



Electronic Telephone Exchange for the Visually Handicapped

Student: G.N. Sriram

Guide: A.G. Rao

The aim was to redesign the console of the EPABX system for easy operation by the visually handicapped. The C-DOT (128 line) system was taken as the basic unit with minimum changes in electronics.

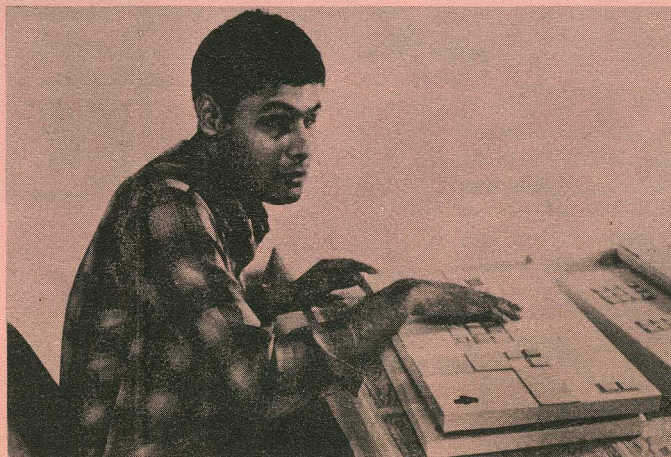
Study and analysis of the C-DOT system; visually handicapped persons operating the telephone exchange; and evaluation of the design concepts by the visually handicapped formed the background of the project. The evaluation phase was video-taped and analysed leading to features which are incorporated in the final design.

It was found that tactile graphics on the console is preferable to audio electronic feedbacks - as this gives an indication of the key function before actuation rather than after actuation.

The initial ideas generated were based on tests by the normally sighted and blind folded persons. However, when these concepts were evaluated by the actually visually handicapped, it was found the raised tactile graphics solutions were too bold; and something much simpler and more subtle was required. The use of reference points by the blind for identifying and locating keys in space was also studied. Tests were also made with various types of tactile graphics: raised numbers; difference in heights of keys; braille; different textures; symbols representing numbers etc. The raised lettering was preferred; though some letters were found to be more easy to identify than others.

In the final design, the location and identification of the keys was improved by larger key size; lowering of keypad area as compared to surroundings; provision of an acrylic sheet in the keypad zone to give a different textures; and use of raised graphics on certain keys. The proposed unit, which is equally suitable for use by the normally sighted persons, has a foldable display unit which can be used when necessary. The console angle is adjustable from 10 to 15° to the horizontal. The handset has been separated from the console unit & rests on another unit which can be placed to suit left or right handed operation. Earphone - microphone set also can be used in place of handset, if required.

