

CMC House, Bandra, Bombay Flash Gordon would feel at home working here. It's being flaunted as India's first 'intelligent building' - an eight-storied structure that has no storeys and that's kept alive by computers controlling the airconditioning, lighting, security and fire systems, an interior that is sound absorbent, a basement parking and an art gallery at the bottom and a swimming pool with a jacuzzi on the top - and that's just half the story. It's easier to imagine that a time machine has fast forwarded you into the 21st Century, than to accept this multi-crore creation of ooh-aah technology is just the branch office of a Government of India enterprise.

Mr S. 'Chip' Bannerjee employee CMC, can't wait to get to work on Monday morning. He enters the reflective glass cloaked structure created by architects Vinod Gupta and Rasik Bahl. The glass doors swing open automatically. Mr Bannerjee 'Swipes' his identification card in one of the three little machines stuck to the walls on the left. Now the 'intelligence' inside the building tells itself. "Ah, so 'ol 'Chip' has arrived". Any creditors hunting for " Chip' now know where to look for him.

An EPABX system automatically redirects Mr Banerjee's incoming calls to whichever desk he is occupying at that moment. This is particularly useful considering one of the principles of

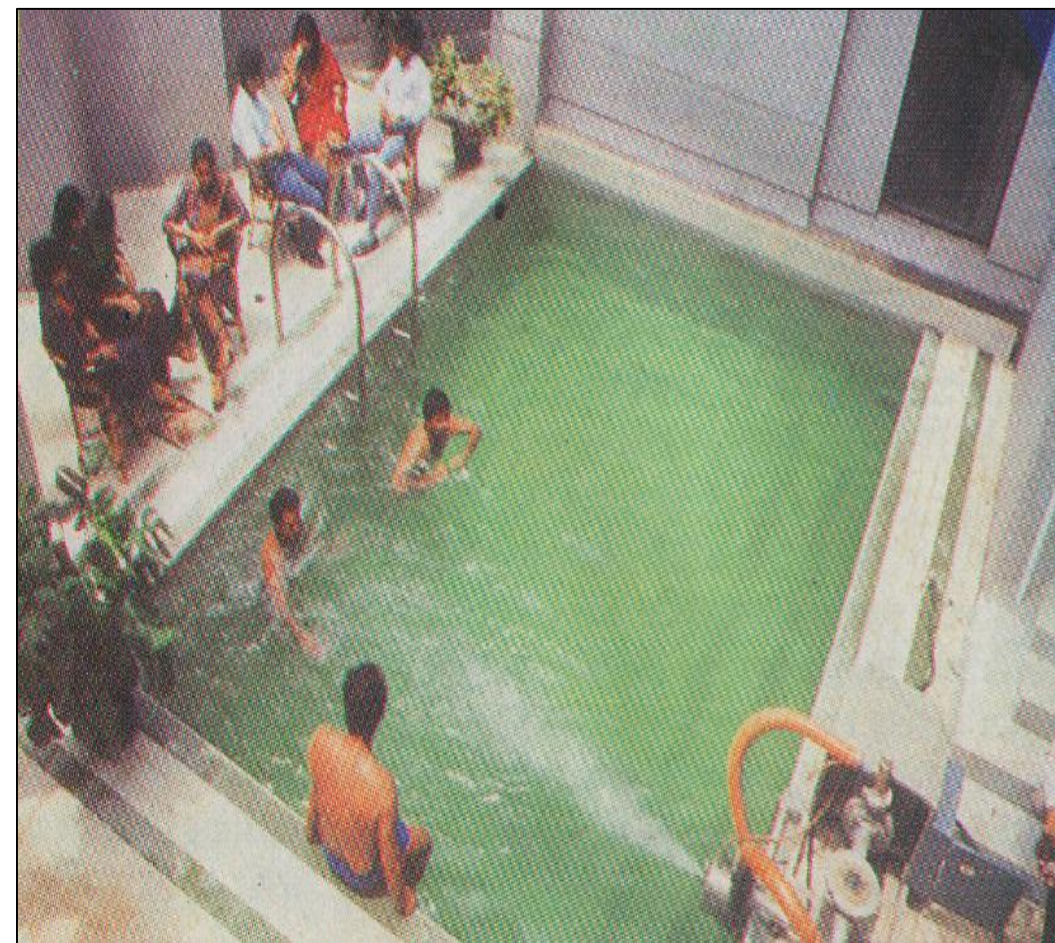
Mr Banerjee goes up to his desk. He uses the steps, not the staircase because there isn't any staircase. And there isn't any staircase because their isn't any clear demarcation of floors. Five steps take him to a landing and another five steps take him to a 'level'. There are eight such 'levels' with three 'landings'



INSIDE-OUTSIDE

‘OL’ CHIP HAS ARRIVED

CMC's off-beat corporate philosophy. The 'Dynamic Seating System' gives no scope for 'Chip' to get sentimental about his favourite desk and chair. As any project progresses, the work force involved in it are moved around to the related areas of work inside or outside the building. The flexible seating arrangement is to make optimum use of office space. This was largely achieved by the two Delhi-based architects taking the average working table as their starting point and working outwards. To the left of the atrium - one towering open space from top to bottom in the middle of which dangles three human figures sculpted by Suruchi Chand, is the nerve centre of the building- the computer room. If Mr Bannerjee is given access to it, he has to convince an advanced fingerprint identification machine first. CMC is one of the five companies in the world that have developed their own such know-how. Only the machine and 'Chip' know which finger he is going to offer for identification. If 'Chip' goofs-up and the finger print doesn't match, the machine gives him a second chance even while it quietly informs the supervisor that someone is smelling fishy. If Mr Banerjee misses on the third try, the security chaps promptly appear and bag him.



Cooling off!

each. Even the high-tech lifts have no floor number on their buttons. There are only alphabets showing 'A Level' or B Level or whatever level. 'Chip' always get the impression the floors (wrong description) merge with each other. And that's the whole idea. It fits

with CMC's work culture that's different enough to make quite a few in New Delhi nervous, but seems to make them good enough to pocket major jobs like computerizing the Indian Railways, doing the train scheduling system for the London underground

railway, the lighting system for Changi Air-port, Singapore. CMC says it believes in providing an atmosphere of openness, accessibility and the freedom for 'Chip' and his colleagues to express themselves creatively or otherwise. At least they have got as far trying to get everybody to eat in the cafeteria where the chairman and managing director as well as the peon get a meal for Re 1, and everybody has to drag around their own files.

Enter the open office concept. The interior design has to mix CMC's 'no cabins, no status symbols' rule and its



Facade of the CMC building

The hi-tech Interiors of CMC building in Bombay is like another world, says Psmith



No more paperwork

declared intentions of making high technology user-friendly. And there fore, there is to be the ideal working atmosphere. Enter the celebrated Mr Carl Christiansson, Sweden, who having accepted the task of de signing the interiors and the furniture to acco-

modate such a concept, apparently was so enraptured by the idea that he's forgotten to send in his bills. To start with, the good Mr Christiansson has blazed a trail of sorts by fashioning CMC's furniture with 'rubber' wood. It's a complete 'first' - CMC persuaded fur-

niture makers to chemically treat the unwanted left-overs of the rubber tree. Seasoned arid made resistant 'to termites, the 'rubber' wood looks like pine. feels like teak and comes at one-third its cost. If the idea clicks beyond CMC. we've got a pretty nice antidote to our vanishing forests. Fabric-covered screens in cool pastels separate work units. The material is insulting and sound-absorbent. So are the coir carpets with a special latex backing. Mr Banerjee's personal furniture is flexible. He has add on drawer units removable table tops, shelves, racks, a write-and-wipe noticeboard that saves bits of paper and is a step towards the future ambitions of creating a 'paperless-office'.

WHAT never fails to awe 'Chip' is the building computerized light and air-conditioning systems. The basic idea is to internally maintain an ideal constant temperature (universally 26 C to 28 C) and lighting. And the smartness of it all is to make the least use of energy. Conservation of energy, as the green brigades call it.

Firstly, the computers control the incoming sunlight. Every window has a venetian blind that is half normal and half 'intelligence' controlled. The abnormal part of the blind has a mirror coating and a tiny motor. The computer keeps track of available daylight and the position of the sun. As the sunlight and the heat varies, the computer sends a message to the motor telling it of the extent it should tilt or close the blinds. The natural light is absorbed and distributed evenly this way throughout the

knows about it. The body warmth sensor on the ceiling above him is the informer. The lights at his table or near him automatically dims or fades out. Likewise, when more people enter a working area, the lighting power increases to the appropriate level. When the building empties itself in the evening as people head home, the lights automatically shut themselves off.

The air conditioning too works the same way. The moment 'Chip' leaves a working area, the air input in that region is reduced and increased in the area he is visiting. And the air conditioning is automatically cut-off in working areas that are empty. The central water chilling plant is connected to air handling units on each level, and the computer tell each unit what to do. The net result is a whopping energy savings to a 25% to 30% extent.

The fire fighting systems too are computer controlled. Each level has an advanced fire-detection gadget. The moment 'Chip' gets very careless with a sneaky cigarette (the whole building is a 'no smoking' zone) and lights a fire, the gadget immediately detects the smoke and informs the computers, while at the same time it sucks in air giving the fire less oxygen to live on. The computer swings into action: (a) it promptly, without human intervention, sends an SOS to the police and fire brigades, (b) it shuts the normally open doors surrounding the danger zone giving it a one way access --people trapped inside and come out, nobody can get in, (c) it gives the in-house fire-fighters the exact low-down on the situation and also immediately lists out the options available to them to rescue people and control or kill the fire.

"All of the technology we have used is entirely indigenous", says Ajay Goving, CMC's public relations manager". Parts of it are widely used in buildings abroad. But I think it's for the first time that so many systems are used in one building". The technology in advanced office automation and communication like electronic mail and immediate access to national and international databases, is all very fine. But what 'Chip' Bannerjee likes more are the little human touches -- like the individual hand towels and little tins of black and neutral shoe polish with brushes in the spotless wash rooms, to the roof top jacuzzi available to him anytime he feels like it and to his family on the weekends.

The office automation package CMC has developed costs around Rs 48 lakhs. They have an even more advanced 'intelligent' building coming up for their R&D centre in Hyderabad. When the one by the Bandra creek opened for a preview, top industrialists promptly wanted to order the same works and trimmings for themselves, considering the savings in energy costs that make it fairly quick break-even investment. Reality seems to be catching up with science fantasies more quickly than we would have thought possible. What's the world coming to?

THERE was a time when it was difficult to distinguish one corporate office from the other. Not anymore. Gone are the days of sloppy negligence, grimy, Il6only cabins, rickety, moth-ridden furniture, peeling paint... or even just neat and convenience-oriented offices.

The apathy towards the work environment is being edged out in the new, competitive environment. Modern-day managements are realising that offices, as workplaces, do not just add value to an organisations' functioning — they are value by themselves.'

They are wombs where ideas are conceived, worked upon and implemented. And, today's corporate houses are leaving no brick uncemented in the quest to give their offices a definite attitude.

When Deutsche Bank got an opportunity to buy the imposing Tata House near Mumbai's Sterling theatre, it lost no time in grabbing it. "When you get a place like this, you don't ask questions," says Bernhard Steinruecke, the German banking giant's general manager in India.

The Bank bought Tata House in 1989, an elegant villa built by a French architect for the Tatas in '1908, and spent the next five years transforming it into a banking office, renovating even as it tried to retain the original structure.

