# "Experience in Managing Technology in ACC"

## (Under Distinguished Technologists Lecture Series of DSIR)

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**by**

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My dear friend Dr. Ramesh Mashelkar, Prof. Natarajan, Prof. Srinivasamurthy, Dr. Vinay Kumar, my esteemed lady colleague whom I respect a lot, Mrs. Jyoti Bhat, distinguished guests, members of the academia, and members from the student community.

It is indeed a great honour and privilege to be invited by the Department of Scientific and Industrial Research under the Distinguished Technologist's Lecture Series. But, there is a little history behind this kind of persuasive process to entrap me that has been going on for over twelve to fourteen months due to the singular persistence of Mrs. Jyoti Bhat, and to a large extent Dr. Vinay Kumar. I agreed to come over because people like me – having reached the winter of our lives and having abhorred or detested the practice of preaching more than doing things that our country needs more – have always had this value system ingrained that if there is anything that individuals can do in our country which needs so much, we should speak less as much as possible and do things in a quiet, self-effacing manner. The results of our labour will be visible. It will speak for itself. We would not have to invite people to hear what this great individual has done.

But, today I have a serious disadvantage, because just preceding me was my illustrious colleague who is FRS on one side and Director General of CSIR on the other side, and he is also a great Maratha gaurav. He speaks with his own brand of dangerous optimism about the future that this country should legitimately secure in the world polity. I cannot perhaps attempt to inspire you to those levels of future. I'll have to bring you to the reality of existence, the reality of managing people, the reality of transforming organizations from a given state of passivity to another state of activity of a rewarding nature to all concerned who are the stakeholders in such organizations. And, that is perhaps the role that the corporate world throughout India and outside is aimed to do – to face the moving times of our vanishing century and the emerging century which Ramesh had quite rightly forecast that will indeed be a knowledge based century, where the science of biology and the newly emerging science of information will to a large extent influence the growth, survival and well-being of humanity throughout the world.

I had a big dilemma of choosing the subject, because I am not young anymore, as you can see for yourselves. In this long span of four decades, I worked in the multinational world, I worked in the publicly owned world and I've also worked recently in the privately owned – a very largely owned organization – ACC. No individual is the owner of ACC and it is truly a publicly owned organization in India. So, rather than talking in generalities and theorizing about things that appear good to people but do not relate to what has been done, I thought that it may be appropriate, in my mind, which may be little dull for you, to share my personal experiences in a process of transformation of a very old, but very modern organization – in my understanding – called the Associated Cement Companies, which as you might know was born in 1936. That was the first merger of its kind in those days when ten individual units belonging to four private owners decided to merge together to face their colonial masters in the business of cement and related business. Sixty three years is a long period of time and it is very easy for an organization like that to get fossilized and get removed from public memory. And also, its right to survive cannot be guaranteed because though we, in general, venerate age, business does not venerate age. Business venerate efficiency, performance, success and, of course, what you are able to do next. So from the very glamorous world, if I may say with some liberty to Ramesh, of the world of organic chemicals, where we have spent most of our lives and he has spent less and I have spent more – I came

over from IPCL under rather difficult circumstances which I am not going to detail – to this very grey world of cement in 1989.

For me, I had no prior experience. I had no idea of what this industry was all about and what one could do in this industry which had been regulated, or may be strangulated to such an extent where the basic core energy of the multiplicity of organizations was taken out. I am referring to about the most oppressive Act which still survives in India, called the Essential Commodities Act. In that remarkably rigorous and non-permissive Act, cement was included because cement was the building block for all of us to have shelter. It also was used for strategic requirements in dams, roads and you name it, where you need cement. For a variety of reasons, this enactment continued to be oppressive until the year 1982, when a fellow technocrat, a hard headed fellow professional Mr. Lovraj Kumar, who was the Chairman of the Bureau of Industrial Costs and Prices in those years of the early 80's, brought out after a lot of effort the demerits of continuing this oppressive Act that was applicable to cement. He said that it should be partially deregulated. So until 1982, this was a suffocating industry which could not grow for reasons that you can imagine. It was not making money, but it was a basic industry.