*Tactile concept
being tested
with visually
handicapped user*



Electronic Braille Learning Equipment

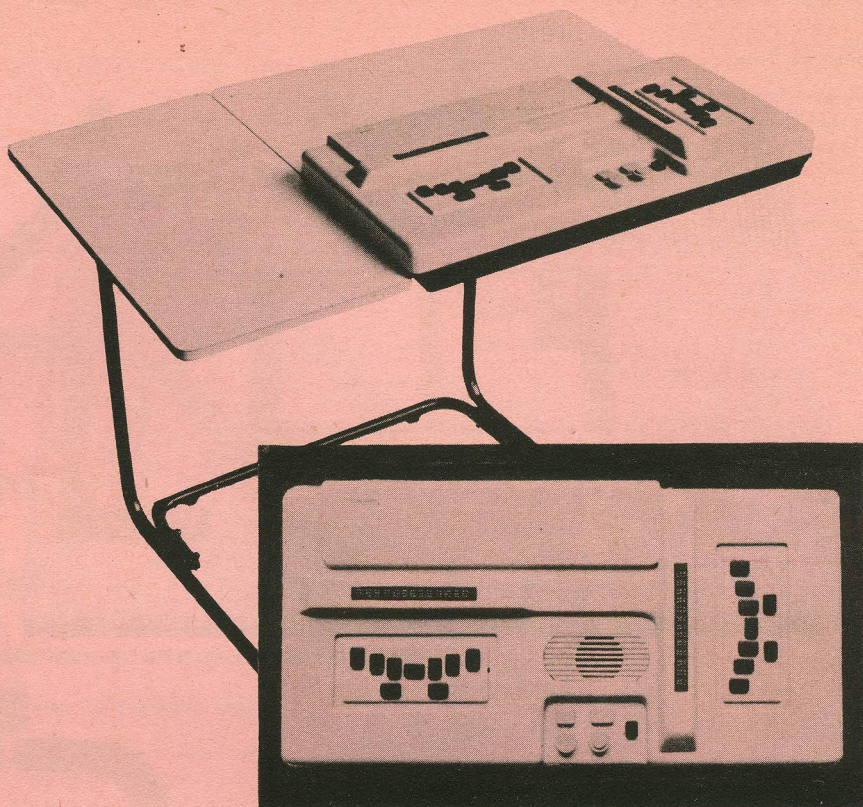
Student: Kashmira Rathod

Guide: Mohan Bhandari

The equipment is a modification of a product which was designed as a personal braille trainer for the visually handicapped at CEDT, Indian Institute of Science. The original product consisted of two basic units: a) a braille keyboard that generates a tactual output in the form of a braille code on the braille display, and b) an ASCII keyboard to train the blind in the use of normal typewriter. Only a first prototype was made and not yet tested by the blind people. The product was priced around Rs.20,000/- putting it beyond the scope of personal ownership.

The new product design is based on the same electronic technology but is much more adaptable to the user. Aimed more at use in schools it permits the vital role of the teacher in training the students. The product consists of two keyboards and two displays on a single unit and allows interaction between the student and the teacher. The product also allows for self-paced learning in the absence of a teacher.

A work table was also designed to keep the product and to provide an ergonomically correct work surface.



Educational Aid for Science Museums

Student: N.T. Desai

Guide: A.G. Rao

Ours is an age of science and technology. Still, for many people science is incomprehensible and technology frightening. They perceive them as separate worlds that are harsh and hostile to humanity.

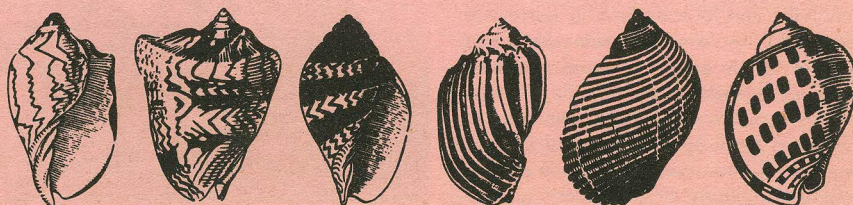
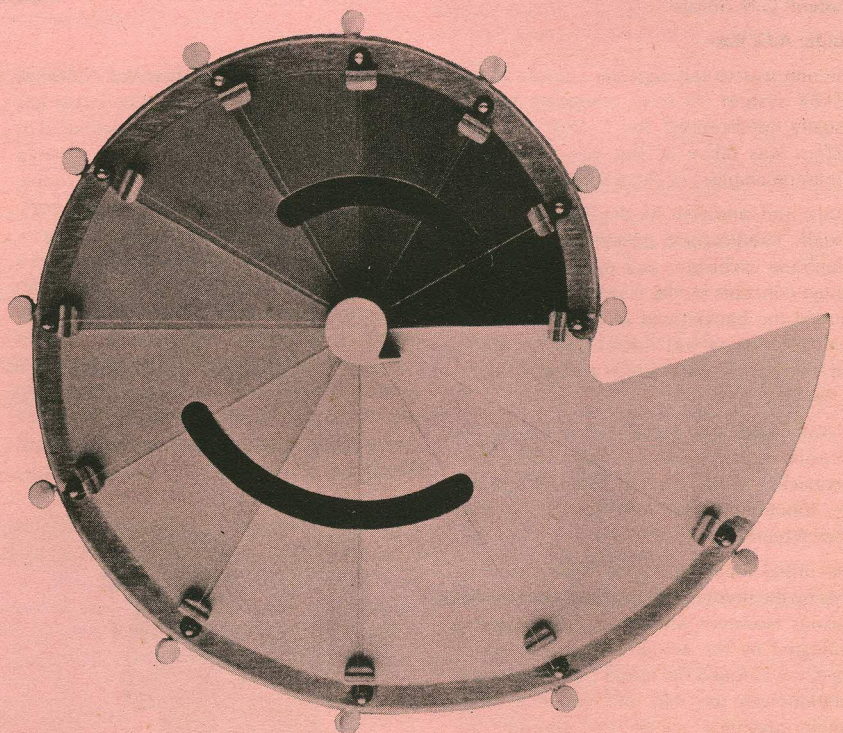
There is thus a growing need for an environment in which people can become familiar with basic concepts of science and technology. Science Museums provide this.

