

Professor Sudhakar Nadkarni



Sudakar(R) with brother Kamalkar

1. Nadkarni brothers

Prof Sudhakar Nadkarni was born in a big middle class family, whose dad used to work in the National Bank in Bombay. He lived in a generation where people sought the cities for education. He lived in a chawl, which is a mosaic of different cultures, languages and faiths living in relative harmony in a small-unplanned space. People shared resources, be it bathing or washing spaces, utensils.



2. Family: Courtesy

In the chawl there resided besides Prof Nadkarni's house a family of signboard and hoarding painters from Goa. His inclination towards graphic design or design in general he says comes from helping this family and being around them. The community life allowed space for a free life, leadership skills and accountability. The chawl used to have occasions for celebration where families used to participate in dramatics, singing and various other performances. Sudhakar used to be the best in makeup and painting. He used to be an expert in set design. So everybody took it for granted that he was destined for the Arts.

He remembers the mood of the nation when she received her independence and listening to Jawaharlal Nehru's – Tryst with Destiny speech. How charged the nation was with the hope of a great future. He also remembers the contrast in the sadness of the nation when Mahatma Gandhi was assassinated.

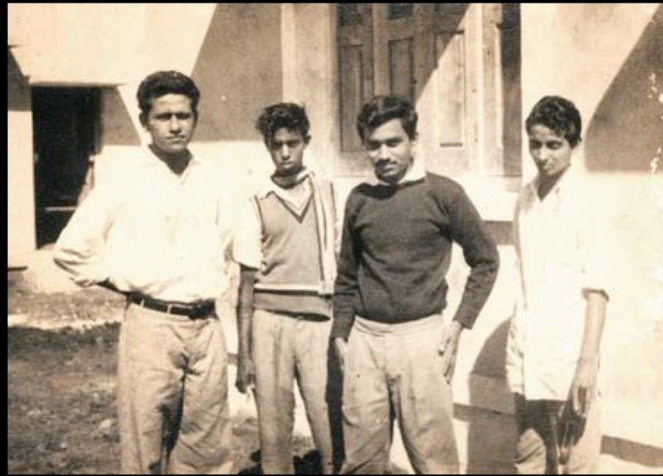
He chose to go to the JJ School of Arts and chose to go for Applied Arts in the hope that it would fetch a job later. JJ had workshops setup for Lithography, Screen-printing and skill based learning, but did not have any particular courses detailing communication science. Amongst his batch very few people had managed to pass the course as the government had raised the cut of mark. He was amongst the five or six students that did clear through. He had already started working part time in Design Organization with the help of VN Adarkar. He regrets having

missed out on the cultural life at JJ but feels he made up for it at HfG Ulm.



3. Working in Asia Art Advertising

Design Organisation did a lot of work related to exhibition design and printmaking. It was around that time when Yashwant Chaudhary had come to India and they heard about a lecture being given by James Garner in the Indian Merchant Chamber. Sudhakar Nadkarni for the first time came into contact with the term “Industrial Design” and what it stood for in the global context. He was talking about the relevance of design in many walks of life.



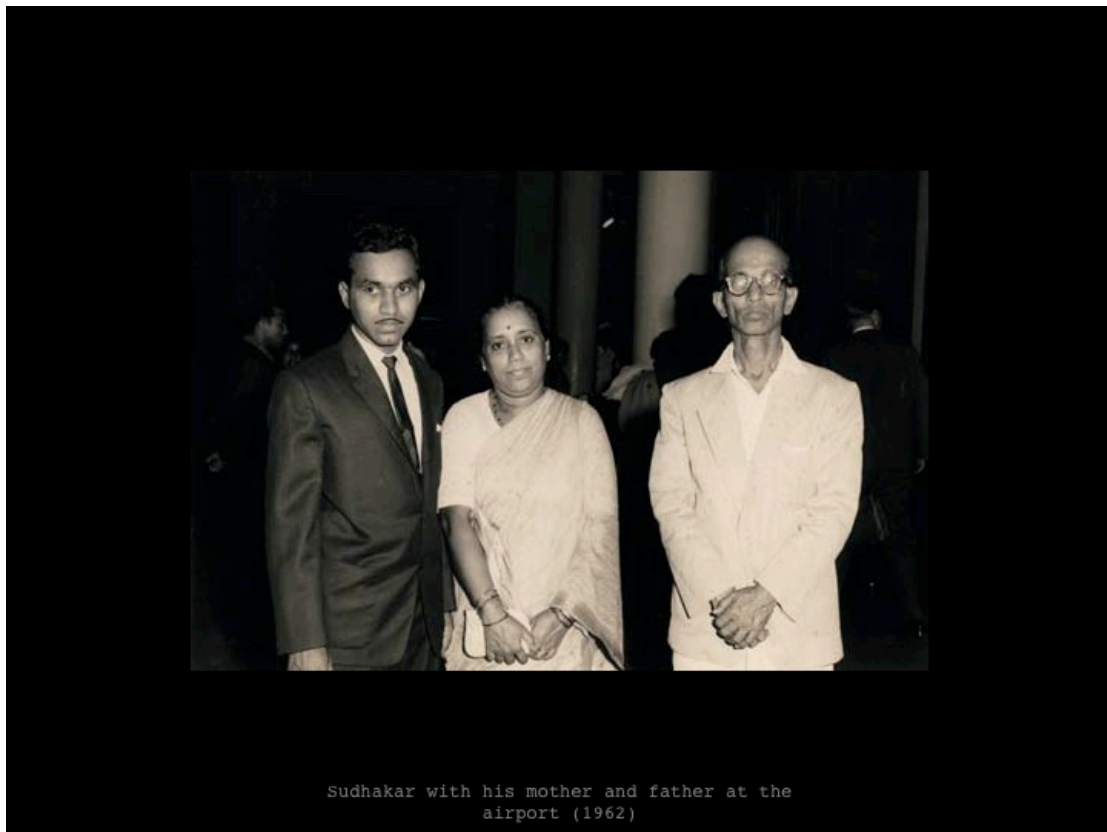
Sudhakar (3rd from Left) with friends from
Design Organisation.

