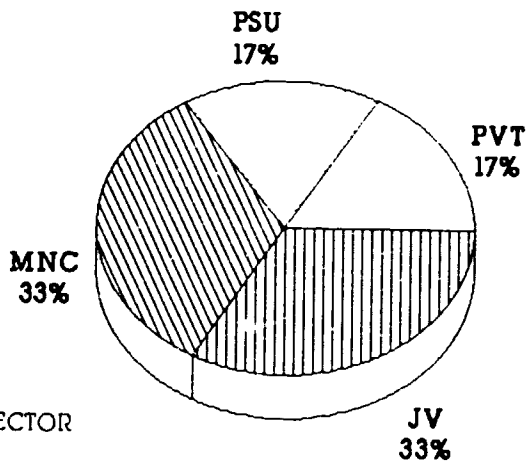
**NOTE -**

PVT - PRIVATE  
PSU - PUBLIC SECTOR UNIT  
MNC - MULTI NATIONAL COMPANY  
JV - JOINT VENTURE  
TYPE OF CO. - TYPE OF COMPANY



**ANNEXURE - 6  
RESPONDENT PROFILE - COMPANY TYPE :  
SUPPLIER SEGMENT**

**TOTAL RESPONDENTS - 12**



**NOTE**

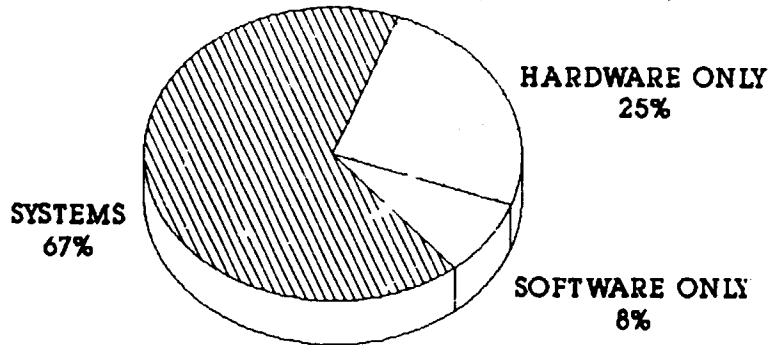
PVT PRIVATE  
PSU PUBLIC SECTOR  
UNIT  
MNC MULTINATIONAL  
COMPANY  
JV JOINT VENTURE

**ANNEXURE - 6 (CONTD.)  
RESPONDENT PROFILE - RANGE OF PRODUCTS :  
SUPPLIER SEGMENT**

**NOTE**

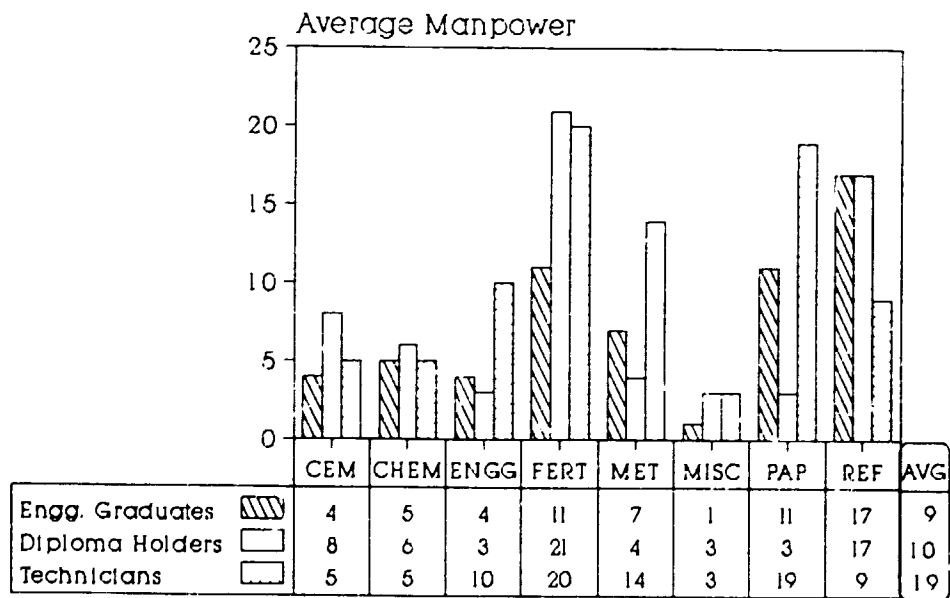
**HARDWARE ONLY** -Manufacturers non electronic components  
controls valves,flow meters,gauging systems  
safety relief valves, transducers etc.,

**SYSTEMS** - Suppliers of DCS,DAS,PLCs,Sensors,Software etc.,



**TOTAL RESPONDENTS - 12**

**ANNEXURE - 7**  
**AVERAGE MANPOWER FOR INSTRUMENTATION :**  
**USER SEGMENT**

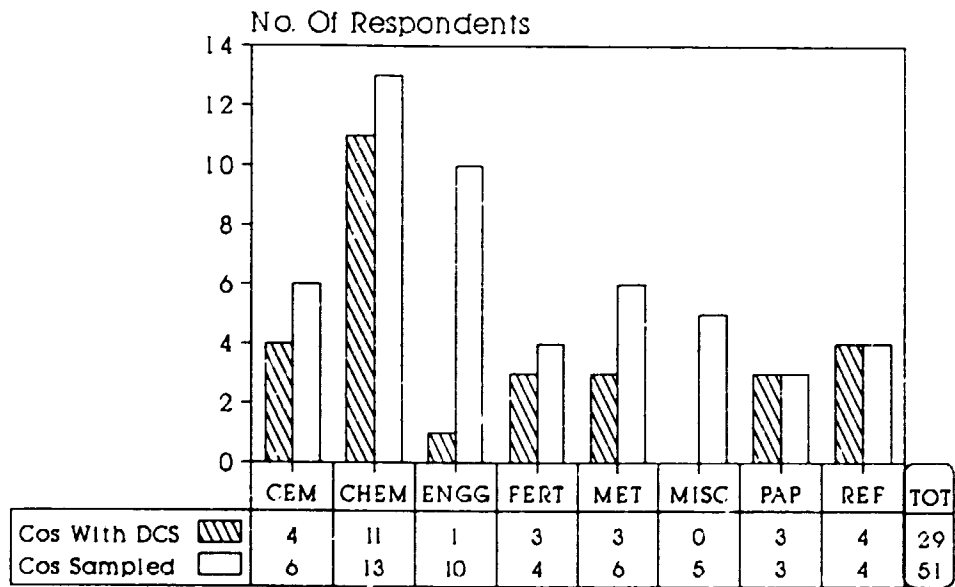


**NOTE** Excluding Electronic Component (ELET) Manufacturers

**ANNEXURE - 8****DCS INSTALLATION : USER SEGMENT**

| GROUP/SECTOR       | YEAR       |          |          |          |          |          |           | TOTAL     |
|--------------------|------------|----------|----------|----------|----------|----------|-----------|-----------|
|                    | BEFORE '91 | '91      | '92      | '93      | '94      | '95      | AFTER '95 |           |
| CEMENT             | 2          | 0        | 1        | 0        | 0        | 0        | 1         | 4         |
| CHEMICAL           | 1          | 1        | 0        | 2        | 0        | 1        | 6         | 11        |
| ELECTRONICS        | 0          | 0        | 0        | 0        | 0        | 0        | 0         | 0         |
| ENGINEERING        | 0          | 0        | 0        | 0        | 0        | 1        | 0         | 1         |
| FERTILIZER         | 0          | 0        | 1        | 0        | 1        | 0        | 1         | 3         |
| METALLURGY         | 0          | 0        | 0        | 0        | 0        | 2        | 1         | 3         |
| MISCELLANEOUS      | 0          | 0        | 0        | 0        | 0        | 0        | 0         | 0         |
| PAPER              | 0          | 0        | 0        | 0        | 1        | 2        | 0         | 3         |
| PETROLEUM REFINERY | 3          | 0        | 0        | 0        | 0        | 0        | 1         | 4         |
| <b>TOTAL</b>       | <b>6</b>   | <b>1</b> | <b>2</b> | <b>2</b> | <b>2</b> | <b>6</b> | <b>10</b> | <b>29</b> |

**ANNEXURE - 8 (CONTD.)  
STATUS OF DCS INSTALLATIONS :  
USER SEGMENT BY 1997**



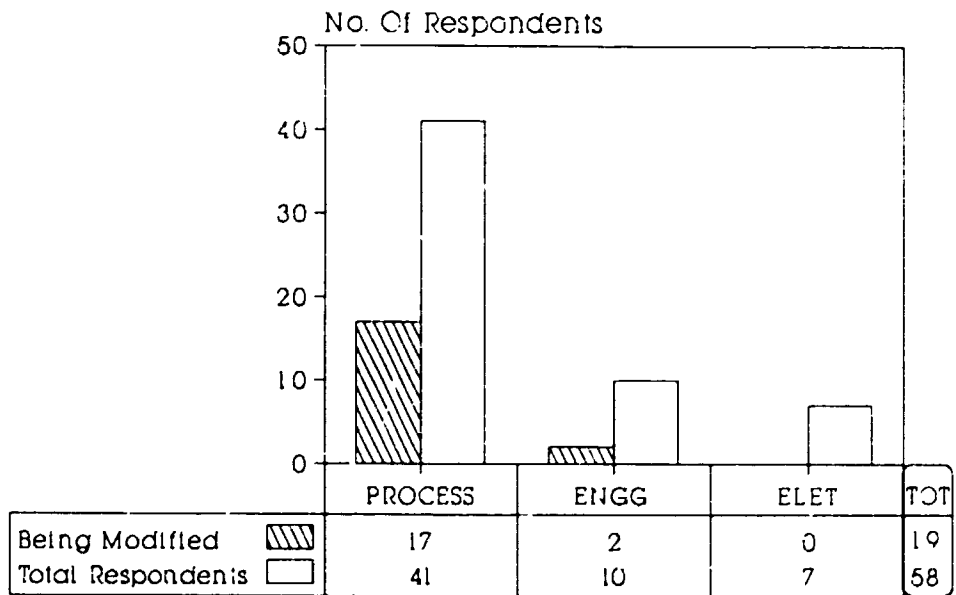
**NOTE** Excluding Electronic Component (ELET) Manufacturers

**ANNEXURE - 9**

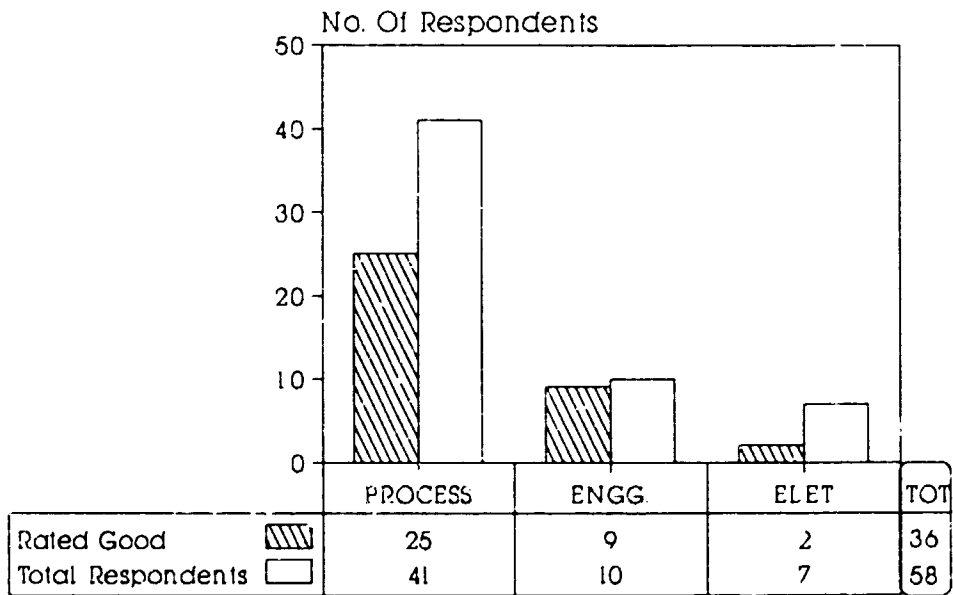
**PLC INSTALLATION : USER SEGMENT**

| GROUP/SECTOR       | YEAR       |          |          |          |          |          |           | TOTAL     |
|--------------------|------------|----------|----------|----------|----------|----------|-----------|-----------|
|                    | BEFORE '91 | '91      | '92      | '93      | '94      | '95      | AFTER '95 |           |
| CEMENT             | 5          | 0        | 0        | 0        | 0        | 0        | 0         | 5         |
| CHEMICAL           | 2          | 1        | 0        | 2        | 0        | 2        | 3         | 10        |
| ELECTRONICS        | 0          | 0        | 0        | 0        | 0        | 0        | 0         | 0         |
| ENGINEERING        | 4          | 0        | 0        | 0        | 0        | 0        | 0         | 4         |
| FERTILIZER         | 0          | 0        | 1        | 0        | 1        | 0        | 0         | 2         |
| METALLURGY         | 2          | 0        | 1        | 0        | 0        | 1        | 1         | 5         |
| MISCELLANEOUS      | 1          | 1        | 1        | 0        | 0        | 1        | 0         | 4         |
| PAPER              | 0          | 0        | 0        | 0        | 0        | 1        | 0         | 1         |
| PETROLEUM REFINERY | 3          | 0        | 0        | 0        | 0        | 0        | 1         | 4         |
| <b>TOTAL</b>       | <b>17</b>  | <b>2</b> | <b>3</b> | <b>2</b> | <b>1</b> | <b>5</b> | <b>5</b>  | <b>35</b> |