This project is an attempt to strengthen the concept of Science Museum and to project that science and technology are easy to comprehend.

A theme 'spirals' was chosen in this project to explore how themes in Science Museums could be designed systematically and innovatively to create excitement in children about the subject, which is essential for learning.

Developing interesting exhibits on a chosen theme was taken as the main objective of the project. Consequently it became a communication or pedagogic exercise which also entertains and amuses children. Many ideas were generated to make interesting exhibits on the chosen theme.

'Spiral and Music' is one of them. The idea here was to present the fact that spiral and musical octave represent growth. A musical string instrument based on the 'spiral' principle was also developed as one of the proposed exhibits.



Family Scooter

Student: Atul Kedia

Guide: Vijay Bapat

Scooters account for 51% of total 2-wheeler population in India. A scooter is basically an urban vehicle popular with middle and service class, and small families. The high price and maintenance of car and poor urban transport facilities have further contributed to the popularity of scooters.

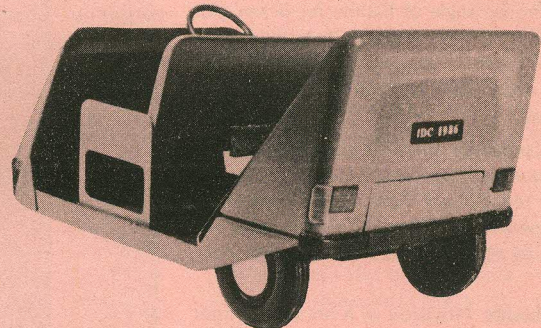
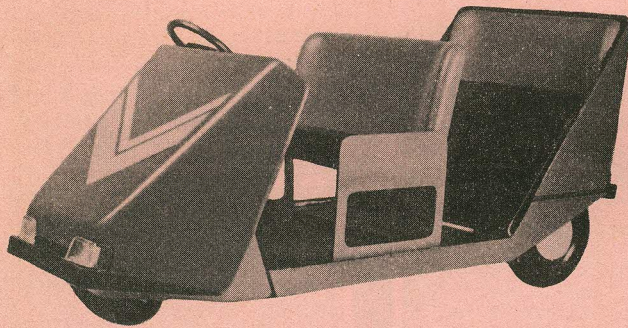
A scooter is essentially designed as a two-seater, and though many users use it as a

family vehicle for up to 4 passengers (two adults & two children) - it is not really suitable for that use. Side car attachments are also available for this purpose, but due to their many demerits they are not very popular.

An attempt has been made in this project to use the 150 cc scooter power pack to create a compact family vehicle for middle class users, as a good demand for such a vehicle was seen. The cost of the proposed vehicle has been kept low & is estimated to be about Rs.20,000/- to be within the purchasing power of this class.

The new family scooter is a rear engine three wheeler, with the total length and wheel base dimensions same as an ordinary scooter. It accommodates two adults and two children (up to 12 years of age) comfortably. The front and rear seats have a capacity to accommodate one adult and one child each side-by-side.

Attention has been paid to safety aspects of the vehicle, which also incorporates more powerful brakes, headlights and rear lights. The body and seats are proposed to be made of FRP and the bumpers of polyurethane.