We were importing at that stage and even after 1982 we were importing this material. So with his remarkable and courageous steps – like Ramesh indicated unless you have courage and risk taking ability you cannot achieve anything in life – in 1982 the industry was deregulated. I will suggest to you that you please record some figures in your mind to relate the remarkable performance of a truly Indian industry, a truly Swadeshi industry. This industry did not depend on the so called fancy–for-foreigners syndrome that is now pervading throughout the country.

In 1982, as I will show you with some slides, the ground level capacity of cement in the country was a little more than 20 million tonnes. Now you see that in 1999, the year we are in now, it has grown to over 100 million tonnes in the organized sector. I am not talking of my fellow colleagues in the small scale sector, who produce today more than 19 million tones of capacity. So from 22 to over 100 million tonnes this capacity was created involving a capital investment, in my estimates, of over Rs. 30,000 crores. So, India is not a poor country in the ordinary way that we talk of. People saw that in a completely privately owned industry Rs. 30,000 crores of capital was invested with part share-holding, largely publicly held and with a lot of support from financial institutions. And this industry, which is over 100 million tonnes/year – is the most modern industry India possesses and this is the world's No. 1 industry in terms of the size and technology status. The cement industry is the only industry of this size which has a maximum number of single million tonne units/year. And India is the only country in the world where all the technologies that are available in the world are being operated successfully by Indians to the highest levels of technical efficiency. So, if the spirit of this audience, if it can be invoked to say that there is a time which is already late, then you can yet again begin to feel proud to be Indians and achieve things in an Indian way. At least the fancy of some of our younger colleagues, who after receiving an expensive, subsidized education, look for opportunities outside the shores of India, may be reduced to some extent.

Now, having set the scale of this industry, which is very large, I would describe the road map of this industry and its technology content. I am relating to the slides that you will see one after another that in this particular microcosm of India called ACC, we happen to have every single facet of the Industry as it has developed from the times seventy to eighty years ago, when the technology of making cement had to be a wet process technology which used limestone of a very high quality, some clay material, some ferrous material, some silicious material and putting them through a rotary kiln at a temperature of 1,200 degrees Centigrade and making a product of hard nature which has got fast setting and high compressive properties. In admixture of aggregates with stones, water and chemicals, you produce large enormous structures which are load bearing in nature and whose life cycles ordinarily are over forty to sixty years. So this is a remarkable material, this product, cement. Not understood well, people take it for granted because its price is less than the price of brinjal. Even today, in 1999, you can buy it for Rs. 2.50 per kilogram. Therefore, it is a taken-for-granted industry, but it has got a deep technological content.

What are the technological contents in this industry? It starts from the mining operations, because we deal with nature which has rich resources of limestone and India is one of the fortunate countries where you have an enormous resource of limestone in eight different states of India. Tamilnadu, unfortunately, does not have much of limestone, but the neighbouring state of Karnataka has huge reserves of limestone. The next neighbour, Kerala, has nothing much except in the Palghat area. Andhra is a very rich state; it has got enormous reserves. I'm talking of the South Indian states to illustrate where these mineral resources are. But, the slide will basically show to you that when the industry started, way back in the early 20's it was essentially a wet-process, and expectedly you had to remove the water out of the rotary kilns. So, the thermal efficiency was grossly unsatisfactory; it had a very large usage of over fourteen hundred kilocalories per kg. of cement, before you could produce a tonne of cement. Now, in India today, we in ACC still have two such wet process kilns – one is a forgotten place is the Jharkhand district of Bihar and in your own state here in Madukkarai, which is about thirty kilometres west of Coimbatore, we have a historic plant of over sixty years. I'll show you how in Madukkarai we brought in the world's only technology – there is no comparable plant of this size and complexity as in Madukkarai. Now from that wet process kiln in the late 50's, we made a move forward to what is known as the semi-dry process, which is nothing but removing a part of the energy by installing vertical rotary filters to reduce moisture content before grinding the cakes prior to clinkerisation.