By the time Deutsche moved into Tata House in 1994, the villa had changed — the high ceilings were lowered to suit the needs of modern commercial outfit, huge chandeliers now adorned these Ceilings, a conference hall, a cabin there, a reception hall, potted plants, computer terminals... The aura of the past lingers in the verandah that the conference f ill looks out at, the pillars that rise up to the ceilings and the terrace that gives a viewof the bus-fling life of the city around this structure, which is a meeting of the past and the present — the confluence of two cultures.

Nowhere is this merging of cultures more evident than in the paintings that line the spotless White walls of the bank. For, as has been Deutsche's policy all along and in all countries, here, too, it had tried to bring together works of art of contemporary German artists and those of the local artists- an attempt to transcend the barriers of language and culture aid communicate through the language of colours and creativity. Thus, we have the expressionism of Tyeb Mehta, the calm

The new workplace

The new corporate office aims to harness ideas, heighten creativity and make

*business more competitive, say **Rucha Chitrodia and Sangeeta Menon***

simplicity of Prabhakar Barwe, the intensity of Aparna Caur, the abstracts of Georg Baselitz, the realism of Atul Dodiya, the sensitive, delicate strokes of Paco Knoeller and the dream-like water colours of Wolf- gang Gloeckler, all under one roof.

The way the paintings are distributed among the threefloors of the building also shows a conscious pattern. The ground floor, which comprises the main banking hall, the centre of the bank's daily activities, hectic and bursting with life, gets the works of the younger artists

such as Binod Sharma, Chittrovanu Mazumdar, Aparna Caur, C Douglas and Shibu N, thus reflecting the vitality of the particular section.

On the same floor, in the bills department, the paintings by Svenja Hehner on Deutsch Mark bills, blown up

to unusual proportions, along with her playful pun on the titles reminds one of the aility of an artist to rise above the mundane.

One ascends the stairs up to the first floor — comprising the corporate banking division and the general manager's room — accompanied by a series of five woodcuts titled 'Woman Rising' by Matthias Mansen to be greeted on the landing by a large terracota sculpture of a classical female visage by Ravinder Reddy. This floor gets the works of the older artists. And the second floor houses the conference hall with the long verandah outside and the merchant banking division to the left the staircase.

The conference hall walls are adorned with the drawings of Hella Berent and Markus Oehlen with Prabhakar Barwe providing the balancing effect.

In fact, it is this sense of balance throughout the place that strikes one most.

The colourful vitality of the paintings is offset by the pale grey desks and navy blue chairs and shelves.

The opulence of the chandeliers is toned down by the lighting. The sense of distance created by the large windows is enhanced by the open atmosphere and the absence of cabins.

And the surrealism of Hartmut Neumann stares out at the realism of Florian Merkel's hand coloured photographs. And as one saunters to the roof terrace, after the walk through the museum-bank," one is jolted back to reality by the teeming crowds hurrying towards the nearby CST railway station to catch the next train home. And the beautiful white statues on the roof look on. In contrast to the old Gothic museum look of the Deutshe Bank, in another part of the city — in the Bandra-Kurla complex — the MC building stands tall as a symbol of modern architecture and interior design and hitech. The CMC House is the western region office of what was once called the Computer Maintenance Corporation now known only as CMC Ltd.

The adage that science is but an art seems to apply to CMC House's attitude towards its work. This eight-storey monolith, baby of architects Vinod Gupta and Rasik Bahl and Swedish interior decorator Carl Christiansson, is renowned for its striking

patterns. On first sight, its imposing glass and flake-finished concrete exteriors look formidable.

But, the interiors speak another language. On passing through the automatic glass door, one is surprised to be greeted with a festival of creativity in an obviously information technology company - very much at home with each other.

A perfect illustration is the atrium with a glass roof, which is the first sight from the foyer. this arrangement aims to provide equal sunlight to each floor — an effort towards energy-conservation. At the same time, it is beautified with a small artificial pool and a troika of fibre glass sculptures with clay-finish titled "Search for the divine" by Suruchi Chand, depicting figures trying to reach out to the unknown.

The place is, in fact, house to a myriad collection of many more works of the artist, including paintings, and by other artists such as Badri Narayan, Meera Nair, Charan Sharma... to name a few.

There is a bronze sculpture at the entrance by Shubhika Lal styled "Spirit of challenge," reflecting CMC's will to overcome hurdles.

There is no end to creativity... These pieces of art, put against the light colour scheme, are appended with many a cane-potted plant (nurtured in an in-house nursery), ethnic wall decorations, dhurries and coir carpets.

Though, at first sight, the building looks more like an art gallery, the effortless ease with which it functions comes across. The fact that it has four conference rooms and three boardrooms justifies this.

Each floor has three levels connected by short flights of stairs. The furniture, made from cane and pale rubber-wood, is modular, with one cubicle or "cluster" per employee which is both open-air and maintains privacy. There no cabins.

This chic condominium has some unique computer-controlled systems for the venetian blinds, electric lights, air-conditioning, fire-fighting procedure.

On the top-floor lies the cafeteria which has a mural painted by children of CMC employees. Which, perhaps, indicates the company's spirit — that of creative teamwork.



TOMORROW'S HEADQUARTERS TODAY: The new CMC building in Bombay

TRENDS / JYOTI Pande finds the state-of-the-art CMC House, recently inaugurated in Bombay, to be a structure with a soul

Behind the scenes of a brainy building

ALI Baba stands before the building and shouts: "Open Sesame!" Nothing happens. He repeats the words. Still the doors remain im placably shut.

"Uh-oh!" he says, "I've forgot ten something." He goes to the lit tle black square box to the side of the doorway and inserts a fore fin ger in a U-shaped space. Some where within the steel, glass and concrete structure a computer 're cognises his fingerprint and the doors swing back noiselessly to re veal the corporate treasures within.

Once inside, Ali strides across a foyer to a bank of elevators, swip ing his ID-card through an elec tronic punch-card machine to let the central computer know he's in. He arrives at his workstation where a sensor automatically lights up the tube on his table. He

logs on to his networked terminal, read s the electronic mail received from various parts of the world and settles down to work.

IF you think this is a scenario in to far into the future, think again. It's here. And now. With the country's first intelligent building, CMC House in Bandra,



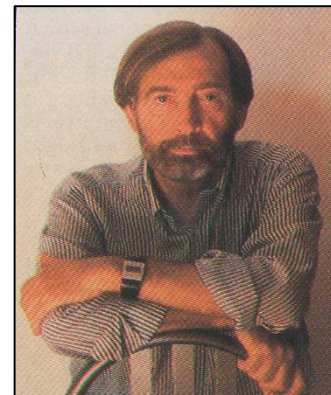
Bombay, already incorporating all this hi-tech wizardry--and a lot more besides.

Cross the threshold, and you might just be fooled by the gracious greenery, statues and sparkling fountains. For behind the cool exterior, the building bristles with behind-the-scenes technology that not only helps make working here easier, but also environmentally sound.

Take the lighting system, for instance. CMC House uses only half the number of electric lights as would an average building of

(Clockwise from above left) Rooftop swim-gym; Hook Rug statue with CMC House in background; Interior work clusters; and Swedish designer Carl Christiansson: redefining the working environment

sive office automation, control and facilities management systems. This covers lighting, air-conditioning and access control systems, maintenance management, automatic water management systems, equipment testing and fire safety systems. In the unlikely event of a fire (all materials used in construction and furnishing are fire retardant), for example, the computer automatically in forms the police and fire departments. But CMC House is more than just a



brainy building. It's a whole new way of corporate life. Consider this:

- Rooftop water tanks-mandatory under the city's fire department regulations-have been converted into a swimming pool, complete with jacuzzi and cabanas to shower and change in. Staff members are free to take a dip whenever they wish;
- The structure has no clear demarcation of floors. What would normally have been an eight-storey building is a spiral, tiered rectangle-



with-corners-cut-off shaped structure, hollow at the centre where each level merges imperceptibly with the next;

- The open office plan adopted by the company allows for free flow of information within teams. The CEO sits along with the rest of the staff, eats at a common canteen and peons are conspicuous by their absence;
- Office furniture is made of wood from rubber trees that have outlived their sap collection years and would

normally have been used as fuel. Partitions that define work station areas are filled with sound absorbent fibres that help cut down on noise levels normally associated with an open office;

Agreed, these may not be devastatingly novel ideas if taken individually. But together with the structure, hollow at the centre high-technology, it is a combination that makes CMC House rather unique. Says leading Swedish design consultant Carl Christiansson, who has been closely associated with the project: "Other buildings may have similar features in

-cult to light. That's why this building was designed to be hollow, letting in light from the centre as well as the sides. We hardly need any artificial light. The resource conservation is enormous."

That's not the only saving grace. By consolidating the company's hitherto scattered offices in the city under one roof, the in crease in productivity due to less commuting, the ergonomic design of the workstations, and power conservation will make the Rs 10- crore building pay for itself in four years flat. "In any case, additional costs over and above what a normal building would have cost anyway are less than Rs 1.5 crore." says Marimuthu, "And this is even without imputing the benefits due to the increase in welfare and quality of living!"

It doesn't take a visitor long to realise that this brainy building doesn't lack a heart-it has been built with the comfort of the occupants kept uppermost in mind--or a stomach for that matter. The common canteen at the very top is a room with an ambience in complete contrast with the rest of the building. The parquet flooring and warm, earthy colours provide a place to unwind. Murals by the children of CMC staffers adorn the walls, splashing them with vibrant hues: Simple striped curtains lend height and a feeling of airiness. Elegant cane chairs clustered around rubberwood tables and bright accessories lighten the atmosphere. says Gupta: "The whole point of high technology is to help people work, think and live better. I wanted a cement, glass, concrete and steel structure with a heart and a brain. And the building is a dream come true." Though there may be sceptics, Christiansson--who was so taken up by the singularity of the project that he worked on it for free-perhaps best sums up the central concept of the building with this anecdote: "A friend of mine recently sent me a stone with 'PTO' inscribed on one side. I turned it over and it had "Aah, that feels so good!" inscribed on the other. You see, I believe that stones, too, have a soul."

CMC House does as well.

WHITE KNIGHT/ Walter Vieira

LETTERS TO THE EDITOR

Erroneous report

Sir: I was pained to read the article on CMC House (ET Esquire, May 10). We, the architects of this building have been responsible for the architectural design, the interiors and for the entire concept of making CMC House an intelligent building. By omitting any reference to our firm and our work, the article creates the impression that the building designer is Carl Christiansson, a Swedish architect. Many of our clients who read the article have called us up to find out what was going on.

The truth is that Carl Christiansson designed the furniture on his own, collaborated with us on the interiors and he had absolutely nothing to do with the building design.

We feel a grave injustice has been done to us by this deliberate act of omission by the reporter who was fully aware of our role in this project. Just so that there is no mistake this time, the CMC House was designed by architects Vinod Gupta and Rasik Bahl of Space Design Associates, New Delhi.

VINOD GUPTA,
Space Design Associates,
New Delhi, May 16.

The omission of any reference to Space Design Associates was purely unintentional, and any inconvenience caused thereby is regretted—**Editor**.

Saving skins

Sir: According to press reports (ET, April 7) UTI had mounted a rescue operation buying large chunks of shares in firms like Reliance, Modi Rubber, TISCO, GRASIM and TELCO. This rescue operation "has helped mitigate...

Smart House

Now, an intelligent building

IT'S apt. A hi-tech company which works in a hi-tech environment. That's the latest at public sector CMC Limited, which packs more future into its new eight-storey, Rs 12-crore Bombay office at Bandra-Kurla than an Indian corporate office has ever seen before.

Here, computers regulate the lighting and air-conditioning systems, depending on the time of day and the number of people in the room. Even the venetian blinds are computer-controlled, their angle changing with the time of day, ensuring that the cabinless office is bathed in a steady 350 lumens—the optimum measure—of light. This is expected to reduce energy costs by half, compared to a conventional office of similar size.