Protective Aid for Chassis Drivers

Student: A.H. Shelke

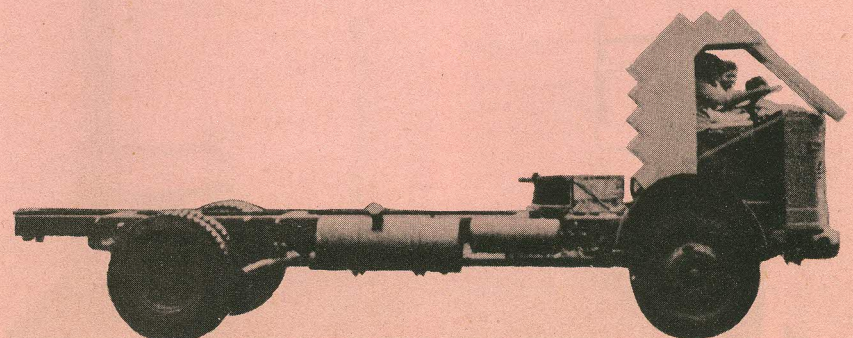
Guide: Vijay Bapat

Trucks and buses are sold as bare chassis without the body or the driver's cabin to the customers in India. The driver who drives this chassis from the factory to the dealer has to drive in an open vehicle exposed to sun, wind, dust, heat and rain, and he is exposed to severe physical and mental stress. The journey can be long - upto 2500 kms and such long distance driving is in itself quite exhausting - doing it on an open chassis makes it twice as tough.

An attempt was made in this project to design a product which will reduce the driver's discomfort and provide the minimum necessary conditions for safe driving.

After analysing the problems, it was felt that a cheap throw-away enclosure could give him the required protection and also fit in the complex existing network system of distribution. A ribbed structure of corrugated board was designed and tested successfully on actual chassis at a speed of 60 km/hr maximum. The front wind shield is of transparent polyester film. Wax coating or polythene lamination is suggested for the top. The estimated cost of the enclosure is Rs.150/- including material and labour costs, if mass-produced.

The enclosure was designed specifically for Telco's 1210 E vehicle, however, the concept is applicable to other chassis models.



Portable Powder Painting Equipment

Student: M.V. Simhan

Guide: K. Munshi

Electrostatic powder coating process technology was first introduced in India in 1978. The distinct advantages of powder coating over conventional painting process are a harder coat of paint; better paint utilization and higher paint recoverability.

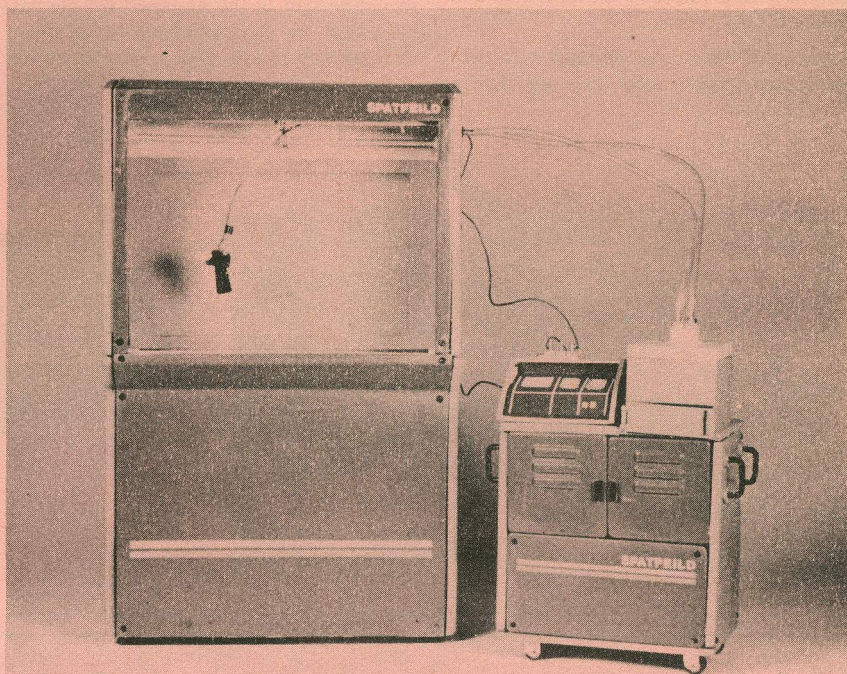
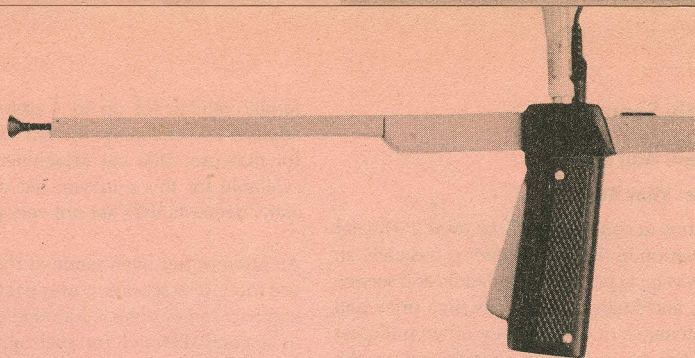
In this project the main design emphasis was given to increase the capabilities, convenience and versatility of the equipment for job coaters. The main problems while operating the existing equipment were identified and major design improvements have been suggested in the following units.