4. Design Organisation Team



Yashwant Chaudhary and Sudhakar

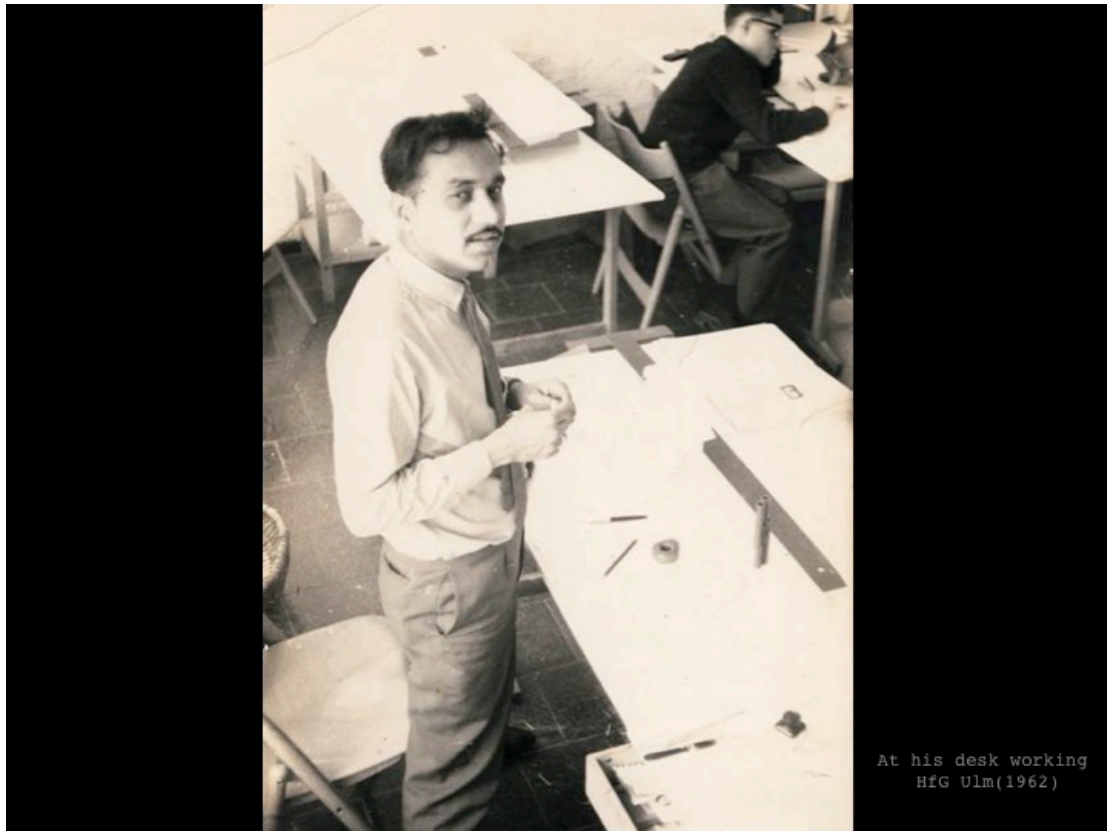
5. Yashwant Chaudhary



6. Parents sending Nadkarni off

Around that time major changes were happening in India in terms of establishing infrastructure for commerce and development like roads and dams. Jawaharlal Nehru was crucial in these early works related to the first 5-year plans.

It was around this time when he sent his portfolio to HfG Ulm under Yashwant Chaudhary's recommendation. He was the first Indian at Ulm many others followed later. He didn't have much of an option when it came to learning German, as he was already late for the course there. So he learnt it when he went to Germany.



At his desk working
HfG Ulm(1962)

7. Nadkarni at Ulm

Hans Gugelot had come to NID to work on a project headed by Gira Sarabhai, related to a tangential fan and to help in some of the courses there. Through him and Prof H Kumar Vyas, when he came to Ulm, Sudhakar was instructed that he was to go to NID on his return to teach and develop the new design course there.



Sudhakar (middle) in the HfG Ulm Ceramics Workshop

8. Working in Ulm

At Ulm basic design course was very challenging, the faculty had meticulously constructed the courses there. Also product design was spoken in the context of society and economics rather than just mere formal and aesthetic nuances. This was the major difference between JJ and Ulm, concepts of color theory and communication science was what the students were involved with at Ulm.

Nadkarni worked there as well, first in a printing press there. He also worked in an Arms manufacturing company and also worked in creating false ceiling designs in Siemens. Some of his student assignments are interesting as his understanding in materials and design was enriched by the contrast between his middle class background from Bombay where the availability of good or well-made products was sparse and his new education at Ulm. He was thus able to work on projects without any mental blocks, this often yielded surprising outcomes.

Jukebox: Studying social aspects led his classmates to believe that a new Ulmer model of the Jukebox would be without any particular purpose and is extremely class specific. Nadkarni thought of a different context, he thought of an educational toy, which would play out the stories for children.



9. Jukebox at HfG Ulm



10. Jukebox at HfG Ulm

He talks about how Ulm kind of radicalized his view on bad design, how earlier radios or transistors would come in boxes with glass covering which required a separate rag to cover the glass covering. His sensitivity towards the ridiculousness of such design was heightened through the Ulm experience.



11. Walkie-talkie design



Programme Learning Unit , HfG Ulm (1965)

12. PLU at Ulm

India by that time had become a market filled with copies. As there was no encouragement in Indian companies for engineers to design, innovate and research, they often took the short route and reverse engineered the products, however the story was different in companies like Philips which spent a lot of time, energy and money to come up with new systems of furniture or electronic appliances, to show at the world fairs.



13. Tata Benz Trucks



14. Tata production line

The Indian government used to give grants and money and yet the companies used to filter this for reverse engineering. There was a lack of technical expertise in the industries. Which Nadkarni says that NID had recognized from its involvement with many crafts people, while attempting to translate craft to mass production. At NID there was a focus in trying to encourage innovation amongst craftspeople and technicians as well as the students. Hence the workshops were made to the huge scale to match production houses.



15. NID Printing studio, Paldi

Education there was secondary as it was project based and production oriented. At IDC he intended that the machines should be of Indian origin to allow the students to be sensitive to

the Indian production constraints. In Guwahati, as the major industries were in Kolkata, he ensured that the workshops were fully equipped, but he says that there needs to be more enthusiasm from the faculty and students as machines need projects and servicing without which it would fall into disuse and become defunct.

In IIT Bombay, designers were unheard of in 1969. The first batch was considered to be artists and was given a wide berth in terms of freedom. But the kind of projects and research that came out of IDC created great interest both inside the campus as well as outside within the industry. Workshops were conducted for industry professionals. It became the responsibility of the educational institute to both teach students as well as try to propagate the principles of design methodology in the industry via workshops, outside India this was generally an activity conducted by societies or bodies of Industrial Design. But in India as the field was unheard of, design propaganda became a thing that the institute had to take care of as well. For Prof Nadkarni the habit of creating and designing made him restless when he was trapped in administrative affairs.



The Design Circle, IDC-IIT Bombay

16. IDC design circle

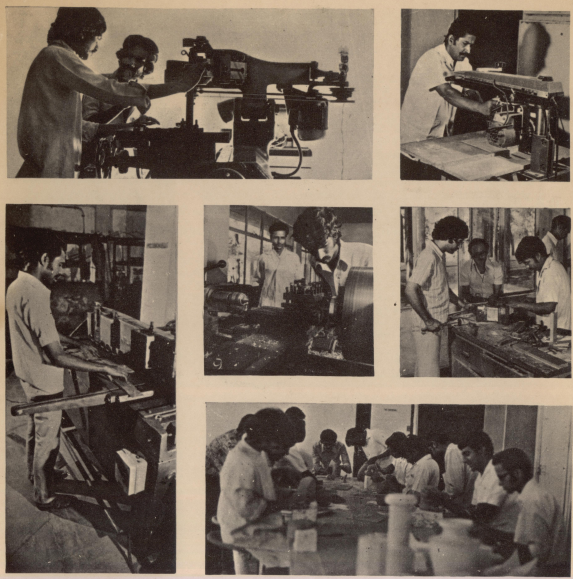
The first set of faculty; Prof AG Rao, Prof Athavankar, Prof Bhandari, Prof Kirti Trivedi were instrumental in creating both the curriculum as well as the environment for design within the campus and exposing them to both global and Indian semantics of design.