Then we quickly brought in the process of fluidized bed technology in a classical core sector industry like cement. A significant breakthrough in the technology development was achieved by installing pre-heaters & precalciners. The stages kept on getting increased in order to get the best thermal efficiency which, you will see from the slide, occurs when from the 1350 kcal kg of cement the heat requirement to produce the best quality cement is brought down by near half. This is one of the most remarkable technologies that I know, where it has been possible to bring down the thermal energy content, to produce a very remarkable product made out of minerals, to less than 700 kcal per kg. of cement. Thermodynamically, the best that is possible theoretically is, because the kiln cannot be insulated and still has a lot of heat loss, the pre-heaters and pre-calciners have got some insulation, for the heat to be brought down to 620 kcal kg of cement if it is possible to innovate. What I am referring to is that the next phase of growth in this basic industry, which modern day civilization cannot do without, has to be an innovative fluidized bed technology not dependent on pre-heating and then putting bulky prolured natural through a rotary kiln and then cooling it again.

But, as you could see from the slides, these large process engineering in the Western world would have got a full range of all the Dry process technologies. These have been adapted under Indian conditions which have the most complex mineralogical characteristics of limestone in the various formations we have, starting from Himachal Pradesh where we have a two and a half million tonnes per year plant to the plains in Madukkarai and in Central Madhya Pradesh and Rajasthan. And, having to use Indian coal, which is a rather difficult mineral India produces with average fly-ash content of over 35%, sometimes even 40%. Whereas the calorific value of Australian or South African coal is over 6000 to 6500 kcal/kg, Indian coal has less than 3500 kcal/kg. So we have severe technological deficiencies to face, but most of these plats are running at the highest levels of capacity utilization with uptime-standards of over 315 to 330 days a year. This is tribute to our technicians, professionals and supervisory staff. To a large extent, if you go to any particular plant anywhere in India, whether by ACC or by anybody, it has got the most advanced DCS supervisory control system, and with less than 100 individuals it is possible to run a 2 million tonne per year plant upto the clinkering stage. This is the transformation of technology that has been brought about.

In this milieu of change of such fundamental order, when I came to ACC it was the time when the Government had partly deregulated the industry. It is a great coincidence that the year I joined ACC the Government chose to deregulate it completely. It made it an 'aazad' industry, a free industry, where no more the Government controlled prices, no more the Government decision where the cement should be sold and what kind of destinations it will take by rail or road. Earlier, everything was determined and so the general attitude of most of the companies was production at all costs and at any cost. From that kind of philosophy where the price was guaranteed by the Government on some formula basis (12% return on Net Worth), we had to face severe competition all of a sudden. So I came to ACC when the games of the

market place had rapidly changed. There was fierce competition from competent organizations who could jump the technology life cycle of the 20's to the late 80's. So, they had the most modern, very efficient plants and here we had a basket of wet process plants, semi-dry process plants and 4-stage pre-heaters, 5-stage pre-heaters and 6-stage pre-heaters based dry process plants.

In Madukkarai, in less than eighteen months we installed the largest flotation technology based cement plant. This again is a novel concept of using the heat of the kiln of exhaust gases, to pre-dry cement raw mix, in a vacuum filtration plant, which was the largest in the world. We have the largest vacuum filtration plant which is running very efficiently and we are able to reduce the moisture content from about 35% to 18%. After we filter and remove the moisture, we remove further the moisture by using the latent heat of the hot air from the kilns to a level of less than 2%. So, it becomes a very remarkable technology using vacuum filtration, using the heat of combustion of the limestone inside the chamber, and making it workable and competitive.

So, in a technologists' approach to managing an enterprise which has to face competition, had to be by necessity multi-dimensional in nature. Because, we had no time to have a series based approach in looking at these areas of complex and fast-moving changes. I must say that because of the previous record of the organization which was run professionally and had a high degree of internal technical and business competence, it was my effort to do two or three things which perhaps was not attempted earlier. The first thing I learnt from colleagues and others is that if you want to succeed in business, past tradition must be highly respected. But, we should also create, 'planned discontinuities'. We must not follow the past literally. To retain the best of the past we may disregard certain inefficiencies and create new discontinuities which have a long-term purpose. What are the discontinuities that I attempted to create? My colleagues who are here might perhaps echo partly or wholly that it was a painful process because it was not done for the last 57 years. The discontinuities that we created were based on the fact that the organization was created around areas of competence. We had tremendous knowledge-based departments starting from Geology to Mining to Process Optimization to Plant-level quality upgradation, to Basic research. I created an organization around all the core people who were the best minds in ACC. We created a consultancy division called Research and Consultancy Directorate. The fragmented Departments were spending Rs. 10 to 15 Crores per year which had to be generated from the cement business. Today, it is an over Rs. 100 crore annual income based profit centre which generates profits of at least 10 to 15%, out of the internal knowledge pool of ACC.