Gun: Proper angle of handle for better grip and movement, hose entry from the top of the gun to reduce hinderance while spraying; use of ABS plastic for hand to eliminate electric sparking.

Paint Container: Modular paint container to allow quick colour change; porous polythene bed to reduce cost; light weight module for easy operation in place of present practice of removing complete paint container for cleaning.

Spray-booth: Provision of a horizontal draft of air suction and a meshframe which reduces the velocity of powder particle while spraying and reduces rebound of particles on the operator.

Trolley: Adequate storage space for equipment provided; option of a compressor also given for small time job coaters.



Engine Diagnostic Equipment for Cars

Student: Peer M. Sathikh

Guide: S. Nadkarni

The increase in production of cars in India and the entry of small car manufacturers in the market means that there will be a need for effective and economic methods to repair and tune the car. Coupled with the strict exhaust emission regulations enforced in Maharashtra, and likely to be followed by other states; the car mechanics need a more reliable way of diagnosing faults.

Computerised engine diagnostic equipment is being imported by garages in India at an exorbitant price paying customs duty. Apart from the high initial cost, heavy cost of

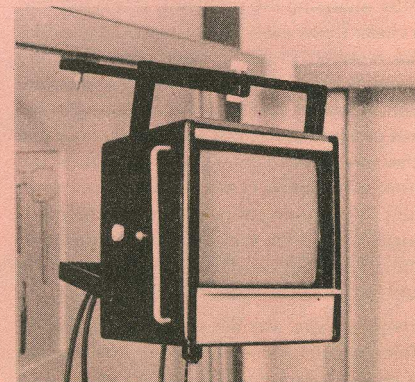
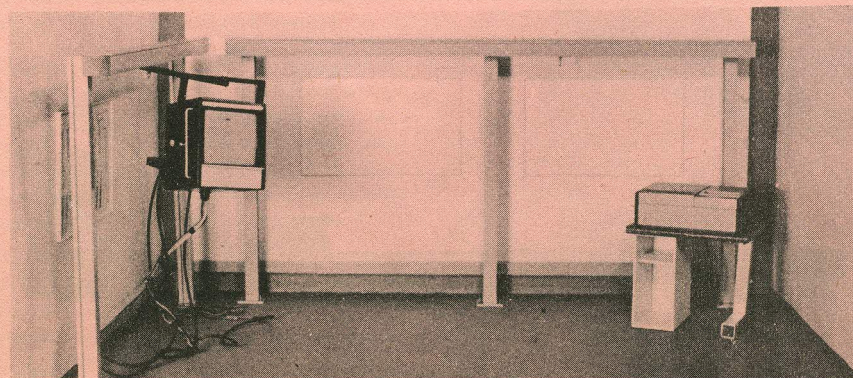
maintenance is also incurred due to frequent component failure. The equipment is not designed for Indian garage conditions and Indian work habits. Garages in India do not have smooth flooring and space to allow the equipment to be trolleyed smoothly, and hence equipment failure causing downtime is also frequent.

The design proposed in this project separates the video display unit, exhaust gas analyser and the control panel (console) from the processor, data bank and printer (computer).