A. Gopinath Rao (1945)
B.E. (Mech.), Diploma in Product Design, (IND Ahmedabad)
Assistant Professor at the Industrial Design Centre; President, Society of Industrial Designers of India. Member, Advisory Committee, Machine Guarding, Ministry of Labour, Government of India. Member R & D Committee for M.P. & U.P. Visiting faculty for IIT Kanpur, IIT Madras, Kurukshetra University.

M. Chattopadhyay (1943)
Diploma in Elec. & Mech. Engg., Diploma in Product Design, (W.S.), P & T Console Design Committee, Member, Society of Industrial Designers of India.

Uday Anand Athavankar (1945)
B. Arch. I.I.A. Assistant Professor at the Industrial Design Centre, I.I.T. Bombay, awarded 3rd prize for design excellence in the international design competition 'Edugame-73' held by Israel Design Centre. Major Design projects, Low cost housing, office building and schools, street furniture, industrial products, exhibition systems, toys and games, Office beater, Society of Industrial Designers of India, Member R & D Committee for Bihar and Assam. Visiting staff of N.I.T.E., T.M.T.C., I.I.T. Kanpur, Sir J. J. College of Architecture, Bombay.

Model Making & Workshops Studios



Kirti Trivedi (1946)
B.E. (Mech.); D.I.I.T. (Industrial Design); Master of Design of the Royal College of Art, London. 'PRE DESIGN AWARD' of the Royal College of Art for outstanding design work in the field of consumer electronics equipment; Awards in the Observer-Vothuesen Design Competition, and the Robert Winsor Display Design Competition, England. Freelance design projects for numerous 1976. Carried out product design, packaging and graphic design projects for numerous organisations. General Secretary, Society of Industrial Designers of India.


K. Munshi (1947)
B.Sc. (Mech. Engg.) DIIT (ID), P.G. Course in ID at the Royal College of Art, London. Lecturer, Industrial Design Centre, I.I.T. Bombay. Formerly Head, Industrial Design Unit, Bush India Limited, Bombay, and consultant Industrial Designer to various organisations. Visiting faculty, National Institute for Training in Industrial Engineering.

Vijay P. Bapat (1950)
B.E. (Mech.), D.I.I.T. (ID). Research Associate 1975 onwards at the Industrial Design Centre, Indian Institute of Technology, Bombay. Member, Society of Industrial Designers of India.

M. S. Govindarajan (1940)
B.Sc. AMIE (Mech.) DIM AMSIDI Foreman, Prototype Development and Model Making Workshop. Worked with Indian Railways for 10 years. Honorary Technical Advisor, J. J. School of Architecture.

One of the main assets of the Centre is the workshops—studios. The workshops—studios for wood, metal, plastics, ceramics and photography are equipped with wide-range of machines and skills to make mock-up models, trial models, and prototypes. The selection of machines range from a watch maker's lathe to a vacuum-forming machine enabling the designers to handle variety of materials with ease. Emphasis is laid on simulation techniques to project the correct image and performance of the end products.

Full benefit of workshops—studios is realised by the faculty in their consultation projects and experimental projects of social relevance. The proposed product development cell further enhances the importance of workshops—studios.



16b. IDC faculty list and workshop capabilities



Discussions with students and faculty at IDC

17. Faculty discussions

AIMS AND OBJECTIVES

'Industrial design is a creative activity whose aim is to determine the formal qualities of objects produced by industry. Formal qualities include the external features but are principally those structural and functional relationship while converting a system into a coherent unity both from the point of view of the producer and user.

Industrial design extends to embrace all aspects of human environment which are conditioned by industrial production'.

1964 UNESCO-ICSID SEMINAR

The Industrial Design Centre has been set up by the Government of India under the auspices of the Indian Institute of Technology, Bombay, for the study of environmental design problems within the field of industrial production and communication. In the context of the present economic conditions it is also necessary to make earnest efforts to improve the appearance of the indigenously manufactured articles so as to be able to face the challenge of the competitive trade both within and outside the country.

The aim of this course is, therefore, to train industrial designers in solving the various problems generated by industrialisation. It deals with visual aspects of products and increasing their efficiency so as to make them more convenient for human use. Visual aspects are otherwise known as the aesthetic qualities of a product, i.e. the form, colour, texture and total arrangements of different components, such as, knobs, scales, dials, handles, etc. The students are trained to arrive at rational solutions by abstract thinking process. The course is designed to make the students conscious about the needs and behaviour pattern of the community as also the usage of the various products. Lectures on Psychology and Sociology are intended to achieve this objective. At present computers are widely used in industry and many complex design problems are processed on it. The lectures on Computer Science aimed at training the students about the programming techniques for the computer. The design process covers the visual and functional aspects of the products of daily needs, e.g. domestic products, office equipments and stationeries, various storage units, furniture, fixtures, agricultural equipments, heavy engineering products, etc.

Entrance Requirements

Graduates in Electrical/Mechanical/Chemical Engineering with aptitude for art and design. The evaluation of the candidates will be made by assessment of their work and personal interview. Candidates already employed in the Design Section of the industry will be given preference.

Commencement

August every year.

Duration

The duration of the course is of 15 months and the curricula is divided into 5 quarters.

Practical training

After 4 months intensive instructions the students are placed in industry for a month's practical training.

Project work

The last quarter is devoted entirely to diploma project work which is to be presented in the form of a *thesis* (multi-media presentation).

Structure

Structure of the course is broadly based on the following classification:

Information

Design theory, Sociology, Socio-dynamics, Ergonomics, Cybernetics, Programming techniques, Material techniques, Management, Marketing Economics, Professional practice.

Formation

Design methodology, Elements of design, System design, Product design problems.

Communication

Technical drawing, Freehand drawing, Rendering and presentation techniques, Photography, Typography, Product graphics, Written and verbal communication.

INFORMATION

Name of the Course

Postgraduate Diploma Course in Industrial Design.

Pattern

Full-time—Residential.

SYLLABUS

Freehand drawing

This is intended to develop the skill of the students in drawing and to enable them visualise and communicate their thoughts systematically and in quick succession. It will help them shed inhibitions about drawing in general and develop their faculty for planning by learning to estimate with eye and to coordinate eyes and hands.

Rendering and Presentation techniques

Application of the techniques learnt through freehand drawing and colour methods, colour rendering for presentation purpose, photographic presentation, charts and graphs, and model making.

Elements of design

Introduction to colour methods, the concepts of line, shape, form, structure, topology, planes, edges and radii, formal transition, symmetry, perception, combinatorics, and the concept of constraints in design. Special design tasks devised to introduce the students to the process of decision making through optimisation, as also to the application of order system in design.