There are no fixed floors, only different work area levels with barely five steps separating one from the other and rising in a spiral around an atrium. Chairs are specially designed to provide proper back support: the partitions have noise-absorbent glass wool: and each desk is provided with a computer terminal.

"We worked towards two basic objectives," says T. Marimuthu, CMC's project manager. "Energy conservation and an environment which would help employees increase productivity."

Everyone from the general manager to the junior clerk will share a common

work environment. Senior managers will also be able to conduct conferences from any desk with their counterparts in other cities on CMC's computer network INDONET, reducing the need for travel. CMC House will also use less paper—plans call for scanning all documents onto computer so that information will be available to officers at their desks.

A unique feature: while 450 people will be employed at CMC House. It will have only 300 seats as not all its employees are present in the office each day, or at the same time. So one section of the employees will be given seats while others who have been assigned outdoor work will immediately check out without entering the office. Everyone will carry computer-coded cards, for the electronic timekeepers in the entrance lobby, punch it in, and start work. The computer ensures that all phone calls and electronic communication are automatically routed to the desk. The worker has only to punch out to end the process. And if he wants a break,

he can always stroll over to the office Swim-Gym for that necessary bit of limb-stretching.

A fair amount of work has gone into what appears like a gamble. CMC picked up Rs 10 crore for the building's cost from the sale of its South Bombay property, and chipped in Rs 1.5 crore to develop all the computer controls and software. It see-



CMC House in Bombay: Hi-tech high rise

ms like a case of overreaching, especially as turnover is dropping.

The 1991-92 revenue is expected to be Rs 120 crore, down Rs 20 crore from last year. And profits are a problem—from a bare Rs 0.85 crore profit in 1989-90. the company declared Rs 7-crore loss in 1990-91. Figures for the last financial year haven't been worked out, but sources say they don't look too good.

CMC will save money in the new building, with all its gizmos, but what company executives are hoping for is that India's corporate Sector eventually buys their hi-tech package to soup up their own offices. And CMC House is just a sample.

Officials say it's still too early to say how successful such a venture will be. But people will certainly be keeping their eyes peeled on the company and its efforts.

Of its equity, 60 per cent was disinvested to mutual funds, and when shares get listed, the company will be accountable to the public. That will definitely be the true test of its technology.

—M. RAHMAN

WORKSTATION CMC

By Darlene Fernandez

A RECTANGULAR structure resembling a satellite station right out of a science fiction movie... This one, nearly eight storeys high and located near the Sales Tax Office at Bandra east, is Computer Maintenance Corporations' new structure, aptly called the Intelligent Building.

Computer buffs view it as the model office of the future, sans mundane office stationery that comprises paper paraphernalia, ledgers, files, manuals and the like.

Attempting to create a fantastic work environment, the CMC people have revolutionised everything, from the construction of the building to routine office activity. They have worked on the concept of eliminating simple repeated activity with a series of electro-mechanical actions. Project Manager G A Srinivasan pointed out that in order to allow the CMC staffer to perform duties of a higher form of intelligence, they have gone in for sophisticated technology comprising a network of computers to perform routine computational, logic and basic decision support functions.

With computers managing, controlling, monitoring and performing various activities, the human being, says Srinivasan, is left to perform his duty in absolute comfort.

Supporting his statement with factual evidence, he goes on to demonstrate how even the control of the lighting, airconditioners or even the venetian blinds can be done from any place in the office, by

feeding certain commands into the computer. "You can have your mail scanned, dispatched and even destroyed if you wish, all the while just sitting in front of a terminal," he added.

Furthermore, he says, you can locate a person anywhere in the building, make messages as well as hold a national telephone calls, send telex and fax conference by logging into INDONET at one particular time.

If a fire broke out in the office, he said, the computers will automatically dial the fire brigade and the police for help. Furthermore, the fire detection and management system will

Computer Maintenance Corporation's new office in Bandra presents a journey through the future.

cut all supply to the affected area, and activate all emergency fire exit doors for evacuation. A CMC employee said fire fighting equipment like sprinklers were set up only in the basement of the building.

A tour of the building reveals that it has neither clearly constructed floors nor the usual office sights.

The lobby on the ground floor leads on to a spiral staircase in front and three lifts on the right.

The atrium around which the stairs are constructed displays Suruchi Chand's fibre glass nudes suspended with metal cords, depicting CMC's theme of reaching higher and higher.

The push button floor indicators in the lift are alphabetically listed. This, explains T Mari muthu, project manager, is because

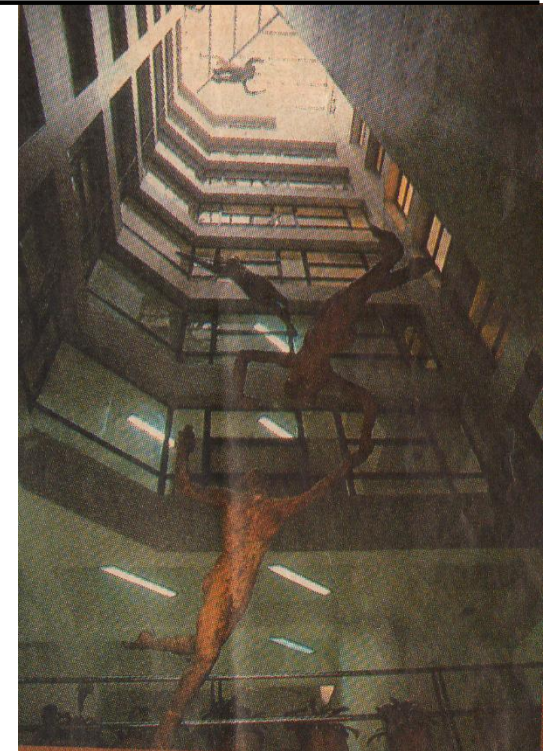
intelligent Building does not have floors but a series of platforms. The lift system can schedule the floor movement of each lift during peak hours based on load and need. If one were to compare it to a single floor as is commonly understood, then one floor of the building would comprise three platforms constructed at three different altitudes. Of these, two can accommodate 13 staff members and the larger one, 30.

TECHNOLOGY

There are no cellular offices in the building (except for a few conference rooms on one

floor), but open cubicles complete with keyboards and terminals, where the mainframe is hooked into INDONET. "We believe in an open office culture and hence see no need for isolation of any kind. Even director P P Gupta has no cabin of his own!" he explained.

The interiors of the building, incidentally, is being designed by renowned Swedish interior designer Carl Christiansson, who it is learnt, is lending his talent to the project on a non-profitable basis. "Let's just say I love doing it..." he says. Christiansson has had the CMC project group install specially treated rubber wood furniture instead of the traditional teak. He says teak being on the list of endangered species and much too expensive, makes it easier to do without it when a good alternative is available.



REACHING HIGHER... The fibre glass nudes suspended with metal cords at the Intelligent Building. Picture by Fawzan Husain.

"Rubber wood is usually burnt after its 30-year production of sapdries up, so why can't they be put to further use?" he argues. The ceiling of each floor is fitted with acoustical absorbers to keep the noise out, as are the cubicles. "I thought it would be proper to cut out the sound at each cubicle considering the telephone culture in the city which requires you to shout if you want the person at the other end of the receiver to hear you!"

Two interesting features of the building are the Nandi wood flooring cafeteria cum dining hall on the 8th floor and the swim-gym above it, for the CMC personnel to cool off! The building, whose foundation stone was laid two years ago, was electronically inaugurated on May 1.

This building is 'intelligent'

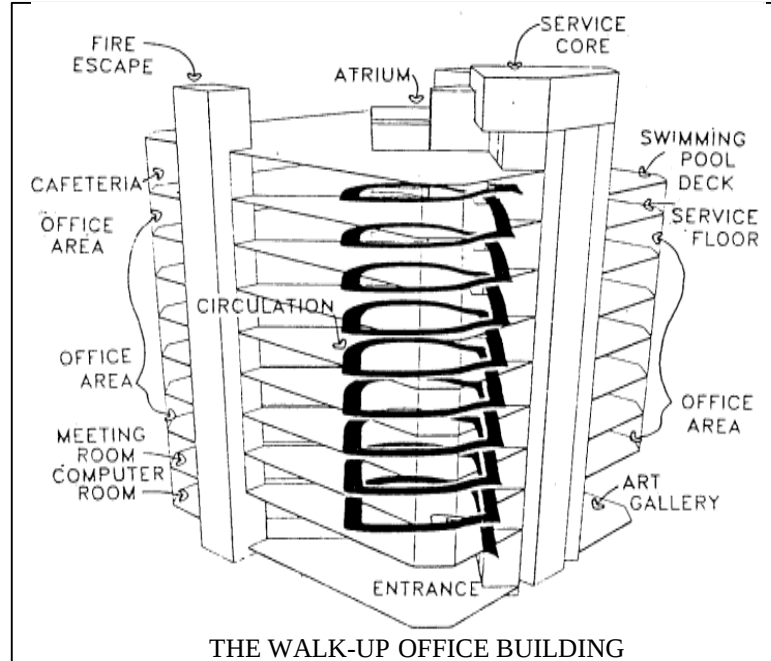
By C. JAYANTHI

IT is the first of its kind in India land and can perhaps match architectural standards even in the West. The 30-metre high building in Bombay of the public sector CMC Ltd. corresponds to a 10-storey structure, and has a unique architectural concept in which conventional floors have been replaced by a continuously rising spiral or helix of small work spaces arranged around an internal atrium.

"The 'concept of an intelligent building is a new one in India as it's hi-tech, environment-friendly and cost-saving in the long run," said Mr. Vinod Gupta, architect, who helped design the Rs 22-crore CMC building along with his associate, Mr Rasik Bahl.

The innovative lighting system in the building makes the most of sunlight, he said. The facade is made of reflective and ordinary glass embedded in concrete. The ceiling is white-painted aluminium which reflects the light from the windows deeper into the room and not just near the windows. And the white matt finish of the ceiling is soothing to the eye.

The venetian blinds at the windows believe it or not, are computerized! A computer system installed at the top of the building



functions like a weather station, Mr Gupta explains. It keeps track of available daylight, angle and radiation of the sun, and cloudy conditions. It then sends signals to 350 tiny motors which control the venetian blinds.

LIGHT SUPPLY : The mirror-coated blinds then tilt to let in or shut out light as necessary, distributing it evenly deep inside the building.

This enables a more than 30 per

cent conservation of electricity in the building compared to conventional buildings, Mr. Gupta says proudly.

Even the air conditioning is computer-controlled, reducing operational costs by 20 per cent.

The central water-chilling plant is connected to air-handling units on each level and this allows air-conditioning to be automatically cut off from unoccupied work areas.

There are no conventional floors in the building, Mr Gupta says. It is

like a helix. Instead of floors, there are smaller work areas which spiral upward, separated by a short flight of stairs which makes each floor merge imperceptibly with the other. There's optimal space use as there are no cabins, only fabric-covered screens which separate work units. The sound absorbent, insulating material together with coir carpets with a special latex backing, cut down noise levels inevitable in an open office, he adds.

Talking about innovativeness, the CMC building is an absolute trend-setter when it comes to staff seating. Each staffer entering the building will be given a magnetic card called the "smart card", which will allocate a vacant seat with a computer for the person to work on, Mr. Gupta explains.

This is especially useful for staffer who have a field job and no permanent seat. The EPABX system will automatically direct coming calls to whichever desk a person is using.