Then we also had a remarkable but very old business called 'Refractories'. This was run as a service department of ACC to provide insulating materials. We decided that we will not make those insulating materials ourselves. It was a remarkable high-alumina brick making unit. So, we decided not to make bricks any more because it was not worth it. Others were able to make the bricks more competitively at a lower cost. We should make something which nobody else makes. What are those? This research outfit of ACC had been working silently, but was not recognized by anybody, in a range of castables which are monolithic in nature and these could be applied at exact geometries that you need. This was an upcoming new creative activity which they had taken an early lead. The problem was standing in the way of how to transfer this learning from the bench scale to the market place through a factory-based operation. We had these prejudices that good researchers rarely know what the market wants. Can it be done? Who takes the risks? All these questions came. I said that I was willing to take the risk. My job was not important, but I wanted everything that RCD had done to be transferred to the market place after trial marketing. I gave them a year's time to go and prove their products in competition with the best in the world and if successful to go and do more.

Here again, these are all true experiences. In that process of transfer of new knowledge and creativity to the market place there were some very risky decisions that one also had to take. What were the risky decisions we took together? ACC had pioneered an indigenous way of making white cement using very high quality limestone in a near forgotten village of Madhya Pradesh called Kymoll, in Jabalpur district. It so happened that by the time I entered ACC, I could realize, and so did my colleagues, that in the white cement that we were making, the whiteness of the cement was not good enough because of the increasing

ferric oxide content in the limestone. The white cement is judged by the "whiteness" index which must be at all times more than 95 in the white index meter range. We took two decisions.

One was to discontinue white cement manufacture and the second was to transfer a product called "brown tabular alumina" made by an unconventional rotary kiln technology which our technologists had developed. The brown tabular alumina is one remarkable "aggregate" whose competitor was "brown fused alumina", made in a very energy intensive process. Our technologists in Thane had produced this particular aggregate in a small rotary kiln and we were very satisfied about its crystallographic properties, its gamma alumina content, and if ground it was giving remarkable properties as insulating materials which aggregates need. So, there was this challenge to convert the white cement plant to a brown tabular alumina plant by innovation, by taking risks, by spending Rs. 6 crores. The money was not peanuts in those days when ACC was not even making Rs. 2 crores as profit. I said that unless they were given a chance it could not happen because nobody else in India made it, and nobody outside Europe made brown tabular alumina. In Europe, they produce it in shaft kilns. It was an Indian innovation of making brown tabular alumina in a rotary kiln, first time in the world. So, I suggested that we should do it. There were a lot of concerns like "it may not work", "it will fail", and "the plant is not good enough". But, we were pleasantly surprised, and it is today India's largest plant, running to 100 percent capacity, at 15,000 tonnes per annum.

So, this is yet another example to show how it is possible to transfer Indian creativity, which is cloistered and unknown because the managers of today who are working only for privately-owned organizations or even Government owned organizations are essentially risk averse. Friends, I have nothing to lose by saying that this whole mindset of risk averseness and not doing things which nobody has done before is the biggest single drag that India is suffering from. Unless that is broken, we will remain other peoples' colonies. Although the British have gone away our minds have not changed. Perhaps, to our young friends, we are saying that "here in India, with the kind of foster parentship, pediatrician's role, mother's role, father's role….." all these roles, it is not what the Gangulys of the world have to do. Each one of us can do, provided there is an enabling environment, provided there is support. We must realize that nothing that we do in life can be guaranteed with success. Everyday we take a variety of decisions and about 60 to 70 percent works well and the rest doesn't. Yet, we don't give up life and become a sanyasi. We try tomorrow and the day after; that is how our daily existence is. So, I am making a case that even in the corporate world, the demands of the bottomline, demands of public accountability, demands of satisfying shareholders and promoters, are very great. It is possible to create these 'planned discontinuities' and look for avenues which have not been attempted before.