Elementary product design

Design of simple products based on concurrent exercises on elements of design.

Product design

Design of products with technical and ergonomic complexity; design of product as a part of system.

Technical design

Introduction to structure, engineering materials, plastic technology and techniques of production; technical design of simple nature in metal and plastics. Emphasis is put on producing a set of solutions and then selecting on the basis of optimisation. Students are asked to design for several levels of production runs, including handicrafts-like batch production methods. The difference between several solutions due to different levels of production runs are discussed in details.

Production processes

Production processes involved in various materials, such as, metal, wood, plastics, ceramic, etc.

Ergonomics

Introduction to aspects of applied physiology directly related to ergonomics, optics, vision, perception, light, illumination, physical energy, posture and skill, work, fatigue, anthropometrics, work spaces, human performance capacity and measurement, noise and audiometry, display and control movements, heat, humidity and vibration.

Social psychology

Introduction to social psychology, psychological methods, concept building, psychic functions, perception, psychological models systems.

Studio practice

Tasks specially devised to make students proficient in model and prototype making. They are encouraged to explore the nature of material and capacity of the tools. The materials are wood, metal, plastics, ceramic and plaster. Students are required to design and make elements which through their combinatoric qualities and repeated use create a growth structure.

Introduction to typography and special graphic problems for the design of scales, dials, information panels, controls, etc.

Introduction to photography: photograms, developing, printing and processing techniques, reproduction, illumination, product and architectural photography.

Professional practice

The elements of design management, contracts, royalties, design registration and patent law.

Administrative stages: the contracting stage, the progressing stage, the completion stage.

Company organisation and structure of management: sales, marketing procedure, distribution, servicing and maintenance, advertising and market research.

History of 20th century culture

Industrial revolution and its influence on arts, background to the development of modern movements, influence of the technological advances on painting, sculpture and architecture, impressionism, post and proto-impressionism, futurism, surrealism, dadaism, cubism, constructivism, influence of photography and film, radio, television and mass media on tradition-oriented societies, art and architecture of today.

History of Industrial design

The concept of industrial design starting from the time of the Great Exhibition leading to the Bauhaus and after, the history of design profession in America and Europe.

Computer science

The topics covered are aimed at providing the students with the fundamentals of computation leading towards computer-aided design. It introduces programming languages and system design, the concepts of algorithms and heuristics and use of flow charts in solving the design problems.

Constructive geometry

The exercises in the field of geometry are intended to help the students to recognise the form-generating structure below the surface of solids and to develop their three-dimensional imagination.

The exercises cover: Introduction and revision; Fundamental view; Skew lines; Piercing points and plane intersections; Perpendicular relationships-lines and planes; Dihedral angle and angle between a line and a plane; Revolution; Intersection and development; Isometric and perspective.

Economics

The elements of economic analysis: concept of economy, market organisation, price determination and function. Application of economic policy: operation of individual market, market structure, theory of the firm, theory of production, demand theory, demand and cost analysis, production analysis, uses of operational research methods.

Electives

The diploma project work of the students is to conform to one of the following electives:

- Environmental Design (Street furniture, Playground equipment, Recreational centres).
- Electrical Fittings and Fixtures.
- Furniture Design-Office and Domestic Storage Systems.
- Ceramic and Glass Products.
- Light and Heavy Engineering Products.
- Plastic Products.

FEES PAYABLE		EDUCATIONAL PROGRAMME				
			Quarters			
			I	II	III	IV
Registration fee	Rs. 5.00 (Payable with application)					
Admission fee	Rs. 10.00					
Tuition fee	Rs. 112.50 (Payable in 11 monthly instalments)	Basic Elements of Design — Practical Design Work	+	+	+	+
Hostel rent	Rs. 247.50 —do—	Elementary Product Design	+	+	0	0
Consolidated fees for Sports, Medical fund, etc.	Rs. 27.00	Complex Product Design	0	+	+	+
Institute caution money	Rs. 25.00	Design Analysis — Systematic Design Methods	0	+	0	0
Hostel caution money	Rs. 60.00	Ergonomics	+	+	+	0
Hostel Mess advance	Rs. 90.00 (Mess bill is about Rs. 125/- p.m.)	Technical Design — Study of Materials and Processes	+	+	+	+
Magazine fee	Rs. 5.00	Case Study — Product Design	0	0	0	+
Folder containing Prospectus, Identity card, Booklet, etc.	Rs. 5.50	Product Graphics	0	0	+	0
Examination fee	Rs. 100.00 (Payable before submission of Project Work)	Production Planning	0	0	0	+
		Constructive Geometry	+	+	+	+
		Communication Media — Studios (Metal, Wood, Plastics, Plaster, Photo, Typo)	+	+	+	0
		Cultural History of the 20th Century (Architecture, Industrial Design, Film, Literature, Painting, Music, Visual Communication)	+	+	0	0
		Sociology, Socio-Dynamics in Culture	0	+	+	0
Amount payable at the time of admission	Rs. 282.50	Programming Techniques (PERT and CPM Methods)	0	0	+	0
SCHOLARSHIP	A sum of Rs. 250/- per month is payable to the candidates who do not receive grant from any source.	Computer Science	0	+	+	0
		Marketing and Mass Media	0	0	0	+
		Professional Practice	0	0	0	+
		Rhetoric	+	+	+	+
		Multi-Media Presentation	0	0	+	+
		Code: + To be taught 0 Not to be taught				
		Prof. V. N. Adarkar Adviser			Prof. S. Nadkarni Faculty-in-Charge	

17c. Educational program

He quotes Dieter Rams of Braun when he says that the context may change, but the grammar remains the same. The first product out of IDC was the construction worker's Ghamela. Though extremely low-tech, it was a bold first step, as the product had many social implications. This early stance is why, Nadkarni says that design is at least known and understood to some extent within the industry, academia and government.



18. Ghamela



19. Ghamela



20. Ghamela

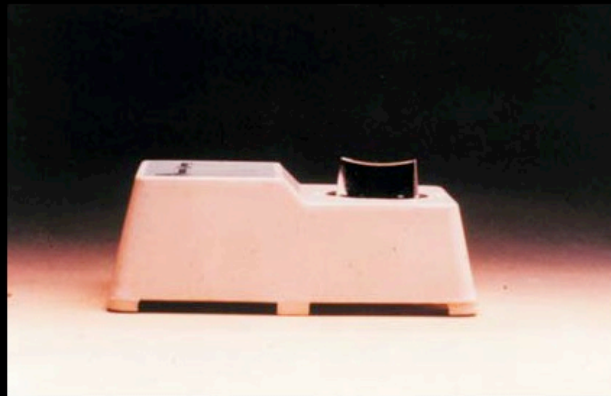
Crompton and Greaves had a project to redesign a long running product of theirs. The project dealt with a modernist approach to the regulator of the fan as well as the fan design. It needed a change from the existing huge box-like design; also during packaging it needed to be stackable through the detail of the step. A feature that was not introduced was the luminous

dial for easier usability during the night. Another part was to simplify the detail of the blades to make it easier to machine and finish.