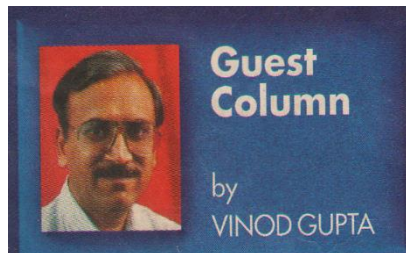
SAFETY : The intelligent building has been sharp enough to make the best possible arrangements for its safety too. The building has fire proof doors which are computer controlled and fire resistant for at least an hour after a fire, its architect explains. The computers

actually hold the self-closing doors open. In case of fire, the electricity to that particular section is automatically cut off and the door jams shut, thus controlling the spread of fire in the office. "The building has a good fire-alarm system and ventilation as well," he adds. An exhaust fan of 6 ft. diameter at the top of the building automatically gets into action and sucks out smoke which can cause severe damage to the computers and walls.

The building is environment-friendly too. Mr. Carl Christianson, a Swedish architect who designed the interiors, has used rubber wood for doors, desk tops and racks, Mr. Gupta said. When the wood has exhausted its rubber producing life, it is chemically treated to increase its hardness and strength and make it termite resistant. Though commonly used for furniture in Europe, this practice is uncommon in India, he observes, adding that this saves the use of teak wood, a fast depleting natural resource.

To top it all, there is an art gallery on the ground floor on the building (CMC is known for promoting Indian art) and for the energetic types, a swimming pool on the roof top, Mr. Gupta informs. Some building!

The Missing Material



DO you fancy living in a house that has no visible walls or roof but which, nevertheless, protects you from the elements? A house from which you can look out, without being seen from the outside? If your answer is yes to both, it's a high-tech, all-glass house you're looking for. Glass is a unique building material that lets in light while keeping wind, rain, dust, noise and insects out. Even ordinary window glass has some special properties that are not commonly appreciated. It is transparent to sunlight, but opaque to heat radiation. This effect is used to advantage in greenhouses, and works in much the same way in cars. This property works especially well in

cold climates where buildings need to be heated. brittle and fragile material, it may shatter at any time.

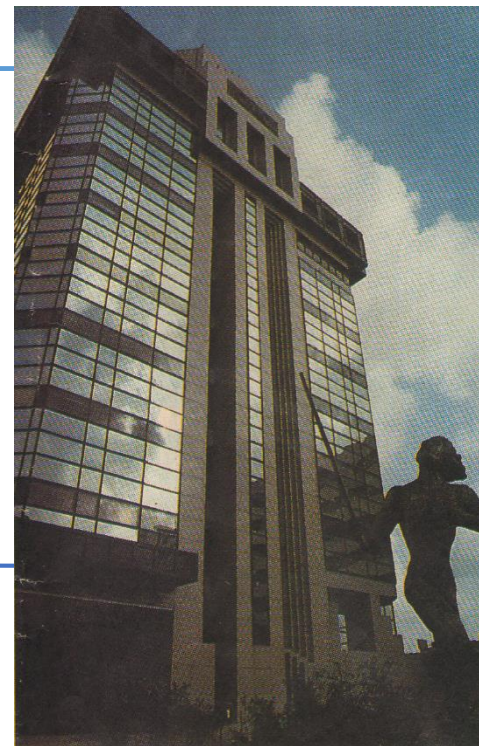
Double glass, particularly sealed double glass, provides insulation in a heated building but does not provide any additional protection against sunlight. Tinted glass is capable of cutting down glare but offers only marginally better protection than plain glass against sunlight. This is because tinted glass absorbs solar radiation, gets very hot and starts letting in the heat.

Perhaps the best glass for hot climates, thus, is reflective glass which as the name suggests, reflects sunlight. Unfortunately, however, though this glass cuts down the heat, it makes the interiors rather dark, even in the case of buildings with large expanses of glass. Also, unless it is used carefully, buildings with reflective glass create problems of glare in surrounding areas, much in the same way as thoughtlessly located air-conditioners cause heat build-up around them. Also, glass being a

opaque when exposed to low temperature or dark when exposed to high temperature. It can turn opaque when exposed to low temperature or dark when exposed to high temperature.

Electrochromatic glass, on the other hand, changes colour on demand, when a small electric current is applied to it. Then there is a heat mirror — clear glass that can reflect heat from inside and outside while allowing light to go through. In terms of brittle behaviour, toughened glass is stronger than ordinary glass. Moreover, if it shatters, the pieces being rounded are less dangerous than ordinary broken glass.

The CMC building, Mumbai: the Glass hides an Insulated wall



In warm climates, glass must be used sparingly in buildings. Unfortunately, there seems to be an increasing tendency to use glass curtain walls in commercial buildings without any thought for the interior environment. Apart from letting in sunlight, glass — being a thin material — also brings in it. Not many people realise that the thermal insulation offered by glass is about the same as that offered by a tin sheet.

The insulation value of glass can be increased by using double glass but this has little effect on the heat coming in due to direct sunlight. One building where the use of glass has been optimised is the CMC building in Mumbai. Although it looks like a building with a glass curtain wall, the windows cover no more than a fourth of the external walls. In the rest of the area, reflective glass is used for its appearance and hides a well-insulated

wall. Half the windows are made of clear glass which brings in daylight and the other half consists of reflective glass to allow a glare-free view of the outside. All the windows have double glass for insulation and venetian-blinds for sun control. A similar effect in terms of view and light could no doubt have been achieved by providing external sun shades on windows—but then the appearance would have been totally different.

—Vinod Gupta
is a Delhi-based architect

Computers

TODAY

CMC's 'Intelligent House' Inaugurated in Bombay

A BUILDING, WHICH can sense when to step up air conditioning, put off lights or turn blinds in windows, without human intervention. These are a few glimpses of the new eight-storey, Rs 10 crore CMC House in Bombay, nicknamed 'Intelligent Building'. The intelligence, of course, comes from computers.

Busy executives in this building need not bother about the lighting level required. A computer keeps track of the sun's position and availability of light and sends appropriate signals to 350 little motors. The motors, in turn, control Venetian blinds. Besides, the computers ensure that all work stations get equal artificial light at night. As people leave the building, lights go off by themselves.



CMC House: Building with a head

Similar is the case with air conditioning. Air conditioners switch off automatically from unoccupied areas. Another novel feature is the access to the computer room through a fingerprint identification system. The building management system also handles water management equipment, testing and fire fighting. In case of fire, computer sends out alert to the fire department and police, without human intervention.

The ultimate aim of CMC seems to be a paperless office. For starters, each desk has a computer terminal which will give users the option to scan, store and retrieve information quickly.

Two more 'intelligent buildings' at Hyderabad and Delhi at the cost of Rs 26 crore each are on the cards.

BUILDINGS WITH BRAINS

HERE'S a tip from the survival guide for the twentieth century: smart people will live in intelligent buildings. Made of ecologically sound materials and trussed by high technology. These modern marvels of architecture are designed to help people work, think and live better. Along with length, breadth and height, they boast of a fourth dimension: in built monitors for increasing resource efficiency.

Consider CMC House, in the Bandra Kurla Complex, at Bombay, which is the country's first intelligent building, or the Tata Research Centre (TRC) in Pune, which is due for completion by the end of September. Both follow the three tenets that distinguish buildings with a brain.

First they use advanced computer technology to increase comfort and safety levels for their occupants. Second they offer the latest in office automation and office design to make the work environment efficient and aesthetic. And finally they harness technology to pare energy costs and conserve natural resources.

Says a CMC employee about CMC House, which was designed by architects Vinod Gupta and Rasik Bahl: "The office building is a fine example of mixture of an intelligent architecture which has all the modern facilities, but at the same time has a distinct stamp of Indian culture in the form of carpets, furniture and the sculpture."

Equally smart is the TRC building, the brain child of the Delhi-based firm of architects, Jasbir Sawhney, and the Pune based Narendra Dengle Associates, who were as associate architects for the project. Equipped with access and air conditioning control, automatic smoke and fire detection systems and intelligent water disposal systems for its laboratory, the Centre is an organic tribute to scientific progress. Consider their intelligent quotient:

Comfort and safety: Every detail in CMC House has been worked out keeping in mind the needs of the people who will be working in it. Right from the size of the average working table to the number of workstations has been meticulously worked out by the project designers. A modular approach was adopted to evolve a flexible seating system., in which desks can be assigned to people as, when and where they are needed.

The logic is simple: rather than one-desk for one-person, the layout takes into consideration the fact that some section of the work force is always away on assignment at any given point in time. So, the office space is designed to accommodate the average occupancy level rather than the total manpower strength. What's more, CMC House is built on an open plan which provides an atmosphere of accessibility and teamwork. There are no enclosed cabins nor any special status-spaces earmarked for senior executives. Instead, the open office concept extends horizontally across a floor and upwards, right through the building: instead of discrete floors, the architects have built small work areas which spiral upward, separated from each other by a short flight of stairs. Thus each floor in CMC House merges imperceptibly with the next.

The decor of the building is equally thoughtful. Designed by Swedish architect, Carl Christiansson for free -- he was that committed to the project -- the interiors are divided into work units through fabric-covered screens. Done in cool and soothing colours, these screens incorporate a sound-absorbent insulating material which cuts down noise levels.

Office automation reaches new levels of sophistication in intelligent buildings, report **Ram Prasad Sahu** from Bombay and **Gouri Agtey Athale** from Pune



Even the furniture reiterates a commitment to the environment. The wood used comes from the rubber tree, widely cultivated in Kerala and whose wood is usually disposed off as waste after 30 years of productive life. CMC persuaded furniture suppliers to chemically treat the wood so that it became harder and more resistant to termites-- and for the first time, the wood was used in a commercial scale.

Interestingly, knowing that the place will be populated equally by computers as by people, the cables and wires have been built into the walls and floors. The design is flexibly integrated with the furniture, so it is easy for equipment to be relocated or added to. Designed to accommodate 400 people, the TRC too has carefully employed materials to conform to an intelligent building. But even more critical is the smart inclusion of security systems. Fire-fighting and smoke detection sensors have been woven extensively into a wiring network. As soon as the sensors detect smoke or feel the heat from flames, the building begins to make warning and corrective

action centrally. The sensors detect the source and start saving the situation -- through alarms or by turning on the sprinklers - besides alerting the users of the building through video display terminals.

What's more, access to the building is also controlled and limited by a central chip-based system. So that, not just anyone can enter the building or walk into any office. Visitors can only go where they are authorized to do so by the computer system.

Communications: Effective information transfer is another hallmark of an intelligent building, where occupants have access to information from within and without. Scheduled to house 300 to 350 computers, the TRC aims to be an important junction on the First, they use information highway.

Eventually, it hopes to be able to use a satellite link to digital libraries worldwide, hold video conferences with its offices anywhere in the world or even within the same building. Similarly, CMC too has chipped in with innovative office tools which add to the hi tech profile of the building. CMC has developed and installed OfficeMate, an office automation system based on a local area network which uses optical technology to scan, store and retrieve information. As at the TRC, a Communications Managerit Module provides voice and data communication within the building and to national and international databases. A smart EPABX system automatically tracks a person to whichever desk he is occupying, while relaying incoming calls.

The building also incorporates an Integrated Building Management System -designed in-house at CMC -to control, manage and track information on the facilities incorporated within the intelligent building. These include the light and air-conditioning systems, the access and security systems, maintenance operations, fire safety systems, automatic water management and automatic equipment testing systems. Importantly, the computers at CMC House run on uninterrupted power supply that is microprocessor



The CMC building in Bombay: India's first fully intelligent building

controlled. In case of a power cut a back-up generator set kicks in barely four seconds after the power breakdown. "The computer doesn't even know that the power has gone off as the gap is only a nanosecond," says maintenance in-charge at CMC House, F F CDias.