**ANNEXURE - 10  
SYSTEM MODIFICATION IN PROGRESS :  
USER SEGMENT**

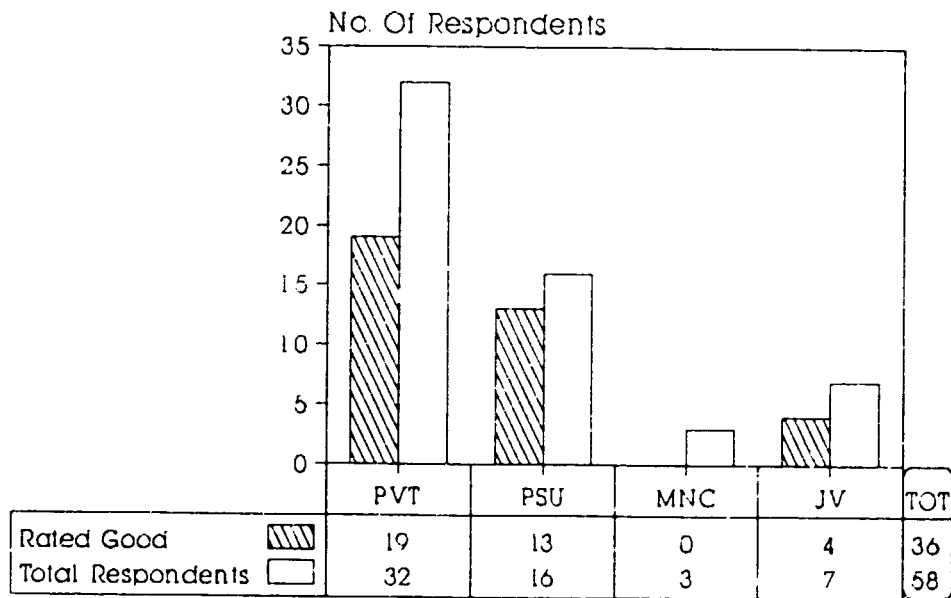


**ANNEXURE - II  
CURRENT TRAINING PATTERN - GROUPWISE :  
USER SEGMENT**





**ANNEXURE - II (CONTD.)  
CURRENT TRAINING PATTERN -  
COMPANY TYPE : USER SEGMENT**



**NOTE** PVT - Private, PSU - Public Sector Unit  
MNC - Multinational Company ; JV - Joint Venture

**ANNEXURE - 12**

**DETAILS OF INDUSTRY SPONSORED TRAINING INSTITUTES**

| S.No | INSTITUTE   | PARTICULARS   |
|------|---|---|
| 1.   | GKD Institute of Technical Resources,<br>Periyanayakkam Palayam,<br>Coimbatore 641 020. | Established in October 1994, in honor of the founder of Lakshmi Machine Works Ltd. (LMW), this institute offers technical training for LMW Group companies. It is being set up with an outlay of Rs.70 million at 'Arasoor' near Coimbatore.  |
| 2.   | SPIC Training Centre,<br>SPIC Nagar,<br>Tuticorin,<br>Tamil Nadu.                       | Imparts training for group companies of SPIC.   |
| 3.   | Southern Regional Training Centre,<br>Dalmiapuram,<br>Trichy District,<br>Tamil Nadu.   | Established in 1993 by a bilateral agreement between Government of India and Darish Government, this institute is being managed by Dalmia Cements (Bharat) Ltd. It imparts training for personnel in the Cement Industry of South India in all technological aspects including instrumentation. |
| 4.   | Refinery School of Engineering & Technology,<br>Manali<br>Madras 600 068                | Since 1986, it offers training for employees of all public sector refineries, Madras Refineries Ltd., in particular.  |

**ANNEXURE - 13**

**PREFERRED TOPICS FOR TRAINING PROGRAMMES : USER SEGMENT**

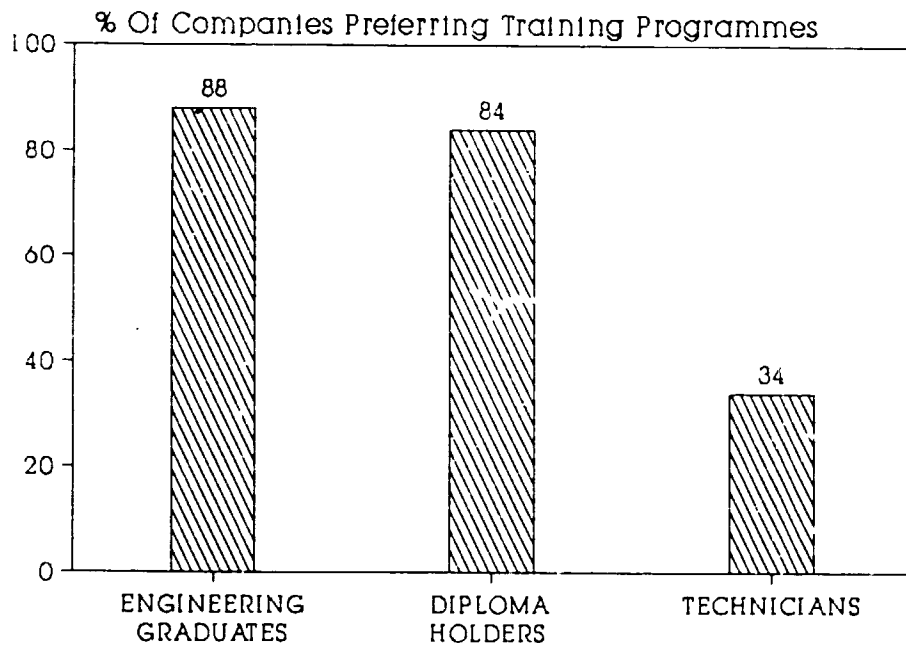
| S. No. | TOPIC   | PROCESS | ENGG | ELET | TOTAL |
|--------|---|---------|------|------|-------|
| 1.     | Technology Development & Future Trends in Process Control Instrumentation | 31      | 4    | 0    | 35    |
| 2.     | Exposure Course in PLC  | 21      | 5    | 1    | 29    |
| 3.     | Basic Course in DCS   | 22      | 3    | 0    | 25    |
| 4.     | Fundamentals of Instrumentation   | 15      | 2    | 0    | 17    |
| 5.     | Digital Instrumentation   | 8       | 0    | 0    | 8     |
| 6.     | Calibration Standards & Techniques  | 8       | 0    | 1    | 9     |
| 7.     | Microprocessor Based Control System                                       | 3       | 1    | 1    | 5     |
| 8.     | Control Valve Design  | 3       | 2    | 0    | 5     |
| 9.     | Maintenance of Controllers (Mainly Elect)                                 | 4       | 1    | 0    | 5     |
| 10.    | New Instruments (Smart Transmitters)                                      | 4       | 1    | 0    | 5     |
| 11.    | Gas Chromatography  | 3       | 0    | 0    | 3     |
| 12.    | Loop Tuning   | 2       | 1    | 0    | 3     |
| 13.    | Card Replacing  | 2       | 0    | 0    | 2     |
| 14.    | Computer Networking for AC Drives   | 0       | 1    | 1    | 2     |
| 15.    | PC Based Preventive Maintenance   | 1       | 0    | 0    | 1     |
| 16.    | Manufacturing Technology in Electronics                                   | 0       | 0    | 4    | 4     |
| 17.    | FMS   | 0       | 6    | 0    | 6     |
| 18.    | Semiconductor Technology (Insulated Gate Bipolar Transistors)             | 0       | 0    | 1    | 1     |

NOTE - FIGURE INDICATES THE NUMBER OF RESPONDENTS PREFERRING SPECIFIC COURSE.

**ANNEXURE - 14****RESPONDENTS FAVORING INDUCTION PROGRAMME : USER SEGMENT**

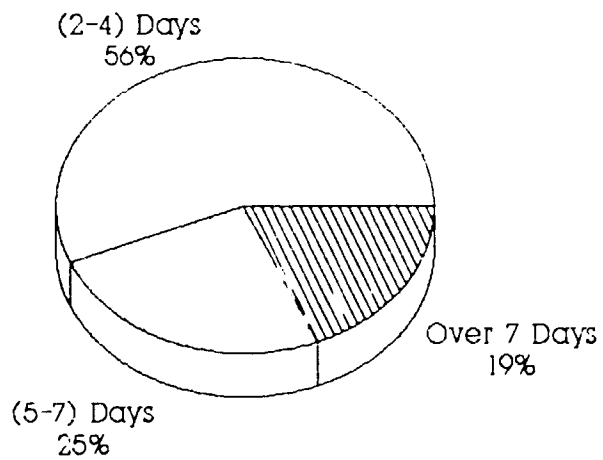
| <b>S. No.</b> | <b>NAME &amp; LOCATION OF COMPANY</b>             | <b>PREFERRED DURATION (DAYS)</b> |
|---------------|---|----------------------------------|
| 34            | RPG Telecom Ltd., Mysore                          | 6                                |
| 39            | Mangalore Chemicals & Fertilizers Ltd., Mangalore | 6                                |
| 24            | O/E/N Connectors Ltd., Cochin                     | 7                                |
| 15            | SRF Ltd., Madras                                  | 15                               |
| 47            | Excel Glasses Ltd., Alleppey                      | 15                               |
| 16            | Stilbene Chemicals Ltd., Pydibeemavaram           | 21                               |
| 2             | ACC Ltd., Wadi                                    | 21                               |
| 55            | Cochin Refineries Ltd., Cochin                    | 21                               |
| 4             | Malabar Cements Ltd., Walayar                     | 30                               |
| 35            | Salem Steel Plant (SAIL), Salem                   | 30                               |
| 53            | Seshasayee Paper & Boards Ltd., Erode             | 30                               |
| 5             | Raasi Cements Ltd., Secunderabad                  | 30                               |
| 13            | Manali Petrochemicals Ltd., Madras                | 30                               |
| 27            | Apollo Tyres Ltd., Chalakkudi                     | 90                               |
| 7             | Andhra Petrochemicals Ltd., Vizag                 | 90                               |
| 8             | BASF India Ltd., Mangalore                        | 90                               |
| 44            | Kumar Metallurgical Corporation Ltd., Hyderabad   | 180                              |

**ANNEXURE - 15**  
**PARTICIPANT PROFILE :**  
**USER SEGMENT**



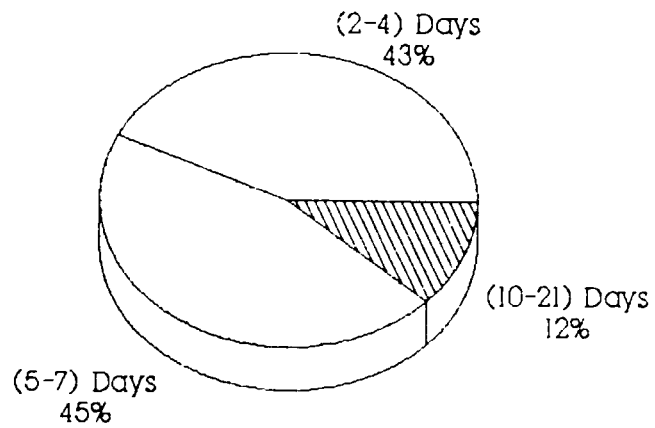
NOTE Number of Companies Preferring Training for Personnel = 5c

**ANNEXURE - 16**  
**DESIRED DURATION - IN HOUSE PROGRAMMES :**  
**USER SEGMENT**



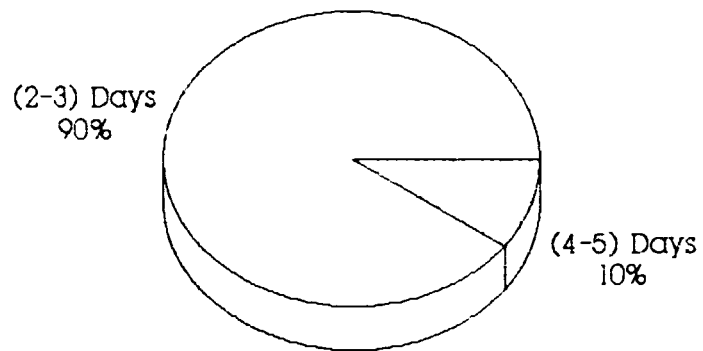
NOTE Number of Respondents Favouring In-House Programme: = 16