Fan Regulator Design, Crompton Greaves (1974)

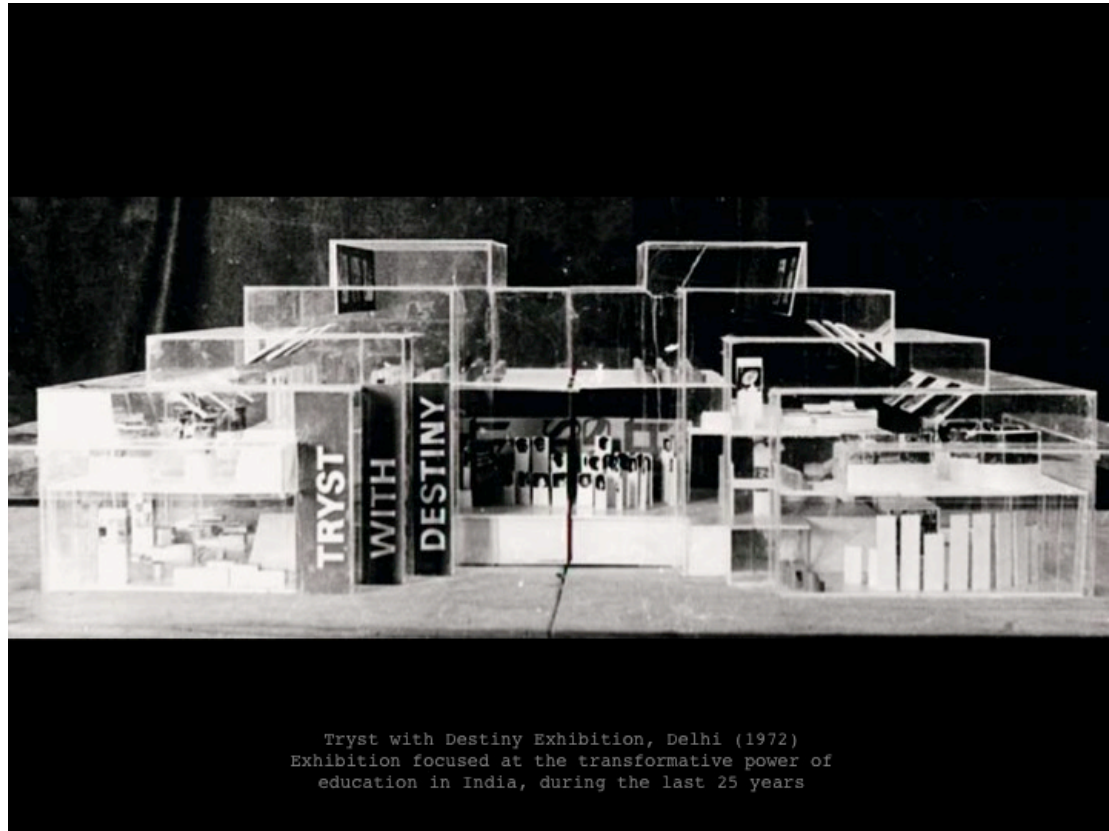
21. Crompton and greaves regulator



22. Crompton and greaves regulator

Exhibition designs:

Tryst with India and the Made in India-State Trading Corporation (STC) Pavilion Dome are two exhibition designs that Prof Nadkarni was a part of. He talks about the engineering difficulties of the project in how the dome started caving in on itself, at the last possible minute.



23. Tryst with destiny exhibition



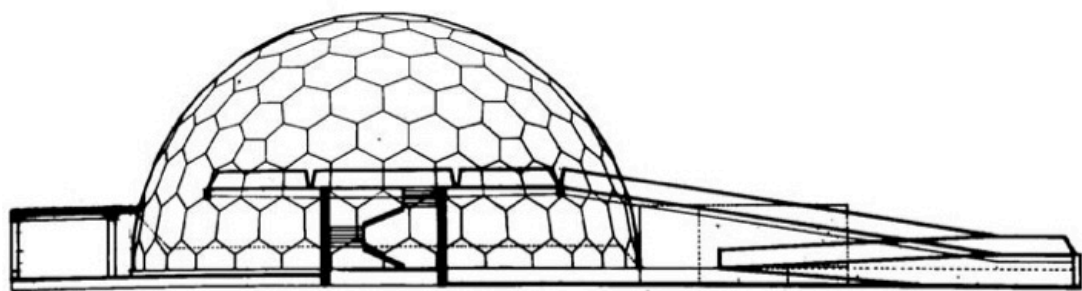
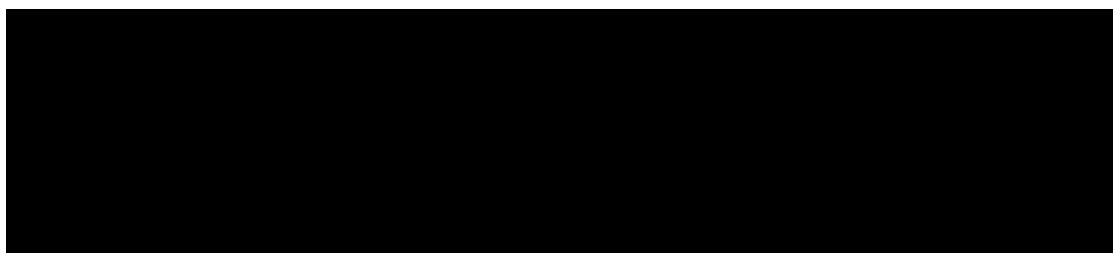
24. Tryst with destiny exhibition