Energy conservation: In the eco-friendly era, intelligent buildings are the bellwethers of energy consciousness and conservation. That means more than just utilising solar energy though -such buildings understand the micro climate of the region and are planned to take full advantage of it. At TRC it means that even at the end of the day, the building continues to work: Pune's usually cool night air is allowed to flow in after dark so that next day's air conditioning costs are reduced.

The Centre has been designed to take full advantage of the sun's movement during the daylight hours. Both passive and active solar

energy is tapped through solar energy panels on the roof top, to meet the building's air-conditioning requirements. What's more, centrally-controlled and computer managed sensors track the need for air-conditioning throughout the day. The air-conditioners do not switch on below a certain temperature threshold, but automatically come on as the day gets warmer. Across seasons too, the building is automatically able to monitor the temperature fluctuations. TRC experts claim to have saved nearly 45 per cent of the electricity costs by the optimum use of resources.

At CMC too, energy conservation was one of the architectural briefs. Says J P Narayanan, general manager, western region, CMC, "The building has two important features -one is the savings on power and the other natural light."

For this the facade had to play a critical role. The most trouble some issue was that the building's structural dimensions were pre defined by the Bombay Metropolitan Region Development Authority: CMC House had to be 22 m wide, 25 m deep and 30 m high. So, the architects created a curtain of mirror

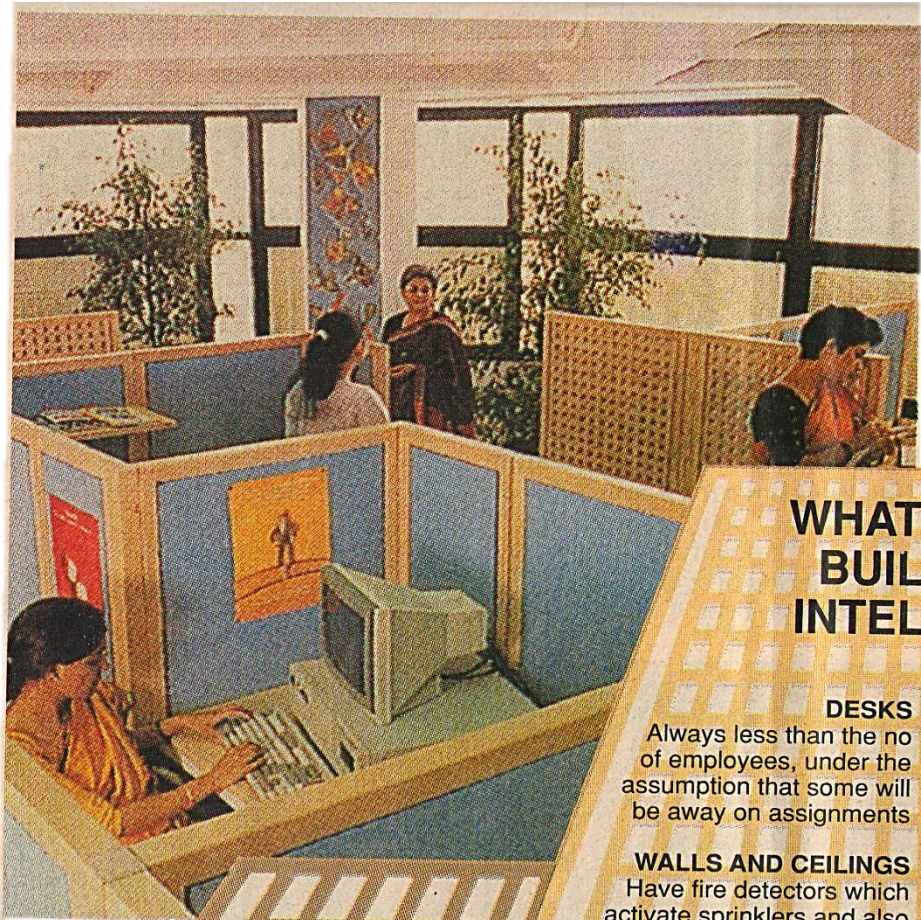
-like reflective glass for the facade, and juxta posed it against the roughness and solidity of flake-finished concrete.

The result was an exterior which was contemporary and distinctive but more importantly, it served an intelligent function. The heat-resistant glass used in the facade helps separate the light from the heat component and the reflectors built into the building change their position in order to optimize the intake of light. As a result, says Narayanan, "The staff works with natural light, unlike other buildings which have artificial lighting."

The central computer system also keeps track of available day light and the position of the sun. It sends signals to 350 tiny motors which control as many Venetian blinds in the windows. The blinds tilt at suitable angles so that the light from the sun is reflected in only such quantities as is required.

Similarly, the air-conditioning in the plant is also computer controlled, which automatically cuts off air-conditioning in unoccupied work areas. The savings from the Control and Facilities Management System: 25 per cent energy, which would otherwise have been wasted in a conventional lighting system due to the higher load factor on the air-conditioners.

Do intelligent buildings need a lot of maintenance? According to the maintenance in-charge at CMC House, F F C Dias, a routine check is necessary for all the various systems in the building. But that's a small price to pay for all the gains. For besides cost savings, the automation, regulated light, continuous power supply and open systems make such offices a preferred place of work. Clearly, intelligent buildings are a wise business decision too.



WHAT MAKES BUILDINGS INTELLIGENT

DESKS

Always less than the no of employees, under the assumption that some will be away on assignments

WALLS AND CEILINGS

Have fire detectors which activate sprinklers and also alert people in other parts of the building

COMPUTRISED ACCESS

Only those people authorised by a central chip based system are allowed access. Not anyone can walk in.

CABLES AND WIRES

Have been built into the walls, so that there is no obstruction to the movement of people or risk of damage to cables and wires

COMPUTER TERMINALS

Users have access to information within the building and also outside, satellite link to digital libraries worldwide, video-conferencing

LAN

Uses optical technology to scan, store and retrieve information and facilitates working without paper

SMART EPABX SYSTEM

Automatically tracks down a person where ever he/she is sitting, in case of incoming calls

UPS

Automatically starts generator in case of power failure. Power to computers stops for less than a fraction of in seconds

SMART AIRCONDITIONING

Centrally controlled microprocessor controls air conditioning needs according to actual demand and cuts down on power cost

OPTIMUM LIGHTING

Tiny motors control Venetian blinds, for optimum natural light utilisation, saving on artificial lighting costs

Indians smarten up for intelligent buildings

Gopal Misra
NEW DELHI

"Do you have an appointment sir?" The disembodied voice comes over the microphone. "Yes," you say. "With Mr X." And then the giant screen lights up: "Please go straight till the next crossing, turn right, and it's the fifth building on the right hand side, numbered B-23." You have entered the Industrial Model Township (IMT) of the future.

And once at the portals of B-23, another computer will direct you to the office of Mr X, whose desk is tilted at a crazy angle because he has a pain in the neck. The computer has adjusted the desk accordingly, just as it has dimmed the lights so as not to hurt his weak eyes. Mr X works in an intelligent building (IB).

With the arrival of the Japanese in a big way, India is on the threshold of this scenario.

In an IMT, an entrepreneur won't have to worry about power connections, finances,

and wasteful expenditure on office space and its accompanying infrastructure it is even possible to evaluate the contribution of each employee on a daily basis.

Indian industry, both in the private and public sectors, are keen to participate in this venture and state governments are vying with each other to set up such townships. Initially, the Japanese have offered IMTs in NOIDA (Uttar Pradesh), Gurgaon (Haryana) and Bangalore. Tamil Nadu, Gujarat, Andhra Pradesh and Maharashtra have shown interest in such townships. Though the West Bengal government has not directly taken up the matter with the Centre the Bengal Chamber of Commerce and Industry is in constant touch with the concerned officials in the ministries of commerce and industry.

Appalled by the poor Indian infrastructure, the then Executive President of Mitsubishi Corporation, Masato Tagai, suggested and explained the IMT concept in March 1989 at the 18th meeting of the India-Japan study committee. Again, he told the India-Japan Business Cooperation Committee in June 1989 that it would be extremely difficult to attract Japanese

Tagai said such townships would become catalytic agents for the country's rapid strides in adopting modern technologies and processes. An Indian computer company, CMC, has already set up an intelligent building, and this capability shows the possibility of a powerful Indian partnership in the proposed IMTs.

After Prime Minister P. V. Narasimha Rao's recent visit to Japan, the proposal for the IMTs is being speeded up. The Greater NOIDA Chairman Yogendra Narain, just back from a two month visit to Japan, is quite excited about the concept.

While admitting that the concept, if implemented, would require a total change in the existing approach and style of administration and laws, Narain was confident that during the final rounds of discussion between the Japanese delegation and the state government scheduled next week, the remaining problems would be resolved.

Apart from the reservations regarding the right of the employers to sack the workers. If their productivity was found in adequate, the slow-moving state administration officials

Kalyan Singh the UP government said that under the existing laws the power supply cannot be handed over to any other organisation. However, the chief minister assured that if it could be the government would not hesitate to amend laws for setting up such townships.

Meanwhile, the beneficiaries of the rampant corruption in the government-run institutions unleashed a whispering campaign against the IMTs. They even convinced some people that Indians would be barred from entering such townships. The issue was raised in Parliament also and the Prime Minister had to observe on the floor of the House. "Even in my wildest imagination I cannot believe that Indians will not be permitted inside the proposed townships."

The first indigenous IB designed in Bombay has cost CMC Rs 10 crore, including the cost of the building and the installation of software. CMC is confident of recovering the investment from the cost of an IMT is estimated to be around Rs 400 to Rs 600 crore. However, Yogendra Narain is of the view that it could be just an estimate without computing the real cost of many features the proposed township is likely to offer.

