

A global hardware R&D hub?

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Subir Roy

Two companies which have joined the old timers in the league table for high end work are Force Computers (a multinational) and Tejas Networks. The Bangalore development center of Force (owned by Solectron) contributes over half of the design requirements of the company which is number one in its segment of embedded computing and computing platforms, says Ushari TS, managing director for India. As an end-to-end design operation, Force has to work with microprocessor manufacturers and the plus point now is that companies like Intel and Motorola are also there in India doing their own designing. Therefore, an "eco-system" is developing with a range of companies performing various tasks in the entire designing value chain. Force also generates its own IP but it is in "what we put together. Designing a system for a customer is our IP," adds Ushari. Like all high end design operations in India, Force is scaling up, having increased its people strength from 35 to 100.

Tejas Networks, the Indian start-up in which incidentally Intel has a stake, is designing the latest generation optical networking products for telecommunications infrastructure. Tejas' distinctiveness is that it has made a success of its cutting edge proprietary products against global competition by solely leveraging Indian IT skills in designing complex ASICS chips and systems. Its customers include Indian firms like Hughes Telecom, Reliance and Tata Teleservices; and foreign firms like CNC, China's third largest carrier, and Hitron of Taiwan. Its products are currently undergoing lab trials with original equipment manufacturers and service providers in the US.

Tejas has made history by achieving virtual cash breakeven in its third year of operations (2002-2003) at a time of severe global slowdown and fall in prices. "This puts us ahead of many other similar startups in the world in our timeframe," says Sanjay Nayak, CEO. "Tejas proves that Indian companies can move up the value chain in globally competitive products," he adds.

The good news in hardware design has spilled over into manufacture also in small ways. The Indian operations of Tyco, a global leader in electronic components, are looking up in a significant way. Tyco already exports 60 per cent of what it manufactures in India but it wants to do more. Managing director K U Subbaiah says: "Our focus is now to attract more and more manufacturing from the parent so as to raise exports." The path that it follows in taking on a new product is to develop the tooling, then fabricate that tooling, do samples and then go into full fledged manufacturing. "We want to release new products in the market, go in for third party sales and convince our affiliates to focus more on India," Subbaiah adds.

Right now an automotive project is coming in for the manufacture of cable assemblies for safety in automobiles. Some of Tyco's main lines in India are connectors and cable assemblies, including fibre optic ones and big wiring harnesses. It sees a growth opportunity in India in the domains of automobiles and telecommunications and areas like fibre, wireless components and products for networking infrastructure. Tyco also wants to do more engineering services out of India. These consist of three dimensional modelling, drawing conversion and compiling material data sheets. And it is also a satellite centre for the parent's designing setups in Holland and Germany.

So why not keep inching along? What has led urgency to the whole hardware manufacturing issue is that the chance to do something in the area will not be there forever. We are well into 2003 and by the time 2005 is out, according to a global agreement to spread access to information technology, import duties on IT products will have to come down to zero. So if India wishes to give its electronic manufacturers a little time to grow up before facing the full blast of international competition, it has to act here and now.

The irony is that the much maligned Indian policy environment has steadily improved over the years and many of the enablers, without which the hardware sector cannot go forward, are already there. Venkat Kedlaya, vice president of the Manufacturers Association of Information Technology or MAIT is clear that "hardware is at an inflection point. As many multinationals like IBM and HP are already there in hardware, what is needed is to make their life a little easier. China has been able to move ahead fast in hardware by mainly leveraging domestic demand." Indian internal demand for hardware is already growing at a faster rate than global demand and if software growth meets the target, there will be huge demand for hardware to support it (an Ernst & Young study suggests that the hardware market will be worth \$62 billion by 2010, including exports, up from just \$5.3 billion now - see chart).

What may prove very useful in the medium term is the initiative several state governments are taking. Andhra Pradesh and Tamil Nadu are both very keen to attract investment in hardware and Karnataka is on its way to setting up a park for hardware manufacturing units. Vinnie Mehta, executive director, MAIT, is clear that "the last one year has seen an increased hardware focus at both the Centre and states. What is now needed is a bit of tinkering to really incentivise manufacturing."

But even if manufacturing in general keeps growing incrementally, the absence of a commercial class merchant semiconductor manufacturer will make Indian hardware somewhat one legged. Says Harish M, business development manager at Texas Instruments India: "Manufacturing semiconductors requires a huge amount of investment. Somebody or the other has to take the lead. Besides all the requirements of clean water, power and air, there is also a capacity issue. There is a lot of excess capacity round the world in chip making." So the most feasible route is for an existing foundry to be moved to India for whatever reason. "Companies have talked about it. Somebody has to take the decision. Manpower is not an issue in India and its cost will be an advantage. It is the responsibility of the government of India and industries to collectively pitch for an investment of that kind. We will be doing more and more complex designs but manufacturing will be a different kind of experience."

Several observers continue to be pessimistic about India's hardware manufacturing prospects. Asked whether hardware production would be the next big thing out of India, Srini Rajam replied: "May not be. Our strengths in product design and R&D do not directly lead to competencies in hardware production." MAIT's Vinnie Mehta too thinks that India is still far away from becoming a manufacturing base because of poor infrastructure. "That will be the logical evolution, but certainly it won't happen in a hurry," he concludes.