25. Tryst with destiny exhibition

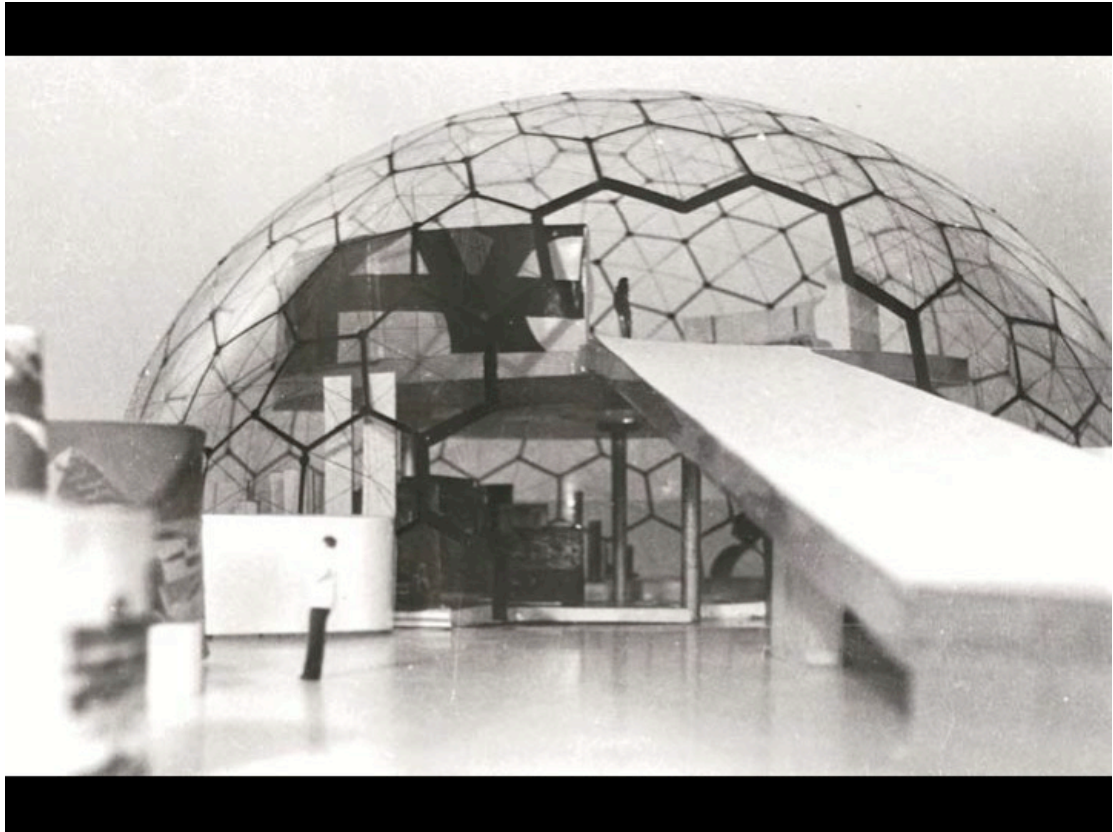


26. Tryst with destiny exhibition



Made in India-Pavillion, Delhi, 1979
Client: State Trading Corporation, Maharashtra Government