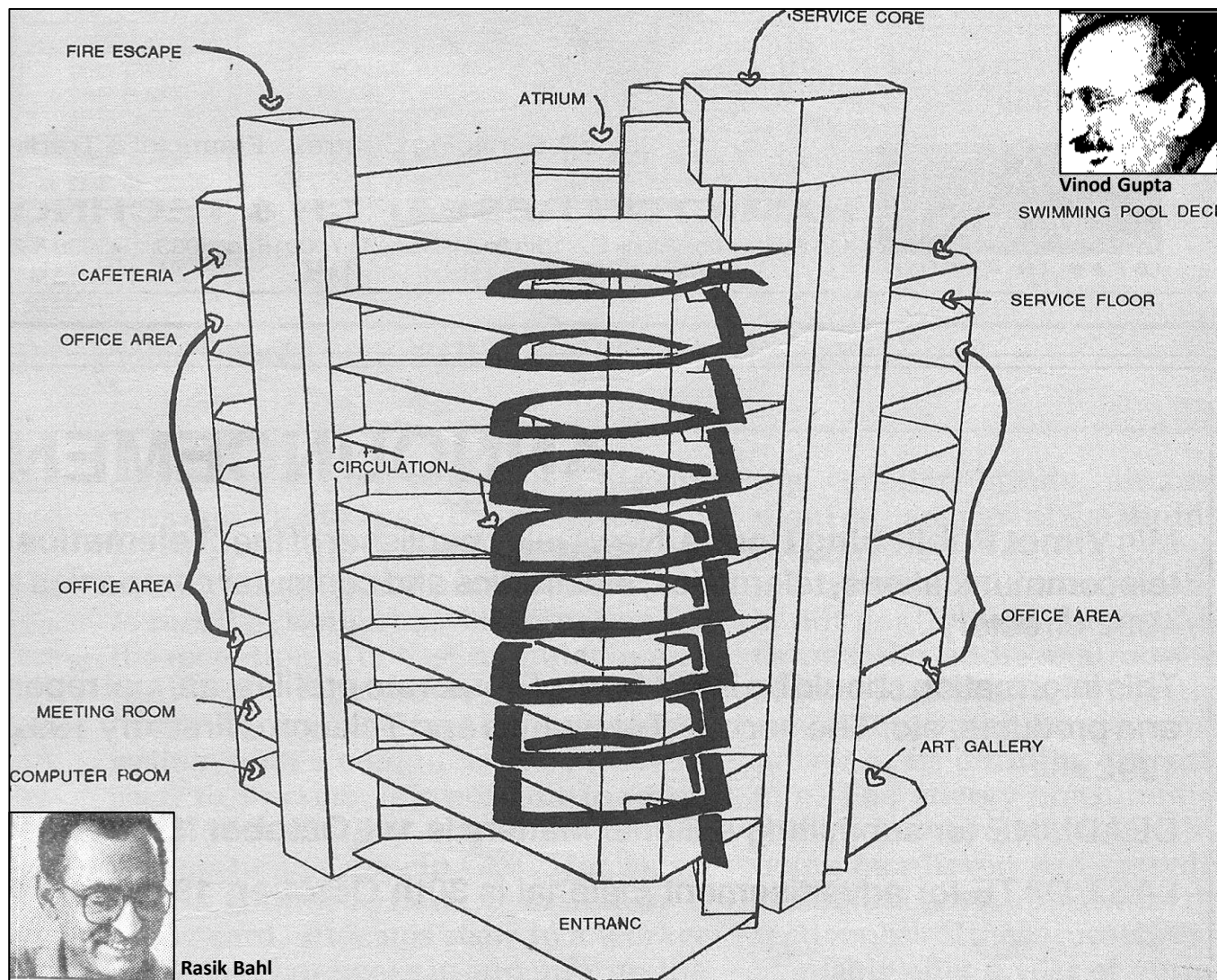
The IB in Bombay set up by the CMC is the first-ever building visualised and designed in the country for the purpose. According to its architects, Vinod Gupta and Rasik Bahl of Space Design Associates, the buildings have automated systems to assist almost every function that goes on inside it. In developed countries these are called intelligent or smart buildings.

Vinod recalled that his first encounter with such a building was in 1981, when he visited Copenhagen. He went to see Kommune da Centrale, a building with an automated system. As the friend accompanying him had only a low-security clearance, he could not go beyond the lobby.

The CMC software is an attempt to create an environment which generates freedom of thought and expression, but the Japanese systems even offer evaluation of workers besides other features, which could expose the cause of delay in carrying out an assignment.

Though Vinod denies that in an IB there would be no privacy, knowledgeable sources reveal that even in CMC it would be possible for the chief executive to know by pushing a small button - what is happening on what floor, who are working and who are wasting away their time. The furniture in the building was made by Swedish architect and designer Carl Christiansson. For the first time rubber wood has been used, and the building design and interiors have been done in such a way that air-conditioning and lighting costs will be reduced by at least 30 per cent.

If trade unions have doubts on the role of hi-tech buildings, they mustn't be blamed. Computer-controlled air-conditioning, lighting, security and communication systems will remove the need for many peons and clerks. A computer-controlled production unit in an IMT would make redundant 30 to 40 per cent of the workforce. And what about the job security of the working classes? The computers would soon be determining their respective potential and would also review an individual worker's output. The theme would be 'survival of the fittest' and the most talented.



licences, marketing and labour trouble. His job will only be to produce goods at par with international standards.

Though the first indigenous IMT has already been set up in Bombay, the Japanese proposal is to establish a network of industries in IMTs with state-of-the-art equipment, which will give an industrial culture to India for the 21st century. The Indian effort in this regard is being appreciated and it is possible that in the IMTs the Indian experience may be integrated with Japanese expertise.

The concept of IMTs and IBs is an attempt to resolve the administrative bottlenecks, red tape and to set up a paperless office. The manufacturing processes are so streamlined and designed that apart from control on inventories

investments, if efforts were not made to provide the investors the same environment that was available to them in their own country.

In July 1990, a written proposal regarding IMTs was submitted to the Planning Commission. The joint industrial model town construction committee (JIMTCC) came into existence to facilitate a feasibility study of setting up such townships in India.

As Tagai had suggested, a four-stage approach for setting up such a project was adopted. Accordingly, the JIMTCC was constituted possible sites examined and a preliminary mission from Japan International Cooperation Agency (JICA) arrived in India to study the investment possibilities in such a township.

are jittery about such townships.

During the last meeting the Japanese delegation had told the state government officials that the existing infrastructure in the state was not only inadequate but primitive too. Japanese industries function in an environment congenial for production. Whether it is finance or supply of adequate power for the industries in the IMTs, the state machinery would have little say. The Indian side was surprised to find that the Japanese delegation was aware of the difficulties being faced by industrialists in getting power, inflated power bills and the difficulties being faced in getting finance from different state organisations, such as PICUP or the UP Finance Corporation.

During their meeting with UP Chief Minister

An Image-building Exercise

INSERT a magnetic ID-card into an electronic reader and step into a hi-tech lobby with an exotic stone pool. You can then start gawking: seven nude fibre glass sculptures suspended from the ceiling stare at you. This is not an M.F. Husain fantasy. You have just walked into the regional headquarters of public sector infotech company CMC Ltd in Bombay.

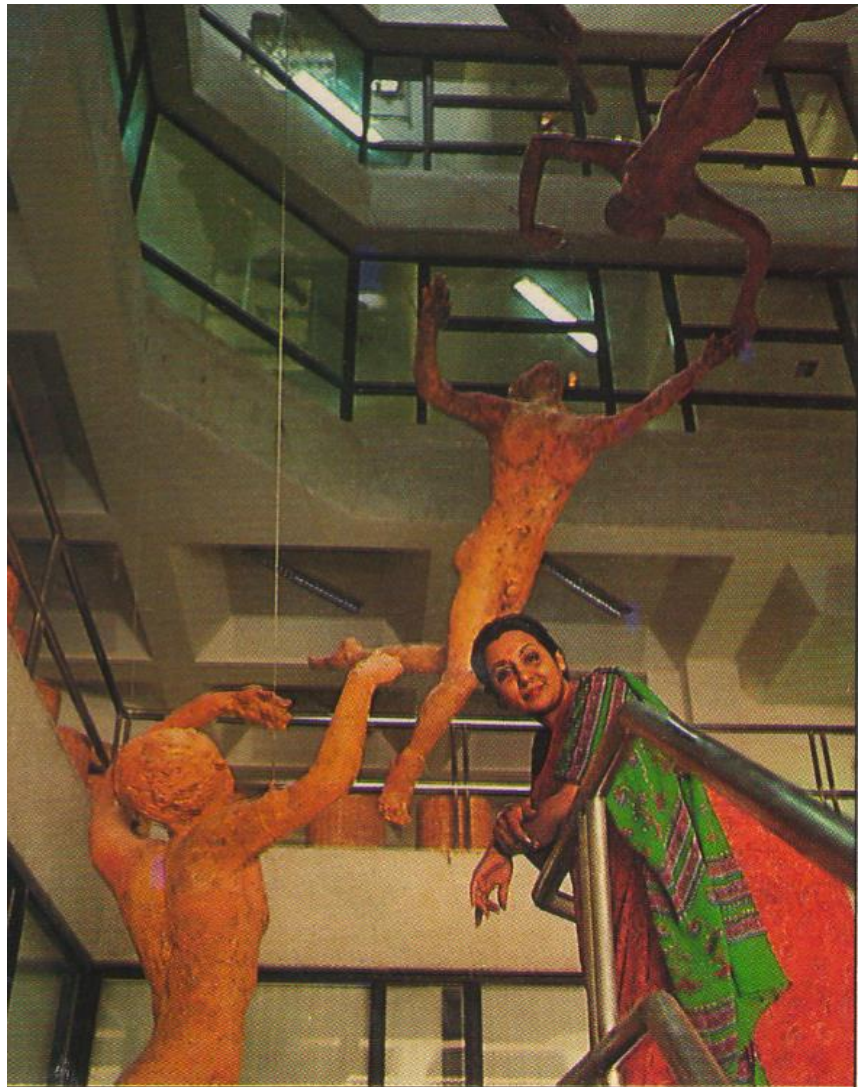
Located in Bandra— a western suburb of Bombay—the new Rs 10.5-crore building, designed by Vinod Gupta and Rasik Behl, is creating waves. Health freaks can do a few laps in the swimming pool on the top floor of the eight-storey building. For gourmets, there is an enticing cafeteria.

But more than any other feature, it is the lobby sculptures that have drawn attention—and more importantly, flak. The seven nude figures—created by Surichi Chand, and christened *Search For The Divine*—have been criticized by office puritans. Defending her work,. Chand says: "Though there was a lot of controversy about the nudity, it was a fantastic experience defying the law of gravity."

But CMC House has more than nudes. It is also supposed to be the first "intelligent building" in India. The intelligence lies in the management systems automation which has been built into the glass, steel and concrete structure. The state-of-the-art building will perhaps pay for

in the corporate world today. Its furniture is made from the wood of rubber trees, which have a productive life of 30 years.

The company's office can make yet another claim to originality. Its interiors, conceived by Swedish architect Carl Christiansson, eschew the use of cabins. The seating arrangement for some of the staff is quite flexible: the 30-odd sales staff will



Sculptor Chand has upset the puritans

itself through energy savings, which are expected to be roughly 25 per cent in the long run.

There are other features as well. In order to promote a "paperless" work culture, important documents—signatures and all—will be scanned, copied and stored in a computer. Apart from saving costs and getting rid of paper, the office building also promises to be environment-friendly—something that is de rigueur in the

get a different place to sit each day.

All this avant garde architecture may not be without meaning. As CMC faces increased competition, employees could well feel overwhelmed by the rat race of corporate life. CMC's new building seems to say: never fear, you can head for the cafeteria or go for a swim. And, if your nerves are on the edge, you could always go to the roof and...

A Full-Computerized Building

By MIND PALNITKAR

BOMBAY — The country's first totally computerized building, belonging to the government-owned Computer Maintenance Corp, is ready.

Designed by Vinod Gupta and Rat& Bahl of Space Design Associates, the building incorporates full office automation and the most advanced communication facilities. It has an integrated management system, which makes it India's first "intelligent building. It is actually named as such.

The entire software, an office automation system, called Officemate, has been designed in-house by CMC engineers. While Officemate substantially reduces the need for paper, using optical technology to scan, store and retrieve information quickly, a communication management module handles all the voice and data communication needs. It also provides access to national and international data bases, according to project manager C. A. Srinivasan.

Savings in Energy

"This has helped CMC develop the concept of the electronic office into a reality," he said in an interview.

The designers said the comm-

issioning of the building on May 1 took India architecture "Into the 21st century."

The building is in the sprawling Bandra-Kurla complex in northwest Bombay. The use of high technology is expected to bring a saving in energy costs of about 25 percent, compared to a conventional building, Srinivasan said.

Features include an unusual mirror-glass curtain wall facade on the exterior, which is part of a high-tech lighting system, making optimum use of natural daylight to illuminate the interior.

Distributes the Light

The computer keeps track of the position of the sun and available daylight. It then sends appropriate signals to 350 motors in as many venetian blinds in the windows. The minor-coated blinds then bit to let in or shut out light as necessary, distributing it not just near the windows but evenly, deep inside the building.

The computer also monitors the artificial lighting in the offices, switching them on or off and dimming them automatically when required. Even the air-conditioning is computer controlled, shutting off by itself

in any work area when it remains unoccupied.