**ANNEXURE - 16 (CONTD.)**  
**DESIRED DURATION - CAMPUS PROGRAMMES :**  
**USER SEGMENT**



NOTE Number of Respondents Favouring Campus Programme = 42

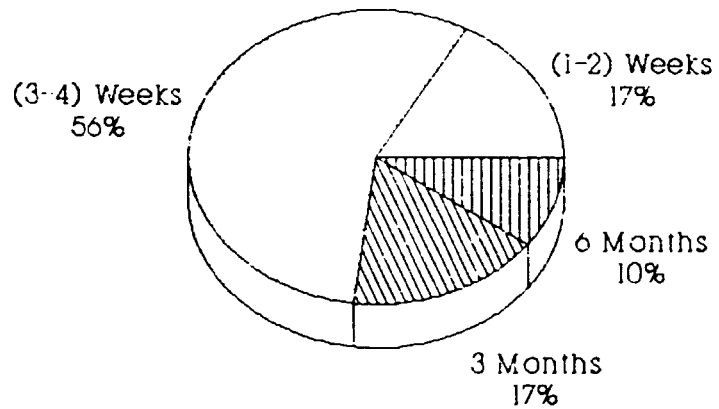
**ANNEXURE - 16 (CONTD.)  
DESIRED DURATION - SEMINARS :  
USER SEGMENT**



NOTE Number of Respondents Favouring Seminars = 40



**ANNEXURE - 16 (CONTD.)**  
**DESIRED DURATION - INDUCTION PROGRAMMES:**  
**USER SEGMENT**



NOTE Number of Respondents Favouring Induction Programme = 17

**ANNEXURE - 17****LIST OF SOME MAJOR INDUSTRY ASSOCIATIONS IN INDIA**

| <b>GROUP/SECTOR</b>                | <b>ADDRESS</b>   |
|------------------------------------|--|
| <b>INDUSTRYWIDE</b>                | CONFEDERATION OF INDIAN INDUSTRY<br>23-26 INSTITUTIONAL AREA<br>LODHI ROAD, NEW DELHI 110 003<br>INDIA   |
| <b>INDUSTRYWIDE</b>                | FEDERATION OF INDIAN CHAMBERS OF COMMERCE AND<br>INDUSTRY (FICCI)<br>FEDERATION HOUSE<br>TANSEN MARG, NEW DELHI 110 001<br>INDIA   |
| <b>METALLURGY</b>                  | INDIAN NON FERROUS METALS MANUFACTURERS ASSOCIATION<br>MACKINON MACKENZIE BUILDING<br>III FLOOR, BALLARD ESTATE<br>BOMBAY 400 028 (MAHARASHTRA)<br>INDIA   |
| <b>PAPER</b>                       | INDIAN PAPER MILLS ASSOCIATION<br>INDIA EXCHANGE, VIII FLOOR<br>CALCUTTA 700 001 (WEST BENGAL)<br>INDIA  |
| <b>CEMENT</b>                      | CEMENT MANUFACTURERS ASSOCIATION<br>VISHNU KIRAN CHAMBER<br>I FLOOR, 2142 - 47 GURUDWARA ROAD<br>KAROL BAGH, NEW DELHI 110 005<br>INDIA  |
| <b>CHEMICAL/<br/>PETROCHEMICAL</b> | INDIAN CHEMICAL MANUFACTURERS ASSOCIATION<br>INDIA EXCHANGE PLACE<br>CALCUTTA 700 001 (WEST BENGAL)<br>INDIA<br><br>ALKALI MANUFACTURERS ASSOCIATION OF INDIA<br>105 BAJAJ BHAVAN, 10TH FLOOR<br>NARIMAN POINT, BOMBAY 400 021 (MAHARASHTRA)<br>INDIA<br><br>ALL INDIA PLASTICS MANUFACTURERS ASSOCIATION<br>JEHANGIR BUILDING<br>III FLOOR, 133 M G ROAD<br>BOMBAY 400 023 (MAHARASHTRA)<br>INDIA |

ADDENDUM TO  
FINAL REPORT ON  
SURVEY OF SERVICE NEEDS OF  
PROCESS CONTROL SYSTEMS  
IN SOUTH INDIA

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Prepared for

CENTRE FOR ELECTRONICS DESIGN AND TECHNOLOGY  
CALICUT 673 501 (INDIA)  
PROJECT NO. DP/IND/90/014

Submitted to

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO), VIENNA,  
AUSTRIA

Prepared by



ABC CONSULTANTS PRIVATE LIMITED  
MANAGEMENT CONSULTANCY SERVICES  
3 WHEATCROFTS ROAD, NUNGAMBAKKAM  
MADRAS 600 034, INDIA

OCTOBER 1995

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CONTR. NO. 95/037/1R

SURVEY OF SERVICE NEEDS OF PROCESS CONTROL SYSTEMS IN SOUTH INDIA

**WORK PLAN**

---

ABC CONSULTANTS PRIVATE LIMITED

## SURVEY OF SERVICE NEEDS OF PROCESS CONTROL SYSTEMS IN SOUTH INDIA

- ◆ Develop a bi-annual calendar for conducting sponsored training programmes in specific areas of PC&I identified during the survey. The training calendar may include topic, dates and duration, venue, faculty, fees and profile of participants namely practicing engineers etc. As a first step, initiate contacts with respondents identified for sponsored training programmes from the survey. The topic wise respondent list is given in enclosure 1. In future, based on feedback from such training programmes, additional topics may be included in the calendar.
  
- ◆ To initiate discussions with Calicut University for Post Graduate Programme in PC&I. The critical mass of participants may be taken from institutes like REC, Calicut etc. But, discussions may also be initiated with the respondents identified for sponsored training programmes to sponsor engineers for the modular courses in the PG Programme.
  
- ◆ To initiate discussions with respondents identified during the survey, as shown in enclosure 2, for induction training programme.
  
- ◆ To initiate discussions with respondents identified during the survey, as shown in enclosure 3, for consultancy services. These respondents are either modifying/upgrading PC&I systems currently or have plans to instal/upgrade PC&I system in future.

SURVEY OF SERVICE NEEDS OF PROCESS CONTROL SYSTEMS IN SOUTH INDIA

- ◆ To initiate discussions with respondents identified during the survey for product design and development, as shown in enclosure 4.
  
- ◆ To conduct Seminars/Workshops in association with CII, Cement Manufacturers Association etc, in industrial catchment areas like Cochin, Madras, Vizag, Bangalore, Hyderabad etc.

SURVEY OF SERVICE NEEDS OF PROCESS CONTROL SYSTEMS IN SOUTH INDIA

**RESPONDENT  
ADDRESS LIST**

S.NO & SECTOR - 1 ; CEM  
CONTACT PERSON - Mr G Ramamoorthy  
DESIGNATION - Sr Engineer-Inst  
NAME OF RESPONDENT- ASSOCIATED CEMENT COMPANY LIMITED  
ADDRESS - MADUKKARAI  
- COIMBATORE DIST 641105 (TAMIL NADU) INDIA  
TELEPHONE - ; FAX- ; TELEX-

S.NO & SECTOR - 2 ; CEM  
CONTACT PERSON - Mr Ganesh Moorthy  
DESIGNATION - Sr Enginer-Inst  
NAME OF RESPONDENT- ASSOCIATED CEMENT COMPANY LIMITED  
ADDRESS - WADI CEMENT WORKS  
- P.O WADI 585225 (KARNATAKA) INDIA  
TELEPHONE - ; FAX- ; TELEX-

S.NO & SECTOR - 3 ; CEM  
CONTACT PERSON - Mr V Kumaran  
DESIGNATION - Asst Manager(Inst)  
NAME OF RESPONDENT- DALMIA CEMENTS (BHARAT) LTD  
ADDRESS - DALMIAPURAM  
- DIST TRICHY 621651 (TAMIL NADU) INDIA  
TELEPHONE - ; FAX- 0431-41905 ; TELEX- 0455-393

S.NO & SECTOR - 4 ; CEM  
CONTACT PERSON - Mr Subramaniam  
DESIGNATION - Asst. Engineer (Inst)  
NAME OF RESPONDENT- MALABAR CEMENTS LIMITED  
ADDRESS - WALAYAR P.O  
- PALAKKAD DIST 678001 (KERALA) INDIA  
TELEPHONE - ; FAX- ; TELEX-

S.NO & SECTOR - 5 ; CEM  
CONTACT PERSON - Mr A Rama Raju  
DESIGNATION - General Manager-Technical  
NAME OF RESPONDENT- RAASI CEMENTS LTD  
ADDRESS - VISHNUPURAM WADAPALLI  
- NALAGONDA DIST. 508355 (ANDHRA PRADESH) INDIA  
TELEPHONE - ; FAX- ; TELEX-

S.NO & SECTOR - 6 ; CEM  
CONTACT PERSON - Mr Joseph Francis  
DESIGNATION - Plant Engineer  
NAME OF RESPONDENT- THE TRAVANCORE CEMENTS LIMITED  
ADDRESS - NATTAKOM  
- KOTTAYAM 686013 (KERALA) INDIA  
TELEPHONE - 561371-EXTN 215 ; FAX- ; TELEX- 0888-214 TCL IN



S.NO & SECTOR - 7 ; CHEM  
CONTACT PERSON - Mr Venkataramana  
DESIGNATION - Sr Instrumentation Engineer  
NAME OF RESPONDENT- ANDHRA PETROCHEMICALS LIMITED  
ADDRESS -  
- VISHAKAPATNAM 530001 (ANDHRA PRADESH) INDIA  
TELEPHONE - ; FAX- ; TELEX-

S.NO & SECTOR - 8 ; CHEM  
CONTACT PERSON - Mr P P Shetty  
DESIGNATION - Manager-Personnel & Administration  
NAME OF RESPONDENT- BASF INDIA LIMITED  
ADDRESS - SWEET HOME JANATA COLONY ROAD,  
- SURATHKAL 574158 (KARNATAKA) INDIA  
TELEPHONE - 476236 ; FAX- 0824-477025 ; TELEX-

S.NO & SECTOR - 9 ; CHEM  
CONTACT PERSON - Mr Indraiah  
DESIGNATION - Manager  
NAME OF RESPONDENT- CHEMINOR DRUGS LIMITED  
ADDRESS - 7-1-27 AMEERPET  
- HYDERABAD 500016 (ANDHRA PRADESH) INDIA  
TELEPHONE - 291946 ; FAX- 040-291955 ; TELEX-

S.NO & SECTOR - 10 ; CHEM  
CONTACT PERSON - Mr D Devaraj  
DESIGNATION - Manager(Instrumentation)  
NAME OF RESPONDENT- DCW LIMITED  
ADDRESS - SAHUPURAM ARUMUGANERI P.O  
- DIST CHIDAMBARANAR 628202 (TAMIL NADU) INDIA  
TELEPHONE - 80231 ; FAX- 04643-80611 ; TELEX-

S.NO & SECTOR - 11 ; CHEM  
CONTACT PERSON - Mr K A Nathan  
DESIGNATION - Chief Engineer(Instrumentation)  
NAME OF RESPONDENT- HINDUSTAN ORGANIC CHEMICALS LIMITED  
ADDRESS - AMBALAMUGAL  
- DIST. ERNAKULAM 682302 (KERALA) INDIA  
TELEPHONE - 75911 ; FAX- 0484-75893 ; TELEX- 885-6690 HOCL IN

S.NO & SECTOR - 12 ; CHEM  
CONTACT PERSON - Mr K Sakthivel  
DESIGNATION - Manager(Maint.-Inst.)  
NAME OF RESPONDENT- Indian Additives Limited  
ADDRESS - EXPRESS HIGHWAY MANALI  
- MADRAS 600068 (TAMIL NADU) INDIA  
TELEPHONE - 541236 ; FAX- 044-541184 ; TELEX- 041-5065 IAL IN

S.NO & SECTOR - 13 ; CHEM  
CONTACT PERSON - Mr J Raghunathan  
DESIGNATION - Dy Manager-Inst  
NAME OF RESPONDENT- MANALI PETROCHEMICAL LTD.,  
ADDRESS - PONNERI HIGH ROAD MANALI  
- MADRAS 600068 (TAMIL NADU) INDIA  
TELEPHONE - 541025 ; FAX- ; TELEX-

S.NO & SECTOR - 14 ; CHEM  
CONTACT PERSON - Mr M P Swathanthira Kumar  
DESIGNATION - Chief Manager(Instrumentation)  
NAME OF RESPONDENT- SPIC  
ADDRESS - HEAVY CHEMICALS DIVISION EXPRESS HIGHWAY, MANALI  
- MADRAS 600068 (TAMIL NADU) INDIA  
TELEPHONE - 2350245-EXTN 565 ; FAX- 044-2350015 ; TELEX- 041-8908

S.NO & SECTOR - 15 ; CHEM  
CONTACT PERSON - Mr V Sekar  
DESIGNATION - Manager-Inst  
NAME OF RESPONDENT- SRF LIMITED  
ADDRESS - FIBRES & PLASTICS GROUP MANALI INDUSTRIAL AREA  
- MADRAS 600068 (TAMIL NADU) INDIA  
TELEPHONE - 541073 ; FAX- ; TELEX-