The Indian electronic hardware industry is mark-ed by a strange contrast. The designing of hardware, what is called the electronic design industry, is growing by leaps and bounds and acquiring increasing sophistication. The most complex of chips are being designed in India. On the other hand, the manufacture of hardware hangs in limbo. The real big ticket investment by a multinational for the

manufacture and fabrication of chips fails to arrive but the existing manufacturers in other areas continue to grow organically.

This creates the feeling that hardware manufacturing may keep growing incrementally and eventually get somewhere, even without the dramatic big leap forward that would have made headlines. What gives hope for a meaningful incremental growth is positive developments in policy and bits of good news from the hardware manufacturing players already there.

What also gives hope is that many more multinationals are setting up research and development (R&D) centres in India. To be sure, not all the close to 100 multinational R&D centres are hardware or even software centres. And, as Sunil Mehta, vice president, National Association of Software & Service Companies, points out, a lot of chip design work has been done in India in the last 10 years. Companies like Motorola and Texas Instruments set up base in India many years ago. Mehta says that Texas Instruments developed two-thirds of its intellectual property out of its Indian operations. India also has only 10-12 per cent of the \$80 billion global R&D outsourcing market, versus China's 30 per cent and Taiwan's 22 per cent. But, adds Mehta: "India is on the verge of a second wave of growth. In wave two, more international biggies will come."

What is more, the government is positioning India as a hardware design and R&D hub. The communications and information technology ministry is trying to pick a consultant that will position India as a brand. Eight consultancy firms, including PriceWaterhouse Coopers and KPMG, have bid for the project, according to a ministry source. Says he: "Although multinationals such as Motorola and GE set up base in India several years back, we now want to convert the trickle into a deluge."

Srini Rajam, chairman & CEO of Ittiam Systems, the digital signal processing systems company, and a former managing director of Texas Instruments India, makes an additional point: "It may not be a major trend yet, but we are clearly seeing more hardware design activities in the India design centers of multinational companies."

Early last year, Synopsys CEO Aart De Geuss had predicted: "Given the kind of talent available here, I believe that along with China, India will be a global powerhouse in design technology in the near future." By the time the year was out Texas Instruments CEO Tom Engibous was telling his audience during an India visit: "India will be a major contributor to the development of silicon and embedded software." In his own company, India is no longer co-partnering with development teams elsewhere in the company. In many cases TI India is taking the leadership vis-vis other teams within the company.

India has come to be recognised as such a major center for chip design, an important element of hardware design, that venture capital funds have begun to lay down their own rules. Says William Quigley, managing director of Clearstone Venture Partners: "We don't fund chip designs that don't outsource to India." So it is not surprising that one of the best known Indian names in chip designing, Vinod Dham, who led the Intel team that created the Pentium processor, should set up his own Indian focused venture capital fund NewPath Ventures to aid startups in chip and system design.

The biggest chipmaker of all, Intel, naturally had specific designs on India and CEO Craig Barnet announced during a visit to the country at about the same time: "Over the long term, we intend to grow our capability in the country, recognising the availability of talent, the costs involved and the

potential size of the market." The manner in which Intel's designing operations have grown in India over the last few years gives a measure of how the realisation of the Indian potential and the ramping up have taken place. Till 1999, Intel had a mere 10 people working in India. That figure became 200 in 2000, recalls Jitendra Chaddah, operations manager at Intel India Development Centre. Then a quantum jump took place and the number rose to close to 800 by the end of last year. Today, 1000-plus people are working there and this will go up to 3,000 by 2005. Naturally, Intel India is one of the largest non-manufacturing sites outside the US and one of the fastest growing.

There has, in particular, been a movement up the value chain in India in processor development which produces the crown jewels for Intel. The work in India is mainly in two areas - processor design and communications. In the former work is going on in taking the 32 bit server with the Zeon processor to the next stage. In communications, the big milestone was the release early last year of the first media switch entirely developed in India, from concept to the end except manufacturing. Work in India encompasses desktops, laptops, servers and networking products. What's left out then?

The only major area in which development activity is not taking place in India but is on in China is hand held devices like mobile phones and personal digital assistants. This is natural, considering that China is such a huge market for hand held devices.

Interestingly, the growth in electronic design activity in India comes at a time when the global designing industry is passing through very difficult times. According to industry estimates, about 7,000-8,000 professionals are working in electronic design in India right now and creating value in the range of \$800-1,000 million a year.

The Indian buoyancy, in a universe of stagnation, is explained by what is now a familiar pattern in IT, increasing outsourcing to India to cut costs and speed up development.

But there is more to the story. Cadence, a global leader in electronic design automation (it makes the tools with which designers do their designing), is in a unique position to keep a finger on the pulse of the entire industry. And, says Rohit Biddappa, marcom specialist, Cadence, there is a trend of creating intellectual property (IP) in semi-conductor technology. This means that the industry in the country, which was till two years ago taking pride in acquiring pure play designing capability, has now graduated to the next higher step of acquiring IP. Indian companies mostly design chips for others but along with the sale of this high end service they have now begun to slip in little bits of their own IP which will represent a separate stream of revenue. Not only do we build for you, they say, we also sell you some of these speciality bricks which go well with such high end construction. Chip design firms are also offering another line of expertise: design and process consulting.