Besides the generous use of high technology, the interior has advanced modular designs created by the Swedish architect Carl Christianson, using pale cool colors with abstract patterns that complement the natural lighting system and enhance the feeling of space.

'Waste Wood' Used

The furniture and fittings are of "waste wood," wing timber from rubber trees discarded after their 34-year productive life span. Widely grown in Kerala, those trees are normally chopped down after their use is over and discarded as waste.

By promoting such use, CMQ seeks to set a trend that it hopes may result in stopping the felling of teak trees. According to Srinivasan, the Swedish architect waived his fees as a gesture of his commitment to that project.

There are also health and recreation facilities for the staff, including a gym and swimming pool. A permanent art gallery displays over 100 works by leading artists here. The building has become a star attraction in the fast-developing Bandra Kurla complex.

India's first 'intelligent' building

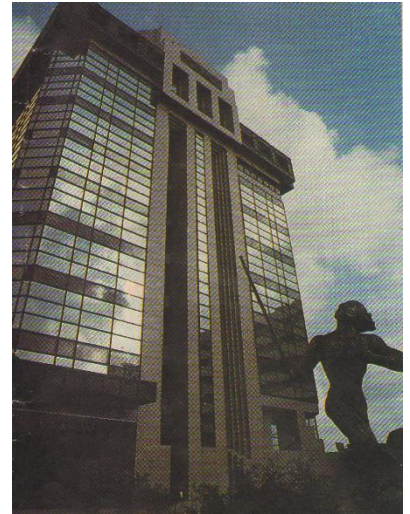
Computer Maintenance Corporation's new office in Bombay is India's first 'intelligent' building which uses a state-of-the-art computer system to automatically maintain optimum levels of lighting and temperature, conserve energy and natural resources, increase comfort and safety and simplify administration.

The computer controls lighting by keeping track of the position of the sun and then sends appropriate signals to 350 tiny motors which, in turn, control the venetian blinds on the windows. The mirror-coated blinds then tilt to let in or shut out light. Only when the central computer decides that available daylight is

insufficient does it switch on the tube lights, and even then not to their maximum capacity but through four steps 0,50,70 and 100 per cent, as required.

By keeping track of temperature levels and the number of people present, the computer decides how many air-conditioning units should operate.

A card-reader at the entrance keeps track of staff attendance and movements. Staff members swipe a bar-coded card on entry and departure. Through the card-reader, the administration staff can track who is within the building and where he is sitting. The high-tech system results in energy savings to the tune of 25 to 30 per cent.



Another unique feature is the use of wood derived from the rubber trees past their productive life for all furniture.

Sculpted loneliness

Suruchi Chand's sculptures adorn the atrium of the newly inaugurated CMC house, Bombay.
Dnyaneshwar Nadkarni speaks to the artist about her latest work

Artist Suruchi Chand's sculptures are an expression of the loneliness that surrounds her life.

"My house was empty; there were no servants and my daughters were away," Suruchi Chand continues. "I badly wanted to touch something, to have around me objects which I could feel with my fingers, like a blind person trying to trace the daylight by sensing things around her."

Suruchi's husband, then in his late 40s, had died in a road accident on the Bombay-Pune Road.

His death left a wound which took a long time to heal. Suruchi soon picked up her brushes and resumed her creative work. She held a few exhibitions, culminating with the highly original Draupadi series in water-colour.

It was not long, however, before she turned to sculpture. She visualised human figures, to fill the void in her life. These figures bore a semblance to those in her paintings. "There is no separation in our tradition between painting and sculpture," points out Suruchi. "Ajanta and Ellora are examples of this close relation. In the heat of the city, I would leave my modelling and go into the house to paint."

The CMC sculpture group was aptly named *Search for the Divine*. "I also thought of the idea of concrete truth versus the truth we are supposed to believe," says Suruchi. "It is this which promotes the tension in sculptures." The figures became naturally and logically elongated.

"While constructing these", she says, "I was aware of the principle of *tribhanga* that characterises the anatomy in classical Indian sculpture. I was faithful to this principle, but I did not copy the classical forms blindly."

"Suruchi started working in the Kanoria Centre for Arts in

Ahmedabad. This centre incidentally encourages painters, sculptors and other likeminded artists to work in its beautiful environs.

The *maquettes* (preliminary models), for the sculptures that Suruchi works on, are made in wax. Then they are cast in

year, and celebrated as "India's first intelligent building" due to its fully computerised functioning, a youthful figure in bronze, sculpted by the Delhi artist, Shubika Lal, called The Spirit of Challenge adorns the entrance. But the most

meet, representing the male and female principles which together generate all life and thought.

The topmost figures also bring to one's mind the muscular images of God and his son, stretching out to touch each other's fingertips in Michaelangelo's awe-inspiring fresco in Rome's Sistine Chapel. The difference is that there is no mystic aura about Suruchi's figures. While they are graceful, they appear to have been conceived in flesh. There is an obvious sensuousness in the nude figures, elevated to a superhuman grandeur by their larger-than-life sizes.

Suruchi came to terms with the architectural form (created by Vinod Gupta and Rasik Bahi) as well as the interior design and furniture (by Carl Christians-son of Sweden). Suruchi kept all the factors in mind when she planned her sculptural exhibits.

"CMC House," observes Suruchi, "is one of the first high-tech buildings of our times." My sculptures lend a human touch, of a beauty which is close to nature." There is certainly a feeling of a human "presence" as one climbs the circular stairway that spirals around the atrium, and look down at the figures.

Could the airy nature of figures be a metaphorical reflection of her determination to rise above the gravity of problems? Suruchi, who is not surprised by her transition to a new domain, says with striking finality, "My relationship with life is very intense, and when the need for expression emerges, it takes hold of me."



Suruchi Chand with her sculpture: Search for the divine

bronze.

This was not Suruchi's first assignment for CMC (formerly known as the Computer Maintenance Corporation). For some years now, she has been organising artist camps in Bombay, Delhi and Calcutta, roping in not only fresh young talent but also eminent artists such as Badri Narayan, Bhupen Khakhar, Rameshwar Broota, Francis Newton Souza, Manjit Bawa and Dharamnarayan Dasgupta. In the architecturally-spectacular CMC House in Bandra, inaugurated on May 1 this

brehtaking sight is undoubtedly that of Suruchi Chand's figures, in upward flight in the atrium.

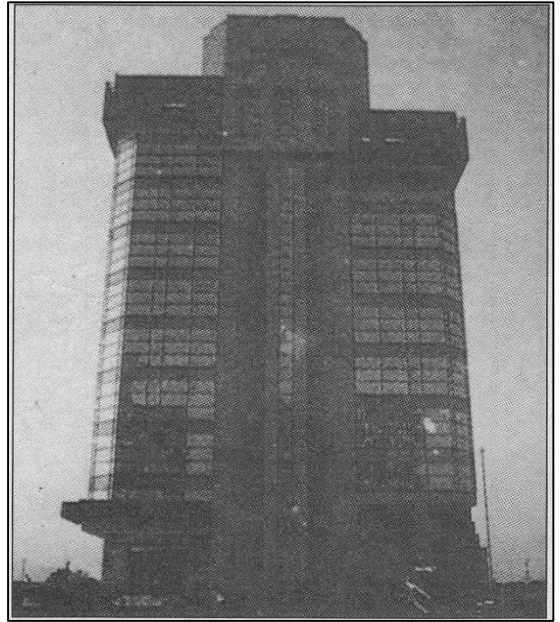
"The idea first struck me when I was working in New Delhi on a HUDCO project," recalls Suruchi. "It would have been both difficult and conventional to paint the 80 feet wall of the atrium. CMC accepted the models but demurred on the idea of floating models."

Suruchi's bold departure from the conventional, appears to be fully vindicated, as the group of sculptures command the immediate attention of the visitor. At the very top, two figure

MUD-HUT CONCEPT TO I.T. BUILDING

SPECIAL CORRESPONDENT

In the last week of May India added another feather to her cap by having the second intelligent building in the world when CMC's multistoryed intelligent building was inaugurated. The concept of an intelligent building quite often is limited to LAN, multimedia and, of course, having ISDN.. In case of this building, architects and planners have worked hard to incorporate the intelligent concept which covers the optimum use of sunlight to energy saving office, environment, office space and a paperless office. A first person account of the planning process to support a write-up prepared by our correspondent may be read at the end of this article.



Computer controlled air-conditioning, lighting, security and communications can actually be installed into just about any building, new or old. For CMC House it was decided to use computerised management and control of the building to achieve a level of efficiency that would not be possible otherwise. Besides managing airconditioning, lighting, security, maintenance of equipment and communications, computers also make the building respond to the outdoor weather conditions to optimize energy use. They allow the full utilisation of the available office space to accommodate more workers than the number of tables provided; each of these ideas saves operational costs without sacrificing the quality of the work environment.

The smart functions provided in CMC House include: daylighting and sun control, artificial lighting control, air conditioning and ventilation control, power and water management, fire and flood crisis management, health monitoring of mechanical equipment, dynamic seat allocation, office data storage & retrieval system and a smart communication system.

Daylighting and sun control

All office buildings have windows, but because of glare, often office workers draw curtains, pull down blinds or cutout daylight in other ways and then switch on artificial lights that provide relatively more comfortable lighting. Such a scenario is wasteful of electrical energy as electricity is used for lighting even when daylight is available and even worse, additional airconditioning is required to remove the heat of electrical lighting. To avoid this, a double glazed continuous window is planned around the building with the upper half used for daylighting and the lower half for view. The upper window incorporates reflective (mirror coated) venetian blinds operated by computer controlled motors which tilt the slats at appropriate angles depending upon the angle of incidence of sunlight on the window. The blinds are programmed to keep direct sunlight out and, when that is not necessary, to reflect daylight onto the ceiling which has white painted flat and angled panels. This provides more light inside the office space and improves daylight

distribution near the windows. The lower half of the window is fitted with reflective glass and ordinary venetian blinds which people can adjust according to their needs. The net effect of these measures is that during daylight hours practically no artificial lighting is needed.

Artificial lighting control

The design of artificial lighting of buildings is usually done for night time conditions i.e. without taking into account the contribution of daylight. In most offices lights are switched on in the relatively darker morning hours, not to be switched off later in the day when more daylight becomes available. The excessive artificial illumination causes avoidable energy expenditure without improving the office environment in any way. In CMC House, a microprocessor controls the switching of lights according to time and according to the daylight available in different areas of the office: The installed artificial lighting load is less than 10 watts per square meter and even this is used only when essential. The saving in power is expected to be of the order of 50% in lighting.

Air conditioning and ventilation

The operation of the entire aircondi-

tioning and ventilation system, chillers, pumps, air handling units, ventilation fans and cooling towers etc, is controlled by a microprocessor. This ensures efficient running of the plant and duty cycling of equipment (like rotation of tyres in a car) to enhance its service life. The equipment is switched on only when required. The controls ensure availability of cooling for the computer room on priority over other cooling requirements. There are savings in capital cost of plant because there is no need to provide separate standby capacity for the computer room and the main plant. The controls allow the mix matched plant to operate at high efficiency. When main's power is not available and the building is to be run on a standby power generator of limited capacity the control system also decides the areas in which airconditioning can be switched off or downgraded. In the event of a fire, the control system shuts off unitary AHU's and starts ventilation fans in the lift lobby.

Fire safety and security

The danger of fire troubles many who have to work in all office buildings and yet fire safety is not taken seriously by builders. The basic rules of the game are : divide the building into small fire safe compartments; reduce the risk of fire by using good quality electrical equipment; reduce firehazard by using non-combustible materials; detect fires early and raise an alarm; reduce danger to people by providing safe exit routes; let people extinguish fires by portable and fixed equipment; allow the fire brigade to do its work unhindered by obstructions.