Now, look at what we did in the essential core business of cement. It is a dramatic side in its content, in the sense that this particular company in 1982-83 had forty seven individual rotary kilns. Now, let's jump to 1998-99, less than fourteen years have passed, we have reduced the number to twenty from forty seven. But see the transformation the average capacity size of the kilns in 1982 was 500 tonnes/day and today it is close to 3500 tonnes/day. This dramatic transformation in a living organization with over 20,000 employees and operating in over twelve different states of India was effected without creating any major upheaval. We have been able to transform all this through a single-minded pursuit of what is good for the organization, and how to adopt the most remarkable technologies within the living soil. We have kept the wet process plants in Chaibase in Bihar. We have kept the semi-dry process plants in Mancherial, Andhra Pradesh, and it in Bhilai in Madhya Pradesh. But, as opportunities presented within a time span of less than seven years, we could achieve all these transformation processes.

In 1988-89, we had less than 7 million tons per year of cement capacity. First, we discarded – over 2 million tons of inefficient cost process units. So we had 5 million tonnes per year cement capacity left. From this 5 million tons per year today, on the ground, we have over 12 million tonnes per year cement capacity. So we grew by over two-and-a-half times in less than seven years in an organization which was running every day. It didn't stop for one day, mark my words, it didn't stop for one day. So the question was, to have a plan of such profound nature and implement it collectively. Set the goals clearly and aim to be ahead of the highest level of individual competitors. What does 'highest level of competitors' mean? It means that we were determined that in order to live in this highly complex crowded business –

today in India there are 65 companies making cement, there are 100 different locations making cement, we ourselves operate in 14 locations. To compete with them we decided on a 5-point agenda, a simple one and not a big thing.

Firstly, our uptime was less than 270 days a year. We said that we must go to 330 days a year in the shortest possible time. We had to look at the entire gamut of engineering practices, maintenance practices and technology practices. Today we have plants that are achieving these world class uptime levels.

Secondly, we looked at the energy content – both in the thermal domain and the electrical domain. If you look at slide no. 9, you can see how – these are real figures subject to audit by anybody – that in this plant at Madukkarai we are saving 30% thermal energy and 10% electrical energy. In the plant at Kymore, a 50% saving in thermal energy has been achieved. Then at Sindri, which was a pioneering cement plant out of the limestone rejects that came out of a fertilizer plant used in those days, we are not making any more cement there. We are using the most advanced grinding technology that anybody uses, separate grinding of slag and separate grinding of cement. That kind of energy transformations we are doing through plant conversion.

Look at the next slide. It again shows that those names stand for the blended cements: OPC stands for Ordinary Portland Cement; PPC stands for Portland Pozulona Cement using generally fly ash; and the next one is slag cement. We were able to reduce the energy content in all these products over this period of time. So to get a graphical illustration if you wish to see how we did this please look at slide no. 14. This is a real organization where the energy intensity was 1400 Kcal for the entire 7 million tonnes/yr. In less than six years, we are now using 800 Kcal/Kg and making enormous savings to the country because we are using less fuel. More importantly, it is good business because we are using less energy and having lower costs. Look at the electrical slide. See the gradient of these power units. We could bring about 30% reduction in the electrical energy with a higher level of capacity and this is contemporary and can be compared with anybody else's in the world. So we have already reached world class energy consumption levels. We have retained the best of wet process plants where the limestone reserves and market place dictate what changes can be done. We have built the best of the most advanced plants and we are in between. Through single minded pursuit of the objectives of competitiveness and efficiency improvement such dramatic changes can be implemented.