27. STC pavilion exhibition



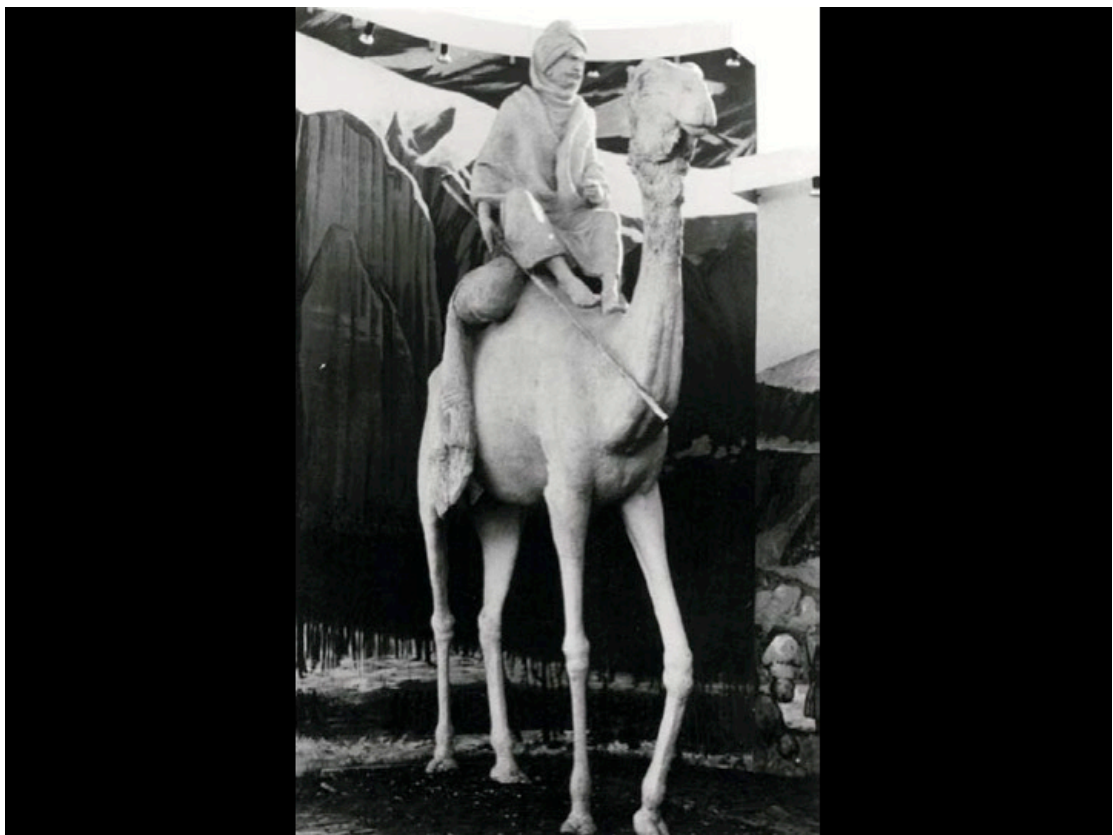
28. STC pavilion exhibition



29. STC pavilion exhibition

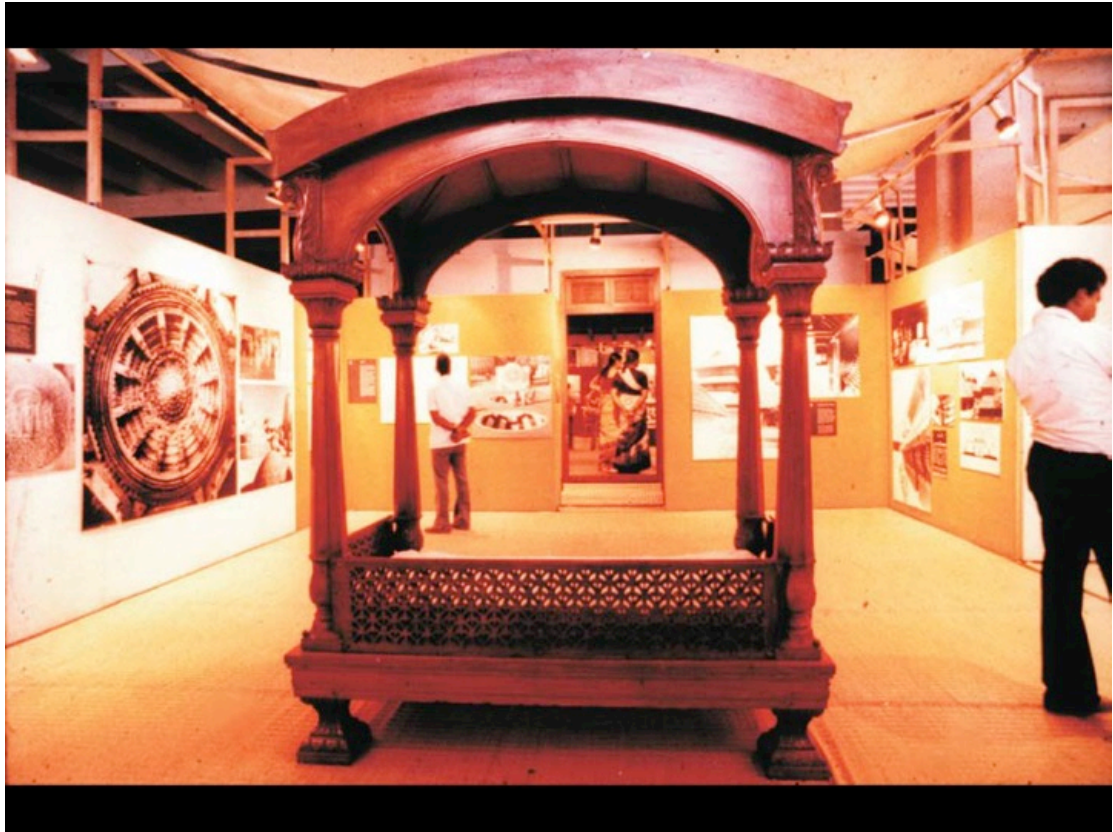


30. Made in India exhibition

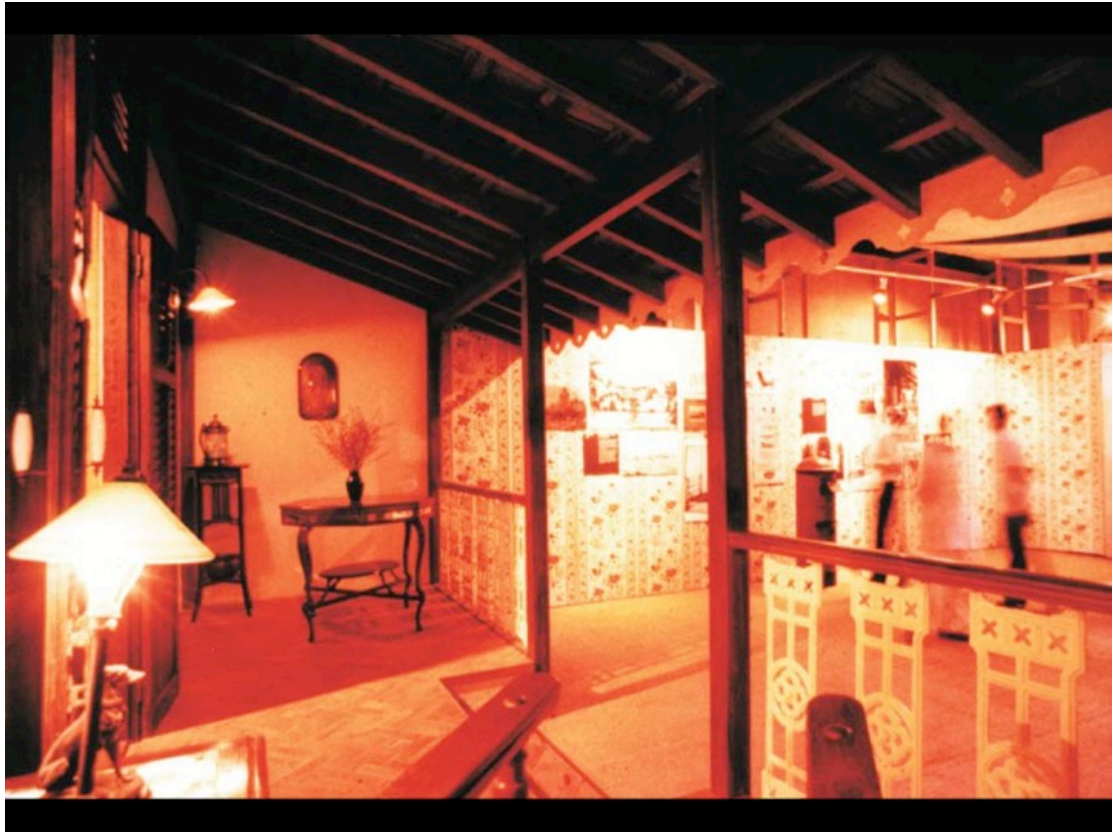


31. Made in India exhibition

Vistara was one of the bigger exhibitions that Prof Nadkarni had undertaken; it was a travel through of Indian architecture through the ages. This was a monumental task in terms of both the content and the destinations that the exhibition was conducted. The exhibit had to go through three countries- Nehru Centre, Mumbai, India, Russia and Japan.



32. Vistara exhibition



33. Vistara exhibition



34. Vistara exhibition

On being asked how the world responded to Indian design and designers, he says that initially there was no particular response as there was hardly any impact. Now however there are more designers of Indian origin who are making their presence felt through their work. He remembers Satyendra Pakhale, how he was, from his student days and how he has progressed to achieve stardom as a designer.



35. Satyendra Pakhale

He also talks about the Department of Design and its role in IIT Guwahati. This was an attempt to try and utilize the abilities of a craftsperson when it came to being meticulous and the ability to design with very fine details. He did not want it to become another space where pretty things were made using indigenous material.



Hospital and School Furniture in Bamboo (2003)

36. IITG DoD



37. Prof Nadkarni working with students



38. Products from IITG_DOD

He further laid emphasis to the program in terms of how it was relevant to this age of technology miniaturization. This kind of detailed work traditionally is seen in the practice of craft. Exercises like designing the dentist's knife pack were given to students to become sensitive to the needs and requirements of products that had finer nuances.

He also speaks about the recognition that Industrial Design got from the industries after the first set of designers was absorbed into the industry. There is a demand for designers from companies like Tata and Godrej and also urban hubs for design entrepreneurship.

He quips that there is a slight difference in the nature of designers that come out of NID and IDC. Where NID sustains an environment of experimentation, the students that come out of it tend to have very high risk taking abilities and hence are generally entrepreneurial in nature. IDC students according Prof Nadkarni however seem to play safe in what has become an extremely corporate-bureaucratic environment, hoping that a big corporate would come and absorb them. This he says reflects a lot in the environment where the two sets of students learn design.

On being asked how he sees the evolution of product or industrial design from his days at Ulm to the present day and to the future, he says if one were to look at Apple's product design there is still something unmistakably Ulmer about it. So he feels the change that has

happened, if at all, is incredibly slow. One thing that has become commonplace is product proximity; products now are closer to the people than it has ever been. He feels however that the terms like human centric design, innovation; are principles that used to be taught at Ulm back during his student days. At Welingkar he continues to teach design methodology to MBA students through developing hand skills and model making, to improve business design skills.