All these are mandatory and have been provided in CMC building but as a result of automation, there are some additional features which enhance the fire-safety of this building.. In a fire emergency, the main stairs will be pressurised with fresh air and isolated from the rest of the building by automatically closing fire doors. The air-conditioning system will stop

recirculating air and special ventilation fans will bring fresh air to all the floors except those affected by fire. The computer will analyse the nature of emergency and announce over the public address system the action required in different areas (such as evacuation) of the building.

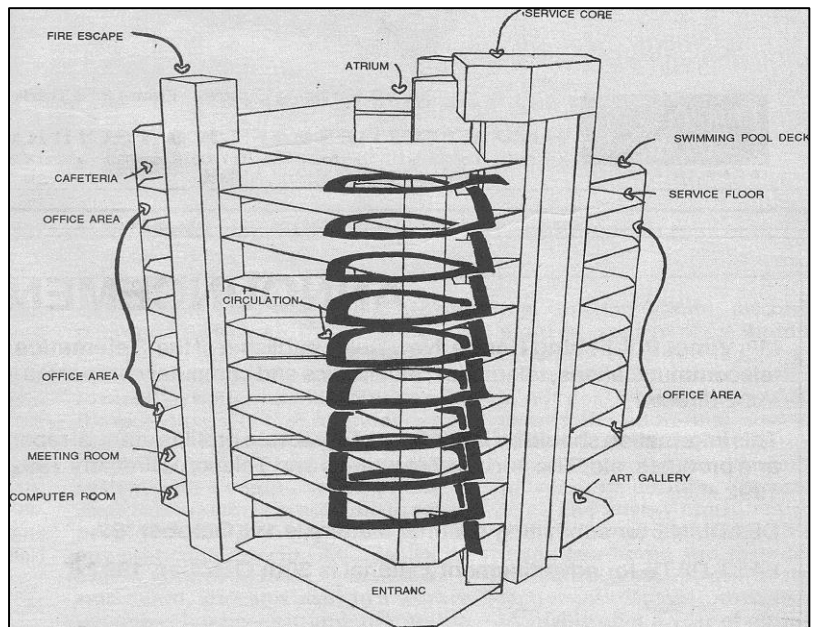
Crisis Management

Although CMC House has a lot of built-in fire safety devices, more than most other comparable buildings, the eventuality of fire cannot be ruled out. The various systems such as fire alarm, fire barrier/door operation, emergency ventilation fans, public address system, etc. have been integrated through the automation system. In case of fire emergency, fire doors will close automatically to isolate the escape

prevent flooding of the basement due to malfunction or break in the water system. These pumps are controlled by the microprocessor which duly cycles the pumps, switches on additional pumps when needed and alerts the security staff in case the pumps cannot handle an emergency such as seepage of water in basement due to flooding outside. To prevent a flash-over the system isolates the high tension panels in the basement.

Emergency conservation

Since the building has not been operational for an appreciable length of time as yet, it is hard to give authentic figures for actual energy savings. However, it is estimated that the savings in lighting and airconditioning would be about 25% as compared to



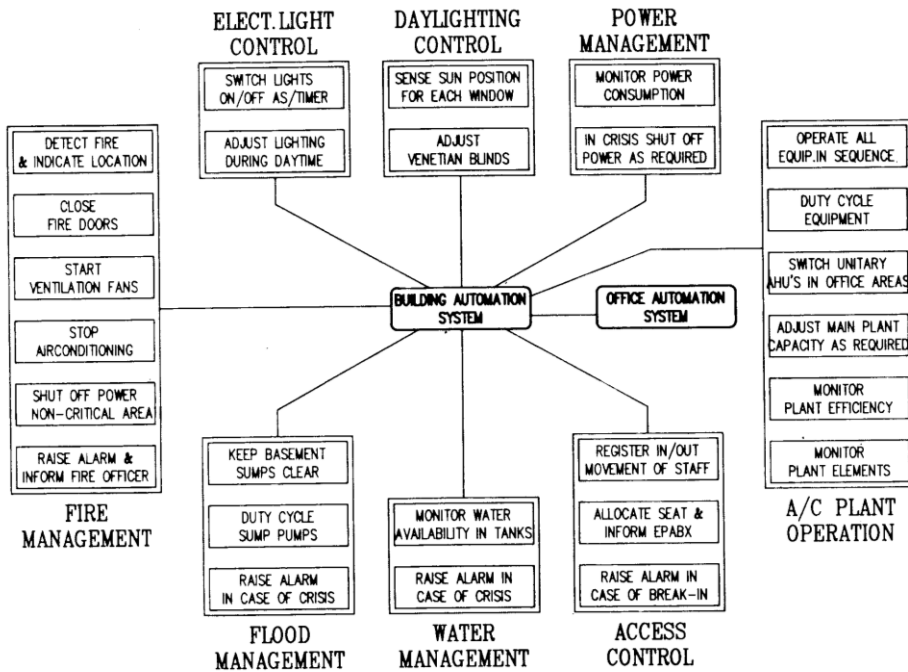
routes from the rest of the building, partial or full evacuation of the building, as required, will be carried out through announcements over the public address system, main's power will be switched off while maintaining emergency power supply to critical equipment, air handling units will shut off, ventilation fans will bring fresh air into the office spaces not effected by the fire and the fire officer will be alerted.

Sump pumps have been provided in CMC House to

other CMC office in Bombay.

Office Automation

The mass of paper documents and files that is common in all offices is being replaced in CMC House by "Office Mate"—CMC's own Office Automation System. All documents are being scanned and digitised. Incoming mail will also be digitised and then directed to the appropriate person, over the computer network. Electronic mail will replace paper memos within the office. The entire workforce will be connected to INDONT—CMC's nationwide



SMART FUNCTIONS IN CMC HOUSE, BOMBAY

communication network, and eventually to other data networks in the world. Workers will be able to send and receive message through various means such as telephone, telex, fax, E-mail etc. from their own workstations.

Dynamic seat allocation

In a typical office situation, at a given point of time, no less than 25% of the workers are absent. They may be on vacation, away for client meetings, or simply away on field jobs. The result is that 25% or more of the work spaces are vacant. In cities like Bombay where office space can cost as much as Rs 75 per square foot, the monthly expenditure on rentals and electricity can exceed Rs 5000 per seat, the vacant tables seem a criminal waste. By allocating tables to workers on a day to day basis, it is possible to improve space utilisation. This is hard to do in a normal office where each worker has his papers and files to keep. In a paperless (or less paper) office, with full computer communication, it is possible but likely to result in a nightmarish situation for the receptionist or the

computer operator who is required to keep track of them. By connecting the telephone system with a computer that allocates seats to workers, it is possible to reach people where they may be seated on any particular day. In CMC House, an access control system, operated by a smart card, allocates seats to a worker whenever he checks in and informs the EPABX of his location for the day. The worker is able to go to his allocated seat, retrieving paper mail on the way, and has full access to his work through "OFFICE MATE". By using the worker's code number in place of the telephone extension number, people can easily contact anyone in the office irrespective of where he might be seated for the day. All normal facilities of the EPABX such as "follow-me" will still be available to workers.

Automation costs

Because the various controls for lighting venetian blinds, airconditioning plant etc. are part of the Building Automation System developed by CMC itself, a

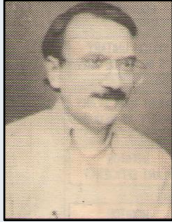
meaningful cost/benefit analysis is not possible. So far as CMC is concerned the additional cost of microprocessor controls was justifiable because it wanted to demonstrate the power of its building automation system. The energy consumption in the different components of the building is being monitored and recorded by the Automation System so that the cost effectiveness of these measures would be available after a year of normal operation.

But savings will not be limited to energy only. The dynamic seat allocation system will save cost of office space and there will be savings in cost of operation and maintenance of mechanical equipment.

Everything depends on how smart are the people using the building. Many believe CMC is for the grab and government is planning to divest its shares. Will the smart building gift its shares when these reach the market? asks one telecom expert of a rival company.

BRAIN BEHIND CMC'S SMART BUILDING

VINOD GUPTA Ph.D., Architect, Space Design Associates, N. Delhi.



My first encounter with an automated building was in Copenhagen, Denmark in 1981. An architect friend was showing me his work at the recently completed Kommune Data Centrale, but because he had only a low security clearance, his magnetic card could take us no further than the entrance lobby. A few months later, at an architects' camp organised by CMC to select the architect for their R&D facility in Hyderabad, I met Dr. P.P. Gupta, Chairman & Managing Director of the company. He wanted the R&D building to be built out of earth and stone, without steel, concrete and glass, in other words a low technology, low-energy building. But he also talked of his vision of a totally different Hi-tech building possibly in Delhi, that would use state of the art technology. I could see that he was talking about something like the Building in Copenhagen. This was 1982 when personal computers were yet to make their mark on the common Indian office and the terms "smart" or "intelligent" building had probably not been coined. The next I heard of this again was sometime in 1986 when I was asked to design CMC's office building in Bombay, which had to be hi-tech, intelligent, efficient and paperless.

At that point of time my personal exposure to computers was limited to the few years of doctoral research work I did at the IIT Delhi. To understand what information technology does to an office, we decided to computerise our own drawing office and installed the first CAD station in 1987. It made

such an amazing difference to our output that we decided to carry out the entire CMC project on the computer and went on to add three more workstations eventually. After this experience we felt we knew what the computer demanded in the office environment, but the concept of the

'smart' buildings in the USA and Denmark revealed that many of these were ordinary buildings with only a few smart gadgets put in. They all had computerised security, airconditioning and sometimes lighting. The one that stood out was Bella Centre, an exhibition and conference facility near Copenhagen. Apart from the other smart features in it, the glass roof of this complex was designed to maintain a comfortable temperature inside by opening and closing according to the outside weather conditions. This is a building that relies heavily on the computer controls. It became clear to me that automation of CMC building could mean more than simply asking the computer to switch airconditioning and lights and it could actually give rise to a different architectural form.

A project for development of a Building Automation System had already been initiated by Dr. Gupta at CMC and the Bombay building turned out to be the first one where it would be applied. True to our expectations, there were plenty of teething problems. Samples of hardware, and technical literature on the BAS of CMC were just not available. The computer engineers were used to working within the four walls of a computer room and had no experience of working in a big building. We architects had to try and understand what RTU's and transceivers are, and explain to the

computer people beams, slabs, columns, shafts, conduits. We thought all they needed for communication was one wire, and they thought they could punch holes and take cables wherever they wanted. It was a long time before the respective areas of work of the consultants, contractors, subcontractors and owner became clear. Over many discussions with Dr P.P. Gupta, CMC's R&D team, and our electrical, mechanical and plumbing engineering consultants the actual scheme for what the automation system should do in this building was developed.

To achieve our goal, we needed motorised venetian blinds, fluorescent lighting that could be dimmed, computer controlled devices that could close fire doors, motorised dampers for the ventilation system, smart smoke detectors and many other such gadgets. These, according to our consultants, could be easily imported, but at the height of the gulf crisis, foreign exchange was hard to find and we had either to reinvent the wheel, or to do without the gadgets. After many false and time consuming starts, we managed to get Indian companies to develop & supply at least our minimum needs. Whenever there were delays & problems in procurement, the entire BAS was at risk because the 'non-believers' would take over. The economics of some of the sub-systems had to be justified time and again. It is a measure of the commitment of the entire team to the idea of building automation that CMC House, the first smart building of India ended up with features which equal other smart buildings in the world and it even has some features as yet unheard of elsewhere.