The next slide I would like you to see is another area about which ordinary people don't like to speak, in a public forum the area of manpower. Here is a classic study. You may see how in terms of the tonnes per man on rolls, ACC has brought about a 300% improvement in productivity. From 344 tonnes per man on rolls in 1988-89, currently we are making 1000 tonnes per man. It is possible. How? What did we do? We did two or three simple things. We decided that to remain in business we cannot be unduly protective any more. We can't keep on recruiting people to pander to the political pressure or gram panchayat's request. We realized that our "life" was at stake and that we must protect the lives and interests of our existing people. We decided not to fill up vacancies or positions caused by retirements, as and when they took place. We encouraged elderly people above the age of 50 years and who had reached a plateau in their physical or mental abilities to leave and a suitable compensation scheme of a discounted nature was designed where the amount to be paid was equal to their existing earnings till the individuals reached their normal supernuation. We did not cause much distress nor did we make any noise. Can you believe, about 15,000 people of ACC went away without being replaced! And we produced 250% more. This happened without us doing anything outside the law and without creating any animus between us and the society at large. To achieve such goals in a living system it needs again, a clear determination. But, we have allowed ourselves to be prisoners, to be held to ransom by a few. Also the silent majority doesn't speak. It is about time that they realized that they are in a majority, first, and then ask themselves why they should remain silent. They must exercise their voice and it cannot be subjected to oppression. If we could remove a colonial power, why should our own internal people try to oppress us?

Two other small things I would like to share. In the cement fraternity – I believe that the civil engineers and construction engineers have perhaps not been fair to the changing nature of construction materials. Because, we are dealing with finite resources. Once the limestone resources are used up, once the coal resources are used up, they do not get regenerated in the next 50 or 70 years. Unless we have new planets where human beings can be sent on space stations to live in and exploit the resources there, it is not possible to have the resources in this universe after these are exhausted. So what is necessary is to extend the "life cycle" of these remarkable resources.

What we did – it is nothing great because the Japanese had done it long ago, but we decided that we should do more – is shown in slide18. In the last six years, we have been able to increase the content of the blendable materials, the steel plant slag and fly ash in varieties of cement produced by ACC. I would like you to see how many hundreds and thousands of tons of steel slag we have used every year – over eight hundred thousand tons of steel slag. It has gone up over real time, but more dramatically, the fly ash, about which a lot of papers have been written but nothing much has happened excepting the singular contribution made by this section of the industry, that you can blend upto 20% fly ash from combustable material of a given quality, in ordinary portland cement.

The Portland Pozulona cement is one of the most remarkable products being used with great success in the whole land of Kerala. All the producers, whether it is India Cements, Madras Cements, Chettinad Cements or ACC, have marketed it for the last 50 years, but it is not well known. Right here you can see King super grade advertised in the whole city of Madras all along Mount Road. It is ordinary Portland cement. The people of the city of Chennai have been fond of ordinary Portland Cement. But why should we be fond only of ordinary cement? We can begin to look at Portland Pozulona cement. We are in coastal region just as our brothers in Kerala are in. Why do we not use this? Somebody has to take the lead. I am saying that these technological issues are of simple day to day existence. If only we do things that are acceptable from a given standard, of the highest stringency, we should not bring prejudices of the past like 'I don't know', and 'it can't work'. In this very city, a new product called 'Ready Mix Concrete' has been recently introduced. This can be tailored to the exact type of mass construction that we want. We can get tailor-made concrete at our doorsteps. But, the buyers, the householders, are not very comfortable about what exactly they are getting. They prefer to see the branded bags or whatever they are. Again, it is a question of the mindset being aware to unacceptable changes around us.

The last thing that I would like to discuss with you is, again, an area of great importance and interest to all of us. It is the area of environment protection. One of the reasons why many people felt put off by the cement plants was the kind of particulate emissions polluting the countryside. In India, as the slide shows, it is possible to bring in new technology even in the main plants. I go entirely by Dr. Mashelkar's view that we 'buy to make'. Let me explain – we wanted to make electrostatic precipitators (ESPs) in India. I found that in the companies in India making ESPs all the drawings and the internal competence for designing the fluid flow of gaseous matter containing particulates were being replicated by obtaining certain fabrication drawings from foreign countries. But we felt that the key thing to make a breakthrough, is to have internal competence.