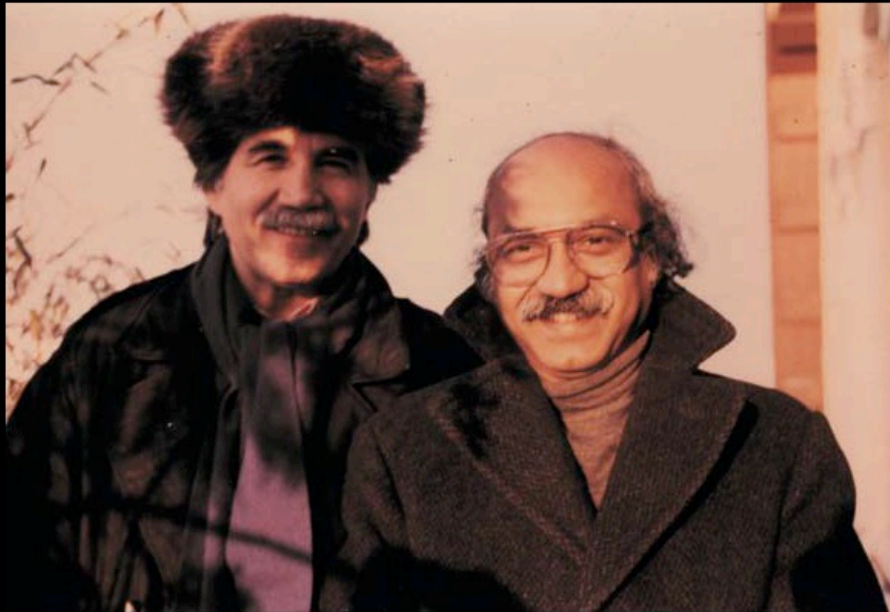
As influences he cites Tomas Maldonado his guide for all his projects. He was instrumental in changing Ulm by introducing science, technology and sociology to enrich design principles. He also recalls Gui Bonsiepe and his inputs in design theory. Herbert Lindinger is another faculty who Prof Nadkarni remembers as a guide in his milk booth project.



39. Tomas Maldonado

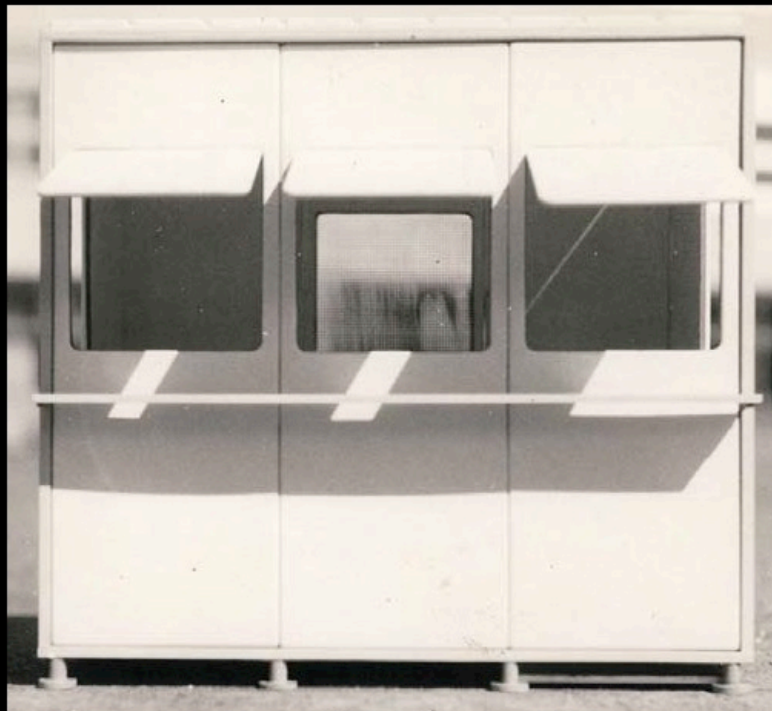


40. Gui Bonsiepe



Prof. Lindinger and Prof Nadkarni, Ulm(1975)

41. Herbert Lindinger



Milk Booth, HfG Ulm (1966)

42. Milk booth

He concludes by addressing the clichéd question- " His words to the future designers? ". He says that designers need to be more involved in intellectual work and that cross-disciplinary interests need to be developed with new vigor than before, as the concept of the "Master Designer" is almost non-existent. He calls for more commitment and conviction and for designers to be involved in work that they enjoy doing, without which the products are often lack-luster and sometimes detrimental to the people using it.

Image references:

1. Nadkarni brothers: Courtesy of Prof Sudhakar Nadkarni
2. Family: Courtesy of Prof Sudhakar Nadkarni
3. Working in Asia Art Advertising: Courtesy of Prof Sudhakar Nadkarni
4. Design Organisation Team: Courtesy of Prof Sudhakar Nadkarni
5. Yashwant Chaudhary: Courtesy of Prof Sudhakar Nadkarni
6. Parents sending Nadkarni off : Courtesy of Prof Sudhakar Nadkarni
7. Nadkarni at Ulm: Courtesy of Prof Sudhakar Nadkarni
8. Working in Ulm: Courtesy of Prof Sudhakar Nadkarni
9. Jukebox at HfG Ulm: Courtesy of Prof Sudhakar Nadkarni
10. Jukebox at HfG Ulm: Courtesy of Prof Sudhakar Nadkarni
11. PLU at Ulm: Courtesy of Prof Sudhakar Nadkarni
12. Walkie-talkie design: Courtesy of Prof Sudhakar Nadkarni
13. Tata Benz Trucks: Anon, (2016). [online] Deeplythinking.files.wordpress.com. Available at: <https://deeplythinking.files.wordpress.com/2011/06/tata-benz.jpg> [Accessed 1 Apr. 2016].
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15. NID Printing studio, Paldi: NID. (2016). [online] Pinterest. Available at: <https://in.pinterest.com/pin/290411875946343342/> [Accessed 1 Apr. 2016].
16. IDC design circle: Courtesy of Prof Sudhakar Nadkarni
- 16a. IDC faculty list and workshop capabilities: Courtesy of Prof Sudhakar Nadkarni
17. Faculty discussions: Courtesy of Prof Sudhakar Nadkarni
- 17a. Aims and objectives: Courtesy of Prof Sudhakar Nadkarni
- 17b. Syllabus: Courtesy of Prof Sudhakar Nadkarni
- 17c. Educational program: Courtesy of Prof Sudhakar Nadkarni
18. Ghamela: Courtesy of Prof Sudhakar Nadkarni
19. Ghamela: Courtesy of Prof Sudhakar Nadkarni
20. Ghamela: Courtesy of Prof Sudhakar Nadkarni
21. Crompton and greaves regulator: Courtesy of Prof Sudhakar Nadkarni
22. Crompton and greaves regulator: Courtesy of Prof Sudhakar Nadkarni
23. Tryst with destiny exhibition: Courtesy of Prof Sudhakar Nadkarni
24. Tryst with destiny exhibition: Courtesy of Prof Sudhakar Nadkarni
25. Tryst with destiny exhibition: Courtesy of Prof Sudhakar Nadkarni
26. Tryst with destiny exhibition: Courtesy of Prof Sudhakar Nadkarni
27. STC pavilion exhibition: Courtesy of Prof Sudhakar Nadkarni
28. STC pavilion exhibition: Courtesy of Prof Sudhakar Nadkarni
29. STC pavilion exhibition: Courtesy of Prof Sudhakar Nadkarni
30. Made in India exhibition: Courtesy of Prof Sudhakar Nadkarni
31. Made in India exhibition: Courtesy of Prof Sudhakar Nadkarni
32. Vistara exhibition: Courtesy of Prof Sudhakar Nadkarni

33. Vistara exhibition: Courtesy of Prof Sudhakar Nadkarni
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