S.NO & SECTOR - 16 ; CHEM  
CONTACT PERSON - Mr Sridhar  
DESIGNATION - Instrumentation Engineer  
NAME OF RESPONDENT- STILBENE CHEMICALS LIMITED  
ADDRESS - IDA, PYDIBEEMAVARAM RANASTHALAM MANDALAM  
- DIST SRIKAKULAM 532409 (ANDHRA PRADESH) INDIA  
TELEPHONE - ; FAX- ; TELEX-

S.NO & SECTOR - 17 ; CHEM  
CONTACT PERSON - Mr E V Ravindran  
DESIGNATION - Chief Engineer-Inst  
NAME OF RESPONDENT- THE TRAVANCORE-COCHIN CHEMICALS LTD.  
ADDRESS - UDYOGAMANDAL P.O  
- KOCHI 683501 (KERALA) INDIA  
TELEPHONE - 541011 ; FAX- 0484-532420 ; TELEX- 885-5009

S.NO & SECTOR - 18 ; CHEM  
CONTACT PERSON -  
DESIGNATION - Instrumentation Engineer  
NAME OF RESPONDENT- TRICHY DISTILLERY AND CHEMICAL LIMITED  
ADDRESS - GOLDEN ROCK  
- TRICHY 620004 (TAMIL NADU) INDIA  
TELEPHONE - ; FAX- ; TELEX-

S.NO & SECTOR - 19 ; CHEM  
CONTACT PERSON - Mr S Ramesh  
DESIGNATION - Dy Manager-Inst  
NAME OF RESPONDENT- Tamilnadu Petroproducts Limited  
ADDRESS - MANALI EXPRESS HIGHWAY MANALI  
- MADRAS 600068 (TAMIL NADU) INDIA  
TELEPHONE - 541350 ; FAX- ; TELEX-

S.NO & SECTOR - 20 ; ELET  
CONTACT PERSON - Mr S Nagaraj  
DESIGNATION - Dy Manager-Maintenance  
NAME OF RESPONDENT- BPL  
ADDRESS -  
- BANGALORE 560076 (KARNATAKA) INDIA  
TELEPHONE - ; FAX- ; TELEX-

S.NO & SECTOR - 21 ; ELET  
CONTACT PERSON - Mr N Balasubramaniam  
DESIGNATION - Asst Manager-QA  
NAME OF RESPONDENT- CONTROLS & DRIVES COIMBATORE (P) LTD.,  
ADDRESS - 60-B/67-A-1 ATHIPALAYAM ROAD GANAPATHY  
- COIMBATORE 641006 (TAMIL NADU) INDIA  
TELEPHONE - 531717 ; FAX- 0422-531062 ; TELEX-

S.NO & SECTOR - 22 ; ELET  
CONTACT PERSON - Mr K V Ramasubramanian  
DESIGNATION - Sr Engineer-Stores & PPC  
NAME OF RESPONDENT- INDCHEM INSTRUMENTATION LIMITED  
ADDRESS - SURVEY NO. 36, OLD MAHABALIPURAM ROAD PERUNGUDI  
- MADRAS 600096 (TAMIL NADU) INDIA  
TELEPHONE - 4926462 ; FAX- 044-4925049 ; TELEX- 041-21091 IIL IN

S.NO & SECTOR - 23 ; ELET  
CONTACT PERSON - Mr P Suresh Babu  
DESIGNATION - Asst Manager-Marketing  
NAME OF RESPONDENT- KELTRON, SPECIAL PRODUCTS DIVISION  
ADDRESS - KELTRON EQUIPMENT COMPLEX KARAKULAM  
- THIRUVANANTHAPURAM 695564 (KERALA) INDIA  
TELEPHONE - 436551 ; FAX- 0471-435936 ; TELEX-

S.NO & SECTOR - 24 ; ELET  
CONTACT PERSON - Mr E John Mathew  
DESIGNATION - Asst Manager-Personnel  
NAME OF RESPONDENT- O/E/N Connectors Ltd  
ADDRESS - ELECTROGIRI MULANTHURUTHY  
- VIA COCHIN 682314 (KERALA) INDIA  
TELEPHONE - 871072 ; FAX- 0484-740372 ; TELEX-

S.NO & SECTOR - 25 ; ELET  
CONTACT PERSON - Mr M H J Messiahdas  
DESIGNATION - Sr Manager-Production  
NAME OF RESPONDENT- PREMIER INSTRUMENTS & CONTROLS LIMITED  
ADDRESS - POST BOX 4209 PERIANAICKENPALAYAM  
- COIMBATORE 641020 (TAMIL NADU) INDIA  
TELEPHONE - 892901 ; FAX- 0422-211534 ; TELEX- 0855-341 PIC IN

S.NO & SECTOR - 26 ; ELET  
CONTACT PERSON - Mr O A Balasubramaniam  
DESIGNATION - Manager Systems  
NAME OF RESPONDENT- ROOTS INDUSTRIES LIMITED  
ADDRESS - ULAVAGAM GANAPATHY  
- COIMBATORE 641006 (TAMIL NADU) INDIA  
TELEPHONE - 532100 ; FAX- 0422-532107 ; TELEX- 0855-524 ROOT IN

S.NO & SECTOR - 27 ; ENGG  
CONTACT PERSON - Mr E J Joseph  
DESIGNATION - Dy Manager(E&E)  
NAME OF RESPONDENT- APOLLO TYRES LTD.  
ADDRESS - P.O PERAMBRA  
- DIST. TRICHUR 680689 (KERALA) INDIA  
TELEPHONE - 2211 (CHALAKUDY) ; FAX- ; TELEX- 0887-273

S.NO & SECTOR - 28 ; ENGG  
CONTACT PERSON - Mr K Venkataraman  
DESIGNATION - Manager-Unit Planning & IE  
NAME OF RESPONDENT- Ashok Leyland Limited  
ADDRESS - ENNORE  
- MADRAS 600057 (TAMIL NADU) INDIA  
TELEPHONE - 543001 ; FAX- 044-543798 ; TELEX- 041-7111

S.NO & SECTOR - 29 ; ENGG  
CONTACT PERSON - Mr M N Madhusudan  
DESIGNATION - Sr Manager-PSG  
NAME OF RESPONDENT- KIRLOSKAR ELECTRIC COMPANY LTD  
ADDRESS - INDUSTRIAL SUBURB RAJAJI NAGAR  
- BANGALORE 560010 (KARNATAKA) INDIA  
TELEPHONE - ; FAX- ; TELEX-

S.NO & SECTOR - 30 ; ENGG  
CONTACT PERSON - Mr P Chandrasekaran  
DESIGNATION - Sr Officer-Personnel  
NAME OF RESPONDENT- Lakshmi Electrical Control Systems  
ADDRESS - Limited ARASUR  
- COIMBATORE 641407 (TAMIL NADU) INDIA  
TELEPHONE - 88509 ; FAX- 0422-88652 ; TELEX- 0855-411 LECS IN

S.NO & SECTOR - 31 ; ENGG  
CONTACT PERSON - Mr P Ganesan  
DESIGNATION - Sr Manager-Systems  
NAME OF RESPONDENT- Lakshmi Machine Works Limited  
ADDRESS - ARASUR  
- COIMBATORE 641407 (TAMIL NADU) INDIA  
TELEPHONE - 887512 ; FAX- 0422-887529 ; TELEX- 0855-409

S.NO & SECTOR - 32 ; ENGG  
CONTACT PERSON - Mr K V Hariprasadan  
DESIGNATION - Supdt. Engg  
NAME OF RESPONDENT- PREMIER TYRES LIMITED  
ADDRESS -  
- KALAMASSERY 683104 (KERALA) INDIA  
TELEPHONE - 855262 ; FAX- 0885-5005 ; TELEX-

S.NO & SECTOR - 33 ; ENGG  
CONTACT PERSON - Mr S Sridharan  
DESIGNATION - Sr Manager-TQM  
NAME OF RESPONDENT- ROYAL ENFIELD MOTORS LIMITED  
ADDRESS - THIRUVOTTIYUR P B 5284  
- MADRAS 600019 (TAMIL NADU) INDIA  
TELEPHONE - 544252 ; FAX- 044-543253 ; TELEX- 041-7692

S.NO & SECTOR - 34 ; ENGG  
CONTACT PERSON - Mr P D Kulkarni  
DESIGNATION - Sr Manager-Technical & Quality Control  
NAME OF RESPONDENT- RPG Telecom Limited  
ADDRESS - HEBBAL INDUSTRIAL AREA BELAVADI POST  
- MYSORE 571186 (KARNATAKA) INDIA  
TELEPHONE - 42401 ; FAX- 0821-42499 ; TELEX- 0846-208

S.NO & SECTOR - 35 ; ENGG  
CONTACT PERSON - Mr V Srinivasan  
DESIGNATION - Manager(Elect)  
NAME OF RESPONDENT- Steel Authority of India Limited  
ADDRESS - Salem Steel Plant  
- SALEM 636013 (TAMIL NADU) INDIA  
TELEPHONE - 483021 ; FAX- ; TELEX- 0450-284

S.NO & SECTOR - 36 ; ENGG  
CONTACT PERSON - Mr V Nagaraju  
DESIGNATION - Asst General Manager (Mfg. Services)  
NAME OF RESPONDENT- TEXTTOOL COMPANY LIMITED  
ADDRESS - GANAPATHY  
- COIMBATORE 641006 (TAMIL NADU) INDIA  
TELEPHONE - 531271 ; FAX- 0422-532848 ; TELEX- 0855-353 TXT IN

S.NO & SECTOR - 37 ; FERT  
CONTACT PERSON - Mr N Seetaram  
DESIGNATION - Manager-Technical Services  
NAME OF RESPONDENT- COROMANDEL FERTILIZERS LIMITED  
ADDRESS -  
- VISHAKAPATNAM 530001 (ANDHRA PRADESH) INDIA  
TELEPHONE - 578400 ; FAX- 0891-577665 ; TELEX- 0495-438

S.NO & SECTOR - 38 ; FERT  
CONTACT PERSON - Mr P R Vasantha Kumar  
DESIGNATION - Asst Manager-Instruments  
NAME OF RESPONDENT- MADRAS FERTILIZERS LIMITED  
ADDRESS - MANALI  
- MADRAS 600058 (TAMIL NADU) INDIA  
TELEPHONE - 541001 ; FAX- ; TELEX-

S.NO & SECTOR - 39 ; FERT  
CONTACT PERSON - Mr R Baglodi  
DESIGNATION - Manager(Instruments)  
NAME OF RESPONDENT- MANGALORE CHEMICALS & FERTILIZERS LTD  
ADDRESS - PANAMBOOR  
- MANGALORE 575010 (KARNATAKA) INDIA  
TELEPHONE - 407601 ; FAX- 0824-407938 ; TELEX- 218-310

S.NO & SECTOR - 40 ; FERT  
CONTACT PERSON - Mr B Parameswaran  
DESIGNATION - Dy Chief Engineer(Instrumentation)  
NAME OF RESPONDENT- THE FERTILIZERS AND CHEMICALS  
ADDRESS - TRAVANCORE LTD. COCHIN DIVISION, AMBALAMEDU  
- KOCHI 682303 (KERALA) INDIA  
TELEPHONE - 777281-EXTN 2101 ; FAX- 0484-75948 ; TELEX- 0885-6359 CFER IN

S.NO & SECTOR - 41 ; MET  
CONTACT PERSON - Mr P N Abdul Sahab  
DESIGNATION - DGM-Inst  
NAME OF RESPONDENT- BINANI ZINC LIMITED  
ADDRESS -  
- BINANIPURAM 683502 (KERALA) INDIA  
TELEPHONE - 540175 ; FAX- 0484-532134 ; TELEX- 0885-5015

S.NO & SECTOR - 42 ; MET  
CONTACT PERSON - Mr K V Ramulu  
DESIGNATION - General Manager  
NAME OF RESPONDENT- ESSAR PELLETIZATION  
ADDRESS -  
- VISHAKAPATNAM 530001 (ANDHRA PRADESH)  
TELEPHONE - ; FAX- ; TELEX-

S.NO & SECTOR - 43 ; MET  
CONTACT PERSON - Mr Pandian  
DESIGNATION - Inst. Engineer  
NAME OF RESPONDENT- INDIAN ALUMINIUM CO. LTD.  
ADDRESS - P B NO. 30  
- KALAMASERRY 683104 (KERALA) INDIA  
TELEPHONE - 857641 ; FAX- 0885-857948 ; TELEX- 0885-5001

S.NO & SECTOR - 44 ; MET  
CONTACT PERSON - Mr P V M Rao  
DESIGNATION - Vice President-Works  
NAME OF RESPONDENT- KUMAR METALLURGICAL CORPORATION LIMITED  
ADDRESS - VATTIMARTHI VILLAGE CHITIYALA MANDALAM  
- NALAGONDA DIST. 0 (ANDHRA PRADESH) INDIA  
TELEPHONE - ; FAX- ; TELEX-

S.NO & SECTOR - 45 ; MET  
CONTACT PERSON - Mr V Sreekumar  
DESIGNATION - Chief Engineer-Elect. & Inst  
NAME OF RESPONDENT- TRAVANCORE TITANIUM PRODUCTS LIMITED  
ADDRESS -  
- THIRUVANANTHAPURAM 695021 (KERALA) INDIA  
TELEPHONE - 450868 ; FAX- 0471-451533 ; TELEX- 0435-212