What is the internal competence? We decided to put a most advanced facility called gas dynamics laboratory, with technical support from Research Cottvell Companies Inc., USA. We had to determine the relative precipitation of solid material in a gaseous atmosphere at varying levels of temperature. These are very complex equations, but it is possible to design the configuration of chambers and pipelines by simulation. We simulated various conditions of pressure, temperature and solid load. We can now design and supply modern ESPs to international standards. We are perhaps the only company in the country who are having an advanced gas dynamics laboratory for engineering ESPs for thermal plants, steel plants, cement plants etc.

Before I conclude the theme of "planned discontinuities" of a novel nature, I want to share how ACC entered an entirely new business of Advanced Materials. These are fields of purest forms of alumina, zirconia, titanic zixconic and mixtures thereof. Nobody in the world would give the technology. Only two companies in the world had technology of a basic nature, TDK and Murata in Japan, and they would

not give it to us under any circumstances. So, we encouraged our scientists, that through the most advanced 'sol-gel' techniques and through the most advanced routes to develop a family of high purity inorganic oxides. ACC Board accepted the promise that these materials would be a leading business of 'tomorrow' and that ACC would position itself in this unchartered area. I had to give encouragement to our scientists to go for the field. Now, if you visit our Research Centre at Thane, you will see the wind of synergy and spin off effects that have been brought about. Because we encouraged our scientists to go into the business they have now set up pilot plants of the semi-commercial type which are now exporting this entire output to Japan and South Korea who are competitors. That is still not the best thing.

The most important thing that we saw through this explanation of an entirely new area of inorganic oxides of the highest purity that could be used for surface modification and deposition in micron thickness over a range of substances. Dr. Bhat and Dr. Vinay Kumar have recently seen in Calcutta the only facility of this kind in India (Diamond like nano composite corporate development centre). We have four partners – India is the first, the USA is the second, Japan is the third and Belgium is the fourth. The particular know-how of ultra-high vacuum with a liquid composite deposition in one micron thickness is a new business area we have identified and we are going forward. Out of this same inquiry again, we found that the telecommunications world and the information technology world will need some very high quality pure oxides to produce what we call as micro wave ferrites and dielectric materials. This is a business completely different from cement, refractory and so on. Again, we have set up the most advanced facility of this type, fully managed by Indians. We are in dialogue with the French, the Germans and the Americans who are going to use our products for telecommunications, defence, electronics component industries.

Now, for the last interesting development of a very exciting nature, I would like to mention about special magnets of the highest field force. These are being processed out of some pure neudonium, boron and pure iron oxide. We already have purest iron oxide being produced in India. Pure neudenium may be sourced from the Indian Rare Earths (IRE), while boron will require imported sourcing. If we can work together with IRE and extract the neodimium then we can start producing the advanced family of magnets. Currently, it is a patented process by one company, Sumitomo Special Materials, Japan. I have visited Sumitomo's facilities in Japan. They see our emerging strength, but have questioned whether we can compete globally.

The purpose of my talk is to say that most of us, if not all of us, in ACC will be more than happy living with a great deal of satisfaction nurturing and growing the large cement business. But, if we unite these little things which my friend, Dr. Ramesh Mashelkar, says 'I' for Innovation and not Imitation, we can create the kind of stimuli, a kind of energy in our organizations where sections of our employees feel very enthused and are willing to go to the frontiers of their capabilities. We can do anything that we wish when intellectual capital is put to productive use. So, my plea to this audience is that, despite the many negative things that we talk about ourselves, we should have hope and strive for our progress since we have the necessary capabilities and resources. We are our greatest enemies because we do not give any positive message to our people at large, because our media, whether the print media or the audio-visual media, everyday displays the ills of our society, particularly at the political level. Young people ask where is a role model, who is there, and who is different from all that we see in the newspapers and TV. I can say to them there are hundreds and thousands of such people lying there out in the countryside. I can ask them in return, why don't you be one of them? Why do you have to go the United States to make all the money? Why don't you try your fortune here, and there are organizations where if you join the movement you can certainly feel proud to be an Indian, once again.

Thank you very much.