This protects the computer from the harsh environment of the garage and is also convenient from the business point of view. The console is moved in an overhead channel

rail by a trolley to prevent undue vibration. The flexible detailing allows one to fix the rail along the periphery of the garage or on the ceiling. The detailing also allows the console to be fixed on a permanent column at a convenient place in the garage. Communication and power connection are through conduits along the wall.

The system has the advantage of bringing certain amount of order in the garage by eliminating the chaos caused by wires trailing on the floor. The electronic technology for the design is to be imported to the design specification. The product is aimed at organised garages, service stations and car dealers.



Pneumatic Angle Grinder

Student: Suresh Bademi

Guide: S. Nadkarni

The project was undertaken after studying the existing grinder and identifying the problems associated with it. The main problems were high tool weight (too heavy), unsuitable for left-handed operation; improper handle orientation. Detailed ergonomic investigations were made to identify the stress regions giving rise to localised pain.

After developing a number of possible solutions, it was decided to replace the metallic body parts by suitable plastics, resulting in an estimated weight reduction of 2.3 kgs. (3.1 kg against 5.4 kg of existing grinder).

The handles are designed to be suitable for both left and right handed people; and an adjustable front grip was incorporated to provide the right orientation for different use situations. A strong and rugged look was also given to the product.

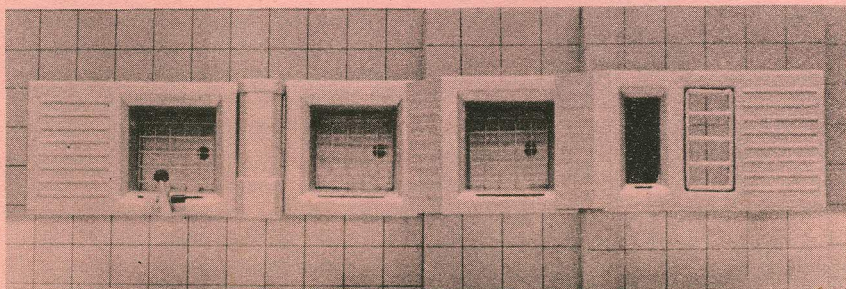
Dishwashing System for Industrial Canteens

Student: Dipan Shah

Guide: U.A. Athavankar

Most present automatic dishwashers in industrial canteens, are designed for flat ceramic dishes, and so are not very effective in cleaning the metal dishes (usually with depressions for various items). As Indian food tends to be oily - the clearing requires extra steps - hence most of the industries opt for manual dishwashing by sterilizing sinks. Yet even this process has a number of flaws.

A new dishwashing system has been proposed for industrial canteens in this project, with a modular construction to permit various layouts. A more effective working process is achieved by modifying the pre-cleaning zone to incorporate removal of left-overs from dishes as well as washing them; bigger opening for removal of left-overs; use of valves which operate by a 90° turn of the handle for draining water and heavy impurities; use of automatic scrubbing unit; use of mixer tap and shower head in rinsing zone; use of different working levels; reduction in noise level due to sliding of dishes instead of throwing; and better utilization of running water from rinsing sink. In addition a better image for the equipment has been achieved by enclosing the plumbing connections; modifying the support structure; and avoiding projections.



Industrial Staff Canteen Furniture

Student: Vishwas Hittalmani

Guide: U.A. Athavankar

The existing industrial canteens in general have no specific type of furniture to accommodate the dining activity in a disciplined yet informal manner. This project aimed at designing furniture specifically for the executive cadre in industry, suited to their status and environment. Other aspects like serving, cleaning, circulation, orientation of space etc. were also considered.

The proposed design of canteen furniture has multiple advantages like easy assembly on site, use of readily available, mass-produced components, and involves less skilled labour for repairs and replacement. As the number of vertical members touching the floor has been reduced, the cleaning of floors is easier. The rotating seats fixed to the table frame are a distinguishing feature of the design.

Electric Irons

Student: Nitin Urdhwaresh

Guide: K. Munshi

Electric irons in India are mainly of two types - those for use in laundries, and those for domestic use. The laundry irons are very heavy and uncomfortable - but still continue to be used as weight is associated with heavy-duty performance. Even in the category of domestic irons, this notion that heavy irons perform better, has resulted in a situation where most commonly available models are a lot heavier than they need to be. The new light-weight irons have not really penetrated the average Indian household.