S.NO & SECTOR - 46 ; MET  
CONTACT PERSON - Mr C J George  
DESIGNATION - Sr Manager(Insts)  
NAME OF RESPONDENT- The Kerala Minerals and Metals Ltd.  
ADDRESS - SANKARAMANGALAM CHAVARA  
- QUIILON 691583 (KERALA) INDIA  
TELEPHONE - 203724 ; FAX- 0475-93211 ; TELEX- 0886-359 KMML IN

S.NO & SECTOR - 47 ; MISC  
CONTACT PERSON - Mr M G K Kurup  
DESIGNATION - Asst Manager(Instrumentation)  
NAME OF RESPONDENT- EXCEL GLASS LIMITED  
ADDRESS - PATHIRAPALLY P.O  
- ALAPUZHA 688521 (KERALA) INDIA  
TELEPHONE - 3771 ; FAX- 0477-3760 ; TELEX- 0883-214 EGL IN

S.NO & SECTOR - 48 ; MISC  
CONTACT PERSON - Mr C Sreejith  
DESIGNATION - Dy Manager(Instrumentation)  
NAME OF RESPONDENT- HINDUSTAN LATEX LIMITED  
ADDRESS - PB NO.2, PEROORKADA PG  
- THIRUVANANTHAPURAM 695005 (KERALA) INDIA  
TELEPHONE - 437270 ; FAX- 0471-435013 ; TELEX- 0435-333 NIRO IN

S.NO & SECTOR - 49 ; MISC  
CONTACT PERSON - Mr N F Joseph  
DESIGNATION - Manager-Plant  
NAME OF RESPONDENT- MCDOWELL & CO. LTD.  
ADDRESS - CHERTHALA  
- ALAPUZHA DIST 688524 (KERALA) INDIA  
TELEPHONE - 2634 ; FAX- ; TELEX- 0881-205

S.NO & SECTOR - 50 ; MISC  
CONTACT PERSON - Mr C Subroto Cariapa  
DESIGNATION - Brew Master  
NAME OF RESPONDENT- MYSORE BREWERIES LIMITED  
ADDRESS - JALAHALLI CAMP ROAD YESHWANTPUR  
- BANGALORE 560022 (KARNATAKA) INDIA  
TELEPHONE - 3375227 ; FAX- 080-3378313 ; TELEX- 0845-2485 MBL IN

S.NO & SECTOR - 51 ; MISC  
CONTACT PERSON - Mr C K Mohandas  
DESIGNATION - Sr Manager-Engg.  
NAME OF RESPONDENT- PREMIER BREWERIES LIMITED  
ADDRESS - KANJIKODE WEST  
- PALAKKAD 678623 (KERALA) INDIA  
TELEPHONE - 66160 ; FAX- ; TELEX- 0852 269 BEER IN



S.NO & SECTOR - 52 ; PAP  
CONTACT PERSON - Mr U K Nambiar  
DESIGNATION - Manager-Inst.  
NAME OF RESPONDENT- HINDUSTAN NEWSPRINT LIMITED  
ADDRESS - NEWSPRINT NAGAR  
- KOTTAYAM DIST. 686616 (KERALA) INDIA  
TELEPHONE - 7711 ; FAX- 04829-7777 ; TELEX- 0888-242 HNL IN

S.NO & SECTOR - 53 ; PAP  
CONTACT PERSON - Mr K Ponnuswamy  
DESIGNATION - Manager(Control Systems)  
NAME OF RESPONDENT- SESHASAYEE PAPER AND BOARDS LIMITED  
ADDRESS -  
- ERODE 638007 (TAMIL NADU) INDIA  
TELEPHONE - 50221 ; FAX- 04289-40229 ; TELEX- 081-856

S.NO & SECTOR - 54 ; PAP  
CONTACT PERSON - Mr A Muthusamy  
DESIGNATION - Manager-Inst.  
NAME OF RESPONDENT- Tamil Nadu Newsprint and Papers Limited  
ADDRESS - KAGITHAPURAM  
- TRICHY DIST. 639136 (TAMIL NADU) INDIA  
TELEPHONE - 481 ; FAX- 04324-22441 ; TELEX- 0456-228 TNPL IN

S.NO & SECTOR - 55 ; REF  
CONTACT PERSON - Mr Sabu Jose  
DESIGNATION - Manager Maintenance  
NAME OF RESPONDENT- COCHIN REFINERIES LIMITED  
ADDRESS - POST BAG NO.2 AMBALAMUGAL  
- ERNAKULAM DISTRICT 682302 (KERALA) INDIA  
TELEPHONE - 777261 ; FAX- 0484 75855 ; TELEX- 0885-6214

S.NO & SECTOR - 56 ; REF  
CONTACT PERSON - Mr A S V Iyengar  
DESIGNATION - Manager-Inst.-Maint.  
NAME OF RESPONDENT- HINDUSTAN PETROLEUM CORPORATION  
ADDRESS - LIMITED  
- VISHAKAPATNAM 530001 (ANDHRA PRADESH) INDIA  
TELEPHONE - ; FAX- ; TELEX-

S.NO & SECTOR - 57 ; REF  
CONTACT PERSON - Mr B Manivannan  
DESIGNATION - Dy Manager-Maint.(Inst.)  
NAME OF RESPONDENT- MADRAS REFINERIES LIMITED  
ADDRESS - MANALI  
- MADRAS 600068 (TAMIL NADU) INDIA  
TELEPHONE - 541100 ; FAX- 044-541047 ; TELEX- 041-8455 MRL IN

S.NO & SECTOR - 58 ; REF  
CONTACT PERSON - Mr V K Talithaya  
DESIGNATION - Vice President - P&A  
NAME OF RESPONDENT- MANGALORE REFINERY & PETROCHEMICALS LTD  
ADDRESS - KUTHETHUR PO,  
- MANGALORE 574149 (KARNATAKA) INDIA  
TELEPHONE - 476313 ; FAX- 0824-476013 ; TELEX-

S.NO & SECTOR - 59 ;  
CONTACT PERSON - Mr Pramod Shukla  
DESIGNATION - Regional Sales Manager  
NAME OF RESPONDENT- ALLEN-BRADLEY INDIA LTD  
ADDRESS - 88, VI FLOOR S B TOWERS M G ROAD  
- BANGALORE 560001 (KARNATAKA) INDIA  
TELEPHONE - 5588060 ; FAX- 2251468 IC FAX 501 ; TELEX- 0845-2199 CSC IN

S.NO & SECTOR - 60 ;  
CONTACT PERSON - Mr V C Sridhar  
DESIGNATION - System Specialist  
NAME OF RESPONDENT- BELLS CONTROLS LIMITED  
ADDRESS - III FLOOR 37 WHITES ROAD  
- MADRAS 600014 (TAMIL NADU) INDIA  
TELEPHONE - 8523391 ; FAX- 044-831512 ; TELEX- 041-6343

S.NO & SECTOR - 61 ;  
CONTACT PERSON - Mr V P Singh  
DESIGNATION - Area Manager  
NAME OF RESPONDENT- Birla Kent-Taylor  
ADDRESS - 4 KHADER NAWAZ KHAN ROAD  
- MADRAS 600006 (TAMIL NADU) INDIA  
TELEPHONE - 8271688 ; FAX- 044-8251674 ; TELEX- 041-6547

S.NO & SECTOR - 62 ;  
CONTACT PERSON - Mr P Chandrasekar  
DESIGNATION - Sr Area Executive  
NAME OF RESPONDENT- Fisher-Rosemount (India) Limited  
ADDRESS - SUITE 103, JHAVER PLAZA 1-A NUNGAMBAKKAM HIGH ROAD  
- MADRAS 600034 (TAMIL NADU) INDIA  
TELEPHONE - 8276252 ; FAX- 044-8279334 ; TELEX- 041-8005 JSGR IN

S.NO & SECTOR - 63 ;  
CONTACT PERSON - Mr N Ramakrishnan  
DESIGNATION - Executive Manager - Quality Control  
NAME OF RESPONDENT- FISHER-XOMOX (INDIA) LIMITED  
ADDRESS - 147 KARAPAKKAM VILLAGE  
- MADRAS 600096 (TAMIL NADU) INDIA  
TELEPHONE - 4925455 ; FAX- 044-4926114 ; TELEX- 041-21026

S.NO & SECTOR - 64 ;  
CONTACT PERSON - Mr V K Ramakrishnan  
DESIGNATION - Sr. manager (D & E)  
NAME OF RESPONDENT- INSTRUMENTATION LTD.  
ADDRESS - KANJIKODE WEST  
- PALAKKAD DISTRICT 678623 (KERALA) INDIA  
TELEPHONE - 66127 ; FAX- 0491-66135 ; TELEX- 0852-260 ILP IN

S.NO & SECTOR - 65 ;  
CONTACT PERSON - Mr A V G Warriar  
DESIGNATION - General Manager (Works)  
NAME OF RESPONDENT- KELTRON CONTROLS  
ADDRESS - ARROOR  
- ALLEPPEY DIST 688534 (KERALA) INDIA  
TELEPHONE - (047887) 2323 ; FAX- ; TELEX- 0885-6730

S.NO & SECTOR - 66 ;  
CONTACT PERSON - Mr G P Nagaraj  
DESIGNATION - Dy. General Manager  
NAME OF RESPONDENT- LARSEN & TOUBRO LIMITED  
ADDRESS - MYSORE WORKS KIADB INDUSTRIAL AREA,HEBBAL  
- GOOTAHALLI, MYSORE 571186 (KARNATAKA) INDIA  
TELEPHONE - 42561 ; FAX- 0821-42172 ; TELEX- 0846-317 LTGM IN

S.NO & SECTOR - 67 ;  
CONTACT PERSON - Mr R Manivasakan  
DESIGNATION - Engineer - Design  
NAME OF RESPONDENT- MOORCO (INDIA) LIMITED  
ADDRESS - 89/4 VADUGAPATTI VILLAGE VIRALIMALAI  
- PUDUKOTTAI DIST. 621316 (TAMIL NADU) INDIA  
TELEPHONE - 20249 ; FAX- (04339) 20370 ; TELEX- 0455-396 MIL IN

S.NO & SECTOR - 68 ;  
CONTACT PERSON - Mr S Rajmurali  
DESIGNATION - Execution (RTG)  
NAME OF RESPONDENT- RAMCO SYSTEMS  
ADDRESS - 3 NUNGAMBAKKAM HIGH ROAD  
- MADRAS 600034 (TAMIL NADU) INDIA  
TELEPHONE - 8273770 ; FAX- ; TELEX-

S.NO & SECTOR - 69 ;  
CONTACT PERSON - Mr S Srikumar  
DESIGNATION - Engineer-Marketing  
NAME OF RESPONDENT- TATA HONEYWELL LTD.  
ADDRESS - Arjay Apex Centre, III FLOOR 24 COLLEGE ROAD  
- MADRAS 600006 (TAMIL NADU) INDIA  
TELEPHONE - 8255463 ; FAX- 044-8259837 ; TELEX- 041-25079 THLM IN

S.NO & SECTOR - 70 ;  
CONTACT PERSON - Mr R Ananthkrishnan  
DESIGNATION - Divisional Manager-System Marketing  
NAME OF RESPONDENT- Yokogawa Blue Star Limited  
ADDRESS - 40/4 LAVELLE ROAD  
- BANGALORE 560001 (KARNATAKA) INDIA  
TELEPHONE - 2271513 ; FAX- 080-2274270 ; TELEX- 0845-8702 YBCO IN

**ENCLOSURE 1**

**RESPONDENT SUMMARY**

- **Based on Training Programmes -  
Topicwise**
- **Based on Type of Training  
Programmes**

**USER SEGMENT**

RESPONDENT SUMMARY- USER SEGMENT  
 TRAINING PROGRAMME  
 TOPIC 1 - Technology Development & Future Trends in  
 Process Control Instrumentation

| S.NO | SECTOR | NAME OF RESPONDENT                      | LOCATION           |
|------|--------|---|--------------------|
| 2    | CEM    | ASSOCIATED CEMENT COMPANY LIMITED       | P.O WADI           |
| 4    | CEM    | MALABAR CEMENTS LIMITED                 | PALAKKAD DIST      |
| 5    | CEM    | RAASI CEMENTS LTD                       | NALAGONDA DIST.    |
| 6    | CEM    | THE TRAVANCORE CEMENTS LIMITED          | KOTTAYAM           |
| 7    | CHEM   | ANDHRA PETROCHEMICALS LIMITED           | VISHAKAPATNAM      |
| 9    | CHEM   | CHEMINOR DRUGS LIMITED                  | HYDERABAD          |
| 10   | CHEM   | DCW LIMITED                             | DIST CHIDAMBARANAR |
| 11   | CHEM   | HINDUSTAN ORGANIC CHEMICALS LIMITED     | DIST. ERNAKULAM    |
| 12   | CHEM   | Indian Additives Limited                | MADRAS             |
| 13   | CHEM   | MANALI PETROCHEMICAL LTD.,              | MADRAS             |
| 14   | CHEM   | SPIC                                    | MADRAS             |
| 16   | CHEM   | STILBENE CHEMICALS LIMITED              | DIST SRIKAKULAM    |
| 17   | CHEM   | THE TRAVANCORE-COCHIN CHEMICALS LTD.    | KOCHI              |
| 18   | CHEM   | TRICHY DISTILLERY AND CHEMICAL LIMITED  | TRICHY             |
| 19   | CHEM   | Tamilnadu Petroproducts Limited         | MADRAS             |
| 27   | ENGG   | APOLLO TYRES LTD.                       | DIST. TRICHUR      |
| 29   | ENGG   | KIRLOSKAR ELECTRIC COMPANY LTD          | BANGALORE          |
| 32   | ENGG   | PREMIER TYRES LIMITED                   | KALAMASSERY        |
| 35   | ENGG   | Steel Authority of India Limited        | SALEM              |
| 37   | FERT   | COROMANDEL FERTILIZERS LIMITED          | VISHAKAPATNAM      |
| 39   | FERT   | MANGALORE CHEMICALS & FERTILIZERS LTD   | MANGALORE          |
| 40   | FERT   | THE FERTILIZERS AND CHEMICALS           | KOCHI              |
| 41   | MET    | BINANI ZINC LIMITED                     | BINANIPURAM        |
| 43   | MET    | INDIAN ALUMINIUM CO. LTD.               | KALAMASERRY        |
| 44   | MET    | KUMAR METALLURGICAL CORPORATION LIMITED | NALAGONDA DIST.    |
| 46   | MET    | The Kerala Minerals and Metals Ltd.     | QUILON             |
| 47   | MISC   | EXCEL GLASS LIMITED                     | ALAPUZHA           |
| 48   | MISC   | HINDUSTAN LATEX LIMITED                 | THIRUVANANTHAPURAM |
| 49   | MISC   | MCDOWELL & CO. LTD.                     | ALAPUZHA DIST      |
| 52   | PAP    | HINDUSTAN NEWSPRINT LIMITED             | KOTTAYAM DIST.     |
| 53   | PAP    | SESHASAYEE PAPER AND BOARDS LIMITED     | ERODE              |
| 54   | PAP    | Tamil Nadu Newsprint and Papers Limited | TRICHY DIST.       |
| 55   | REF    | COCHIN REFINERIES LIMITED               | ERNAKULAM DISTRICT |
| 56   | REF    | HINDUSTAN PETROLEUM CORPORATION         | VISHAKAPATNAM      |
| 57   | REF    | MADRAS REFINERIES LIMITED               | MADRAS             |

RESPONDENT SUMMARY- USER SEGMENT  
 TRAINING PROGRAMME  
 TOPIC 2 - Exposure Course in PLC

| S.NO | SECTOR | NAME OF RESPONDENT                      | LOCATION           |
|------|--------|---|--------------------|
| 1    | CEM    | ASSOCIATED CEMENT COMPANY LIMITED       | COIMBATORE DIST    |
| 2    | CEM    | ASSOCIATED CEMENT COMPANY LIMITED       | P.O WADI           |
| 3    | CEM    | DALMIA CEMENTS (BHARAT) LTD             | DIST TRICHY        |
| 7    | CHEM   | ANDHRA PETROCHEMICALS LIMITED           | VISHAKAPATNAM      |
| 8    | CHEM   | BASF INDIA LIMITED                      | SURATHKAL          |
| 10   | CHEM   | DCW LIMITED                             | DIST CHIDAMBARANAR |
| 11   | CHEM   | HINDUSTAN ORGANIC CHEMICALS LIMITED     | DIST. ERNAKULAM    |
| 12   | CHEM   | Indian Additives Limited                | MADRAS             |
| 13   | CHEM   | MANALI PETROCHEMICAL LTD.,              | MADRAS             |
| 14   | CHEM   | SPIC                                    | MADRAS             |
| 15   | CHEM   | SRF LIMITED                             | MADRAS             |
| 16   | CHEM   | STILBENE CHEMICALS LIMITED              | DIST SRIKAKULAM    |
| 20   | ELET   | BPL                                     | BANGALORE          |
| 29   | ENGG   | KIRLOSKAR ELECTRIC COMPANY LTD          | BANGALORE          |
| 34   | ENGG   | RPG Telecom Limited                     | MYSORE             |
| 35   | ENGG   | Steel Authority of India Limited        | SALEM              |
| 37   | FERT   | COROMANDEL FERTILIZERS LIMITED          | VISHAKAPATNAM      |
| 38   | FERT   | MADRAS FERTILIZERS LIMITED              | MADRAS             |
| 39   | FERT   | MANGALORE CHEMICALS & FERTILIZERS LTD   | MANGALORE          |
| 43   | MET    | INDIAN ALUMINIUM CO. LTD.               | KALAMASERRY        |
| 44   | MET    | KUMAR METALLURGICAL CORPORATION LIMITED | NALAGONDA DIST.    |
| 46   | MET    | The Kerala Minerals and Metals Ltd.     | QUILON             |
| 49   | MISC   | MCDOWELL & CO. LTD.                     | ALAPUZHA DIST      |
| 50   | MISC   | MYSORE BREWERIES LIMITED                | BANGALORE          |
| 53   | PAP    | SESHASAYEE PAPER AND BOARDS LIMITED     | ERODE              |
| 58   | REF    | MANGALORE REFINERY & PETROCHEMICALS LTD | MANGALORE          |

RESPONDENT SUMMARY- USER SEGMENT  
 TRAINING PROGRAMME  
 TOPIC 3 - Basic Course in DCS

| S.NO | SECTOR | NAME OF RESPONDENT                      | LOCATION           |
|------|--------|---|--------------------|
| 1    | CEM    | ASSOCIATED CEMENT COMPANY LIMITED       | COIMBATORE DIST    |
| 2    | CEM    | ASSOCIATED CEMENT COMPANY LIMITED       | P.O WADI           |
| 3    | CEM    | DALMIA CEMENTS (BHARAT) LTD             | DIST TRICHY        |
| 4    | CEM    | MALABAR CEMENTS LIMITED                 | PALAKKAD DIST      |
| 7    | CHEM   | ANDHRA PETROCHEMICALS LIMITED           | VISHAKAPATNAM      |
| 8    | CHEM   | BASF INDIA LIMITED                      | SURATHKAL          |
| 10   | CHEM   | DCW LIMITED                             | DIST CHIDAMBARANAR |
| 11   | CHEM   | HINDUSTAN ORGANIC CHEMICALS LIMITED     | DIST. ERNAKULAM    |
| 12   | CHEM   | Indian Additives Limited                | MADRAS             |
| 14   | CHEM   | SPIC                                    | MADRAS             |
| 16   | CHEM   | STILBENE CHEMICALS LIMITED              | DIST SRIKAKULAM    |
| 17   | CHEM   | THE TRAVANCORE-COCHIN CHEMICALS LTD.    | KOCHI              |
| 27   | ENGG   | APOLLO TYRES LTD.                       | DIST. TRICHUR      |
| 29   | ENGG   | KIRLOSKAR ELECTRIC COMPANY LTD          | BANGALORE          |
| 35   | ENGG   | Steel Authority of India Limited        | SALEM              |
| 37   | FERT   | COROMANDEL FERTILIZERS LIMITED          | VISHAKAPATNAM      |
| 39   | FERT   | MANGALORE CHEMICALS & FERTILIZERS LTD   | MANGALORE          |
| 41   | MET    | BINANI ZINC LIMITED                     | BINANIPURAM        |
| 46   | MET    | The Kerala Minerals and Metals Ltd.     | QUILON             |
| 52   | PAP    | HINDUSTAN NEWSPRINT LIMITED             | KOTTAYAM DIST.     |
| 53   | PAP    | SESHASAYEE PAPER AND BOARDS LIMITED     | ERODE              |
| 54   | PAP    | Tamil Nadu Newsprint and Papers Limited | TRICHY DIST.       |
| 55   | REF    | COCHIN REFINERIES LIMITED               | ERNAKULAM DISTRICT |
| 56   | REF    | HINDUSTAN PETROLEUM CORPORATION         | VISHAKAPATNAM      |
| 58   | REF    | MANGALORE REFINERY & PETROCHEMICALS LTD | MANGALORE          |



RESPONDENT SUMMARY- USER SEGMENT  
 TRAINING PROGRAMME  
 TOPIC 4 - Fundamentals of Instrumentation

| S.NO | SECTOR | NAME OF RESPONDENT                      | LOCATION           |
|------|--------|---|--------------------|
| 1    | CEM    | ASSOCIATED CEMENT COMPANY LIMITED       | COIMBATORE DIST    |
| 3    | CEM    | DALMIA CEMENTS (BHARAT) LTD             | DIST TRICHY        |
| 5    | CEM    | RAASI CEMENTS LTD                       | NALAGONDA DIST.    |
| 8    | CHEM   | BASF INDIA LIMITED                      | SURATHKAL          |
| 9    | CHEM   | CHEMINOR DRUGS LIMITED                  | HYDERABAD          |
| 11   | CHEM   | HINDUSTAN ORGANIC CHEMICALS LIMITED     | DIST. ERNAKULAM    |
| 32   | ENGG   | PREMIER TYRES LIMITED                   | KALAMASSERY        |
| 35   | ENGG   | Steel Authority of India Limited        | SALEM              |
| 40   | FERT   | THE FERTILIZERS AND CHEMICALS           | KOCHI              |
| 41   | MET    | BINANI ZINC LIMITED                     | BINANIPURAM        |
| 43   | MET    | INDIAN ALUMINIUM CO. LTD.               | KALAMASERRY        |
| 44   | MET    | KUMAR METALLURGICAL CORPORATION LIMITED | NALAGONDA DIST.    |
| 53   | PAP    | SESHASAYEE PAPER AND BOARDS LIMITED     | ERODE              |
| 54   | PAP    | Tamil Nadu Newsprint and Papers Limited | TRICHY DIST.       |
| 55   | REF    | COCHIN REFINERIES LIMITED               | ERNAKULAM DISTRICT |
| 56   | REF    | HINDUSTAN PETROLEUM CORPORATION         | VISHAKAPATNAM      |
| 58   | REF    | MANGALORE REFINERY & PETROCHEMICALS LTD | MANGALORE          |

RESPONDENT SUMMARY- USER SEGMENT  
 TRAINING PROGRAMME  
 TOPIC 5 - Digital Instrumentation

| S.NO | SECTOR | NAME OF RESPONDENT                      | LOCATION           |
|------|--------|---|--------------------|
| 3    | CEM    | DALMIA CEMENTS (BHARAT) LTD             | DIST TRICHY        |
| 37   | FERT   | COROMANDEL FERTILIZERS LIMITED          | VISHAKAPATNAM      |
| 44   | MET    | KUMAR METALLURGICAL CORPORATION LIMITED | NALAGONDA DIST.    |
| 53   | PAP    | SESHASAYEE PAPER AND BOARDS LIMITED     | ERODE              |
| 54   | PAP    | Tamil Nadu Newsprint and Papers Limited | TRICHY DIST.       |
| 55   | REF    | COCHIN REFINERIES LIMITED               | ERNAKULAM DISTRICT |
| 56   | REF    | HINDUSTAN PETROLEUM CORPORATION         | VISHAKAPATNAM      |
| 58   | REF    | MANGALORE REFINERY & PETROCHEMICALS LTD | MANGALORE          |

RESPONDENT SUMMARY- USER SEGMENT  
 TRAINING PROGRAMME  
 TOPIC 6 - Calibration Standards & Techniques

| S.NO | SECTOR | NAME OF RESPONDENT                     | LOCATION        |
|------|--------|--|-----------------|
| 3    | CEM    | DALMIA CEMENTS (BHARAT) LTD            | DIST TRICHY     |
| 11   | CHEM   | HINDUSTAN ORGANIC CHEMICALS LIMITED    | DIST. ERNAKULAM |
| 15   | CHEM   | SRF LIMITED                            | MADRAS          |
| 25   | ELET   | PREMIER INSTRUMENTS & CONTROLS LIMITED | COIMBATORE      |
| 41   | MET    | BINANI ZINC LIMITED                    | BINANIPURAM     |
| 47   | MISC   | EXCEL GLASS LIMITED                    | ALAPUZHA        |
| 49   | MISC   | MCDOWELL & CO. LTD.                    | ALAPUZHA DIST   |
| 53   | PAP    | SESHASAYEE PAPER AND BOARDS LIMITED    | ERODE           |
| 56   | REF    | HINDUSTAN PETROLEUM CORPORATION        | VISHAKAPATNAM   |