Redesign of both laundry iron and the domestic iron was taken up in this project. In addition a light-weight, folding travelling iron was also designed.

The redesigned laundry iron is much lighter in weight, has a bakelite body with brass sole plate. It is designed such that the heat transfer from the sole plate to the body is minimised.

Weight reduction and appearance improvement were the main objectives in the new domestic iron design. It has various features like indicator lamp, teflon coated sole plate base, polycarbonate body, a vertical rest and thermostat - which were decided after a survey of irons in the Indian market.

Projects by French Students

Mr. Bertrand Rochette and Ms. Flavie Chollet - students from the University of Compeigne, France, working with Prof. K. Munshi completed the following projects during their six-month stay at IDC.

Passive Water Cooler

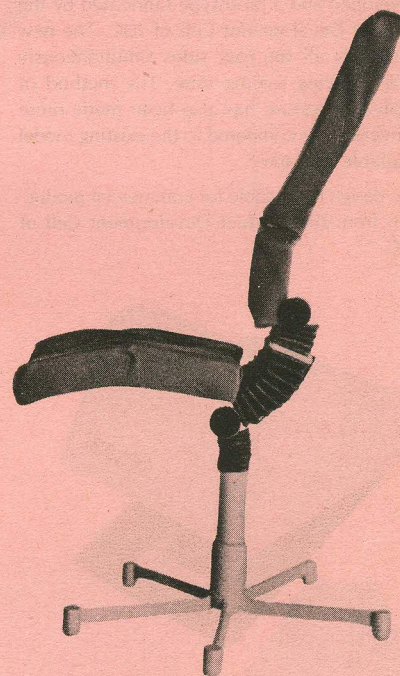
To provide cool drinking water or storage facility for cooked or raw food to be stored overnight. This was designed to be a low cost product using the principle of radiative cooling to achieve temperatures lower than the ambient.

Roofing System for Cooling

The same principle was used to devise a roofing system for buildings for cooling of the rooms at night and insulating them from heat during the day. The task included computer simulation for design comparison, performance prediction and development of prototype.

The running cost of this system would be almost negligible, thus providing an inexpensive alternative to air-conditioning and cooling by electricity. The system would be highly efficient in those areas where night skies are clear.

Both these projects were carried out by Bertrand Rochette.

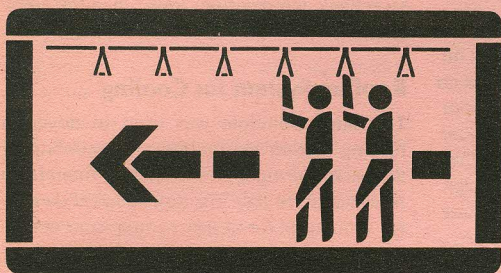


Ergonomic Work Chair

Flavie Chollet developed an ergonomic work chair for offices. In this chair the backrest and the seat pan articulate around an axis corresponding to the hip joint. The front part of the seat pan is forward tilted to obtain work postures which help in keeping the back straight and fatigue free. Seat pan can tilt backwards as well as forwards to carry out tasks requiring forward bent postures. A soft hump is provided to avoid forward sliding by the user.

Public Transport Information Graphics

A project to develop graphic symbols for standardised communication in public road transport vehicles completed by Prof. S.S. Sathaye of IDC and Dr. P.K. Muttagi of TISS, Bombay - has been accepted by BEST (Bombay Electric Supply & Transport Undertaking) for in-media trial.



Initially 10 graphic symbols have been selected which will appear along with the existing written instructions inside 200 buses covering different routes from 15th August. This is expected to provide feedback from various cross-sections of the commuting population. This feedback and evaluation process would help in establishing certain norms for information graphics for public transport in general.

New Products

Slide Sealing Unit

A new slide-sealing unit for mounting transparencies in card-board mounts has been developed and a prototype fabricated by the Product Development Cell of IDC. The new unit seals all the four sides simultaneously thus reducing sealing time. The method of applying pressure has also been made more convenient as compared to the existing model available in market.