RESPONDENT SUMMARY- USER SEGMENT  
 TRAINING PROGRAMME  
 TOPIC 7 - Microprocessor Based Control System

| S.NO | SECTOR | NAME OF RESPONDENT                       | LOCATION           |
|------|--------|--|--------------------|
| 23   | ELET   | KELTRON, SPECIAL PRODUCTS<br>DIVISION    | THIRUVANANTHAPURAM |
| 34   | ENGG   | RPG Telecom Limited                      | MYSORE             |
| 39   | FERT   | MANGALORE CHEMICALS &<br>FERTILIZERS LTD | MANGALORE          |
| 50   | MISC   | MYSORE BREWERIES LIMITED                 | BANGALORE          |
| 52   | PAP    | HINDUSTAN NEWSPRINT LIMITED              | KOTTAYAM DIST.     |

RESPONDENT SUMMARY- USER SEGMENT  
 TRAINING PROGRAMME  
 TOPIC 8 - Control Valve Design

| S.NO | SECTOR | NAME OF RESPONDENT                        | LOCATION           |
|------|--------|---|--------------------|
| 3    | CEM    | DALMIA CEMENTS (BHARAT) LTD               | DIST TRICHY        |
| 10   | CHEM   | DCW LIMITED                               | DIST CHIDAMBARANAR |
| 18   | CHEM   | TRICHY DISTILLERY AND CHEMICAL<br>LIMITED | TRICHY             |
| 29   | ENGG   | KIRLOSKAR ELECTRIC COMPANY LTD            | BANGALORE          |
| 35   | ENGG   | Steel Authority of India<br>Limited       | SALEM              |

RESPONDENT SUMMARY- USER SEGMENT  
 TRAINING PROGRAMME  
 TOPIC 9 - Maintenance of Controllers

| S.NO | SECTOR | NAME OF RESPONDENT                      | LOCATION           |
|------|--------|---|--------------------|
| 34   | ENGG   | RPG Telecom Limited                     | MYSORE             |
| 45   | MET    | TRAVANCORE TITANIUM PRODUCTS<br>LIMITED | THIRUVANANTHAPURAM |
| 47   | MISC   | EXCEL GLASS LIMITED                     | ALAPIJZHA          |
| 48   | MISC   | HINDUSTAN LATEX LIMITED                 | THIRUVANANTHAPURAM |
| 50   | MISC   | MYSORE BREWERIES LIMITED                | BANGALORE          |

RESPONDENT SUMMARY- USER SEGMENT  
 TRAINING PROGRAMME  
 TOPIC 10 - New Instruments (Smart Transmitters)

| S.NO | SECTOR | NAME OF RESPONDENT                  | LOCATION           |
|------|--------|-------------------------------------|--------------------|
| 3    | CEM    | DALMIA CEMENTS (BHARAT) LTD         | DIST TRICHY        |
| 11   | CHEM   | HINDUSTAN ORGANIC CHEMICALS LIMITED | DIST. ERNAKULAM    |
| 29   | ENGG   | KIRLOSKAR ELECTRIC COMPANY LTD      | BANGALORE          |
| 53   | PAP    | SESHASAYEE PAPER AND BOARDS LIMITED | ERODE              |
| 55   | REF    | COCHIN REFINERIES LIMITED           | ERNAKULAM DISTRICT |

RESPONDENT SUMMARY- USER SEGMENT  
 TRAINING PROGRAMME  
 TOPIC 11 - Gas Chromatography

| S.NO | SECTOR | NAME OF RESPONDENT                  | LOCATION        |
|------|--------|-------------------------------------|-----------------|
| 2    | CEM    | ASSOCIATED CEMENT COMPANY LIMITED   | P.O WADI        |
| 3    | CEM    | DALMIA CEMENTS (BHARAT) LTD         | DIST TRICHY     |
| 11   | CHEM   | HINDUSTAN ORGANIC CHEMICALS LIMITED | DIST. ERNAKULAM |

RESPONDENT SUMMARY- USER SEGMENT  
 TRAINING PROGRAMME  
 TOPIC 12 - Loop Tuning

| S.NO | SECTOR | NAME OF RESPONDENT              | LOCATION      |
|------|--------|---------------------------------|---------------|
| 29   | ENGG   | KIRLOSKAR ELECTRIC COMPANY LTD  | BANGALORE     |
| 41   | MET    | BINANI ZINC LIMITED             | BINANIPURAM   |
| 56   | REF    | HINDUSTAN PETROLEUM CORPORATION | VISHAKAPATNAM |

RESPONDENT SUMMARY- USER SEGMENT  
TRAINING PROGRAMME  
TOPIC 13 - Card Replacing

| S.NO | SECTOR | NAME OF RESPONDENT                  | LOCATION           |
|------|--------|-------------------------------------|--------------------|
| 11   | CHEM   | HINDUSTAN ORGANIC CHEMICALS LIMITED | DIST. ERNAKULAM    |
| 55   | REF    | COCHIN REFINERIES LIMITED           | ERNAKULAM DISTRICT |

RESPONDENT SUMMARY- USER SEGMENT  
TRAINING PROGRAMME  
TOPIC 14 Computer Networking for AC Drives

| S.NO | SECTOR | NAME OF RESPONDENT                 | LOCATION           |
|------|--------|------------------------------------|--------------------|
| 23   | ELET   | KELTRON, SPECIAL PRODUCTS DIVISION | THIRUVANANTHAPURAM |
| 29   | ENGG   | KIRLOSKAR ELECTRIC COMPANY LTD     | BANGALORE          |

RESPONDENT SUMMARY- USER SEGMENT  
TRAINING PROGRAMME  
TOPIC 15 - PC Based Preventive Maintenance

| S.NO | SECTOR | NAME OF RESPONDENT        | LOCATION           |
|------|--------|---------------------------|--------------------|
| 55   | REF    | COCHIN REFINERIES LIMITED | ERNAKULAM DISTRICT |

RESPONDENT SUMMARY- USER SEGMENT  
 TRAINING PROGRAMME  
 TOPIC 16 - Manufacturing Technology in Electronics  
 TOPIC 17 - Flexible Manufacturing Systems

| S.NO | SECTOR | NAME OF RESPONDENT                     | LOCATION   |
|------|--------|--|------------|
| 20   | ELET   | BPL                                    | BANGALORE  |
| 21   | ELET   | CONTROLS & DRIVES COIMBATORE (P) LTD., | COIMBATORE |
| 24   | ELET   | O/E/N Connectors Ltd                   | VIA COCHIN |
| 25   | ELET   | PREMIER INSTRUMENTS & CONTROLS LIMITED | COIMBATORE |
| 26   | ELET   | ROOTS INDUSTRIES LIMITED               | COIMBATORE |
| 28   | ENGG   | Ashok Leyland Limited                  | MADRAS     |
| 30   | ENGG   | Lakshmi Electrical Control Systems     | COIMBATORE |
| 31   | ENGG   | Lakshmi Machine Works Limited          | COIMBATORE |
| 33   | ENGG   | ROYAL ENFIELD MOTORS LIMITED           | MADRAS     |
| 36   | ENGG   | TEXTTOOL COMPANY LIMITED               | COIMBATORE |

RESPONDENT SUMMARY- USER SEGMENT  
 TRAINING PROGRAMME  
 TOPIC 18 - Semiconductor Technology  
 (Insulated Gate Bipolar Transistors)

| S.NO | SECTOR | NAME OF RESPONDENT                 | LOCATION            |
|------|--------|------------------------------------|---------------------|
| 23   | ELET   | KELTRON, SPECIAL PRODUCTS DIVISION | THIRUVANANTHAPIURAM |

RESPONDENT SUMMARY- USER SEGMENT  
 TYPE OF TRAINING PROGRAMME  
 "IN-HOUSE"

| S.NO | SECTOR | NAME OF RESPONDENT                         | LOCATION           | DURATION<br>DAYS |
|------|--------|--|--------------------|------------------|
| 7    | CHEM   | ANDHRA PETROCHEMICALS LIMITED              | VISHAKAPATNAM      | 4                |
| 10   | CHEM   | DCW LIMITED                                | DIST CHIDAMBARANAR | 3                |
| 16   | CHEM   | STILBENE CHEMICALS LIMITED                 | DIST SRIKAKULAM    | 7                |
| 25   | ELET   | PREMIER INSTRUMENTS & CONTROLS<br>LIMITED  | COIMBATORE         | 4                |
| 31   | ENGG   | Lakshmi Machine Works Limited              | COIMBATORE         | 2                |
| 33   | ENGG   | ROYAL ENFIELD MOTORS LIMITED               | MADRAS             | 3                |
| 34   | ENGG   | RPG Telecom Limited                        | MYSORE             | 6                |
| 36   | ENGG   | TEXTTOOL COMPANY LIMITED                   | COIMBATORE         | 2                |
| 37   | FERT   | COROMANDEL FERTILIZERS LIMITED             | VISHAKAPATNAM      | 4                |
| 40   | FERT   | THE FERTILIZERS AND CHEMICALS              | KOCHI              | 3                |
| 44   | MET    | KUMAR METALLURGICAL<br>CORPORATION LIMITED | NALAGONDA DIST.    | 180              |
| 46   | MET    | The Kerala Minerals and Metals<br>Ltd.     | QUILON             | 30               |
| 52   | PAP    | HINDUSTAN NEWSPRINT LIMITED                | KOTTAYAM DIST.     | 10               |
| 56   | REF    | HINDUSTAN PETROLEUM<br>CORPORATION         | VISHAKAPATNAM      | 7                |
| 58   | REF    | MANGALORE REFINERY &<br>PETROCHEMICALS LTD | MANGALORE          | 0                |

RESPONDENT SUMMARY- USER SEGMENT  
TYPE OF TRAINING PROGRAMME  
"CAMPUS BASED"

| S.NO | SECTOR | NAME OF RESPONDENT                      | LOCATION           | DURATION<br>DAYS |
|------|--------|---|--------------------|------------------|
| 1    | CEM    | ASSOCIATED CEMENT COMPANY LIMITED       | COIMBATORE DIST    | 7                |
| 2    | CEM    | ASSOCIATED CEMENT COMPANY LIMITED       | P.O WADI           | 3                |
| 3    | CEM    | DALMIA CEMENTS (BHARAT) LTD             | DIST TRICHY        | 4                |
| 4    | CEM    | MALABAR CEMENTS LIMITED                 | PALAKKAD DIST      | 5                |
| 8    | CHEM   | BASF INDIA LIMITED                      | SURATHKAL          | 6                |
| 9    | CHEM   | CHEMINOR DRUGS LIMITED                  | HYDERABAD          | 3                |
| 11   | CHEM   | HINDUSTAN ORGANIC CHEMICALS LIMITED     | DIST. ERNAKULAM    | 7                |
| 12   | CHEM   | Indian Additives Limited                | MADRAS             | 6                |
| 13   | CHEM   | MANALI PETROCHEMICAL LTD.,              | MADRAS             | 5                |
| 14   | CHEM   | SPIC                                    | MADRAS             | 3                |
| 15   | CHEM   | SRF LIMITED                             | MADRAS             | 7                |
| 18   | CHEM   | TRICHY DISTILLERY AND CHEMICAL LIMITED  | TRICHY             | 3                |
| 20   | ELET   | BPL                                     | BANGALORE          | 3                |
| 21   | ELET   | CONTROLS & DRIVES COIMBATORE (P) LTD.,  | COIMBATORE         | 7                |
| 22   | ELET   | INDCHEM INSTRUMENTATION LIMITED         | MADRAS             | 30               |
| 23   | ELET   | KELTRON, SPECIAL PRODUCTS DIVISION      | THIRUVANANTHAPURAM | 5                |
| 24   | ELET   | O/E/N Connectors Ltd                    | VIA COCHIN         | 7                |
| 25   | ELET   | PREMIER INSTRUMENTS & CONTROLS LIMITED  | COIMBATORE         | 5                |
| 26   | ELET   | ROOTS INDUSTRIES LIMITED                | COIMBATORE         | 3                |
| 27   | ENGG   | APOLLO TYRES LTD.                       | DIST. TRICHUR      | 6                |
| 29   | ENGG   | KIRLOSKAR ELECTRIC COMPANY LTD          | BANGALORE          | 21               |
| 32   | ENGG   | PREMIER TYRES LIMITED                   | KALAMASSERY        | 10               |
| 33   | ENGG   | ROYAL ENFIELD MOTORS LIMITED            | MADRAS             | 3                |
| 35   | ENGG   | Steel Authority of India Limited        | SALEM              | 7                |
| 36   | ENGG   | TEXTTOOL COMPANY LIMITED                | COIMBATORE         | 3                |
| 37   | FERT   | COROMANDEL FERTILIZERS LIMITED          | VISHAKAPATNAM      | 4                |
| 38   | FERT   | MADRAS FERTILIZERS LIMITED              | MADRAS             | 7                |
| 39   | FERT   | MANGALORE CHEMICALS & FERTILIZERS LTD   | MANGALORE          | 3                |
| 40   | FERT   | THE FERTILIZERS AND CHEMICALS           | KOCHI              | 7                |
| 41   | MET    | BINANI ZINC LIMITED                     | BINANIPURAM        | 3                |
| 44   | MET    | KUMAR METALLURGICAL CORPORATION LIMITED | NALAGONDA DIST.    | 35               |
| 45   | MET    | TRAVANCORE TITANIUM PRODUCTS LIMITED    | THIRUVANANTHAPURAM | 5                |
| 46   | MET    | The Kerala Minerals and Metals Ltd.     | QUILON             | 5                |
| 47   | MISC   | EXCEL GLASS LIMITED                     | ALAPUZHA           | 4                |
| 48   | MISC   | HINDUSTAN LATEX LIMITED                 | THIRUVANANTHAPURAM | 10               |
| 49   | MISC   | MCDOWELL & CO. LTD.                     | ALAPUZHA DIST      | 3                |
| 50   | MISC   | MYSORE BREWERIES LIMITED                | BANGALORE          | 6                |



|        |  |                    |   |
|--------|--|--------------------|---|
| 52 PAP | HINDUSTAN NEWSPRINT LIMITED                | KOTTAYAM DIST.     | 3 |
| 53 PAP | SESHASAYEE PAPER AND BOARDS<br>LIMITED     | ERODE              | 3 |
| 54 PAP | Tamil Nadu Newsprint and<br>Papers Limited | TRICHY DIST.       | 7 |
| 55 REF | COCHIN REFINERIES LIMITED                  | ERNAKULAM DISTRICT | 3 |
| 58 REF | MANGALORE REFINERY &<br>PETROCHEMICALS LTD | MANGALORE          | 4 |

RESPONDENT SUMMARY- USER SEGMENT  
TYPE OF TRAINING PROGRAMME  
"SEMINAR"

| S.NO | SECTOR | NAME OF RESPONDENT                      | LOCATION           |
|------|--------|---|--------------------|
| 2    | CEM    | ASSOCIATED CEMENT COMPANY LIMITED       | P.O WADI           |
| 4    | CEM    | MALABAR CEMENTS LIMITED                 | PALAKKAD DIST      |
| 5    | CEM    | RAASI CEMENTS LTD                       | NALAGONDA DIST.    |
| 6    | CEM    | THE TRAVANCORE CEMENTS LIMITED          | KOTTAYAM           |
| 7    | CHEM   | ANDHRA PETROCHEMICALS LIMITED           | VISHAKAPATNAM      |
| 9    | CHEM   | CHEMINOR DRUGS LIMITED                  | HYDERABAD          |
| 10   | CHEM   | DCW LIMITED                             | DIST CHIDAMBARANAR |
| 11   | CHEM   | HINDUSTAN ORGANIC CHEMICALS LIMITED     | DIST. ERNAKULAM    |
| 12   | CHEM   | Indian Additives Limited                | MADRAS             |
| 13   | CHEM   | MANALI PETROCHEMICAL LTD.,              | MADRAS             |
| 14   | CHEM   | SPIC                                    | MADRAS             |
| 16   | CHEM   | STILBENE CHEMICALS LIMITED              | DIST SRIKAKULAM    |
| 17   | CHEM   | THE TRAVANCORE-COCHIN CHEMICALS LTD.    | KOCHI              |
| 18   | CHEM   | TRICHY DISTILLERY AND CHEMICAL LIMITED  | TRICHY             |
| 19   | CHEM   | Tamilnadu Petroproducts Limited         | MADRAS             |
| 25   | ELET   | PREMIER INSTRUMENTS & CONTROLS LIMITED  | COIMBATORE         |
| 27   | ENGG   | APOLLO TYRES LTD.                       | DIST. TRICHUR      |
| 28   | ENGG   | Ashok Leyland Limited                   | MADRAS             |
| 29   | ENGG   | KIRLOSKAR ELECTRIC COMPANY LTD          | BANGALORE          |
| 30   | ENGG   | Lakshmi Electrical Control Systems      | COIMBATORE         |
| 31   | ENGG   | Lakshmi Machine Works Limited           | COIMBATORE         |
| 32   | ENGG   | PREMIER TYRES LIMITED                   | KALAMASSERY        |
| 33   | ENGG   | ROYAL ENFIELD MOTORS LIMITED            | MADRAS             |
| 35   | ENGG   | Steel Authority of India Limited        | SALEM              |
| 36   | ENGG   | TEXTOL COMPANY LIMITED                  | COIMBATORE         |
| 37   | FERT   | COROMANDEL FERTILIZERS LIMITED          | VISHAKAPATNAM      |
| 39   | FERT   | MANGALORE CHEMICALS & FERTILIZERS LTD   | MANGALORE          |
| 40   | FERT   | THE FERTILIZERS AND CHEMICALS           | KOCHI              |
| 41   | MET    | BINANI ZINC LIMITED                     | BINANIPURAM        |
| 43   | MET    | INDIAN ALUMINIUM CO. LTD.               | KALAMASERRY        |
| 44   | MET    | KUMAR METALLURGICAL CORPORATION LIMITED | NALAGONDA DIST.    |
| 46   | MET    | The Kerala Minerals and Metals Ltd.     | QUILON             |
| 47   | MISC   | EXCEL GLASS LIMITED                     | ALAPUZHA           |
| 48   | MISC   | HINDUSTAN LATEX LIMITED                 | THIRUVANANTHAPURAM |
| 49   | MISC   | MCDOWELL & CO. LTD.                     | ALAPUZHA DIST      |
| 52   | PAP    | HINDUSTAN NEWSPRINT LIMITED             | KOTTAYAM DIST.     |
| 53   | PAP    | SESHASAYEE PAPER AND BOARDS LIMITED     | ERODI              |
| 54   | PAP    | Tamil Nadu Newsprint and Papers Limited | TRICHY DIST.       |

55 REF  
57 REF

COCHIN REFINERIES LIMITED  
MADRAS REFINERIES LIMITED

ERNAKULAM DISTRICT  
MADRAS

RESPONDENT SUMMARY- USER SEGMENT  
TYPE OF TRAINING PROGRAMME  
"WORKSHOP"

| S.NO | SECTOR | NAME OF RESPONDENT                       | LOCATION  |
|------|--------|--|-----------|
| 20   | ELET   | BPL                                      | BANGALORE |
| 29   | ENGG   | KIRLOSKAR ELECTRIC COMPANY LTD           | BANGALORE |
| 33   | ENGG   | ROYAL ENFIELD MOTORS LIMITED             | MADRAS    |
| 34   | ENGG   | RPG Telecom Limited                      | MYSORE    |
| 39   | FERT   | MANGALORE CHEMICALS &<br>FERTILIZERS LTD | MANGALORE |
| 46   | MET    | The Kerala Minerals and Metals<br>Ltd.   | QUILON    |

**ENCLOSURE 2**

**RESPONDENT SUMMARY**

**Based on Induction Training  
Programme**

**USER SEGMENT**

RESPONDENT SUMMARY- USER SEGMENT  
 TYPE OF TRAINING PROGRAMME  
 "INDUCTION PROGRAMME"

| S.NO | SECTOR | NAME OF RESPONDENT                      | LOCATION           | DURATION<br>DAYS |
|------|--------|---|--------------------|------------------|
| 2    | CEM    | ASSOCIATED CEMENT COMPANY LIMITED       | P.O WADI           | 21               |
| 4    | CEM    | MALABAR CEMENTS LIMITED                 | PALAKKAD DIST      | 30               |
| 5    | CEM    | RAASI CEMENTS LTD                       | NALAGONDA DIST.    | 30               |
| 7    | CHEM   | ANDHRA PETROCHEMICALS LIMITED           | VISHAKAPATNAM      | 90               |
| 8    | CHEM   | BASF INDIA LIMITED                      | SURATHKAL          | 90               |
| 13   | CHEM   | MANALI PETROCHEMICAL LTD.,              | MADRAS             | 30               |
| 15   | CHEM   | SRF LIMITED                             | MADRAS             | 15               |
| 16   | CHEM   | STILBENE CHEMICALS LIMITED              | DIST SRIKAKULAM    | 21               |
| 24   | ELET   | O/E/N Connectors Ltd                    | VIA COCHIN         | 7                |
| 27   | ENGG   | APOLLO TYRES LTD.                       | DIST. TRICHUR      | 90               |
| 34   | ENGG   | RPG Telecom Limited                     | MYSORE             | 6                |
| 35   | ENGG   | Steel Authority of India Limited        | SALEM              | 30               |
| 39   | FERT   | MANGALORE CHEMICALS & FERTILIZERS LTD   | MANGALORE          | 6                |
| 44   | MET    | KUMAR METALLURGICAL CORPORATION LIMITED | NALAGONDA DIST.    | 180              |
| 47   | MISC   | EXCEL GLASS LIMITED                     | ALAPUZHA           | 15               |
| 53   | PAP    | SESHASAYEE PAPER AND BOARDS LIMITED     | ERODE              | 30               |
| 55   | REF    | COCHIN REFINERIES LIMITED               | ERNAKULAM DISTRICT | 21               |
| 58   | REF    | MANGALORE REFINERY & PETROCHEMICALS LTD | MANGALORE          | 180              |

**ENCLOSURE 3**

**RESPONDENT SUMMARY**

**CONSULTANCY SERVICES**

■ **Based on System Modification in Progress**

■ **Based on Future Plans of Respondents for PC&I**

**USER SEGMENT**

RESPONDENT SUMMARY  
SYSTEM MODIFICATION IN PROGRESS - USER SEGMENT

| S.NO | SECTOR | NAME OF RESPONDENT                      | LOCATION           |
|------|--------|---|--------------------|
| 2    | CEM    | ASSOCIATED CEMENT COMPANY LIMITED       | P.O WADI           |
| 4    | CEM    | MALABAR CEMENTS LIMITED                 | PALAKKAD DIST      |
| 6    | CEM    | THE TRAVANCORE CEMENTS LIMITED          | KOTTAYAM           |
| 7    | CHEM   | ANDHRA PETROCHEMICALS LIMITED           | VISHAKAPATNAM      |
| 10   | CHEM   | DCW LIMITED                             | DIST CHIDAMBARANAR |
| 11   | CHEM   | HINDUSTAN ORGANIC CHEMICALS LIMITED     | DIST. ERNAKULAM    |
| 15   | CHEM   | SRF LIMITED                             | MADRAS             |
| 17   | CHEM   | THE TRAVANCORE-COCHIN CHEMICALS LTD.    | KOCHI              |
| 18   | CHEM   | TRICHY DISTILLERY AND CHEMICAL LIMITED  | TRICHY             |
| 27   | ENGG   | APOLLO TYRES LTD.                       | DIST. TRICHUR      |
| 34   | ENGG   | RPG Telecom Limited                     | MYSORE             |
| 35   | ENGG   | Steel Authority of India Limited        | SALEM              |
| 38   | FERT   | MADRAS FERTILIZERS LIMITED              | MADRAS             |
| 39   | FERT   | MANGALORE CHEMICALS & FERTILIZERS LTD   | MANGALORE          |
| 41   | MET    | BINANI ZINC LIMITED                     | BINANIPURAM        |
| 46   | MET    | The Kerala Minerals and Metals Ltd.     | QUILON             |
| 53   | PAP    | SESHASAYEE PAPER AND BOARDS LIMITED     | ERODE              |
| 54   | PAP    | Tamil Nadu Newsprint and Papers Limited | TRICHY DIST.       |
| 56   | REF    | HINDUSTAN PETROLEUM CORPORATION         | VISHAKAPATNAM      |
| 57   | REF    | MADRAS REFINERIES LIMITED               | MADRAS             |



RESPONDENTS SUMMARY -  
 RESPONDENTS WITH FUTURE PLANS  
 IN PC&I

| S.NO | SECTOR | NAME OF RESPONDENT                        | LOCATION           |
|------|--------|---|--------------------|
| 4    | CEM    | MALABAR CEMENTS LIMITED                   | PALAKKAD DIST      |
| 10   | CHEM   | DCW LIMITED                               | DIST CHIDAMBARANAR |
| 15   | CHEM   | SRF LIMITED                               | MADRAS             |
| 17   | CHEM   | THE TRAVANCORE-COCHIN<br>CHEMICALS LTD.   | KOCHI              |
| 18   | CHEM   | TRICHY DISTILLERY AND CHEMICAL<br>LIMITED | TRICHY             |
| 27   | ENGG   | APOLLO TYRES LTD.                         | DIST. TRICHUR      |
| 39   | FERT   | MANGALORE CHEMICALS &<br>FERTILIZERS LTD  | MANGALORE          |
| 46   | MET    | The Kerala Minerals and Metals<br>Ltd.    | QUILON             |
| 53   | PAP    | SESHASAYEE PAPER AND BOARDS<br>LIMITED    | ERODE              |

**ENCLOSURE 4**

**RESPONDENT SUMMARY**

**PRODUCT DESIGN AND DEVELOPMENT IN PC&I**

**SUPPLIER SEGMENT**

RESPONDENTS SUMMARY - SUPPLIER SEGMENT  
RESPONDENTS TO ASSOCIATE FOR  
PRODUCT DESIGN AND DEVELOPMENT IN PC&I

| S.NO | NAME OF RESPONDENT      | LOCATION           |
|------|-------------------------|--------------------|
| 64   | INSTRUMENTATION LTD.    | PALAKKAD DISTRICT  |
| 66   | LARSEN & TOUBRO LIMITED | GOOTAHALLI, MYSORE |
| 67   | MOORCO (INDIA) LIMITED  | PUDUKOTTAI DIST.   |