The design is available for commercial production from the Product Development Cell of IDC.



Computer Workstation for School Children

The computer workstation for school children designed by Nitin Urdhwarshie under guidance from Dr. G.G. Ray and Prof. U.A. Athavankar, is currently being used by the Kendriya Vidyalaya, IIT, Powai for feedback and evaluation.

Paper on Ceramic Design

Shri A. Gaffoor, Ceramic Designer presented a paper on 'Importance of Industrial Design Aspects in Ceramic Design' at the Seminar 'Indian Ceramic Industry - Preparing for 21st Century' organised by Small Industries Service Institute, Ministry of Industry, on 15-16 March at Udyog Bhavan in New Delhi.

Award for Solar Rice Cooker

The Solar Rice Cooker developed by Anne-Marie Dufour under the supervision of Prof. K. Munshi was awarded a consolation prize in the Solar Cooker Design and Prototype Development Contest. The first, second and third prizes were not awarded to any entry. The contest was organised by Gujarat Energy Development Agency, Baroda.

'Aksharayoga' Exhibition Abroad

An exhibition on Indian Calligraphy was specially designed and sent to the Design School in Basel by IDC, at their request. The exhibition features the work of the Indian Calligraphers who participated in 'Aksharayoga'; with an introductory section on the historical, multi-lingual and structural aspects of Indian letterforms including the educational and research work being done in India in this area.

This exhibition will be first held at the Fachhochschule at Wiesbaden in West Germany. It will then move to Lausanne School; and the Design School at Basel. The exhibition will further tour other cities in Europe.

M/s. Western India Art Lithoworks Pvt. Ltd. - a leading press in Bombay has kindly contributed towards the cost of preparing this travelling exhibition.

Visitors

Tom Ockerse

Prof. Tom Ockerse, Head of Graphic Design Department and Chairman of Faculty of Design at Rhode Island School of Design, Providence, USA visited IDC on 20th June, 1986. He gave a lecture on the work done by him and his students at RISD; and explained how semiotic theory has been applied to graphic design education there. Later he had discussions with the IDC faculty on the Visual Communication programme at IDC.

John Sanders

Prof. John W. Sanders, an eminent expert in the areas of Eye Movement Analysis by Electro-oculography, & Control Panel Organisation visited the Ergonomics Laboratory of IDC on January 27-29. Prof. Sanders gave several talks to IDC students and faculty on mathematical modelling of control panel organisation, eye-movement recording, stereotypes etc. He also conducted a short workshop on 'Application of EOG in Eyeball Movement Analysis'; and gave a talk on 'Importance of Ergonomics in Nuclear Power Control Design' at the Atomic Energy Regulatory Board.

K.V.N. Rao

Shri K.V.N. Rao, doctoral student at Tufts University, USA, and a past student of IDC was in the Centre from 9 to 19 July. Shri Rao is now working under Prof. John Kreifeldt in the area of human factors. Shri Rao held discussions with the present M.Des. students; and also gave a Seminar on his work at Tufts to the IDC students and faculty.

New Students

Admission interviews for the new batch of students were held in IDC in July. From 82 applicants, 13 were selected for the Product Design programme and 7 for the Visual Communication programme. The selected students are:

Product Design

Jayprakash Mehta, Vani Sheshadri, Jagjit Singh, V. Satheesan, B.K. Chakravarthy, K. Srinivas, Sudheendra Dhulkhed, Anupam Shukla, Suresh Hiremani, C. Suresh Chandrasekaran, Prashant Ahir, Vinay Mundada and Boban Varghese.

Visual Communication

Raghunath Kolli, Dipankar Goswamy, Rajiv Samvatsar, Sreenivas Ratnam, Rajul Mehta, P.A. Kavita and M. Madhava Hebbar.

Editor: Kirti Trivedi

IDC News is published quarterly by Industrial Design Centre, Bombay for private circulation to designers, design educators and others in the design profession. To obtain more information about material published, please write to:

IDC News
Industrial Design Centre
Indian Institute of Technology
Powai, Bombay 400 076
India.